

# Graffy Wind Park

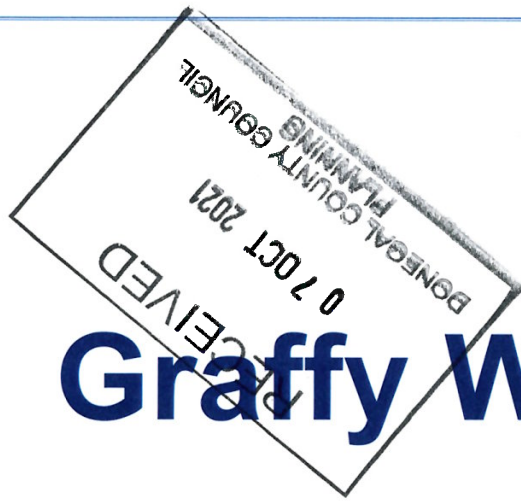
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**Natura Impact Statement (NIS)**







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# Graffy Wind Park



**Natura Impact Statement (NIS)**



# GRAFFY WINDPARK, CO. DONEGAL

## Natura Impact Statement (NIS)

Graffy Windpark  
NIS  
F02  
17/09/2021



### Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
1	NIS	Samuel O'Hara	James McCrory	James McCrory	17/09/21

### Approval for issue

James McCrory



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**Appendix I** draft Construction Environmental Management Plan (CEMP)

**Appendix I:** Collision Risk Model (Woodrow Sustainable Solutions Ltd.)

# 1 INTRODUCTION

This report has been prepared by RPS on behalf of Cuilfeach Teoranta. This report will inform Donegal County Council in undertaking an appropriate assessment of the application for development consent for the proposed Graffy Windpark Project, hereafter referred to as the proposed development, in addition to proposed compensatory forestry planting.

RPS has prepared the report in support of an application for consent to a competent authority. It is intended that the planning authority shall be furnished with this report in association with an application for consent required for proposed development to assist the Authority in fulfilling its duties in accordance with Part XAB of the Planning and Development Act, 2000 as amended which transposes certain aspects of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC. This report contains a Stage 1 screening appraisal for appropriate assessment and a Stage 2 appraisal for appropriate assessment involving an examination of whether, in view of best scientific knowledge and applying the precautionary principle, the proposed development, either individually or in combination with other plans or projects, will result in likely significant effects on the European sites concerned (Stage 1) and as such effects cannot be excluded, whether it may adversely affect the integrity of those European sites (Stage 2). The appraisals have been carried out in accordance with the legal context outlined in **Section 1.2**. This document also considers the potential for transboundary effects, upon sites in Northern Ireland, where relevant.

## 1.1 Legislative Context

### 1.1.1 European Sites

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as “*The Habitats Directive*”, provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of a European Union (EU)-wide network of sites known as Natura 2000 (hereafter referred to as ‘European sites’). In the Republic of Ireland, European sites comprise:

- Special Areas of Conservation (SACs) designated for habitats, plants, and non-bird species, under the Habitats Directive (92/43/EEC);
- Special Protection Areas (SPAs) designated for bird species and their habitats, under the Birds Directive (79/409/EEC as codified by Directive 2009/147/EC); and
- ‘Candidate’ sites including ‘cSACs’. The process of designating cSACs as SACs is ongoing in Ireland. The term SAC is used throughout this report for both SACs and cSACs, given they are subject to equal protection.

### 1.1.2 Appropriate Assessment

#### 1.1.2.1 European Context

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to have a significant effect on or to adversely affect the integrity of European sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (AA):

*“Any plan or project not directly connected with or necessary to the management of the [European] site but likely to have a significant effect thereon, either individually or in combination with other plans or*

*projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."*

Article 6(4) states:

*"If, in spite of a negative assessment of the implications for the [European] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted."*

### 1.1.2.2 National Context

In the context of the proposed development, the requirement (to screen) for AA under the Habitats Directive is transposed by the Planning and Development Acts (2010 to 2018 as amended); 'the Planning Acts', and the Planning and Development Regulations (2010 to 2018, as amended).

Under Section 177U (5) of the Planning and Development Acts 2000-2010, as amended ('the Planning Acts'), the competent authority (in this case, DCC) shall determine that an AA of a proposed development is required if it cannot be excluded [emphasis added], on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site(s).

Under Section 177V (2) the competent authority shall take into account each of the following matters in their AA determination:

- a) The NIS (defined below);
- b) Any supplemental information furnished in relation to an NIS;
- c) If appropriate, any additional information sought by the planning authority and furnished by the applicant in relation to a NIS;
- d) Any additional information furnished to the competent authority at its request in relation to a NIS;
- e) Any information or advice obtained by the competent authority;
- f) If appropriate, any written submissions or observations made to the competent authority in relation to the application for consent for proposed development; and
- g) Any other relevant information.

Under the Planning Acts (177T), an NIS is defined as "a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a proposed development, on its own or in combination with other plans or projects, for one or more than one European site, in view of the conservation objectives of the site or sites". The NIS must "include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for one or more than one European site in view of the conservation objectives of the site or sites".

### 1.1.2.3 UK Departure from the EU

It is recognised that following the United Kingdom's departure from the European Union, SACs and SPAs in the UK are no longer considered "Natura 2000 sites" for the purpose of an assessment pursuant to Article 6(3) of the Habitats Directive. However, pursuant to the UK's Conservation of Habitats and



Species (Amendment) (EU Exit) Regulations 2019, those sites still retain the same protection under UK law as they did prior to the UK's exit from the EU.

In the circumstances, and consistent with Ireland's obligations as a signatory to the Bern Convention on the Conservation of European Wildlife and Natural Habitats, to which the Birds and Habitats Directives give effect, and in order to ensure the highest level of protection for the species and habitats protected by those Directives, the following assessment includes a full assessment of relevant UK sites formerly forming part of the Natura 2000 network of sites protected under those Directives.

This will enable the competent authority to ensure that there will no adverse effect on the integrity of those UK sites and the UK national site network.

#### **1.1.2.4 Role of the Competent Authority**

DCC, in its role as the competent authority, is obliged to examine the likely significant effects individually or in combination, of the proposed development on European sites in light of their specific qualifying interests (QIs; i.e. non-bird species and habitats), Special Conservation Interests (SCIs; i.e. bird species and associated wetland habitats) and Conservation Objectives (COs). Where screening for AA determines that there is likely to be significant effects on any European site, then full AA must be carried out for the proposed development, including the compilation of a NIS to inform the determination. The competent authority, DCC, will carry out the AA and complete a determination.

#### **1.1.2.5 Public Access to Environmental Information**

The European Communities (Access to Information on the Environment) Regulations 2007 to 2014 (AEI Regulations) transpose Directive 2003/4/EC on public access to environmental information, which was adopted to give effect to the 'Access to Information' pillar of the Aarhus Convention (S.I. No. 615/2014).

The AEI Regulations give the public the right to access environmental information. The Regulations also oblige public authorities to be proactive in disseminating environmental information to the public and to make reasonable efforts to maintain environmental information and have it in a form that is accessible and can be reproduced.

#### **1.1.2.6 Screening**

Section 177U of the 2000 Act requires *inter alia* that a screening for appropriate assessment of an application for consent for proposed development shall be carried out by the competent authority to assess, in view of best scientific knowledge, if that proposed development, individually or in combination with another plan or project is likely to have a significant effect on a European site. While the provisions of section 177U adopt the terminology used in Article 6(3) of the Habitats Directive in terms of the test for screening, section 177U expands on this, in light of the interpretation given in decisions of the Court of Justice of the European Union. Thus, section 177U give effect to the requirement to screen an application for development consent for appropriate assessment by assessing whether the proposed development is likely to have a significant effect on a European site by considering whether such a significant effect can or cannot be excluded.

Regulation 42 of the 2011 Regulations requires *inter alia* that screening for appropriate assessment of a project for which an application for consent is received, and which is not directly connected with or necessary to the management of the site as a European Site, shall be carried out by the public authority to assess, in view of best scientific knowledge and in view of the conservation objectives of the site, if that project, individually or in combination with other plans or projects is likely to have a significant effect on the European site.

### 1.1.27 Appropriate Assessment

Section 177V of the 2000 Act requires *inter alia* that an appropriate assessment carried out by the competent authority shall include a determination under Article 6(3) of the Habitats Directive as to whether or not a proposed development would adversely affect the integrity of a European site and an appropriate assessment shall be carried out by the competent authority where it has made a determination under section 177U(4) that an appropriate assessment is required, before consent is given for the proposed development.

Regulation 42 of the 2011 Regulations requires *inter alia* that a public authority shall determine that an appropriate assessment of a project is required where the project is not directly connected with or necessary to the management of the site as a European Site and if it cannot be excluded, on the basis of objective scientific information following screening that the project, individually or in combination with other plans or projects, will have a significant effect on a European site.

## 1.2 Stages of Appropriate Assessment

### *Stage 1: Screening / Test of Significance*

This process identifies whether the proposed development is directly connected to or necessary for the management of a European site(s) and identifies whether the development is likely to have significant impacts upon a European site(s) either alone or in combination with other projects or plans. The output from this stage is a determination for each European site(s) of not significant, significant, potentially significant, or uncertain effects. The latter three determinations will cause that site to be brought forward to Stage 2.

### *Stage 2: Appropriate Assessment*

This stage considers the impact of the proposed development on the integrity of a European site(s), either alone or in combination with other projects or plans, with respect to: (i) the site's conservation objectives; and (ii) the site's structure, function and its overall integrity. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts is undertaken.

The output from this stage is a Natura Impact Statement (NIS). This document must include sufficient information for the competent authority to carry out the appropriate assessment. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must consider alternatives (Stage 3) or proceed to Stage 4.

### *Stage 3: Assessment of Alternatives*

This process examines alternative ways of achieving the objectives of the project that avoid adverse impacts on the integrity of the European site. This assessment may be carried out concurrently with Stage 2 in order to find the most appropriate solution. If no alternatives exist or all alternatives would result in negative impacts to the integrity of the European sites then the process either moves to Stage 4 or the project is abandoned.

### *Stage 4: Assessment where Adverse Impacts Remain*

This stage includes the identification of compensatory measures where, in the context of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed.

The applicability of the procedure, and the extent to which it applies, depend on several factors, and in the sequence of steps, each step is influenced by the previous step. The order in which the steps are followed is therefore essential for the correct application of Article 6(3).

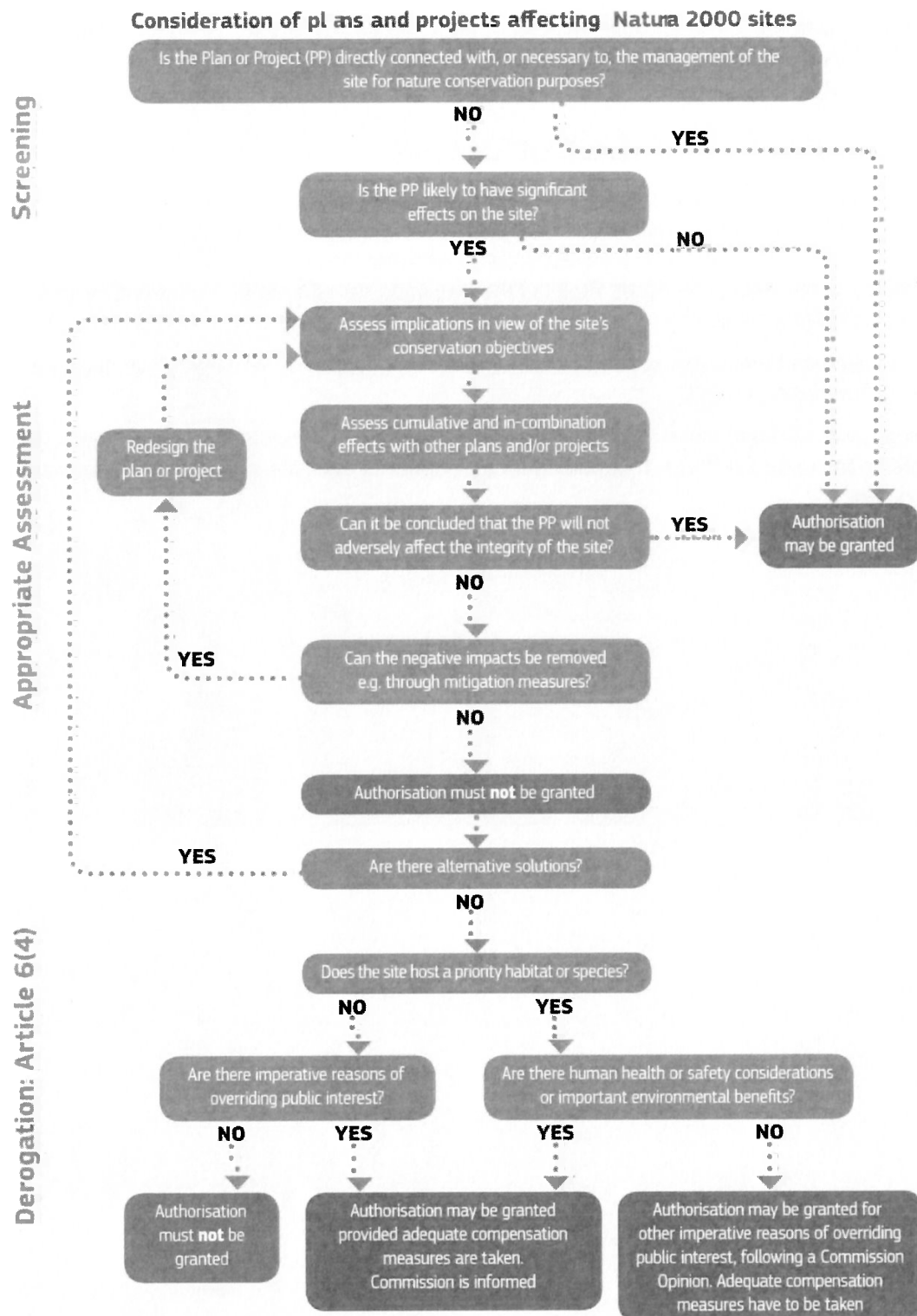
Each step determines whether a further step in the process is required. If, for example, the conclusion at the end of Stage 1 is that significant effects on European sites can be excluded, there is no requirement to proceed further.

### **1.3 Objective of the Document**

The purpose of the screening appraisal for appropriate assessment and NIS is to provide an appraisal for the competent authorities to enable each respective competent authority to carry out a screening for appropriate assessment in the first instance and, thereafter, an appropriate assessment of the implications of the Graffy Windpark Project ('the proposed development') on European sites in view of their conservation objectives.

This exercise has been conducted on behalf of Cuilfeach Teoranta in support of an application for Planning Permission to DCC.

This document seeks to assist DCC as a competent authority under the 2000 Act in fulfilling its obligations to conduct a Stage 1 screening for appropriate assessment, and Stage 2 appropriate assessment.



Source: Commission guidance on Article 6 of the Habitats Directive

**Figure 1.1 Step wise procedure of Article 6 of the Habitats Directive (from EC, 2019)**

## **1.4 Document Structure**

### **1.4.1 Methodology and Guidance**

Section 2 of the document, report sets out the methodology followed, and guidance documents used in conducting a screening appraisal for appropriate assessment and subsequent appraisal for appropriate assessment of the implications of the proposed development on European sites.

### **1.4.2 Proposed Development**

Section 3 of the report describes the proposed development, the general construction sequence and construction activities to be undertaken, and the manner in which the development, if permitted, will be used during the operational phase.

### **1.4.3 Stage 1 Screening Appraisal**

Section 4 of the report contains a preliminary examination and analysis to understand whether or not the proposed development is likely to have a significant effect on any European site. This is the screening appraisal for appropriate assessment. It has been undertaken in view of best scientific knowledge, in light of the Conservation Objectives of the sites concerned and considers the proposed development individually or in combination with other plans and projects. Measures intended to avoid or reduce the harmful effects of the proposed development on European sites, (i.e. "mitigation measures") or best practice measures have not been taken into account in the screening stage appraisal (and should not be taken into account by the competent authorities in conducting their respective screening exercises).

### **1.4.4 Stage 2 Appraisal for Appropriate Assessment**

Section 5 of the report contains a more detailed examination and analysis of the implications of the proposed development on the Conservation Objectives of those European sites where the possibility of Likely Significant Effects (LSEs) could not be excluded at the screening stage in the absence of further evaluation and analysis, including mitigation measures.

## **1.5 Directly connected with or necessary to the management of the site**

The proposed windfarm project follows a former application for the site, the former being granted planning permission in 2011, with the proposals representing a reduction in the distribution and number of turbines proposed.

The proposed development is not directly connected with or necessary to the management of any European Site and as such shall be subject to the requirements of Article 6(3) of the Habitats Directive.



## 2 METHODOLOGY

### 2.1 Appropriate Assessment Guidance

EU and national guidance exist in relation to Member States' fulfilling their requirements under the EU Habitats Directive, with particular reference to Article 6(3) and 6(4) of that Directive. The methodology followed in relation to this AA has had regard to the following guidance:

- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of Environment, Heritage and Local Government (DoEHLG, 2010);
- Communication from the Commission on the Precautionary Principle (EC, 2000);
- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (known as MN2000), Office for Official Publications of the European Communities, Luxembourg (EC, 2018);
- Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities, Brussels (EC, 2001);
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission (EC, 2007);
- Nature and biodiversity cases: Ruling of the European Court of Justice (EC, 2006);
- Interpretation Manual of European Union Habitats. Version EUR 28. European Commission (EC, 2013);
- Article 6 of the Habitats Directive: Rulings of the European Court of Justice (EC, 2014);
- Institute of Air Quality Management 'A guide to the assessment of air quality impacts on designated nature conservation sites (Version 1.1)' (IAQM, 2020); and
- European Commission Notice C(2020) 7730 'Guidance document on wind energy developments and EU nature legislation', Office for Official Publications of the European Communities, Luxembourg (EC, 2020).

There have been significant changes to AA practice since both the EC (2001) and the DoEHLG guidance (2010), arising from practice and rulings in European, UK and Irish courts. The following issues have been addressed in the preparation of this report:

- Cataloguing the entirety of the habitats and species for which each European site is protected<sup>1</sup>;
- Examination of the implications of the proposed development for the species present on a European site, and for which the site has not been listed<sup>1</sup>. This is understood to include habitats and species providing supporting or secondary services to those listed for the European site designation;

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<sup>1</sup> Holohan V An Bord Pleanála (Court of Justice of the EU, case 461/17)

- Examination of the implications for habitat types and species to be found outside the boundaries of the site, provided that in each case those implications are liable to affect the integrity of the site<sup>1</sup>;
- Identification, in light of best scientific knowledge in the field, all aspects of the development which can, by itself or in combination with other plans or project, affect the European site in light of its conservation objectives<sup>2</sup>;
- Inclusion of complete, precise and definitive findings and conclusions, and the removal of gaps following an evaluation of the potential for impacts in the light of the best scientific knowledge in the field<sup>2</sup>;
- Inclusion of a determination that the proposed development will/will not adversely affect the integrity of any European site where on the basis of complete, precise and definitive findings and conclusions made, the competent authority decides that no reasonable scientific doubt remains as to the presence/absence of the identified potential effects<sup>2</sup>;
- Making of findings explicit<sup>3</sup>; and
- Distinguishing between measures to avoid or reduce the impacts of the proposed development on European sites, and measures to compensate for damaging impacts; the latter of which cannot be taken into account<sup>4</sup>.

## 2.2 Ecological Data

### 2.2.1 Desk Study

A desk study was completed to assess the potential for all QIs and SCIs of European sites to occur, given their ecological requirements identified by Balmer *et al.* (2013) for SCIs, and the National Parks and Wildlife Service (NPWS) for QIs (NPWS, 2013a,b,c).

SCI Birds and mobile QI species can travel many kilometres from their core areas, and desktop surveys assessed the potential presence of such species beyond the European sites for which they are QIs/SCIs. Desktop studies had particular regard for the following sources:

- EPA online interactive mapping tool<sup>5</sup>;
- Tabulated lists for all European sites in Ireland of SCIs and QIs, obtained through a data request to the NPWS;
- Information on ranges of mobile QI populations in Volume 1 of NPWS' Status of EU Protected Habitats and Species in Ireland (NPWS, 2013a), and associated digital shapefiles obtained from the NPWS Research Branch;
- Information on ranges of mobile SCIs bird populations from Bird Atlas 2007–11 (Balmer *et al.*, 2013), excluding birds of prey whose ranges were determined with reference to Hardey *et al.* (2013);

<sup>2</sup> Kelly V An Bord Pleanála (2014) IEHC 400 (High Court)

<sup>3</sup> Connelly V An Bord Pleanála (2018) IESC 31 (Supreme Court)

<sup>4</sup> Briels V Minister van Infrastructuur (Court of Justice of the EU, case C521/12)

<sup>5</sup> Available online at <https://gis.epa.ie/EPAMaps/default>. Accessed May 2020.

- Mapping of European site boundaries and Conservation Objectives for relevant sites in County Donegal and beyond, as relevant, available online from the NPWS;
- Distribution records for QI and SCI species of European sites held online by the National Biodiversity Data Centre (NBDC)<sup>6</sup>;
- Details of QIs/SCIs of European sites within the County Longford Biodiversity Action Plan 2010-2015 (WCC, 2010), which had not been updated at the time of writing;
- Data including surface and ground water quality status, and river catchment boundaries available from the online database of the Environmental Protection Agency (EPA); and
- Boundaries for catchments with confirmed or potential freshwater pearl mussel (FWPM) *Margaritifera margaritifera* populations in GIS format available online from the NPWS.

## 2.2.2 Field Study

This report was informed by a Phase 1 Habitat Survey of the site, undertaken by RPS in August 2020 in addition to specialist surveys for birds and bats undertaken by Woodrow Sustainable Solutions Ltd. and assessments of the potential of the scheme to give rise to effects in respect of aquatic ecology and freshwater pearl mussel undertaken by RPS and Paul Johnston Associates Ltd.

## 2.3 Relevant European Sites

The identification of relevant European sites to be included in this report was based on the identification of the Zol of the proposed development, a source-pathway-receptor model of effects, and the likely significance of any identified effects.

### 2.3.1 Zone of Influence

The proximity of the proposed development to European sites, and more importantly QIs/SCIs of those European sites, is of importance when identifying potential likely significant effects. During the initial scoping of this report, a 15 km Zol was applied for impact assessment. A conservative approach has been used, which minimises the risk of overlooking distant or obscure effect pathways, while also avoiding reliance on buffer zones (e.g. 15 km), within which all European sites should be considered. This approach assesses the complete list of all QIs/SCIs of European sites in Ireland (i.e. potential receptors), instead of listing European sites within buffer zones. This follows Irish Departmental guidance on AA:

*"For projects, the distance could be much less than 15 km, and in some cases less than 100m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects"* (DoEHLG, 2010; p.32, para 1).

Following the guidance set out by the NRA (2009), the proposed development has been evaluated based on an identified Zol with regard to the potential impact pathways to ecological feature (e.g. mobile and static). The Zol of the proposed development on mobile species (e.g. birds, mammals, and fish), and static species and habitats (e.g. saltmarshes, woodlands, and flora) is considered differently. Mobile species have 'range' outside of the European site in which they are QI/SCI. The range of mobile QI/SCI species varies considerably, from several metres (e.g. in the case of whorl snails *Vertigo* spp.), to

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<sup>6</sup> Assessing records up to 10 years old (from date of search), for an area of 5 km from the proposed development site. Assessed 26/08/2020.

hundreds of kilometres (in the case of migratory wetland birds). Whilst static species and habitats are generally considered to have Zols within close proximity of the proposed development, they can be significantly affected at considerable distances from an effect source; for example, where an aquatic QI habitat or plant is located many kilometres downstream from a pollution source.

Hydrological linkages between the proposed development and European site (and their QIs/SCIs) can occur over significant distances; however, any effect will be site specific depending on the receiving water environment and nature of the potential impact. As a precautionary measure, a reasonable worst-case Zol for water pollution from the proposed development site is considered to be the surface water catchment. In this report, the surface water catchment is defined at the scale of Catchment Management Unit (CMU), as adopted in the River Basin Management Plan (RBMP) for Ireland 2018-2021 (DoHPLG, 2018).

### 2.3.2 Source-Pathway Receptor Model

The likely effects of the proposed development on any European site from has been assessed using a source-pathway-receptor model, where:

- A 'source' is defined as the individual element of the proposed works that has the potential to impact on a European site, its qualifying features and its conservation objectives;
- A 'pathway' is defined as the means or route by which a source can affect the ecological receptor; and
- A 'receptor' is defined as the Special Conservation Interests (SCI) of SPAs or Qualifying Interests (QI) of SACs for which conservation objectives have been set for the European sites being screened.

A source-pathway-receptor model is a standard tool used in environmental assessment. In order for an effect to be likely, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism results in no likelihood for the effect to occur. The source- pathway-receptor model was used to identify a list of European sites, and their QIs/SCIs, with potentially links to European site. These are termed as 'relevant' European sites/QIs/SCIs throughout this report.

### 2.3.3 Likely Significant Effect

The threshold for a Likely Significant Effect (LSE) is treated in the screening exercise as being above a *de minimis* level<sup>7</sup>. The opinion of the Advocate General in CJEU case C-258/11 outlines:

*"The requirement that the effect in question be 'significant' exists in order to lay down a de minimis threshold. Plans or projects that have no appreciable effect on a European site are thereby excluded. If all plans or projects capable of having any effect whatsoever on the site were to be caught by Article 6(3), activities on or near the site would risk being impossible by reason of legislative overkill."*

In this report, therefore, 'relevant' European sites are those within the potential Zol of activities associated with the construction and operation of the proposed development, where LSE pathways to European sites were identified through the source-pathway-receptor model.

<sup>7</sup>*Sweetman v. An Bord Pleanála* (Court of Justice of the EU, case C-285/11). A *de minimis* effect is a level of risk that is too small to be concerned with when considering ecological requirements of an Annex I habitat or a population of Annex II species present on a European site necessary to ensure their favourable conservation condition. If low level effects on habitats or individuals of species are judged to be in this order of magnitude and that judgment has been made in the absence of reasonable scientific doubt, then those effects are not considered to be likely significant effects

## 23.4 Mitigation Measures

In determining whether or not likely significant effects will occur or can be excluded in the Stage 1 appraisal, measures intended to avoid or reduce the harmful effects of the proposed development on European sites, (i.e. “mitigation measures”) or best practice measures have not been taken into account in this screening stage appraisal. This approach is consistent with EU guidance and the case law of the Court of Justice of the European Union (CJEU):

EC (2001) states that “project and plan proponents are often encouraged to design mitigation measures into their proposals at the outset. However, it is important to recognise that the screening assessment should be carried out in the absence of any consideration of mitigation measures that form part of a project or plan and are designed to avoid or reduce the impact of a project or plan on a Natura 2000 site”. This direction in the European Commission’s guidance document is unambiguous in that it does not permit the inclusion of mitigation at screening stage.

In April 2018, the Court of Justice of the European Union issued a ruling in case C-323/17 *People Over Wind & Peter Sweetman v Coillte Teoranta* (“People Over Wind”) that Article 6(3) of Directive 92/43/EEC must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site.

The judgment in *People Over Wind* is further reinforced in EC (2019) which refers to CJEU Case C-323/17.

## 2.3.5 Consideration of ex-situ effects

EC (2019) advises that Member States, both in their legislation and in their practice, allow for the Article 6(3) safeguards to be applied to any development pressures, including those which are external to European sites but which are likely to have significant effects on any of them.

The CJEU developed this point when it issued a ruling in case C-461/17 (“*Brian Holohan and Others v An Bord Pleanála*”) that determined inter alia that Article 6(3) of Directive 92/43/EEC must be interpreted as meaning that an appropriate assessment must on the one hand, catalogue the entirety of habitat types and species for which a site is protected, and, on the other, identify and examine both the implications of the proposed project for the species present on that site, and for which that site has not been listed, and the implications for habitat types and species to be found outside the boundaries of that site, provided that those implications are liable to affect the conservation objectives of the site.

In that regard, consideration has been given in this Habitats Directive appraisal to implications for habitats and species located both inside and outside of the European sites considered in the screening appraisal with reference to those sites’ Conservation Objectives where effects upon those habitats and/or species are liable to affect the conservation objectives of the sites concerned.

## 2.3.6 Conservation Objectives

The conservation objectives for each European site are to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the site has been selected.

The favourable conservation status of a habitat is achieved when:



- its natural range, and area it covers within that range, are stable or increasing;
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and
- the conservation status of its typical species is favourable.

The favourable conservation status (or condition, at a site level) of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

#### **2.3.6.1 Site-Specific Conservation Objectives**

NPWS began preparing detailed Site-Specific Conservation Objectives (SSCOs) for European sites in 2011. Of the European sites in closest proximity to the proposed development which are considered in some detail in this report, all but six (SPAs) had SSCO set.

The published SSCO documents note that an appropriate assessment based on the most up to date conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out.

The most up-to-date Conservation Objectives for the European sites being considered, and details in relation to the Qualifying Interests and Special Conservation Interests of these European sites is based on publicly available data on these European Sites, sourced from the [NPWS website](#) in May 2021 have been used in this assessment, with references provided.

#### **2.3.7 In-combination Effects**

Article 6(3) of the Habitats Directive requires that in-combination effects with other plans or projects are also considered. As set out in EC (2018), significance will vary depending on factors such as magnitude of impact, type, extent, duration, intensity, timing, probability, cumulative effects and the vulnerability of the habitats and species concerned.

EC (2020) notes that cumulative environmental effects can be defined as effects on the environment caused by the combined action of past, current and future activities. Although the effects of one development may not be significant, the combined effects of several developments together can be significant. Cumulative effects are relevant to wind energy deployment, given the continuously growing number of applications for wind energy production and the expected increase in capacity over the coming years.

EC (2020) also notes that the 'in combination' provision applies to plans or projects that are completed, approved but uncompleted, or proposed. In addition to the effects of the plans or projects that are the main subject of the assessment, it may be appropriate to consider the effects of already completed plans and projects. Although already completed plans and projects are themselves excluded from the

assessment requirements of Article 6(3), it is still important to take them into consideration when assessing the effects of the current plan or project in order to determine whether there are any potential cumulative effects arising from the current project in combination with other completed plans and projects. The effects of completed plans and projects would typically form part of the site's baseline conditions at this stage. Plans and projects that have been approved in the past but have not yet been implemented or completed should be included in the in-combination provision. As regards other proposed plans or projects, on grounds of legal certainty it would seem appropriate to restrict the 'in combination' provision to plans that have been proposed, i.e. for which an application for approval or consent has been submitted.

This mirrors the advice contained in EC (2018) which advises that other plans or projects which are completed, approved but uncompleted, or proposed have been considered. EC (2018) specifically advises that "as regards other proposed plans or projects (i.e. other projects not proposed by the Applicant), on grounds of legal certainty it would seem appropriate to restrict the in-combination provision to those which have been actually proposed, i.e. for which an application for approval or consent has been introduced".

## 3 PROPOSED DEVELOPMENT

This Section sets out a description of the proposed development and contains information on the project site, design, size and other relevant features in order to establish the characteristics of the project for the purposes of environmental assessment.

### 3.1 Location of the Proposed Development

#### 3.1.1 Site Location

The proposed site is located on the southern side of Aghla Mountain to the east of Glenties within mid-west Donegal. The site lies to the north and south of the local road L-6743-2 and within the upper catchment of the Stracashel River. The site location is shown on Figure 3.1 Site Location.

The proposed compensatory forestry planting is located in Sonvolaun, Co. Mayo (ITM 550643, 793252). The location of this site is shown on **Figure 3.2 Compensatory Forestry Planting Location**.

#### 3.1.2 Development Area

The area of the proposed development for which permission is sought, and in respect of which this AA screening and NIS has been prepared, is defined by the 'red line' application boundary as illustrated on the application drawings and at Figure 3.1.

##### 3.1.2.1 Windfarm Site

The proposed development involves the construction of eight individual turbines which will be distributed in a roughly linear array which runs south-west to north-east to the north of the adjacent L-6743-2 local road, with a sub-station for the scheme proposed to the south of the local road.

Each wind turbine sub-site comprises an area of around 0.33-0.43 ha with further areas of hardstanding, including a total of 4,810m of access roads, required to facilitate access to the turbine locations. Electrical connections to each of the proposed turbine locations will be via underground cables to the proposed substation.

The substation and control building site comprises an area of around 0.3ha with access again required from the adjacent minor road.

##### 3.1.2.2 Grid Connection

The proposed grid connection route will proceed from the proposed substation site and will link to the Tievebrack Eirgrid Station at Drumnalough. This route will be approximately 7.5km in length and will comprise an underground cable connection primarily following the minor road, before proceeding along a private road servicing the Eirgrid Station.

##### 3.1.2.3 Proposed New Access Road

The proposed new access road will proceed from the junction of the local roads L-2023-1 and L-6733-1 located approximately 5.5km to the north-east of the proposed wind park, to the proposed wind park itself, and will proceed through an area currently occupied by Coillte forestry in addition to along existing Coillte access roads, until it meets the L-6743-2 local road.

### 3.1.2.4 Proposed Compensatory Forestry Planting

The area proposed for compensatory forestry planting comprises an area of 8.9ha, which includes for an area of 6.82ha which has an existing approval for an afforestation license.

## 3.2 Proposed Development Works

### 3.2.1 Windfarm Site

The proposed development site has been subject to a previous consent for a wind farm development, this consent being granted in February 2011 for the development of a wind farm comprising 13 turbines (An Bord Pleanála Ref. No: PL 05B.237656).

This application, for the same site as the previous application is for a decreased number of turbines within a more confined layout, with an alternative substation location proposed. A total of eight turbines are now proposed, which will be in place for 25 years from the date of commissioning.

The turbines will comprise a three-bladed design with a tubular tower and horizontal axis. Dimensions of the proposed turbines are illustrated at the below Figure 3.3. For the purposes of assessment two turbine models are considered, due to the need for flexibility in the delivered turbines, which will comprise one or other of these two designs the dimensions of which are shown at Figure 3.3.

The turbines will typically turn at between 6 and 18 revolutions per minute (rpm) depending on wind speed. Start-up is generally achieved at a wind speed of around 3m/sec (measured at the hub), with optimum power generation at approximately 12 to 14m/sec. Turbine models generally shut down at wind speeds greater than 25m/sec.

The towers of the turbines are conical steel columns 83m or 86m height and are delivered to site in 4/5 sections. The base of the towers is typically around 4.8m in diameter, tapering to approximately 2.2m, where it is attached to the nacelle. The turbines are accessed at the first floor, approximately 3m above ground level via an external staircase.

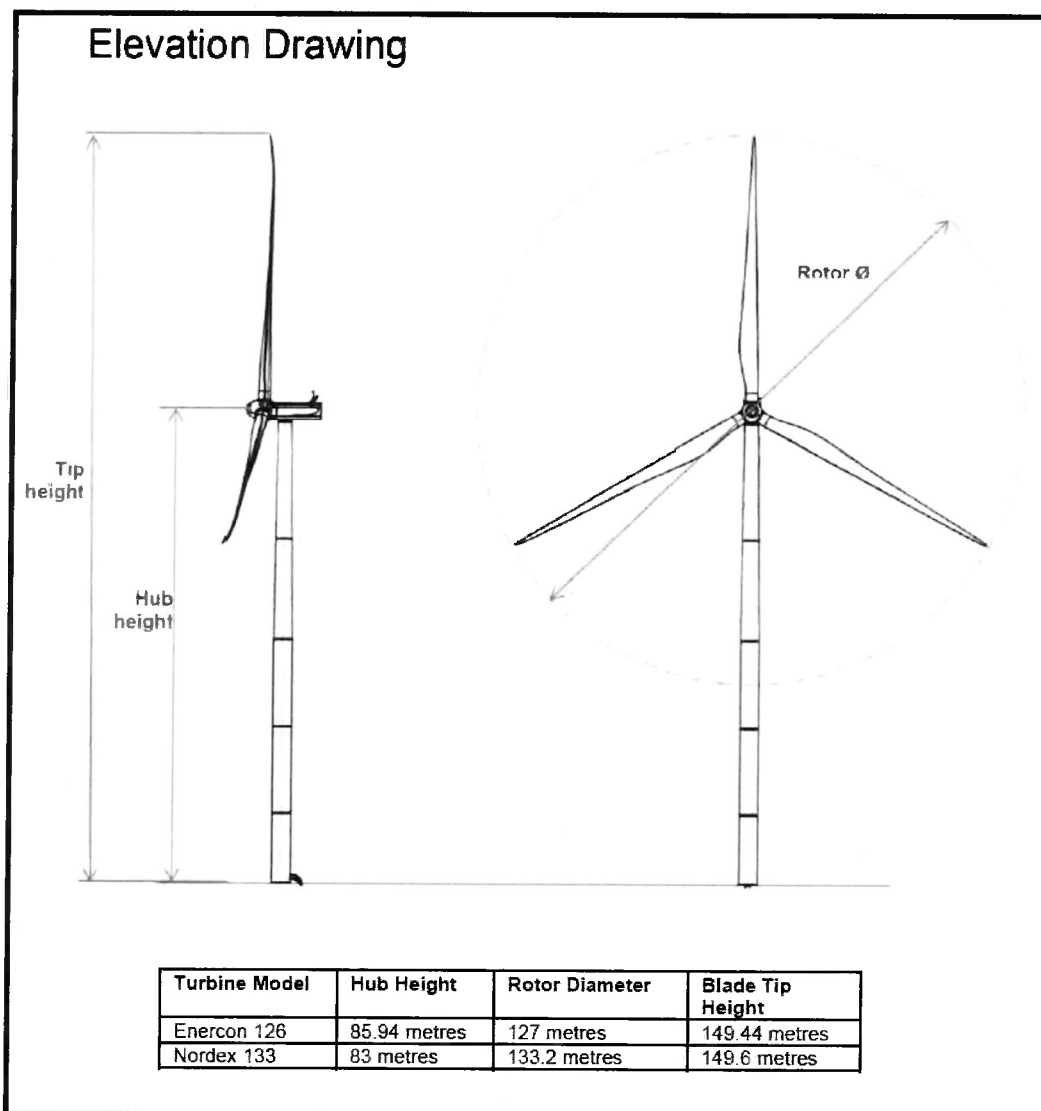
The first floor houses the control unit. A hatch-door provides access to the basement, where the turbine transformer is located. From the first floor, an internal ladder leads up to the nacelle. Elevators are also available for most modern turbines, being compulsory for turbines with taller tower heights.

The turbines use a direct drive system. The benefits of the direct drive include less maintenance and lower mechanical noise emission.

The turbine foundations will be cast-in-place with reinforced concrete. They will be 16m to 20m in diameter. The size of the foundation will depend on the ground conditions, wind classification for the site and the presence of groundwater. Foundation heights are approximately 2.7m high. The sequence for installation of the foundation includes the following steps:

- Excavation of peat and overburden to a depth that allows the top of the foundation to be finished near existing ground level;
- Placement of a reinforced piling platform;
- After piling, a concrete blinding layer is placed;

- The tower foundation section is then placed on the concrete blinding layer, around which the steel reinforcement is fixed;
- The formwork is then erected around the steel reinforcing and the concrete pumped into the foundation;
- The formwork is then removed and once the concrete strength is confirmed, the foundation is covered with suitable backfill material.



**Figure 3.3 Wind Turbine Design**

The turbines will be delivered to the site from Killybegs via the N56 to Donegal Town and then along the N15 before turning at the Roadhouse Bar at Cappry to join the R252 to Ballinamore. From Ballinamore the haul route will use local county roads to reach the project site from the east. Construction vehicles will

also use this route, which is considered to be the optimum route in terms of interference with the local community.

There will be approximately 4810 metres of access road needed to service the proposed turbines. This will generally be of conventional road construction and if considered necessary floating roads, although deep peat areas have been avoided in the wind farm layout design.

Conventional roads construction will involve clearing of peat / topsoil / soft soils to the top of firm clay or dense gravel and placement of road construction material, geogrid if deemed necessary, capping layer, sub-base and running course. Floating roads will be constructed by placing geogrid reinforcement directly onto the bog surface, followed by road construction material similar to the conventional road. Staged loading will be used to allow the peat to consolidate and gain strength during floating road construction.

Level hardstanding areas between 3,300m<sup>2</sup> and 4,300m<sup>2</sup> will be created adjacent to each turbine location. This area will accommodate cranes during the assembly of the turbine. It will be required to meet minimum bearing capacity requirements for the cranes during lifting of turbine components. To ensure stability of the crane during lifting, the platform will be constructed by first removing the peat / soft soils and building back up to original ground level with imported stone. The area adjacent to the crane area (assembly area) will be used for storing the turbine components prior to assembly and lifting. Access roads and hardstanding will be finished with aggregates from local quarries.

The crane hardstands at each turbine will also be required during the operational phase of the wind farm. From time to time, cranes may be needed to replace or repair larger components, such as blades, transformers etc. It is therefore necessary to maintain the crane hardstands for the duration of the operational phase.

### 3.2.2 Sub-station and Control Room

Underground 33kV cables will link the turbines to one another and from the last turbine to the substation and control building. The building will consist of an Eirgrid room, customer metering room and stores. The construction of the control room will be to Eirgrid specifications.

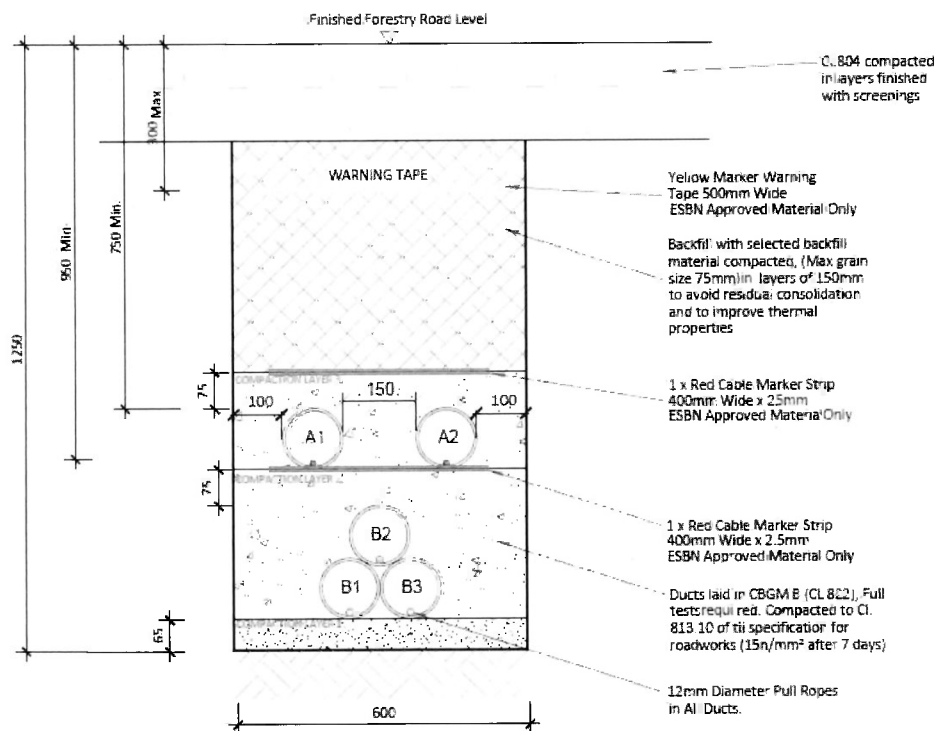
### 3.23 Grid Connection

The proposed grid connection line (GCL) will extend for circa 7.5km from the proposed substation/control room at Meenagrubby, westwards to the Tievebrack Eirgrid Station at Drumnalough. This route will primarily follow the L-6743-2 and L-2593-2 local road before proceeding along a private road servicing the Eirgrid Station and adjacent areas of commercial forestry.

The grid connection is likely to be constructed at the same time as the wind park itself and works will be carried out simultaneously at different sections of the grid connection route. The underground sections will use ducting (150mm diameter PVC ducts). Typical trench sections are shown on Figures 3.4 and 3.5 below.



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rpsgroup.com



A = 125mm: Outer Diameter HDPE ESB Approved Duct, SDR=17.6 [ESB Code: 9317552]  
 B = 125mm: Outer Diameter HDPE ESB Approved Duct, SDR=17.6 [ESB Code: 9317552]

### Typical 110kV Ducting in Forestry Road

**Figure 3.5 Typical Cable Trench Details on private forestry road**

The detailed construction methodology for the proposed grid connection is set out in the Construction Methodology document, produced by TLI which accompanies the planning application; this methodology is summarised, with emphasis on works with potential to affect watercourses, below.

The GCL has been split into several sections, these being Section 1: between the Tievebrack Eirgrid Station to the L-2593-2 local road; Section 2: which includes for the entirety of the route within existing local roads L-2593-2 and L-6743-2 up to the entrance to the proposed new sub-station; and Section 3: which comprises the short section between the local road and the sub-station itself.

The vast majority of the GCL will involve the installation of the ducting within the bed of the existing road or access tracks. Installation of the grid connection in these areas will be via a typical 600mm trenching and duct installation method.

#### 3.2.3.1 Culvert Crossings

In total the route will require 50 culvert crossings (13no. in Section 1 and 37no. in Section 2) and 3 crossings using horizontal directional drilling (HDD) (1no. in Section 1 and 2no. in Section 2). The route will also require the installation of a total of 11 joint bays.



Culvert crossings, which include all instances where the proposed GCL will pass over an existing culvert location, will require a varied approach dependent upon the nature of the existing culverts and the depth of the roadbed above these structures. Where possible, such as when sufficient depth is supported between the roadbed and the top of the culvert, these features will be left in place with the GCL installed above. Where this is not possible, and undercrossing will be required, in many cases this will necessitate the removal and replacement of the culverts.

As set out at Appendix A of the Construction methodology document, of the 50 culvert crossings, seven will comprise overcrossings, where sufficient depth is supported within the roadbed, with four of these to be confirmed during pre-construction site investigation works; 16 will comprise undercrossings, with the existing culverts retained and 23 will comprise undercrossings where the existing culverts may or may not be replaced subject to the nature of the culverts following excavation. A further two crossings will be either overcrossings or undercrossings subject to investigations and a further two are unknown with the method to be established following investigations.

Overcrossings will be installed in line with the trenching methodology for within the roadbed. Undercrossings will utilise either a dam and flume or dam and diversion approach.

The following methodology will be utilised for the dam and flume approach to undercrossings:

1. The flume pipe(s) will be set out on the bed of the existing stream.
2. A dam will be constructed using sand bags and suitable clay material around the flume pipe(s) and across the stream so that all the flows are diverted through the pipe(s).
3. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream trenching location prior to construction, to minimise silt loss.
4. The ducting installation works will be carried out in the dry stream bed and under/around the flume pipe(s). If required, a temporary sump will be established and used to collect any additional water. This water will be removed by pumping to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the de-watering.

Reinstatement will utilise the following steps:

1. Following the completion of works, the stream bed will be reinstated with original or similar material and the spawning gravels replaced under the supervision of an aquatic ecologist.
2. Once the stream bed is appropriately re-instated the dam and the flume pipe(s) will be removed thus restoring the stream to its original condition.

The following methodology will be utilised for the dam and diversion approach to undercrossings:

1. A suitable channel for the stream will be excavated adjacent to the original channel.
2. Bedding stone will be placed on the bed of the new channel.
3. A dam will be constructed using sand bags and suitable clay material across the stream so that the flow is diverted down the new channel.
4. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-river trenching location prior to construction, to minimise silt loss.
5. The proposed trench will be excavated in the dry stream bed. If required, a temporary sump will be established and used to collect any additional water. This water will be removed by pumping to a

percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the de-watering.

Reinstatement will utilise the following steps:

1. Following the installation of the cable ducts, the stream bed will be reinstated with original or similar material and the spawning gravels replaced under the supervision of an aquatic ecologist.
2. Once the stream bed is appropriately reinstated, the dam will be removed thus restoring the stream to its original alignment.
3. The temporary channel will then be reinstated with the previously excavated material.

Where undercrossing require the replacement of the existing culvert the following methodology will be utilised:

1. Where applicable, under the supervision of an aquatic ecologist, spawning gravels will be removed at the watercourse crossing location.
2. The old culvert will be removed using an excavator.
3. A new HDPE or precast concrete pipe or box culvert will be installed in the watercourse. The new structure will be installed 300mm below the original bed level.
4. The spawning gravels will be replaced under supervision of an aquatic ecologist both upstream, downstream and inside the new structure. Washed gravel will be added to the stream bed if required by the aquatic ecologist.
5. Crushed stone will be laid over the culvert and built up in layer to provide vehicular access across the watercourse.
6. The surface/road level will be reinstated as per the existing track/road requirements.

### **3.2.32 Horizontal Directional Drilling (HDD)**

HDD is proposed in three locations all the GCL. These include under the Stracashel River, within Section 1 of the GCL, where the existing access track crosses this watercourse via a slab bridge; under a tributary to the Stracashel River, within Section 2 of the GCL, along the L-2593-2 local road, where a triple culvert supports high volume flows; and under another tributary to the Stracashel River, within Section 2 of the GCL, along the L-2593-2 local road crosses this watercourse via a slab bridge.

The following methodology will be utilised during HDD operations:

1. A works area of circa. 40m<sup>2</sup> will be fenced on both sides of the river crossing,
2. The drilling rig and fluid handling units will be located on one side of the bridge and will be stored on double bunded 0.5mm PVC bunds which will contain any fluid spills and storm water run-off.
3. Entry and exit pits (1m x 1m x 2m) will be excavated using an excavator, the excavated material will be temporarily stored within the works area and used for reinstatement or disposed of to a licensed facility.
4. A 1m x 1m x 2m steel box will be placed in each pit. This box will contain any drilling fluid returns from the borehole.

5. The drill bit will be set up by a surveyor, and the driller will push the drill string into the ground and will steer the bore path under the watercourse.
6. A surveyor will monitor drilling works to ensure that the modelled stresses and collapse pressures are not exceeded.
7. The drilled cuttings will be flushed back by drilling fluid to the steel box in the entry pit.
8. Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit pit and will pull a drill pipe back through the bore to the entry side.
9. Once all bore holes have been completed, a towing assembly will be set up on the drill and this will pull the ducting into the bore.
10. The steel boxes will be removed, with the drilling fluid disposed of to a licensed facility.
11. The ducts will be cleaned and proven and their installed location surveyed.
12. The entry and exit pits will be reinstated to the specification of ESB Networks and Donegal County Council.
13. A transition coupler or transition chamber will be installed at either side of the bridge/ following the horizontal directional drilling as per ESB requirements, this will join the HDD ducts to the standard ducts.

### 3.2.4 Forestry Felling

All tree felling will be undertaken under the Forestry Act 2014, using good working practices as outlined in the Forestry Regulations 2017 (S.I. No. 191 of 2017). Felling of trees, totalling 6.656 ha will be required. These are at a new road and junction widening to facilitate turbine delivery, corner widening along the delivery route, a service track through commercial forestry between turbine 4 and turbines 5/6 and mitigation felling for bats around T1, T4, T5 and T6. The trees to be felled are predominantly Sitka spruce conifer plantations. A tree felling licence application will be submitted to the Forestry Service, before any felling takes place.

### 3.2.5 Compensatory Forestry Planting

To ensure compliance with the Forestry Act 2014 and the Forestry Regulations 2017, replanting of the trees felled as part of the construction of the proposed wind farm must take place. The proposed compensatory planting site, which already has approval for an afforestation license, will be presented to the Forestry Service, as part of the tree felling licence application.

It is envisaged that this forestry planting will be undertaken utilising a standard planting methodology, in line with the conditions attached to the license approval and the Coillte Northwest BAU Strategic Plan 2021-2025 (Coillte 2021).

### 3.2.6 Operational Phase

The operational phase of the proposed development will involve the site being utilised as an operational wind farm, this will involve relatively minor maintenance operations throughout the lifetime of the wind park site.

The proposed development, at operational stage will involve:

- the use of a back-up generator at the substation which would be fuelled from a storage tank (typically 1,300 litre capacity);
- Oils and greases used in the maintenance of the turbines will be brought to site as needed and waste oils will be taken from site as they occur by the turbine maintenance contractor. The oils and greases are used in the equipment within the turbine, isolated from the environment.
- Cooling oils are used in the grid transformer at the substation. Depending on the model, the grid transformer holds 1,000L of cooling oil. These could leak /rupture, releasing oils into the environment. The oils need to be changed a few times over the lifetime of the transformer which presents an increased risk of leaks / spills.

All further operational phase works will involve the routine movement of vehicles along the proposed turbine access roads, as required.

### 3.2.7 Decommissioning

The decommissioning process will involve the removal of all above ground structures, and reinstatement of disturbed areas following the completion of the wind farms operational lifetime. Some access tracks will be removed and others will remain for farm and forestry use.

This stage of the proposed development will involve similar activities as that described above in respect of the construction phase with temporary higher levels of plant movement associated with the removal of the turbines using the public and proposed wind farm tracks, the use of cranes to facilitate turbine removal and the use of excavators to reinstate developed areas to be reinstated including turbine foundations and a number of access tracks.

The proposed sub-station will likely be retained and form a part of the national grid following decommissioning. The grid connection will be retained.

Areas to be reinstated, such as turbine foundations, will be covered over with locally sourced soil and peat and allowed to re-vegetate.

## 4 RECEIVING ENVIRONMENT

### 4.1 Overview of the Site of the Proposed Development

Lands within the immediate locality of the proposed development are comprised of areas of upland habitat including wet heath, upland blanket bog and lowland raised bog, in addition to wet and dry grasslands, coniferous plantation and upland streams. The site also lies adjacent to the Stranagoppogue River which forms a part of the River Finn SAC and the Stracashel River which forms a part of the West of Ardara/Maas Road SAC.

### 4.2 European Sites

The proposed development site lies in proximity, or is hydrologically connected to, a number of European sites, within the locality and further afield. A total of 19 European Sites are considered to be within the potential Zone of Influence of the proposed project. The location of these sites is presented in **Figures 4.1**. Details of these sites, including Qualifying Interests/Special Conservation Interests and distance from the study area are found in **Error! Reference source not found.**. Conservation Objectives for each of these European Sites, are also listed in **Error! Reference source not found.**. The information contained in these tables is based on publicly available data, sourced from NPWS and DAERA in September 2021. A further figure, showing European sites which lie in proximity to the proposals, and their locations relative to the proposed site boundary, is included at **Figure 4.2** for clarity.

The nearest European sites to the compensatory forestry planting area, in addition to hydrological linkages are illustrated in **Figure 4.3**.



Site Name / Code	Distance (Km) / Direction from site	Qualifying Interests/Special Conservation Interests	Conservation Objectives
		[2110] Embryonic shifting dunes	<ul style="list-style-type: none"><li>Ardara/Maas Road SAC, as defined by 2 no. attributes and targets.</li></ul>
		[2120] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)	
		[2130] Fixed coastal dunes with herbaceous vegetation (grey dunes)	
		[2140] Decalcified fixed dunes with <i>Empetrum nigrum</i>	
		[2150] Atlantic decalcified fixed dunes ( <i>Calluno-Ulicetea</i> )	
		[2170] Dunes with <i>Salix repens</i> ssp. <i>argentea</i> ( <i>Salicion arenariae</i> )	
		[2190] Humid dune slacks	
		[21A0] <i>Machairs</i> (in Ireland)	
		[3110] Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> )	
		[3130] Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i>	
		[4010] Northern Atlantic wet heaths with <i>Erica tetralix</i>	<ul style="list-style-type: none"><li>To maintain the favourable conservation condition of Decalcified fixed dunes with <i>Empetrum nigrum</i> in West of Ardara/Maas Road SAC, as defined by 9 no. attributes and targets.</li></ul>
		[4030] European dry heaths	
		[4060] Alpine and Boreal heaths	
		[5130] <i>Juniperus communis</i> formations on heaths or calcareous grasslands	
		[6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (Important orchid sites)	
		[6410] <i>Molinia</i> meadows on calcareous, peaty or clayey-silt laden soils ( <i>Molinion caeruleae</i> )	
		[6510] Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> )	
		[7130] Blanket bogs (if active bog)	
		[7150] Depressions on peat substrates of the <i>Rhynchosporion</i>	





**Table 4-1: European Sites and their Qualifying Interests/Special Conservation Interests within the Zone of Influence of the proposed project.**  
\*denotes a priority habitat under the Habitats Directive.

Site Name / Code	Distance (Km) / Direction from site	Qualifying Interests/Special Conservation Interests	Conservation Objectives
River Finn SAC [SAC 002301]	N/A	[3110] Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	31 <sup>st</sup> May 2017 Version 1 (NPWS 2017a) <ul style="list-style-type: none"><li>To restore the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) in the River Finn SAC, as defined by 18 no. attributes and targets.</li><li>To restore the favourable conservation condition of Norther Atlantic wet heaths with Erica tetralix in the River Finn SAC, as defined by 21 no. attributes and targets.</li><li>To restore the favourable conservation condition of Blanket bogs in River Finn SAC, as defined by 19 no. attributes and targets.</li><li>To restore the favourable conservation condition of Transition mires and quaking bogs in River Finn SAC, as defined by 13no. attributes and targets.</li><li>To maintain the favourable conservation condition of Atlantic salmon <i>Salmo salar</i> in the River Finn SAC, as defined by 6 no. attributes and targets.</li><li>To maintain the favourable conservation condition of Otter <i>Lutra lutra</i> win the River Finn SAC, as defined by 7 no. attributes and targets.</li></ul>
West of Ardara/Maas Road SAC [002301]	N/A	[1130] Estuaries [1140] Mudflats and sandflats not covered by seawater at Low tide [1160] Large shallow inlets and bays [1210] Annual vegetation of drift lines [1330] Atlantic salt meadows (Glauco-Puccinellietalia Maritimae) [1410] Mediterranean salt meadows (Juncetalia maritime	19 <sup>th</sup> August 2015 Version 1 (NPWS 2015a) <ul style="list-style-type: none"><li>To maintain the favourable conservation condition of Estuaries in West of Ardara/Maas Road SAC, as defined by 2 no. attributes and targets.</li><li>To maintain the favourable conservation condition of Mudflats and sandflats in West of Ardara/Maas Road SAC, as defined by 2 no. attributes and targets.</li><li>To maintain the favourable conservation condition of Large shallow inlets and bays in West of</li></ul>



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Site Name / Code	Distance (Km) / Direction from site	Qualifying Interests/Special Conservation Interests	Conservation Objectives
		[7230] Alkaline fens	
		[1013] Geyer's whorl snail <i>Vertigo geyeri</i>	<ul style="list-style-type: none"><li>• To restore the favourable conservation condition of Machairs in West of Ardara/Maas Road SAC, as defined by 11 no. attributes and targets.</li></ul>
		[1029] Freshwater pearl mussel <i>Margaritifera margaritifera</i>	
		[1065] Marsh Fritillary <i>Euphydryas aurinia</i>	<ul style="list-style-type: none"><li>• To maintain the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) in West of Ardara/Maas Road SAC, as defined by 18 no. attributes and targets.</li></ul>
		[1106] Salmon <i>Salmo salar</i>	
		[1355] Otter <i>Lutra lutra</i>	<ul style="list-style-type: none"><li>• To restore the favourable conservation condition of Northern Atlantic wet heaths with <i>Erica tetralix</i> in West of Ardara/Maas Road SAC, as defined by 20 no. attributes and targets.</li></ul>
		[1365] [Harbour seal <i>Phoca vitulina</i>	<ul style="list-style-type: none"><li>• To restore the favourable conservation condition of European dry heaths in West of Ardara/Maas Road SAC, as defined by 19 no. attributes and targets.</li></ul>
		[1395] Petalwort <i>Petalophyllum ralfsii</i>	<ul style="list-style-type: none"><li>• To restore the favourable conservation condition of Alpine and Boreal Heaths in West of Ardara/Maas Road SAC, as defined by 14 no. attributes and targets.</li></ul>
		[1833] Slender Naiad <i>Najas flexilis</i>	<ul style="list-style-type: none"><li>• To maintain the favourable conservation condition of Juniperus communis formations on heaths or calcareous grasslands in West of Ardara/Maas Road SAC, as defined by 8 no. attributes and targets.</li></ul>
			<ul style="list-style-type: none"><li>• To maintain the favourable conservation condition of Semi-natural dry grasslands and scrubland facies on calcareous substrates in West of Ardara/Maas Road SAC, as defined by 11 no. attributes and targets.</li></ul>
			<ul style="list-style-type: none"><li>• To maintain the favourable conservation condition of Molinia meadows on calcareous peaty or clayey-silt-laden soils in West of Ardara/Maas Road SAC, as defined by 13 no. attributes and targets.</li></ul>
			<ul style="list-style-type: none"><li>• To maintain the favourable conservation condition of Lowland hay meadows in West of Ardara/Maas</li></ul>



Site Name / Code	Distance (Km) / Direction from site	Qualifying Interests/Special Conservation Interests	Conservation Objectives
			<ul style="list-style-type: none"><li>• Road SAC, as defined by 11 no. attributes and targets.</li><li>• To restore the favourable conservation condition of Blanket bog in West of Ardara/Maas Road SAC, as defined by 19 no. attributes and targets.</li><li>• To maintain the favourable conservation condition of Depressions on peat substrates of the rhynchosporion in West of Ardara/Maas Road SAC, as defined by 16 no. attributes and targets.</li><li>• To maintain the favourable conservation condition of Alkaline fens in West of Ardara/Maas Road SAC, as defined by 9 no. attributes and targets.</li><li>• To maintain the favourable conservation condition of Geyer's whorl snail in West of Ardara/Maas Road SAC, as defined by 5 no. attributes and targets.</li><li>• To restore the favourable conservation condition of freshwater pearl mussel in West of Ardara/Maas Road SAC, as defined by 12 no. attributes and targets.</li><li>• To maintain the favourable conservation condition of marsh fritillary in West of Ardara/Maas Road SAC, as defined by 4 no. attributes and targets.</li><li>• To maintain the favourable conservation condition of Salmon in West of Ardara/Maas Road SAC, as defined by 6 no. attributes and targets.</li><li>• To maintain the favourable conservation condition of otter in West of Ardara/Maas Road SAC, as defined by 7 no. attributes and targets.</li><li>• To maintain the favourable conservation condition of harbour seal in West of Ardara/Maas Road SAC, as defined by 5 no. attributes and targets.</li><li>• To maintain the favourable conservation condition of petalwort in West of Ardara/Maas Road SAC, as defined by 5 no. attributes and targets.</li></ul>



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Site Name / Code	Distance (Km) / Direction from site	Qualifying Interests/Special Conservation Interests	Conservation Objectives
Lough Nillan Bog1.7km S (Carrickatieve) SAC [000165]		[3110] Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [7130] Blanket bogs (if active bog)	<ul style="list-style-type: none"><li>To maintain the favourable conservation condition of slender naiad in West of Ardara/Maas Road SAC, as defined by 13 no. attributes and targets</li><li>6<sup>th</sup> September 2016 Version 1 (NPWS 2016a)<ul style="list-style-type: none"><li>To maintain the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) in Lough Nillan Bog (Carrickatieve) SAC, as defined by 18 no. attributes and targets.</li><li>To restore the favourable conservation condition of Blanket bog in Lough Nillan Bog (Carrickatieve) SAC, as defined by 19 no. attributes and targets.</li></ul></li></ul>
Lough Nillan Bog 1.7km S SPA [004110]		[A098] Merlin <i>Falco columbarius</i> [A140] Golden Plover <i>Pluvialis apricaria</i> [A395] Greenland white-fronted goose <i>Anser albifrons flavirostris</i> [A466] Dunlin <i>Calidris alpina schinzii</i>	<ul style="list-style-type: none"><li>23<sup>rd</sup> March 2021 Generic Version 8.0 (NPWS 2021b)<ul style="list-style-type: none"><li>To maintain or restore the favourable conservation condition of bird species listed as special conservation interests for this SPA.</li></ul></li></ul>
Derryveagh and Glendowan Mountains SPA [004039]	2.4km N	[A001] Red-throated diver <i>Gavia stellata</i> [A098] Merlin <i>Falco columbarius</i> [A103] Peregrine <i>Falco peregrinus</i> [A140] Golden Plover <i>Pluvialis apricaria</i> [A466] Dunlin <i>Calidris alpina schinzii</i>	<ul style="list-style-type: none"><li>23<sup>rd</sup> March 2021 Generic Version 8.0 (NPWS 2021a)<ul style="list-style-type: none"><li>To maintain or restore the favourable conservation condition of bird species listed as special conservation interests for this SPA.</li></ul></li></ul>
Meenaguse Scragh SAC [001880]	4.1km S	[4010] Northern Atlantic wet heaths with <i>Erica tetralix</i>	<ul style="list-style-type: none"><li>10<sup>th</sup> September 2019 Version 1 (NPWS 2019a)<ul style="list-style-type: none"><li>To restore the favourable conservation condition of Northern Atlantic wet heaths with <i>Erica tetralix</i> in West of Ardara/Maas Road SAC, as defined by 20 no. attributes and targets.</li></ul></li></ul>
Cloghermagore Bog and Glenveagh National Park SAC [002047]	4.9km N	[3110] Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3260] Water courses of plain to montane levels with the Ranuncuion fluitantis and Callitricho-Batrachion vegetation [4010] Northern Atlantic wet heaths with <i>Erica tetralix</i> [4030] European dry heaths	<ul style="list-style-type: none"><li>24<sup>th</sup> July 2017 Version 1 (NPWS 2017d)<ul style="list-style-type: none"><li>To maintain the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) in Cloghermagore Bog and Glenveagh National Park SAC, as defined by 18 no. attributes and targets.</li></ul></li></ul>





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Site Name / Code	Distance (Km) / Direction from site	Qualifying Interests/Special Conservation Interests	Conservation Objectives
		[4060] Alpine and Boreal heaths	<ul style="list-style-type: none"><li>• To maintain the favourable conservation condition of Watercourses of plain to montane levels with the Ranunculus fluitantis and Callitriche-Batrachion vegetation in Cloghernagore Bog and Glenveagh National Park SAC, as defined by 9 no. attributes and targets.</li><li>• To restore the favourable conservation condition of Northern Atlantic wet heaths with Erica tetralix in Cloghernagore Bog and Glenveagh National Park SAC, as defined by 20 no. attributes and targets.</li><li>• To restore the favourable conservation condition of European dry heaths in Cloghernagore Bog and Glenveagh National Park SAC, as defined by 19 no. attributes and targets.</li><li>• To maintain the favourable conservation condition of Alpine and boreal heaths in Cloghernagore Bog and Glenveagh National Park SAC, as defined by 14 no. attributes and targets.</li><li>• To maintain the favourable conservation condition of Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinia caerulea) in Cloghernagore Bog and Glenveagh National Park SAC, as defined by 13 no. attributes and targets.</li><li>• To restore the favourable conservation condition of Blanket bog in Cloghernagore Bog and Glenveagh National Park SAC, as defined by 19 no. attributes and targets.</li><li>• To restore the favourable conservation condition of Depressions on peat substrates of the rhynchosporion in Cloghernagore Bog and Glenveagh National Park SAC, as defined by 16 no. attributes and targets.</li><li>• To restore the favourable conservation condition of Old sessile oak woods with Ilex and Blechnum in the British Isles in Cloghernagore Bog and</li></ul>
		[6410] Molinia meadows on calcareous, peaty or clayey-silt laden soils (Molinia caerulea)	
		[7130] Blanket bogs (if active bog)	
		[7150] Depressions on peat substrates of the Rhynchosporion	
		[91A0] Old sessile oak woods with Ilex and Blechnum in the British Isles	
		[1029] Freshwater pearl mussel Margaritifera margaritifera	
		[1106] Salmon Salmo salar	
		[1355] Otter Lutra lutra	
		[1421] Killarney Fern Trichomanes speciosum	



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Site Name / Code	Distance (Km) / Direction from site	Qualifying Interests/Special Conservation Interests	Conservation Objectives
Meentygrannagh Bog SAC [000173]	6.2km NE	[7130] Blanket bogs (if active bog) [7140] Transition mires and quaking bogs [7230] Alkaline fens [6216] Slender green feather-moss <i>Hammatocaulis vernicosus</i>	<ul style="list-style-type: none"><li>Glenveagh National Park SAC, as defined by 12 no. attributes and targets.</li><li>To restore the favourable conservation condition of freshwater pearl mussel in Cloghernagore Bog and Glenveagh National Park SAC, as defined by 12 no. attributes and targets.</li><li>To maintain the favourable conservation condition of salmon in Cloghernagore Bog and Glenveagh National Park SAC, as defined by 6 no. attributes and targets.</li><li>To maintain the favourable conservation condition of otter in Cloghernagore Bog and Glenveagh National Park SAC, as defined by 7 no. attributes and targets.</li><li>To maintain the favourable conservation condition of Killarney fern in Cloghernagore Bog and Glenveagh National Park SAC, as defined by 16 no. attributes and targets.</li></ul>
			15 <sup>th</sup> May 2017 Version 1 (NPWS 2017f)
			<ul style="list-style-type: none"><li>To restore the favourable conservation condition of Blanket bog in Meentygrannagh Bog SAC, as defined by 19 no. attributes and targets.</li><li>To restore the favourable conservation condition of Transition mires and quaking bogs in Meentygrannagh Bog SAC, as defined by 13 no. attributes and targets.</li><li>To restore the favourable conservation condition of Alkaline fens in Meentygrannagh Bog SAC, as defined by 19 no. attributes and targets.</li><li>To maintain the favourable conservation condition of slender green feather-moss in Meentygrannagh Bog SAC, as defined by 13 no. attributes and targets.</li></ul>
Coolvoy Bog SAC	6.5km N	[7130] Blanket bogs (if active bog)	15 <sup>th</sup> May 2017 Version 1 (NPWS 2017b)



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Site Name / Code	Distance (Km) / Direction from site	Qualifying Interests/Special Conservation Interests	Conservation Objectives
[001107]			<ul style="list-style-type: none"><li>To restore the favourable conservation condition of Blanket bog in Coolvoy Bog SAC, as defined by 19 no. attributes and targets.</li></ul>
Meenaguse/Ardbane Bog SAC	7.4km S	[7130] Blanket bogs (if active bog)	<ul style="list-style-type: none"><li>15<sup>th</sup> May 2017 Version 1 (NPWS 2017c)<ul style="list-style-type: none"><li>To restore the favourable conservation condition of Blanket bog in Meenaguse/Ardbane SAC, as defined by 19 no. attributes and targets.</li></ul></li></ul>
[000172]			
Gannivegil Bog SAC	8.8km NW	[3110] Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> ) [4010] Northern Atlantic wet heaths with <i>Erica tetralix</i> [7130] Blanket bogs (if active bog)	<ul style="list-style-type: none"><li>15<sup>th</sup> May 2017 Version 1 (NPWS 2017e)<ul style="list-style-type: none"><li>To maintain the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) in Gannivegil Bog SAC, as defined by 18 no. attributes and targets.</li><li>To restore the favourable conservation condition of Northern Atlantic wet heaths with <i>Erica tetralix</i> in Gannivegil Bog SAC, as defined by 20 no. attributes and targets.</li></ul></li><li>To restore the favourable conservation condition of Blanket bog in Gannivegil Bog SAC, as defined by 19 no. attributes and targets.</li></ul>
[000142]			
Lough Eske and Ardnamona Wood SAC	11.7km S	[3110] Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> ) [7220] Petrifying springs with tufa formation ( <i>Cratoneurion</i> ) [91A0] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [1029] Freshwater pearl mussel <i>Margaritifera margaritifera</i> [1106] Salmon <i>Salmo salar</i> [1421] Killarney Fern <i>Trichomanes speciosum</i>	<ul style="list-style-type: none"><li>11<sup>th</sup> September 2019 Version 1 (NPWS 2019b)<ul style="list-style-type: none"><li>To restore the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) in Lough Eske and Ardnamona Wood SAC, as defined by 18 no. attributes and targets.</li><li>To restore the favourable conservation condition of Petrifying springs with tufa formation (<i>Cratoneurion</i>) in Lough Eske and Ardnamona Wood SAC, as defined by 9 no. attributes and targets.</li><li>To restore the favourable conservation condition of Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles in Lough Eske and Ardnamona</li></ul></li></ul>
[000163]			



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Site Name / Code	Distance (Km) / Direction from site	Qualifying Interests/Special Conservation Interests	Conservation Objectives
Slieve Tooey/Tormore Island/Loughros Beg Bay SAC [000190]	13.3km SW	[1230] Vegetated sea cliffs of the Atlantic and Baltic coasts	<ul style="list-style-type: none"><li>Wood SAC, as defined by 13 no. attributes and targets.</li><li>To restore the favourable conservation condition of freshwater pearl mussel in Lough Eske and Ardnamona Wood SAC, as defined by 13 no. attributes and targets.</li><li>To restore the favourable conservation condition of salmon in Lough Eske and Ardnamona Wood SAC, as defined by 6 no. attributes and targets.</li><li>To maintain the favourable conservation condition of Killarney fern in Lough Eske and Ardnamona Wood SAC, as defined by 16 no. attributes and targets.</li></ul>
		[2110] Embryonic shifting dunes	
		[2120] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)	
		[2130] Fixed coastal dunes with herbaceous vegetation (grey dunes)	
		[2140] Decalcified fixed dunes with <i>Empetrum nigrum</i>	
		[2150] Atlantic decalcified fixed dunes ( <i>Calluno-Ulicetea</i> )	
		[4060] Alpine and Boreal heaths	
		[7130] Blanket bogs (if active bog)	
		[1014] Narrow-mouthed Whorl Snail <i>Vertigo angustior</i>	
		[1355] Otter <i>Lutra lutra</i>	
		[1364] Grey Seal <i>Halichoerus grypus</i>	<ul style="list-style-type: none"><li>19<sup>th</sup> August 2015 Version 1 (NPWS 2015b)</li><li>To maintain the favourable conservation condition of Vegetated sea cliffs of the Atlantic and Baltic coasts as defined by 8 no. attributes and targets.</li><li>To maintain the favourable conservation condition of Embryonic shifting dunes as defined by 7 no. attributes and targets.</li><li>To restore the favourable conservation condition of shifting dunes along the shoreline as defined by 7 no. attributes and targets.</li><li>To maintain the favourable conservation condition of Decalcified fixed dunes as defined by 8 no. attributes and targets.</li><li>To maintain the favourable conservation condition of Atlantic decalcified fixed dunes as defined by 8 no. attributes and targets.</li><li>To maintain the favourable conservation condition of Alpine and Boreal heaths as defined by 14 no. attributes and targets.</li><li>To restore the favourable conservation condition of Blanket bog as defined by 19 no. attributes and targets.</li></ul>





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Site Name / Code	Distance (Km) / Direction from site	Qualifying Interests/Special Conservation Interests	Conservation Objectives
Sheskinmore Lough SPA [004090]	13.4km W	[A395] Greenland white-fronted goose <i>Anser albifrons</i> <i>flavirostris</i>	<ul style="list-style-type: none"><li>To maintain the favourable conservation condition of narrow-mouthed whorl snail as defined by 5 no. attributes and targets.</li><li>To maintain the favourable conservation condition of otter as defined by 8 no. attributes and targets.</li><li>To maintain the favourable conservation condition of grey seal as defined by 5 no. attributes and targets.</li></ul>
			23 <sup>rd</sup> March 2021 Generic Version 8.0 (NPWS 2021d)
Inishkeel SPA [004116]	14.0km W	[A045] Barnacle Goose <i>Branta leucopsis</i>	To maintain or restore the favourable conservation condition of bird species listed as special conservation interests for this SPA. 23 <sup>rd</sup> March 2021 Generic Version 8.0 (NPWS 2021c) To maintain or restore the favourable conservation condition of bird species listed as special conservation interests for this SPA.
Durnesh Lough SPA [004145]	25.5km SW	[A038] Whooper swan <i>Cygnus cygnus</i> [A395] Greenland white-fronted goose <i>Anser albifrons</i> <i>flavirostris</i>	23 <sup>rd</sup> March 2021 Generic Version 8.0 (NPWS 2021e) To maintain or restore the favourable conservation condition of bird species listed as special conservation interests for this SPA.
River Foyle and Tributaries SAC [UK0030320]	40.6km E	[3260] Watercourses of plain to montane levels with the Ranunculon fluitantis and Callitricho-Batrachion vegetation [1106] Salmon <i>Salmo salar</i> [1355] Otter <i>Lutra lutra</i>	<ul style="list-style-type: none"><li>To maintain (or restore where appropriate) the favourable condition of Atlantic salmon within the SAC as defined by 2 no. objectives.</li><li>To maintain (or restore where appropriate) the favourable condition of Watercourses of plain to montane levels within the SAC as defined by 4 no. objectives.</li><li>To maintain (or restore where appropriate) the favourable condition of otter within the SAC as defined by 2 no. objectives.</li></ul>
			27 <sup>th</sup> July 2017 V3 (DEARA 2017)
Lough Foyle	45.0km NE	[A005] Great crested grebe <i>Podiceps cristatus</i>	1 <sup>st</sup> April 2015 V4 (DAERA 2015)



Site Name / Code	Distance (Km) / Direction from site	Qualifying Interests/Special Conservation Interests	Conservation Objectives
SPA (NI) [UK9020031]		[A037] Bewick's Swan <i>Cygnus columbianus bewickii</i>	<ul style="list-style-type: none"><li>• To maintain or enhance the population of the qualifying species;</li><li>• To maintain or enhance the range of habitats utilised by the qualifying species;</li><li>• To ensure that the integrity of the site is maintained;</li><li>• To ensure there is no significant disturbance of the species and;</li><li>• To ensure that the following are maintained in the long term:<ul style="list-style-type: none"><li>◦ Population of the species as a viable component of the site</li><li>◦ Distribution of the species within site</li><li>◦ Distribution and extent of habitats supporting the species</li><li>◦ Structure, function and supporting processes of habitats supporting the species.</li></ul></li><li>• To maintain the species diversity contributing to the waterfowl assemblage;</li><li>• Maintain or enhance the area of natural and semi-natural habitats used or potentially usable by Feature bird species. (2056.13 ha intertidal area) subject to natural processes;</li><li>• Maintain the extent of main habitat components subject to natural processes; and</li><li>• Maintain or enhance sites utilised as roosts.</li></ul>
		[A038] Whooper swan <i>Cygnus cygnus</i>	
		[A043] Greylag goose <i>Anser answer</i>	
		[A046] Light-bellied brent goose <i>Branta bernicla hrota</i>	
		[A048] Shelduck <i>Tadorna tadorna</i>	
		[A050] Wigeon <i>Anas penelope</i>	
		[A052] Teal <i>Anas crecca</i>	
		[A053] Mallard <i>Anas platyrhynchos</i>	
		[A063] Eider <i>Somateria mollissima</i>	
		[A069] Red-breasted merganser <i>Mergus serrator</i>	
		[A130] Oystercatcher <i>Haematopus ostralegus</i>	
		[A140] Golden plover <i>Pluvialis apricaria</i>	
		[A142] Lapwing <i>Vanellus vanellus</i>	
		[A143] Knot <i>Calidris canutus</i>	
		[A149] Dunlin <i>Calidris alpina</i>	
		[A157] Bar-tailed godwit <i>Limosa lapponica</i>	
		[A160] Curlew <i>Numenius arquata</i>	
		[A162] Redshank <i>Tringa totanus</i>	
Lough Foyle SPA (RoI) [004087]	57.4km NE	Waterfowl Assemblage	
		Habitat Extent	
		Roost Site Locations	
		[A001] Red-throated diver <i>Gavia stellata</i>	
		[A005] Great crested grebe <i>Podiceps cristatus</i>	
		[A037] Bewick's Swan <i>Cygnus columbianus bewickii</i>	
		[A038] Whooper swan <i>Cygnus cygnus</i>	
		[A043] Greylag goose <i>Anser answer</i>	
		[A046] Light-bellied brent goose <i>Branta bernicla hrota</i>	
		[A048] Shelduck <i>Tadorna tadorna</i>	



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Site Name / Code	Distance (Km) / Direction from site	Qualifying Interests/Special Conservation Interests	Conservation Objectives
Callow Bog SAC [000595]	14.4km E of proposed compensation forestry site	[A050] Wigeon <i>Anas penelope</i>	19 <sup>th</sup> January 2016 Version 1.0 (NPWS 2016b) <ul style="list-style-type: none"><li>To restore the favourable conservation condition of active raised bogs as defined by 17no. attributes and targets;</li></ul>
		[A052] Teal <i>Anas crecca</i>	
		[A053] Mallard <i>Anas platyrhynchos</i>	
		[A063] Eider <i>Somateria mollissima</i>	
		[A069] Red-breasted merganser <i>Mergus serrator</i>	
		[A130] Oystercatcher <i>Haematopus ostralegus</i>	
		[A140] Golden plover <i>Pluvialis apricaria</i>	
		[A142] Lapwing <i>Vanellus vanellus</i>	
		[A143] Knot <i>Calidris canutus</i>	
		[A149] Dunlin <i>Calidris alpina</i>	
		[A157] Bar-tailed godwit <i>Limosa lapponica</i>	
		[A160] Curlew <i>Numenius arquata</i>	
		[A162] Redshank <i>Tringa totanus</i>	
		[A179] Black-headed gull <i>Chroicocephalus ridibundus</i>	
		[A182] Common gull <i>Larus canus</i>	
		[A184] Herring gull <i>Larus argentatus</i>	
		[A999] Wetland and waterbirds	
Lough Gara SPA [004048]	16.8km E of proposed compensation forestry site	[A038] Whooper swan <i>Cygnus cygnus</i>	23 <sup>rd</sup> March 2021 Generic Version 8.0 (NPWS 2021f)  To maintain or restore the favourable conservation condition of bird species listed as special conservation interests for this SPA.
		[A395] Greenland white-fronted goose <i>Anser albifrons flavirostris</i>	
Tullaghanrock Bog SAC [002354]	13.5km E of proposed compensation forestry site	[7110] Active raised bogs [7120] Degraded raised bogs still capable of natural regeneration [7150] Depressions on peat substrates of the	15 <sup>th</sup> December 2015 Version 1.0 (NPWS 2015c) <ul style="list-style-type: none"><li>To restore the favourable conservation condition of active raised bogs as defined by 17no. attributes and targets;</li></ul>



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Site Name / Code	Distance (Km) / Direction from site	Qualifying Interests/Special Conservation Interests	Conservation Objectives
[7150] Depressions on peat substrates of the Rhynchosporion			





## 4.3 Habitats and Flora

### 4.3.1 Terrestrial

Habitats within the site, which will be impacted directly by the proposed development, largely comprise a range of upland habitats including wet heath, upland blanket bog and lowland blanket bog in addition to areas of cutover bog, fen and flush communities, coniferous plantation and wet grassland.

The proposed grid connection will be via existing roadways and as such will affect only areas of bare ground and hardstanding.

The proposed new Coillte access road will also require clearance of relatively small areas of coniferous plantation and scrub.

### 4.3.2 Aquatic

The application site supports a number of small watercourses classified as eroding/upland rivers, including the Stranagoppogue River, furthermore the proposed grid connection will cross the Stracashel River. As such the proposals are hydrologically linked with a number of European Sites which lie downstream and as such are hydrologically connected to the proposals.

## 4.4 Mobile Species

### 4.4.1 Qualifying Interests

Desk study, in addition to project survey findings indicate that a number of QI mobile species have been recorded or are present within 10 km of the proposed development site.

#### 4.4.1.1 Mammals

22 records of Otter *Lutra lutra*, a qualifying interest of the River Finn SAC, West of Ardara/Maas Road SAC and the River Foyle and Tributaries SAC, were returned from the data search exercise conducted with NBDC. The species was recorded to be present within proximity to the site, with a single holt recorded along the Stranagoppogue River, to the south of the proposed grid connection. The species is considered likely to utilise watercourses within and in proximity to the site on at least an occasional basis.

The proposed development is outside the favourable reference range of the lesser horseshoe bat *Rhinolophus hipposideros* (NPWS, 2013), which is the only bat species designated as a QI in Ireland. The species is restricted to the western Atlantic seaboard and has never been recorded in Co. Donegal.

#### 4.4.1.2 Fish

The proposed development is within the favourable reference range of QI Atlantic salmon (*Salmo salar*), QI river lamprey (*Lampetra fluviatilis*), and QI brook lamprey (*Lampetra planeri*) (NPWS, 2013).

The site of the proposed development has been subject to a suite of fisheries surveys, desk study and assessment undertaken in respect of this group. Surveys undertaken of watercourses included stream benthic community analysis, an assessment of physical stream characteristics, field study of fisheries habitat and electrofishing survey.

The findings of these surveys recorded that a number of watercourses downstream of the proposed development, including the Stranagoppogue River, Stracashel River, River Finn and Ownea River support salmon, a qualifying interest of the River Finn SAC, West of Ardara/Maas Road SAC and River Foyle and Tributaries SAC, and as such are likely to represent important spawning habitat for this species. On this basis these watercourses, which form a part of the West of Ardara/Maas Road SAC or River Finn SAC are considered to be highly sensitive to effects arising as a result of the proposed development.

#### 4.4 1.3 In vertebrates and Amphibians

The proposed development is within the favourable reference range (NPWS, 2013) and potential foraging range of QI marsh fritillary *Euphydryas aurinia*, furthermore 67 records of this species were returned from the data search exercise conducted with NBDC. The Application Site does not support any areas of dense devil's-bit scabious *Succisa pratensis*, the food plant for the marsh fritillary, as such it is not considered that habitats within the Application Site are likely to be of particular value for breeding marsh fritillary.

The favourable reference range of all QI whorl snail Geyer's and Desmoulin's Whorl Snail, are not within the Zol of the proposed development (NPWS, 2013).

The proposed development is within the favourable reference range of QI freshwater pearl mussel *Margaritifera margaritifera* (NPWS, 2013). Three records of freshwater pearl mussel were returned from the data search exercise conducted with NBDC. Detailed desk study and field survey for freshwater pearl mussel and subsequent assessment has been undertaken in respect of the proposed development.

Surveys, undertaken under license from NPWS, utilised the standard survey methodology which includes for a presence and absence method based on a search of those sections of the river exhibiting features most likely to support pearl mussels. In shallow streams, such as those within the study area, this was undertaken by wading with a bathyscope or "glass-bottomed" bucket.

These surveys recorded that lengths of the Stracashel River and Ownea River populations of freshwater pearl mussel, a qualifying interest of the West of Ardara/Maas Road SAC, albeit in sub-optimal habitat conditions, and these populations and the associated watercourses, which lie downstream from the proposed development and comprise a part of the SAC are considered to be highly sensitive on this basis.

The proposed development is outside the favourable reference range of QI Kerry slug *Geomalacus maculosus* and QI natterjack toad *Bufo calamita* (NPWS, 2013).

The proposed development is within the favourable reference range of QI White-clawed Crayfish *Austropotamobius pallipes*, however no evidence indicating the presence of this species within watercourses downstream of the proposed development has been recorded and furthermore it does not comprise a qualifying feature for any SAC within the Zol of the proposed development.

#### 4.42 Special Conservation Interests

The desk study returned records for a range of SCI bird species from the preceding 10 years, within 5 km of the proposed development.

An extensive range of bird surveys, desk study and assessment have been undertaken in respect of the proposed development by Woodrow Sustainable Solutions.

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The site has been subject to bird surveys in respect of breeding birds, in the periods March to August 2019 and March to August 2020 and wintering birds in the periods October to March 2018/19 and October to March 2019/20. A limited updated survey was undertaken in 2021, in respect of the previously recorded Merlin nesting locations only. Surveyors utilised a range of methodologies designed to target different species groups including:

- Vantage point surveys for areas within 500m of the proposed development, to inform collision risk modelling;
- Breeding wader surveys within 800m of the proposed development, undertaken in line with the Brown and Sheppard (Brown and Sheppard 1993);
- Non-breeding season walkovers surveys within 500m of the proposed turbine locations;
- Breeding raptor surveys covering areas within 2km of the proposed turbine locations and within 6km of the proposed turbine locations for breeding eagles;
- Breeding red-throated diver surveys, inclusive of loughs within 2km of the proposed development; and
- Non-breeding wintering waterbird surveys which covered wetland habitats and potential foraging habitats within 5-6km of the proposed development.

It is noted that the survey effort for birds was tailored to capture the potential for the use of the proposed development site and wider area by bird species listed as SCIs for SPAs within the Zol of the site, which may have potential connectivity with the proposals, including those listed within Table 4.1.

These surveys recorded a wide range of bird species utilising the development site and wider area, including 44 breeding species within 2km of the proposed development in addition to a further 27 species which utilise the site for wintering, foraging or on passage.

Many of the species recorded are of conservation concern however of the SCI bird species listed as qualifying features of SPAs within the 15km Zol of the proposed project, as set out at Table 4.1, only merlin *Falco columbarius*, peregrine *Falco peregrinus* and golden plover *Pluvialis apricaria* were recorded during the suite of surveys.

Records of golden plover were limited to three observations of the species across the two-year survey period, beyond the north-west site boundary of the survey buffer. It is noted that the closest known breeding records of this species are from the Lough Nillan Bog SPA and it is considered likely that these observations represent passage records.

Records of peregrine were limited to two observations within the areas in which turbines are proposed, with the species being recorded on an occasional basis within the wider survey area. No evidence indicating the presence of breeding peregrine was recorded within the wider survey area during the surveys.

A single pair of merlin was recorded as breeding within the 500m turbine buffer area in both the 2019 and 2020 breeding seasons. The majority of flight-lines utilised by the breeding pair of this species were not within 500m of the proposed turbine locations. The species was also recorded regularly throughout the wintering season.

A number of further Annex I bird species were recorded within the surveyed area namely whooper swan *Cygnus cygnus*, white-tailed eagle *Haliaeetus albicilla*, hen harrier *Circus cyaneus* and golden eagle *Aquila chrysaetos*.

Whooper swan observations recorded during the surveys were limited to a number of records of passage flocks, between 3 and 23 birds, in the autumn and spring. No breeding foraging or roost sites were recorded within the survey area. It is noted that the closest SPA for which whooper swan forms a SCI species is Durnesh Lough SPA which is located 25.5km to the south of the proposed development at its closest point.

Hen harrier observations recorded within the 500m survey buffer during the two-year survey period were limited to that of four individuals recorded foraging in the wintering period. No breeding activity was recorded within the wider area. The closest SPA for which hen harrier is an SCI species is Slieve Beagh SPA, this site lies 80km to the south-east of the proposed development and as such is considered to lie outside of the Zol of the proposed development.

While golden eagle were recorded on 19 occasions within the 500m survey buffer all known breeding locations for the species are at least 6km away from the proposed development. Furthermore, there are no SPAs in Ireland for which golden eagle represents an SCI bird species.

White-tailed eagle were recorded on eight dates within the 500m survey buffer, including a number of commuting and foraging birds. While no breeding behaviour was recorded it is considered likely that pairs are likely to begin breeding within 6km of the proposed development in the future. As per golden eagle, there are no SPAs in Ireland which include white-tailed eagle as an SCI species.

Collision risk modelling was undertaken for bird species considered to be potentially affected by the proposed development, and the findings are discussed further below, were relevant.

## 5 APPROPRIATE ASSESSMENT - STAGE 1: SCREENING

### 5.1 Screening for Appropriate Assessment

A screening exercise must be undertaken by the competent authorities to determine whether, firstly, the plan or project is directly connected with or necessary to the management of the site, and secondly, whether it is likely to have a significant effect on the site; EC 2018.

In addition, the provisions of national legislation, such as section 177U make clear that screening for appropriate assessment of an application for consent for proposed development shall be carried out by the competent authority to assess, in view of best scientific knowledge, if that proposed development, individually or in combination with another plan or project is likely to have a significant effect on the European site.

This screening assessment considers European sites designated under Directives 92/43/EEC and 2009/147/EC. Of the sites considered no distinction is drawn between candidate sites and designated sites in this document.

The proposed development will be screened against those European sites in order to appraise whether, firstly, the project is directly connected with or necessary to the management of the European sites and, secondly, whether it is likely to have a significant effect on any European site.

### 5.2 Ascertaining Whether Impact Pathways Exist

The possibility of significant effects is considered using the source-pathway-receptor model. 'Source' is defined as the individual elements of the proposed works that have the potential to affect the identified ecological receptors. 'Pathway' is defined as the means or route by which a source can affect the ecological receptor. 'Ecological receptor' is defined as the Special Conservation Interests (for SPAs) or Qualifying Interests (of SACs/cSACs) for which conservation objectives have been set for the European sites under consideration. Each element can exist independently however an effect is created when there is a linkage between the source, pathway and receptor.

Possible effects are discussed under four themes:

- Habitat loss
- Water quality and habitat deterioration
- Aerial noise and visual disturbance
- Collision risk
- Barrier effects

## 5.3 Possible Effects

### 5.3.1 Habitat Loss

The vast majority of the Application Site, including all of the proposed turbine locations, lies outside of any European site. The proposed development will however involve works within the boundary of both the West of Ardara/Maas Road SAC and the River Finn SAC.

The West of Ardara/Maas Road SAC lies within the redline boundary of the proposed development within the grid connection route section, which will cross the SAC at the Stracashel River via an existing private access road which services the Tievebrack Eirgrid Station. This underground cable grid connection will be installed using an HDD methodology and as such will not give rise to any loss of habitat within the West of Ardara/Maas Road SAC.

The River Finn SAC lies within the redline boundary of the proposed development within a short section of the local road L-6743-2 between the T1 and T2 access and associated cabling in addition to a short section of the proposed new road within Coillte commercial forestry lands, to the east of local road L-6743-2. Works within these areas will include the movement of construction traffic, the laying of cabling within the roadbed and the construction of a new road which will utilise an existing bridge structure. The proposed development will therefore not give rise to the loss of any areas of watercourse, or semi-natural habitat which form a part of the River Finn SAC.

The proposed forestry compensation planting will not be undertaken within, or in proximity to a European Site. It is therefore not considered that this aspect of the proposed development has potential to give rise to any likely significant effects through habitat loss.

Consideration is given in the next sections as to whether or not the proposed development could indirectly affect the habitats of the above European sites which lie in close proximity to the proposals, either at construction or operational phase. In addition, some aspects of the proposed development could give rise to indirect effects on qualifying habitats or species of a range of European sites further afield and these potential effects are also considered below. However, on the basis that the proposals will not give rise to any direct habitat loss within any European site it is considered that likely significant effects will not arise to any European Sites as a result of direct habitat loss associated with the proposed development.

### 5.3.2 Water Quality and Habitat Deterioration

As discussed above and at Table 4.1, the proposed development site lies adjacent and hydrologically connected to a number of European sites, namely the West of Ardara/Maas Road SAC, River Finn SAC, the River Foyle and Tributaries SAC and Lough Foyle SPA (NI and RoI). These SACs are designated in part, on account of the supported populations of freshwater species and habitats which are sensitive to impacts associated with water quality and habitat deterioration.

In the case of West of Ardara/Maas Road SAC freshwater qualifying interests which are sensitive to water quality and habitat deterioration effects include freshwater pearl mussel, salmon and otter. Further qualifying interests include a number of terrestrial and coastal habitats and species which are either not hydrologically linked to the proposals or are coastal habitats which lie downstream of the proposed development but are located at a distance of at least 21.1km downstream of the site. At this location flows of around 92.5m<sup>3</sup>/s arise from a catchment comprising an area of 126km<sup>2</sup>. Over such a distance and in the context of such supported flows originating across the large catchment, in addition to mixing in the energetic tidal marine environment, any potential water quality and habitat deterioration effects arising as a result of

the proposed development are likely to be undetectable at the point at which they interact with these coastal habitats which form qualifying interests for the SAC, such as estuaries, mudflats and sandflats and saltmarsh habitats.

In the case of the River Finn SAC freshwater qualifying interests which are sensitive to water quality and habitat deterioration effects include salmon and otter. Further qualifying interests include a number of terrestrial habitats in addition to Oligotrophic waters, which are not hydrologically linked to the proposed development as these features are not freshwater habitats or do not lie downstream of the site.

In the case of the River Foyle and Tributaries SAC freshwater qualifying interests which are sensitive to water quality and habitat deterioration effects include salmon, otter and the freshwater habitat Watercourses of plain to montane levels with the Ranunculion fluitantis Callitriche-Batrachion vegetation. It is noted that while the Application Site is hydrologically connected to the River Foyle and Tributaries SAC via the Stranagoppogue River and subsequently the River Finn, this is following a hydrological pathway of some 51km at which point the supported flows to which the Stranagoppogue River contribute are around 252m<sup>3</sup>/s with the total catchment inclusive of an area of 472km<sup>2</sup>. It is considered likely that in the context of such a catchment and the supported flows any inputs arising as a result of the proposed development are likely to be subject to significant dilution, it is noted however that such dilution has not been relied on for the purposes of this assessment in the case of the proposed wind farm development.

Lough Foyle SPA (NI and RoI) is designated on account of the supported populations of waders, waterfowl and wetlands. This European Site lies at a great distance downstream of the proposed development, via the Stranagoppogue River and River Finn. The Lough drains a catchment of approximately 3,700km<sup>2</sup> and supports an energetic tidal environment. Inputs potentially arising as a result of the proposed development are likely to be subject to significant dilution and mixing to background levels. Furthermore, the SPA is not noted as being particularly sensitive to sedimentary inputs, with potential water quality impacts being associated with chemical inputs, as set out in the conservation objectives for the sites. Given that the potential for chemical inputs associated with the proposals is fairly minimal, and associated with relatively small volumes of petrochemical fuels, oils and other chemicals for use during construction phase, it is not anticipated that the proposals would have potential to give rise to any likely significant effects upon this site through water quality and habitat deterioration.

The proposed compensatory forestry planting site, already subject to an afforestation license approval, lies within the catchment of the Lung River, a watercourse which lies within the Tullaghanrock SAC and Callow Bog SAC and upstream of the Lough Gara SPA which lies 34km downstream of the site via the Lung River. Given the qualifying interests of the Tullaghanrock Bog SAC and Callow Bog SAC, limited to terrestrial raised bog habitats which do not lie downstream of the proposals, as they lie adjacent to and upstream of the Lung River, it is not considered that the proposed development would have potential to give rise to any likely significant effects upon the Tullaghanrock Bog SAC or Callow Bog SAC.

Lough Gara SPA is designated on account of the supported populations of whooper swan and Greenland white-fronted goose. As stated above, this SPA lies 34km downstream of the proposed compensatory forestry planting site, via the Lung River. This watercourse, at the point at which it flows into the SPA drains an area of approximately 233km<sup>2</sup> and supports flows of around 37m<sup>3</sup>/s. The special conservation interests of this site are not noted as being particularly sensitive to water quality effects, such as sedimentation, which have some limited potential to arise as a result of the proposed compensatory forestry planting. On the basis that any such inputs would be subject to significant dilution in the Lung River and would be relatively minor given the small-scale of the proposed forestry planting, it is not envisaged that the proposed

compensatory forestry planting would give rise to any likely significant effects through water quality and habitat deterioration upon the Lough Gara SPA.

No further European sites lie downstream of or are hydrologically connected to the Application Site and as such likely significant effects through water quality effects are limited to the aforementioned SACs.

The proposed development will involve significant works with potential to give rise to release of materials into the hydrological environment throughout the construction stage.

Such works include:

- Felling of commercial forestry to facilitate the delivery of turbine T1 and a section of the proposed new road.
- Excavations to facilitate installation of turbines in 8 no. locations;
- Provision of hardstanding including turbine foundations, access tracks and proposed sub-station;
- Construction of proposed sub-station;
- Excavations to facilitate delivery of the proposed grid connection;
- Watercourse crossings associated with the delivery of the proposed grid connection;
- Delivery of the proposed new road, including watercourse crossings;
- Movement of construction vehicles and plant throughout the proposed development site; and
- Decommissioning works and associated site reinstatement.

These works which will take place within areas which lie in proximity to the Stracashel River or the Stranagoppogue River or will ultimately drain into these watercourses, via hydrological pathways of various lengths.

These works will give rise to the potential likely significant effects through:

- Accidental release of highly alkaline contaminants from concrete and cement during the construction of hardstanding and other structures;
- General water quality impacts associated with works machinery, infrastructure and on-land operations including the temporary storage of construction materials, oils, fuels and chemicals;
- Sedimentation through release of sediments, soils and other materials from proposed excavation works and vehicular movements within the site into the freshwater environment, including through run off and during works associated with watercourse crossings;
- The release of HDD drilling fluid into watercourses through inadvertent 'break-out' or rupture, such fluids include bentonite clay which may give rise to sedimentation and environmental toxicity; and
- Potential operational spillage of cooling oils associated with the sub-station site, or the use of chemical fuels and lubricants utilised in routine turbine maintenance throughout the operational phase.

It is therefore considered that in the absence of mitigation measures the proposals will give rise to likely significant effects in respect of potential water quality and habitat deterioration effects upon the West of Ardara/Maas Road SAC, River Finn SAC and River Foyle and Tributaries SAC, at construction and operational stage, in the absence of further analysis or the application of mitigation measures.



In regard to the potential for peat slippage associated with the proposed development, and any resulting sedimentation effects, it is noted that the site has been subject to detailed soil assessment, by Keohane Geological & Environmental Consultancy. This analysis included a desk-based assessment and field survey incorporating the following collected data:

1. Measurement of peat depth using a metal probe.
2. Measurement of un-drained shear strength of the peat.
3. Measurement of unconfined compressive strength of the bedrock, where exposed.
4. Visual description of the soil, peat, rock, topography, drainage and ground conditions.
5. Location of wells used for drinking water supply.

The findings of this assessment concluded that in general peat depths across the wind farm site were less than 1m deep. While some discrete areas of peat were recorded as being up to 5.4m deep, these were recorded to be located within relatively flat narrow basins which are restricted by ridges of bedrock, which was also tested as being extremely strong.

A recent highly publicised peat slippage event which occurred at a wind farm development at Meenbog, which occurred on an area of unbroken deep peat, up to 4m depth and up to 15ha in size and resulted from the creation of a floating road. In contrast the conditions within the proposed Graffy Windpark site are vastly different, with shallow peat depths across sloped areas which are broken up by areas of bedrock. Furthermore the proposals will not utilise floating roads, with areas of deep peat to be avoided by proposed access tracks.

It is assessed that the risk of a peat slippage occurring at the Graffy Windpark site is negligible. No likely significant water quality or habitat deterioration effects are therefore predicted to arise as a result of the proposed development through peat slippage.

### 5.3.3 Aerial Noise and Visual Disturbance

The proposed development will give rise to significant aerial noise and visual disturbance during the construction phase, through the movement of vehicles plant and staff throughout the Application Site, in addition to noise arising through construction.

Both the West of Ardara/Maas Road SAC and River Finn SAC lie within the boundary of the proposed development. These sites support a single qualifying interest which may be vulnerable to aerial noise and visual disturbance as a result of the proposed development, namely otter. It is noted that the conservation objectives for these sites (NPWS 2015a and 2017a) illustrate the known commuting areas of the species within the SACs. Neither of these distribution maps show otter commuting areas within the Stranagoppogue River or the Stracashel River or within proximity to the proposed development. It is considered likely however that these areas of watercourse are utilised by otter while not representing areas of core habitat for the distribution of this species within the SACs. The habitat survey of the proposed development site, undertaken by RPS in 2020 did not record the presence of any potential otter holts within 150m of any part of the proposed development. Proposed works in close proximity to the relevant watercourses will be limited to the installation of the proposed grid connection, any resultant disturbance therefore will be of extremely limited scale and duration. On this basis it is considered that the proposed development would have no potential to give rise to a significant aerial noise and visual disturbance effect upon the West of Ardara/Maas Road SAC or the River Finn SAC.

A number of SPAs are present within the ZOI of the proposed scheme, namely the Derryveagh and Glendowan Mountains SPA, designated on account of the supported populations of breeding upland species, and Lough Nillan Bog SPA, designated on account of the supported populations of breeding upland birds and wintering white-fronted goose. These SPAs are located 2.4km and 1.7km from the proposed development respectively. On the basis that these SPAs are separated from the proposed development by significant areas of upland habitat and given the relative levels of disturbance which are likely to arise during construction it is considered that there is no potential for the proposed development to give rise to any aerial noise or visual disturbance upon any nearby SPA directly through aerial noise and visual disturbance during construction or operation.

Avi-faunal survey of the site did not record the site or its surrounds as being important for SCI bird species from populations likely to be originating within or associated with the relevant SPAs within the ZOI of the development, with the exception of Merlin, discussed below.

It is noted that a single pair of breeding merlin were recorded in both 2019 and 2020, within close proximity to the proposed development site respectively, with these sites not used by nesting merlin in 2021. Merlin are included as an SCI species for both the Derryveagh and Glendowan Mountains SPA and Lough Nillan Bog SPA. The recorded breeding pair of this species is likely to be vulnerable to aerial noise and visual disturbance at the construction stage of the proposed development, given the proximity of the nesting locations utilised by this pair to the site. Aerial noise and visual disturbance to the supported pair of this species could lead to displacement of the pair to an alternative nesting site with potential to give rise to increased resource competition, such as nest site competition, for the species within the Derryveagh and Glendowan Mountains SPA and Lough Nillan Bog SPA.

It is considered that the breeding pair of merlin recorded within proximity to the development proposals in 2019 and 2020 does not comprise a part of the merlin populations of either the Derryveagh and Glendowan Mountains SPA or the Lough Nillan Bog SPA for which the species forms a qualifying interest. A rationale is provided below.

Turning first to the Derryveagh and Glendowan Mountains SPA it is noted that, as set out at Table 4-1, this SPA is located 2.4km to the north of the site boundary. This represents the distance between the closest point of the proposed development site redline boundary and the closest point of the Derryveagh and Glendowan Mountains SPA. In assessing the potential connectivity of merlin populations within the site it is the location of the recorded nest sites which are of relevance, as opposed to the general site boundary. In 2019 and 2020 the recorded nesting locations were situated 3.1km and 3.3km from the closest part of the Derryveagh and Glendowan Mountains SPA respectively. In surveys undertaken subsequently in 2021 the nesting location has moved significantly and is no longer in proximity to the site. These distances, 3.1km and 3.3km respectively, are to the nearest part of the SPA, that being Lough Finn, which is separate from the remainder of the SPA and inclusive of the lake area only. Lough Finn lies 2.5km to the south of the main block of the SPA, that being the upland areas with potential to support nesting merlin. The designated area of Lough Finn is comprised of a large inland waterbody with a single non-forested island and as such is not suitable to support nesting merlin, with only shoreline foraging potential for the species.

On this basis the relevant measurement becomes the distance between the recorded nesting locations and the nearest point of the SPA with potential to support breeding merlin, that being the main block of the Derryveagh and Glendowan Mountains SPA. This distance is 7.1km and 7.3km for the 2019 and 2020 nest sites respectively.

On this basis, and known information regarding the mean nearest neighbour distance, which in Ireland ranges from 3-6km (Norris et al. 2010), it is considered that the nesting pair of merlin within proximity to the site, do not comprise a portion of the 6-11 pairs which form a special conservation interest of the Derryveagh and Glendowan Mountains SPA.

In respect of Lough Nillan Bog SPA, it is noted at Table 4-1 that the distance between this site and the proposed development is 1.7km. This represents the distance between the closest point of the proposed development site redline boundary and the closest point of the Lough Nillan Bog SPA. In this case that is the distance between the proposed grid connection route to the south-west of the wind farm proposals and the SPA. As above, the relative location of the merlin nest sites is the point of relevance to assess potential connectivity. The 2019 and 2020 nesting locations were 5.2km and 5.1km respectively from the SPA boundary at its closest point. On this basis it is considered possible that the pair is rarely present within the SPA boundary but this is relatively unlikely given the spatial separation which is approaching the maximum estimated territory size of 6km, with the mean being generally regarded as lower and around 3-4km (Lusby et al. 2010, Rebecca et al. 1992) with Hardley *et al.* (2009) reporting a range of 0.5-4.5 km between nesting territories. As such it is not considered that the pair represents a portion of the five pairs which comprise the recorded population at Lough Nillan Bog SPA.

On the basis that the pair of merlin breeding in proximity to the proposals is not considered to comprise a part of the population of the Lough Nillan Bog SPA and does not form a part of the population within the Derryveagh and Glendowan Mountains SPA, it is not considered that the proposed development would have potential to give rise to direct aerial noise or visual disturbance impacts upon merlin populations of either of these SPAs.

As stated above, any potential impacts to either the Derryveagh and Glendowan Mountains SPA or Lough Nillan Bog SPA, arising as a result of aerial noise or visual disturbance would be limited to that associated with indirect effects through displacement of the single breeding pair that has been recorded to utilise areas in proximity to the proposed development. Such impacts are considered to arise at the construction and decommissioning phases of the proposals only.

The operational phase of the proposals will involve the operational functioning of the site as an eight-turbine wind farm which has potential to give rise to some very limited aerial noise and visual disturbance within proximity to the completed development including the occasional movement of vehicles for routine maintenance, which is not anticipated to add significantly to background levels of anthropogenic disturbance in the area, in addition to that generated by the turbines themselves. It is noted that the nesting pair of merlin recorded in proximity to the site appear to be relatively tolerant to human disturbance, nesting in close proximity to a public road and a working farm. The pair was also recorded to principally utilise flight-lines outside of a 500m buffer surrounding the proposed turbine locations during bird survey works undertaken at the site, as such it is not considered that the proposed turbine locations will be located within the core foraging area for the recorded pair of merlin.

RSPB mapped and written guidance in relation to birds and onshore wind energy development in England (RSPB 2009), includes written guidance for merlin which recommends that individual turbines within are relocated to at least 200m to 500m from merlin nest locations, the proposed development will not involve the placement of any turbine locations within 500m of a recorded merlin nest site. While displacement effects of operational phase wind farms upon merlin are relatively poorly understood, Woodrow Sustainable Solutions Ltd. in surveying a number of wind farm sites, post construction, have recorded merlin pairs nesting within 500m and 200m of operational wind turbine location. Furthermore, the nesting pair was absent from the previously utilised nest locations during surveys undertaken in 2021 and on this basis it is

considered that other suitable nesting locations and associated foraging areas are present within the wider locality and any displacement effects which could arise (although not envisaged) would be local and minor and highly unlikely to give rise to any indirect effects upon populations of this species within nearby SPAs.

Given all of the above information it is considered highly unlikely that the proposed development at the operational phase would have potential to give rise to likely significant displacement effects upon merlin, through aerial noise and visual disturbance at the operational stage.

As set out above in respect of construction stage disturbance, European sites in close proximity to the proposed wind park, namely the West of Ardara/Maas Road SAC and River Finn SAC support a single qualifying species, otter, which is vulnerable to aerial noise and visual disturbance, it is not considered however that significant disturbance would arise upon this species given the rationale set out above in respect of construction phase effects in addition to the relative magnitude of such effects at operational stage which would be minimal.

It is not considered that operational phase aerial noise and visual disturbance, associated with occasional maintenance to the turbines and sub-station, which would require similar traffic movement to that currently supported along the local road, would have likely significant aerial noise or visual effects upon merlin. As such, displacement effects as set out above are not considered relevant to the operational stage of the proposed development.

In the absence of mitigation measures the proposals will give rise to likely significant effects in respect of aerial noise and visual disturbance, and subsequent displacement effects upon the Derryveagh and Glendowan Mountains SPA and Lough Nillan Bog SPA, at construction stage, in the absence of further analysis or the application of mitigation measures.

#### 5.3.4 Collision Risk

The proposed development, at construction and operational stage, will involve the installation and operation of eight no. turbines as described at Section 3 of this report. The installation and operation of these turbines presents the potential for collision with bird species associated with nearby and distant SPAs.

The proposed development site and its surrounds have been subject to significant bird survey works by Woodrow Sustainable Solutions Ltd. These bird surveys had particular regard to special conservation interest (SCI) bird species associated with the SPAs within the projects zone of influence, in addition to flight lines used by migratory species which may be associated with SPAs across the country.

As set out above at section 4.2.2 these surveys did not record the site of the proposed wind park and its surrounds as being of importance for SCI bird species populations associated with nearby SPAs, including those listed at Table 4.1, with limited migration flight lines recorded within the site and survey area. The detailed findings of the surveys were utilised to produce a collision risk model for the proposed wind park. This model identified the likely collision rates arising as a result of the operation of the proposed wind park, in light of the survey findings (Appendix II).

SCI bird species identified from SPAs within the Zol of the proposed development, with the exception of the Lough Foyle SPAs (NI and RoI) which are considered to lie outside the Zol for collision effects, are summarised below in respect of the survey findings and the results of the collision risk model, in Table 5.1, below, this analysis being undertaken by Woodrow Sustainable Solutions Ltd.

**Table 5-1: SCI Bird Species and the survey and Collision Risk Model Results**

SCI Bird Species	Relevant SPA	Survey findings and Collision Risk Model Results
[A098] Merlin <i>Falco columbarius</i>	Lough Nillan Bog SPA Derryveagh and Glendowan Mountains SPA	Single pair breeding on site, with wintering presence of the species. Model results were for 0.73 collisions every 30 years, in a worst-case scenario (N133 Turbines) primarily due to the typical flight height of the species which is below the proposed turbine sweep. This risk is considered to be <b>not significant</b> as it would indicate no collisions will occur over the lifetime of the project.
[A140] Golden Plover <i>Pluvialis apricaria</i>	Lough Nillan Bog SPA Derryveagh and Glendowan Mountains SPA	No records of the species were recorded within the site or survey area. Several observations were recorded outside of this area. Further analysis through collision risk modelling was not considered necessary. Collision risk is considered to be <b>not significant</b> .
[A395] Greenland white-fronted goose <i>Anser albifrons flavirostris</i>	Lough Nillan Bog SPA Sheskinmore Lough SPA Durnesh Lough SPA	The species was not recorded during the surveys undertaken across the two years. Further analysis through collision risk modelling was not considered necessary. Collision risk is considered to be <b>not significant</b>
[A466] Dunlin <i>Calidris alpina schinzii</i>	Lough Nillan Bog SPA Derryveagh and Glendowan Mountains SPA	The species was not recorded during the surveys undertaken across the two years. Further analysis through collision risk modelling was not considered necessary. Collision risk is considered to be <b>not significant</b>
[A001] Red-throated diver <i>Gavia stellata</i>	Derryveagh and Glendowan Mountains SPA	The species was not recorded during the surveys undertaken across the two years. Further analysis through collision risk modelling was not considered necessary. Collision risk is considered to be <b>not significant</b>
[A103] Peregrine <i>Falco peregrinus</i>	Derryveagh and Glendowan Mountains SPA	The species was recorded on only a small number of occasions in proximity to the site. Further analysis through collision risk modelling was not considered necessary. Collision risk is considered to be <b>not significant</b>
[A045] Barnacle Goose <i>Branta leucopsis</i>	Inishkeel SPA	The species was not recorded during the surveys undertaken across the two years. Further analysis through collision risk modelling was not considered necessary. Collision risk is considered to be <b>not significant</b>
[A038] Whooper swan <i>Cygnus cygnus</i>	Durnesh Lough SPA	The species was recorded to utilise a migration flight line in proximity to the site, in small numbers, during the surveys undertaken across the two years. Further analysis through collision risk modelling was undertaken. Collision risk was modelled to be 0.76 collisions every 30 years in a worst-case scenario (N133 Turbines). This risk is considered to be <b>not significant</b> as it indicates that no collisions will occur over the lifetime of the project.

On the basis of the above findings, in addition to the separation of the proposed windfarm site from nearby SPAs, which rule out the potential for significant impacts upon bird populations associated with any SPA through collision risk associated with these populations or flight lines of migratory species which may be associated with SPAs across Ireland. Likely significant effects are therefore excluded at the screening stage in the absence of further consideration or the application of mitigation measures.

### 5.3.5 Barrier Effects

The proposed development, at operational stage has potential to give rise to barrier effects associated with the movement of SCI bird species, both between relevant nearby SPAs and on passage during migration. Where the proposed wind park acts as a barrier to migration of SCI bird species it has potential to give rise to displacement, avoidance and subsequently mortality through exhaustion or abandonment of SCI bird species populations.

The site and its surrounds has been shown not to comprise an important migration flight line for any SCI bird species, furthermore the proposed development at the operational stage has only very limited potential to give rise to collision risk to these SCI bird species.

On the basis of the above it is not considered that the proposed development will not give rise to any likely significant effects through barrier effects upon SCI bird species, in the absence of further consideration or the application of mitigation measures.

## 5.4 In-Combination Effects

Article 6(3) of the Habitats Directive and Irish national law require that in-combination effects with other plans or projects are considered. The significance of any identified combined effects of the proposed development and other past, present or reasonably foreseeable future plans or projects must also be evaluated. On this basis, a range of other projects were considered in terms of their potential to have in-combination effects with the Proposed Project. Those plans and projects are set out within Table 5.1 below.

**Table 5-2:** In-combination impacts with other plans, programmes and projects.

Plan/Project	Key Policies/Objectives/Issues	Assessment of In-Combination Effects
<b>National Plans and Programmes</b>		
EU Nitrates Directive (91/676/EEC)	Ireland's Nitrates Action Programme was designed to prevent pollution of surface waters and groundwater from agricultural sources and to protect and improve water quality, giving effect to the EU Nitrates Directive.	The implementation of the Nitrates Action Programme will ensure compliance with the EU Nitrates Directive (91/676/EEC).
National Spatial Strategy (NSS) (2002 to 2020)	Objectives of the NSS are to achieve a better balance of social, economic and physical development across Ireland, supported by more effective planning.	No Appropriate Assessment Screening Statement or Natura Impact Report has been completed for the National Spatial Strategy for Ireland 2002-2020. It is considered that this plan will not have any adverse effects on SAC QI habitats or species, or SPA SCI bird species, due to the fact that any development arising out of the NSS will have to adhere to the policies and objectives of land use development plans to ensure that planning applications comply with proper planning and sustainability and with the requirements of relevant EU Directives and environmental considerations, there is no potential for adverse in-combination effects on European Sites.

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National Biodiversity Plan 2017-2021	The plan aims to prevent and eliminate the causes of biodiversity loss and maintain and enhance current levels of biodiversity	The Overarching Vision of this Plan is: "That biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally."
NPWS Conservation Plans and Conservation Objectives	Conservation plans have been drawn up for a number of sites. Such plans include descriptive information and a management framework section that outlines objectives and strategies. However, these objectives may have been superseded by the site's Conservation Objectives.	The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. Generic and site-specific conservation objectives aim to define favourable conservation condition for a particular habitat or species at that site to ensure the ecological integrity of these sites is maintained or restored. The resultant effects of conservation objectives are a net positive and there is no potential for adverse in- combination effects on European Sites.
Inland Fisheries Ireland (IFI) Corporate Plan 2016-2020	The main objectives of the IFI Corporate Plan 2016-2020 are as follows: <ul style="list-style-type: none"> <li>• To improve the protection and conservation of the resource.</li> <li>• To develop and improve wild fish populations.</li> <li>• To increase the number of anglers.</li> <li>• To generate a better return for Ireland from the resource</li> </ul>	Implementation and compliance with the goals of the IFI corporate plan will result in net positive in-combination effects to European sites.
Groundwater Pollution Reduction Programmes	Programmes are being implemented the River Basin Management Plans in accordance with international and national legislation to satisfy the criteria set out under the Water Framework Directive.	The implementation of Groundwater and Surface water Pollution Reduction Programmes will ensure compliance with the EU Groundwater Directive (2006/118/EC) and the EU Water Framework Directive 2000 (2000/60/EC) Compliance will result in net positive in-combination effects to European sites.
Surface Water Pollution Reduction Programmes	These programmes and their associated legislative mechanisms are identified within the Pollution Reduction Plans of the Register of Plans and Programmes Background Document to the River Basin Management Plans in accordance with Article 13(3) of the European Communities (Water Policy) Regulations 2003 (S.I. No 722 of 2003) <sup>8</sup> .	
Catchment Flood Risk Assessment and	Catchment Flood Risk Assessment and Management (CFRAM) Studies and their product – Flood Risk Management Plans (FRMPs) – are at the core of the national policy for flood risk management and the	The programme of measures resulting from the CFRAM study may perpetuate significant effects on European sites in view of their conservation objectives. However, the overarching policies and objectives of the landuse plans include the requirement for any development

<sup>8</sup> [http://www.wfdireland.ie/docs/Register\\_Plans\\_Programmes.pdf](http://www.wfdireland.ie/docs/Register_Plans_Programmes.pdf)

Management Study	<p>strategy for its implementation. The aim of the CFRAM Studies is to:</p> <ul style="list-style-type: none"> <li>▪ assess flood risk, through the identification of flood hazard areas and the associated impacts of flooding;</li> <li>▪ identify viable structural and non-structural measures and options for managing the flood risks for localised high-risk areas and within the catchment as a whole; and</li> <li>▪ prepare a strategic Flood Risk Management Plan (FRMP) and associated Strategic Environmental Assessment (SEA) that sets out the measures and policies that should be pursued to achieve the most cost effective and sustainable management of flood risk.</li> </ul>	<p>taking place to undergo Screening for Appropriate Assessment and/or Habitats Directive Assessment where necessary. No negative in-combination effects to European sites are expected.</p>
<b>Regional Plans and Programmes</b>		
National Planning Framework	<p>The Department of Housing Planning and Local Government, on behalf of the Government, has prepared and published the finalised National Planning Framework (NPF). The objective of the NPF is to establish a broad national plan for the Government in relation to the strategic planning of urban and rural areas, to secure regional development, and to secure the co-ordination of regional spatial and economic strategies and city and county development plans.</p>	<p>A Natura Impact Statement was prepared to assess the impact of the draft National Planning Framework. This assessment took a precautionary approach and assessed the general impacts that would be anticipated from the NPF providing the necessary inclusion of mitigation measures and guiding principles at the strategic level of the plan. As a precautionary approach, the NPF included environmental protection criteria which require avoidance of European Sites in the first instance and reiterated the legislative requirement for AA screening and full AA where potential for effects exists. As a result no negative in-combination effects are expected.</p>
River Basin Management Plans (RBMP)	<p>RBMPs were prepared for each of the eight River Basin Districts (RBDs). They were valid for a six year period and ran from 2009-2014. The plans summarised the waterbodies that may not meet the environmental objectives of the WFD by 2015 and identified which pressures are contributing to the environmental objectives not being achieved. The environmental objectives of the RBMP to be achieved are as follows:</p> <ul style="list-style-type: none"> <li>▪ Prevent deterioration;</li> <li>▪ Restore good status;</li> <li>▪ Reduce chemical pollution; and</li> <li>▪ Achieve water related protected areas objectives.</li> </ul>	<p>Implementation of the environmental objectives of the RBMPs and compliance with the EU Water Framework Directive 2000 (2000/60/EC) and any associated Programmes of Measures, or any such plans that may supersede the RBMP, shall only be permitted where it can be clearly demonstrated that the proposal would not have an unacceptable impact on the water environment, including surface waters, groundwater quality and quantity, river corridors and associated wetlands, estuarine waters and coastal waters. Compliance with result in net positive in-combination effects to European sites. There is no potential for adverse in-combination effects on European Sites.</p>
County Development Plans	<p>The Donegal County Development Plan (2018-2024) sets out a framework for the sustainable physical development of the county while considering the conservation and protection of the built and natural environment. The legal basis for the plans</p>	<p>Policies and objectives of County Development Plans ensure that local planning applications must comply with the requirements of relevant EU Directives and environmental considerations. The plan has been subject to Appropriate Assessment which concluded</p>



is set out in the Planning and Development Acts 2000, as amended.

that, subject to the application of mitigation measures, there is no potential for the plan to give rise to adverse impacts upon integrity to any European site. There is therefore no potential for adverse in- combination effects on European Sites with the proposed project.

Planning Applications	There are no planning applications approved or pending in close proximity to the proposed development, however there are a number of planning applications approved or pending within the sub-catchment in which the proposed development is located. The applications are for the extension, renovation and construction of dwellings, in addition to other agricultural permissions.	Adherence to the overarching policies and objectives of the Donegal County Development Plan 2018-2024 will ensure that local planning applications and subsequent grant of planning will comply with the requirements of relevant environmental legislation including the WFD and Habitats Directive.
Integrated Pollution Control (IPC) and Industrial Emissions Licensing (IEL)	A search was undertaken of Integrated Pollution Control and Industrial Emissions licences within Donegal. There are no licenced facilities within the vicinity of the proposed development. A number of licenced activities will take place within the catchments of the River Finn and therefore have potential to act in-combination with the proposals, namely those granted to Glenmore Generation Ltd., Ballybofey, McCools Sawmills Ltd., Ballybofey and Aurivo Consumer Foods Ltd., Killygordon.	The EPA is responsible for monitoring emissions and dealing with any infringements on IPC licences. All emissions must be within set limits which must not be contravened. Where relevant these applications have been accompanied by AA and subject to the application of mitigation measures should not give rise to any adverse effects to any European sites. On this basis it is not considered that there is potential for in-combination effects with the proposed development.
Wind Farm Developments	A search was undertaken to establish the locations of other windfarms within the wider Zol of the proposed development. There are at least 26 windfarms in Donegal, with further windfarms in the neighbouring counties.	Each of these wind farm developments has been assessed in light of their potential to give rise to significant impacts upon birds associated with SPAs within their respective Zols. Given the findings of bird surveys undertaken in association with the proposed development and the resultant rationale given at section 5.3.4 of this document, it is considered that there is no potential for in-combination effects when considered alongside other wind farm projects in the Zol and beyond.
Active Quarries	There appear to be no active quarries within proximity to the proposed development or within the catchments of either the Stracashel River or the River Finn within the Zol of the proposed development.	It is not considered that the proposals have any potential to act in combination with any active quarries.
Forestry Operations	The proposed development lies in proximity to a number of areas of plantation forestry furthermore the catchments of both the Stracashel River and River Finn support significant areas of both private and public forestry throughout.	Coillte, who manage public commercial forestry on behalf of the state, outline within their North-West business unit Area Strategic Plan 2021-2024 (Coillte 2021)(which covers the relevant SAC catchments and the whole of Donegal), a range of considerations which will be taken into account to address the potential for effects upon European sites arising as a result of any proposed forestry operations. Measures to reduce or remove the potential for impacts to watercourses include the use of buffer zones around watercourses, and the use of sensitive drainage and cultivation practises. Forestry operations which are to take place within Natura 2000 sites will be subject to a Habitats Regulations Assessment, prior to being carried out.

Such measures are likely to eliminate the potential for significant adverse effects to arise upon nearby Natura 2000 sites.

The majority of significant felling operations, whether associated with public or private forests, require a felling license granted by the Forest Service of the Department of Agriculture, Food and the Marine. Such felling licenses are subject to a screening for appropriate assessment where relevant and, where potential for a likely significant effect exists, a Natura Impact Statement assessment. These assessments should identify any potential adverse effects which may arise as a result of the proposals and provide details on any prescribed mitigation to ensure that the proposals will not lead to a significant adverse effect upon any Natura 2000 site.

It is considered that there remains potential for minor in-combination effects through small scale felling and associated sedimentation across the relevant catchments.

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## 5.5 Conclusion of the Screening Assessment

Through an assessment of the source-pathway-receptor model, which considered the Zol of effects from the proposed development and the potential in-combination effects with other plans or projects, the following findings were reported in by RPS (2020):

- The potential for LSEs arising through direct habitat loss to any European site can be ruled out at the screening stage in the absence of further information or the application of mitigation measures;
- In the absence of further information or the application of mitigation measures, the potential for LSEs arising through water quality and habitat deterioration to the West of Ardara/Maas Road SAC, River Finn SAC and the River Foyle and Tributaries SAC cannot be ruled out;
- In the absence of further information or the application of mitigation measures, the potential for LSEs to the Lough Nillan Bog SPA and Derryveagh and Glendowan Mountains SPA arising through indirect effects associated with aerial noise and visual disturbance to merlin cannot be ruled out at the screening stage;
- The potential for LSEs arising through collision risk to any European site can be ruled out at the screening stage, in the absence of further information or the application of mitigation measures;
- The potential for LSEs arising through barrier effects to any European site can be ruled out at the screening stage, in the absence of further information or the application of mitigation measures

For the purposes of this NIS, RPS has assumed that DCC would agree that the proposed development 'Screens in' to the requirement for AA; although it is ultimately the responsibility of the competent authority to make the final determination.

## 6 APPROPRIATE ASSESSMENT – STAGE 2: NATURA IMPACT STATEMENT

The requirement to carry out a NIS followed on from the conclusion arrived at during the Screening process (See **Section 5**). In order to determine if the identified source-pathway-receptor linkages could give rise to Likely Significant Effects (LSEs), the following steps are taken:

1. Identification of the information required, including the proposed development, linkages to European sites, and description of relevant European sites;
2. Examination of the site-specific conservation objectives and attributes of QIs/SCIs of relevant European sites; and
3. Prediction of any LSEs of the proposed development, including in-combination effects.

### 6.1 Required Information

#### 6.1.1 Proposed Development

The proposed project has been described at Section 3 of this report.

#### 6.1.2 Linkages to European Sites

The connectivity between the proposed project and all European Sites has been assessed.

The vast majority of works associated with the proposed development will take place outside of any European sites, with lengths of proposed grid connection route and proposed new road being located within the boundary of the West of Ardara/Maas Road SAC and River Finn SAC. In addition the River Foyle and Tributaries SAC is hydrologically linked to the proposals via the Stranagoppogue River. The source-pathway-receptor model for the proposed development is detailed in Table 6-1. Only relevant identified effects are brought forward to the next part of the NIS assessment.

The QIs of the relevant European Sites are described, with regard to source-pathway-receptor link(s) within the Zol of LSE of the proposed development, in **Table 6-2** and **Table 6-3**. QIs with identified source-pathway-receptor link(s) are carried forward for further assessment; while QIs and SCIs with no identified source-pathway-receptor link(s) are not assessed further in this NIS.



**Table 6-1. Source-Pathway-Receptor Model for the Proposed Project**

Source of Potential Effect	Description of Effect Pathway	Potential Zone of Influence of Effect	Potential Relevance of Effect to AA
Surface water and run-off carrying suspended silt, concrete, cement or other pollutants and chemicals into local watercourses, or spillage of such substances into these watercourses.	Silt, concrete, cement or other pollutants may enter nearby watercourses through surface water run-off and via existing drainage channels, furthermore works in close proximity to watercourses have potential to give rise to direct accidental spillage of such substances into a single watercourse comprising part of the West of Ardara/Maas Road SAC or other watercourses flowing into this SAC in addition to the River Finn SAC and River Foyle and Tributaries SAC.	The Zone of Influence of effects from contaminated surface water is difficult to accurately estimate as it will depend on numerous factors including the type and concentration of pollutants, assimilative capacity of receiving waters, and time of year (related to water levels).	<b>Relevant.</b> It has been determined that silt, concrete, cement and other pollutants including concrete/petrochemical fuel, could enter surface waters, Stracashel River, Stranagoppogue River and other minor watercourses during the proposed project. In the absence of mitigation measures to control surface water pollution during construction of the proposed development, the potential for LSEs a number of downstream European Sites cannot be ruled out.
Aerial noise and visual disturbance to merlin through construction works, including movements of plant and staff.	Aerial noise and visual disturbance to merlin breeding in proximity to the site has potential to give rise to displacement of the breeding pair leading to increased resource competition for merlin populations within the nearby Lough Nillan Bog SPA and Derryveagh and Glendowan Mountains SPA.	On a precautionary basis, it is envisaged that displacement of a single breeding pair would have potential to impact upon SPAs for which merlin comprise an SCI within 15km of the proposed development. In reality it is considered that other nesting opportunities for the species are likely to be available within relative proximity to the site.	<b>Relevant.</b> It has been determined that construction phase operations leading to aerial noise and visual disturbance has potential to result in the displacement of merlin with LSEs to nearby SPAs where merlin are present not ruled out in the absence of mitigation.



**Table 6-2. Proposed Development Link(s) with relevant SACs and SPAs.**

European Site	Qualifying Interest	Relevance to the Zone of Source-Pathway-receptor /link(s)
		Influence of Likely Significant Effects of the Proposed Development
West of Ardara/Maas Road [1106] Salmon <i>Salmo salar</i> SAC [1355] Otter <i>Lutra lutra</i> [000197]	[1029] Freshwater pearl mussel <i>Margaritifera margaritifera</i>	The proposed works will take place within areas of land which drain into minor watercourses flowing into the Stracashel River, which forms a part of the SAC. Furthermore a short section of the proposed grid connection will cross the Stracashel River, via an existing roadbridge, within the SAC itself.
	1130] Estuaries [1140] Mudflats and sandflats not covered by seawater at low tide [1160] Large shallow inlets and bays [1210] Annual vegetation of drift lines [1330] Atlantic salt meadows (Glaucopuccinellietalia Maritimae) [1410] Mediterranean salt meadows (Juncetalia maritima [2110] Embryonic shifting dunes [2120] Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2140] Decalcified fixed dunes with Empetrum nigrum [2150] Atlantic decalcified fixed dunes (Calluno-Ulicetia)	These qualifying interests are not hydrologically linked to the proposals, given their terrestrial nature or their location within the SAC which does not lie downstream of the proposals. Other QIs which are estuarine or marine in nature, which may lie downstream of the proposed development, are situated at a distance of at least 21.1km downstream of the proposals.
	<b>No link identified:</b> In the context of the likely dilution which would occur across the 21.1km hydrological pathway, or given the lack of hydrological connection to the qualifying interest it is considered that there is no potential for likely significant effects resulting from water quality and habitat deterioration associated with the proposals upon these QIs.	<b>Link identified:</b> The proposed development will give rise to the potential for water quality and habitat deterioration effects through the release of sediments and pollutants including concrete, cement and petrochemical fuels into the hydrological environment within the SAC. These freshwater qualifying interests are sensitive to hydrological effects and are located downstream of the proposed development.





<div>[2170] Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicicion arenariae</i>) [2190] Humid dune slacks [21A0] Machairs (in Ireland) [3110] Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3130] Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i> [4010] Northern Atlantic wet heaths with <i>Erica tetralix</i> [4030] European dry heaths [4060] Alpine and Boreal heaths [5130] <i>Juniperus communis</i> formations on heaths or calcareous grasslands [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (Important orchid sites) [6410] <i>Molinia</i> meadows on calcareous, peaty or clayey-silt laden soils (<i>Molinion caeruleae</i>) [6510] Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) [7130] Blanket bogs (if active bog) [7150] Depressions on peat substrates of the <i>Rhynchosporion</i> [7230] Alkaline fens [1013] Geyer's whorl snail <i>Vertigo geyeri</i> [1065] Marsh Fritillary <i>Euphydryas aurinia</i> [1365] [Harbour seal <i>Phoca vitulina</i> [1395] Petalwort <i>Petalophyllum ralfsii</i> [1833] Slender Naiad <i>Najas flexilis</i></div>		
River Finn SAC [002301]	[1106] Salmon <i>Salmo salar</i>  [1355] Otter <i>Lutra lutra</i>	
The proposed works will take place within areas of land which drain into minor watercourses flowing into the Stranagoppogue River, which forms a part of the SAC.		<b>Link identified:</b> The proposed development will give rise to the potential for water quality and habitat deterioration effects through the release of sediments and pollutants



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		including concrete, cement and petrochemical fuels into the hydrological environment within the SAC.
[3110] Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> )	These QIs are not hydrologically connected to the proposals, being either terrestrial in nature or upstream of the proposed development.	<b>No link identified:</b> No hydrological link.
[4010] Northern Atlantic wet heaths with <i>Erica tetralix</i>		
[7130] Blanket bogs (if active bog)		
[7140] Transition mires and quaking bogs		
River Foyle and Tributaries SAC [UK0030320]	[3260] Watercourses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation	<b>Link identified:</b> The proposed development will give rise to the potential for water quality and habitat deterioration effects through the release of sediments and pollutants including concrete, cement and petrochemical fuels into the hydrological environment within the SAC.
[1106] Salmon <i>Salmo salar</i>	into the Stranagoppogue River, which contributes to the catchment of the River Foyle and Tributaries	
[1355] Otter <i>Lutra lutra</i>	SAC via the River Finn.	
Lough Nillan Bog SPA [004110]	[A098] Merlin <i>Falco columbarius</i>	<b>Link identified:</b> The proposed development has potential to lead to the displacement of merlin potentially resulting in resource competition with the SPA population.
Lough Nillan Bog SPA [004110]	[A140] Golden Plover <i>Pluvialis apricaria</i> [A395] Greenland white-fronted goose <i>Anser albifrons flavirostris</i> [A466] Dunlin <i>Calidris alpina schinzii</i>	<b>No link identified:</b> These species were not recorded to utilise the proposed development site or its surrounds in any significant capacity.
Derryveagh and Glendowan Mountains SPA	[A098] Merlin <i>Falco columbarius</i>	<b>Link identified:</b> The proposed development has potential to lead to the displacement of merlin potentially



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<div>[004039]</div> <div>Derryveagh and Glendowan Mountains SPA</div> <div>[004039]</div>	<div>breeding pair of merlin at construction stage.</div> <div>resulting in resource competition with the SPA population.</div>
<div>[A001] Red-throated diver <i>Gavia stellata</i></div> <div>[A103] Peregrine <i>Falco peregrinus</i></div> <div>[A140] Golden Plover <i>Pluvialis apricaria</i></div> <div>[A466] Dunlin <i>Calidris alpina schinzii</i></div>	<div>The proposed development will not have potential to give rise to any LSEs upon these SCI species.</div> <div><b>No link identified:</b> These species were not recorded to utilise the proposed development site or its surrounds in any significant capacity.</div>



The NPWS Natura 2000 data forms for the relevant sites, provides status assessments for QIs or SCIs of the relevant European Sites. For each relevant QI or SCI of the relevant sites, the site-level and national conservation status, and the site-level and national treats are detailed in **Table 6-3**.

**Table 6-3.** Conservation Status and Threats to Relevant QIs of Relevant SACs

European Site	Relevant QI	National Conservation Status (and Trend)	Primary Site-level Threats from the Proposed Development
West of Ardara/Maas Road SAC [000197]	[1029] Freshwater pearl mussel <i>Margaritifera margaritifera</i>	<b>Bad (deteriorating)</b>	<b>Siltation and pollution of surface waters and subsequently the freshwater environment</b>
	[1106] Salmon <i>Salmo salar</i>	<b>Inadequate (stable)</b>	<b>Siltation and pollution of surface waters and subsequently the freshwater environment</b>
	[1355] Otter <i>Lutra lutra</i>	<b>Favourable (improving)</b>	<b>Siltation and pollution of surface waters and subsequently the freshwater environment</b>
River Finn SAC [002301]	[1106] Salmon <i>Salmo salar</i>	<b>Inadequate (stable)</b>	<b>Siltation and pollution of surface waters and subsequently the freshwater environment</b>
	[1355] Otter <i>Lutra lutra</i>	<b>Favourable (improving)</b>	<b>Siltation and pollution of surface waters and subsequently the freshwater environment</b>
River Foyle and Tributaries SAC [UK0030320]	[3260] Watercourses of plain to montane levels with the Ranunculus fluitans and Callitriche-Batrachion vegetation	<b>Inadequate (deteriorating)</b>	<b>Siltation and pollution of surface waters and subsequently the freshwater environment</b>
	[1106] Salmon <i>Salmo salar</i>	<b>Inadequate (stable)</b>	<b>Siltation and pollution of surface waters and subsequently the freshwater environment</b>
	[1355] Otter <i>Lutra lutra</i>	<b>Favourable (improving)</b>	<b>Siltation and pollution of surface waters and subsequently the freshwater environment</b>
Lough Nillan Bog SPA [004110]	[A098] Merlin <i>Falco columbarius</i>	<b>Unknown</b>	<b>Indirect aerial noise and visual disturbance and subsequent displacement effects to merlin present on the proposed development site.</b>
Derryveagh and Glendowan Mountains SPA [004039]	[A098] Merlin <i>Falco columbarius</i>	<b>Unknown</b>	<b>Indirect aerial noise and visual disturbance and subsequent displacement effects to merlin present on the proposed development site.</b>

## 62 Conservation Objectives

Conservation objectives for each of the relevant sites are included within **Table 4.1**, above.

These objectives include for site specific conservation objectives in the case of West of Ardara/Maas Road SAC (NPWS 2015a); River Finn SAC (NPWS 2017a); and River Foyle and Tributaries SAC (DAERA 2017), but are generic in respect to the Lough Nillan Bog SAC (NPWS 2021b) and Derryveagh and Glendowan Mountains SPA (NPWS 2021a).

## 63 Predicted Effects

The prediction of potential effects from the proposed development (alone) to the integrity of relevant European sites is presented in this Section.

The prediction of effects upon site integrity (based on the relevant QI or SCIs) of the various relevant European Sites is set out below in **Table 6-4**.



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Table 6-4. Prediction of Effects on Site Integrity (QIs) of relevant SACs and SPAs as a result of the proposed development.

European Site	Relevant QI or SCI	Effect Pathway	Relevant Site-level Threat	Predicted adverse effect triggers to QI or SCI
West of Ardara/Maas Road SAC [000197]	[1029] Freshwater pearl mussel <i>Margaritifera margaritifera</i>	Hydrological impacts	Siltation and pollution of surface waters and subsequently the freshwater environment	<b>Habitat deterioration:</b> Siltation and other water quality effects leading to, mortality, failed recruitment and population decline.
	[1106] Salmon <i>Salmo salar</i>	Hydrological impacts	Siltation and pollution of surface waters and subsequently the freshwater environment	<b>Habitat deterioration:</b> Siltation and other water quality effects leading to, mortality, failed recruitment, prey reduction and population decline.
	[1355] Otter <i>Lutra lutra</i>	Hydrological impacts	Siltation and pollution of surface waters and subsequently the freshwater environment	<b>Habitat deterioration:</b> Siltation and other water quality effects leading to, mortality, failed recruitment, prey reduction and population decline.
River Finn SAC [002301]	[1106] Salmon <i>Salmo salar</i>	Hydrological impacts	Siltation and pollution of surface waters and subsequently the freshwater environment	<b>Habitat deterioration:</b> Siltation and other water quality effects leading to,



mortality, failed recruitment, prey reduction and population decline.

River Foyle and Tributaries SAC [UK0030320]	[1355] Otter <i>Lutra lutra</i>	Hydrological impacts	Siltation and pollution of surface waters and subsequently the freshwater environment	<b>Habitat deterioration:</b> Siltation and other water quality effects leading to, mortality, failed recruitment, prey reduction and population decline.
	[3260] Watercourses of plain to montane levels with the Ranunculus fluitantis and Callitriche-Batrachion vegetation	Hydrological impacts	Siltation and pollution of surface waters and subsequently the freshwater environment	<b>Habitat deterioration:</b> Siltation and other water quality effects leading to, reduction in habitat quality and potentially altered vegetative composition.
	[1106] Salmon <i>Salmo salar</i>	Hydrological impacts	Siltation and pollution of surface waters and subsequently the freshwater environment	<b>Habitat deterioration:</b> Siltation and other water quality effects leading to, mortality, failed recruitment, prey reduction and population decline.
Lough Nilián Bog SPA [004110]	[1355] Otter <i>Lutra lutra</i>	Hydrological impacts	Siltation and pollution of surface waters and subsequently the freshwater environment	<b>Habitat deterioration:</b> Siltation and other water quality effects leading to, mortality, failed recruitment, prey reduction and population decline.
	[A098] Merlin <i>Falco columbarius</i>	Aerial Noise and Visual Disturbance	Displacement of breeding merlin from the proposed development site leading to resource competition within the SPA	<b>Aerial noise and visual disturbance:</b> Construction disturbance



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leading to displacement  
and resource competition.

Derryveagh and Glendowan [A098] Merlin <i>Falco columbarius</i> Mountains SPA [004039]	Aerial Noise and Visual Disturbance	Displacement of breeding merlin from the proposed development site leading to resource competition within the SPA	<b>Aerial noise and visual disturbance:</b> Construction disturbance leading to displacement and resource competition.
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## 7 MITIGATION MEASURES

This section details the proposed mitigation measures in respect of the potential identified adverse effects upon the integrity of the European Sites which may arise as a result of the proposed development via the identified impact pathways namely through water quality and habitat deterioration effects and aerial noise and visual disturbance.

### 7.1 Water Quality and Habitat Deterioration

As set out above water quality and habitat deterioration effects may arise through the input of sediments and pollutants including petrochemical fuels, cements and other chemicals, into the freshwater environment. The proposed development will be undertaken in line with the draft CEMP (Appendix III).

#### 7.1.1 Proposed Wind Park Site: Soil Excavation, Storage and Re-use

The proposed development, which will require the excavation of a total of 47,972m<sup>3</sup> of peat and topsoil substrates in order to facilitate the construction of the turbine bases, surrounding hardstanding and access roads. These substrates will largely be utilised in proposed peat regeneration areas.

In order to ensure that these soils are appropriately managed and to ensure that the risks arising to surface waterbodies, such as run off during flood conditions and any other potential release of sediments is minimised the following mitigation measures will be put in place during the construction phase:

- A draft CEMP has been prepared for the development (Appendix III). This will be updated and finalised prior to the commencement of construction. The CEMP includes, at Chapter 6 a description of the proposed measures to be implemented during earthworks at the site. This is supplemented by CEMP attachments 2 and 3 which address road construction and peat management respectively;
- The civil engineering contractor engaged to construct site tracks and turbine foundations will provide a method statement for all earthworks which will include the measures detailed in the CEMP. This will be reviewed and approved by suitably qualified and experienced geotechnical engineer or engineering geologist, and hydrologist or drainage engineer.
- The developer will appoint an Environmental/Ecological clerk of works (ECoW) for the duration of the construction project. The ECoW will have an ecological and environmental management background with practical experience of wind farm construction projects. The ECoW will monitor the environmental aspects of construction (soil storage, peat stability, day-to-day excavation works, etc.). The ECoW will have the authority to instruct the contractor to implement additional mitigation measures, if deemed appropriate. The ECoW will maintain a written record of all environmental issues on site, including incidents and monitoring results. This file will be made available to the relevant Authorities upon request. The ECoW will be responsible for notifying the relevant Authorities of any environmental incident.
- In addition to the day-to-day monitoring of excavation works by the ECoW, inspections of the excavation works (rock cuts, peat) will be carried out by suitably qualified and experienced geotechnical personnel.
- Micro-siting of turbines will be permitted for geotechnical reasons should unforeseen ground conditions be encountered. A lateral move of up to 20m should be allowed with a vertical change of up to 3m. Micro-siting will be allowed once the turbines don't come any closer to the closest stream.

- To minimise soil erosion, earthworks will be suspended during extreme weather conditions. An extreme rainfall event will be classified as an event that corresponds to the Met Éireann Orange – Weather Alert for rainfall. The ECoW will monitor the weather forecast to make preparations ahead of adverse weather conditions.
- The proposed roads and hardstand areas will be set out by a surveyor. Excavation will then precede the turbine, cable trench and access road construction, whereby peat and soft soils will be excavated and replaced with granular fill where required within the works corridor. Excavation will be carried out from access roads, where possible, in order to reduce soil compaction. Machinery will stay within the works corridor, as set out, so that compaction of soils outside the works area is avoided.
- Peat and soil stripped will be used to restore road verges on an on-going basis as the road advances. This will reduce the volume of soil stockpiled and minimise soils exposed to erosion.
- Peat regeneration areas have been identified to accommodate excess peat spoil. Areas where peat can be placed include the cutaway areas at the site entrance to turbines T01/T02, the improved grassland near turbine T04 and smaller areas at most turbine location. Peat regeneration areas will have rock and earthen berms to contain peat. Peat will be placed to a depth not exceeding 1.2m. The upper layer of peat excavated will be placed on top to facilitate re-vegetation and regeneration of the peat. No spoil stockpiles will be left on site after construction is completed.
- Peat / soil / rock will not be stockpiled on areas with slopes >50° or in areas with peat depth greater than 1m. Areas to be used for temporary stockpiles will be approved by the project geotechnical personnel.
- Dewatering of excavations, if required will be to the drainage channels (via silt traps). Dewatering of excavations down slope of excavations in an uncontrolled overland flow fashion will not be permitted as this may lead to erosion of peat and overburden and silting of streams. The excavations for turbine foundation will be shallow (circa 3m), so dewatering is not anticipated.
- Underground cabling will follow the track alignment where possible.
- Rock imported into site will be sourced from a quarry with similar geochemistry to the bedrock on site; limestone quarries will not be used.

During the operational phase a geotechnical engineer will inspect the earthworks within 6 months of the commissioning the wind farm to ensure there are no stability issues. An ecologist will inspect the restored / landscaped areas of the site to ensure vegetation is established. Remedial works (additional planting or seeding) will be carried out as required.

### 7.1.2 Proposed Wind Park Site: General Protection of Surface Waters

The following additional measures will be implemented in order to address the potential for sediments and contaminants to enter the freshwater environment:

- During the construction phase, best practices will be employed to minimise the release of sediment laden storm water runoff.
- Following mobilisation to site, surface water management infrastructure will be the first works carried out. Additional controls will be installed as needed as construction progresses through the site, and/or as identified during site inspections of surface water management infrastructure.



- Keyhole felling of trees for road construction will follow Forest Service Forestry and Water Quality Guidelines and Forest Harvesting and Environmental Guidelines.
- Works on stream crossings will be carried out in dry weather and as far as practical when low flows occur in the streams / drains.
- Clean surface water runoff will be diverted around earthworks areas to minimise the potential volume of silted water generated. To achieve this, shallow cut-off drains or temporary plastic diversion barriers will be installed.
- Areas stripped of vegetation will be kept to a minimum. Areas along road verges and around hardstands will be reinstated / landscaped on an on-going basis as this infrastructure is constructed. Peat turfs will be placed on the surface to expedite this restoration. Where peat turfs are not available, stored areas will be seeded. This will reduce areas of soil exposed to erosion and will also provide beneficial reuse of the peat near its source.
- Stockpiled soils will be kept a minimum distance of 50m from any watercourse. Silt fences will be placed downgradient of stockpiles to treat any polluted runoff.
- Drainage swales will be constructed at track edges, as necessary, with discharge to existing forestry drains for sections of road within forestry. These features are intended to act as sediment settlement areas and as such will give rise to a positive decrease in the levels of suspended sediment which may occur naturally or otherwise within these areas of forestry. The creation of such features will be undertaken in -line with other mitigation measures set out within this report and the appended CEMP (Appendix III).
- Drains will be culverted under roads using suitably sized pipework. Streams will be crossed with bottomless (clear span) structures. A minimum 450mm  $\phi$  culvert will be used.
- Check dams and or straw bales will be installed along the alignment of roadside drainage to slow flows and remove silt. Check dams will be constructed using clean stone and geotextile spanning across the drainage channel.
- The road and hardstanding areas will be constructed with aggregate – there will not be a hard-paved surface. This will reduce runoff volumes.
- The release of cement to water courses will be prohibited. Concrete pours will occur in contained areas, using shuttering. Rinsing down of concrete trucks will be done at dedicated locations on site. These will be located at a number of locations around the site. The rinse down areas will consist of a settlement pond, lined with terram and stone filter. This will have the capacity to hold enough water for the rinse down of 80 trucks using 150 litres per truck. Water will be able to percolate through the stone filter and terram while removing cement fines. These settlement ponds will not receive surface water runoff so capacity to receive rinse down water is always available. They will be located a minimum distance of 50m from any watercourse with water released to diffuse flow once pH has neutralised and confirmed by the ECoW. Signage will be erected at each concrete pour location directing drivers to the nearest rinse down area. These rinse down areas will be removed at the end of the construction phase.
- Hydrocarbons (oils, diesel and chemicals) will be stored and managed in an appropriate manner to ensure no negative impacts. Specific measures will include:
- Any storage of oils and diesel on site will be in steel or plastic tanks of good integrity and banded to 110 % of tank capacity.

- All fuel and hydraulic fluids will be stored in the site COSHH store located in the site compound.
- Refuelling will be carried out directly from delivery vehicles.
- Refuelling of mobile plant will not take place within 50m of any sensitive receptor. Refuelling by mobile bowser may be used for small generators etc.
- Toolbox talks on refuelling will be given to delivery drivers in addition to plant operatives.
- Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice.
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of.
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- Appropriate spill control equipment, such as oil soakage pads, will be kept in the site plant to deal with any accidental spillage. Spare spill kits will be kept at the construction site compound.
- The public road serving the site will be kept clean of mud and debris so that silt is not washed to watercourses downstream of the site and outside the control of the wind farm development. If mud or debris is tracked onto the public road from vehicles leaving the wind farm site, the road will be swept.
- To reduce the volume of water to be treated during construction and to reduce the erosion potential of exposed peat and soils, clean surface water runoff will be diverted around earthworks areas. This will be done with the use of diversion barriers/channels. Diversion channels are shallow interceptor drains, while barriers are made of a stiff, but flexible, plastic (HDPE or LDPE) material approximately 0.3m high that is inserted vertically (50 to 100mm) into the peat/ground surface to divert overland flows. The barrier will be supported with wooden pegs.
- Silt fences will be erected on the downslope side of any earthworks areas to intercept any overland flows that could potentially be carrying silt / fines. These are constructed with geotextile embedded in the peat and supported with wooden pegs.
- Where conventional road construction is used, check dams will be installed at frequent intervals along the roadside drainage channels. These will be constructed using geotextile supported by two wooden pegs, sandwiched by clean washed filter gravel, as illustrated.
- Use of settlement ponds at the turbine locations. Water pumped from the foundation excavation or runoff from the works area will be directed to a settlement pond to remove silt. The flow from the settlement ponds will be diffuse overland flow.

The worse-case scenario would be if there was a release of silt-laden water during construction into the streams draining the site. This could result in impacts on water quality, aquatic habitats, and aquatic fauna downstream of the event. With the implementation of the mitigation measures, inspections, and monitoring, the risk of this occurring is extremely low.

In the very unlikely event of this occurring, the following emergency response will be implemented. The full emergency response procedure will form part of the Site-Specific Health & Safety Plan.

- Safety of site personnel and any potentially affected neighbours will be checked as a priority and appropriate action taken.
- The appropriate authorities will be notified. This will include the County Council Environment Section, Inland Fisheries Ireland, etc
- The ECoW will assess the situation and carry out a risk assessment to inform the appropriate mitigation to be undertaken. The priority will be to prevent any further release of silt-laden water.
- Remedial works will be carried out at the location of the incident. The rest of the wind farm site will be inspected and similar remedial works carried out where appropriate.
- Surveys of the affected water course will be carried out and remedial measures carried out, where possible.

A surface water monitoring plan will be put in place with the ECoW taking regular samples at a range of sampling points to assess the water chemistry.

Given the sensitivity of Freshwater Pearl Mussel within the West of Ardara/Maas Road SAC, and the status of the population, which is in unfavourable condition and as such must be protected from any further water quality and sedimentation effects further more-stringent mitigation measures are required. These measures include the following:

- Regular communication should be maintained with NPWS staff. Regular contact with NPWS rangers will ensure the requirements of the Freshwater Pearl Mussel and all interested parties are being met, this is not intended to be a mitigation measure in itself but rather a procedure to be followed, i.e. communication with the local NPWS staff on the project to keep them informed on the effectiveness of the mitigation and to seek engagement on project matters which may be relevant to their remit. This also applies to all such use of this wording below.
- A suitable qualified ecologist experienced in the requirements of the Freshwater Pearl Mussel shall be present throughout initial stages of implementation of the site mitigation measures, silt trap erection, spill preventative measures etc. in order to observe and direct in consultation with the Environmental Manager from the earliest stages. During this initial stage, the presence of an ecologist on site will allow for the opportunity to inspect the methods being applied and allow for initial assessment of the efficacy of silt traps/mats/mitigation measures;
- Regular checks shall be undertaken by an experienced ECoW to ensure the management measures stipulated in the Construction Environmental Management Plan for the protection of the Freshwater Pearl Mussel and its habitat are been implemented by the contractor.
- Tool box talks specific to the Freshwater Pearl Mussel and its habitat shall be undertaken by the ECoW prior to commencement of works onsite.

- Multiple mitigation measures in terms of preventing silt release at source shall be employed. All construction must be designed such that silt must be trapped before entry to the river. The detailed design, placement and maintenance of such measures shall be carried out in close consultation with ECoW and where necessary the NPWS and IFI. A key factor in the design of such measures will be the on-going maintenance.
- Silt traps need ongoing monitoring both during and after construction operations have been completed to ensure that silt does not enter the watercourse. Where silt is removed from the traps it shall be deposited far enough back from the watercourse to ensure that it will not be carried back into the trap or river during subsequent rainfall. Once construction works have been completed, ECoW shall ensure that the condition of the site is such that there is no threat of silt entering the aquatic zone.
- This risk can be particularly high following dry periods when following subsequent heavy rain, wheel or track ruts from construction works which previously had been dry can act as channels through which silt can be transported to the aquatic zone. Before completion of all sites works the site agent or foreman must ensure that a thorough check of the site is carried so that that any mitigation measures deemed necessary to prevent negative impacts can be implemented before completion of works.

### 7.1.3 Proposed Grid Connection: Watercourse Crossings

Watercourse crossings associated with the proposed GCL route, will either utilise a trenching method, in line with that proposed from the roadbed itself; will involve an undercrossing which in many cases will require the replacement of the existing culvert structure; or will require HDD operations.

In respect of undercrossing in which it is proposed to replace the existing culvert, typically a stone structure which is liable to collapse during the required trenching works, the following mitigation measures will be applied, in line with the method statement which will form a part of the CEMP for the proposed development (Appendix III):

- Works will be supervised by the ECoW and / or the project aquatic ecologist who will liaise with IFI and National Parks and Wildlife Service (NPWS) prior to works commencing. The ECoW will also monitor surface water quality downstream of the works in accordance with the surface water monitoring programme and will have the authority to cease any works should the monitoring identify unacceptable water quality conditions.
- Any works within watercourses that have the potential to support fish, which include all watercourses adjoining the Stracashel and Stranogoppogue Rivers, will be avoided between Oct 1st and April 30th as per IFI and Loughs Agency guidelines
- Where temporary fluming or flow diversion is proposed in a watercourse with salmon present (at least Medium sensitivity) all fish within the designated area will be subject to fish rescue and translocation downstream by a fisheries biologist. Fish rescue will be conducted under Section 14 authorisation (DCCAE/ IFI) or Section 69 authorisation (Loughs Agency) where appropriate. This fluming and fish rescue will avoid fish mortality which would otherwise occur as a result of the proposed watercourse crossings.
- Flume placement for temporary flow diversion or permanent replacement of culverts will follow guidelines issued by IFI and CIRIA to ensure that fish passage is not impeded. Culverts will be embedded to at least 300mm below the existing stream bed to ensure backwatering. Culverts will avoid a significant change in gradient (i.e. >3%).
- After embedding, replacement culverts will be filled with clean washed gravels and cobbles to replace lost habitat and facilitate fish movement.
- Works will be carried out in dry weather with low flows in the streams with forecast for dry weather for the duration of the works – approximately 2 days.
- Machinery used will stay on the public road; machinery will not be permitted to enter the stream channel.
- The road edge adjacent to the watercourse will be lined with sandbags and silt fences (multiple fences recommended) as appropriate to prevent runoff from the trenching works reaching the stream. The design of these multiple features shall also allow for the safe removal of accumulated silt away from the channel, particularly through staged removal of the most contaminated upper fence before the lower ones, and the removal of the final fence only when it is clear of any silt
- Clean sandbags will be used to dam flows on the upstream side of the culvert. Sandbags will be placed by hand at a suitable location to take advantage of any natural pool but set back from the works to permit unhindered excavation of the existing culvert.

- A second sandbag dam will be placed on the downstream side of the culvert to prevent backflow into the works and contain any groundwater seepage that is likely to be turbid.
- Sandbagging requires careful attention to detail if it is to be effective. All bags must be laid neck uppermost and seams aligned. Bags must not be overfilled or they will not tamp together or will burst with ease.
- If topography permits, the water will be piped over the road by gravity flow, otherwise, it will be pumped. Discharge will be via break tank or similar approved storage onto a splash-plate or rip-rap (gabion basket) to dissipate energy and avoid scour or erosion of the stream bend or banks. The pump will be filled with a screen, so fish aren't drawn into the pump intake.
- The ducting will be advanced passed the culvert and the existing culvert will be excavated 'in the dry' and a new culvert, sized for a 100-year rainstorm event, will be installed with appropriate gradient, headworks and outfall. A precast concrete culvert, concrete pipe or HPDE pipe will be used.
- Dry stone headworks will be placed at the culvert intake and discharge and the stream bed adjacent to the works will be reinstated at the direction of the project aquatic ecologist.
- The ECoW will determine the quality of any water trapped between the two dams – visual inspection and turbidity meter. There will be no discharges from the works area to the water course. Dewatering of the works area prior to dam removal will be undertaken by pumping from the stream bed to a treatment area, assuming adequate percolation is available. This treatment area will be of sufficient capacity for the treatment of the pumped volumes and bunded using sandbags or other suitable material. If infiltration is not possible the water will be taken back to the wind farm site for treatment at an on-site settlement pond.
- Treatment areas will be monitored and adjusted where necessary, as directed by the ECoW.
- Additional bags will be filled ready to raise freeboard of dams but also to construct additional swale bunding for treatment areas. Filtration of pollution at pump outlet water treatment area to have a landing board to prevent erosion and sandbags to be placed in a 'rice paddy' arrangement, with filtration and no direct discharge to the river.
- The use of pump sumps will be considered within the dammed area. These will be lined to prevent scouring. The intention is to intercept clean groundwater ingress and pump it out rather than allowing it to get silted in the works area by segregating off areas.
- The upstream dam will then be removed to permit flow through the new culvert. This will be done in phases, so a large volume of water isn't released at once. The downstream dam will be removed in a similar manner.
- All plant and equipment will be serviced and cleaned before entry to site to limit risk of oil spillage and for biosecurity.
- Any spoil generated will be removed to designated safe area clear of the flood plain. Some of this spoil will be saturated and will require bunding and sheeting over.
- If bank material needs to be removed it will be stored separately and reinstated accordingly.

### 7.1.4 Proposed Grid Connection: Horizontal Directional Drilling

The proposed grid connection route will involve HDD operations in three locations in order to facilitate delivery of the GCL. It is envisaged that these works which will include for launch and receptor pits at least 25m either side of the watercourse to be crossed, have relatively limited potential to give rise to significant sedimentation or other water quality impacts, and are likely to comprise the most effective solution for crossing these watercourses whilst minimising potential for water quality effects. The principle pathway however for these works to give rise to adverse impacts is associated with a 'break out' or 'frac-out', a relatively uncommon event where drilling fluids and substrates enter the watercourse via cracks in inconsistent substrates beneath the riverbed, under drilling pressure. Mitigation measure in respect of such an occurrence are set out below. This mitigation is also set out in more detail within Attachment 6 to the draft CEMP (Appendix III). It is also noted that measures set out above in respect of general protection of surface waters, such as bunding of fuel storage and other material storage, remain relevant to HDD and watercourse crossing works.

At each HDD crossing, a geo-technical investigation will be undertaken to determine the porosity of the underlying stream bed and to locate a suitable clay/ silt formation so that the risk of drilling mud break out can be ascertained. The depth of the bore may be increased subject to the investigation.

Spatial buffers and sediment traps/ booms will protect sensitive waterways where HDD is undertaken. Drilling fluid leakage and bank-side disturbance will be prevented by ensuring that drill launch and receiver pits, are sufficiently distant from watercourses (at least 25m either side of the watercourse, as above). Construction of settling basins/ containment pits at drilling exit/ entrance points will contain drilling fluids/ drill cuttings so that there is a negligible risk of run-off.

The safe removal (e.g. use of a vacuum lorry) and disposal of drilling slurry (drilling fluids and cuttings) will mean that there is a negligible risk of sediment run-off to watercourses.

An outline Frac-Out mitigation plan has been prepared as part of the construction methodology. This outlines how the risk of break-out or drill fluid run-off will be monitored and managed during all phases of construction and will be finalised as part of the final contractors Construction Environmental Management Plan (CEMP). The Frac-Out mitigation plan includes a clear process including;

- Full briefing of personnel with the plan and risks involved
- Monitoring of drilling fluid pressure and viscosity by a fluid technician to ensure that readings are within expected values; any change indicative of the risk of a frac-out will be investigated and drilling ceased in such cases.
- A frac-out watch programme will be implemented whereby "spotters" will monitor the ground surface above the drill path and the bed of the watercourse
- If a frac-out occurs, drilling will be suspended and the frac-out will be contained using the following measures;
  - Sand bag containment at launch pits and riparian area
  - Available on-site tractor and bowser
  - Pumps
  - Physical plugging of the reamed bore using Enviro Formfill

Further detail on the measures to be included within the frac-out mitigation plan are provided at Attachment 6 to the CEMP (Appendix III) with a sample frac-out plan is provided at Appendix B to Attachment 6.

A procedure for conducting an emergency “clean-up” operation within the watercourse will be included in the full CEMP; this procedure will include contact points and methods of liaising with the NPWS, IFI and Donegal District Council. Again, this is not intended to be a mitigation measure in itself but rather a procedure to be followed, i.e. communication with the NPWS, IFI and DDC staff on the project to keep them informed on the effectiveness of the mitigation and to seek engagement on project matters which may be relevant to their remit.

### **7.1.5 Operational Phase**

The backup generator at the substation will require a fuel storage tank (1,300 L), for cooling oil, this will be appropriately bunded and the same controls as outline for fuel, oil and greases in the construction phase mitigation will apply during the operational stage where relevant.

### **7.1.6 Decommissioning**

The proposed project at decommissioning stage has potential to give rise to a similar set of impacts as associated with the construction stage. The same pathways for potential adverse effects upon European sites are therefore supported. It is therefore considered that mitigation measures as set out above in respect of construction will also be required in association with decommissioning where relevant.

Decommissioning works associated with the reinstatement of turbine foundations will involve the spreading of locally sourced peat and soils to allow for the re-vegetation of these areas, following the working life of the proposed development. This reinstatement work will be undertaken in line with the mitigation measures set out within the appended CEMP, to avoid any potential for the reinstatement of the site to give rise to any potential inputs of sediments into the freshwater environment.

### **7.1.7 Water Quality and Habitat Deterioration Mitigation Summary**

The mitigation measures set out above in respect of the potential for water quality and habitat deterioration effects associated with a range of aspects of the proposed development are considered to fully mitigate any potential adverse impacts upon freshwater qualifying interests of the West of Ardara/Maas Road SAC, River Finn SAC and River Foyle and Tributaries SAC.

## **7.2 Aerial Noise and Visual Disturbance**

As set out above the proposed development has potential to give rise to adverse impacts upon the Lough Nillan Bog SPA and Derryveagh and Glendowan Mountains SPA through aerial noise and visual disturbance to merlin breeding in proximity to the site which has potential to give rise to displacement of the breeding pair potentially leading to resource competition, including nest site competition within the SPAs.

The following mitigation measures will be implemented at construction stage to minimise construction phase aerial noise and visual disturbance effects upon birds and merlin specifically:



- Any construction works proposed during the nesting bird season (March to August inclusive) will be preceded by a nesting bird survey and associated reporting. The report will detail nesting or prospecting birds in the area and will detail buffer zones and measures required in order to avoid potential disturbance or impact and will be submitted to the Planning Authority prior to the commencement of works. Particular attention will be given to priority bird species and any species known to be sensitive to construction related disturbance (including breeding raptors and waders). Special consideration will be given to breeding sparrowhawk, merlin, snipe, ground nesting passerines (meadow pipit, skylark) and whinchat.
- There will be no clearance of vegetation suitable for nesting birds within the bird nesting season, unless checked for nesting birds by a suitably qualified ornithologist (performing the role of Ecological Clerk of Works (ECoW)) and cleared by them for removal, taking account of both potential for direct nest destruction and disturbance to nesting birds.
- Wherever feasible, where suitable nesting habitat removal is required to facilitate the works (such as the footprint of the site track, turbines, hardstands and set down areas, excavation of the grid connection route, any vegetation removal or cutting of overhanging vegetation along the turbine delivery route), including dense ground cover and trees/scrub, it will be undertaken prior to the 1st March in the construction year.
- Works during the bird nesting season will be supervised on a weekly basis by an appropriately qualified ornithologist (who may also perform the ECoW role if appropriately qualified for both). Their role will be to monitor nesting birds within the construction site and advise on buffer zones required in order to avoid impacts on them. In this regard, special consideration will be given to merlin.
- Construction works will be appropriately phased to avoid seasonally sensitive ornithological receptors, and while this will necessitate a dynamic approach in anticipation of birds potentially moving to different nesting locations within/adjacent to the construction site (as may be the case with merlin), there will be some restrictions in place based on the distribution of birds recorded during the baseline, including:
  - Commencement of construction works will not be permitted in the northern sections during the breeding season (1st March to 31st August). Construction works must be phased to ensure that the majority of the northern section of the development (T1 to T4) is completed prior to the onset of the breeding season (1st March).
  - Road maintenance works, including excavation and laying of cabling along the grid connection route will not be permitted during the bird breeding season (1st March to 31st August) for two sections, including:
    - along the L-6743 secondary local road between junctions to T1 and T4
    - from the met mast and following the L-2593 along the Stracashel River for 500 m after the Graffy Bridge turn
  - No construction will be permitted within 500 m of the merlin nesting location identified during the baseline surveys. Construction works are defined as all heavy civil works (including turbine erection) and all preparatory/finishing works (including vegetation clearance, road capping, landscaping, fencing and light, manual tasks). Specifically, this will limit all works on tracks leading to T1/T2 and T4/T3 within 500 m of the baseline nest sites. While no heavy civil works

will be permitted during the breeding season, construction traffic will be facilitated access to work areas beyond the 500 m buffer via the junction to T4/T3 and junction to T1/T2.

- If merlin occupy an alternative nest site during construction, a 500 m exclusion zone buffer will be applied where all construction activities will only be permitted outside the bird breeding season (1st March to 31st August). Depending on the location of the nest, additional access restrictions may also be applied.
- With respect to birds, the ECoW's role will include:
  - Providing advice to ensure legal compliance with respect to nesting birds;
  - Ensuring that all required exclusion zones for nesting birds are adequately set out, protected and signed-off, and that all contractors working on the site abide by them;
  - Ensuring suitable measures are in place to protect retained or created habitats;
  - Undertaking the necessary pre-construction protected species surveys (if suitably qualified) and supervising the implementation of any mitigation measures required;
  - Liaison with contractors and construction staff working on site;
  - Providing regular on-site advice with respect to any ecological issues that arise.

At decommissioning the same mitigation measures as set out above in respect of the construction phase will be implemented, as directed by an ECoW.

Following the implementation of the above mitigation measures, it is considered that the potential for aerial noise and visual disturbance effects and subsequent effects associated with displacement of merlin upon the Lough Nillan Bog SPA and Derryveagh and Glendowan Mountains SPA will be fully mitigated.

## 8 CONCLUSION OF APPROPRIATE ASSESSMENT

RPS has conducted this screening exercise on behalf of Cuilfeach Teoranta. This NIS was conducted following the Department of the Environment, Heritage and Local Government guidance 'Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities' (DoEHLG, 2010). As stated in that guidance document, the requirement of the AA is not to prove what the impacts and effects will be, but rather to establish beyond reasonable scientific doubt that adverse effects on site integrity will or will not result.

RPS has prepared this NIS to document the analysis and evaluation seeking to establish whether or not, in view of best scientific knowledge and applying the precautionary principle, and in light of the conservation objectives of relevant European sites, the proposed development, either individually or in combination with other plans or projects, will adversely affect the integrity of European sites.

The construction and operation of the proposed development has been detailed (**Section 3**), and the receiving environment has been described (**Section 4**). Likely significant effects upon a number of European Sites, including the West of Ardara/Maas Road SAC; River Finn SAC, River Foyle and Tributaries SAC, Lough Nillan Bog SPA and Derryveagh and Glendowan Mountains SPA, have been identified within the ZOI of the proposed development via the following effect pathways (**Section 6**):

- Water quality and habitat deterioration effect, through sedimentation and pollution; and
- Aerial noise and visual disturbance, leading to effects associated with displacement of merlin.

Following the implementation of a range of mitigation measures in respect of these impact pathways it is considered that any likely significant effects will be fully mitigated and as such the proposed development will not give rise to any adverse impacts to the integrity of any European Sites.

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## Figures

Figure 3.1: Site Location

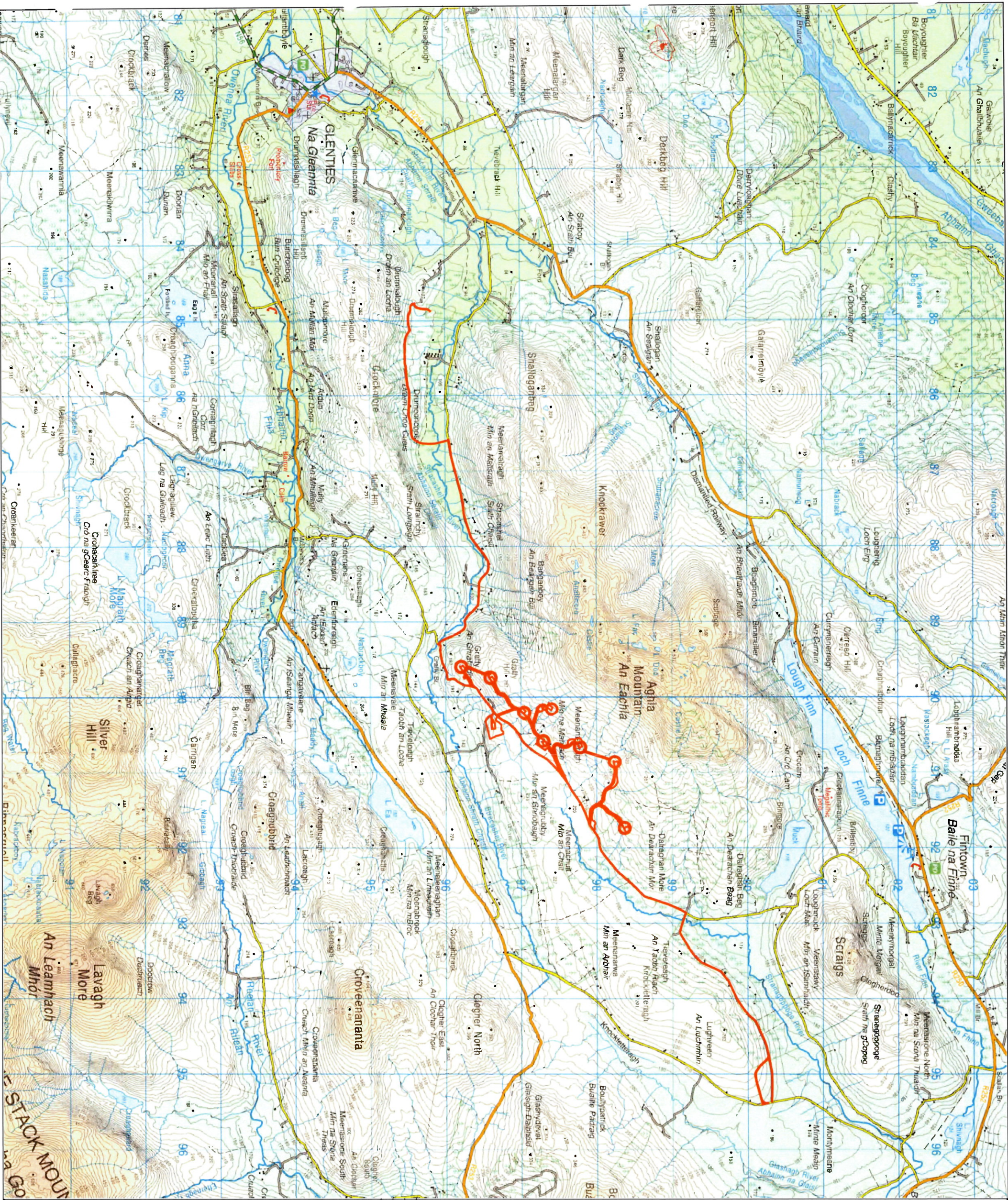
Figure 3.2: Compensatory Forestry Planting Location

Figure 4.1: European Sites

Figure 4.2: European Sites in Proximity to the Site

Figure 4.3: Compensatory Forestry Planting Designated Sites





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**Legend**

Application Site Boundary

Rev	Description	By	Ckd	Date



Elmwood House, 74 Boucher Road,  
BELFAST, BT12 6RZ  
T: 028 9066 7914

Client : Cuifeach Teoranta

Project : Grafty Windpark

Site Location

Figure Number 3-1

Status Scale @ A3  
Preliminary 1:1250 Date 12.05.21

RPS Project Number N12256 Revision

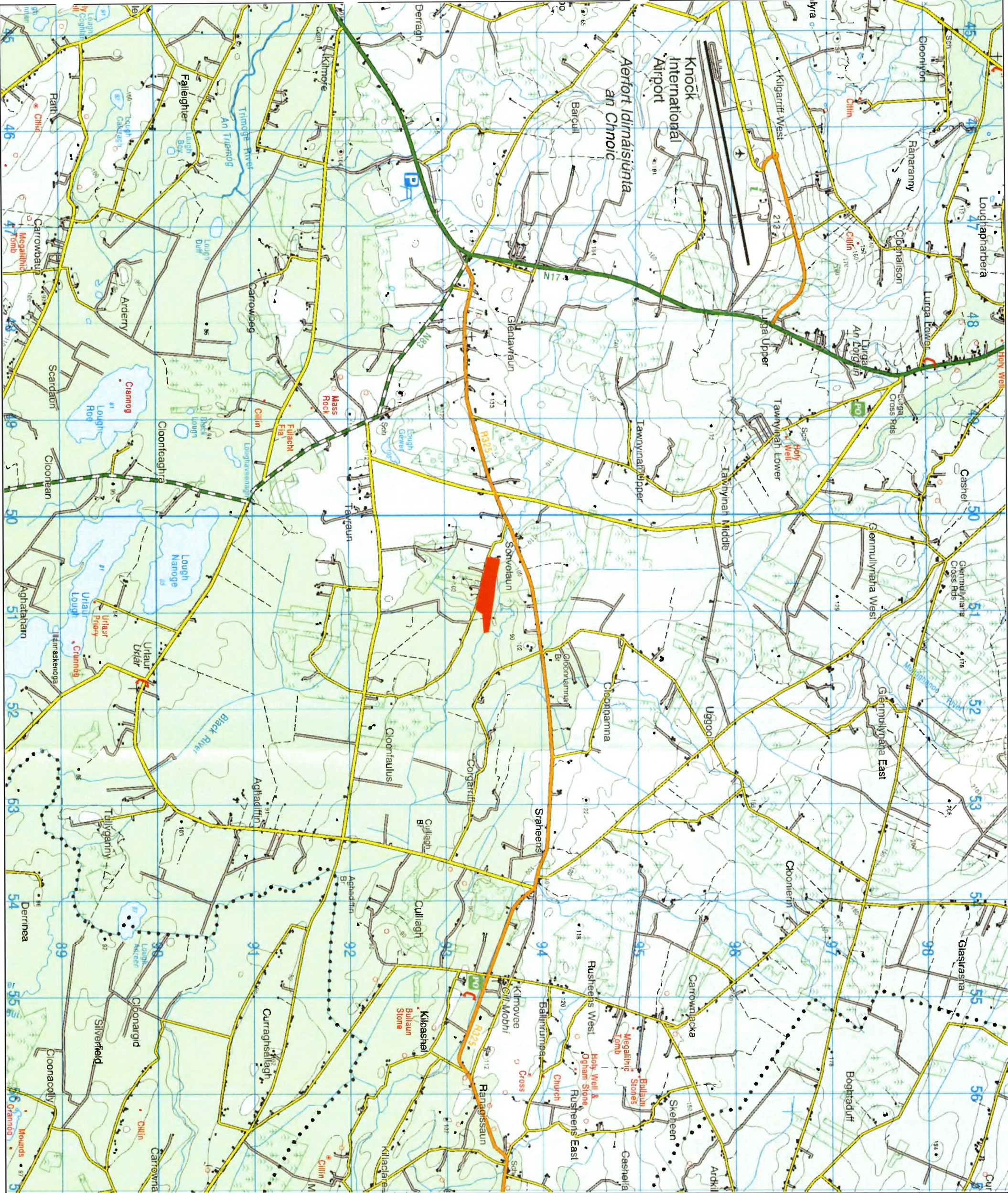
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Legend

 Proposed Compensatory  
Forestry Planting Site

Rev	Description	By	Ckd	Date

**rps**

Elmwood House, 74 Boucher Road,  
BELFAST, BT12 6RZ  
T: 028 9066 7914

Client : Cuifeach Teoranta

Project : Graffy Windpark

Compensatroy Forestry Planting

Location

Figure Number 3.2

Status Scale @ A3

Preliminary 1:1250

RPS Project Number

NI2256

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12.05.21

Revision







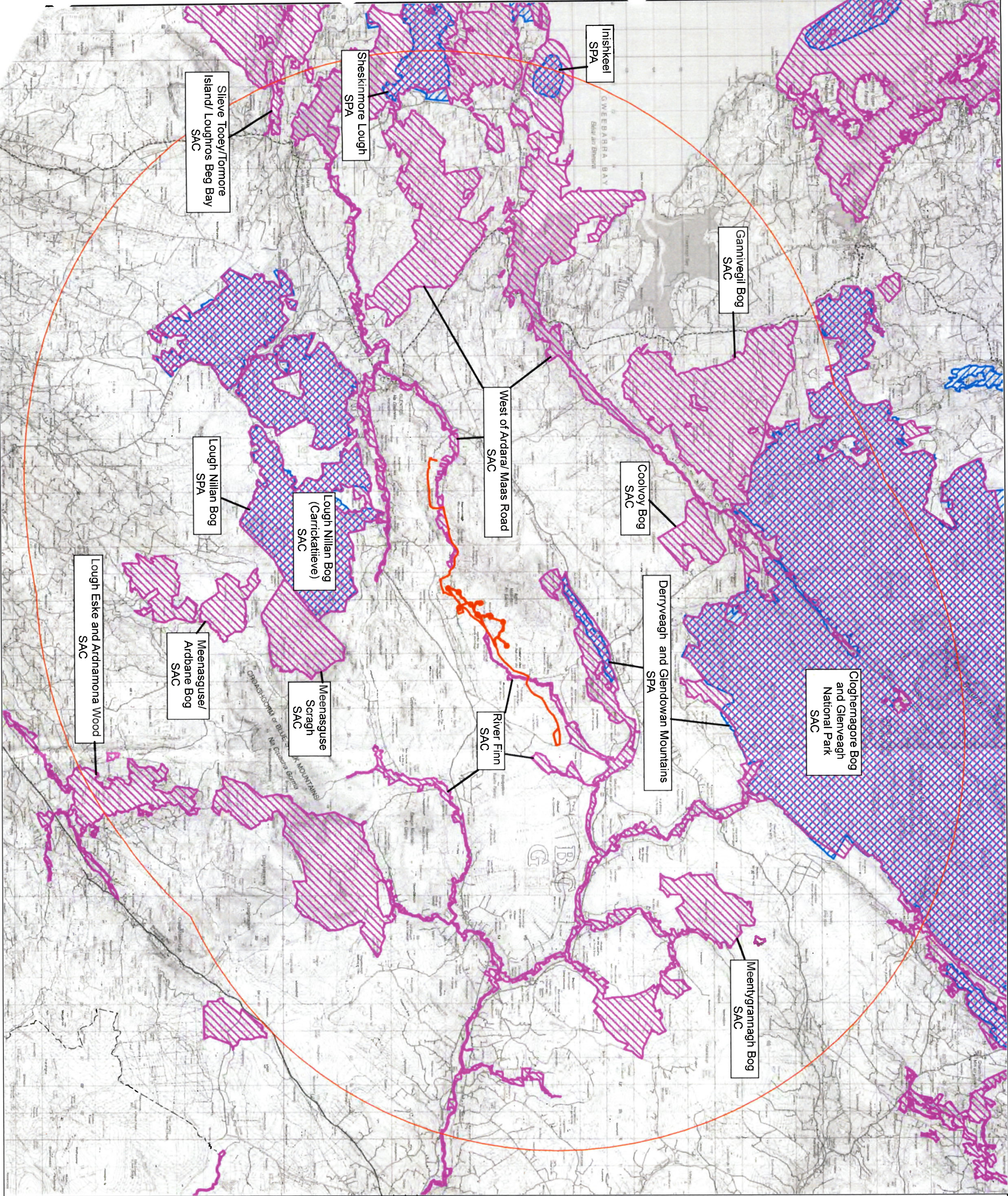


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Legend

- Site Boundary
- 15km Site Buffer
- SAC
- SPA



Rev	Description	By	Ckd	Date



Elmwood House, 74 Boucher Road,  
BELFAST, BT12 6RZ  
T: 028 9066 7914

Client : Cullfeach Teoranta

Project : Graffy Windpark

European Sites

Figure Number 4-1

Status Scale @ A3  
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NI2256

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Date  
12.05.21

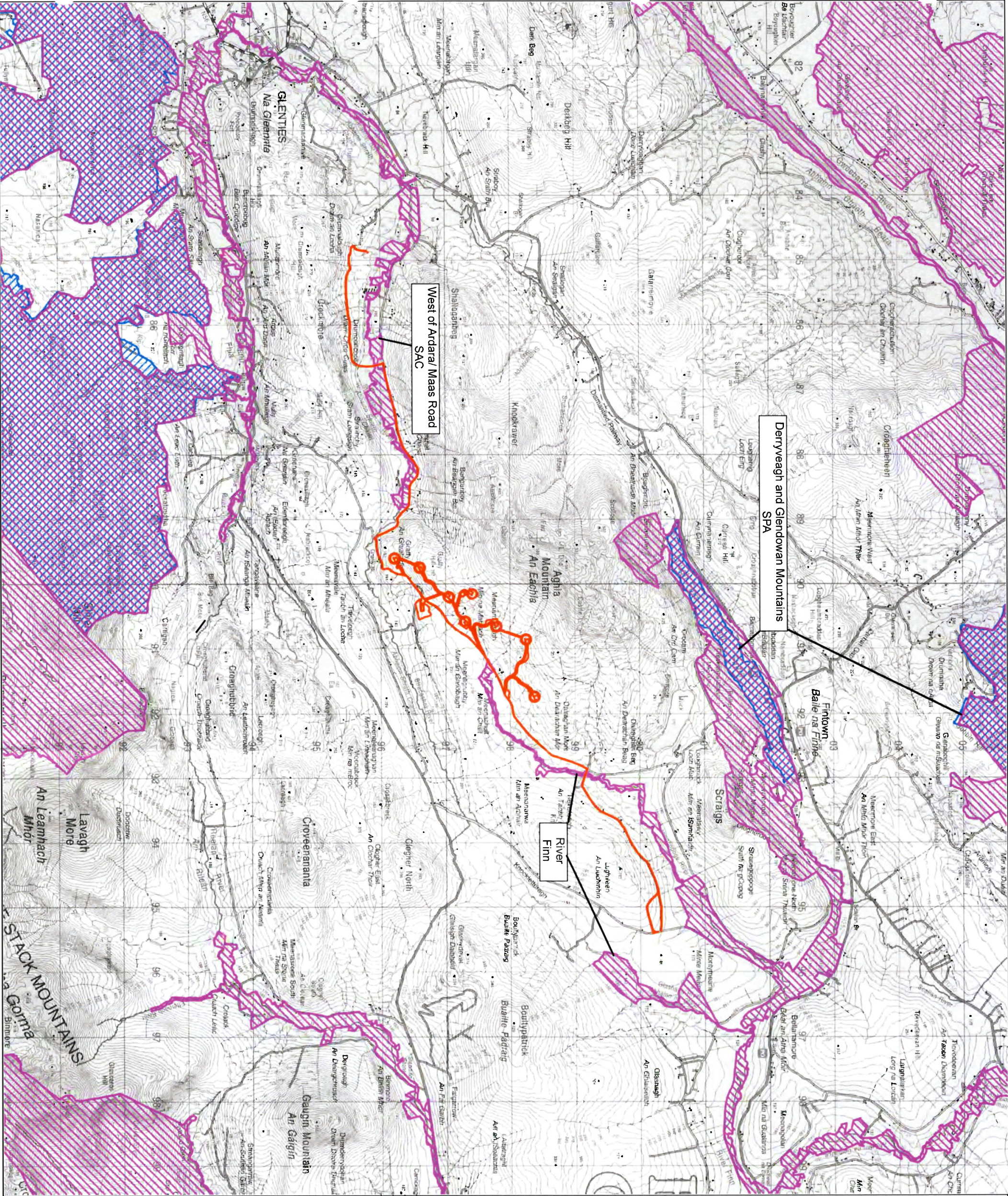
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**Legend**

Site Boundary

15km Site Buffer

SAC

SPA

Rev	Description	By	Ckd	Date



Elmwood House, 74 Boucher Road,  
BELFAST BT12 6RZ  
T: 028 9066 7914

Client : Cuilteach Teoranta

Project : Grafty Windpark

European Sites In Proximity to the Site

Figure Number 4-2

Status Scale @ A3

Preliminary 1:1250 Date 12.05.21

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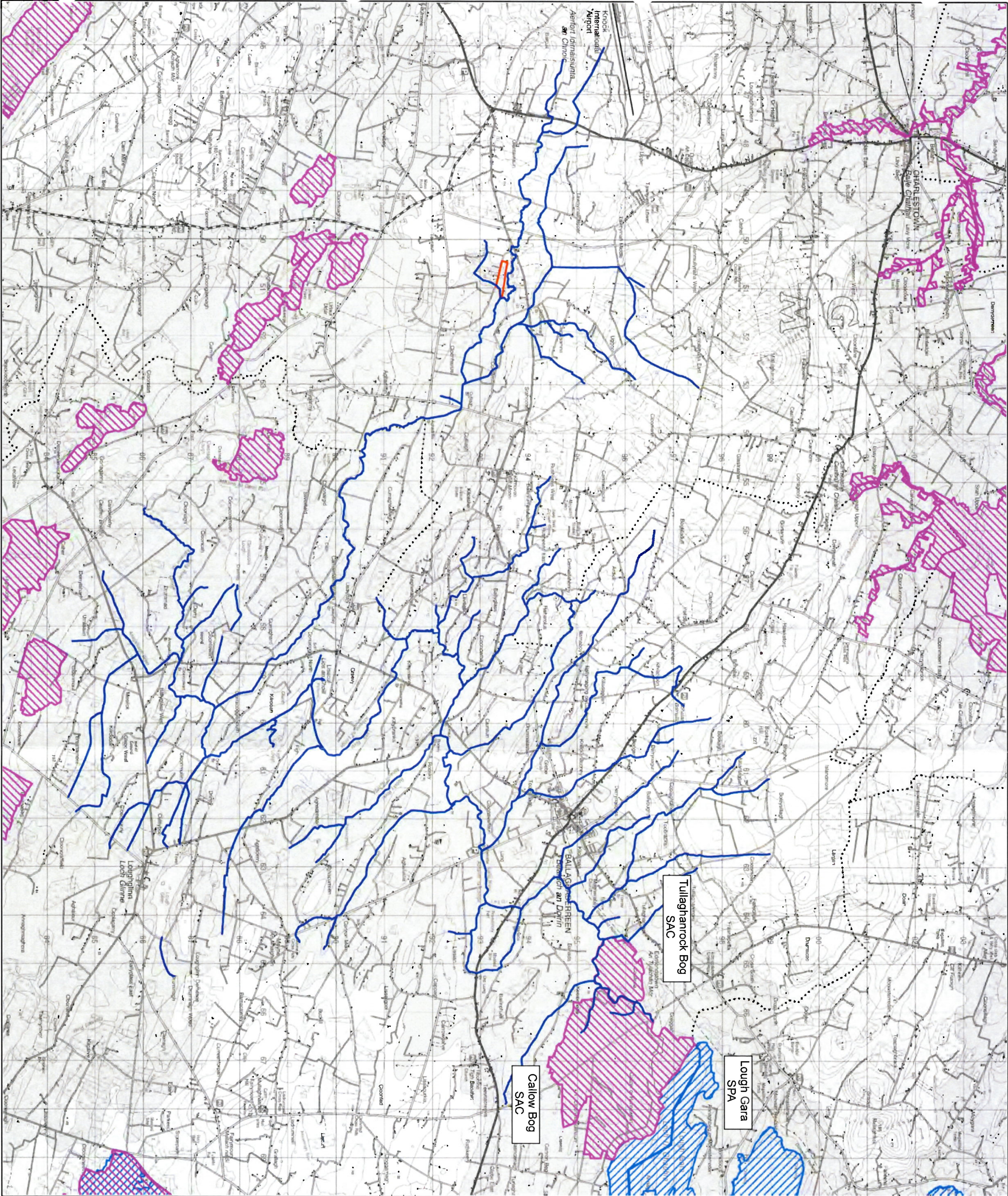
Legend

Proposed Compensatory  
Forestry Planting Site

SAC

SPA

Surface Water Hydrological  
Linkage



Rev	Description	By	Ckd	Date



Elmwood House, 74 Boucher Road,  
BELFAST, BT12 6RZ  
T: 028 9066 7914

Client : Cullteach Teoranta

Project : Grafty Windpark

Compensatory Forestry Planting :  
Designated Sites

Figure Number 4.3

Status Scale @ A3  
Preliminary 1:1250 Date  
12.05.21

RPS Project Number  
NI2256

Revision  
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## Appendices

### Appendix I: draft Construction Environmental Management Plan (CEMP)



Proposed Graffy Wind Farm  
Glenties,  
County Donegal

## **Construction Environmental Management Plan**

Prepared for:  
Cuilfeach Teoranta  
McKendrick Place  
Pearse Road  
Letterkenny  
County Donegal

Prepared by:  
Keohane Geological & Environmental Consultancy  
Ivy House  
Clash  
Carrigrohane  
County Cork

August 2021

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- ATTACHMENT 2** – Method Statement: Road Construction
- ATTACHMENT 3** – Method Statement: Peat Management
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- ATTACHMENT 6** – Method Statement: Horizontal Directional Drilling
- ATTACHMENT 7** - Construction Methodology – Graffy Wind Farm – 110kV Underground Cable (prepared by tli Group)
- ATTACHMENT 8** – ECoW CV – NAME
- ATTACHMENT 9** – Refuelling Toolbox Talk Information Sheet
- ATTACHMENT 10** – Environmental Audit Check List
- ATTACHMENT 11** – Settlement Pond Size Calculations [INSERT WHEN COMPLETED]
- ATTACHMENT 12** – Incident Reporting Form



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# 1 INTRODUCTION

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Cuilfeach Teoranta retained Keohane Geological & Environmental Consultancy (KGEC) to prepare the Construction Environmental Management Plan (CEMP) for submission with the planning application for the Graffy Wind Farm. The CEMP is prepared to satisfy the 2019 draft wind farm guidelines<sup>1</sup>. Section 4.11 of the draft Guidelines state:

*Construction Environment Management Plans (CEMPs) are recommended to be prepared in advance of the construction projects and implemented throughout. Such plans are recommended to incorporate relevant mitigation measures which have been integrated into the project and an Environmental Impact Assessment Report or Appropriate Assessment. CEMPs typically provide details of intended construction practice for the proposed development, including:*

- a) location of the sites and materials compound(s) including area(s) identified for the storage of construction refuse,*
- b) location of areas for construction site offices and staff facilities,*
- c) details of site security fencing and hoardings,*
- d) details of on-site car parking facilities for site workers during the course of construction,*
- e) details of the timing and routing of construction traffic to and from the construction site and associated directional signage,*
- f) measures to obviate queuing of construction traffic on the adjoining road network,*
- g) measures to control noise during construction, in particular noise associated with the transportation of wind turbine components from staging areas at night.*
- h) measures to prevent the spillage or deposit of clay, rubble or other debris,*
- i) alternative arrangements to be put in place for pedestrians and vehicles in the case of the closure of any public right of way during the course of site development works,*
- j) details of appropriate mitigation measures for noise, dust and vibration, and monitoring of such levels,*
- k) containment of all construction-related fuel and oil within specially constructed bunds to ensure that fuel spillages are fully contained; such bunds shall be roofed to exclude rainwater,*
- l) disposal of construction/demolition waste (in line with higher level waste management policies) and details of how it is proposed to manage excavated soil,*
- m) a water and sediment management plan, providing for means to ensure that surface water runoff is controlled such that no silt or other pollutants enter local water courses or drains,*
- n) details of a water quality monitoring and sampling plan,*
- o) if peat is encountered - a peat storage, handling and reinstatement management plan,*
- p) measures adopted during construction to prevent the spread of invasive species (such as Japanese Knotweed),*
- q) appointment of an ecological clerk of works at site investigation, preparation and construction phases,*
- r) details of appropriate mitigation measures for lighting specifically designed to minimise impacts to biodiversity including bats*

Section 3.1 of Technical Appendix 2 recommends that 'A draft Construction and Environmental Management Plan (CEMP) shall be submitted with the planning application'.

---

<sup>1</sup> Department of Housing, Planning and Local Government, December 2019. *Draft Revised Wind Energy Development Guidelines*.

The objective of the CEMP is to set out the construction approaches to protect the receiving environment. With the siting of the Graffy Wind Farm within the catchment of two sensitive rivers, the protection of the surface water environment is of particular importance and focus.

## **1.1 Development Background**

In February 2011 An Bord Pleanála upheld Donegal County Council's decision to grant planning permission for a 105MW wind farm in Graffy, Meenagrubby and surrounding townlands, Glenties County Donegal; planning numbers 09/30520 and PL05B.237656 refer. That proposed development consisted of 35 No. turbines (revised down to 19), control building, ESB substation and compound and associated site roads. The permission granted by An Bord Pleanála reduced the number of turbines to thirteen. Ten of these were located to the north of the public road where the current proposal is located. The proposed development will replace the permission for the 13 No. turbines.

The proposed turbine model has not been finalised, but wind energy resource assessments indicate that the optimal sizes for the site should have a tip height of approximately 150m. For the purposes of the assessment, two turbine models are considered; rotor diameter of 126m with 86m hub height; and 133m rotor diameter with 81m hub height. These are the typical dimensions as the various manufactures have slightly different rotor diameters and hub heights for the capacity of turbine proposed (4MW range). This will be determined by competitive tender after planning permission is secured.

The wind farm will be connected to the National Grid at the ESB Tievebrack 110kV substation via approximately 7.3km of underground cable which will mostly follow public and forestry roads. The grid connection forms part of the permission for the wind farm.

## **1.2 Planning Permission**

INSERT DETAILS OF PLANNING PERMISSION

- PLANNING PERMISSION REFERENCE NUMBER(S)
- DATE OF GRANT
- VALIDITY PERIOD OF PERMISSION.
- CONDITIONS.

A copy of the planning permission is provided in Attachment 1.

## **1.3 Scope of CEMP**

The CEMP defines the responsibilities and procedures for the management of potential impacts on the surrounding environment and habitats arising from site construction works. It sets out the avoidance, reduction and mitigation measures detailed in the Environmental Impact Assessment Report (EIAR) and the Natura Impact Statement (NIS) submitted in support of the application. Allowance will be made for implementation of alternative measures by the contractor where these alternatives demonstrate improved environmental protection and are approved by the Environmental/Ecological Clerk of Works (ECoW).

The CEMP sets out the following:

1. Details of the contractual arrangements, roles and responsibilities.
2. General working hours and flexibility in these hours for specific works.
3. Buffer zones for environmental protection and pollution prevention.
4. Liaison arrangements.
5. Mitigation procedures to reduce and avoid environment and ecological impact.
6. An Environmental Emergency Response Plan.
7. Monitoring and auditing of environmental performance during the construction period.
8. A Waste Management Plan.

The CEMP should be read in conjunction with the following documents prepared for the proposed development:

1. Environmental Impact Assessment Report for the Graffy Wind Farm dated August 2021 and prepared by Harley Planning Consultants.
2. Natura Impact Statement for the Graffy Wind Farm, dated August 2021 and prepared by RPS Ltd.
3. Planning Conditions for the proposed development, dated [INSERT DATE].
4. Traffic Management Plan dated October 2020 and prepared by KH Chartered Engineers.
5. Emergency Response Plan included as Chapter 8 of this CEMP.
6. Method Statements for the development, namely:
  - a. Road Construction – Attachment 2.
  - b. Peat Management – Attachment 3.
  - c. Concrete Pours & Concrete Truck Washout – Attachment 4.
  - d. Biosecurity Attachment 5.
  - e. Horizontal Directional Drilling – Attachment 6.
7. Construction Methodology – Graffy Wind Farm – 110kV Underground Cable, prepared by tli Group – Attachment 7. This includes an outline of the HDD frac-out mitigation plan.
8. Employers Requirements to be prepared by the Client's Engineer.
9. Site Specific Health & Safety Plan to be prepared by the Client's Engineer.

The CEMP should be seen as a live document open to refinement and improvements as situations change on site, as lessons are learnt and technologies advance. Any changes must result in an improved environmental outcome.

---

## 2 SITE DESCRIPTION

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The wind park is in a rural upland area in the upper catchments of the Stracashel and Stranagoppoge rivers and along the foothills of Aghla Mountain. The turbines are located to the north of local road L-6743 at elevations of between 200m and 292m.

The nearest settlement is Fintown, approximately 4km to the north of the wind farm, but separated from it by the Aghla Mountain, which rises to almost 600m. Glenties is the largest town, approximately 8km to the west-southwest of the wind farm. Letterkenny is approximately 28km to the northeast. Housing is sparse in the immediate area, consisting of a few farmhouses along the local road, most of which are now derelict. Figure 2-1 shows the regional site location map (Discovery Series Map No. 11). Figure 2-2 shows the site layout.

The land use is primarily rough grazing for sheep. Conifer plantations are widespread in the area, with forestry within the central part of the site, and adjacent to the eastern site boundary. There is evidence of small-scale historic turf cutting at the site; active turf cutting is occurring in the general area, particularly at the low-lying elevations to the southwest of the wind farm site. The site substation is located to the south of local road L-6743 in improved wet grassland, used for sheep grazing.

The grid connection to the Tievebrack substation follows local roads L-6743 and L-2593 to the east towards the R250. Housing density increases to the east with farmhouses and ribbon development occurring. Land use consists primarily of low intensity agriculture and forestry. The eastern-most 2km of the grid connection follows a forestry road, passing a mink farm.

Access route improvements needed for local road L-6733 to the northeast of the wind farm and a turbine road between turbines T04 and T05/T06, are within commercial forestry. Agreement has been reached with Coillte to develop these roads. The transport route upgrade (construction of a new forestry road) is also in commercial forestry.

The turbines will be delivered to Killybegs and over-sized loads will be delivered to site via regional road R263 to the N56. The route will follow the N56 Donegal Town. From Donegal Town, it will follow the N15 through Ballybofey, turning northwest onto the R252 towards Fintown. Approximately 4km from Fintown, the route follows local road L-2023-1 to the location of the transport route upgrade / Coillte road (L-6733-1) to local roads L-6743-2 and L-6743-3 to the site entrances. The transport route is shown in Figure 2-3.

The streams draining the site flow to the Stracashel and Stranagoppoge rivers. The western side of the site is drained by the Stracashel River and its tributaries, which form part of the Owenea River catchment. Downstream of Graffy Bridge, the Stracashel River is designated as part of West of Ardara/Maas Road Special Area of Conservation (SAC). This is a large SAC selected for a wide range of habitats and/or species listed on Annex I / II of the E.U. Habitats Directive. The Owenea River catchment is one of six freshwater pearl mussel catchments in County Donegal. Turbines T05 to T08, the substation and the grid connection route are within the catchment of the Stracashel River. The eastern side of the site is drained by the Stranagoppoge River. The Stranagoppoge River forms part of the River Finn SAC, which extends downstream from local road L-6743 near the wind farm site. Turbines T01 to T04 and the transport route upgrade are located in the catchment of the Stranagoppoge River.

The site is underlain by the Termon Formation and Slieve Tooley Quartzite Formation. These are Precambrian-aged rocks, showing a high degree of metamorphism and complex relationships due to their long history of folding, faulting, igneous intrusions and other tectonic activities. The bedrock is covered by a thin layer of peat, generally <1.0m but up to 5.4m deep in small peat basins developed between bedrock ridges. Bedrock outcrop is frequent across the site. The bedrock is classified as a poor aquifer. Water supplies in the locality are sourced from streams and wells (dug and bored); the area is not serviced by mains water.

There are no recorded monuments or statutorily protected archaeological remains within the footprint of the proposed wind farm, substation, transport route upgrade or grid connection. As a result, it is considered there will be no direct or indirect construction phase effect on the recorded archaeological resource. Similarly, there are no protected structures, architectural conservation areas, NIAH structures or any additional statutorily protected architectural features within the construction footprint. The wind farm development crosses eight townland boundaries.





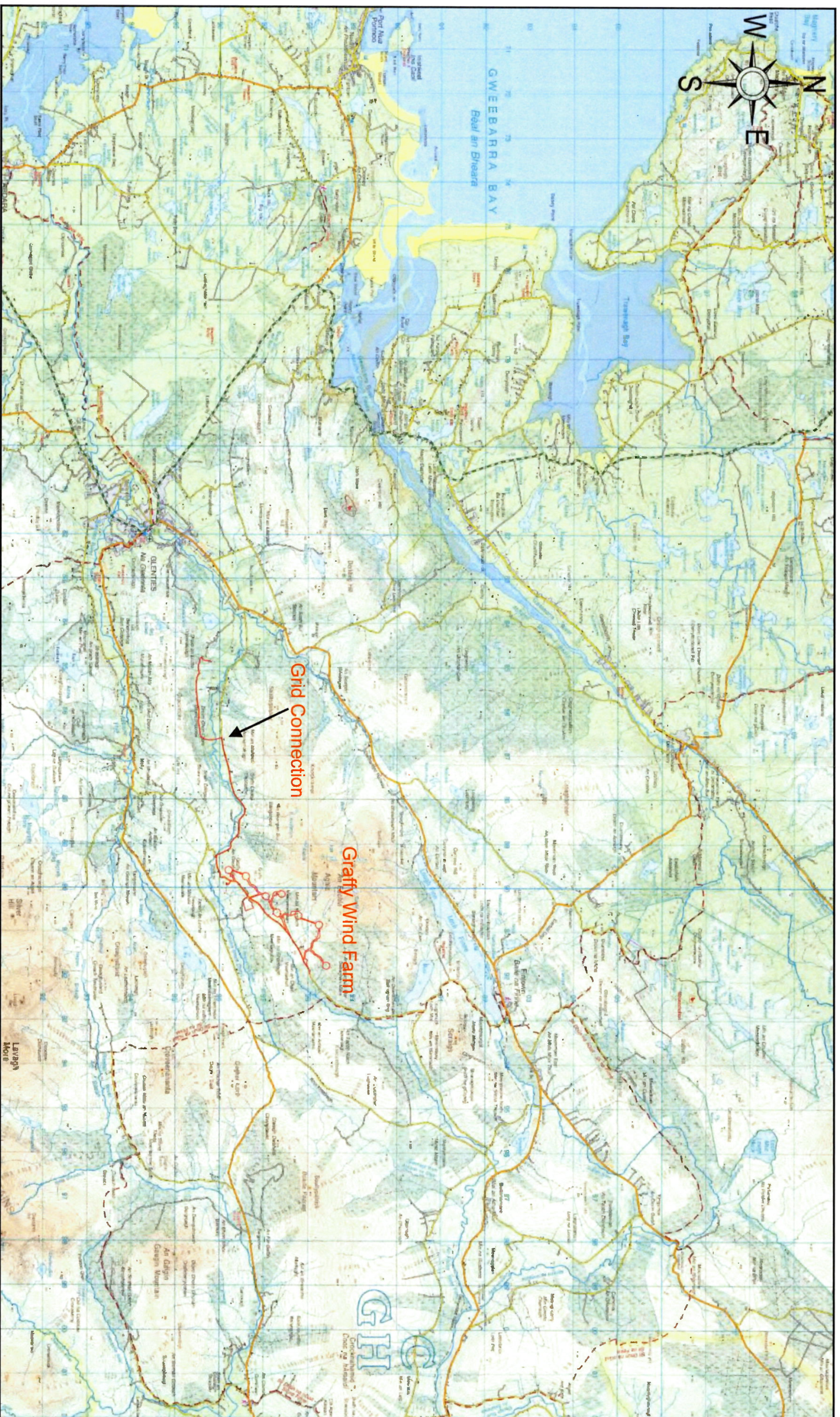
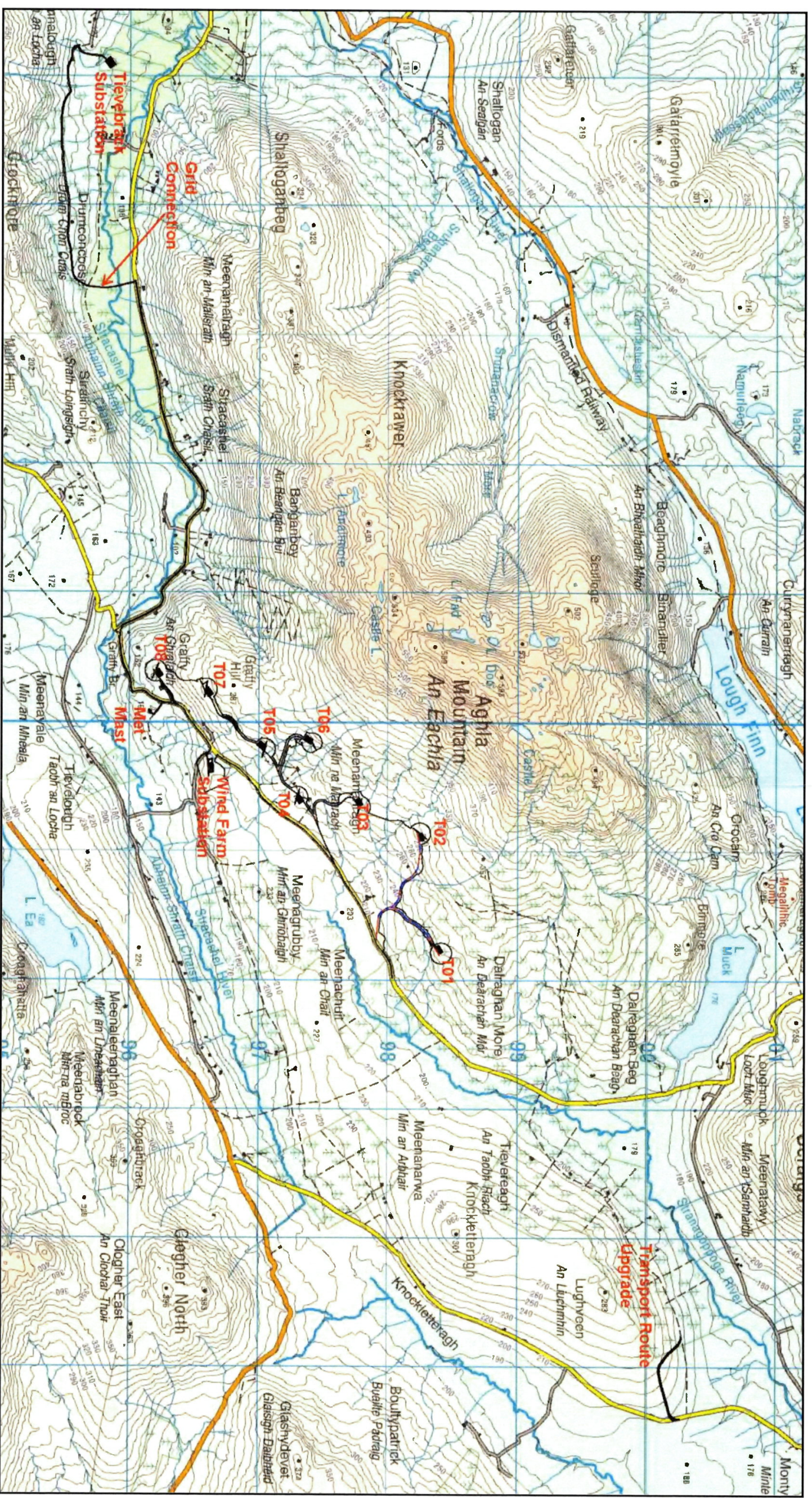


Figure 2-1: Site Location Map









**Figure 2-2: Site Layout Plan**





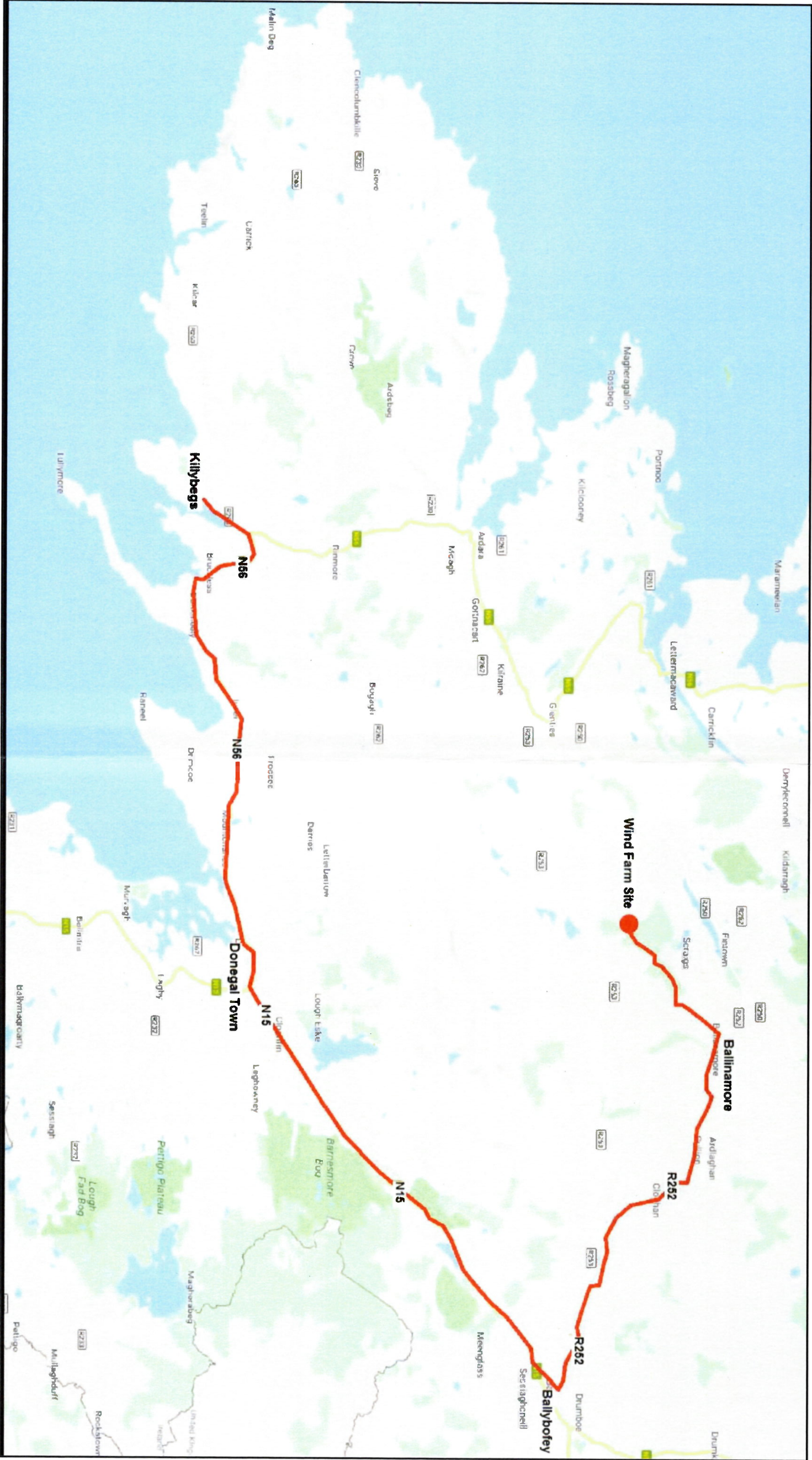


Figure 2-3: Turbine Delivery Route



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### 3 PROPOSED DEVELOPMENT

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The principal components of the proposed development include 8 No. turbines, hardstand areas, internal access roads, internal cabling, substation compound, temporary construction compound, permanent met mast, grid connection and transport route upgrade as described below.

#### 3.1 Wind Farm Infrastructure

The main elements of the wind farm infrastructure are described in the subsections below.

##### 3.1.1 Construction Site Compound

The temporary construction site compound will be located centrally on the site near the proposed substation. It will be approximately 38m x 18m and will provide site offices, secure storage cabins, canteen, workers welfare facilities, parking, waste/recyclables bins and open storage area. The compound will be surrounded by a 2.3m-high security fence.

Electricity will be provided by an on-site diesel-powered generator, mounted over a drip tray. Fuel will be stored in a self-bunded tank adjacent to the generator. The generator will be positioned so the cabins provide a noise shield to the nearest houses.

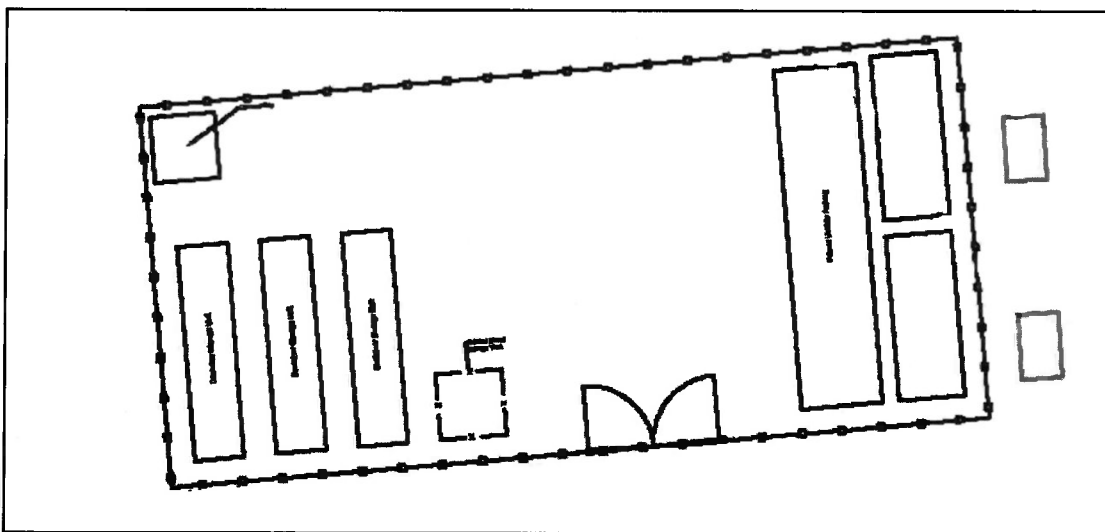
Wireless telecommunication will be provided.

Bottled water will be used. Rainwater harvesting will be used as the water supply for toilets. If needed, potable water will be brought to site in bowsers.

Wastewater from the welfare facilities will be collected in a sealed tank and emptied by an appropriately licenced contractor.

Skips will be provided for various waste streams, including domestic waste and recyclables (cardboard, wood, plastic).

An area will be used for open storage of larger bulkier materials such as ducting, cable reels, rolls of geotextile etc. The layout of the site compound is shown on Figure 3-1.



**Figure 3-1: Layout of Temporary Construction Site Compound**

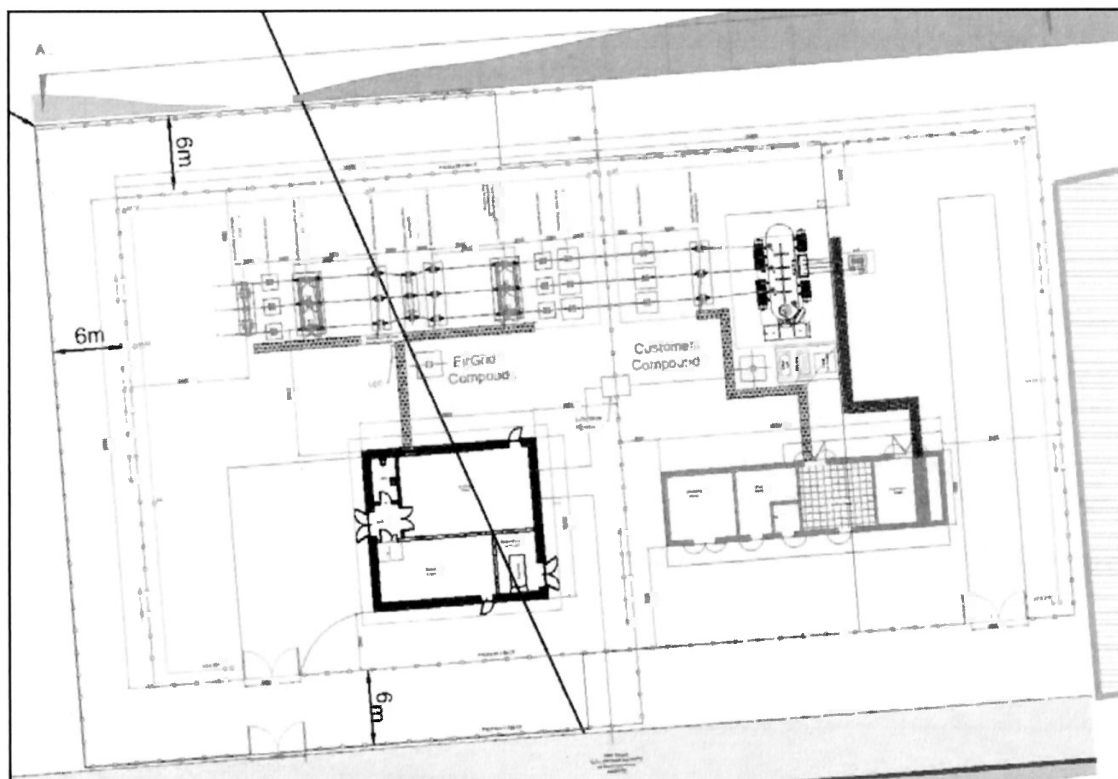
### 3.1.2 Substation Compound

The substation compound will have a footprint area of approximately 40m x 56m and surrounded by a 2.3m high palisade fence. It will be divided into the customer and ESB areas by a 2.3m-high palisade fence. It will have a building divided into switch room, control room, ESB room and welfare facilities. Wastewater will be collected in a sealed underground tank and emptied periodically by a licensed waste contractor.

The compound will house the grid transformer, bus bars and other electrical equipment mounted on concrete plinths. The grid transformer sits on a concrete bund. The transformer is surrounded by a reinforced concrete blast wall.

A back-up diesel-powered generator will be installed so there is power to the substation lights during outages. The diesel will be stored in a 1,300 litre self-bunded tank. The generator will be installed on a concrete plinth, which will drain to the transformer bund.

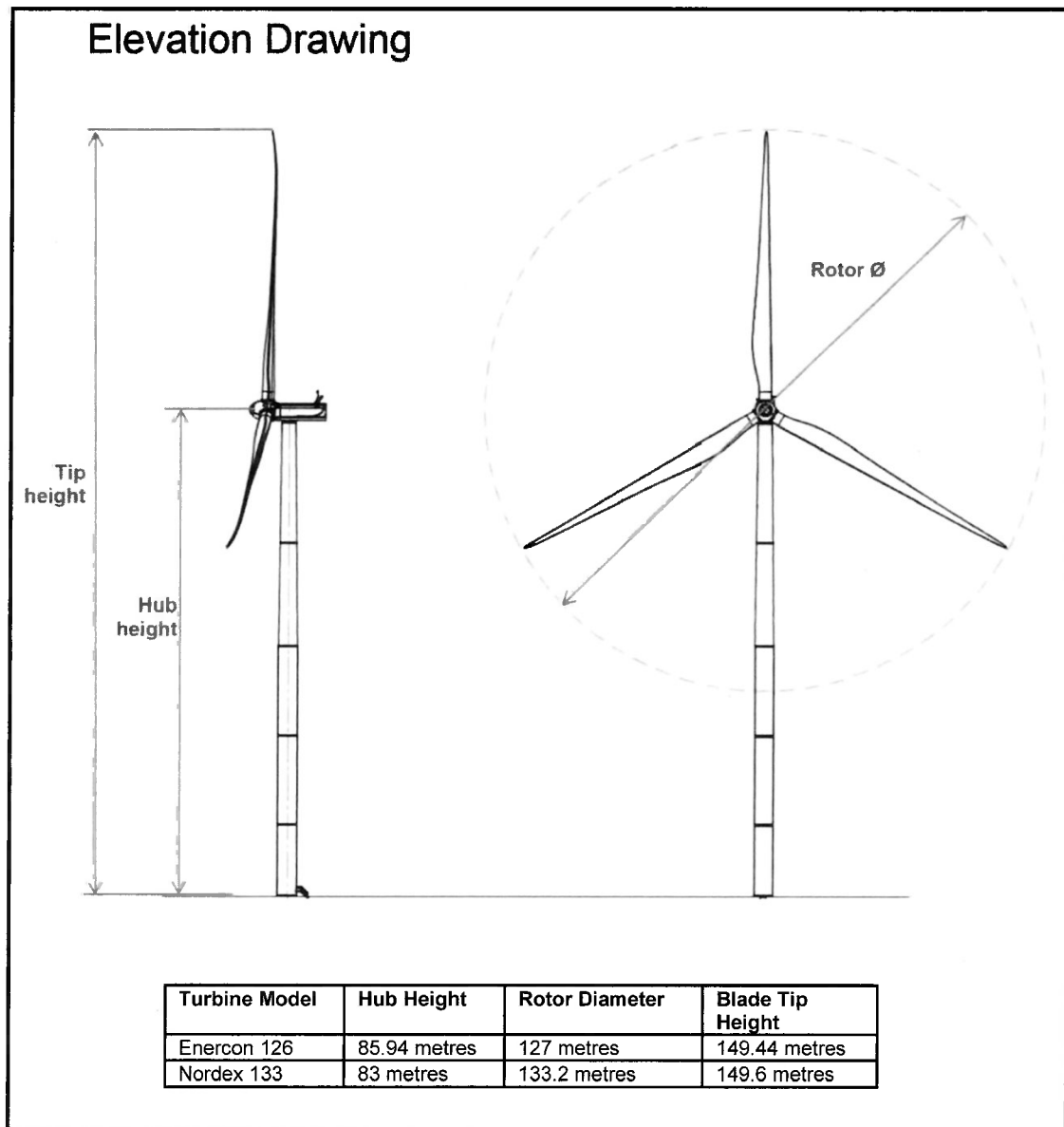
The layout of the substation compound is shown on Figure 3-2.



**Figure 3-2: Layout of Site Substation**

### 3.1.3 Turbines

There are 8 No. turbines to be installed at the site. The turbines to be installed will be selected based on competitive tender following the planning process. The turbines will be in the 4MW range and have a tip height of up to ~150m; For the purposes of the assessment, two turbine models are considered; rotor diameter of ~127m with ~86m hub height; and ~133m rotor diameter with ~83m hub height. Figure 3-3 shows the main features of a generic 3-bladed turbine for illustration purposes.



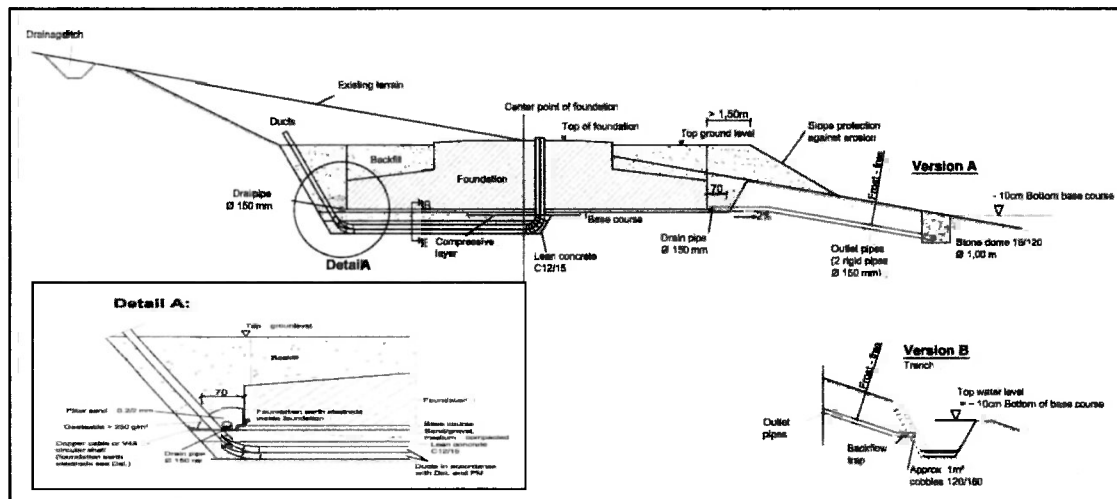
**Figure 3-3: Typical 3-Bladed Turbine to be Installed**

#### 3.1.4 Turbine Foundation

The turbine foundations will be shallow and likely without the effects of buoyancy with loads of approximately 300kN/m<sup>2</sup>. For the Graffy site, bedrock is found at shallow depths and will be the bearing stratum. The foundations will be subject to detail design, but will likely be up to 22.5m in diameter, 3.2m high and requiring 600m<sup>3</sup> of concrete and approximately 82 tonnes of reinforcing steel. This size of shallow foundation would account for the effects of buoyancy. Piled foundations will not be required.

Based on the observations on site and experience in this area, a shallow foundation without the effects of buoyancy will be used for each of the turbines. Figure 3-4 shows the general arrangements for the turbine foundations.



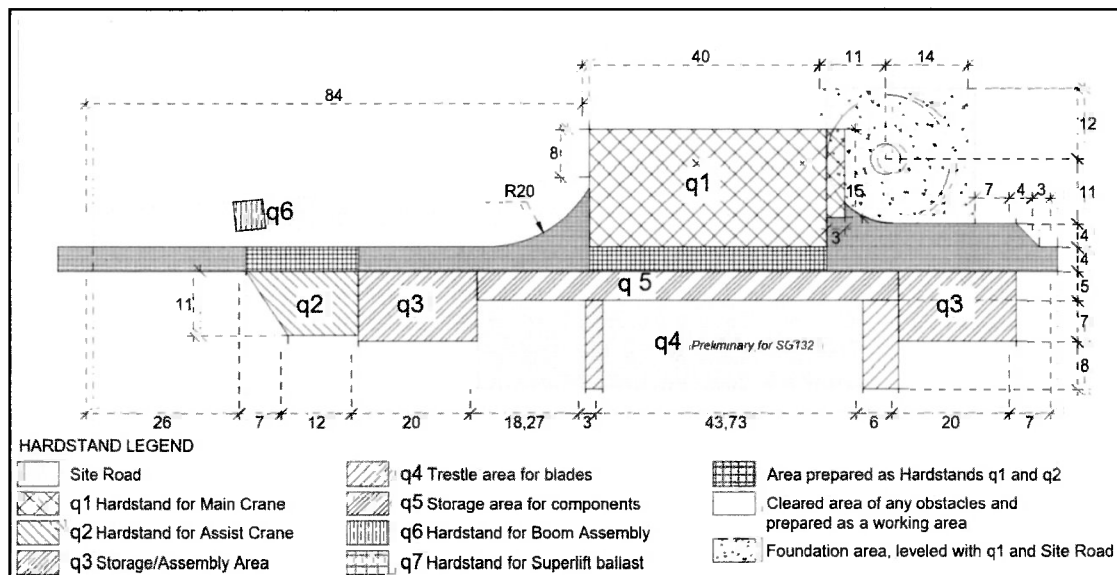


**Figure 3-4: General Details of Turbine Foundations**

### 3.1.5 Cranage Areas

A level hardstanding area is required at the turbine location for the assembly and installation of the turbine. The cranage area required for the 4MW range turbines are 40m long and 23m wide. They are required to have a minimum bearing of 200kN/m<sup>2</sup> to support cranes during lifts. Level areas adjacent to the cranage area are required for the storage of turbine components prior to assembly. Areas adjacent are to be free from obstacles. Figure 3-5 shows the layout of the standard cranage platform. Variations to this layout can be accommodated if dictated by site topography or other constraints.

The cranage platforms are finished proud of adjacent ground level to allow free, over-the-edge drainage of surface water. It is also finished to a level that is a maximum of 200mm below the foundation's upper edge. The surface should be finished with aggregate of maximum diameter 32mm and be of the same rock type found at the wind farm.



**Figure 3-5: Standard Cranage Platform Layout**



### 3.1.6 Site Roads

Approximately 4.5km of access road will be required to service the wind farm. An additional section (734m) of transport route upgrade will be required for the local road L-6733-1. Wind farm site roads will use conventional road construction (founded on tills and rock). Site access roads have the following minimum requirements:

- A useable roadway width of at least 4m.
- A useable road width for jib assembly of 6.0m (i.e. the road width within 80m of the crane area is to be 6.0m wide).
- The clearance width for over-sized loads must be 6.0m.
- The clearance height for over-sized loads must be 4.6m.
- Radius of curve is a minimum of 28.0m.
- The maximum incline for unpaved roads is 7%.
- The maximum incline for paved roads is 12%.
- Capable of withstanding axle loads of up to 12 tonnes.
- Capable of withstanding overall weights of up to 165 tonnes.
- The  $E_{v2}$  values for the road construction are:
  - o Substructure:  $\geq 80\text{MN/m}^2$ .
  - o Base/wearing course:  $\geq 100\text{MN/m}^2$ .

The internal site access road construction details are shown on Figure 3-6.

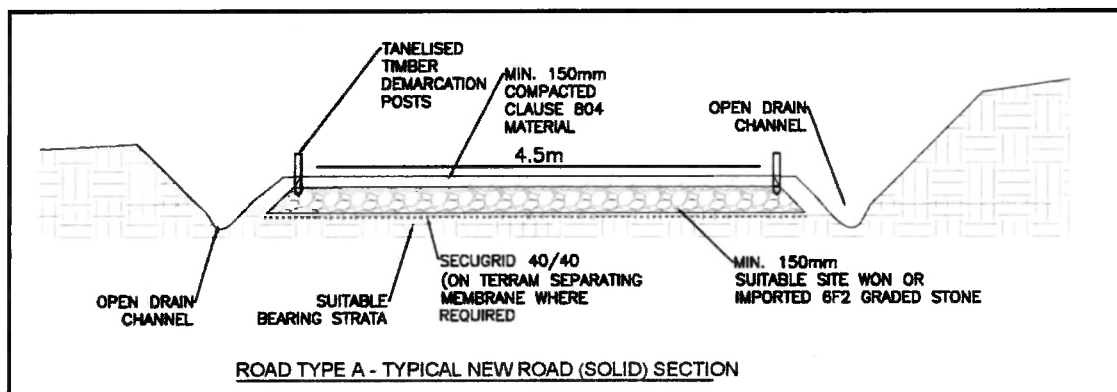


Figure 3-6: Internal Access Road Details-Conventional Construction

### 3.1.7 Internal Cabling

An underground 20kV cable will link each turbine with the proposed wind farm substation. The on-site cabling will generally follow site roads and offset approximately 1m, but some cable routes will go 'cross-county'. Cables can either be laid directly and surrounded with sand or pulled through PVC ducting. The use of ducting is proposed for the Graffy Wind Farm. For this single circuit, the cable trench will typically be 600mm wide and 1,300mm deep. The material excavated from the trench will be reused as backfill. For sections crossing site roads, the ducting is surrounded in lean-mix concrete for added strength. The backfill is engineered fill to return the road surface to its original condition. Figure 3-7 shows a typical trench detail.



### 3.2.2 Pulling Pits

Joining bays / pulling pits will be installed at predetermined locations along the grid route. Their locations will be determined by the cable lengths and bends in the route where pulling would be difficult. Cables sections are pulled from one pulling pit to the next and the cables then joined. The pulling pits are then backfilled and covered. A typical joining bay is shown in Figure 3-9.

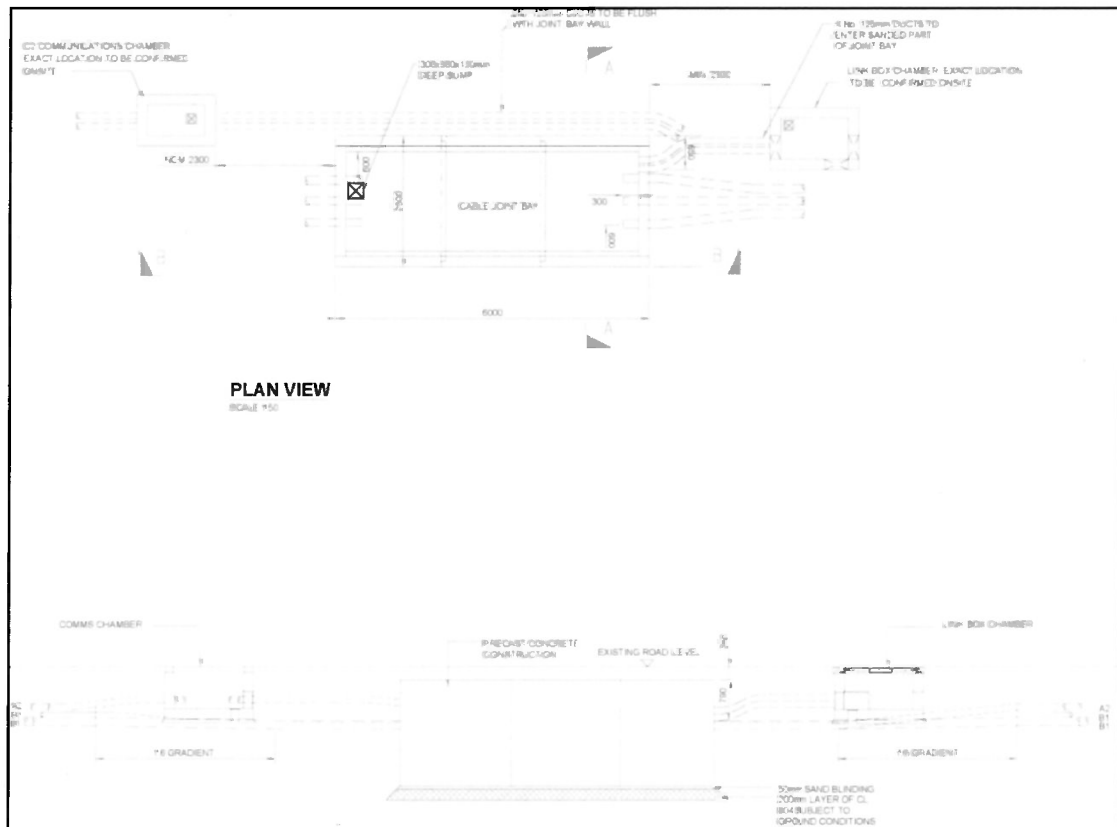
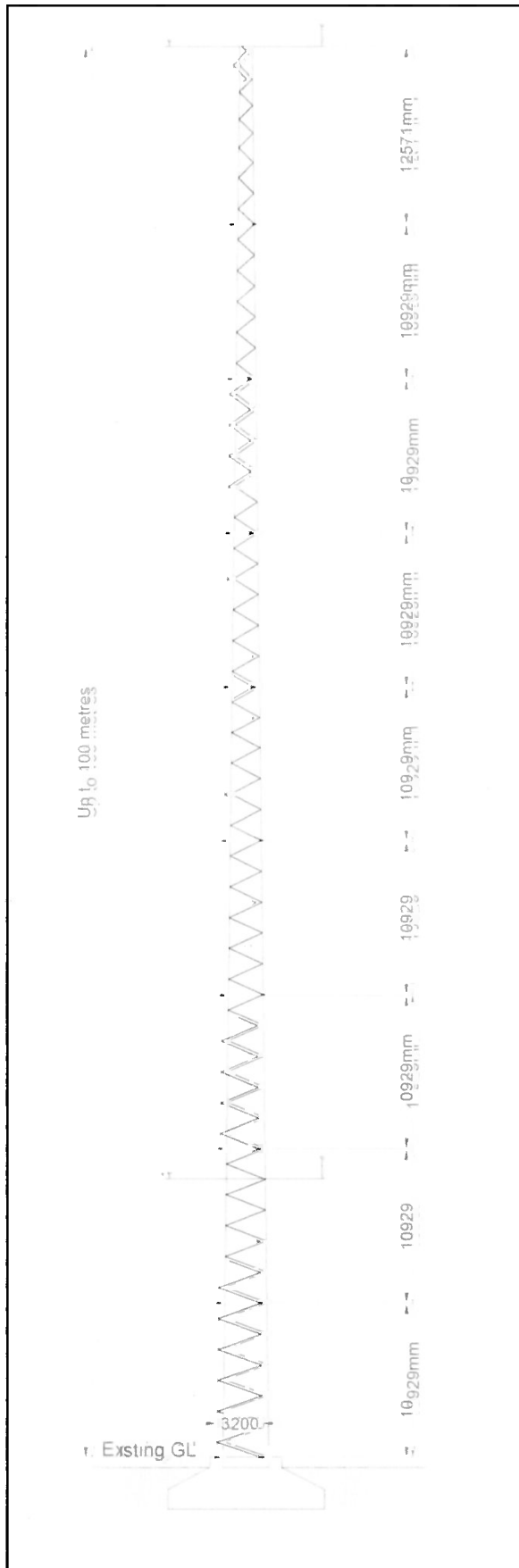


Figure 3-9: Typical Pulling Pit / Jointing Bay

### 3.3 Met Mast

One permanent meteorological mast will be erected within the wind farm. Its location is shown on Figure 2-2. The mast will be equipped with wind monitoring equipment mounted at various heights. A lattice galvanised steel mast is proposed which will have a triangular footprint with sides approximately 3m wide at the base and tapering towards the top of the mast. The mast will be anchored with a large reinforced concrete foundation approximately 10m in diameter and 2m high. The typical design of a meteorological mast is shown in Figure 3-10.



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## 4 CONTRACTUAL ARRANGEMENTS

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### 4.1 Project Organisation

The organisation structure for the project is provided in Figure 4-1. The developer / Employer for this project is INSERT DEVELOPER NAME. The Employer contact is INSERT NAME.

Contact Details:

Name: INSERT NAME  
Mobile: INSERT NUMBER  
Address: INSERT ADDRESS

The client's representative / engineer is INSERT NAME OF COMPANY. INSERT NAME OF COMPANY will be responsible for the following items:

1. COMPANY NAME has appointed ENGINEERING COMPANY NAME as Project Supervisor Design Process (PSDP) for the project.
2. ENGINEERING COMPANY NAME will be responsible for project management during the construction phase and coordinating the various stakeholders and contractors.
3. ENGINEERING COMPANY NAME will be responsible for coordinating the external stakeholders / contractors including the ESB, Local Authority, Inland Fisheries Ireland and the landowners.
4. Compliance with certain planning conditions and liaising with the planning authority and Inland Fisheries Ireland.
5. Preparation and submission of the Section 50 applications to the OPW watercourse crossings, as required.
6. Licenses and authorisations from the statutory authorities for the construction and operation of the power generating plant.

#### Environmental/Ecological Clerk of Works (ECoW)

COMPANY NAME has also appointed INSERT ECoW NAME of INSERT COMPANY NAME as the Environmental/Ecological clerk of works (ECoW) for the duration of the construction project. The ECoW has an ecological and environmental management background with more than INSERT EXPERIENCE OF ECoW. ECoW NAME CV is provided in Attachment 7. The ECoW has the following responsibilities:

1. Undertaking regular compliance audits to establish if requirements of the CEMP are being implemented.
2. Ensuring that the environmental constraints are properly marked and sign-posted on site.
3. Providing site inductions / toolbox talks to construction workers detailing the environmental constraints and work practices to be followed to protect water quality, sensitive habitats and the environment.
4. Ensuring compliance with certain planning conditions, in particular those relating to protection of water quality and the environment.
5. Ensuring that all environmental monitoring and surveying is carried out and documented. This will include inspection of mitigation measures.

The ECoW will have the authority to instruct the client's representative and/or the contractor to implement additional mitigation measures if he deems appropriate. This includes the authority to stop works (on part or all of the site, as appropriate). The ECoW will report directly to the client's representative. The ECoW will maintain a written record of all environmental issues on site, including incidents and monitoring results. This file will be made available to the relevant Authorities upon request. The ECoW will be responsible for notifying the relevant Authorities of any environmental incident.

The ECoW will be on site fulltime for the initial site set up and commencement of works (first week) to ensure work practices are understood and carried out correctly by the contractors. The ECoW will maintain a site office permanently based on site. During works its anticipated that the ECoW will visit site a minimum of once per week and will be permanently available should he/she be required.

### **Civils**

The Civil Works Contract (CWC) was awarded to INSERT COMPANY NAME. INSERT COMPANY NAME will have the following responsibilities:

1. To provide a qualified and experienced site foreman.
2. Perform the role of Project Supervisor Construction Stage (PSCS).
3. Provision and maintenance in a neat and sanitary fashion a temporary, secure site compound for all workers anticipated to be on the site. This will include office, canteen, welfare facilities, storage, parking for all workers and visitors and utilities required for the safe execution of the works.
4. Provision of all plant, tools, equipment and signage deemed necessary for the safe completion of the works within the programme schedule. Site signage shall include all safety signage as required by the Health, Safety & Welfare at Work (construction) regulations, site notice board, speed limit signage (max site speed shall be 15km/hr), direction signage, warning signage at excavations etc.
5. Setting out of the site to the details shown on the planning drawings, including internal roads, turbine location and crane area, site compound, internal cable trenches and grid connection trenches.
6. Construction of site roads, crane areas, excavation of turbine foundations, excavation of the cable trenches and installation of the PVC ducting, construction of the substation, excavation of the grid connection trench and installation of ducting, drainage, environmental controls etc.
7. Securing road opening licences for the installation of cables along the public road.
8. Control of potential pollution arising from the works. These will include:
  - a. Washout of concrete trucks.
  - b. Refuelling of machinery.
  - c. Silt-laden runoff.

### **Turbine Supply**

The turbine (WTG) supplier will be INSERT SUPPLIER NAME. The Employer will have a separate contract with the turbine manufacturer for the supply, erection and commissioning of the turbines. The turbine manufacturer's scope of supply includes the construction of the turbine foundations. The client's representative will be required to co-ordinate certain works with the turbine manufacturer to ensure smooth interface with turbine foundation construction and turbine installation.

### **Electrical Contract**

INSERT SUPPLIER NAME has been appointed the electrical balance of plant contractor. INSERT SUPPLIER NAME will be responsible for:

1. Provision of all plant, tools, equipment necessary for the pulling and termination of 20kV cables and fibre optic cables.
2. Fit-out of the substation of all electrical equipment.
3. Commissioning of the substation equipment.
4. Pulling and jointing of the grid connection cables.

## **4.2 Construction Programme**

The construction programme will last approximately 12 months. The earthworks element of the project is expected to be completed within the first six months.

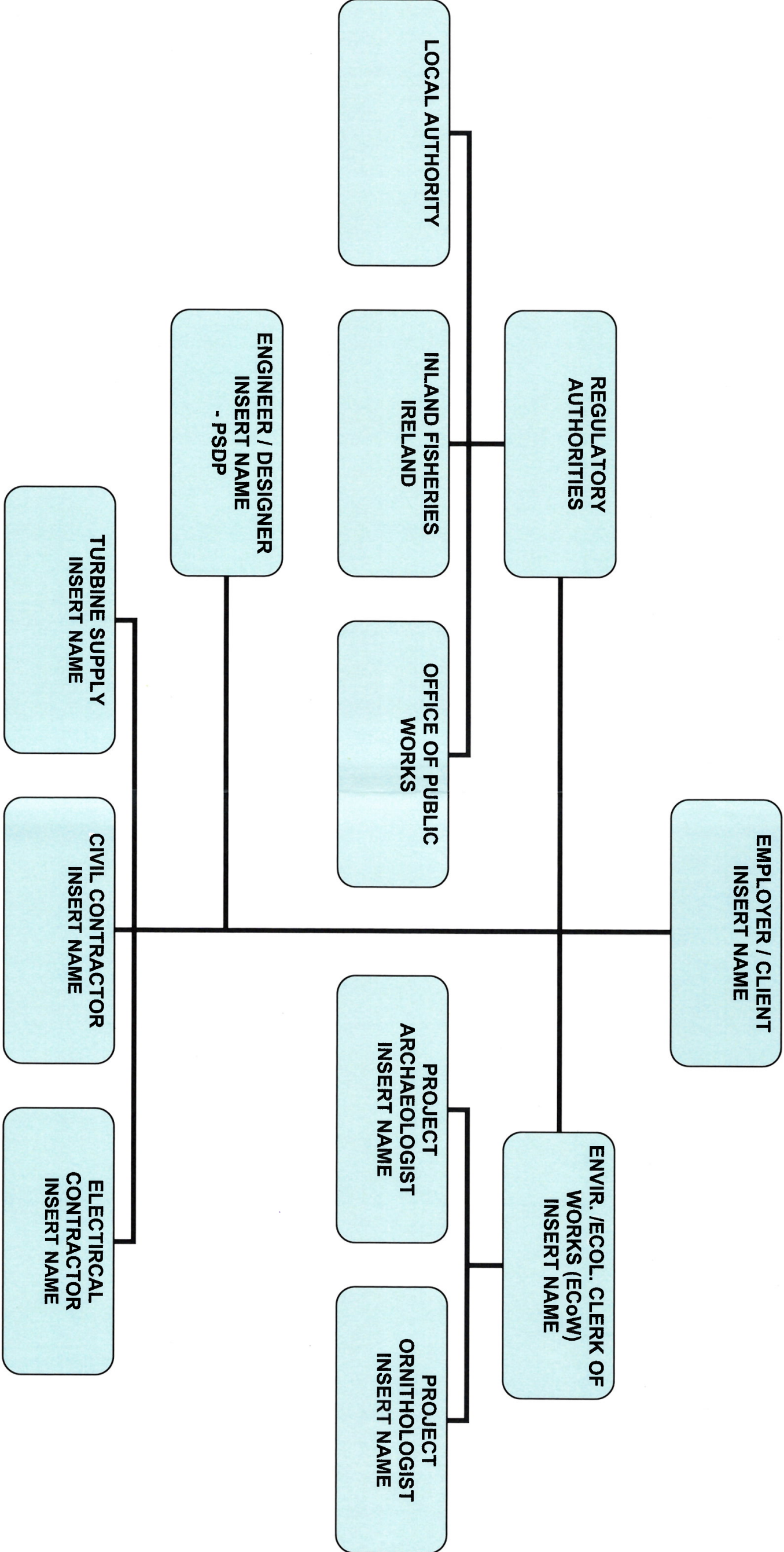
An outline of the project programme is as follows:

1. February 2022: Mowing of construction area footprint to discourage birds nesting in the works areas and trimming of trees on access roads.
2. Month 1: Mobilisation to site and commence construction of access roads, craneage areas, installation of cable ducting and transport route upgrade. Estimated duration = 6 months.
3. Month 4: Commence construction of turbine foundations. Estimated duration = 3 months.
4. Month 6: Commence pulling internal wind farm cabling. Estimated duration = 1 month.
5. Month 7: Commence installation of turbines. Estimated duration = 4 months.
6. Month 12: Wind farm commissioning complete.





Figure 4-1: Organisation Structure





## 5 ENVIRONMENTAL CONTROLS

The avoidance, reduction and mitigation measures provided below reflect those provided in the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) submitted with the planning application. The civil works contractor may, with agreement of the Employer and ECoW, propose alternative measures that provide equal or greater protection to water quality and the environment.

### 5.1 Amenity Protection

The protection of the amenity in the vicinity of the site relates largely to the control of noise emissions from the site. Management of construction traffic to minimise impact on local road users is also an important consideration.

Noise surveys were carried out as part of the environmental impact assessment for Graffy Wind Farm to establish existing background noise levels. Noise surveys were conducted at two locations over 15 days. Data collected from one of the monitoring stations were considered erroneous, so the data from the second monitoring station is relied upon to establish baseline noise levels. These baseline noise measurements are considered to represent background noise levels in the wider area. The main sources of noise were typical countryside sounds predominantly controlled by the noise generated from wind effects on vegetation, low-intensity farming activities, water flowing in the on-site streams and traffic on the local road network.

It is not possible to specify the precise noise level emissions from the construction equipment until such time as the construction plant has been selected. However, Table 5-1 indicates typical construction related noise levels.

**Table 5-1: Typical Noise Levels from Construction Works (ref: BS 5228)**

Activity	Plant	LAeq @ 10m
Site clearance/excavation	Lorries (drive by)	70 dB
Removal of waste/rubble	Dozers	87 dB
	HGV and tippers	84 dB
	Concrete Pour	to 80 dB
Foundations	Place and vibrate	to 86 dB
	concrete cycle Cement	80 dB
	Mixers	74 dB
	Large crane operations	86 dB
Concrete Frame	Place and vibrate	80 dB
Road works/landscaping	Surfacing/rolling	76 – 86 dB
Infilling/Levelling	Dump truck	82 dB
	Wheeled excavator/Loader	76 dB
	Dozer	81 – 89 dB

The construction of turbines will typically be at least 725m from the nearest dwellings. Attenuation by distance, ground absorption and air attenuation will result in typical noise levels at the nearest dwellings of approximately 33dB(A). As a pre-caution, a 5dB(A) penalty is applied for possible tonal effects, bringing the noise level to 38dB(A). These levels indicate a minor/negligible impact with all the machines listed in Table 5-1 in operation, based on background noise levels recorded in 2019.

The construction equipment likely to be used for the grid construction works is listed in Table 5-2.

**Table 5-2: Typical Noise Levels during Construction**

<b>Equipment</b>	<b>BS5 228 reference</b>	<b>L<sub>Aeq</sub> at 10m</b>
Excavator	Table C5 No.11	73
Tractor	Table C4 No.74	80
Stihl Saw	Table C4 No.70	91
Small Excavator	Table C4 No.10	66
Compacton	Table D3 No.118	89

The construction work associated with the grid connection will be closer to houses than the works on the wind farm. Noise levels associated with the equipment listed in Table 5-2 at 30m, all operating at the same time, will be 66.3 L<sub>Aeq</sub>, below the noise level limit of 70dB L<sub>Aeq</sub>. Where construction occurs less than 30m from a property, the noise limit is expected to be exceeded, however, at a cable-laying rate of 100m per day, the equipment would only be expected to be within 30m for a short period.

To mitigate against the impacts of noise on the local community, the following mitigation measures are proposed for the construction phase:

- Working hours at the site during the construction phase will generally be limited from 07:00 to 19:00 Monday to Saturday inclusive. Work on Sundays or Bank Holidays will only be conducted in exceptional circumstances or emergency or where heavy (i.e. noisy) machinery is not required. Exceptional circumstances would include lifting of turbine components in calm weather periods outside normal working hours. Concrete pours for turbine foundations will need to start earlier (typically 05:00). This will only occur for the pouring of the foundations (8 No. turbines and substation) during the construction period.
- All construction will be carried out in accordance with BS 5228: 2014 (Noise and Vibration Control on Construction and Open Sites - Part 1<sup>2</sup>). Accordingly, all construction traffic to be used on site will have effective well-maintained silencers.
- Operators of all mobile equipment will be instructed to avoid unnecessary revving of machinery. Machines that may be in intermittent use will be shut down between work periods or will be throttled down to a minimum.
- The contractor will be instructed to use the least noisy equipment. With efficient use of well-maintained mobile equipment considerably lower noise levels than those predicted can be attained.
- The Client's Representative will closely supervise all construction activity. Construction activity due to its nature is a temporary activity and thus any impacts will be short term. The majority of construction works will be carried out during the day-time period.
- Plant known to emit noise strongly in one direction will, where possible, be orientated so that the noise is directed away from the nearest noise sensitive locations.
- Speed limits of 15km/hr will be enforced on internal site roads. This will reduce noise emissions from the HGV traffic.

## 5.2 Groundwater Protection

The bedrock aquifer underlying the site is classified as a poor aquifer (PI). The thin overburden cover means that the aquifer has an extreme vulnerability to contamination, such as fuel spills during the construction phase. There are two groundwater wells within the vicinity of the site – a shallow dug well / spring and a bored well.

The following measures will be implemented during construction to minimise the risk to the groundwater resource:

<sup>2</sup> British Standards Institute, February 2014. *Code of Practice for Noise and Vibration Control on Construction and Open Sites. Noise: BS 5228-1: 2009+A1:2014.*

1. Any storage of oils and diesel on site will be in steel or plastic tanks of good integrity and banded to 110% of tank capacity. All fuel and hydraulic fluids will be stored in the site COSHH store located in the site compound.
2. Refuelling will be carried out directly from delivery vehicles. Refuelling of mobile plant will not take place within 50m of any sensitive receptor – e.g. streams, wells, etc. Refuelling by mobile bowser may be used for small generators etc. Toolbox talks on refuelling will be given to delivery drivers in addition to plant operatives. The refuelling toolbox talk information sheet is provided in Attachment 8.
3. Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice.
4. Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of.
5. Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
6. Appropriate spill control equipment, such as oil soakage pads, will be kept within the construction site to deal with any accidental spillage.
7. Concrete will be poured in excavations and / or in formwork. Washing out of concrete trucks will not be permitted on site. Washout will take place at the batching plant where suitable facilities should be in place. Chute only washing will be permitted on site. This will occur at a dedicated, lined and contained area(s) on site.
8. Wastewater from the welfare facilities will be collected in sealed tanks for both the construction and operational phases.

There are no groundwater wells near the works areas, so specific measures for wellhead protection are not required.

### 5.3 Surface Water Protection

Surface water assessments are addressed in Chapter 8 (Water) and Chapter 11 (Fisheries & Aquatic Ecology) of the EIAR. Figure 5-1 shows the main surface water drainage features on the site relative to the proposed turbines. As outlined in Chapter 2 above, the site is in mountain peatland, in the upper catchments of the Stracashel and Stranagoppoge rivers and along the foothills of Aghla Mountain.

The river water quality in the Stracashel catchment is unpolluted with good water quality rating – Q4 or Q5. The river water quality in the Stranagoppoge catchment is slightly polluted to unpolluted with moderate to good water quality rating – Q3/4 or Q4. There are several crossings to be made of the streams draining the site. This work may be subject to Section 50 approval from the OPW. Consultation with IFI and OPW will be conducted by the Project Engineer in this regard. Drainage from the site is largely overland sheet flow to man-made drains – field boundary drains, forestry drains, herring-bone field drainage and roadside drains – and streams. The main risks associated with potential impacts on water quality are working in proximity to the watercourses, siltation, fuel spillage and use of concrete.

The mitigation measures to be employed during the construction phase to protect water quality follow the hierarchal principle of minimise-settle-treat. These are:

- A minimum buffer of 50m from watercourses will be used for the storage of peat and soils, storage of fuels / chemicals, the refuelling of mobile plant, and the placement of the washout area for concrete trucks.
- All buffer zones adjoining the works area will be delineated using post and rope fencing and marked as an exclusion zone. These will be maintained for the duration of the construction works.
- In-stream works required for the construction of culverts will be conducted during low flow conditions. Method statements for culvert construction will be developed by the civils contractor and approved by the ECoW. The Method Statement will include the minimum requirements set out in the EIAR for the construction of culverts.

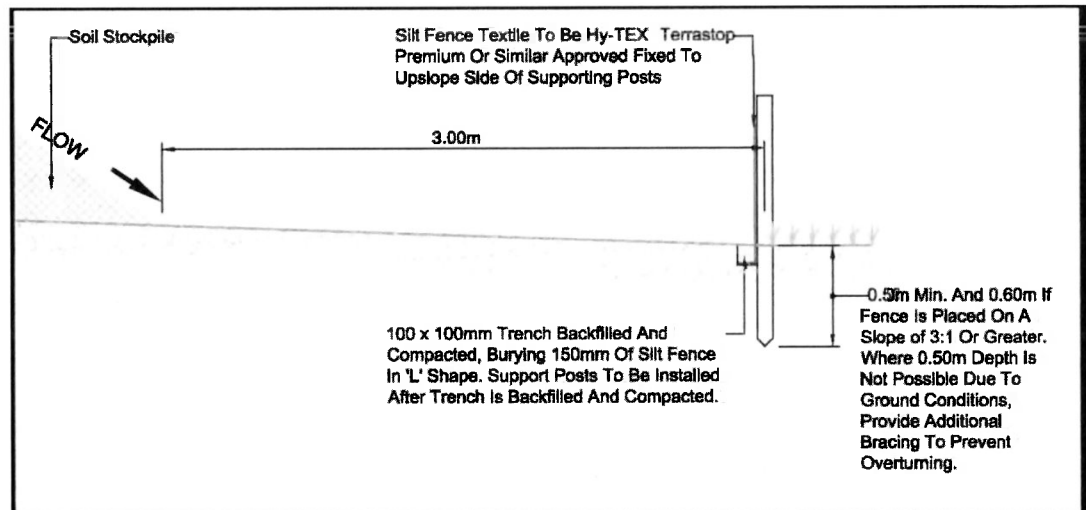
- During the construction phase, best practices will be employed to minimise the release of sediment laden storm water runoff, details of which are set out herein.
- Following mobilisation to site, surface water management infrastructure will be the first works carried out. Additional controls will be installed as needed as construction progresses through the site, and/or as identified during site inspections of surface water management infrastructure.
- To reduce the volume of water to be treated and to reduce the erosion potential of exposed peat and soils, clean surface water runoff will be diverted around earthworks areas at the turbine locations and through earthworks areas along road alignments. This will be done with the use of diversion drains or barriers.
- Areas stripped of vegetation will be kept to a minimum. Areas along roads and around hardstands will be reinstated on an on-going basis as this infrastructure is constructed. This will reduce areas of soil exposed to erosion.
- Roadside drainage will be provided to collect runoff from new site roads. Check dams will be installed at intervals within the channels to slow flows and settle silt. Distances between check dams will be such that the level at the crest of one dam will be the same as that of the toe of the upstream dam. Therefore, dams will be closer together on steeper parts of the site. The drainage channels will tie into existing drains where they intercept.
- In addition, roadside drainage channels on steep sections of the site will be lined with geotextile or jute to reduce erosion.
- Where the roads cross existing drainage paths, pipework will be installed to transfer water beneath the road. There are a number of existing roadside and field boundary drains to be crossed. To retain the hydraulic balance across the site, cross drains will be installed through the roads at regular distances where they cut through existing preferential flow paths.
- Settlement ponds will be provided at the locations shown on the site layout drawing. They will be used to treat surface water runoff from the earthwork areas. Each will be sized for the catchment area contributing to that pond and to treat water, in combination with the polishing in the vegetative buffer zone, to 20mg/l prior to reaching any watercourse. The limit at the inlet to each pond will be 1,000mg/l TSS. The rationale for 1,000mg/l is set out below in Section 5.3.1. The design, location and sizing of these ponds are included on the pond location drawing prepared by [INSERT NAME OF PROJECT ENGINEER].
- The roads and hardstand areas will be constructed with aggregate – there will not be a hard-paved surface. This will reduce runoff volumes in practice from the estimated increases.
- The public road serving the site will be kept clean of mud and debris so that silt is not washed to watercourses downstream of the site and outside the control of the wind farm development. If mud or debris is tracked onto the public road from vehicles leaving the wind farm site, the road will be swept.
- Stockpiled soils will be kept a minimum distance of 50m from any watercourse. Silt fences will be placed downgradient of stockpiles to treat any polluted runoff.
- Check dams and / or straw bales will be installed along the alignment of roadside drainage to slow flows and remove silt. Check dams will be constructed using clean stone and geotextile spanning across the drainage channel.
- If required, dewatering of the foundation excavations will be to the temporary settlement ponds. Flow from the settlement ponds will be diffuse, distributed from the ponds by level spreaders. On release, the discharge water would travel over a minimum of 50m of peatland thus ensuring that there is no direct discharge to watercourses and that all flows are buffered prior to entering existing drainage systems. However, it is not expected that groundwater will be encountered during foundation construction.
- Works on stream crossings will be carried out in dry weather as far as practical when low flows occur in the streams / drains. Although fish were absent during surveys at all new crossing locations, bridging of the larger streams will be achieved by clear-span structures – refer to crossings X1, X5 and X6. In-stream works will be kept to a minimum and will be avoided between 01 October and 30 April as per IFI and Loughs Agency guidelines. The IFI will be consulted for crossings wider than 600mm.



Stream crossing design will have regard to the Fishery Board's guidance documents for road construction.

- The release of cement to water courses will be prohibited. Concrete pours will occur in contained areas. Chute only washout of concrete trucks will be done at a dedicated location on site (minimum of 50m from any watercourse) where a skip, lined with plastic will be provided to collect washout water. The skip will be placed in a contained lined pond with a shutoff valve. Water will be decanted from the skip into the lined pond. Signage will be erected at the site directing drivers to the washout area. This washout area will be removed at the end of the construction phase. The pH of the washout water will be monitored and will only be released from the pond when pH falls below 9. The hardened concrete will be taken off site for disposal or for beneficial reused on site.
- Suitably qualified persons will carry out monitoring of construction activities to ensure surface water quality is not impacted and where necessary instruct the contractor to implement remedial works. This will include a surface water quality monitoring programme to be implemented at the site during the construction phase. Reference should be made to the Method Statements prepared for the development which outline the monitoring requirements for each construction phase. As noted, the ECoW will carry out this monitoring. See Section 5.7 below for further details on the site monitoring measures.
- Earthworks will be temporality suspended during prolonged periods of heavy rainfall – i.e. during a Met Eireann Orange Warning for Rainfall<sup>3</sup>. In this regard, weather forecasts will be monitored by the Client's Representative.
- Hydrocarbons (oils, diesel and chemicals) will be stored and managed in an appropriate manner to ensure no negative impacts. Specific measures will include:
  - o Any storage of oils and diesel on site will be in steel or plastic tanks of good integrity and banded to 110% of tank capacity. All fuel and hydraulic fluids will be stored in the site COSHH store located in the site compound.
  - o Refuelling will be carried out directly from delivery vehicles. Refuelling of mobile plant will not take place within 50m of any sensitive receptor. Refuelling by mobile bowser may be used for small generators etc. Toolbox talks on refuelling will be given to delivery drivers in addition to plant operatives.
  - o Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice.
  - o Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of.
  - o Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
  - o Appropriate spill control equipment, such as oil soakage pads, will be kept in the site plant to deal with any accidental spillage. Spare spill kits will be kept at the construction site compound.
- Silt fences will be erected on the downslope side of any earthworks areas to intercept any overland flows that could potentially be carrying silt / fines. They will also be erected downslope of the pond discharge points to assist with polishing of surface water in the buffer zones. These are constructed with geotextile embedded in the peat and supported with wooden pegs. See example in Plate 5-1.

<sup>3</sup> USEPA National Pollutant Discharge Elimination System, 2014. National Menu of Best Management Practices (BMPs) for Stormwater.



**Plate 5-1: Example of Typical Silt Fence Arrangement**

- An Emergency Response Plan (EMP) has been developed to set out procedures to be followed in the event of a pollution incident – refer to Chapter 8. The ECoW will explain the EMP to all workers during site induction.

Mitigation measures to be employed during the trenching for the grid connection include:

- The trenching for the grid connection will be done in short sections minimising the amount of disturbed ground and soil exposed to runoff. Each section of trench opened will be completed (ducting installed and backfilled) by the end of each working day.
- The section of trenching to be completed each day will be inspected and surface water protection measures put in place prior to excavation works commencing. This will include placement of sandbags to protect existing roadside drains, placement of sandbags to direct road runoff from the works area, erecting silt fencing where appropriate, locating culverts to be crossed that day, etc.
- Surplus excavated material will be loaded directly into trucks and taken off site to an authorised waste recovery facility. Where the material encountered is suitable for reuse as backfill, it will be placed on the upgradient side of the trench so that any rainfall runoff (carrying silt) will be into the trench.
- Concrete truck rinse down will not be carried out along the grid route. This will be done at the batching plant.
- In the unlikely event that trenches need to be dewatered, a vacuum tanker will be used. The water will be taken to the wind farm site and discharged into an on-site settlement pond. The water will be released into a drain leading to the pond at a rate that doesn't exceed the design parameters of the pond, to ensure the water is sufficiently treated to remove silt. Due to the extremely high value of the receiving surface water environment, water will not be pumped from trenches to the roadside drains.
- Where replacement of existing stone culverts is required, the following mitigation will be used:
  - o Works will be supervised by the ECoW and / or the project aquatic ecologist who will liaise with IFI and National Parks and Wildlife Service (NPWS) prior to works commencing. The ECoW will also monitor surface water quality downstream of the works in accordance with the surface water monitoring programme and will have the authority to cease any works should the monitoring identify unacceptable water quality conditions.
  - o Any works within watercourses that have the potential to support fish (indicated in Chapter 11 of the EIAR as being at least of "Medium" sensitivity), will be avoided between 01 October and 30 April as per IFI and Loughs Agency guidelines.

- All plant and equipment will be serviced and cleaned before entry to site to limit risk of oil spillage and for biosecurity.
- Where temporary fluming or flow diversion is proposed in a watercourse with salmon or trout present (at least Medium sensitivity) all fish within the designated area will be subject to fish rescue and translocation downstream by a fisheries biologist. Fish rescue will be conducted under Section 14 authorisation (DCCAE/ IFI) or Section 69 authorisation (Loughs Agency) where appropriate.
- Works will be carried out in dry weather with low flows in the streams with forecast for dry weather for the duration of the works – approximately 2 days.
- Machinery used will stay on the public road; machinery will not be permitted to enter the stream channel.
- The road edge adjacent to the watercourse will be lined with sandbags and silt fences (multiple fences recommended) as appropriate to prevent runoff from the trenching works reaching the stream. The design of these multiple features shall also allow for the safe removal of accumulated silt away from the channel, particularly through staged removal of the most contaminated upper fence before the lower ones, and the removal of the final fence only when it is clear of any silt
- Clean sandbags will be used to dam flows on the upstream side of the culvert. Sandbags will be placed by hand at a suitable location to take advantage of any natural pool but set back from the works to permit unhindered excavation of the existing culvert.
- A second sandbag dam will be placed on the downstream side of the culvert to prevent backflow into the works and contain any groundwater seepage that is likely to be turbid.
- Sandbagging requires careful attention to detail if it is to be effective. All bags must be laid neck uppermost and seams aligned. Bags must not be overfilled or they will not tamp together or will burst with ease. Additional bags will be filled ready to raise freeboard of dams.
- Flume placement for temporary flow diversion or permanent replacement of culverts will follow guidelines issued by IFI and CIRIA to ensure that fish passage is not impeded.
- If topography permits, the water will be piped over the road by gravity flow, otherwise, it will be pumped. Discharge will be via break tank or similar approved storage onto a splash-plate or rip-rap (gabion basket) to dissipate energy and avoid scour or erosion of the stream bend or banks. The pump will be filled with a screen, so fish aren't drawn into the pump intake.
- The use of pump sumps will be considered within the dammed area. These will be lined to prevent scouring. The intention is to intercept clean groundwater ingress and pump it out rather than allowing it to get silted in the works area by segregating off areas.
- Any spoil generated will be removed to designated safe area clear of the flood plain. Some of this spoil will be saturated and will require bunding and sheeting over.
- If bank material needs to be removed it will be stored separately and reinstated according.
- The ducting will be advanced passed the culvert and the existing culvert will be excavated 'in the dry' and a new culvert, sized for a 100-year rainstorm event, will be installed with appropriate gradient, headworks and outfall. A precast concrete culvert, concrete pipe or HPDE pipe will be used. Culverts will be embedded to at least 300mm below the existing stream bed to ensure backwatering. Culverts will avoid a significant change in gradient (i.e. >3%). After embedding, replacement culverts will be filled with clean washed gravels and cobbles to replace lost habitat and facilitate fish movement.
- Dry stone headworks will be placed at the culvert intake and discharge and the stream bed adjacent to the works will be reinstated at the direction of the project aquatic ecologist.
- The ECoW will determine the quality of any water trapped between the two dams – visual inspection and turbidity meter. If this water is clean, it will be

left in situ. If it is not clean, it will be removed from the works area prior to removal of the dams. If required, dewatering of the works area prior to dam removal will be undertaken by pumping from the stream bed to either a) the cable trench for percolation or b) taken back to the wind farm site for treatment at an existing settlement pond or c) treatment using a Siltbuster. The most efficient method will depend on the volume of water present and the available percolation.

- The upstream dam will then be removed to permit flow through the new culvert. This will be done in phases, so a large volume of water isn't released at once. The downstream dam will be removed in a similar manner.

The two bridges along the grid connection route have been inspected by the specialist contractor and it confirms that HDD is the most appropriate ducting installation method at these two locations and at a third location (triple culvert). For directional drilling, a specialist contractor will be engaged. The HDD contractor will provide a site-specific method statement for this work – see draft in Attachment 6. It will incorporate the measures detailed in the CEMP, including emergency response plan, and the following measures:

- As rotary drilling techniques are required, drilling fluid will be required. A materials safety data sheet (MSDS) for the drilling fluid will be provided to, and approved by, the ECoW prior to works commencing.
- Measures to protect the watercourse will be erected before commencement of drilling. This will include silt fencing, sandbags and straw bales. Additional materials will be on hand in the event of a frac-out – refer to Appendix B in the TLI report (Appendix 7) for the 'frac-out' mitigation plan.
- Operations will be limited to daytime hours and conditions when low levels of rainfall are forecast.
- The depth of the bore shall be a safe depth (minimum 1.5m) below the bed of the watercourse.
- The ECoW will monitor, or arrange for monitoring, drilling operations at all times
- Diesel tanks, used to store fuel for the various items of machinery, will be self-contained and double-walled. Refuelling will be carried out from these tanks for small plant such as generators and directly from delivery vehicles for larger plant. Specific mitigation measures relating to management of hydrocarbons are:

A suitably qualified ECoW will carry out monitoring of construction activities to ensure surface water quality is not impacted and where necessary instruct the contractor to implement remedial works.

### 5.3.1 Selection of Stilling Pond Trigger Level

Based on site-specific settlement trials [TO BE CONDUCTED] and published literature on the efficiency of buffer zones, the surface water treatment infrastructure has been designed as follows:

- Ponds to settle out particles >63µm (i.e. fine sand) with 100% efficiency.
- Ponds to settle out particles <63µm (i.e. silt and clay) with 31% efficiency.
- Buffer zones with minimum width of 50m to settle out remaining particles <63µm with 97% efficiency.

Based on a pond inlet trigger level limit of 1,000mg/l, a concentration of 20mg/l TSS on discharge to any watercourse is designed. This will take up a small percentage of the available TSS headspace in the streams draining the site.

Assimilative Capacity =  $[(C_{\max} - C_{\text{back}}) \times F \times 86.4]$  kg/day

where:

$C_{\max}$  = maximum permissible concentration 25 mg/l TSS

$C_{back}$  = background upstream concentration 10 mg/l TSS (maximum recorded at Graffy site)

F = flow in the river (m<sup>3</sup>/sec) 95%tile flow used

86.4 = constant to correct the units to kg/day

The assimilative capacity calculation is supported by a mass balance assessment which calculates the resultant concentration in the receiving waters due to the discharge. The mass balance assessment uses the following formula:

$$\text{Mass Balance (T)} = [(F \times C) + (f \times c)] / F + f \quad \text{mg/l}$$

where:-

T = Resulting concentration due to the discharge (mg/l)

F = Flow in receiving waters at 95%tile (m<sup>3</sup>/sec)

C = Average background concentration in receiving waters 10mg/l TSS

f = Discharge flow (total flow from the ponds in each catchment) (m<sup>3</sup>/sec)

c = concentration in the discharge (mg/l)

Assimilative capacity and mass balance assessment is provided for total suspended solids (TSS) - the salmonid water regulations value of 25mg/l is used.

#### **Stracashel River**

background concentration = 10 mg/l

95%tile flow in the Stracashel River = 0.032 m<sup>3</sup>/sec

Maximum permissible concentration = 25 mg/l (salmonid water regulations)

Discharge flow from the ponds in Stracashel catchment = 0.208 m<sup>3</sup>/sec

$$\text{Assimilative Capacity TSS} = [(C_{max} - C_{back}) \times F \times 86.4] \text{ kg/day}$$

$$= [(25 - 10) \times 0.032 \times 86.4]$$
$$= 41.47 \text{ kg/day}$$

$$T \text{ TSS} = [(F \times C) + (f \times c)] / F + f \quad \text{mg/l}$$

$$= [(0.032 \times 10) + (0.208 \times 20)] / 0.032 + 0.208$$
$$= 18.67 \text{ mg/l TSS}$$

The discharge will increase concentrations in the Stracashel River from 10 mg/l to 18.67 mg/l, using up 58% of the available headroom.

#### **Stranagoppoge River**

background concentration = 10 mg/l

95%tile flow in the Stranagoppoge River = 0.02 m<sup>3</sup>/sec

Maximum permissible concentration = 25 mg/l (salmonid water regulations)

Discharge flow from the ponds in Stranagoppoge catchment = 0.164 m<sup>3</sup>/sec

$$\text{Assimilative Capacity TSS} = [(C_{max} - C_{back}) \times F \times 86.4] \text{ kg/day}$$

$$= [(25 - 10) \times 0.02 \times 86.4]$$
$$= 25.92 \text{ kg/day}$$

$$T \text{ TSS} = [(F \times C) + (f \times c)] / F + f \quad \text{mg/l}$$

$$= [(0.02 \times 10) + (0.164 \times 20)] / 0.02 + 0.164$$
$$= 18.9 \text{ mg/l TSS}$$

The discharge will increase concentrations in the Stranagoppoge River from 10 mg/l to 18.9 mg/l, using up 59% of the available headroom.

### 5.3.2 Maintenance of Site Drainage Systems

The drainage system for the wind farm will be maintained regularly to keep it operating effectively. The maintenance will include the following:

- inspection of silt fencing for silt build up.
- inspecting cross-drains for any blockages.
- inspecting settlement pond and outfalls.
- inspecting the stream crossing for obstructions.
- inspecting the progress of the re-establishment of vegetation.
- implementing appropriate remedial measures as required after the above inspections.

The above checks will be undertaken as part of the drainage audit which will commence on the installation of the drainage prior to construction and will continue through the construction phase. During the first year of the operation and maintenance phase of the wind farm, drainage inspections will also be carried out at regular intervals.

A record will be kept of any remediation measures which are deemed necessary following each audit and/or inspection. A template of the audit check list is provided in Attachment 9. Records of any remediation measures will be made readily available as part of the weekly reporting upon request by the IFI and Donegal County Council.

Maintenance will be in accordance with CIRIA C697 (SuDS and Maintenance Manual).

It is not envisaged that the operation of the wind farm will result in significant impacts on the hydrological regime or water quality of the area, as there will be no further disturbance of soils post-construction, and only minimum traffic movement. The drainage system will however remain in place during the operational period, albeit that settlement ponds will be backfilled following the completion of the works. The settlement ponds will be backfilled with suitable excavated material, with an allowance for the continuity of drainage across the top of the settlement pond from inlet to outlet.

## 5.4 Site Stability

It is estimated that approximately 46,593m<sup>3</sup> of peat will potentially be excavated during construction of the roads, crane areas, substation and turbine foundations.

The peat depth within the development footprint was found to be <1.0m typically, but up to 5.4m. Deeper peat is found in small basin defined by rocky outcrop, so is contained.

Based on an assessment of ground conditions at the site it is determined that the construction of the wind farm has a low risk of construction-related peat instability. The full peat landslide risk assessment is provided in EIAR.

During construction the following measures will be employed to ensure peat and ground stability:

1. Avoid the stockpiling of peat at the turbine sites. Excess excavated peat will be removed to the peat recovery areas – locations shown on the site layout drawing.
2. Earthen / rock embankments will be used to hold the peat in place.
3. Peat turves will be stored on site for reuse in restoration along the roads and around the crane areas and turbine foundations. Restoration will be carried out on an on-going basis as infrastructure is built. This will reduce the volume of peat in temporary storage and also reduce the areas of soil exposed to erosion.
4. Inspections and testing of roads and crane area will be carried out during their construction to ensure that they can accommodate the design loadings. Formation levels for the turbine foundations will also be inspected, tested and certified prior to constructing the turbine foundations.



5. Monitoring of the peat during the road construction will be carried out in areas of deeper peat at the site. Based on the road construction method, monitoring pegs (for lateral displacement) will be used.

Engineers from INSERT COMPANY NAME will carry out monitoring of construction activities, with a view to identifying areas of unstable peat and to instruct the contractor to implement suitable remedial works, if required.

## 5.5 Archaeology

Dermot Nelis Archaeology prepared the Archaeological & Cultural Heritage Assessment for the proposed development – refer to Chapter 9 of the EIAR. The findings of the assessment were that there are no features of archaeological interest within the proposed development footprint; there are 11 RMPs within the 5km study area of the wind farm; one RMP within the 1km study area of the grid connection; and no RMP within the 1km study area of the transport route upgrade. It was concluded that there will be no direct or indirect construction phase effect on the recorded archaeological, architectural or cultural heritage resource. It is considered there will be a permanent direct imperceptible construction phase effect on any previously unrecorded archaeological remains that may exist within the development area. It is considered there will be a permanent direct imperceptible construction phase effect on eight townland boundaries that will be impacted on by the development.

Bogs are recognised as being areas of archaeological potential and often contain previously unrecorded well-preserved below-ground archaeological remains. As such, previously unknown archaeological sites could be encountered during construction earthworks and so, monitoring of excavation works will be carried out.

INSERT COMPANY NAME has engaged INSERT COMPANY NAME to carry out the necessary monitoring, liaise with the Department and report on its findings. The mitigation measures to be implemented for archaeology during construction are as follows:

1. Written and photographic records be created of the eight affected townland boundaries. The written and photographic records will be created in advance of groundworks commencing on site.
2. No groundworks will occur without the presence of a suitably qualified and licensed archaeologist to monitor all such disturbance. Monitoring will be carried out under licence to the Department of Culture, Heritage and the Gaeltacht and the National Museum of Ireland. Provision will be made for the full excavation and recording of any archaeological features or deposits that may be exposed during monitoring. The objective of archaeological monitoring is to record, to professional standards, any features and objects of archaeological importance that will be discovered in the course of the construction activity.
3. The Civil Works Contractor will work closely with the archaeologist and provide all necessary access and other arrangements.
4. Each excavating machine will be watched by one archaeologist at all times (1:1 ratio).
5. The Department will be consulted to agree the appropriate course of action in the event of the discovery and identification of any archaeological remains, which may include preservation in situ or excavation and recording. This may require suspension of earthworks at that location until agreement is reached.
6. The project archaeologist will keep the Department case officer informed of all stages of the archaeological site works.

## 5.6 Ecological Management Plan

Woodrow Sustainable Solutions Ltd and RPS prepared the Biodiversity chapter for the EIAR and RPS prepared the NIS for the proposed development.

Fourteen habitat types have been mapped across the proposed development. The vast majority of the application site and its surrounds comprises a range of upland habitats including wet grassland, wet heath, upland blanket bog and lowland blanket bog. These habitats are typical of the wider area which is characterised by upland habitat. The site is within the catchments of two SAC – Finn River SAC and West of Ardara/Maas Road SAC.

The proposed grid connection lies in proximity to a range of habitats including semi-improved grassland, forestry plantation, watercourses, heath and wet grassland. It is noted that the grid connection proposals will not give rise to the loss of any adjacent habitat with the proposals confined to the carriageway of the existing road/track on which the route is proposed.

Otter is the only mammal identified that could potentially be affected by the proposed development – the grid connection runs close to the Stracashel River. Other mammal species such as badger, red deer, red squirrel, pine marten and Irish hare are likely to utilise the site; red deer and Irish hare were recorded within the general vicinity of the site. However, it is considered that the relatively small areas of habitat which will be affected by the proposed development are likely to be of relatively low ecological value for these species.

There are no moderate or major effects predicted for terrestrial habitats as a result of the proposed development. Thus, there are no potential significant impacts arising which require avoidance, reduction or counterbalancing measures to mitigate or offset their adverse effects. In turn, there is no requirement for monitoring of habitats post-development.

The proposed development has potential to give rise to major adverse effects upon marsh fritillary. Pre-construction surveys will be carried out within the development footprint to ensure marsh fritillary isn't present. Should the species be recorded during these surveys, works will cease in these areas, fencing installed around the suitable habitats used by the species and appropriate mitigation will be agreed with NPWS. Appropriate mitigation in such a scenario would include the appropriate timing of habitat clearance works to align with translocation of the caterpillars within the period between late-July and September.

The proposed development is located in the headwaters of two different river catchments (Ownea and Finn), both of which are significant, due to Atlantic salmon stocks and their occurrence within SACs. The Ownea River also hosts populations of freshwater pearl mussel. The principal risk to fish and the aquatic environment will be during the construction phase of the proposed development.

The bat species recorded utilising the site are generally considered common and widespread in an Irish context. Low levels of bat activity were recorded for all the species detected. However, taking into account the EU Annex IV protected status of bats, the bat assemblage is considered to represent a feature of Local (Higher) importance for more common species to County Importance for rarer species. One potential bat roost was identified near turbine T04. Construction-related mitigation measures for bats are:

1. Pre-construction bat surveys will be conducted at the derelict cottage near turbine T04. These surveys will inform the requirement for further measures to preserve and possibly enhance this building, or alternative buildings. This information will also inform the application of a derogation license from NPWS to undertake appropriate mitigation action to ensure the conservation of bats using this roost, as required. The preferred option is the retention of the building and the implementation of a 30m exclusion zone during the construction phase, to prevent disturbance during times of occupancy.
2. The only location where removal of vegetation was judged to potentially impact on foraging / commuting bats was in the vicinity of T04. Construction of the access track between T03 and T04, as well as implementation of a 100m turbine buffer zone for bats, will result in the removal of a small open woodland consisting of mature Sitka spruce and sycamores that provides connectivity to a nearby forestry plantation via treelines and scattered mature trees. To replace the loss of bat commuting/foraging habitat adjacent to T4, there will be an equivalent area identified as compensatory habitat. The re-planting will aim to maximise future woodland, hedgerow and treeline

- ecological function by specifying an appropriate species mix and replacement locations to maximise connectivity. The aim of the replanting is to strengthen connectivity from the cottage to the plantation to the north.
3. A low treeline/hedge (< 3m) will also be planted to replace trees along the western and southern edges of the cottage and although, this would fall on the edge of the turbine buffer for bats, planting is considered necessary to retain the integrity of the roost. Once this hedgerow/treeline has become established the taller trees around the cottage can be felled to limit the height of the bat features.
  4. For the creation of bat buffers zones around other turbines, including T01, T05, and T06 the full extent of foraging features for bats, specifically forestry edge will not be impacted at locations where felling of conifer plantation is required. Any existing edge effect will be replicated post-felling by the residual edge of the plantation that remains unfelled.
  5. There will generally be no night-time works, so lighting, which could interfere with bat activity, will not be required.

For birds, the following construction-related mitigation measures will be implemented:

1. As noted above, an ECoW will be appointed for the construction phase. With respect to birds, their role will include:
  - a. Providing advice to ensure legal compliance with respect to nesting birds.
  - b. Ensuring that all required exclusion zones for nesting birds are adequately set out, protected and signed-off, and that all contractors working on the site abide by them.
  - c. Ensuring suitable measures are in place to protect retained or created habitats.
  - d. Undertaking the necessary pre-construction protected species surveys (if suitably qualified) and supervising the implementation of any mitigation measures required.
  - e. Liaison with contractors and construction staff working on site.
  - f. Providing regular on-site advice with respect to any ecological issues that arise.
2. Wherever feasible, where suitable nesting habitat removal is required to facilitate the works (such as the footprint of the site track, turbines, hardstands and set down areas, excavation of the grid connection route, any vegetation removal or cutting of overhanging vegetation along the turbine delivery route), including dense ground cover and trees/scrub, it will be undertaken prior to the 01 March in the construction year. Vegetation removal required for creation of bat buffers around turbines, especially around T1 will be undertaken outside the bird breeding season (01 March to 31 August). This will avoid direct disturbance to a known sparrowhawk nest, as well as avoiding direct impacts to other breeding species.
3. Construction works will be appropriately phased to avoid seasonally sensitive ornithological receptors, and while this will necessitate a dynamic approach in anticipation of birds potentially moving to different nesting locations within/adjacent to the construction site (as may be the case with merlin), there will be some restrictions in place based on the distribution of birds recorded during the baseline, including:
  - a. Commencement of construction works will not be permitted in the northern sections during the breeding season (01 March to 31 August). Construction works must be phased to ensure that the majority of the northern section of the development (T01 to T04) is completed prior to the onset of the breeding season (01 March).
  - b. Road maintenance works, including excavation and laying of cabling along the grid connection route will not be permitted during the bird breeding season (01 March to 31 August) for two sections, including:
    - i. along the L-6743 road between junctions to T01 and T04
    - ii. from the met mast and following the L-2593 along the Stracashel River for 500m after the Graffy Bridge turn.
  - c. No construction will be permitted within 500m of the merlin nesting location identified during the baseline surveys. Construction works are defined as all heavy civil works (including turbine erection) and all preparatory/finishing

works (including vegetation clearance, road capping, landscaping, fencing and light, manual tasks). Specifically, this will limit all works on tracks leading to T01/T02 and T04/T03 within 500m of the baseline nest sites. While no heavy civil works will be permitted during the breeding season, construction traffic will be facilitated access to work areas beyond the 500m buffer via the junction to T04/T03, provided this is undertaken without vehicles utilising the L-6743 between the T01 and T04 junctions, i.e. vehicle approach must be from the west (Graffy Bridge) side of the T04 junction. Access to the construction site via the T01 junction will not be permitted during the breeding season.

- d. If merlin occupy an alternative nest site during construction, a 500m exclusion zone buffer will be applied where all construction activities will only be permitted outside the bird breeding season (01 March to 31 August). Depending on the location of the nest, additional access restrictions may also be applied.
4. Compensatory measures are required to offset the potential displacement of 1-2 pairs of snipe breeding within 400 m of construction works (as well as operational turbines). Within the landholdings under the Applicant's 'control', areas beyond the 400 m turbine buffer have been identified for the creation or enhancement of existing wet areas for breeding snipe. This includes a variety of habitats, including semi-improved grassland as well as wet heath, upland blanket bog, marshy grassland and areas with wet flushes. The core target area will be along the Stracashel River and will tie in with enhancement measures for breeding whinchat. The feasibility of blocking some of the bog hags on the top of Graffy Hill and creating more stabilised wet areas of blanket bog will be investigated.
  5. Several enhancement measures are proposed including:
    - a. Provision of nesting baskets for merlin. Suitable locations in the area surrounding the wind farm will be targeted for the erection of nest baskets to provide a greater range of nesting options for merlin than is currently available. It is suggested that five general locations are selected and up to 15 baskets are erected. Locations up to 5 km from the wind farm site will be considered, if agreements with landowners can be secured. Ongoing monitoring will be undertaken post-construction to investigate levels of uptake.
    - b. Securing agreements with landowners to implement habitat management measures designed to protect and enhance (if appropriate) the fields of wet grassland along the Stracashel River for breeding whinchat. Implementation will be monitored as part of the post-construction ornithological monitor program and the aim will be to increase the breeding density of whinchat in the area.
    - c. Securing agreements with landowners to implement habitat management measures designed to create or enhance existing wet areas beyond the 400m turbine buffer for breeding snipe. As well as providing enhancement, this is considered as compensatory mitigation to offset the potential displacement of 1-2 pairs of breeding snipe during the construction and operational phase of the project.
    - d. In the wider area, kestrels may be struggling with inter-specific nest site competition; as aggressive interaction with raven was noted during the 2020 breeding season. Provision of four nest boxes at selected sites along the Stracashel River valley is recommended to provide this species more nesting options in the area. Potential sites have been identified with locations beyond the 1 km turbine buffer being targeted and pending securing landowner agreements.
    - e. Where stream crossings are proposed these should be designed to including nesting crevices for grey wagtail. Provision of nest boxes/holes for dippers could also be considered.

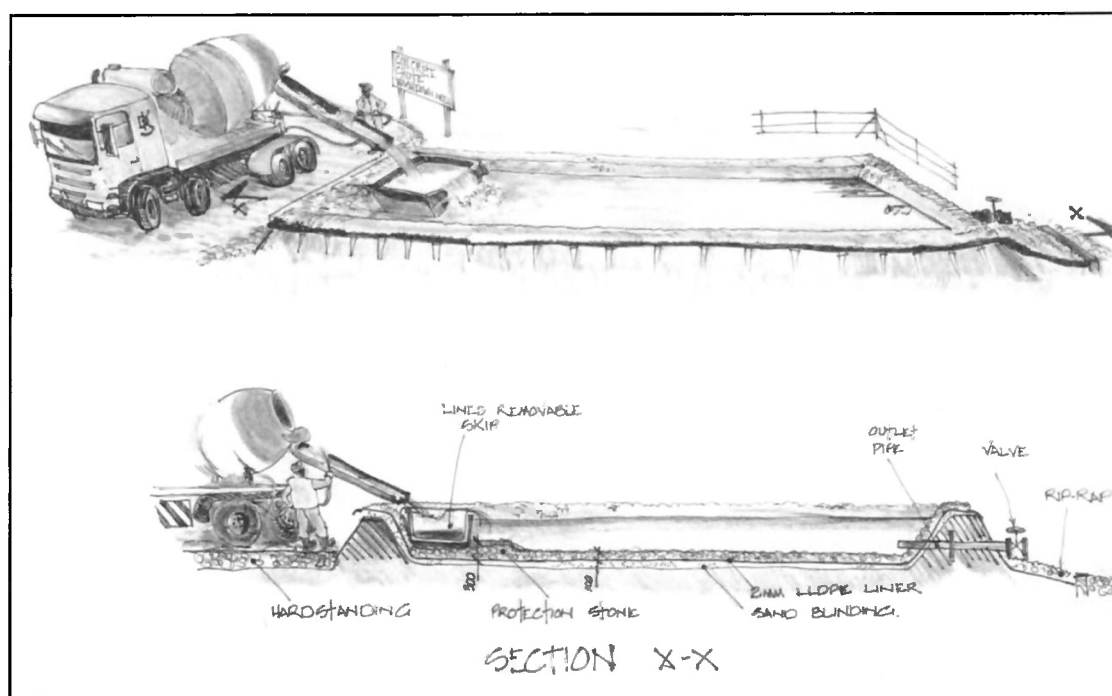
Construction-phase bird monitoring requirements are detailed in Section 5.8.4.

## 5.7 Wash Down from Concrete Trucks and Cement Mixers

The concrete wash down protocol will consist of the following elements and will operate as follows:

- All concrete truck drivers will receive a toolbox talk and be familiar with the procedure and restrictions on washing of concrete chutes on site.
- Prior to each concrete pour the Construction Manager will check that all mitigation measures are in place. The ECoW will be responsible for the monitoring regime as outlined below.
- The works will begin with the cement truck arriving onto site at the proposed pour location, which will be identified by local signage.
- The concrete truck will back up into the pour location.
- The concrete truck will discharge into the form work (or into the concrete pump) under supervision of INSERT CWC NAME, where it will be contained.
- When the concrete discharge is complete, the concrete truck will back up to the concrete wash down area, the chute discharging the concrete on the back of the truck will be cleaned by brush into a steel skip that is enclosed in a concrete wash-down bund. This will be supervised by the INSERT CWC NAME Construction Manager, who will ensure that all excess concrete is removed into the skip only and has been removed from the chute before releasing the truck from site.
- The washing out of the inside of trucks will not be permitted on site. Wash down of the concrete trucks will occur back at the batching plant.

An illustration of the concrete truck washdown arrangements are shown on Plate 5-1. The Method Statement for concrete washdown is provided in Attachment 4. The concrete washdown area will be located at a location convenient to each pour, subject to environmental constraints and having regard to the traffic management of the site.



**Plate 5-1: Concrete Washdown Arrangements**

## 5.8 Site Monitoring

### 5.8.1 Safety Monitoring

The Civil Works Contractor as PSCS will provide a competent Safety Officer to be present on the site at all times during working hours for the purposes of providing advice on all on-going operations and to exercise a general supervision on the works taking place with a view to maintaining a safe site.

### 5.8.2 Water Quality Monitoring

The ECoW will undertake weekly inspections at all outfalls from the construction works.

The ECoW will be responsible for monitoring water chemistry at the agreed monitoring points in the streams draining development site, as shown on Figure 5-1. Table 5-2 summarises the proposed monitoring regime.

All samples collected will be input to a database and compared to baseline monitoring data. In the event of levels being identified which are outside of the baseline or above applicable guideline or legislative values an investigation will be undertaken.

It is also proposed to establish the site-specific relationship between turbidity values and TSS to allow real-time assessment of water quality at the ponds' inlets. Field measurement of turbidity will be taken at the pond inlets and samples of that water will be sent for TSS analysis. Once a sufficient number of samples have been collected, it will allow the relationship between turbidity and TSS concentration to be established for each pond. The 1,000mg/l TSS trigger value will then have an equivalent turbidity value, which can be measured in the field allowing for immediate action to be taken (i.e. the pond shut off), if required.

**Table 5-3: Surface Water Quality Monitoring Plan**

Monitoring Location	Monitoring Frequency	Monitoring Programme	Parameters
WQ1 to WQ10	Monthly	Starting 1 month prior to construction and continuing for the duration of construction.	Apparent Colour, TSS, Nitrate, Nitrite, Total Oxidised Nitrogen, Ortho-Phosphate, Ammoniacal Nitrogen, Turbidity, BOD, Free Ammonia, Total Phosphorus & TPH
WQ3, WQ5, WQ8 and WQ9	Continuous monitoring	Starting 1 month prior to construction and continuing for the duration of construction.	Turbidity with SMS alarm capability
WQ1 to WQ10 & All Settlement Pond Discharge Points	Weekly or Daily Depending on Site Activity	During and following periods of rainfall, concrete pouring, daily inspection will be carried out.	Visual inspection, turbidity measurement and TSS.
All Settlement Pond Discharge Points	Daily	During / following periods of heavy rainfall, daily inspection will be carried out.	Visual inspection.

Monthly samples will be submitted to an accredited laboratory for analysis. Test results will be maintained on site and available for inspection by Council and Inland Fisheries Ireland staff.

Furthermore, an aquatic ecological survey will be undertaken within 12 months of the completion of the construction phase of the development. The developer will appoint a suitably qualified Ecologist to complete a macro-invertebrate (Q-Value) assessment of the surface waters in the Stracashel and Stranagoppoge rivers upstream and downstream of the site. With reference to Figure 5-1, proposed locations for Q-value assessment are:



- WQ9 – downstream location on Stranagoppoge River.
- WQ1 – downstream location on Stracashel River.
- WQ3 – downstream location on Stracashel River

### 5.8.3 Environmental Monitoring

The onsite INSERT CWC COMPANY NAME Project Manager will monitor environmental performance on a daily basis on the site and improvement items will be communicated locally (e.g. excavator drivers and foreman) and to the site management. The INSERT CWC COMPANY NAME Project Manager will carry out daily visual inspections of settlement ponds and outfalls during the construction period in addition to visual inspections of the watercourses downstream of the site, to ensure suspended solids are not entering these rivers. The ECoW will be notified and remedial action will be taken immediately, should silt laden runoff be observed downstream of the on-site treatment measures. The ECoW will carry out inspections on a weekly basis at a minimum.

Water samples will be taken by the ECoW and analysed and appropriate action will be taken as outlined below, should the concentration of suspended solids rise above acceptable levels. The ECoW will carry out weekly inspections of the settlement ponds and rivers and a record will be kept including photographs of observations. This will form part of a formal weekly environmental audit, with all correction actions logged on a database.

If pumping of waters from foundation excavations is taking place the outlet from the pump will be the subject of hourly visual inspection during working hours. Unsupervised overnight pumping is not envisaged.

The inspections will be undertaken more regularly during and following extreme weather conditions. Earthworks will be suspended during extreme weather conditions. An extreme rainfall event will be classified as an event that corresponds to the Met Éireann Orange – Weather Alert for rainfall.

**Table 5-4: Met Éireann Weather Alert for Rainfall – Expected Rainfall in mm**

<b>Met Éireann Orange – Weather Alert for Rainfall</b>
50 mm – 70 mm in 24 hrs
40 mm – 50 mm in 12 hrs
30 mm – 40 mm in 6 hrs

Roads, drains and silt fencing/traps will be inspected for damage after intense storms and repaired or replaced as appropriate. Appropriate records of monitoring will be maintained as part of the drainage audits.

The inflow and outflow from the settlement pond will be monitored using turbidity monitors to check for increases over the threshold levels. Proposed trigger levels for the discharge from the ponds are 100mg/l TSS.

The INSERT CWC COMPANY NAME Project Manager will carry out turbidity monitoring at the inlet and outlet of each settlement pond.

Site environmental performance will be discussed at the weekly project meetings and any open corrective actions will be addressed.

### 5.8.4 Bird Monitoring

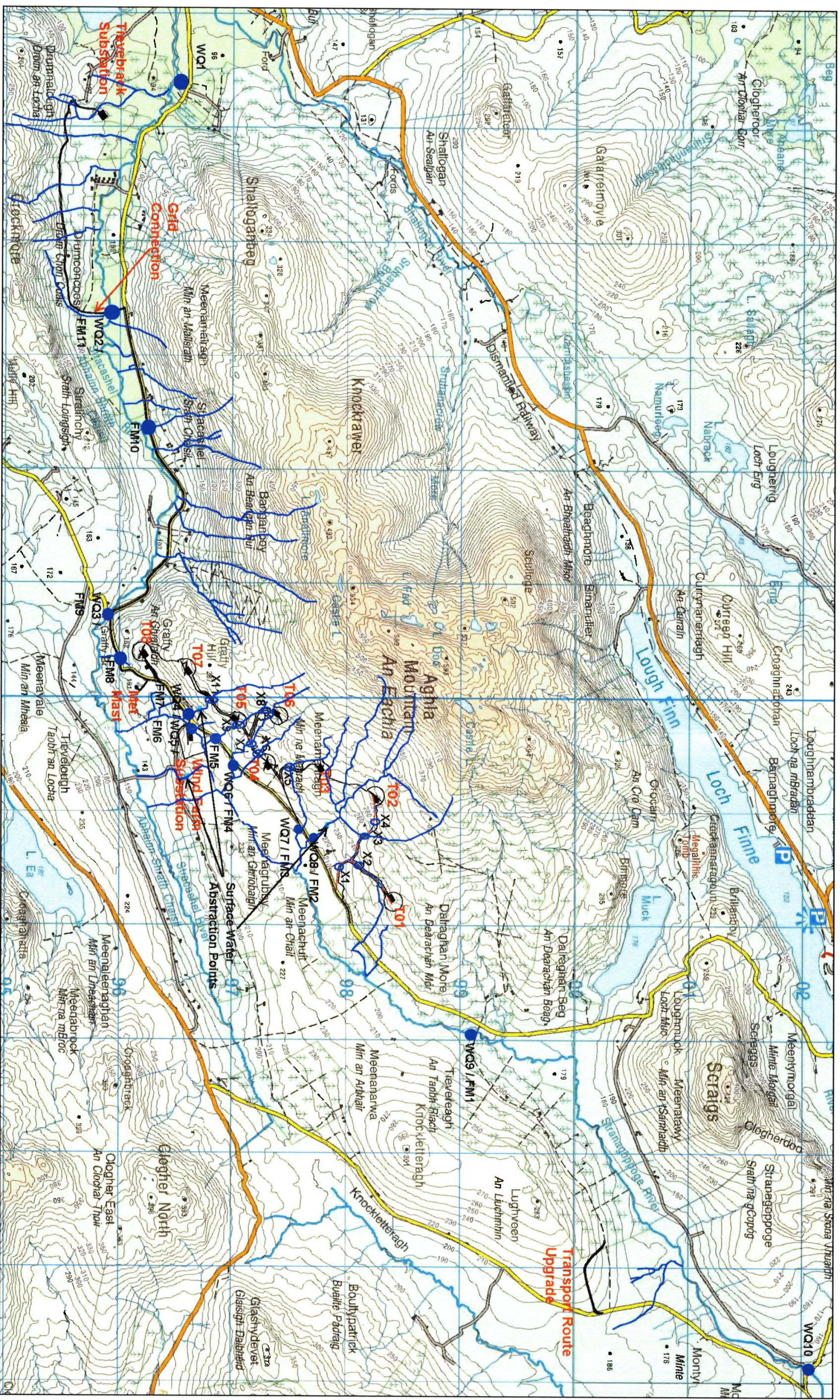
Bird monitoring during construction will consist of the following:

1. In the year prior to construction works commencing, the following bird monitoring is proposed:

- a. Wider area breeding eagle/ merlin surveys, initially to a distance of 6 km from the site for eagles.
  - b. Breeding season walkovers – upland breeding bird surveys.
2. Construction works proposed during the nesting bird season (March to August inclusive) will be preceded by a nesting bird survey and associated reporting. Particular attention will be given to priority bird species and any species known to be sensitive to construction related disturbance, including breeding sparrowhawk, merlin, snipe, ground nesting passerines (meadow pipit, skylark) and whinchat.
3. There will be no clearance of vegetation suitable for nesting birds within the bird nesting season, unless checked for nesting birds by a suitably qualified ornithologist (performing the role of ECoW) and cleared by them for removal, taking account of both potential for direct nest destruction and disturbance to nesting birds.
4. Works during the bird nesting season will be supervised on a weekly basis by an appropriately qualified ornithologist (who may also perform the ECoW role if appropriately qualified for both). Their role will be to monitor nesting birds within the construction site and advise on buffer zones required in order to avoid impacts on them. In this regard, special consideration will be given to merlin, sparrowhawk at T1 and whinchat occurring around Graffy Bridge.

Additional post construction bird monitoring is proposed in the EIAR.









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## 6 CONSTRUCTION METHODS

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The construction of the wind farm will have several main elements. These are listed below along with the main construction practices to be employed. The commencement of construction works will be preceded by a site investigation to inform the design of the turbine foundations, crane areas and roads. The Local Authority and Inland Fisheries Ireland will be notified of the mobilization date to site.

### 6.1 Earthworks - General

Earthworks for the temporary construction site compound will be undertaken first. This will be followed by construction of roads to provide access to the turbine locations and subsequently construction of the crane areas, turbine foundations and cabling. It is envisaged that 6 to 8 track-mounted excavators (20 to 30-tonne range) will be used during earthworks, along with 4 dumper trucks. With four access points from the public road, it is envisaged that the construction of the wind farm will be divided into smaller work areas.

#### 6.1.1 Site Access

Construction traffic and deliveries to the site shall be in accordance with the Traffic Management Plan submitted under separate cover. Signage will be erected to ensure construction traffic follows the agreed routes to / from the site.

#### 6.1.2 Working Hours

The proposed core working hours for the construction phase are 07:00 to 19:00 Monday to Saturday inclusive; generally, no construction works on Sundays or Bank Holidays. Work outside of these core hours will be permitted for:

- Concrete pours for foundations – earlier start times will be permitted to allow concrete deliveries to start at 05:00. This will only be required on approximately 10 to 12 days of the entire construction programme – i.e. during turbine foundation pours and during pours at the substation.
- Excavation of turbine foundations – later working hours may be required to complete excavation, testing and protection of the bearing stratum. This will only be required on up to eight days of the entire construction programme. It would only be needed where bearing stratum is unconsolidated material, which is not envisaged at the Graffy site. It will not cause nuisance to local residents.
- Lifting of turbine components – out-of-hour lifts will be permitted to avail of suitable weather windows for lifts. These operations are quiet and would not be a source of noise nuisance. While core hours will be preferentially worked, night-time and Sunday / Bank Holiday lifts may be required.
- Delivery of over-sized loads – deliveries of over-sized loads is normally carried out at night to minimise impact on local traffic.

Work on Sundays or Bank Holidays will only be conducted in exceptional circumstances or emergency, as outlined above. In winter months, core working hours may be shortened to take account of daylight hours and to avoid light pollution.

### 6.1.3 Setting Out

A surveyor will set out the location of the wind farm infrastructure – road alignment, turbine locations, craneage areas, cable routes, site compound and peat recovery areas. Offset from this will be a working corridor in which the construction will take place – drainage, etc. Machinery and workers will not go outside of this work area to avoid unnecessary damage or disturbance to habitats and wildlife. The ECoW will set out the exclusion zones for habitat protection with appropriate signage erected. All workers will be made aware of the exclusion zones – their location and purpose; it will be part of the site induction course.

### 6.1.4 Environmental Controls

The environmental controls as detailed in Chapter 5 will be put in place as early as practicable in the construction programme. This will include:

1. Mowing / flailing of vegetation before 01 March to discourage birds nesting within the construction corridor. This is proposed as a more environmental alternative to topsoil stripping in advance of earthworks. Topsoil stripping will expose large areas of peat / topsoil to erosion and increase the risk of silt-laden runoff.
2. The setting out of sensitive environmental receptors as detailed in Section 6.1.3.
3. Installation of surface water management infrastructure, including clean surface water runoff diversions, silt fences, settlement ponds etc. Refer to Chapter 5 for details of surface water management.
4. Checking that all plant and machinery are equipped with silencers to minimize noise emissions.
5. Installation of exclusion zone rope and post fencing.
6. Any pre-construction surveys for nesting birds, Marsh Fritillary etc. will be carried out. Exclusion zones will be demarcated, as necessary.

An ECoW will be appointed to ensure that these controls are implemented, monitored for effectiveness and maintained during the construction programme. The ECoW will make regular visits to site during construction.

### 6.1.5 Site Clearance

There are some sections of commercial forestry to be cleared for road construction, turbulence felling and buffer zones for bat protection. This felling will be carried out by a specialist contractor under licence from Forest Service adhering to all environmental controls.

The earthworks at the site presents the greatest risk for pollution of watercourse and damage to the environment. Management of earthworks is therefore an important aspect in the project. There are a number of general principles, planning conditions [CONFIRM] and work methods/plans that must be adhered to for earthworks as follows:

1. Setting out of work areas to be clearly delineated and explained to workers.
2. Surface water management infrastructure to be put in place ahead of earthworks.
3. Earthworks to be suspended in periods of prolonged heavy rainfall.
4. Plant, machinery and personnel to stay within the works corridor.
5. Works to proceed in accordance with the planning conditions, [SPECIFY THE RELEVANT CONDITIONS].
6. All machinery to be suited for purpose and kept in a good condition.
7. Soils of different types to be stored separately to permit later reuse in landscaping / site restoration – i.e. peat turves, peat, subsoil and rock. Soils to be stored in a manner that minimises erosion potential and doesn't present a risk to peat instability.
8. The disturbance of existing soil vegetation surface and soil permeability will be kept to a minimum during construction.
9. Restore excavated areas as soon as possible, and on an ongoing basis, with peat turves to minimise the extent of soils exposed to erosion.



10. As there will be surplus peat, the areas identified on the site layout drawing will be prepared for peat recovery. This will include construction of earthen berms to ensure stability.
11. Storage of excavated soil will be on near flat areas. Storage will not be on areas with deep peat or on steep slopes.
12. Monitoring of soil stability (in excavations and stockpiles) will be conducted throughout the construction period.

#### 6.1.6 Plant & Equipment

An indicative list of the plant and equipment to be used for the construction of the wind farm is set out in Table 6-1.

**Table 6-1: Indicative List of Plant & Equipment to be Used**

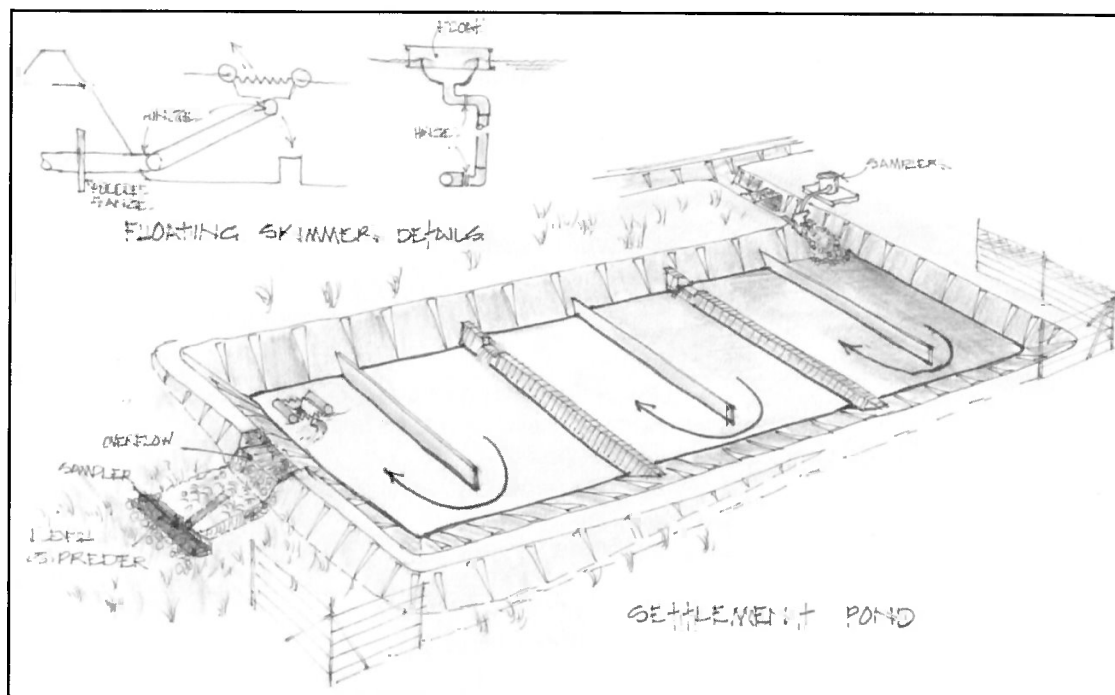
Activity	Plant & Equipment
Site Compound	Generator Fuel storage / dispenser
Tree Felling	Harvester Forwarder
Site Clearance / earthworks	6 to 8 No 20 to 30-tonne track-mounted excavators 4 No. dumper trucks or tractor and trailers Dynamic compactor
Foundations	2 No 20 to 30-tonne track-mounted excavators Dumper truck 50-tonne crane teleporter
Turbine Installation	1 No 500 to 1,000-tonne crane 1 No 100-tonne crane Generator Teleporter
Cabling	20-tonne track-mounted excavator Cable drum carrier Cable pulling equipment teleporter

## 6.2 Settlement Ponds

Settlement ponds will be put in place in advance as construction progresses across the site. The proposed locations for settlement ponds are shown on Figure 5-1. Calculations for sizing the ponds is provided in Attachment 11. The ponds have been sized for a 10-year storm event (CIRIA Report 142, 1994; CIRIA Report 532, 2001; CIRIA C648, 2006 & CIRIA Report B14, 1993). Washed and rounded drainage stone will be placed at the inlet to the ponds to filter the flows before they enter the ponds. The [INSERT COMPANY NAME] Project Manager will supervise the installation of the settlement ponds and discharge point (including photos) and certify that the installation is in accordance with the detailed design drawings. Each settlement pond will be signed off by the design engineer.

The ponds will have a sinuous flow path and diffuse outfall which will encourage the diffuse spread of flows overland and back into natural drains down slope of the settlement ponds. A minimum distance of 50m flow path through vegetative buffer will be available. Where this cannot be provided by gravity flows from the pond, water will be pumped from the discharge end of the pond to a level spread area thus providing that minimum buffer distance – e.g. at turbine T06. The outflow from the ponds will be monitored in accordance with the monitoring plan in Section 5.7.

In the event of an emergency, the settlement ponds will provide a temporary holding area for any accidental spills on site as it will be possible to block off the outflow from these ponds for a limited period. Accidental Spill Response Details are included in Chapter 8. The settlement ponds will be fenced off for safety. A diffuse outflow detail is provided which will mitigate any increase in runoff. The diffuse outflow will have a minimum buffer of 50m to the nearest surface water drain. Erosion control and retention facilities, including the settlement pond will be regularly maintained during the construction phase.



**Plate 6-1: Example of Typical Settlement Pond Arrangement**

### 6.3 Site Compound

The site compound will be located adjacent to the proposed substation. It will have a footprint area of approximately 38m x 18m.

Site offices, welfare facilities, fuel storage, refuelling points, waste receptacles, parking area etc. will be established. Wastewater effluent will flow to a sealed underground holding tank. It will be maintained under contract with the supplier, who must hold a current, valid waste collection permit. The holding tanking will be emptied periodically, and the wastewater taken for disposal at a wastewater treatment plant.

Upon completion of the construction activities, the construction compound will be removed, and the area reinstated to its original condition.

### 6.4 Roads

All access roads, excavations, bases and hardstands will be designed so as to incorporate drainage measures. Drainage will be installed on the upslope side of any excavations and to discharge such water in a manner which will not cause ponding, damming or areas of concentrated flow.

Detailed design for the site access roads indicates that conventional road construction is the optimal solution. The conventional road construction as shown on Figure 3-6 will be used. A method statement for road construction is provided in Attachment 2.

The road alignment will be marked prior to earthworks. The peat will be stripped, under archaeological monitoring, and used in the restoration of road verges of completed sections of road. Excess will be taken directly to one of the recovery areas. There will be no storage of soils within 50m of any watercourse. Relatively short sections (10 to 15m) of road will be stripped, so that road construction will follow behind. Road construction will require break-out the of high side and filling the low side where roads follow the contours – i.e. where there is a crossfall. Geogrid will be placed where required followed by capping stone. This will minimise the extent of soils / peat exposed to erosion. Surface water management infrastructure for 'dirty water' will be put in place on an ongoing basis; clean water diversion around / through the earthworks will have been installed ahead of road construction. Cable ducting will be installed closely behind road construction. Excavated peat turves will also be used to landscape the edges of constructed road sections.

The roads will be maintained during the construction period, and will be re-dressed to provide a clean, smooth running surface following concrete pours and prior to delivery of turbine components. Surface dressing will be imported from local quarries where the rock has a similar geochemistry to the bedrock on site.

Once constructed, roads will be tested at intervals to ensure that they are stable and meet the minimum requirements for the delivery of oversized loads. Plate bearing tests will be conducted on the roads to confirm minimum bearing capacity of 185kN/m<sup>2</sup> and meeting any other parameters of the turbine supply company.

## **6.5 Cranage Areas**

The cranage areas will be constructed as the roads reach each turbine location. They will be constructed and tested in a similar manner to the roads. The high side of most of the cranage hardstands will need to be lowered by rock breaking. Rock extracted from this work will be reused to make the hardstand. The rock will be over-excavated on the high side of the hardstand to create storage capacity for excess peat. Peat placed in these areas will be held in place by the rock on the high side and the hardstand.

## **6.6 Turbine Foundations**

Turbine foundation work is scheduled to start after the cranage areas are completed. For the proposed turbines, the foundations are cast-in-place reinforced concrete. The likely design for the turbines is the shallow foundation without the effects of buoyancy. They will be 20m to 22m diameter. This design will be confirmed to the contractor by the turbine supplier with the issue of the Foundation Release Form.

The construction of the turbine foundations will follow this general sequence:

1. The excavation extent will be marked at ground surface. The diameter of the excavation will take account of the foundation diameter, depth to target bearing stratum and safe side slopes of the excavation walls.
2. Where present, peat will be stripped from the excavation area, under archaeological monitoring. Peat turves will be placed on a flat surface nearby for later reuse in restoration / landscaping. The excess peat will be taken directly to one of the peat recovery areas. Downslope silt fences will be extended as required to intercept runoff from this exposed soil.
3. Overburden will then be excavated and stored separately adjacent to the excavation. If suitable, it will be reused as ballast over the turbine foundation. It is not expected that sufficient overburden will be found on site for ballast, requiring the importation of engineered fill.
4. Once the target excavation depth is reached, it will be inspected and tested by an engineer to confirm that it meets the minimum bearing capacity for the turbine. The sign-off for the foundation bearing stratum will include the following to ensure long-term stability of the turbine:

- a. Minimum bearing of [INSERT FIGURE] kN/m<sup>2</sup>.
  - b. Long term settlements to be less than [INSERT FIGURE] mm.
  - c. Differential settlement will not exceed [INSERT FIGURE] mm/m over [INSERT FIGURE] years.
  - d. Minimum rocking spring stiffness of  $k_{\phi,stat} = [INSERT FIGURE]$  MNm/rad and  $k_{\phi,dyn} = [INSERT FIGURE]$  MNm/rad.
5. Following approval of the bearing stratum, uplift by soil replacement may be required as follows:
- a. Placement of a separating geotextile followed by geogrid (Tensar TX160 or one with similar performance).
  - b. Engineered fill, (with minimum 10% sand content and preferably up to 20%) to be placed and compacted in 250mm lifts – class 6F2 or similar approved.
  - c. Laboratory test certificates will be provided by the quarry supplying the material and should include test results for particle size distribution (PSD), 10% fines and pyrite tests (TRL test suite).
  - d. Plate bearing tests (4 No.) will be carried out at a minimum of every 750mm of engineered fill placed. Results should be provided in real-time to ensure the fill is properly compacted and meets the design requirements.
6. A 100mm-thick level concrete blinding layer is then placed, which extends 0.5m beyond the edge of the foundation. While shuttering is not used for this, the pour is contained in the excavation, so no release of concrete to the environment will occur. Washout of concrete truck chutes will take place at one of the designated locations on site.
7. The foundation basket and reinforcing steel is delivered to site and stored on the craneage area.
8. Once the blinding layer is set, the foundation basket and reinforcing steel is placed and tied.
9. The concrete shuttering is then placed around the foundation and the concrete is poured. This is normally done in one pour, but sometimes in two pours.
10. Once cured the shuttering is removed. Once the cube test results confirm that the concrete has reached sufficient strength, the excavation is backfilled using soil with a minimum dry unit weight of 18kN/m<sup>3</sup>. Very often excavated soil is used – subject to density testing. The peat turves removed from the location is then reused to landscape around the turbine, so no stockpiles of soil remain at the site.
11. All waste and cut-offs will be removed from the turbine location on a daily basis and placed in the appropriate waste containers located at the site compound, or locally at the turbine location.

## 6.7 Turbine Installation

The installation of the turbine is the responsibility of the turbine supplier. It will follow completion of the civil works associated with the roads, craneage areas, foundations (backfill) and any works associated with the delivery route.

[INSERT TURBINE SUPPLIER NAME] will be responsible for the delivery of the turbines components from the delivery port (Killybegs) to the site. The civil contractor is responsible for any works along the delivery route. The Traffic Management Plan will be adhered to for turbine delivery.

The installation of the turbines will follow this general sequence:

1. Delivery of turbine components to the site by the specialist heavy haulage contractor, under permit and with garda escort. Deliveries are scheduled so that components are erected soon after arrival to minimise storage time on site.
2. Mobilisation of 2 No cranes to site for the installation of the turbines. These would typically be a 1,000-tonne crane and a smaller tailing crane, typically 100-tonne crane.

3. Installation follows a specific sequence as follows: control modules, Section 5 of the tower, Section 4 of the tower, Section 3 of the tower, Section 2 of the tower, Section 1 of the tower, nacelle, generator and rotor with blades.

Weather permitting, turbine installation takes approximately 5 days. This is followed by mechanical fit out and electrical fit out, which takes another 10 days. Once the turbine is energised, testing and commissioning is carried out, which takes another 10 to 15 days.

## 6.8 Internal Cabling

Internal cabling connecting the turbines will commence in Month 6. Cabling will generally follow adjacent to road alignments and to expedite restoration, installation of ducting will be done as the roads are constructed. Internal site cables will be pulled through the PVC ducting.

The installation of the cables will follow this general sequence:

1. The cable trench alignment will be set out by the surveyor. It will generally follow the road alignment and will follow closely behind road construction so restoration of road verges can be completed as soon as possible. Some sections of internal cables will be installed 'cross country' – i.e. T02 to T03, T05 to the substation and T07 to T08.
2. Peat will be stripped, under archaeological monitoring, and placed on a flat surface nearby for later reuse in restoration / landscaping.
3. The trench will be excavated to a depth of approximately 1.3m and a width of approximately 0.4m. Subsoil will be set to one side, separate from the peat.
4. The bedding material will be placed in the trench along with the required ducting and earthing cables. Once placed, the trench is backfilled with excavated material. A warning tile is placed near the top of the trench. The original ground surface is then restored.
5. Durable warning markers are then placed along the trench alignment at 100m intervals and at changes in direction.
6. Where the trench crosses roads or where it is located within the carriageway, the lower half of the trench is backfilled with lean-mix concrete. The upper half of the trench is backfilled with engineered fill, well compacted and the existing road surface repaired.
7. Where the cable passes drains, the ducting will be buried at least 300mm below the bed of the drain and surrounded with lean-mix concrete and the drain restored to its original condition.
8. Cable runs between turbines will be a single length of cable, so joints are avoided.
9. Where cabling crosses streams, HDD or temporary diversion (using a flume to bring clean water past the works area) will be used to install the ducting. Refer to Attachment 7 for HDD method statement.

Trenching for installation of ducting is expected to advance closely behind road construction.

Once all the ducting is installed, the cable is pulled between the turbines at the pulling pit adjacent to the turbine foundation. The cable is then pulled into the turbine and terminated. Once the cables are terminated in the turbines, the pulling pits are backfilled and landscaped.

## 6.9 Grid Connection

The grid connection route largely follows public roads and existing forestry roads to the ESB Tievebrack substation at Drumnalough – a distance of approximately 7.3km. A short section at the eastern end (near the substation) cuts across a field for a distance of approximately 50m. The grid connection will be an underground 110kV cable. This will be installed in ducting within a trench approximately 1.25m deep and 0.6m wide. A typical detail is shown in Plate 3-8.

Prior to the commencement of construction, the following will be carried out:



1. Detailed survey of route to identify all existing culverts, stream/drain crossings, existing underground utilities, etc.
2. Carry out detailed design of route, including the identification of the jointing bays.
3. Prepare a traffic management plan and detailed method statement.
4. Apply for a road opening licence.

Attachment 7 provides the construction methods for the installation of the underground grid connection. The installation of the trench / ducting / cable will follow this general sequence:

1. The cable trench alignment will be set out by the surveyor.
2. The trench will be excavated to a depth of approximately 1.25m and a width of approximately 0.6m. Where the trench is on the public road, the tarmac will be cut with a con saw. Excavated material will be loaded directly into dumper trucks and removed for either reuse on the wind farm site or taken to a licenced/permited site for recovery or disposal.
3. The bedding material will be placed in the trench along with the required ducting and earthing cables. Once placed, the trench is backfilled with lean-mix / engineered fill as appropriate. A warning tile is placed near the top of the trench. The original ground surface is then restored / road surfacing repaired.
4. Jointing bays / pulling pits will be installed at predetermined locations. A typical jointing bay is shown in Plate 3-9. Proposed locations are identified in Attachment 7.
5. Trenching for installation of ducting is expected to advance at approximately 100m per day but is dependent on ground conditions. The trenching, installation of ducting, backfilling and restoration of the temporary road surface will be completed for each section each day. It is expected that 2 to 3 crews will work on the grid connection simultaneously.
6. Where stream crossings are required and the ducting can't be accommodated in the structure of the bridge, horizontal directional drilling (HDD) will be used. Three locations have been identified along the grid connection route where HDD will be employed. A draft method statement for HDD is provided in Attachment 6.
7. After the ducting is installed, the cables will be pulled and jointed. The pulling pits / jointing bays are then backfilled with sand and the surface restored to original condition.
8. Temporary road repairs will be followed by resurfacing of the public road along the length of the cable route installed in the public road.

## 6.10 Wind Farm Substation

The proposed wind farm substation is shown in Figure 3-2. It will be located in improved wet grassland with peat depths generally less than 1m within its footprint. The earthworks required for its construction will follow the same general approach as with roads and hardstands. This will consist of setting out, installation of surface water management infrastructure, preparation of peat recovery area to accept peat, peat stripping under archaeological supervision, installation of earthing grid, excavation for foundation, pouring of foundations, construction of control buildings and electrical fit out.

## 6.11 Construction Traffic

Construction traffic will consist of:

- Articulated lorries mobilising plant and equipment to the site.
- HGVs bringing stone / aggregate to the site for road and hardstand construction.
- Concrete trucks.
- Over-sized loads delivering turbine components to the site.
- Heavy goods vehicles delivering concrete, steel and other building materials.
- Workers coming to site in private cars and vans.

Traffic associated with the wind farm construction will comply with the Traffic Management Plan for the development. The traffic management plan will have regard to the restrictions on road usage during the bird breeding season – refer to Section 5.6.

The volume of traffic will depend on the activities planned for each day. Highest volumes will occur during the concrete pour for turbine foundations. Approximately between 65 and 75 loads of concrete will be required to complete each base. Pours will take place over a 12-hour period (approximately) with a constant supply of concrete. This will result in approximately 13 HGV movements per hour.

#### **Over-sized Loads Delivering Turbines**

HGVs bringing turbine parts will come from Killybegs. The proposed delivery route from Killybegs is summarised as follows:

1. Killybegs port to Donegal Town via the regional road R263 and national road N56.
2. From Donegal Town, it will follow the N15 through Ballybofey.
3. In Ballybofey, turn northwest onto the R252 towards Fintown.
4. Approximately 4km from Fintown, the route follows local road L-2023-1 to the location of the transport route upgrade / Coillte road (L-6733-1) to local roads L-6743-2 and L-6743-3 to the site entrances.

#### **Concrete & Stone Deliveries**

The concrete and aggregate supplier has not been identified. Deliveries of concrete and stone will be organised such that a one-way system is used on the local road network so that conflicts do not arise between trucks coming to / leaving the wind farm. Where a one-way system is not practical, two-way radios will be used to schedule lorries coming and going to avoid conflicts on the local roads.

#### **Building Materials Deliveries**

Building materials are likely to use the R252 and the local road network leading to the site and in accordance with the Traffic Management Plan.

#### **Workers**

Workers will come to site in cars and vans and will use the local road networks, depending on where they live.

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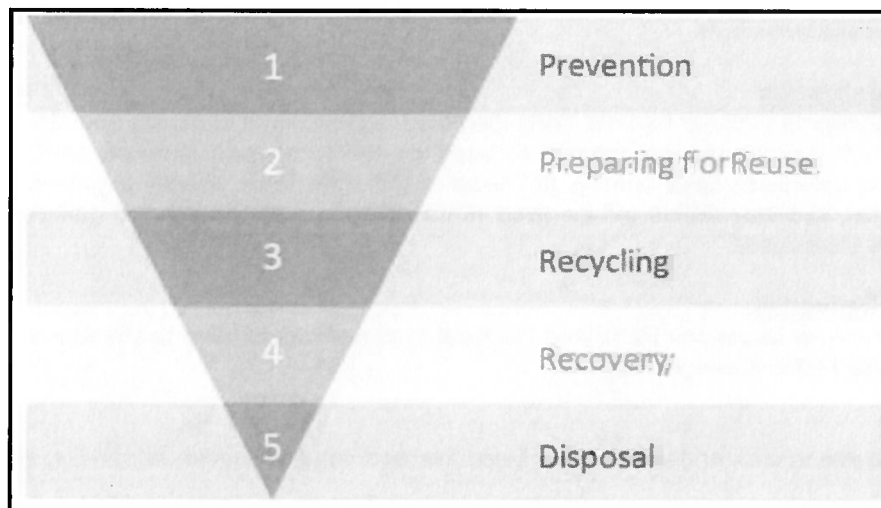
## 7 WASTE MANAGEMENT PLAN

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The management of waste generated during the construction of the wind farm and grid connection shall be in accordance with the current waste management regulations 1996-2020 and guidance documents including:

- EPA, 2013. *Design Out Waste - Preparation of Waste Reduction Factsheets for Design Teams.*
- Zero Waste Scotland, 2017. *Designing out Construction Waste - A Guide for Project Design Teams.*

The general approach will be prevention, reduction, reuse as per the EPA waste hierarchy – see Plate 7-1.



**Plate 7-1: Waste Management Hierarchy**

The contractor must be committed to preventing waste through implementing reduction and effectively managing resources from the design stage of construction to the completion of the construction of the project. This will ensure that:

- Legal and planning obligations are met.
- Waste production is minimised.
- Build costs are minimised.
- A framework for continuous assessment and best practice is implemented.
- Carbon emissions and negative environmental impacts of and from waste materials are reduced.

The least favoured option is to dispose of waste to landfill where embodied energy is not recovered

The construction site waste management plan involves a number of stages, namely:

- Planning.
- Implementation.
- Monitoring.
- Review.

### 7.1.1 Planning

The planning stage of the development has taken into account the nature of the site, design of the project, environmental considerations and construction methods to minimise the quantity of waste produced on site during its construction and maximise the use of existing materials.

The construction plan for the project was outlined in the EIAR and the NIS that was submitted to the Planning Authority at the planning stage. The methodology as outlined, requires the reuse of all excavated materials and therefore any wastes from this phase of the project are expected to be minimal.

The appointed contractor will be responsible for any and all disposal, from the construction works.

### 7.1.2 Implementation

This WMP includes:

1. An inventory of waste type expected to be produced in the course of the construction of the wind farm and grid connection. A provisional inventory is given in Section 7.3.
2. Estimates of the volume of each type of waste that is likely to be produced during construction.
3. End sources for all wastes generated during the project.

Best practice dictates that a statement showing how the contractor will minimise each type of waste is produced prior to any activity generating this waste. Waste minimisation measures are communicated to staff through toolbox talks.

### 7.1.3 Monitoring

The appointed contractor will have the responsibility for implementing and monitoring its employees and subcontractors in adhering to this waste management plan for all works associated with the wind farm and grid connection.

All workers will be fully briefed of the waste management plan during site induction and in toolbox talks. All site visitors will be briefed on appropriate waste storage and disposal units. Littering on site will not be tolerated. All personnel have a duty of care to challenge others littering on site. Should littering be encountered by site personnel then that person will be subject to the site disciplinary procedures as set out in the Health and Safety File.

The ECoW will carry out daily housekeeping and litter checks through the construction phase.

### 7.1.4 Review

A waste inventory will be maintained and kept up to date. It will include an inventory of all waste materials leaving the site for disposal.

## 7.2 Waste Management Principles

- a) The contractor will avoid or minimise the volume of waste generated. All excavated materials will be reused on site (as per the principles outlined in the EIAR and the NIS submitted as part of the planning application).
- b) Waste, including spoil, will not be stored within 50m of any watercourse.
- c) All storage areas for waste will be within the main wind farm compound and not on the grid connection line. Any materials used during the days work will be removed to the wind farm compound at the end of the working day.

- d) All waste storage areas will be secure.
- e) Waste storage and disposal will be carried out in a way which prevents pollution in compliance with legislation.
- f) Wastes transported off site will be by a licensed waste carrier and will be taken to a licensed / permitted waste facility. All loads will be transported under Waste Control dockets. These must detail:
  - An adequate description of the waste.
  - Source of the waste.
  - The appropriate code from the List of Wastes Regulations for the waste (commonly referred to as the EWC code).
  - Information on the quantity and nature of the waste and how it is contained.
  - Names and addresses of the transferor (the person currently in control of the waste) and the transferee (usually either a registered waste carrier or a waste management licence holder (waste manager)).
  - The Standard Industry Classification (SIC) code (2007 or 2003 for hazardous waste only) of the business from where the waste was received.
  - Where applicable, indicate that the Waste Hierarchy has been complied with.
  - The place, date and time of transfer of the waste. If using a season ticket the period for which it is valid (i.e. valid from dd/mm/yyyy to dd/mm/yyyy).
  - If the waste is being taken to landfill the transfer note must also contain details of any treatments or processes that have already been applied.
- g) Where the export of material off site is through a registered waste collector collecting general waste, the collector will be selected on the basis of whether they practice downstream segregation. Waste collectors who do not conduct downstream segregation will not be considered. In such circumstances collection dockets will suffice as duty of care records. Specific waste characterisation for each load of general waste will not be required of site personnel.
- h) It is the responsibility of the contractor to ensure waste controls and duty of care checks are carried out as appropriate. It is their responsibility to ensure that all appropriate checks are conducted on the site and that personnel are trained appropriately.
- i) Hazardous Wastes should be stored in a Control of Substances Hazardous to Health (COSHH) store as specified in Pollution Prevention Guidelines. Only trained operatives should handle hazardous substances. Please note that COSHH data sheets are not risk assessments and all risk assessment should be carried out separately. All stored hazardous waste will be clearly labelled.
- j) Waste storage areas will be clearly located and signed. If space allows, key waste streams will be segregated.
- k) All waste should be transported from site at appropriate frequency by a registered waste contractor to prevent over-filling of waste containers.
- l) Frequency of Checks. The contractor will ensure that all storage facilities are checked on a weekly basis.

### 7.3 Waste Streams

C&D waste will arise on the project mainly from the excavation works. There will also be unavoidable construction waste from surplus and damaged construction materials. However, the nature of the proposed development will not contribute significantly to waste arisings.

The wastes/spoils likely to be generated during the construction phase will include the following:

- Excavated material emanating from earthworks will be used on site for landscaping and restoration of earthworks areas. It is not envisaged that any soil from the wind farm construction will be taken off site for disposal.
- Concrete collected at the washout area will also be taken to a C&D waste recycling facility or put to beneficial reuse on site.



- Excavated material from cable trenches on the road will not be reused as trench backfill and concrete and engineered fill will need to be used. Excavated material may be put to beneficial reuse on the wind farm site. If not, it will be taken to a permitted / licensed facility for disposal or recovery.
- Drilling fluid from the HDD works will be collected. It is estimated that for each 100m section of drilling, there will be approximately 8m<sup>3</sup> of waste arisings – 50:50 mixture of slurry and soil cuttings. This material will be temporarily stored in a bunded tank before being taken off site for disposal at landfill.
- Cut-offs from building material - will be taken off site for re-use (where appropriate), recycled (in the case of copper and other metal cut-offs), or taken to a licensed landfill facility.
- Domestic type waste generated by contractors - will be collected on site, stored in an enclosed skip and disposed of at a licensed landfill facility. A number of skips of 8m<sup>3</sup> (typical) will be kept in the site compound. Covered waste skips may also be kept at the turbine locations during turbine installation as there will be a lot of package waste to be dealt with. When full, a permitted waste collection contractor will be retained to remove the skips to a permitted facility for recovery / recycling / disposal. These subcontractors will be identified nearer the commencement of construction. The Site Manager will ensure that each waste management subcontractor used have the necessary permits in place for each waste type being managed.
- Foul effluent from the welfare facilities will be collected in a sealed tank and periodically emptied by a permitted waste collection contractor.
- Records of all wastes that leave site will be kept by the Project Manager in the site offices for inspection

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## **8 EMERGENCY RESPONSE PLAN**

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### **8.1 Introduction**

This Emergency Response Plan (ERP) contains predetermined guidelines and procedures to protect the environment during the construction phase of the Graffy Wind Farm. This outlines the immediate response to an accidental release or emergency at the construction site. It will be incorporated into the Preliminary Health & Plan developed by the PSCS and the Site-Specific Health & Safety Plan developed by the Main Contractor in its role as PSCS.

### **8.2 Emergency Response Procedures**

An emergency response plan deals with the immediate physical effects of a pollution incident and outlines the initial response. Attachment 12 provides a template of the incident reporting form.

#### **8.2.1 Emergency Response Liaison**

The Main Contractor will designate an individual to serve as the Emergency Response Liaison Officer for this project. The emergency response liaison will coordinate the emergency response for the duration of any emergency at or nearby the project site. The Emergency Response Liaison will be immediately reachable at all times during project construction.

In the event of any spillage of polluting material on site, whether accidental or otherwise, the Main Contractor shall:

1. Carry out an immediate investigation to identify and isolate the source of the contamination.
2. Put all necessary measures in place to prevent further contamination and carry out a clean-up of the incident.
3. Notify the appropriate Regulatory Authorities promptly – Inland Fisheries Ireland, Local Authority, etc. Emergencies contact lists and phone numbers will be posted in the site offices and site compound.
4. The Emergency Response Liaison will make a decision whether an oil spill clean-up contractor is required and engage its services as appropriate. Oil spill clean-up contractors include:
  - a. Verde Environmental – 1890 20 10 20
  - b. Rilta Environmental – 01-401 8000
  - c. AQS Environmental Solutions – 1800 500 020 / 086-8131010
  - d. Enva – 1850 504 504

#### **8.2.2 Environmental Emergency Procedure**

An emergency preparedness and response procedure are required to prevent environmental pollution incidents and limit effects of any such incidents.

All personnel working on site will be trained in pollution incident control response and the use of pollution prevention equipment. An adequate supply of containment booms and oil/chemical absorbent materials shall be kept on site at all times. Material to contain silt-laden runoff water will also be kept on site, including geotextile for silt fence construction, sandbags or straw bales. A supply of rip-rap stone (clause 6A type material) will be kept on site to construct a containment berm if required.

In the event of any spillage of polluting material on site or if analysis / observations made on the quality or appearance of surface water runoff indicates that contamination has taken place, the following actions shall apply:

1. Carry out an immediate investigation to identify and isolate the source of the contamination, including the inspection of the bunding for the fuel/oil storage tanks/drums.
2. In instances where surface water is impacted by silt, earthworks will be stopped in the area contributing to the incident. The source of the polluting water will be identified, and emergency measures put in place, which might include excavation of a temporary stilling pond, installation of silt fencing / straw bales etc., or, if feasible, pumping of water to the existing stilling ponds.
3. Put in place measures to prevent further contamination and to minimise the effects of any contamination on the environment.
4. Notify the Planning Authority – Environment Section and Inland Fisheries Ireland immediately in the event of Environmental Incident, pollution or aquatic habitat damage. See contact numbers included in Table 8-1 below.
5. Engage the service of emergency response contractor.

It should be noted that actions '1' and '4' will take place simultaneously and the relevant authorities will be notified without delay.

**Table 8-1: Notifiable Authorities in the Event of a Spillage**

Agency	Contact Number
Inland Fisheries Ireland, 24-hour pollution incident reporting	1890 34 74 24
Inland Fisheries Ireland, Ballyshannon Office	071-9851435
Donegal County Council – Environment Section	074-9153900

### 8.2.3 Accidental Spillage from Leaking or Damaged Fuel Lines

Emergency spill kits will be kept on site for use in emergencies.

In the event of an accidental spillage from leaking or damaged fuel lines, the spillage should be cleaned up with absorbent material e.g. sand or turf mold and placed in a designated bunded location while awaiting removal offsite to a licensed facility. The Accidental Spill Response Details are included in Figure 8-1 of this Report. Materials should be disposed of in accordance with the Local Authority regulations.

In the event of an emergency, the settlement ponds will provide a temporary holding area for any accidental spills on site as it will be possible to block off the outflow from these ponds for a limited period.

Appropriate action following the detection of any oils or fuels in the surface water is outlined as follows:

- Increased monitoring in receiving waters at monitoring locations in the receiving water course as appropriate.
- Investigation of the cause of the spillage.
- Ceasing the discharge from the settlement pond through the use of a shut off valve or similar.
- Ceasing work in the area, and/or,
- Provision of pumping equipment or vacuum tankers to divert flow to other settlement ponds.

#### 8.2.4 Accidental break out of silt

Following an accidental break out of silt, emergency measures will be put in place. During the construction period, an emergency facility (sandbags or shut off valve to block off the outlet pipe in the settlement ponds) will be provided to prevent discharge from the settlement ponds in the event of a breakout of silt. All surface water runoff from the earthworks areas lead into settlement ponds. This will mitigate the risk of any accidental spillage on site affecting watercourses.

Additional silt fencing will be installed if it is deemed appropriate for further protection of receiving waters. A turbidity meter will be used regularly to monitor the nearest downstream watercourse to monitor any increase over baseline readings which have been taken pre-construction. The results will be examined on a weekly basis to ensure no contamination of watercourses is occurring as a result of construction. Records will be kept of the readings and made available to an authorised person under the meaning of the Local Government (Water Pollution) Acts, 1977 and 1990, as amended.

The ECoW appointed by the developer will ensure the effective operation and maintenance of the drainage and other mitigation measures during construction.

Additional silt fencing, sandbags / straw bales will be kept on site for use in emergencies.

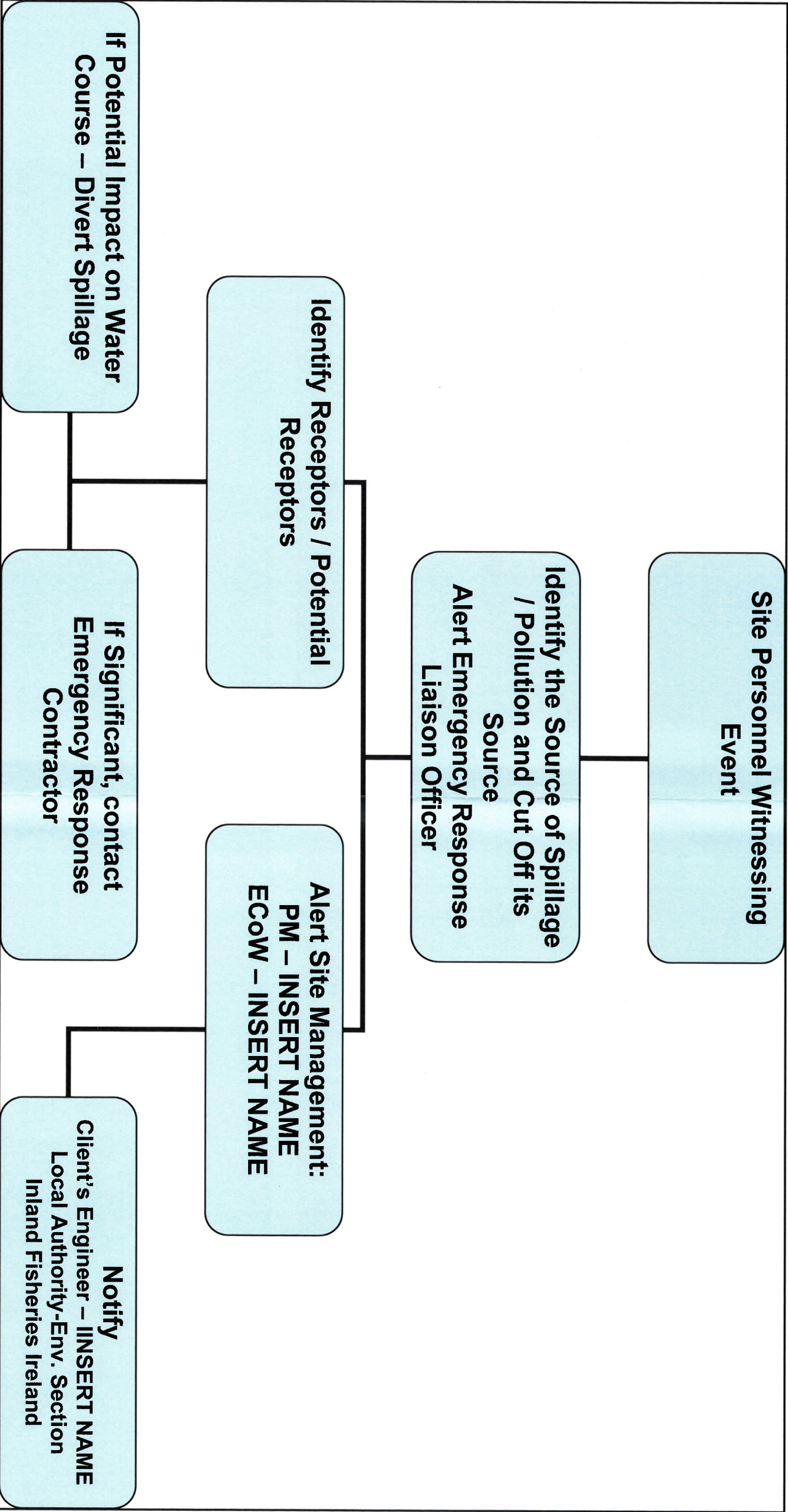


Figure 8-1: Accidental Spill Response Details





## **LIST OF ATTACHMENTS**

- ATTACHMENT 1 – Copy of Planning Permission**
- ATTACHMENT 2 - Method Statement: Road Construction**
- ATTACHMENT 3 - Method Statement: Peat Management**
- ATTACHMENT 4 - Method Statement: Concrete Pours & Concrete Truck Washout**
- ATTACHMENT 5 - Method Statement: Biosecurity**
- ATTACHMENT 6 - Method Statement: Horizontal Directional Drilling**
- ATTACHMENT 7 - Construction Methodology – Graffy Wind Farm – 110kV Underground Cable (prepared by tli Group)**
- ATTACHMENT 8 - ECoW CV – INSERT NAME**
- ATTACHMENT 9 - Refuelling ToolBox Talk Information Sheet**
- ATTACHMENT 10 - Environment Audit Check List**
- ATTACHMENT 11 – Preliminary Settlement Pond Size Calculations**
- ATTACHMENT 12 - Incident Reporting Form**

**ATTACHMENT 1**  
**COPY OF PLANNING PERMISSION**

**ATTACHMENT 2**

**METHOD STATEMENT:  
ROAD CONSTRUCTION**

Proposed Graffy Wind Farm  
Glenties,  
County Donegal

**Draft Method Statement**  
**Construction of New Wind Farm Access Roads**

Prepared for:  
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Ivy House  
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April 2021

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# 1 INTRODUCTION

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## 1.1 Overview of Scope of Work

Cuilfeach Teoranta is applying for planning permission to construct the Graffy Wind Farm, near Glenties County Donegal. The proposed wind farm will replace the wind farm permitted previously – planning numbers 09/30520 and PL 05B.237656 refer. It will consist of eight turbines, wind farm substation, transport route upgrades and underground connection to the National grid. The grid connection route largely follows public roads and existing forestry roads to the Eirgrid Tievebrack substation at Drumnalough – a distance of approximately 7.3km.

The development of the wind farm will involve the construction of approximately 4.5km of wind farm access road. An additional 734m of new road is required offsite for the transport of oversized loads. This document is produced to outline works involved in construction of roads and hardstands. This Method Statement should be read in conjunction with the Construction Environmental Management Plan (CEMP) prepared for the site. The procedures detailed in this document will be advised to all construction workers. The primary focus of these procedures is the protection of water quality, avoidance of risk of peat landslide and to maintain the existing peatland hydrology (greenfield) conditions as much as possible.

## 1.2 Environmental Setting

The site is located on the lower slopes of the Aghla Mountain in the valleys of Stracashel and Stranagoppoge Rivers. The land use is low intensity hill grazing by sheep and commercial forestry. Turbines are located at elevations of between approximately 200mOD and 292mOD. The Aghla Mountain rises to over 600mOD to the north of the wind farm site.

The western side of the site is drained by the Stracashel River and its tributaries. It flows in a westerly direction towards Glenties. The West of Ardara/Maas Road SAC extends west along the valley of the Stracashel River downstream of Graffy Bridge. In addition to being part of an SAC, the Stracashel River is an important fisheries river, and the Owenea River catchment (to which the Stracashel River flows) is one of six freshwater pearl mussel catchments in County Donegal.

The eastern side of the site is drained by the Stranagoppoge River. It flows in a general north-easterly direction and joins the Finn River at Bellanamore. The Finn River flows in a general easterly direction through Ballybofey and Strabane, where it is called the Foyle River. It discharges to Lough Foyle at Derry. The River Finn SAC extends east along the valley of the Stranagoppoge River downstream of the public road running along the southern side of the wind farm site.



## 2 CONSTRUCTION WORKS

### 2.1 Introduction

The construction of wind farm access roads will involve the following components:

1. Set out of road alignment.
2. Demarcating environment protection buffer zones with post and rope fencing and signage.
3. Installation of surface water management infrastructure.
4. Removal of peat, topsoil and unsuitable (soft) soils from the road alignment.
5. Construction of roads using geogrid, imported stone and site-won aggregate.

Detail road design will be carried out by the Client's Engineer – [INSERT COMPANY NAME]. The design will specify the thickness of stone, strength of geogrid etc., but the general methods of the construction will be as per that set out herein. Site access roads will be constructed to allow for both the construction of the wind farm and the operation and maintenance of the wind farm. Approximately 4.5km of access road will be required to service the wind farm. An additional 7.34m of new road is required as part of the transport route upgrade. Based on the surveys conducted, conventional road construction will be used; the requirement for floating roads is not envisaged.

### 2.2 Minimum Road Requirements

Site access roads have the following minimum requirements:

- A useable roadway width of 4m along straight runs and wider at curves.
- A useable road width for jib assembly of 6m (i.e. the road width within 80m of the crane area is to be 6m wide).
- The clearance width for over-sized loads must be 6m.
- The clearance height for over-sized loads must be 4.6m.
- Radius of curve is a minimum of 30m.
- [INSERT TURBINE MANUFACTURER'S SPECIFICATIONS FOR GRADIENTS, STRENGTH, ETC.]

### 2.3 Plant & Equipment

An indicative list of the plant and equipment to be used for the construction of roads is set out in Table 2-1.

**Table 2-1: Indicative List of Plant & Equipment to be Used**

Activity	Plant & Equipment
Site Clearance / earthworks	6 to 8 No 20 to 30-tonne track-mounted excavators 4 No. dumper trucks or tractor and trailers Dynamic compactor
Cabling	20-tonne track-mounted excavator Cable drum carrier Cable pulling equipment teleporter

## 2.4 Construction Sequencing

An important consideration for the construction of the site access roads will be the sequencing of the works. The works will follow this sequence:

- Establish site compound and mobilise construction plant and equipment.
- Set out road alignment.
- Establish surface water management infrastructure and demarcate buffer zones to sensitive habitats.
- Prepare peat regeneration areas to accept excess peat.
- Construct new roads.

## 2.5 Construction of Roads

The construction of the wind farm access roads will mostly be conventional techniques. Floating roads are not envisaged but are discussed here for completeness. Construction methods for both are detailed in the subsections below.

### 2.5.1 Construction of New Conventional Roads

New roads will be constructed with the wind farm and for the transport route upgrade. Much of these roads will be constructed using conventional road construction methods. The site roads pass through peatlands, commercial forestry and improved grassland.

1. The new road alignment will be marked out by the site engineer using surveying equipment (GPS). Machinery will stay within this corridor; there will be no unnecessary encroaching on nearby / adjacent vegetation by machinery.
2. The settlement ponds will already have been constructed and certified by the Client's Engineer [INSERT COMPANY NAME].
3. Clean water interceptors will be installed upgradient of the road alignment to divert clean water away from the earthworks area, reducing the volume of water to be treated in the settlement ponds as far as possible.
4. Silt fences will be erected to control surface water runoff from the earthworks areas.
5. Trees will have been felled and removed in forestry areas by a specialist contractor under licence from Forest Service.
6. Peat / topsoil stripping will be carried out under archaeological supervision.
7. Peat / topsoil stripping will be carried out in short sections and the road constructed progressively behind.
8. Peat turves will be used to restore road verges on an ongoing basis, with excess peat brought directly to the peat restoration area.
9. The road construction will be made up of:
  - a. Layer of geogrid, if required.
  - b. Site won / imported aggregate to form the road subgrade. Rock will be won on site in a cut/fill fashion. Thickness = 400mm minimum.
  - c. Imported aggregate for the running course. Thickness = 50mm minimum.
10. Permanent roadside drainage will be constructed progressively as the road advances. Check dams will also be installed progressively at a maximum separation of 30m on the steep sections of the road and at maximum 80m intervals on the flat road sections as directed by the ECoW.
11. Clean water from upslope of the road will be brought under the road at intervals to clean water breakout locations.
12. Runoff water from the road alignment, potentially carrying silts and fines will be taken to small settlement ponds (to remove silt) at breakout locations with discharge via a level spreader and overland flow.
13. The minimum road specifications required by the turbine manufacturer are set out in Section 2.2.

Plate 2-1 illustrates the road construction sequencing.

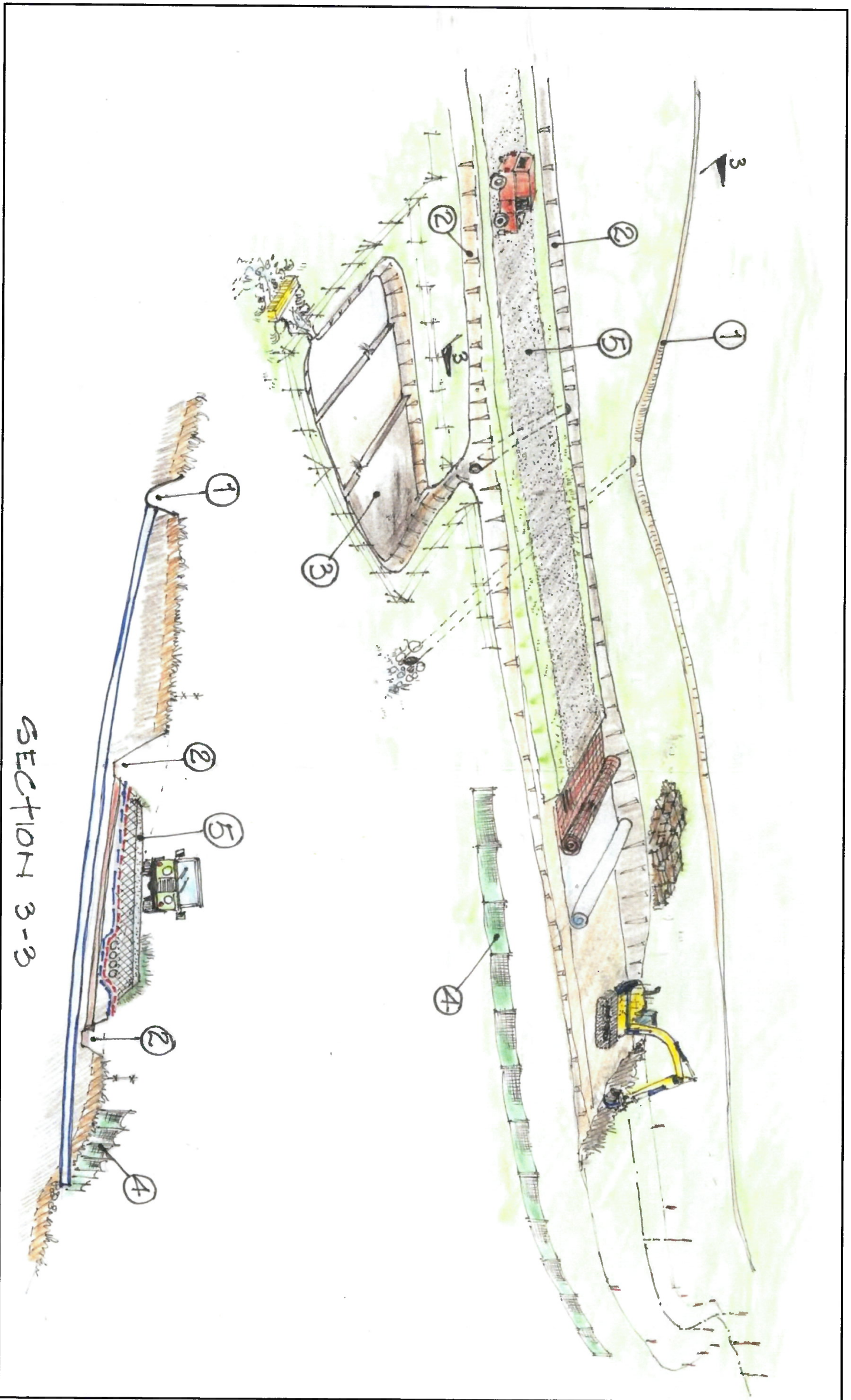


Plate 2-1: Illustration of Road Construction

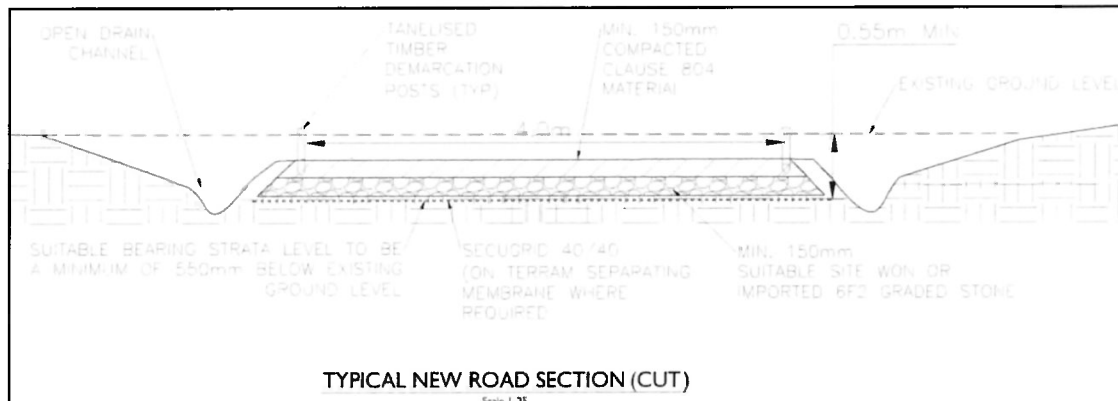


## 2.5.2 Construction of Floating Roads

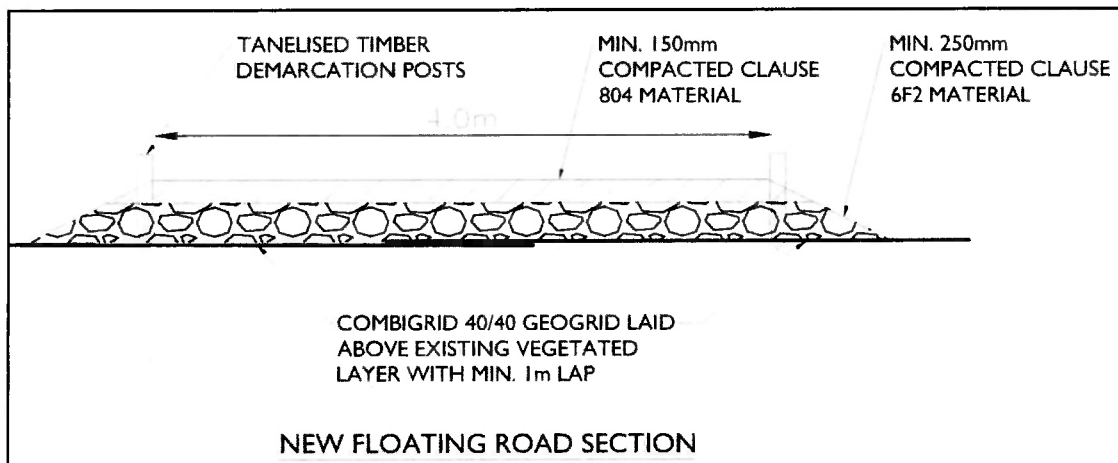
If floating roads are used, construction will follow this sequence:

1. The new road alignment will be marked out by the site engineer using surveying equipment (GPS). Machinery will stay within this corridor; there will be no unnecessary encroaching on nearby / adjacent vegetation by machinery.
2. The settlement ponds will already have been constructed and certified by the Client's Engineer [INSERT COMPANY NAME].
3. Clean water interceptors will be installed upgradient of the road alignment to divert clean water away from the earthworks area, reducing the volume of water to be treated as far as possible.
4. Silt fences will be erected to control surface water runoff from the earthworks area.
5. The road construction will be made up of:
  - a. Layer of geogrid.
  - b. Imported aggregate to form the road subgrade. Thickness = 400mm minimum.
  - c. A second layer of geogrid may be used to further strengthen the road, pending detailed design.
  - d. Imported aggregate to form the capping layer. Thickness = 200mm minimum.
  - e. Site-won aggregate for the running course. Thickness = 50mm minimum.
6. The minimum road specifications required by the turbine manufacturer are set out in Section 2.2.

Plates 2-2 and 2-3 show sections of typical conventional and floating road construction, respectively.



**Plate 2-2: Typical New Road Construction Details**



**Plate 2-3: Typical Floating Road Construction Details**

### 2.5.3 Road Upgrade / Strengthening

Some sections of existing roads will need to be widened and strengthened. The specific locations will be determined by the Client's Engineer and agreed with Coillte and the County Council as appropriate.

Where road widening / strengthening is required, the following sequence of works will be used:

1. The section of road to be widened and strengthened will be marked out by the site engineer using surveying equipment (GPS).
2. The Project Ecologist / ECoW will inspect the road section for the presence of non-native invasive plant species. Appropriate action will be taken if found, in accordance with the Biosecurity Method Statement.
3. If no non-invasive species are required to be removed, surface water management infrastructure requirements will be identified by the ECoW and installed – i.e. check dams, silt fences etc. Clean water interceptors will be installed upgradient of the road alignment, as required, to divert clean water away from the earthworks area,
4. Machinery will stay on the road to carry out the works; there will be no unnecessary encroaching on nearby / adjacent vegetation by machinery.
5. Depending on the available space, a new roadside drain will be installed upslope of the existing drain.
6. The road construction will be made up of:
  - a. Removal of the soft layer to formation level. Soil and vegetation will be used to landscape along the road verge.
  - b. A layer of geogrid will be placed in the widened section of road and lapped onto the existing road surface.
  - c. Imported aggregate to form the road subgrade. Thickness = 400mm minimum.
  - d. A second layer of geogrid may be used to further strengthen the road, pending detailed design, which would continue across the existing road surface if strengthening is required.
  - e. Imported aggregate to form the for the running course.
7. The minimum road specifications required by the turbine manufacturer are set out in Section 2.2.
8. Silt fences and check dams will be removed once the landscaping is established.

Plate 2-4 illustrates the road widening / strengthening.

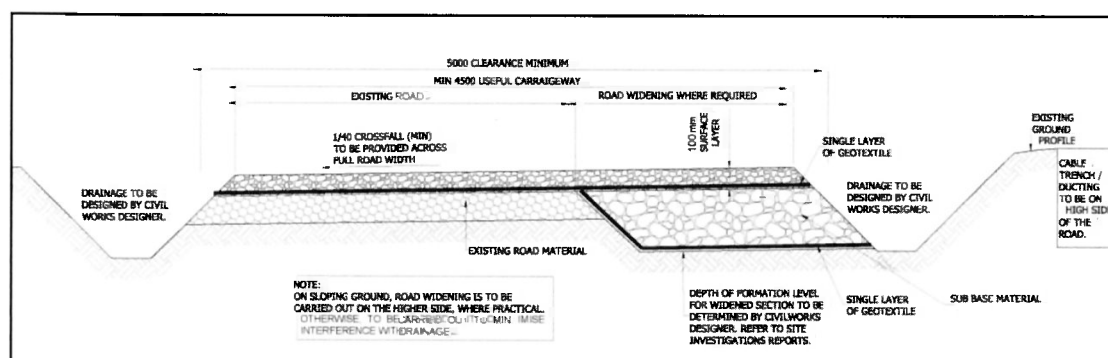


Plate 2-4: Illustration of Road Widening / Strengthening



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### 3 MITIGATION MEASURES

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Measures will be put in place to ensure there is no impact on water quality in the adjacent water courses during road construction, as follows:

1. A minimum buffer of 50m from watercourses will be used for the temporary storage of peat and soils, storage of fuels / chemicals, the refuelling of mobile plant, and the placement of the washout area for concrete trucks.
2. To reduce the volume of water to be treated and to reduce the erosion potential of exposed peat and soils, clean surface water runoff will be diverted around earthworks areas.
3. Areas stripped of vegetation will be kept to a minimum. Areas along roads and around hardstandings will be reinstated on an on-going basis as this infrastructure is constructed. This will reduce areas of soil exposed to erosion. To achieve this, short sections of road (30 to 50m per day) will be stripped.
4. Roadside drainage will be provided to collect runoff from new site roads. Check dams will be installed at intervals within the channels to slow flows and remove silt. Small settlement ponds will be constructed at breakout locations for this runoff water. Discharge from these small settlement ponds will be via a level spreader to overland flow. Where the roadside drainage ties into existing drains or streams, the flow will be through a roadside settlement pond.
5. Larger settlement ponds will be provided at the turbine, peat regeneration areas and substation locations – shown indicatively on Drawing XXX (Surface Water Infrastructure Layout), [INSERT DRAWING ONCE PLANNING GRANTED AND LAYOUT FINALISED]. They will be used to treat surface water runoff from the larger earthwork areas. Each will be sized for the catchment area contributing to that pond and to treat water to the agreed emission limit value. Discharge from ponds will be diffuse overland flow for polishing.
6. Diesel tanks, used to store fuel for the various items of machinery, will be self-contained and double-walled. Refuelling will be carried out from these tanks or from delivery vehicles. Specific mitigation measures relating to management of hydrocarbons are:
  - a. Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice - (Enterprise Ireland BPGCS005).
  - b. Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of.
  - c. Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
  - d. Appropriate spill control equipment, such as oil soakage pads, will be kept within the construction site to deal with any accidental spillage.
7. Earthworks will be temporality suspended during prolonged periods of heavy rainfall. In this regard, weather forecasts will be monitored by the ECoW.
8. Excess peat will be taken directly to the peat restoration area, from which runoff will be controlled.
9. Supplies of silt fencing, straw bales and/or sandbags will be kept at the site compound and installed where additional mitigation is required.

Monitoring of surface water management will be carried out during the construction phase by the ECoW. This will include the following:

1. Monitoring of environmental performance on a daily basis on the site and improvement items will be communicated locally (e.g. excavator drivers and foreman) and to the site management.

2. Daily visual inspections of settlement ponds and outfalls during the construction period in addition to visual inspections of the watercourses downstream of the site, to ensure suspended solids are not entering these streams and rivers. This will include turbidity monitoring at the inlet and outlet of each settlement pond.
3. The ECoW will carry out inspections of settlement ponds, check dams, outfalls and the rivers on a weekly basis.
4. Roads, drains and silt fencing/traps will be inspected for damage after intense storms and repaired or replaced as appropriate. Appropriate records of monitoring will be maintained as part of the drainage audits.
5. Water samples will be taken by the ECoW at the agreed monitoring points.

**ATTACHMENT 3**  
**METHOD STATEMENT:**  
**PEAT MANAGEMENT**

Proposed Graffy Wind Farm  
Glenties,  
County Donegal

## **Draft Method Statement Peat Management**

Prepared for:  
Cuilfeach Teoranta  
McKendrick Place  
Pearse Road  
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Prepared by:  
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April 2021

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# 1 INTRODUCTION

---

## 1.1 Overview of Scope of Work

Cuilfeach Teoranta is applying for planning permission to construct the Graffy Wind Farm, near Glenties County Donegal. The proposed wind farm will replace the wind farm permitted previously – planning numbers 09/30520 and PL 05B.237656 refer. It will consist of eight turbines, wind farm substation, transport route upgrades and underground connection to the National grid. The grid connection route largely follows public roads and existing forestry roads to the Eirgrid Tievebrack substation at Drumnalough – a distance of approximately 7.3km.

The construction of the wind farm and associated infrastructure will involve the stripping of peat. This document is produced to outline works involved in the management of peat and the environmental mitigation measures required as a result of these works. This Method Statement should be read in conjunction with the Construction Environmental Management Plan (CEMP) prepared for the site. The procedures detailed in this document will be advised to all construction workers. The primary focus of these procedures is the protection of water quality and the avoidance of risk of peat landslide.

## 1.2 Environmental Setting

The wind park is in a rural upland area in the upper catchments of the Stracashel and Stranagoppoge rivers and along the foothills of Aghla Mountain. The turbines are located to the north of local road L-6743 at elevations of between 200m and 292m.

The land use is primarily rough grazing for sheep. Conifer plantations are widespread in the area, with forestry within the central and eastern part of the site. There is evidence of small-scale historic turf cutting at the site; active turf cutting is occurring in the general area, particularly at the low-lying elevations to the southwest of the wind farm site. The site substation is located to the south of local road L-6743 in improved wet grassland, used for sheep grazing.

The grid connection to the Tievebrack substation follows local roads L-6743 and L-2593 to the east towards the R250. The eastern-most 2km of the grid connection follows a forestry road, passing a mink farm. Access route improvements needed for local road L-6733 to the northeast of the wind farm, turbine T01 and an internal access road between turbines T04 and T05/T06, are within commercial forestry. Agreement has been reached with Coillte for this development. The transport route upgrade (construction of a new forestry road) is also within commercial forestry.

The streams draining the site flow to the Stracashel and Stranagoppoge rivers. The western side of the site is drained by the Stracashel River and its tributaries, which form part of the Owenea River catchment. Downstream of Graffy Bridge, the Stracashel River is designated as part of West of Ardara/Maas Road Special Area of Conservation (SAC). This is a large SAC selected for a wide range of habitats and/or species listed on Annex I / II of the E.U. Habitats Directive. The Owenea River catchment is one of six freshwater pearl mussel catchments in County Donegal. Turbines T05 to T08, the substation and the grid connection route are within the catchment of the Stracashel River. The eastern side of the site is drained by the Stranagoppoge River. The Stranagoppoge River forms part of the River Finn SAC, which extends downstream from local road L-6743 near the wind farm site. Turbines T01 to T04 and the transport route upgrade are located in the catchment of the Stranagoppoge River.



The site is underlain by the Termon Formation and Slieve Tooley Quartzite Formation. These are Precambrian-aged rocks, showing a high degree of metamorphism and complex relationships due to their long history of folding, faulting, igneous intrusions and other tectonic activities. The bedrock is covered by a thin layer of peat, generally <1.0m but up to 5.4m deep in small peat basins developed between bedrock ridges. Bedrock outcrop is frequent across the site. The bedrock is classified as a poor aquifer. Water supplies in the locality are sourced from streams and wells (dug and bored); the area is not serviced by mains water.

---

## 2 PEAT MANAGEMENT

---

### 2.1 Introduction

The construction of the Graffy Wind Farm will result in the excavation of approximately 46,593m<sup>3</sup> of peat. This will be managed in a number of ways, depending on the type of peat and the area on the site from where it is excavated. Excavated peat will be:

1. In the case of excess peat, brought to the designated peat restoration areas – approximately 33,573m<sup>3</sup>.
2. Reused in restoration near to where it is excavated – approximately 13,020m<sup>3</sup>.

The goals and objectives of a peat management Method Statement are to:

1. Minimise interference to areas of the blanket bog that have to date had relatively low anthropogenic interference.
2. Carry out all excavation works and peat handling in a manner that would not cause deterioration of water quality in the streams leaving the site and draining to the Stracashel and Stranagoppoge rivers.
3. Carry out all excavation works and peat handling in a manner which would not lead to peat stability issues or landslide risk.

### 2.2 Peat Restoration Area

Several areas of the site will be used to place excess peat. The preparation of these areas to receive peat will be as follows:

1. Setting out of the peat restoration areas (PRAs).
2. Installation of clean surface water diversions around the upgradient side of the PRAs to reduce the volume of potentially contaminated water.
3. Construction of a settlement pond at the low point of the PRA and installation of silt fencing downgradient of the works.
4. Construction of an earthen / rockfill berm around the perimeter of the PRAs. These will tie into natural rock outcrops / bedrock ridges. Earthen / rockfill berms will also be constructed in the larger PRAs as these areas are filled to create workable cells of approximately 25m x 50m. These will be lower than the perimeter berm and will assist with peat stability.
5. Construction of a temporary access road to the PRA.
6. Stripping of a small area of acrotelm peat from within the PRA to receive peat. Stripped turves will be placed on the outer slope and crest of the perimeter berm to restore and landscape the berms.
7. Placement of excavated catotelm peat to a depth of approximately 1.3m into the stripped area. Peat to be placed so that incident rainfall runoff is directed to the settlement pond.
8. Once filled, strip the next section of PRA to receive peat. Stripped turves (acrotelm peat) to be placed on the surface of the peat just deposited in the previous area. Turves to be placed right-way-up to accelerate regeneration. If insufficient acrotelm peat to cover the entire surface area and in accordance with guidelines (Standen V. (1993)<sup>1</sup>), strips of acrotelm peat will be laid as parallel turves to allow for natural re-colonisation of areas of bare peat.
9. This method of filling with continuing restoration of the peat surface will continue until the PRA is at capacity. The upslope edge of the PRA will be graded into the adjoining topography so it will receive overland sheet runoff.

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<sup>1</sup> Standen V. (1993). *The Effects of Transplantation. Impact on Vegetation and Selected Invertebrate Groups*. The Vasculum 70. 13.14.

10. The PRAs will be fenced off with sheep wire fencing to protect the reinstatement process and to avoid accidents with grazing animals and users of the site. Additional signposting will be installed at 20m intervals to advise against the hazards of soft peat.

Figure 1 illustrates the filling of a peat restoration area.



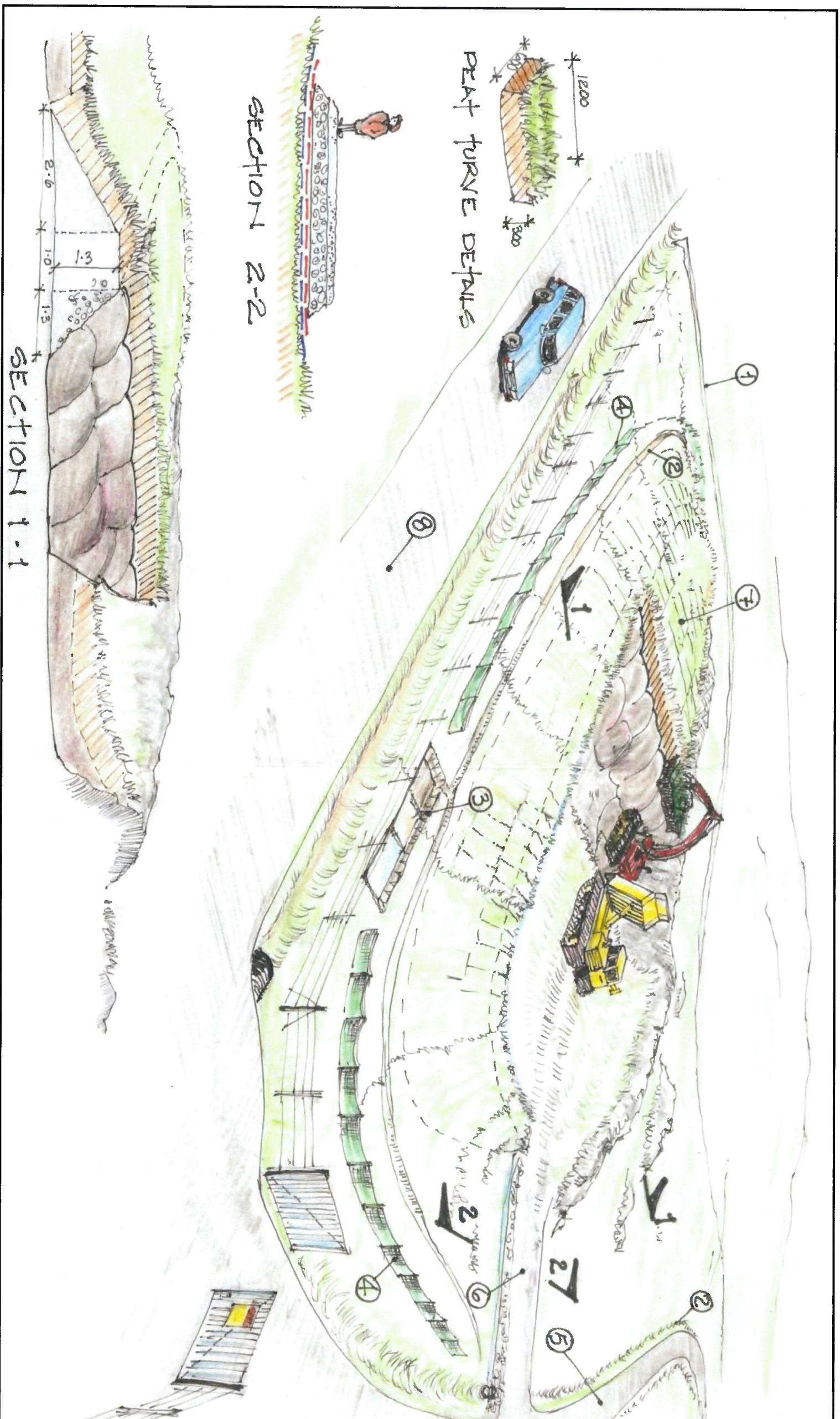


Figure 1: Illustration of Peat Restoration Area





## 2.3 Reuse of Peat

Road verges and the perimeter of hardstand areas will be restored using excavated peat to blend into the adjacent topography. Excavated peat will be used to progressively landscape along road verges, around hardstand areas and over turbine foundations.

## 2.4 Peat & Ground Stability

It is estimated that approximately 46,593m<sup>3</sup> of peat will potentially be excavated during construction of the roads, hardstand areas and turbine foundations.

The peat depth within the development footprint was found to be approximately 0.5m typically, but up to 5.4m.

Based on an assessment of ground conditions at the site it is determined that the construction of the wind farm has a low risk of construction-related peat instability. The full peat landslide risk assessment is provided in EIAR.

During construction the following measures will be employed to ensure peat and ground stability:

1. Avoid the stockpiling of peat at the turbine site. Excess excavated peat will be removed to the nearest PRA.
2. Earthen / rockfill embankments will be used, as required, to hold the peat in place.
3. Peat turves will be stored on site for reuse in restoration along the roads and around the crane areas and turbine foundations.
4. Inspections and testing of roads and crane area will be carried out during their construction to ensure that they can accommodate the design loadings. Formation levels for the turbine foundations will also be inspected, tested and certified prior to constructing the turbine foundations.
5. Monitoring of the peat during road construction will be carried out in areas of deeper peat at the site – i.e. on the approach to T07. Based on the road construction method, monitoring pegs (for lateral displacement) will be used.

Geotechnical specialists from the Client's Engineers will carry out monitoring and inspections of construction activities, with a view to identifying areas of unstable peat and to instruct the contractor to implement suitable remedial works, if required.

## 2.5 Plant & Equipment

An indicative list of the plant and equipment to be used for peat management (this is in addition to the plant and equipment to be used during general wind farm construction) is set out in Table 1. This is in addition to plant used for road / hardstand construction.

**Table 1: Indicative List of Plant & Equipment to be Used**

<b>Plant &amp; Equipment</b>
1 No. 12- to 16-tonne wide track excavator with ditching bucket (bog master)
2 No. 12-tonne tracked dumpers

---

### 3 MITIGATION MEASURES

---

Measures will be put in place during peat management to ensure there is no impact on water quality in the adjacent water courses, as follows:

1. Peat will not generally be stockpiled on site. The use of peat will be identified prior to being excavated so that its management at the beginning of each day is predetermined. In order of preference, it will either be:
  - a. Taken directly to its final use location for restoration. This will be the acrotelm peat used for road verge / hardstand perimeter restoration.
  - b. Stored briefly adjacent to the work area for reuse in restoration. This will be the acrotelm peat used for road verge / hardstand perimeter restoration.
  - c. Taken directly to the peat restoration area.
2. When stored for reuse, there will be a minimum buffer of 50m from watercourses.
3. Surface water management infrastructure will be installed ahead of excavation of peat to manage runoff from these areas.
4. Earthworks will be temporality suspended during prolonged periods of heavy rainfall. In this regard, weather forecasts will be monitored by the ECoW.
5. Supplies of silt fencing, straw bales and/or sandbags will be kept at the site compound and installed where additional mitigation is required.

In addition to the surface water monitoring that will be carried out (and as detailed in the CEMP), monitoring of peat management will be carried out during the construction phase. This will include the following:

1. Monitoring of the peat during road and hardstand construction in any areas where peat depth exceeds 1.5m at / near the construction works. Based on the road construction method, monitoring pegs (for lateral displacement) will be used.
2. Geotechnical specialists from the Client's Engineers will carry out monitoring and inspections of construction activities, with a view to identifying areas of unstable peat and to instruct the contractor to implement suitable remedial works, if required.

**ATTACHMENT 4**

**METHOD STATEMENT:  
CONCRETE POURS & CONCRETE TRUCK WASHOUT**

Proposed Graffy Wind Farm  
Glenties,  
County Donegal

**Draft Method Statement  
Concrete Pours & Concrete Truck Washout**

Prepared for:  
Cuilfeach Teoranta  
McKendrick Place  
Pearse Road  
Letterkenny  
County Donegal

Prepared by:  
Keohane Geological & Environmental Consultancy  
Ivy House  
Clash  
Carrigrohane  
County Cork

April 2021

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# 1 INTRODUCTION

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## 1.1 Overview of Scope of Work

Cuilfeach Teoranta is applying for planning permission to construct the Graffy Wind Farm, near Glenties County Donegal. The proposed wind farm will replace the wind farm permitted previously – planning numbers 09/30520 and PL 05B.237656 refer. It will consist of eight turbines, wind farm substation, transport route upgrades and underground connection to the National grid. The grid connection route largely follows public roads and existing forestry roads to the Eirgrid Tievebrack substation at Drumnalough – a distance of approximately 7.3km.

The construction of the wind farm and associated infrastructure require the pouring of 8 number turbine foundations, foundations at the substation and lean-mix for the cable route along the road. Turbines will require approximately 4,000m<sup>3</sup> of concrete; the substation will require approximately 500m<sup>3</sup> of concrete; the grid connection will require approximately 2,520m<sup>3</sup> of lean-mix; and the met mast will require approximately 100m<sup>3</sup>. Therefore, approximately 7,120m<sup>3</sup> of ready-mix concrete will be required for the wind farm construction.

The purpose of this document is to set out the environmental protective measures to be put in place during the delivery of concrete and pouring of foundations. This Method Statement should be read in conjunction with the Construction Environmental Management Plan (CEMP) prepared for the site. The procedures detailed in this document will be advised to all construction workers and concrete delivery drivers during site induction and/or toolbox talks. The primary focus of these procedures is the protection of water quality.

## 1.2 Environmental Setting

The site is located on the lower slopes of the Aghla Mountain in the valleys of Stracashel and Stranagoppoge Rivers. The land use is low intensity hill grazing by sheep and commercial forestry. Turbines are located at elevations of between approximately 200mOD and 292mOD. The Aghla Mountain rises to over 600mOD to the north of the wind farm site.

The western side of the site is drained by the Stracashel River and its tributaries. It flows in a westerly direction towards Glenties. The West of Ardara/Maas Road SAC extends west along the valley of the Stracashel River downstream of Graffy Bridge. In addition to being part of an SAC, the Stracashel River is an important fisheries river, and the Owenea River catchment (to which the Stracashel River flows) is one of six freshwater pearl mussel catchments in County Donegal.

The eastern side of the site is drained by the Stranagoppoge River. It flows in a general north-easterly direction and joins the Finn River at Bellanamore. The Finn River flows in a general easterly direction through Ballybofey and Strabane, where it is called the Foyle River. It discharges to Lough Foyle at Derry. The River Finn SAC extends east along the valley of the Stranagoppoge River downstream of the public road running along the southern side of the wind farm site.



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## 2 CONCRETE WORKS

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Concrete pours at the wind farm will be required as follows:

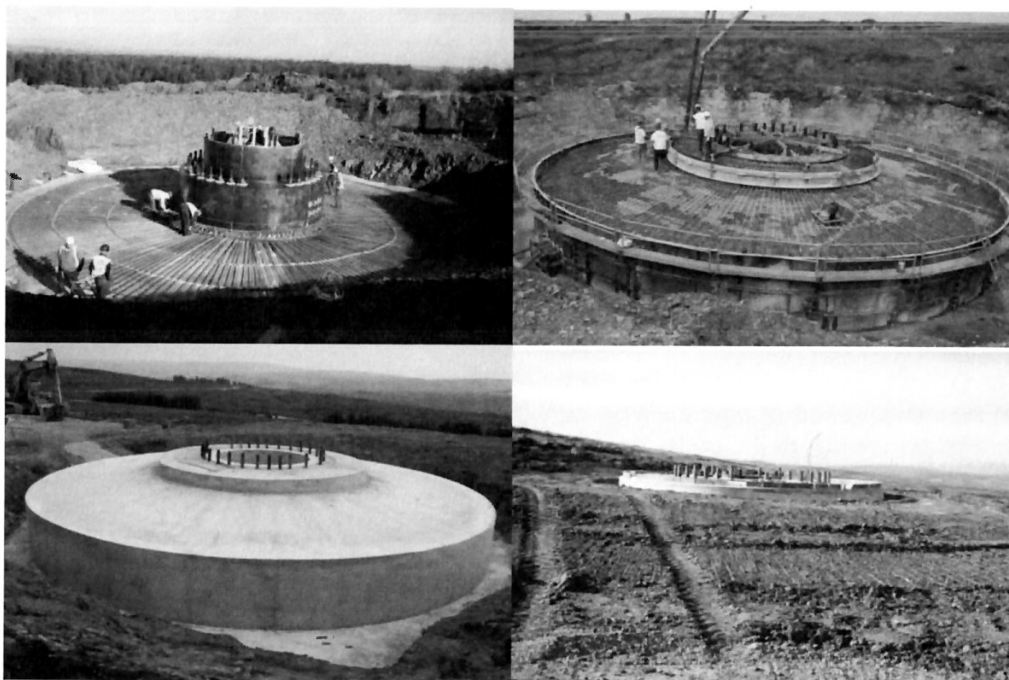
1. Blinding layer for turbine foundation – 35m<sup>3</sup>.
2. Foundation for turbines – 500m<sup>3</sup>.
3. Foundations for substation – 500m<sup>3</sup>, delivered over several days.
4. Lean-mix for cable trench – 39m<sup>3</sup>/day, assuming 100m of ducting installed per day on roads.

The most intensive period of pours will be during turbine foundations, with approximately 65 loads required on the day of the pour.

### 2.1 Turbine Foundation Preparation & Concrete Pours

An outline of the foundation construction is set out below:

1. Following approval of the formation level, the blinding layer, of minimum thickness 100mm, is poured. While shuttering isn't used, these pours take place within excavations, with no possibility of concrete escaping to the surrounding environment.
2. Reinforcing steel is then installed, followed by erecting the foundation shuttering – see Plate 2-1 for examples of turbine foundation sequencing.
3. Expanding foam is used to seal gaps in the shuttering to prevent concrete leak.
4. Prior to the pours, the Client's Engineer inspects the shuttering and the [INSERT CIVIL WORKS CONTRACTOR NAME] Construction Manager ensures that all environmental protection measures are in place. These will be checked also by the ECoW.
5. Signage is erected to direct drivers to the pour location and the designated washout location. All concrete truck drivers will receive a toolbox talk and be familiar with the procedure and restrictions on washing of concrete chutes on site.
6. The works will begin with the concrete truck arriving to site at the pour location that will be identified by site signage. Access to / from the site will be in accordance with the traffic management plan.
7. On arrival at the pour location, the driver will back the truck as close to the foundation as possible and:
  - a. In the case of blinding layers, discharge the concrete into an excavator bucket. The excavator driver will then place the concrete where it is needed.
  - b. In the case of turbine foundations, discharge the concrete into the concrete pumping truck.
8. When the concrete discharge is complete, the chute discharging the concrete will be cleaned by brush into the concrete pump / excavator bucket without the requirement of water.
9. The truck will then go to washout location, where the chute only will be washed. Once the chute washout is complete, the truck will return to the batching plant/quarry for full washout.
10. For the delivery of lean-mix along the cable route, the chute will only be brushed clean. Washdown of the truck and chute will be done at the batching plant/quarry, unless other arrangements are made with the approval of the ECoW which doesn't present a risk to surface water quality.



**Plate 2-1: Concrete Pour Sequence for Turbine Foundation**

## 2.2 Plant & Equipment

An indicative list of the plant and equipment to be used for concrete pours is set out in Table 2-1.

**Table 2-1: Indicative List of Plant & Equipment to be Used**

Plant & Equipment
Teleporter
20-30 tonne excavator
Generator & vibrator
Concrete trucks and pumps
Various hand tools for floating concrete

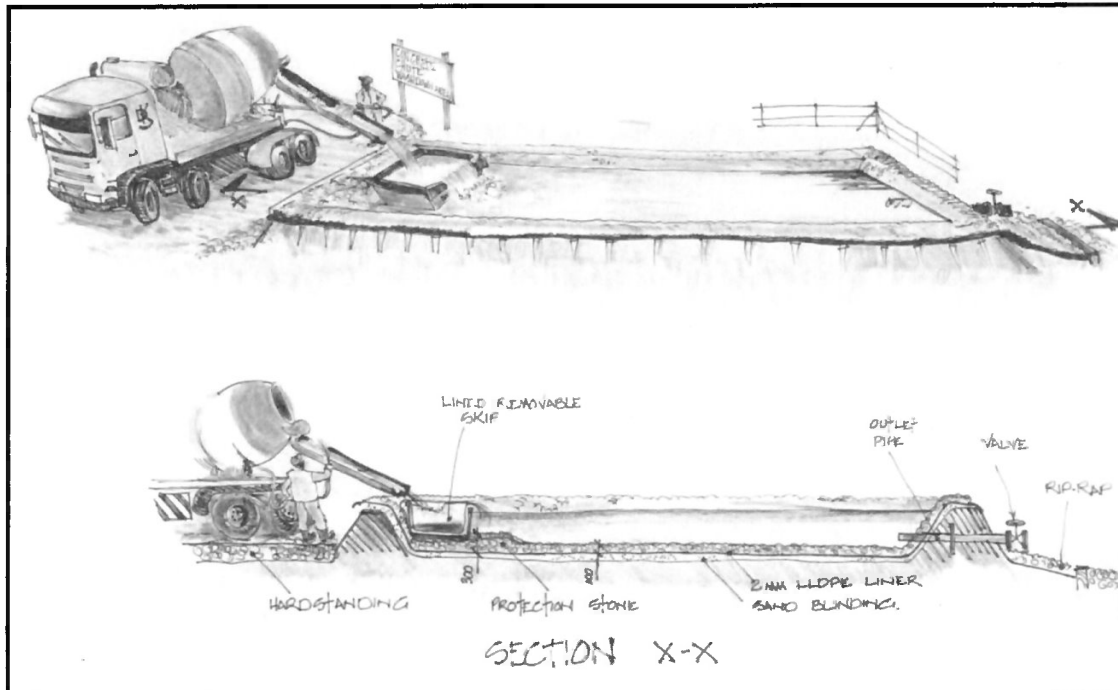
## 2.3 Wash Down from Concrete Trucks and Cement Mixers

The concrete wash down protocol will consist of the following elements and will operate as follows:

- All concrete truck drivers will receive a toolbox talk and be familiar with the procedure and restrictions on washing of concrete chutes on site.
- Prior to each concrete pour the [INSERT CIVIL WORKS CONTRACTOR NAME] Construction Manager will check that all protection measures are in place. The ECoW will be responsible for the monitoring regime as outlined below.
- The works will begin with the cement truck arriving on site at the proposed pour location, which will be identified by local signage.
- The concrete truck will back up into the pour location.
- The concrete truck will discharge into the form work (or into the concrete pump) under supervision of [INSERT CIVIL WORKS CONTRACTOR NAME], where it will be contained.

- When the concrete discharge is complete, the concrete truck will back up to the concrete wash down area, the chute discharging the concrete on the back of the truck will be cleaned by brush into a steel skip that is enclosed in a concrete wash-down bund. This will be supervised by the [INSERT CIVIL WORKS CONTRACTOR NAME] personnel and/or ECoW, who will ensure that all excess concrete is removed into the skip only and has been removed from the chute before releasing the truck from site.
- The washing out of the inside of trucks will not be permitted on site. Wash down of the concrete trucks will occur back at the batching plant.

An illustration of the concrete truck washdown arrangements are shown on Plate 2-2. The concrete washdown area will be located a minimum distance of 50m from any watercourse.



**Plate 2-2: Concrete Washdown Arrangements**

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### 3 MITIGATION MEASURES

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Measures will be put in place to ensure there is no impact on water quality during concrete pours at the site:

1. Silt fencing, straw bales and sandbags will be installed between concrete pour locations and the nearest watercourse, as appropriate.
2. Placement of blinding concrete will occur within excavations below ground surface, so concrete escape into the environment can't occur.
3. All concrete pours for foundations will be into sealed formwork. Any excess concrete will not be discarded on site.
4. Washout of concrete chutes will be done at a dedicated washout facility. Full washout of concrete trucks will be done offsite at the batching plants where facilities should be in place to treat wash-down water.
5. Washout of chutes following pours for the cable route are likely to be done at the batching plants as these pours will be remote from the main wind farm.
6. The capacity of the washout skip is 6m<sup>3</sup>, with an additional capacity of at least 10m<sup>3</sup> capacity in the stone-lined secondary containment.
7. The on-site washout facility will be double-lined. It will be located a minimum of 50m from any watercourse or drain. Clean water will be decanted from the washdown facility when its pH falls below 9.

In addition to the surface water quality monitoring set out in the CEMP, monitoring of concrete pours and washout will consist of:

1. Prior to the pours, the Client's Engineer will inspect the shuttering and ensure that all mitigation measures are in place.
2. The Client's Engineer / ECoW will be on site to observe concrete pours and washout.
3. The [INSERT CIVIL WORKS CONTRACTOR NAME] Project Manager / ECoW will routinely inspect the washout facility to ensure that it is operating properly. If it isn't, use of the washout facility will cease – trucks will have to washout at the batching plant.

**ATTACHMENT 5**  
**METHOD STATEMENT:**  
**BIOSECURITY**

Graffy Wind Farm  
Glenties  
County Donegal

## **Draft Method Statement Biosecurity**

Prepared for:  
Cuilfeach Teoranta  
Letterkenny  
County Donegal

Prepared by:  
Keohane Geological & Environmental Consultancy  
Ivy House  
Clash  
Carrigrohane  
County Cork

April 2021



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# 1 INTRODUCTION

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## 1.1 Overview of Scope of Work

Cuilfeach Teoranta is applying for planning permission to construct the Graffy Wind Farm, near Glenties County Donegal. The proposed wind farm will replace the wind farm permitted previously – planning numbers 09/30520 and PL 05B.237656 refer. It will consist of eight turbine, wind farm substation and underground connection to the National grid.

The purpose of this document is to set out the biosecurity protocol to be put in place during construction works, with particular focus on works within the riparian zones. The procedures detailed in this document will be advised to all construction workers at the site during site induction and toolbox talks. The protocol is based on

- Inland Fisheries Ireland Biosecurity Protocol for Field Survey Work (IFI, 2010).
- European Communities (Birds and Natural Habitats) Regulations 2011, S.I No 477 of 2011.
- Biodiversity Series – Invasive Knotweeds and Regulations, Version 1.2, January 2012, National Biodiversity Data Centre.
- Invasive Species Ireland – Invasive Plant Management <http://invasivespeciesireland.com/invasive-plant-management/>
- Assessing and Managing Invasive Species within Protected Areas. Protected Area Quick Guide Series. The Nature Conservancy.

Non-Native Species (NNS) are any animal or plant introduced (deliberately or accidentally) by human activity to an area in which they do not naturally occur. Some animals and plants may have been transported here a long time ago and be considered “naturalised”, but these are still considered non-native species. Invasive Non-Native Species (INNS), sometimes referred to as ‘invasive alien species’, are those non-native species that have the ability to spread rapidly and become dominant in an area or ecosystem, causing adverse ecological, environmental and economic impacts<sup>1</sup>. Non-native species subject to restrictions under Regulations 49 and 50 are listed in the third schedule of S.I No 477 of 2011.

## 1.2 Environmental Setting

The site is located on the lower slopes of the Aghla Mountain in the valleys of Stracashel and Stranagoppoge Rivers. The land use is low intensity hill grazing by sheep and commercial forestry. Turbines are located at elevations of between approximately 200mOD and 292mOD. The Aghla Mountain rises to over 600mOD to the north of the wind farm site.

The western side of the site is drained by the Stracashel River and its tributaries. It flows in a westerly direction towards Glenties. The West of Ardara/Maas Road SAC extends west along the valley of the Stracashel River downstream of Graffy Bridge. In addition to being part of an SAC, the Stracashel River is an important fisheries river, and the Owenea River catchment (to which the Stracashel River flows) is one of six freshwater pearl mussel catchments in County Donegal.

The eastern side of the site is drained by the Stranagoppoge River. It flows in a general north-easterly direction and joins the Finn River at Bellanamore. The Finn River flows in a general easterly direction through Ballybofey and Strabane, where it is called the Foyle River. It discharges to Lough Foyle at Derry. The River Finn SAC extends east along the valley of the Stranagoppoge River downstream of the public road running along the southern side of the wind farm site.

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<sup>1</sup> Scottish Natural Heritage et al, 2019. Good Practice during Wind Farm Construction, 4<sup>th</sup> Edition.

The construction of the wind farm road and grid connection will cross a number of small tributaries of the Stracashel and Stranagoppoge rivers, and in the case of the grid connection, the Stracashel River itself.

The biodiversity assessment and habitat survey carried out for the wind farm did not record any invasive species within the proposed development area. Japanese knotweed was recorded outside of the wind farm site along the banks of the Stracashel River, near the grid connection route, at the following grid references:

- G 8665 9590
- G 8669 9589
- G 8674 9586

These stands lie beyond 7m from the proposed grid connection crossing at the forestry bridge and as such will not be disturbed by the proposed works. Locations are shown on Figure 1.

No other scheduled invasive species were recorded within the vicinity of the site, however a stand of snowberry was recorded adjacent to the proposed grid connection route at G 9018 9661. Locations are shown on Figure 2. This species is unlikely to be spread through the proposed grid connection works within the roadbed. This species, while considered invasive, is not subject to any legal restrictions or requirements.





Note

- 1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.
- 2. If received electronically it is the recipient's responsibility to print to correct scale. Only written dimensions should be used.
- 3. This drawing should be read in conjunction with all other relevant drawings and specifications.

Legend

- Site Boundary
- Japanese Knotweed



Rev	Description	By	Ckd	Date

Elimwood House, 74 Boucher Road,  
BELFAST, BT12 6RZ  
T: 028 9066 7914

Client: Cullteach Teoranta

Grafty Windpark

Invasive Species Plan: Japanese Knotweed

Status                      Scale @ A3                      Date  
**Preliminary**                      **1:1250**                      **23.02.21**  
RPS Project Number  
**NI 2256**  
Revision  
--  
rpsgroup.com







Note

1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.

2. If received electronically it is the recipient's responsibility to print to correct scale. Only written dimensions should be used.

3. This drawing should be read in conjunction with all other relevant drawings and specifications.

Legend

- Site Boundary
- Snowberry Stands

Rev	Description	By	Ckd	Date

Elmwood House, 74 Boucher Road,  
BELFAST, BT12 6RZ  
T: 028 9066 7914

Client: Cullteach Teoranta

Grafty Windpark

Invasive Species Plan: Snowberry

Status                      Scale @ A3                      Date  
Preliminary                      1:1250                      23.02.21  
RPS Project Number                      NI 2256                      Revision  
rpsgroup.com





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## 2 BIOSECURITY PROTOCOL

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### 2.1 Introduction

The construction of the wind farm will involve the crossing of a number of watercourses with roads and cables (internal cabling and grid connection), which will require work within the riparian zone. While no instream works are proposed, plant and machinery will be brought from other sites, and taken to different sites after the works are complete. It is therefore possible that machinery brought to site could bring invasive species to the site and / or transfer invasive species from the Graffy Wind Farm site to other sites after the works are completed.

This document sets out the protocol to be used for the mobilisation of plant and machinery to the site, particularly for works within the riparian zone; daily precautions to be taken; and protocol for decontaminating plant and machinery after completion of works within the riparian zone.

### 2.2 Pre-mobilisation Surveys

Prior to mobilisation to site the project ecologist will carry out a survey to identify whether there are any invasive plant species within the construction site. It is important to note that no invasive species were identified on the site during any of the many habitat surveys conducted to date.

1. The location and extent of any invasive species identified will be mapped.
2. If present, areas with invasive species and appropriate buffer zones will be fenced using post and rope fence with appropriate warning signs.
3. Depending on what is found and where it is found, a site-specific management plan will be prepared, which will address how the invasive species will be eradicated or contained. It is not practical to prepare a management plan at this stage as no invasive species has been identified. Things to be considered in the site-specific management plan will include:
  - a. Type of species involved, its extent and how well/long it is established.
  - b. Does the invasive species infestation extend into the earthworks area?
  - c. Does the invasive species infestation extend close to water courses?
  - d. Does the invasive species infestation extend into the SAC? Is a Habitats Regulation Assessment (HRA) required per Article 6 of the Habitats Directive, and is a license required under the nature conservation legislation?
  - e. Would protected species be impacted – e.g. are birds using the invasive species for nesting?
  - f. Notification of adjacent landowners.
  - g. Whether a specialist contractor is needed.
  - h. Establishment of exclusion zones to prevent personnel and vehicles entering the infested areas.
  - i. Isolation and treatment of soils excavated from infested areas. Treatment methods would need to be considered including use of herbicides, hand removal, strimming, deep excavation with off-site treatment and disposal etc.
  - j. Any health and safety issues associated with invasive species – e.g. toxic chemicals in the sap of giant hogweed that can cause painful skin irritation.
  - k. Monitoring of eradication programme.
4. Workers on site will be made aware of any invasive species found and educated on their identification. This would form part of the site induction.

### **2.3 Protocol for Machinery Mobilisation**

Before [INSERT CONTRACTOR NAME] mobilises plant and machinery to site, they will be washed using high pressure steam cleaning, or pressure washer. Following washing, and prior to mobilisation to site, they will be inspected to ensure all material and debris has been removed. Disinfectant (Virkon Aquatic or similar) will then be sprayed on the tracks, wheels and undercarriage of the machinery.

### **2.4 During Works in the Riparian Zone**

Only machinery cleaned and disinfected (per Section 2.3) will be allowed work in the riparian zone. Workers' cars/vans will be parked back from the riparian zone to avoid potential for contamination.

A disinfection station will be setup for workers leaving the site to clean and disinfect work boots. This will consist of a shallow tray for washing boots and a handpump strayer with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product).

### **2.5 Protocol for Machinery Demobilisation**

Upon completion of the works in the riparian zone, the plant and machinery will be inspected, and all plant debris removed. The plant and machinery will then be taken to the site compound and will be washed using high pressure steam cleaning, or pressure washer. Following washing, and prior to demobilisation from site or use elsewhere on site, they will be inspected to ensure all material and debris has been removed. Disinfectant (Virkon Aquatic or similar) will then be sprayed on the tracks, wheels and undercarriage of the machinery.

If machinery is to remain on site for work in other areas of the wind farm, they will be washed again before demobilisation from site.

**ATTACHMENT 6**

**METHOD STATEMENT:  
HORIZONTAL DIRECTIONAL DRILLING**

Proposed Grid Connection  
Between  
Graffy Wind Farm,  
&  
Tievebrack Substation, Glenties County Donegal

## **Draft Method Statement Horizontal Directional Drilling**

Prepared for:  
Cuilfeach Teoranta  
McKendrick Place  
Pearse Road  
Letterkenny  
County Donegal

Prepared by:  
Keohane Geological & Environmental Consultancy  
Ivy House  
Clash  
Carrigrohane  
County Cork

April 2021



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Appendix A – Grid Route Map

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# 1 INTRODUCTION

---

## 1.1 Overview of Scope of Work

Cuilfeach Teoranta is applying for planning permission to construct the Graffy Wind Farm, near Glenties County Donegal. The proposed wind farm will replace the wind farm permitted previously – planning numbers 09/30520 and PL 05B.237656 refer. It will consist of eight turbines, wind farm substation, transport route upgrades and underground connection to the National grid. The grid connection route largely follows public roads and existing forestry roads to the Eirgrid Tievebrack substation at Drumnalough – a distance of approximately 7.3km. A short section at the eastern end (near the substation) cuts across a field for a distance of approximately 50m. The grid connection will be an underground 110kV cable.

Three locations have been identified along the route where horizontal directional drilling (HDD) is required. These are at the two bridges along the route and at a triple culvert location. This draft Method Statement contains details for the HDD method of construction that will be utilised at stream / river crossings, where HDD is considered the most appropriate solution considering technical and environmental issues.

A specialist HDD contractor will be appointed for this work, who will prepare site-specific method statements for each crossing location.

## 1.2 Environmental Setting

The grid connection route will extend the Graffy Wind Farm substation to Eirgrid's Tievebrack substation at Drumnalough. Its alignment follows public and forestry roads for most of its 7.3km route. The public roads are undivided rural roads that follow the valley of the Stracashel River. The eastern half of the grid road follows public roads. At Dromconcoose, the route turns south onto a forestry road, crossing the Stracashel River and continues east along the forestry road to the Tievebrack substation. The West of Ardara/Maas Road SAC extends west along the valley of the Stracashel River downstream of Graffy Bridge. Protection of the surface water quality during the installation of the cable and works in proximity to the Stracashel River and its tributaries is therefore a priority.

In addition to being part of an SAC, the Stracashel River is an important fisheries river, and the Owenea River catchment (to which the Stracashel River flows) is one of six freshwater pearl mussel catchments in County Donegal.

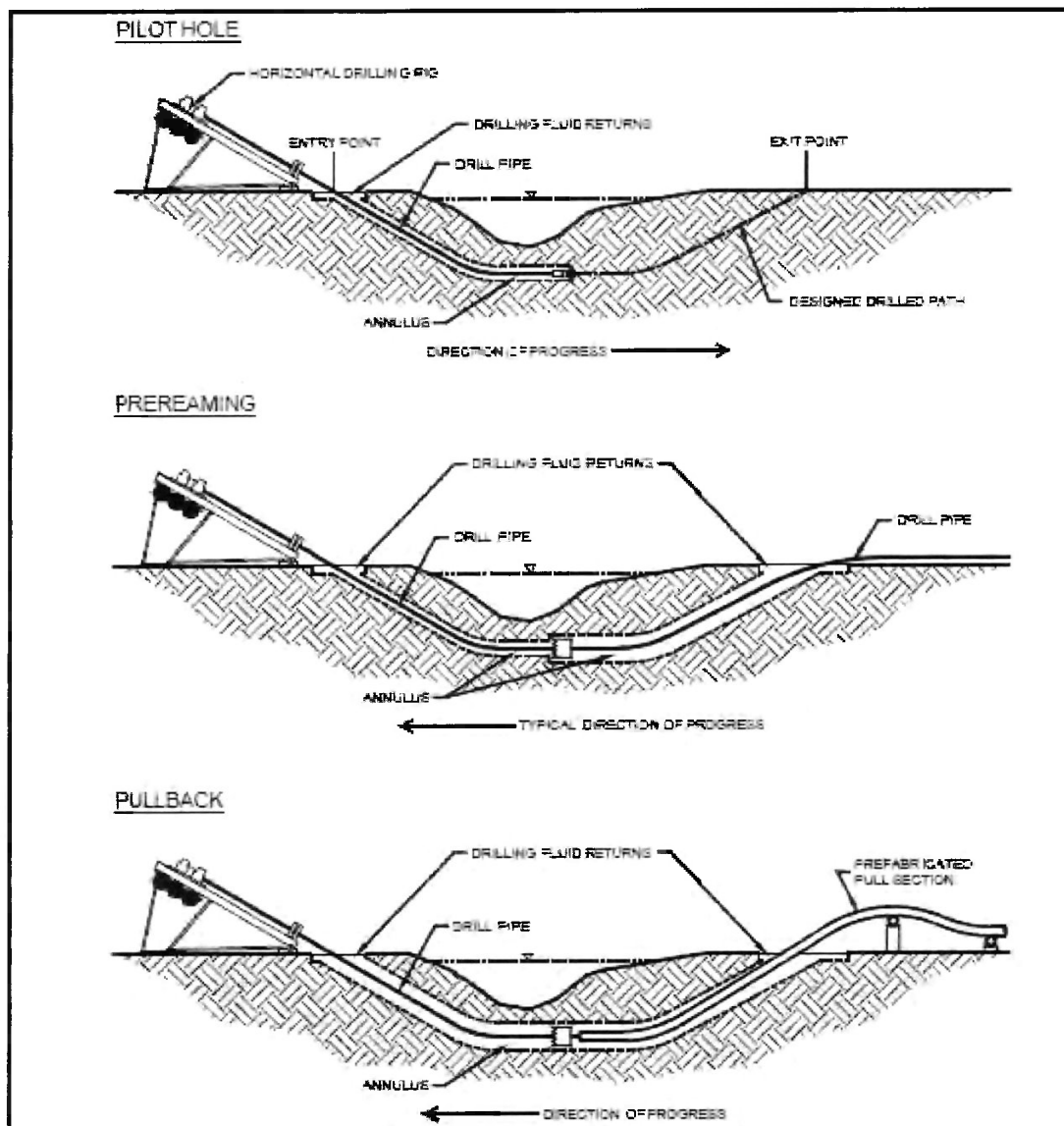
## 1.3 HDD Overview

HDD is a trenchless technology used in a number of industries, including the installation of utility ducting and pipelines under roads, railways and rivers. A drilling rig is used to drill a small diameter pilot hole along a predetermined path between the launch pit and exit pit. The direction of the drill bit is monitored and controlled by the operator. Controls at the cutting head allows the operator to change the drilling direction and maintain the predetermined path. Plate 1-1 shows a typical direction drilling rig used for utility-sized applications, such as that required for the works at Graffy Wind Farm.

Once the pilot hole reaches the exit pit, the borehole is reamed to the required diameter. The reaming can be done as the pipeline/ducting is pulled in behind it or can be done with a separate pass. The process is illustrated in Plate 1-2.



**Plate 1-1: Typical Utility-Sized Horizontal Drilling Rig**



**Plate 1-2: HDD Process**

---

## 2 HORIZONTAL DIRECTIONAL DRILLING

---

### 2.1 Introduction

Site Investigations have been undertaken on behalf of the Developer, and it was established that ground conditions were suitable for the application of HDD at [INSERT LOCATIONS].

A launch pit will be excavated within the open field above the watercourse, on the [INSERT LOCATION DETAILS], with a minimum set back of 25 metres from the watercourse. The drilling rig will be set up adjacent to the launch pit.

Although it is considered that the ground conditions at the launch pit support good bearing capacities a small amount of clean stone material may be required to level the footings of the drill rig, at this location. The exit pit for the drill head shall be positioned in the [INSERT DETAILS OF THE EXIT PIT], approximately 25 metre set back from the watercourse. The coil of 160mm Outer Diameter HDPE pipe will be positioned and back fed under the watercourse, from this exit pit location.

At the point where the HDD duct passes under the watercourse, the minimum clearance distance shall be 2.5 metres, ensuring no undermining or up thrust force on the watercourse bed, which could result in 'frac-out'.

Once the outer duct installation is complete, the launch and exit pits will be backfilled with selected excavated materials. A precast transition / jointing chamber will be permanently inserted adjacent to the locations of the launch and exit pits, in line with Eirgrid requirements. Reinstatement will be in line with Client's Engineer requirements. Environmental controls are to be put in place, with ongoing monitoring throughout the duration of the works.

Details of this crossing are shown on Drawings [INSERT DRAWING NUMBER] (Location Plan), and [INSERT DRAWING NUMBER] (Cross sectional Detail), copies of which can be found in Appendix A of this document.

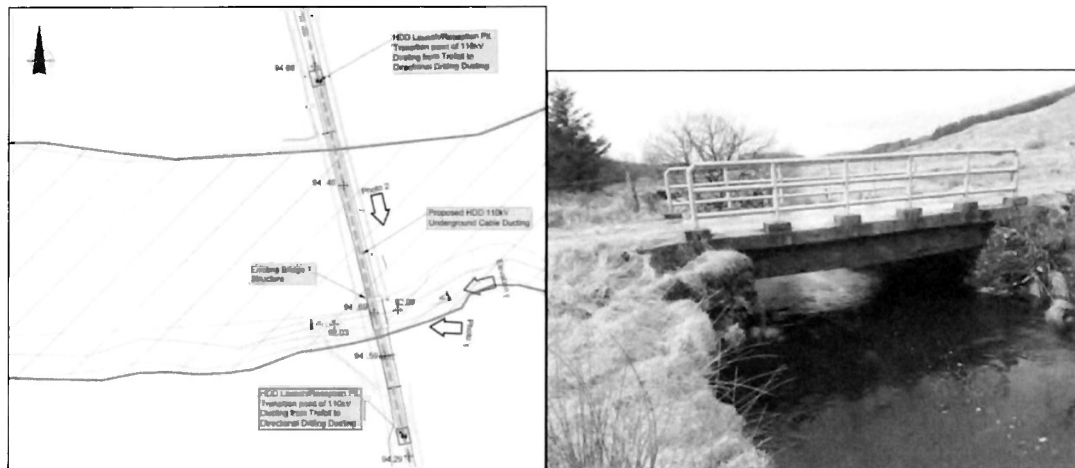
### 2.2 HDD Locations

TLI has inspected the grid route and has identified three locations where HDD is required. These are briefly described below.

#### 2.2.1 Bridge 1 – Coillte Bridge

Bridge 1 is a flat slab bridge within the forestry access road and has insufficient room to install the cable within the bridge deck to EirGrid/ESB specification (450mm cover to top of ducts), the design of the bridge is therefore inadequate to accommodate the proposed works. It is proposed to horizontal directional drill (HDD) approximately 1500mm beneath the waterway and bridge foundations. This depth is based on locating a suitable clay/silt formation for HDD and the required depth may increase subject to geotechnical investigations. The river at this bridge crossing is part of the 'West of Ardara/Maas Road Special Area of Conservation', it is therefore proposed to setup the HDD back from the bridge in order to drill under the SAC and the bridge. The total length of the HDD will be approx. 100m.

It is proposed to align the HDD within the existing access road corridor, however some road widening works may be required to facilitate the HDD. The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber.

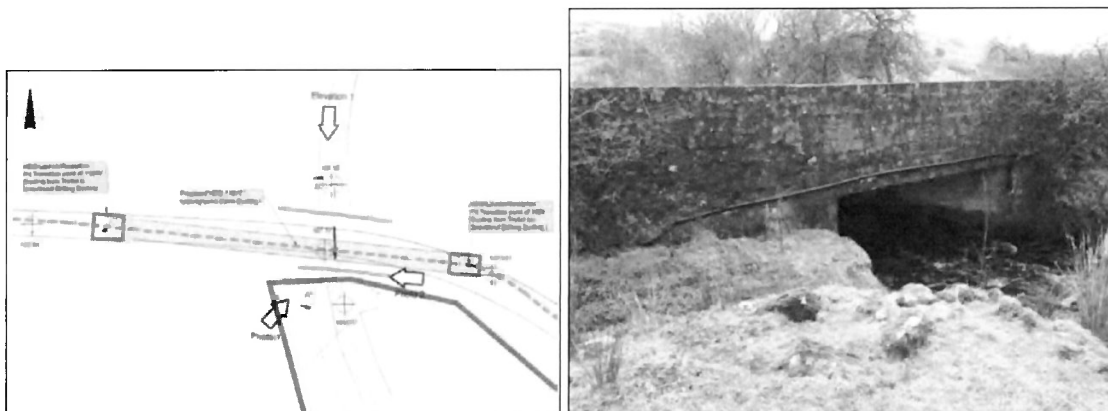


**Plate 2-1: Location of HDD at Coillte Bridge**

### 2.2.2 Bridge 2 – Public Road Bridge

Bridge 2 is a flat slab bridge in the public road and has insufficient room to install the cable within the bridge deck to EirGrid/ESB specification (450mm cover to top of ducts), the design of the bridge is therefore inadequate to accommodate the proposed works. It is proposed to horizontal directional drill (HDD) approximately 1500mm beneath the waterway and bridge foundations. This depth is based on locating a suitable clay/silt formation for HDD and the required depth may increase subject to geotechnical investigations.

The total length of the proposed HDD will be approx. 40m. It is proposed to align the HDD within the existing road corridor, however some road widening works may be required to facilitate the HDD, this may include a temporary works area within the adjacent private lands. The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber



**Plate 2-2: Location of HDD at Coillte Bridge**

### 2.2.3 Culvert No. 27

One culvert has been identified that requires HDD. This consists of 3 No. 500mm HDPE pipe – see Plate 2-3. Because it is wide, normal undercrossing is not feasible.



**Plate 2-3: Culvert No. 27**

## **2.3 Directional Drilling Works**

### **2.3.1 Directional Drill Launch, Reception Pit and Joint Bay Excavation**

**Equipment:**

- 2-3 General Operatives
- 1 Excavator Operator
- 1 no. tracked excavator

**Materials:**

- Geogrid
- Stone for drilling rig platform
- Materials for surface water protection – silt fences, straw bales, sandbags
- Hydrocarbon spill kit

**Method:**

2 no. separate excavations will be made to a depth of approximately 1.5 metres to accommodate the directional drilling launch and exit pits. Spoil arisings will be stored adjacent to the pit locations for reinstatement, at a minimum 25 metre buffer distance to the watercourse. Temporary spoil mound shall have side slopes battered back to 1:1. Slit fencing is to be erected around the base of the temporary mound. Soil will be reinstated on completion of drilling and jointing operations.

### **2.3.2 Storage of Materials – Drilling Operations**

**Equipment:**

- 1 no. Drill Rig
- Drill Head circa 180mm.
- Drill Rods
- Operational control box.
- 1 no. water trailer

**Materials:**

- Coil of 160mm Outer Diameter HDPE Pipe.



**Method:**

All equipment will be stored on or immediately adjacent to the temporary drilling pad location, with a minimum set back distance of 25 metres from the watercourse.

### 2.3.3 Drill Operations

**Equipment:**

- 1 no. Drill Rig
- 1 no. Drill Operator
- 1 no. Labourer
- Drill Head circa 180mm.
- Drill Rods
- Operational control box.

**Materials:**

- Coil of 160mm Outer Diameter HDPE Pipe.
- Biodegradable drilling fluid – see MSDS attached.

**Method:**

The drill head will be placed in the open excavation (launch pit) and it will be guided in by the operator for the first 1-2 metres.

A series of drill rods will be connected to the head as it travels further along the shaft.

The drill position is always known to the operator and the drill can be manoeuvred in 3 planes / axis.

A drilling lubricant will be required this will be delivered directly to the drill head. This will be a biodegradable non-toxic slurry mixture or equivalent.

Once the conduit is completed, the drill head is exposed at the exit pit and removed. The drill rods are connected to the duct pipe and the drill is reversed pulling the pipe back through the conduit.

### 2.3.4 Managing Arisings from Drill Operations

**Equipment:**

- 1 no. General Operative
- 1 no. pump
- 1 no. diesel generator

**Materials:**

- 1 no. mobile bunded storage tank

**Method:**

It is anticipated that 4m<sup>3</sup> of spoil will be excavated for each 100-metre section of pipe. This spoil will be largely subsoil material.

A drilling lubricant will be required which will be delivered directly to the drill head. This will be a biodegradable non-toxic slurry mixture.

The majority of the arisings will exit the launch pit within the slurry mixture. It is conservatively assumed that 1 part slurry will be required for every 1 part of drill spoil. Therefore, for each 100-metre section of pipe approximately 8m<sup>3</sup> of arising will need to be catered for.

A mobile bunded tank will be located next to the launch pit into which the arisings will be pumped. This will be stored outside of the 25-metre watercourse buffer zone. Arisings will be taken offsite for disposal.

## 2.4 Design Measures

The following design measures will be implemented during the electrical connection works:

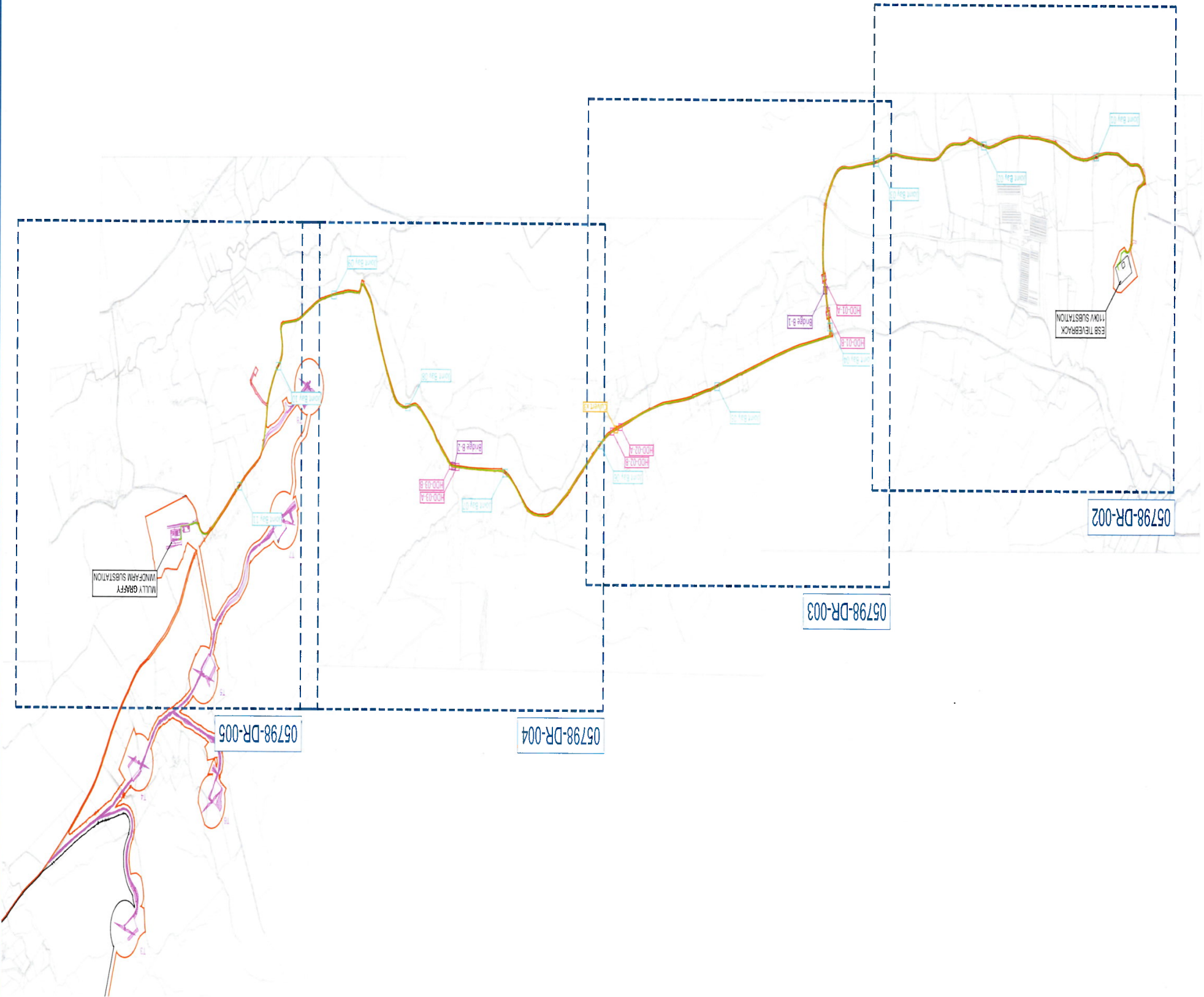
1. No in-stream works will be permitted.
2. Works shall not take place at periods of high rainfall and shall be scaled back or suspended if heavy rain is forecast.
3. A floating hydrocarbon boom and spill kit will be employed.
4. Plant will travel slowly across bare ground at a maximum of 5km/hr. If truck rutting is observed, then bog mats or rolling road will be employed to prevent ground damage on the access routes to watercourse crossings on both banks. This will prevent solids reaching a watercourse from damaged access tracks.
5. Silt fencing will be erected at a setback distance of 5m from the joint bays during excavation. Silt fences will also be erected along both banks of the river downslope of the works.
6. Any excess construction material shall be removed from the works areas and disposed of in a fully licensed landfill.
7. No re-fuelling of mobile machinery will take place on site or within 50 metres of any watercourse. The drilling rig will be refuelled at the launch pit; it is not practical to move it for refuelling.
8. All construction workers will be given a toolbox talk addressing the environmental topics concerning the drilling prior to commencement of construction.
9. In relation to the trenchless installation of the cable, silt fences will be erected down slope of the works area. As noted, the works area will be a minimum of 25 metre back from the watercourse and within this zone, the natural vegetative cover will not be altered and no construction traffic will use the area so that the natural filtering capacity of the vegetation if required will remain intact.
10. Biodegradable, non-toxic drilling fluid will be used.
11. To minimise any risk of breakout when actively drilling the following measures will be taken:
  - a. Drilling fluid volumes and pressures will be constantly monitored to detect any possible leaking of drilling fluid into the surrounding geology that might lead to breakout.
  - b. The watercourse will be monitored during drilling to immediately identify a frac-out, should one occur. In the event of a frac-out, drilling would immediately cease.
  - c. If drilling fluid losses are identified, then drilling drilling fluid pumping will be stopped immediately.
  - d. An attempt can then be made to seal the affected zone and continue drilling. This can be done by either using a higher viscosity drilling fluid or by addition of an environmentally suitable stop-loss additive.
12. By using a competent HDD contractor and following the correct procedures the possibility of any 'frac-out' into the watercourse during the HDD process is therefore negligible.

## 2.5 Monitoring

All works undertaken including preparatory works will be carried out under supervision of a suitably qualified Environmental Engineer / Ecologist. Surface water quality monitoring will be carried out by the ecological clerk of works (ECoW) appointed for the project and in accordance with the Surface Water Quality Monitoring Plan which has been prepared for the project.



Overall Site Layout Plan



Map Scale: Prime Meridian Vector  
ITM Co-ords From Corner: X: 1 = 52714 80030  
Ortho: Survey Ireland Licence No: EN 007271  
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PROJECT

Mully Graffy Windfarm  
110kV Grid Connection

CUSTOMER

Culiffeach Teoranta

CONSULTANTS

NOTES

- This drawing is to be used only for the purpose of the planning application and is subject to detailed design.
- Features of underground cables and overhead lines and their locations may vary depending on the terrain.
- Features of the terrain and existing structures are to be agreed with the relevant authorities.
- Other services may be encountered on the route.
- Features of the terrain and existing structures are to be agreed with the relevant authorities.
- Features of the terrain and existing structures are to be agreed with the relevant authorities.

LEGEND

- Proposed Planning Boundary
- Mully Windfarm Interconnection

KEY PLAN

DATE	DESCRIPTION
15/03/21	Issued for Planning

ISSUE/REVISION

NO.	DATE	DESCRIPTION
1	15/03/21	Issued for Planning

PROJECT NUMBER

05-798

SHEET TITLE

Overall Site Layout Plan

SHEET NUMBER

05798-DR-001



**ATTACHMENT 7**

**CONSTURCTION METHODOLOGY  
GRAFFY WIND FARM - 110kV UUNDERGROUND CABLE**



# CONSTRUCTION METHODOLOGY

**Mull y Graffy Win dfarm - 11 0kV Underground Cable**

Document No: 05798-R01-01



Revision:	Author:	Checked:	Date:	Notes:
00	SK	RG	06.03.21	<i>Issued for Client Review</i>
01	SK	RG	16.03.21	<i>Updated following Client Review</i>

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## 1.0 Introduction

The purpose of this document is to outline and explain the construction techniques and methodologies which will be implemented during construction of the proposed Mully Graffy Wind Farm 110kV underground cable grid connection to the existing ESB Tievebrack 110kV Substation in Co. Donegal. The grid connection will consist entirely of underground cabling (UGC) with the majority of the UGC to be installed within the public road network.

The UGC works will consist of the installation of 5 No. ducts in an excavated trench to accommodate 3 No. power cables, and 1 No. fibre communications cable to allow communications between the Mully Graffy Wind Farm Substation and Tievebrack 110kV substation.

This document is intended to be used as an aid to understand the methodologies to be employed during construction and should be read in conjunction with all other specialist reports which accompany the Planning Application. In addition, this document is in outline form only and will be revised and updated prior to the commencement of any construction activities, detailed Method Statements will be prepared in respect of each aspect of the proposed development.

## 2.0 Proposed 110kV Underground Cable Route

The proposed UGC route is approximately 7.3km in length and runs in a easterly direction from the existing Tievebrack 110kV Substation to the proposed Mully Graffy Wind Farm substation location utilizing existing access tracks, forestry access tracks, the public road network, and some section of private land.

The exact location of the UGC within the proposed site boundary is subject to minor modification following a further detailed assessment to be undertaken prior to construction and following consultation with Donegal County Council and all other relevant stakeholders, having regard to all environmental protection measures outlined in the planning application and accompanying technical reports.

Below (**Figure 1**) which outlines the proposed UGC route, with each section of the route being formulated in detail within Table 1.

This proposed grid connection route is shown as an Overall Site Layout Plan in Drawing No. 05798-DR-001.

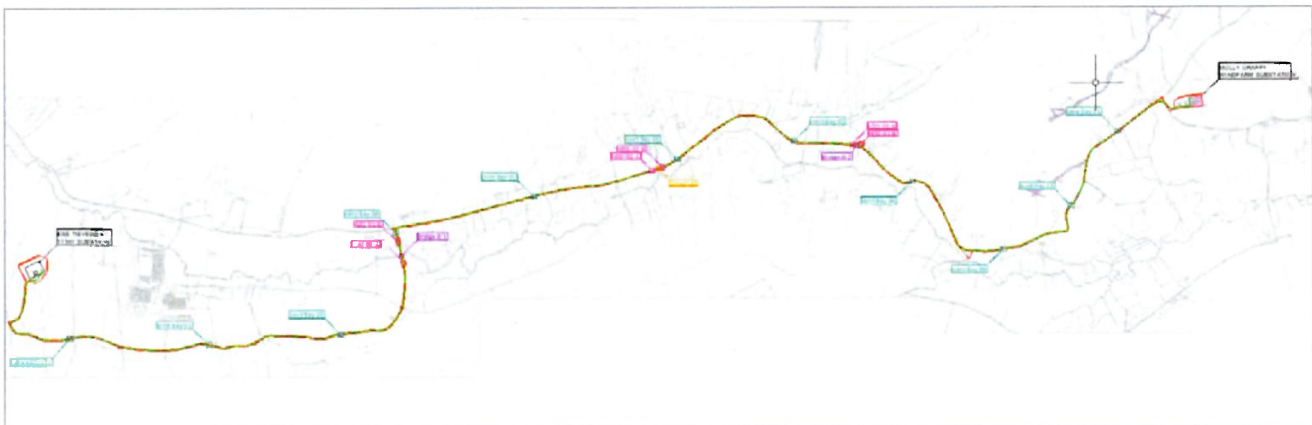


Figure 1 – Grid Connection Route Location

**Table 1** of this report summaries the route location features of the underground cable connection and proposed route.

<b>Table 1 – Approximate Route Location of Preliminary Design:</b>		
<b>Substation/Forestry Access Roads</b>	<b>Public Roads</b>	<b>Private Land / WF</b>
2,675m	4,429m	210m

**Table 1: Tievebrack 110kV Substation to WF Substation – UGC Route Location Summary**

Table 2 below separates the UGC route into a number of sections and describes the specific construction requirements of each individual section and identifies access routes to the work areas. All plant and equipment employed on the proposed works will be subject to good site organisation and hygiene, particularly during construction activities.

<b>Table 2 - Summary of 110kV Underground Cable Route</b>	
<b>Section</b>	<b>Description</b>
<b>Section 1</b> 2,675m	<p><b>UGC from Tievebrack 110kV Substation to L2593-2 Local Road</b></p> <p>The proposed underground cable route exits Tievebrack 110kV Substation and follows the existing access road from the substation in a easterly direction to the junction with the L2593-2 local road. It is proposed to install the ducting within the existing access road corridor for the entirety of this section.</p> <p><u>Section 1 Features:</u></p> <ul style="list-style-type: none"> <li> <b>4 Joint Bays and associated chambers</b>            Joint bays will be located below ground and finished/reinstated to the required landowner specification. Each joint bay will have an associated communication chamber and link box which will have a surface access hatch matching existing ground levels. The final position of the joint bays, link boxes and comms chamber will need to be agreed with ESB as part of the design approval process. It is proposed to install all joint bays within the corridor of the existing access road. Track widening works may be required at some locations to facilitate the joint bays.         </li> <li> <b>13 Culvert Crossings</b>            The UGC will cross existing culverts using an undercrossing or overcrossing method which will be selected based on the cover available above the culvert. Culvert crossings have been designed in-line with the EirGrid specifications. Where it is not possible to cross under an existing culvert while maintaining the culvert in place, the culvert may be replaced.         </li> </ul>

**Table 2 - Summary of 110kV Underground Cable Route**

Section	Description
	<ul style="list-style-type: none"> <li><b>1 HDD Crossing</b> There is one flat slab bridge in this section of the route (Bridge 1) which does not have sufficient cover available to install the cable within the bridge deck. It will therefore be necessary to horizontal directional drill (HDD) under this bridge and watercourse. The river at this bridge crossing is part of the 'West of Ardara/Maas Road Special Area of Conservation', it is therefore proposed to setup the HDD back from the bridge in order to drill under the SAC and the bridge. The total length of the HDD will be approx. 100m.</li> </ul> <p>It is proposed to align the HDD within the existing access road corridor, however some road widening works may be required to facilitate the HDD. The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber.</p>
<b>Section 2</b> 4,639m	<p><b>UGC within the Road Network to the Windfarm Substation</b></p> <p>From section 1 the UGC merges onto the L2593-2 local road which it follows in a easterly direction, after passing Graffy Bridge the UGC continues east in the L6743-3 local road. The final section of the UGC leaves the L6743-3 local road and merges onto the L20230-0 local road which it follows south towards the proposed windfarm substation entrance.</p> <p><u>Section 1 Features:</u></p> <ul style="list-style-type: none"> <li><b>7 Joint Bays and associated chambers</b> Joint bays will be located below ground and finished/reinstated to the required Donegal specification for the roadway. All reinstatement works will be carried out in-line with the 'Guidelines for Managing Openings in Public Roads – 2017'. Each joint bay will have an associated communication chamber and link box which will have a surface access hatch matching road/ground levels. The final position of the joint bays, link boxes and comms chamber will need to be agreed with ESB as part of the design approval process. It is proposed to install all joint bays within the corridor of the existing carriageway, some chambers may be installed in the road verge. Road widening works may be required at some locations to facilitate the joint bays.</li> <li><b>37 Culvert Crossings</b> The UGC will cross existing culverts using an undercrossing or overcrossing method which will be selected based on the cover available above the culvert.</li> </ul>



**Table 2 - Summary of 110kV Underground Cable Route**

Section	Description
	<p>Culvert crossings have been designed in-line with the EirGrid specifications. Where it is not possible to cross under an existing culvert while maintaining the culvert in place, the culvert may be replaced. All reinstatement works will be carried out in-line with the 'Guidelines for Managing Openings in Public Roads – 2017'.</p> <ul style="list-style-type: none"> <li>2 HDD Crossings</li> </ul> <p><u>Culvert 27 (Triple Culvert):</u> Culvert 27 is made up of three twin-wall pipes installed adjacent to each other, which do not have sufficient cover available to install the cable over the culverts. There is a relatively large water flow in this watercourse and it is therefore proposed to HDD under the culverts. It is proposed to complete the HDD within the exiting road corridor, the total length of the proposed HDD will be approx. 50m.</p> <p>The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber.</p> <p><u>Bridge 2:</u> There is one flat slab bridge in this section of the route (Bridge 2) which does not have sufficient cover available to install the cable within the bridge deck. It will therefore be necessary to HDD under this bridge and watercourse. It is proposed to complete the HDD within the exiting road corridor, the total length of the proposed HDD will be approx. 40m.</p> <p>It is proposed to align the HDD within the existing road corridor, however some road widening works may be required to facilitate the HDD, this may include a temporary works area within the adjacent private lands. The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber.</p>

Refer to Figure 1 and to the planning drawings submitted for location details.

Note: The precise location of the proposed cable route within the planning application boundary may be subject to change as result of existing services/utility locations, ground conditions and any environmental constraints.

### 3.0 Preliminary Site Investigations

It would be proposed to carry out Preliminary site investigations along the cable route prior to construction to confirm design assumptions.

The following items may be carried out for the proposed cable route:

- Slit trenches at locations of service crossings (Full road/track width).
- Trial holes along the route to ascertain ground conditions and thermal resistivity of the soil.
- Trial holes at all joint bay positions to ascertain ground conditions and thermal resistivity of the soil.
- Boreholes at proposed HDD locations to ascertain ground conditions.

**Traffic Management** – Single lane Closure with Stop/Go system in place as required.

**Equipment:**

- 4x4 vehicle
- Concrete vibrator
- Wheeled dumper
- Soil compactor
- 360° tracked excavator (only rubber tracked machines will be allowed on public roads)

### 4.0 Access Routes to Work Area

The majority of the proposed underground cable will be installed within the public road network and existing access tracks and will therefore be accessed via the existing road network and access points. Where the cable route is located on private lands, contractor(s) will be required to utilise the local public road network in the vicinity of the work area and from there utilise existing access points, where appropriate.

A detailed Traffic Management Plan will be prepared, and agreed with Donegal County Council, prior to the commencement of construction. Some work areas will require a road closure where it is not possible to safely implement a Stop/Go system. Where road closures are necessary, a suitable diversion will be implemented using appropriate signage, following consultation with Donegal County Council.

Careful and considered local consultation will be carried out, to minimise the amount of disturbance caused during works. Prior to the commencement of construction, the contractor will assess all access routes and determine any additional access requirements which will be incorporated as part of the method statement. All plant and equipment employed during the proposed works (e.g. diggers, tracked machines, footwear etc.) will be inspected prior to arrival on site and on leaving site and cleaned where necessary to prevent the spread of invasive aquatic / riparian species.

## 5.0 Traffic Management

Traffic management and road signage will be in accordance with the Department of Transport: Traffic Signs Manual - Chapter 8: Temporary Traffic Measures and Signs for Road Works and in agreement with Donegal County Council. All work on public roads will be subject to the approval of a road opening license application. The contractor will prepare detailed traffic management plans for inclusion as part of the road opening applications. Where road widths allow, the UGC installation works will allow for one side of the road to be open to traffic at all times by means of a 'Stop/Go' type traffic management system, where a minimum 2.5m roadway will be maintained at all times. Where it is not possible to implement a 'Stop/Go' system a full road closure will be required. Temporary traffic signals will be implemented to allow road users safely pass through the works area by channelling them onto the open side of the road. Typically, the UGC will be installed in 100m sections, and no more than 100m will be excavated without the majority of the previous section being reinstated.

All construction vehicles will be parked within the works area so as not to cause additional obstruction or inconvenience to road users or residents. The traffic signals will be in place prior to the works commencing and will remain in place until after the works are completed. The public road will be checked regularly and maintained free of mud and debris. Road sweeping will be carried out as appropriate to ensure construction traffic does not adversely affect the local road condition.

In the event of emergency; steel plates, which will be available on site, can be put in place across the excavation to allow traffic to flow on both sides of the road.

All traffic management measures will comply with those outlined in the accompanying Traffic Management Report and will be incorporated into a detailed Traffic Management Plan to be prepared, in consultation with Donegal County Council, prior to the commencement of UGC construction.

## 6.0 Road Opening Licence

The proposed grid connection works will require a road opening licence under Section 254 of the Planning and Development Act 2000-2015 from Donegal County Council. A Traffic Management Plan (TMP) will be agreed with Donegal County Council prior to the commencement of the development. The TMP will outline the location of traffic management signage, together with the location of any necessary road closures and the routing of appropriate diversions. Where diversions are required, these will be agreed with Donegal County Council in advance of the preparation of the TMP.

## 7.0 Construction Hours

Standard working hours for construction will be 8.00am to 8.00pm Monday to Friday and 8.00am to 6.00pm on Saturday (if required), with no works on Sundays or Bank Holidays except in exceptional circumstances or in the event of an emergency. All site personnel will be required to wear project notification labelling on high visibility vests and head protection so that they can be easily identified by all workers on-site.

## 8.0 UGC Construction Methodology

The proposed UGC will consist of 3 No. 125mm diameter HDPE power cable ducts and 2 No. 125mm diameter HDPE communications duct to be installed in an excavated trench, typically 600mm wide by 1,250mm deep, with variations on this design to adapt to bridge crossings, culvert crossings, service crossings and watercourse crossings, etc. The power cable ducts will accommodate 1 No. power cables per duct. The communications duct will accommodate a fibre cable to allow communications between the Mully Graffy Wind Farm substation and Tievebrack 110kV substation. The ducts will be installed and the trench reinstated in accordance with the landowner or Donegal County Council specifications, the electrical cabling/fibre cable is then pulled through the installed ducts in approximately 450-700m sections. Construction methodologies implemented and materials used will ensure that the UGC is installed in accordance with the requirements and specifications of ESB.

### 8.1 Trenching Methodology

The following section outlines the methodology to be followed during trenching works:-

- The Contractor, and their appointed Site Manager, will prepare a targeted Method Statement concisely outlining the construction methodology and incorporating all mitigation and control measures included within the EIAR and as required by planning conditions where relevant;
- All existing underground services along the UGC route shall be confirmed prior to the commencement of construction works;
- At watercourse crossings, the contractor will be required to adhere to the environmental control measures outlined within the EIAR, the detailed Construction Environmental Management Plan (CEMP) and best practice construction methodologies;
- Where the cable route intersects with culverts, the culvert will remain in place (where possible) and the ducting will be installed either above or below the culvert to provide minimum separation distances in accordance with ESB and Irish Water specifications;
- In the event that culverts require removal for ducting installation, it is proposed that a suitable method of damming the water source and pumping the water around the work area would be set out in a method statement and agreed with the relevant stakeholders. Once the ducts are installed the culvert will be reinstated to match existing levels and dimensions. If works of this nature are required, the contractor will liaise with Inland Fisheries Ireland in advance of works;
- Traffic management measures will be implemented in accordance with those included in the EIAR, and a detailed Traffic Management Plan will be prepared and agreed with Donegal County Council;
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height. Stockpiles will be located a minimum of 50m from surface water features and all stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECOW);
- Excavated material shall be employed to backfill the trench where appropriate and any surplus material will be transported off site and disposed of at a fully authorised soil recovery site;
- Any earthen (sod) banks to be excavated will be carefully opened with the surface sods being stored separately and maintained for use during reinstatement;

- The excavated trench will be dewatered if required, from a sump installed within the low section of the opened trench. Where dewatering is required, dirty water will be fully and appropriately attenuated, through silt bags, before being appropriately discharged to vegetation or surface water drainage feature;
- Where required, grass will be reinstated by either seeding or by replacing with grass turves;
- No more than a 100m section of trench will be opened at any one time. The second 100m will only be excavated once the majority of reinstatement has been completed on the first;
- The excavation, installation and reinstatement process will take on average of 1 no. day to complete a 100m section;
- Where the cable is being installed in a roadway, temporary reinstatement may be provided to allow larger sections of road to be permanently reinstated together;
- Following the installation of ducting, pulling the cable will take approximately 1 no. day between each joint bay, with the jointing of cables taking approximately 1 week per joint bay location.



**Figure 2 - Typical 110kV Underground Duct Installation**

## 8.2 Ducting Installation Methodology

For the trenching and ducting works the following step by step methodology will apply for the standard trefoil trench design:

1. Grade, smooth and trim trench floor when the required 1,250mm depth and 600mm width have been obtained.
2. Place bedding layer of Cement Bound Granular Mixture B (CBGM B) material in accordance with the specification and compact it so that the compacted thickness is as per the drawings.
3. Lay the bottom row of ducts in trefoil formation as detailed on the design drawings. Use spacers as appropriate to establish horizontal duct spacing. Fit a secure cap / bung to the end of each duct run to prevent the ingress of dirt or water.
4. Carefully surround and cover ducts with CBGM B in accordance with the design drawings and specifications and thoroughly compact without damaging ducts.



- 
- 75mm compacted depth of AC 20 HDM  
bin 70/100 rec to CL 906
- Surface dressing to  
CL 919/CL 921
- Joints Sealed  
[See Note 6]
- ROAD LEVEL
- 75mm depth or match existing depth  
where it is greater than 75mm
- 200mm  
(Min)
- 300  
Min
- 200mm  
min
- yellow marker warning tape. Must be full width of  
trench. ESDN approved material only  
ESB Code 2955092
- CL 804/808 compacted in accordance with CL 802  
(Permanent Reinstatement)  
or  
Subject to the agreement of the Road Authority, CBG  
B to SRW Series 600  
[See Note 8]  
1 x Red Cable Marker Strip 400mm Wide x 2.5mm  
ESB Code 2955103
- CL 804/808 compacted in accordance with CL 802  
(Permanent Reinstatement)  
or  
Subject to the agreement of the Road Authority, CBG  
B to SRW Series 600  
[See Note 8]  
1 x Red Cable Marker Strip 400mm Wide x 2.5mm  
ESB Code 2955103
- 1 x Red Cable Marker Strip 400mm Wide x 2.5mm  
ESB Code 2955103
- 12mm DIA. pull rope in all ducts
- Ducts laid in CBG B to CL 822/Compacted to CL  
813.10 and Table 6/4 of T11 Specification  
Roadworks 15N/mm<sup>2</sup> after 7 days
- 1750
- 950 (Min)
- 750 (Min)
- 75
- 100
- 150
- 100
- A1
- A2
- 75
- 75
- B2
- B1
- B3
- 60
- 600
- A = 125mm Outer Diameter HDPE ESB Approved Duct. SDR=17.6 [ESB Code 9317552]  
B = 125mm Outer Diameter HDPE ESB Approved Duct. SDR=17.6 [ESB Code 9317552]
- Typical Section Through Permanent Reinstatement of Longitudinal Opening in Dressed Rural Unbound Roadway**

12



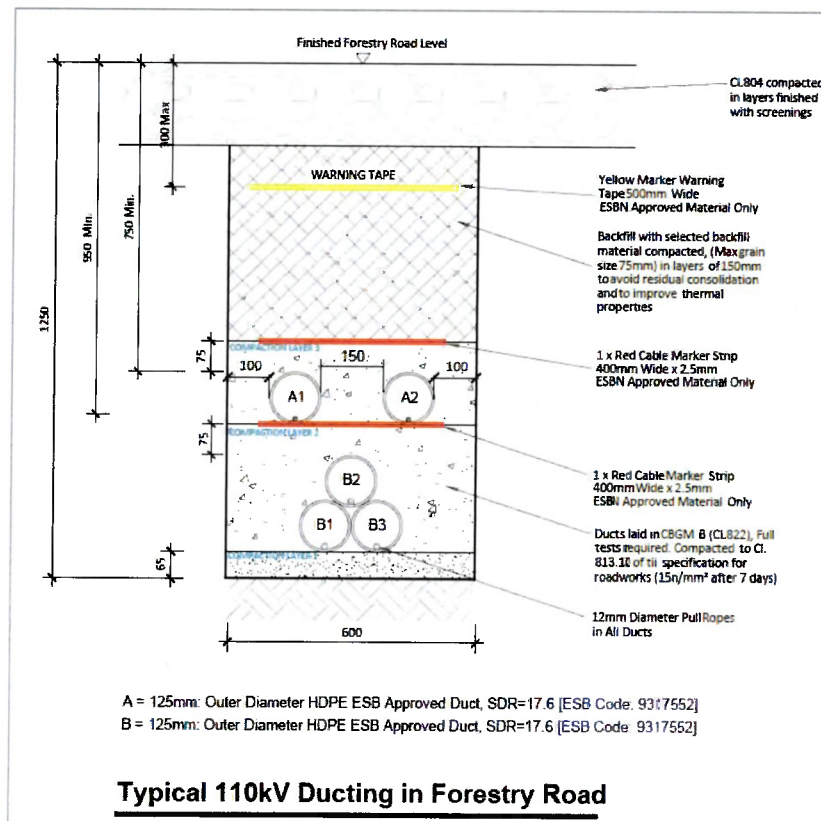


Figure 4 - Typical Trench in Forestry Road Section

#### Equipment:

- 2-3 General Operatives;
- 1 Excavator Operator;
- 1 no. tracked excavator (only rubber tracked machines will be allowed on public roads);
- 1 no. dumper or tractor and trailer.

#### Materials:

- Sand for pipe bedding;
- Ready-mix Concrete where necessary (delivered to site);
- Trench backfilling material (excavated material and aggregates) to relevant specifications;
- 125mm diameter HDPE ducting;
- Temporary Surface Reinstatement Materials

#### 8.2.1 UGC Installation on Public Road

The majority of the 110kV route is located within public road carriageways and where applicable the trench will be installed in the non-trafficked strip between the wheel marks on the road. The cable will be micro-sited based on the presence of existing utilities and the nature of the road and the adjoining terrain. It is preferable to excavate a trench within the middle of the lane, or the middle of the roadway to reduce load on the cable.

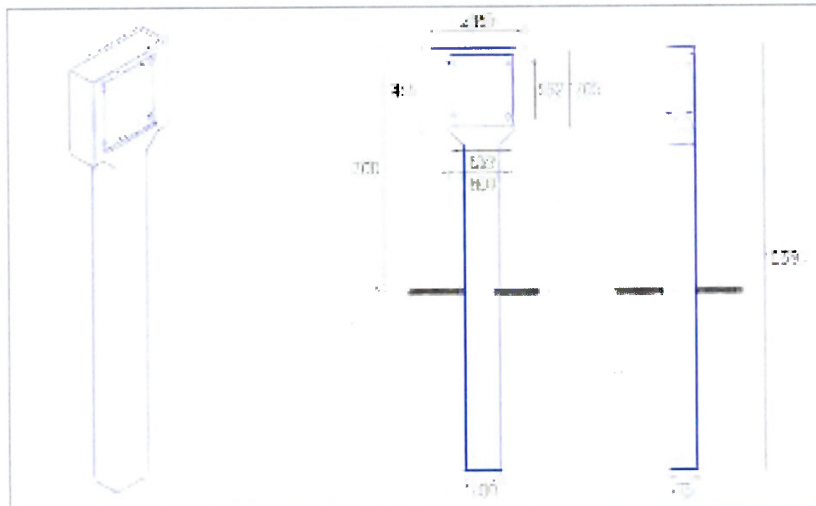
### 8.2.2 UGC Installation on Forestry Tracks

Where the cable is installed in forestry tracks the location where the cable is laid will depend on several factors such as; width of track, bends along the track and crossings. Where the track needs to be widened, stone will be brought in to build up the area to the same level of the track. The excess material from the track will be used elsewhere on reinstatement works.

### 8.3 Surface Cable Markers & Marker Posts

Surface cable markers will be placed along the route where cable depth is unavoidably shallow, due to constraints such as existing services, to indicate the precise location of the UGC. These markers will be metallic plates in accordance with ESB standards.

Marker posts will be used on non-roadway routes to delineate the cable route and joint bay positions. Corrosion proof aluminium triangular danger sign, with 700mm base, and with centred lightning symbol, on engineering grade fluorescent yellow background shall be installed in adequately sized concrete foundations. Marker post shall also be placed in the event that burial depth is not standard. Siting of marker posts to be agreed with ESB as part of the detailed design process (*Figure 5*).



**Figure 5 - Typical ESB Marker Posts Example**

### 8.4 Managing Excess Material from Trench

All excavated material will be temporarily stored adjacent to the trench prior to re-use in the trench reinstatement (where applicable). Stockpiles will be restricted to less than 2m in height. Excess material and excavated tar, etc. will be transported off site by an appropriately authorised waste collector and disposed of at an appropriately licenced waste facility.

### 8.5 Storage of Plant and Machinery

All plant, machinery and equipment will be stored on site within the UGC works area or within the temporary construction compounds to be located within the Mully Graffy Windfarm. Oils and fuels will be stored in an appropriately bunded area within the temporary construction compounds.

## 8.6 Joint Bays and Associated Chambers

Joint Bays are to be installed approximately every 450m - 700m along the UGC route to facilitate the jointing of 2 No. lengths of UGC. Joint Bays are typically 2.5m x 6m x 1.75m pre-cast concrete structures installed below finished ground level. Joint Bays will be located in the non-wheel bearing strip of roadways, however given the narrow profile of local roads this may not always be possible.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between the proposed Mully Graffy Wind Farm substation and the existing 110kV substation at Tievebrack. Earth Sheath Link Chambers are also required at every joint bay along the cable route. Earth Sheath Links are used for earthing and bonding cable sheaths of underground power cables, so that the circulating currents and induced voltages are eliminated or reduced. Earth Sheath Link Chambers and Communication Chambers are located in close proximity to Joint Bays. Earth Sheath Link Chambers and Communication Chambers will be pre-cast concrete structures with an access cover at finished surface level.

The precise siting of all Joint Bays, Earth Sheath Link Chambers and Communication Chambers is subject to approval by ESNB. Marker posts will be used on non-roadway routes to delineate the duct route and joint bay positions.

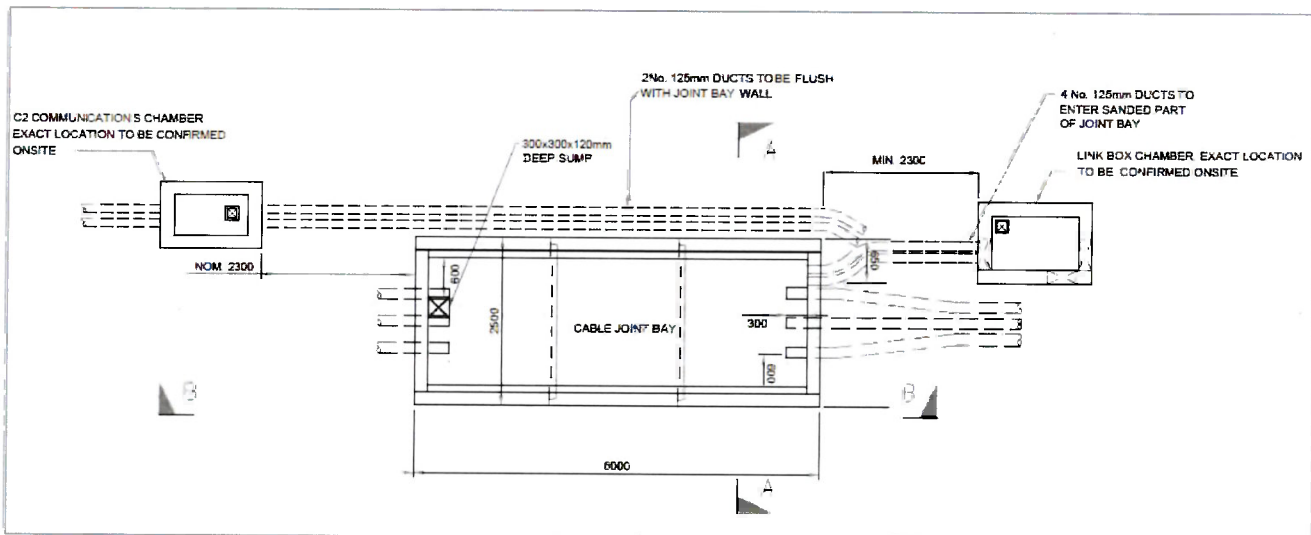


Figure 6 – Typical 110kV Joint Bay Plan Layout

## 8.7 Joint Bay Construction and Cable Installation

Before starting construction, the area around the edge of the joint bay which will be used by heavy vehicles will be surfaced with a terram cover (if required) and stone aggregate to minimise ground damage. Any roadside drains within the temporary works area will be culverted and check dams made from stone or sandbags covered with terram will be inserted upstream and downstream of these culverts to intercept any solids generated during the insertion or which wash out during the works. If the ground slopes from the working area toward a watercourse or if there is evidence of solids washing off the works area toward nearby watercourses or drains, a silt fence with straw bales, will be interposed between the works area and the watercourse.

All excavated material will be stored near the excavations and reused for reinstatement works. Any soil required for reinstatement that will be temporarily stockpiled on site will be placed at least 15m back from

the nearest watercourse on level ground and will be ringed at the base by silt fencing and be regularly monitored by a designated competent person for signs of solids escape. In which case an additional line of silt fencing with straw bales will be added in line with the relevant environmental control measures.

If the joint bay needs to be dewatered, this will be pumped to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the dewatering process to comply with the environmental control measures.

The following steps outline the methodology for joint bay construction and reinstatement:

1. The contractor will excavate a pit for joint bay construction, including for a sump in one corner.
2. Grade and smooth floor; then lay a 50mm depth of thick sand for pre-cast concrete construction on 200mm thick Clause 804 granular material.
3. Place pre-cast concrete sections on sand bedding. (*Figure 7*)



**Figure 7 - Typical joint bay under construction (pre-cast)**

4. Where joint bays are located under the road surface the joint bay will be backfilled with compacted layers of Clause 804 and the road surface temporarily reinstated as specified by the local authority.
5. Precast concrete covers may be used as temporary reinstatement of joint bays at off road locations. These covers are placed over the constructed joint bay and are then removed at the cable installation stage of the project.
6. At a later date to facilitate cable installation and jointing, reinstate traffic management signage, secure individual sites, re-excavate three consecutive joint bays and store excavated material for reuse.
7. The cable is supplied in pre-ordered lengths on large cable drums (*Figure 8*). Installing “one section” of cable normally involves pulling three individual conductors into three separate ducts. The cable pulling winch must be set at a predetermined cut off pulling tension as specified by the designer. The cable will be connected to the winch rope using approved suitably sized and rated cable pulling stocking and swivel or the pulling head fitted by the cable manufacturer. A sponge may also be secured to the winch rope to disperse lubricant through the duct. Lubrication is also applied to the cable in the joint bay before it enters the duct.





**Figure 8 - HV cable pulling procedure (Typical drum set-up)**

8. Once the “two sections” of cable (total of 6 conductors) are pulled into the joint bay, a jointing container is positioned over the joint bay and the cable jointing procedure is carried out in this controlled environment. (Figure 9)



**Figure 9 - HV cable jointing container**

9. Following the completion of jointing and duct sealing works in the joint bay, place and thoroughly compact cement-bound sand in approximately 200mm layers to the level of the cable joint base to provide vertical support. Install additional layers of cement-bound sand and compact each layer until the cement-bound sand is level with the top of the joint. Install an additional 100mm cement-bound sand layer. Install cable protection strip. Backfill with cement-bound sand to a depth of 250mm below surface and carry out permanent reinstatement including placement of warning tape at 400mm depth below finished surface.

**Equipment:**

- 2-3 General Operatives
- 1 Excavator Operator
- 360° tracked excavator (13 ton normally, 22 ton for rock breaker)
- 1 no. tracked dumper or tractor and trailer

**Materials:**

- Sand for pipe bedding

- Clause 804 Material
- 125mm diameter HDPE ducting;
- Precast Joint Bay Chamber Units
- Link Boxes & C2 Comms Chambers (precast)

## 9.0 Horizontal Direction Drilling (HDD)

Horizontal Direction Drilling (HDD) is a method of drilling under obstacles such as bridges, railways, water courses, etc. in order to install cable ducts under the obstacle. This method is employed where installing the ducts using standard installation methods is not possible. There are two bridges on this UGC route which will require HDD due to there being insufficient cover and depth in the bridge to cross within the bridge deck. There is also a triple culvert which will require HDD due to the large flow of water through the culverts.

Detailed site investigation works will be completed at each of the proposed HDD locations to confirm ground conditions. This information will be obtained by completing boreholes at each location, the results from the borehole data will be used to design the HDD and proposed crossing depth. A bespoke design will be prepared for each HDD crossing by a specialist drilling contractor. As part of each HDD design an Outline Frac-Out Mitigation Plan will be prepared by the contractor which will detail the measures which will be implemented to prevent, contain, control and stop any potential frac-out. A sample 'HDD outline Frac-Out Mitigation Plan' is shown in Appendix B of this report.

The proposed drilling methodology is as follows:

1. A works area of circa. 40m<sup>2</sup> will be fenced on both sides of the river crossing,
2. The drilling rig and fluid handling units will be located on one side of the bridge and will be stored on double bunded 0.5mm PVC bunds which will contain any fluid spills and storm water run-off.
3. Entry and exit pits (1m x 1m x 2m) will be excavated using an excavator, the excavated material will be temporarily stored within the works area and used for reinstatement or disposed of to a licensed facility.
4. A 1m x 1m x 2m steel box will be placed in each pit. This box will contain any drilling fluid returns from the borehole.
5. The drill bit will be set up by a surveyor, and the driller will push the drill string into the ground and will steer the bore path under the watercourse.
6. A surveyor will monitor drilling works to ensure that the modelled stresses and collapse pressures are not exceeded.
7. The drilled cuttings will be flushed back by drilling fluid to the steel box in the entry pit.
8. Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit pit and will pull a drill pipe back through the bore to the entry side.
9. Once all bore holes have been completed, a towing assembly will be set up on the drill and this will pull the ducting into the bore.
10. The steel boxes will be removed, with the drilling fluid disposed of to a licensed facility.
11. The ducts will be cleaned and proven and their installed location surveyed.
12. The entry and exit pits will be reinstated to the specification of ESB Networks and Donegal County Council.



13. A transition coupler or transition chamber will be installed at either side of the bridge/ following the horizontal directional drilling as per ESB requirements, this will join the HDD ducts to the standard ducts.

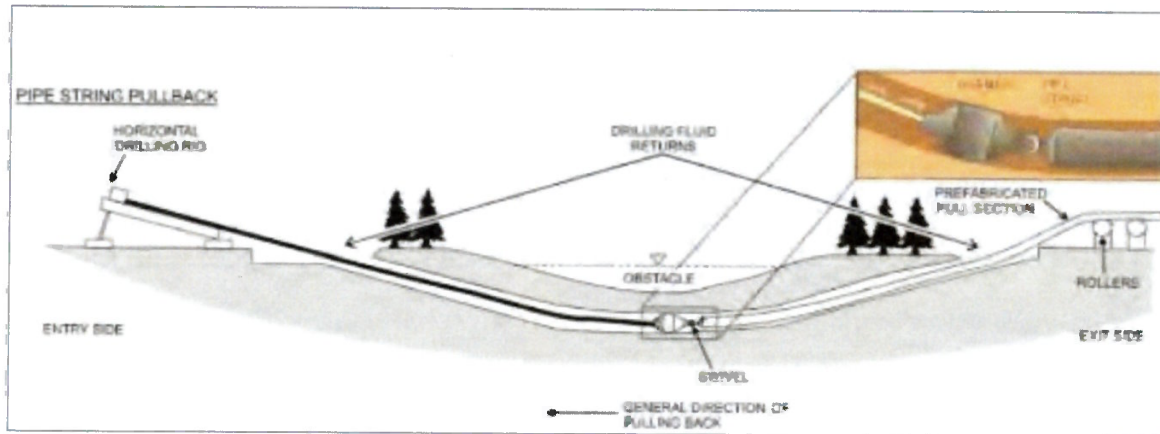


Figure 10 - Typical HDD Installation

## 10.0 Watercourse Damming and Reinstatement Methodology

Sections of the proposed trenching and ducting will involve instream works at numerous culvert crossing locations in order to install cabling. To facilitate the works, these watercourses will be dammed and the water diverted over or around the works using either a flume pipe or a diversion channel. Following the completion of works at the watercourse, the dam will be removed and the watercourse reinstated.

**Duration:** 1-2 Days per location

### Personnel, Machinery & Equipment:

- 2-3 operatives
- Wheeled dumper or track dumper (6 to 8 tons)
- 360° tracked excavator

### Materials:

- Pipe culvert
- Box culvert
- Cable ducting and trenching backfill
- Sand bags
- Water pump
- Geotextile membrane
- Straw bales

### Standard Methods - Dam & Flume Work:

1. The flume pipe(s) will be set out on the bed of the existing stream.

2. A dam will be constructed using sand bags and suitable clay material around the flume pipe(s) and across the stream so that all the flows are diverted through the pipe(s).
3. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream trenching location prior to construction, to minimise silt loss.
4. The ducting installation works will be carried out in the dry stream bed and under/around the flume pipe(s). If required, a temporary sump will be established and used to collect any additional water. This water will be removed by pumping to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the de-watering.

#### **Standard Methods - Dam & Divert Work:**

1. A suitable channel for the stream will be excavated adjacent to the original channel.
2. Bedding stone will be placed on the bed of the new channel.
3. A dam will be constructed using sand bags and suitable clay material across the stream so that the flow is diverted down the new channel.
4. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-river trenching location prior to construction, to minimise silt loss.
5. The proposed trench will be excavated in the dry stream bed. If required, a temporary sump will be established and used to collect any additional water. This water will be removed by pumping to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the de-watering.

#### **Standard Methods - Reinstatement of the Watercourse at Dam and Flume Locations:**

1. Following the completion of works, the stream bed will be reinstated with original or similar material and the spawning gravels replaced under the supervision of an aquatic ecologist.
2. Once the stream bed is appropriately re-instated the dam and the flume pipe(s) will be removed thus restoring the stream to its original condition.

#### **Standard Methods- Reinstatement of the Watercourse at Dam and Divert Locations:**

1. Following the installation of the cable ducts, the stream bed will be reinstated with original or similar material and the spawning gravels replaced under the supervision of an aquatic ecologist.
2. Once the stream bed is appropriately reinstated, the dam will be removed thus restoring the stream to its original alignment.
3. The temporary channel will then be reinstated with the previously excavated material.

## 11.0 Replacement of Existing Culverts

Due to the depth and construction of some existing culverts (i.e. shallow stone built culverts), it may be necessary to replace some culverts as part of the proposed grid construction works. The works will take place in a dry stream bed, following damming methods outlined in Section 10 'Watercourse Damming and Reinstatement Methods' above. A trench will be excavated in the dry stream bed and cable ducts will be laid using the methods outlined Section 8.2 'Ducting Installation Methodology' above.

**Duration:** 1-2 Days per location

### **Personnel, Machinery & Equipment:**

- 2-3 operatives
- Wheeled dumper or track dumper (6 to 8 tons)
- 360° tracked excavator
- Water pump

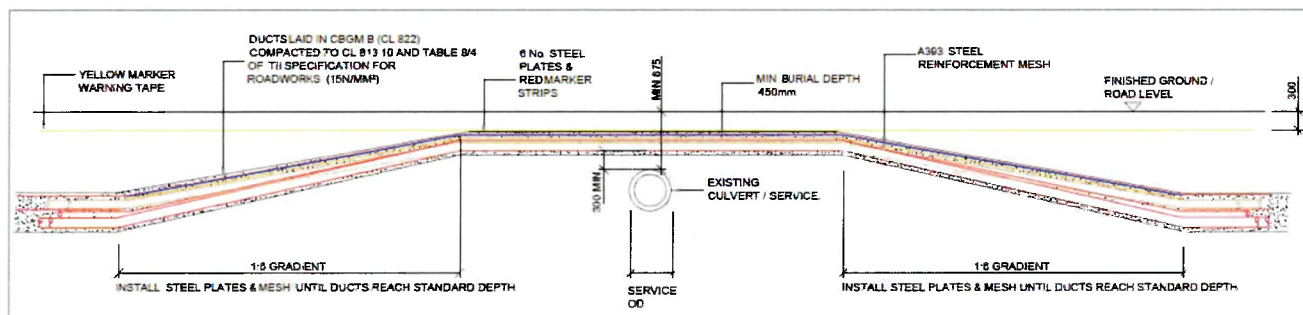
### **Materials:**

- Pipe culvert
- Box culvert
- Cable ducting and trenching backfill
- Sand bags
- Geotextile membrane
- Straw bales

### **Standard Methods - Replacement of Existing Culvert:**

1. Where applicable, under the supervision of an aquatic ecologist, spawning gravels will be removed at the watercourse crossing location.
2. The old culvert will be removed using an excavator.
3. A new HDPE or precast concrete pipe or box culvert will be installed in the watercourse. The new structure will be installed 300mm below the original bed level.
4. The spawning gravels will be replaced under supervision of an aquatic ecologist both upstream, downstream and inside the new structure. Washed gravel will be added to the stream bed if required by the aquatic ecologist.
5. Crushed stone will be laid over the culvert and built up in layer to provide vehicular access across the watercourse.
6. The surface/road level will be reinstated as per the existing track/road requirements.

**Figure 11 – Typical 110kV UGC Culvert Undercrossing**



**Figure 12 – Typical 110kV UGC Culvert Overcrossing**

Inland Fisheries Ireland have published guidelines relating to construction works along water bodies entitled 'Requirements for the Protection of Fisheries Habitats during Construction and Development Works at River Sites', and these guidelines will be adhered to during the construction of the proposed development.

### 13.1 Bridge 1 - Horizontal Directional Drilling

ITM Coordinates: 586581.3776, 895906.2887

Bridge 1 is a flat slab bridge within the forestry access road and has insufficient room to install the cable within the bridge deck to EirGrid/ESB specification (450mm cover to top of ducts), the design of the bridge is therefore inadequate to accommodate the proposed works. It is proposed to horizontal directional drill (HDD) approximately 1500mm beneath the waterway and bridge foundations. This depth is based on locating a suitable clay/silt formation for HDD and the required depth may increase subject to geotechnical investigations. The river at this bridge crossing is part of the 'West of Ardara/Maas Road Special Area of Conservation', it is therefore proposed to setup the HDD back from the bridge in order to drill under the SAC and the bridge. The total length of the HDD will be approx. 100m.

It is proposed to align the HDD within the existing access road corridor, however some road widening works may be required to facilitate the HDD. The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber.

See Drawing 05798-DR-022 for further details.



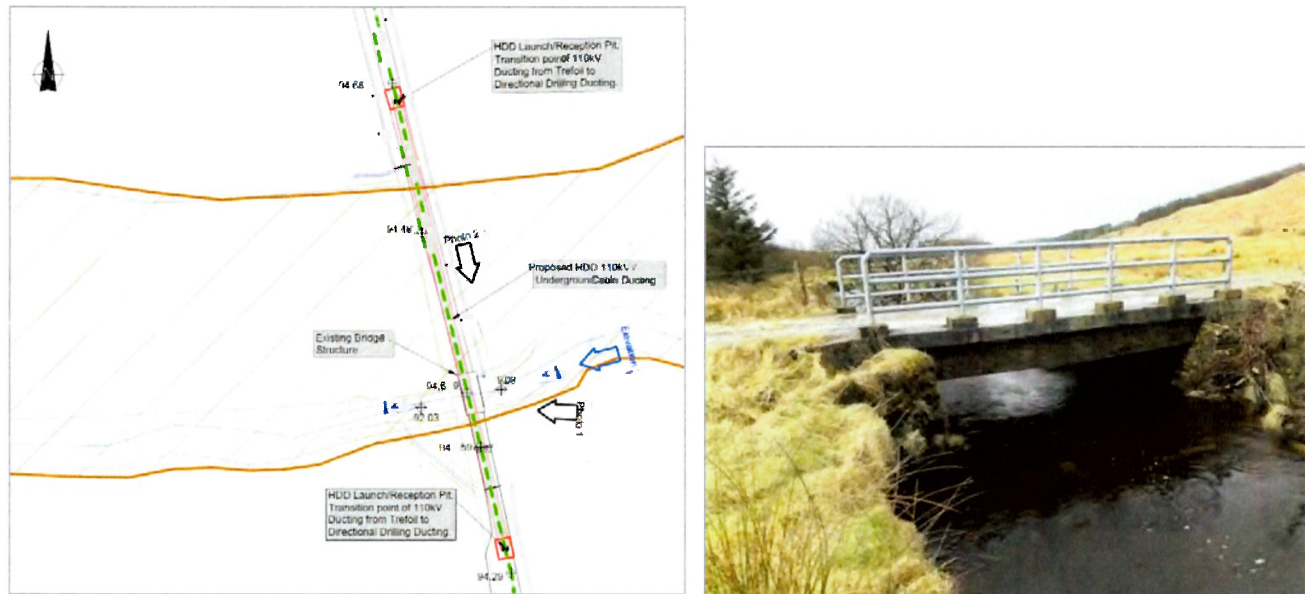


Figure 13 - Bridge 1

### 13.2 Bridge 2 - Horizontal Directional Drilling

111111 Coordinates: 588725, 50227, 89642, 4.70811

Bridge 2 is a flat slab bridge in the public road and has insufficient room to install the cable within the bridge deck to EirGrid/ESB specification (450mm cover to top of ducts), the design of the bridge is therefore inadequate to accommodate the proposed works. It is proposed to horizontal directional drill (HDD) approximately 1500mm beneath the waterway and bridge foundations. This depth is based on locating a suitable clay/silt formation for HDD and the required depth may increase subject to geotechnical investigations.

The total length of the proposed HDD will be approx. 40m. It is proposed to align the HDD within the existing road corridor, however some road widening works may be required to facilitate the HDD, this may include a temporary works area within the adjacent private lands. The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber.

See Drawing 05798-DR-023 for further details.



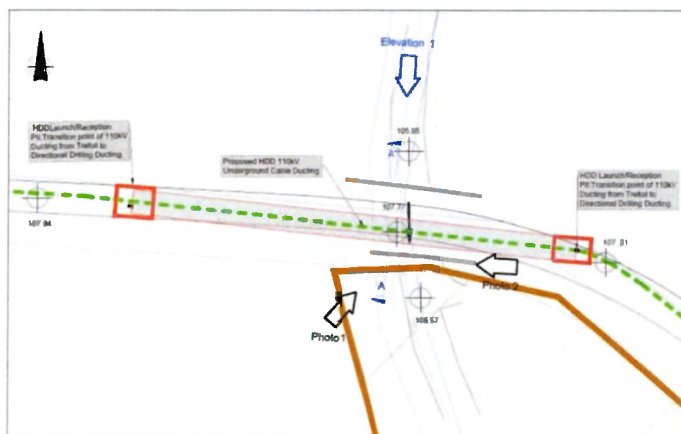


Figure 14 - Bridge 2

## 14.0 Reinstatement of Private Land

Once all construction works are complete, the work areas will be reinstated with excavated soil and either seeded out with native species, allowed to vegetate naturally or reinstated with excavated grass turves and will be restored to their original condition. This work will be carried out in consultation with the landowner and in line with any relevant measures outlined in the planning application, CEMP and planning conditions.

## 15.0 Best Practice Design and Construction & Environmental Management Methodology

Prior to commencement of construction works the contractor will draw up detailed Method Statements which will be informed by this Outline Construction Methodology, environmental protection measures included within the planning application, measures proposed within the CEMP, and the guidance documents and best practice measures listed below. This method statement will be adhered to by the contractors and will be overseen by the Project Manager, Environmental Manager and ECoW where relevant.

The following documents will contribute to the preparation of the method statements in addition to those measures proposed below: -

- Inland Fisheries Ireland (2016) *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters*. Inland Fisheries Ireland, Dublin;
- National Roads Authority (2008) *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*. National Roads Authority, Dublin;
- E. Murnane, A. Heap and A. Swain. (2006) *Control of water pollution from linear construction projects*. Technical guidance (C648). CIRIA;
- E. Murnane et al., (2006) *Control of water pollution from linear construction projects*. Site guide (C649). CIRIA.
- Murphy, D. (2004) *Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites*. Eastern Regional Fisheries Board, Dublin;

- H. Masters-Williams et al (2001) *Control of water pollution from construction sites. Guidance for consultants and contractors* (C532);
- Enterprise Ireland (unknown). *Best Practice Guide (BPGCS005) Oil storage guidelines*;
- Law, C. and D'Aleo, S. (2016) *Environmental good practice on site pocket book*. (C762) 4th edition. CIRIA;
- CIRIA *Environmental Good Practice on Site (fourth edition) (C741) 2015*.

The proposed works will be carried out by employing accepted good work practices during construction, and environmental management measures such as those discussed below. Please note that the following measures will be supplemented by further specific environmental protection measures that will be included in method statements prepared for specific tasks during the works and will form part of the detailed CEMP.

- All materials shall be stored at the temporary compound within the Mully Graffy Wind Farm site and transported to the works zone immediately prior to construction;
- Where drains and watercourses are crossed with underground cables, the release of sediment will be prevented through the implementation of best practice construction methodologies.
- Weather conditions will be considered when planning construction activities to minimise risk of run off from site;
- Provision of 50m exclusion zones and barriers (silt fences) between any excavated material and any surface water features to prevent sediment washing into the receiving water environment;
- If dewatering is required as part of the proposed works e.g. in trenches for underground cabling or in wet areas, water must be treated prior to discharge;
- The contractor shall ensure that silt fences are regularly inspected and maintained during the construction phase;
- If very wet ground must be accessed during the construction process bog mats/aluminium panel tracks will be used to enable access to these areas by machinery. However, works will be scheduled to minimise access requirements during winter months;
- The contractor shall ensure that all personnel working on site are trained in pollution incident control response. A regular review of weather forecasts of heavy rainfall is required, with the Contractor required to prepare a contingency plan for before and after such events;
- The contractor will carry out visual examinations of local watercourses from the proposed works during the construction phase to ensure that sediment is not above baseline conditions. In the unlikely event of water quality concerns, the Environmental Manager and ECoW will be consulted;
- Excavations will be left open for minimal periods to avoid acting as a conduit for surface water flows.
- Only emergency breakdown maintenance will be carried out on site. Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures.
- Appropriate containment facilities will be provided to ensure that any spills from vehicles are contained and removed off site. Adequate stocks of absorbent materials, such as sand or commercially available spill kits shall be available;
- Concrete or potential concrete contaminated water run-off will not be allowed to enter any watercourses. Any pouring of concrete (delivered to site ready mixed) will only be carried out in dry weather. Washout of concrete trucks shall be strictly confined to a designated and controlled wash-out area within the Wind Farm site; remote from watercourses, drainage channels and other surface water features;

- A designated trained operator experienced in working with concrete will be employed during the concrete pouring phase;
- Concrete waste water can be pumped into a skip to settle out; settled solids will need to be appropriately disposed of off-site;
- Wash-down water from exposed concrete surfaces, will be trapped to allow sediment to settle out and reach neutral pH before clarified water is released to the drain system or allowed to percolate into the ground;
- Where dust suppression is considered to be required by the Contractor, such requirements and methodology shall be subject to the agreement with the Ecological Clerk of Works;
- Entry by plant equipment, machinery, vehicles and construction personnel into watercourses or wet drainage ditches shall not be permitted. All routes used for construction traffic shall be protected against migration of soil or waste water into watercourses;
- Cabins, containers, workshops, plant, materials storage and storage tanks shall not be located near any surface water channels and will be located beyond the 50m hydrological buffer at all times.

## 16.0 Invasive Species Best Practice Measures

Invasive species can be introduced into a location by contaminated plant, machinery and equipment which were previously used in locations that contained invasive species. Good site organisation and hygiene management shall be maintained always on site, and best practice measures will be implemented, as follows:








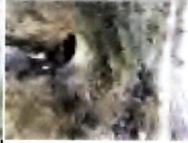

- The contractor will prepare an Invasive Species Action Plan to be implemented during construction, and all personnel will be made aware of the requirements contained within;
- Plant and machinery will be inspected upon arrival and departure from site and cleaned/washed as necessary to prevent the spread of invasive aquatic / riparian species such as Japanese knotweed *Fallopia japonica* and Himalayan Balsam *Impatiens glandulifera*. A sign off sheet will be maintained by the contractor to confirm the implementation of measures;
- Site hygiene signage will be erected in relation to the management of non-native invasive material.

## 17.0 Waste Management

All waste arising during the construction phase will be managed and disposed of in a way that ensures the provisions of the Waste Management Act 1996 and associated amendments and regulations and the Waste Management Plan. Soil will be reinstated into trenches where possible. In the event, there is excess material with no defined purpose, it will be transported to an authorised soil recovery site.











Appendix A – Culvert Crossing Schedule








Culvert Crossing Schedule					
Culvert No	Dimensions (mm)	Material	Approx. Cover (mm)	Proposed Crossing Methodology	Photo
C-1	1000 Ø	HDPE Twinwall	820	OVERCROSSING / UNDERCROSSING - TBC	
C-2	900 Ø	HDPE Twinwall	940	OVERCROSSING / UNDERCROSSING - TBC	
C-3	800 Ø	HDPE Twinwall	1300	OVERCROSSING - TBC	
C-4	450 Ø	HDPE Twinwall	560	UNDERCROSSING	
C-5	450 Ø	HDPE Twinwall	440	UNDERCROSSING	
C-6	1000 Ø	HDPE Twinwall	330	UNDERCROSSING	
C-7	1000 Ø	HDPE Twinwall	565	UNDERCROSSING	
C-8	800 Ø	HDPE Twinwall	1000	OVERCROSSING	
C-9	800 Ø	HDPE Twinwall	540	UNDERCROSSING	














Culvert Crossing Schedule					
Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Proposed Crossing Methodology	Photo
C-10	600 Ø	HDPE Twinwall	800	UNDERCROSSING	
C11	450 Ø	Concrete Pipe	650	UNDERCROSSING	
C-12	1240 (h) x 600 (w)	Stone Built	750	UNDERCROSSING / REPLACEMENT - TBC	
C-13	TBC	TBC	TBC	CULVERT BLOCKED AND FLOODED AT TIME OF SURVEY TBC IN ADVANCE OF CONSTRUCTION	
C-14	660 (h) x 400 (w)	Stone Built	750	UNDERCROSSING / REPLACEMENT - TBC	
C-15	600 (h) x 450 (w)	Stone Built	380	UNDERCROSSING / REPLACEMENT - TBC	
C-16	480 (h) x 500 (w)	Stone Built	470	UNDERCROSSING / REPLACEMENT - TBC	
C-17	580 (h) x 450 (w)	Stone Built	240	UNDERCROSSING / REPLACEMENT - TBC	
C-18	300 Ø	Concrete Pipe	200	UNDERCROSSING	







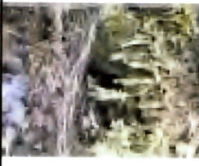




Culvert Crossing Schedule					
Culvert No	Dimensions (mm)	Material	Approx. Cover (mm)	Proposed Crossing Methodology	Photo
C-19	600 (h) x 450 (w)	Stone Built	450	UNDERCROSSING / REPLACEMENT - TBC	
C-20	400 Ø	Concrete Pipe	400	UNDERCROSSING	
C-21	600 (h) x 450 (w)	Stone Built	600	UNDERCROSSING / REPLACEMENT - TBC	
C-22	200 Ø	Concrete Pipe	600	UNDERCROSSING	
C-23	500 Ø	Concrete Pipe	550	UNDERCROSSING	
C-24	400 Ø	Concrete Pipe	365	UNDERCROSSING	
C-25	610 (h) x 350 (w)	Stone Built	620	UNDERCROSSING / REPLACEMENT - TBC	
C-26	300 Ø	Concrete Pipe	490	UNDERCROSSING	
C-27	500 Ø x3	HDPE TWINWALL X3	235	HORIZONTAL DIRECTIONAL DRILL (HDD)	







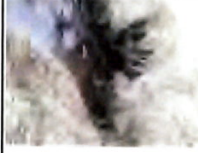
Culvert Crossing Schedule					
Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Proposed Crossing Methodology	Photo
C-28	580 (h) x 490 (w)	Stone Built	660	UNDERCROSSING / REPLACEMENT - TBC	
C-29	400 (h) x 300 (w)	Stone Built	610	UNDERCROSSING / REPLACEMENT - TBC	
C-30	500 Ø x2	Concrete Pipe x2	665	OVERCROSSING - TBC	
C-31	730 (h) x 500 (w)	Stone Built	115	UNDERCROSSING / REPLACEMENT - TBC	
C-32	500 (h) x 600 (w)	Stone Built	636	UNDERCROSSING / REPLACEMENT - TBC	
C-33	650 (h) x 300 (w)	Stone Built	270	UNDERCROSSING / REPLACEMENT - TBC	
C-34	500 (h) x 500 (w)	Stone Built	386	UNDERCROSSING / REPLACEMENT - TBC	
C-35	500 Ø	Concrete Pipe	670	OVERCROSSING	
C-36	500 Ø	Concrete Pipe	686	UNDERCROSSING	





Culvert Crossing Schedule						
Culvert No	Dimensions (mm)	Material	Approx. Cover (mm)	Proposed Crossing Methodology	Photo	
C-37	760 (h) x 500 (w)	Stone Built	840	UNDERCROSSING / REPLACEMENT - TBC		
C-38	380 (h) x 450 (w)	Stone Built	500	UNDERCROSSING / REPLACEMENT - TBC		
C-39	550 (h) x 450 (w)	Stone Built	950	OVERCROSSING - TBC		
C-40	600 (h) x 600 (w)	Stone Built	620	UNDERCROSSING / REPLACEMENT - TBC		
C-41	500 Ø	Concrete Pipe	1720	OVERCROSSING		
C-42	650 (h) x 400 (w)	Stone Built	250	UNDERCROSSING / REPLACEMENT - TBC		
C-43	650 (h) x 500 (w)	Stone Built	650	UNDERCROSSING / REPLACEMENT - TBC		
C-44	650 (h) x 400 (w)	Stone Built	370	UNDERCROSSING / REPLACEMENT - TBC		
C-45	450 (h) x 400 (w)	Stone Built	280	UNDERCROSSING / REPLACEMENT - TBC		



Culvert Crossing Schedule					
Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Proposed Crossing Methodology	Photo
C-46	830 (h) x 450 (w)	Stone Built	1260	OVERCROSSING	
C-47	690 (h) x 500 (w)	Stone Built	160	UNDERCROSSING / REPLACEMENT - TBC	
C-48	500 Ø x2	Concrete Pipe x2	460	UNDERCROSSING	
C-49	450 Ø	HDPE Twintail	420	CULVERT NOT CROSSED	
C-50	500 Ø x2	Concrete Pipe x2	660	UNDERCROSSING	



## Appendix B – Sample HDD Outline Frac-Out Mitigation Plan

### HDD Outline Frac-Out Mitigation Plan

All HDD personnel to be briefed and fully conversant with this Frac-Out Mitigation Plan prior to works commencing. There are four stages to the management of a frac-out which will be implemented as follows: -

- |               |                |            |         |
|---------------|----------------|------------|---------|
| 1) Prevention | 2) Containment | 3) Control | 4) Stop |
|---------------|----------------|------------|---------|

#### Methods for Mitigating Hydro-Fracture

##### 1 Prevention

A hydrofracture or 'frac-out' is the unintentional return of drilling fluids to the surface during HDD. A frac-out occurs when the down hole mud pressure exceeds the overburden pressure (i.e. shallow or loose sections of the bore), or the fluid finds a preferential seepage pathway (such as fault lines and fractures, infrastructure or loose material). These fractures can be natural or induced by over-pressurising the formation. Most frac-outs are usually minor, within works easements and close to the bore entry or exit.

Drilling fluid is comprised primarily of water and approximately 1 to 3% bentonite, a naturally occurring clay mineral, so it is, in most circumstances, a non-toxic, benign fluid, except when suspended within a water body where it can harm ecology. The risk of inadvertent fluid returns should be reduced through competent design and good practices.

Annular fluid pressures are minimised by constant monitoring of the drilling fluid parameters.

- The Fluids Technician will monitor drill fluid density, viscosity and solids content on a regular basis, (half-hourly), to ensure that the fluid does not increase in viscosity, requiring additional pressure to maintain mobility.
- The Driller will monitor the drill fluid pressures, volumes, viscosities and densities of mud being pumped through the bore. Any increases in pump pressure will be investigated immediately to prevent the risk of pressure build up within the annulus.
- The Fluids Technician will monitor active fluid tank volumes and account for any unexpected changes (The drill fluid is designed to allow water loss in porous formations in order to build filter cake).
- The bore hole will be reamed on a regular basis to keep the annulus clear. Rates of Penetration and circulated cuttings volumes will be monitored to ensure that drilled cuttings are being flushed from the bore and are not building up creating pressure restrictions.
- Annular fluid velocity will be kept below critical velocity to prevent eddying and subsequent erosion caused by turbulent flow. When drilling clay based formations (which may be present), inhibitors may be used to prevent the absorption of water and subsequent swelling of the formations.
- A Frac-Watch programme will be operated at all times whilst circulating, particularly when drilling past potential pathways.
- The Frac-Watch programme will ensure that the ground surface above the drilling path will be inspected throughout the HDD process. Spotters will be responsible for the monitoring (numbers dependant on drill length and location topography etc.)

HDD drilling fluid returns to be monitored. Risk of hydro-fracture to be mitigated through monitoring and HDD fluid selection. Methods of monitoring include: -

#### Operational (This will be undertaken throughout HDD process)

- Full briefing of personnel prior to HDD operation (Mitigation Plan)
- Personnel will be assigned to specific tasks and be fully conversant with procedures in Mitigation Plan
- Follow best drilling practices (HDD Design)
- Monitor & control mud weights

- Maintain effective fluid properties
- Monitor pressure on HDD rig
- Frac-Watch - Visual monitoring of returns at both launch and reception pits
- Frac-Watch - Spotters to be deployed
- Frac-Watch - Spotters to have two-way radios, along with launch and reception teams (close monitoring and direct communication ensures swift reaction)
- Frac-Watch - Driller to inform spotters of progress of drill so that they know location of drill head/reamer (i.e. Joint 1, 2, 3, etc.)

## 2 Containment

Contingencies are in place to deal with potential frac-outs when drilling operations commence. If a frac-out occurs, drilling operations to be suspended temporarily and assessment of location and severity to be carried out.

- The rig and pumps will immediately be shut off
- The drilling assembly will be pulled off bottom to reduce annular pressures
- Once shut down procedure is complete the frac-out will be contained by all site personnel as quickly as possible by any one of the measures listed below where applicable

**Physical (This will be undertaken if a frac-out occurs)**

The following is to be stored at the Entry Site and Exit Site

- Sandbags – use to contain spill, deploy at source. Frac-out may occur some distance from the bore path. Sand Bags will be available to control drill fluid at surface
  - 1 x roll of Polyethylene
  - Tractor & bowser
  - Pumps
- Client Site Manager to be notified as soon as possible.

## 3 Control

The freshwater based bentonite suspension drill fluid systems utilised are, essentially, low viscosity grouts. In most cases, the fracture pathways will quickly seal up. Frac-out is likely to indicate that the bore hole requires reaming to reduce the pressure required to return drill fluid to surface.

Once the frac-out has been contained a slab-tip may be sufficient to prevent further frac-out and re-establishment of fluid returns. Lost Circulation Material (LCM) drill fluid additives will be available to seal fractures in the formation.

After an assessment has been conducted following a frac-out, the following control measures should be implemented as follows:-

### a) Re-Circulation Attempt (This will be undertaken if a frac-out occurs)

- The pilot bore or reaming operation will be retracted away from the frac-out to try and re-establish fluid returns. This may require the complete extraction of the drill string and a re-drill if necessary.

### b) Mechanical (This will be undertaken if a frac-out occurs)

This will be carried out via fluid mixing system and pumped down drill string to frac-out.

- Physical plugging by Loss of Circulation Material (LCM) Enviro Formfill to be utilised as soon as possible to manufacturer's specification.



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**4 Stop Procedure (If sections 1, 2, & 3 are unsuccessful)**

If any of the measures outlined in sections 1, 2, & 3 are unsuccessful then drilling operation will be suspended.

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**ATTACHMENT 8**  
**ECOW CV – [INSERT NAME]**

**ATTACHMENT 9**  
**REFUELLING TOOLBOX TALK INFORMATION SHEET**

## Environmental Toolbox Talk

### Refuelling Procedures

#### Pre-refuelling

1. All fuels, oils and chemicals are to be kept in a bunded area, away (>50m) from drainage lines / watercourses and away from other environmentally sensitive areas where practical.
2. The bunded area are to be constructed in accordance with AS 1940:2004.
3. Inspect hoses and pumps, etc for breakages and/or leaks.
4. Ensure an appropriate spill kit is readily available and stocked. Spill kits should be maintained on the mobile fuel truck and at numerous locations on the Project site.

#### Refuelling from Mobile Fuel Truck

1. Maintain at least a 50m buffer away from drainage lines / watercourses and away from other environmentally sensitive areas where practical. It is noted that moving piling machines away from watercourses is considered to be impractical.
2. A fully maintained spill kit will be stored on the fuel truck
3. Only the driver of the fuel truck is to operate the fuel pump
4. Ensure drip trays are placed under the fuel tank to be filled
5. Wrap absorbent sausage around the opening collar of the fuel tank
6. Turn on fuel pump and ensure counter is reset
7. Refuelling operations are to be closely monitored at all times
8. The refuelling operator is to stay close to the 'stop' valve/trigger at all times
9. At the completion of refuelling, ensure the pump is switched off and nozzle is securely in the cradle.
10. The mobile fuel truck is to be parked overnight offsite or in the bunded location provided to minimise the risk of spills and leaks.

#### Spill Response

1. In the event of a spill follow the procedure outlined in the Spill Response Procedure.
2. The spill is to be cleaned up and reported to the Site Manager / Environmental Manager immediately.
3. The Environmental Manager will notify the relevant parties and authorities in accordance with Incident Reporting Procedure.

### **DO's**

- Supervise all fuel and oil deliveries
- Lock containers and tanks when not in use
- Ensure a spill kit is provided adjacent to fuel storage and refuelling areas
- Ensure bulk fuel and oil storage tanks are bunded and that the bund has a capacity of 110 per cent of the tank
- Store all containers of oil and fuel in a secure, bunded area
- Regularly check tanks, containers and bunds for damage and leaks
- Place a drip tray or absorbent mat under all static plant and mobile plant during fuelling
- Clear up all minor spillages immediately
- Use a funnel when refuelling small plant
- Use an automatic shut off or pistol grip delivery system when refuelling plant
- Seek advice from a line manager before disposing of waste fuel or oil, or contaminated spill granules or absorbent mats
- Liaise with a line manager to organise removal of contaminated water from bunds and trays by an appropriate contractor.

### **DO NOTS**

- Refuel plant or vehicles without using a drip tray
- Pour waste fuel and oil down drains8wash fuel and oil spillages down drains
- Store fuel and oil, or carry out refuelling, within 10 m of a watercourse or drain
- Allow drip trays or bunds to overflow
- Locate fuel and oil tanks/storage area near to vehicle routes
- Leave a tank to fill unsupervised
- Store oil or fuel outside a bunded container

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**ATTACHMENT 10**  
**ENVIRONMENTAL AUDIT CHECK LIST**

**Project:** \_\_\_\_\_

Site Audit Check List

Audit No: 001

Site Audited: Graffy Wind Farm

Name of Contractor(s) Audited & Person in Charge:

\_\_\_\_\_

\_\_\_\_\_

Audit Team:

\_\_\_\_\_

Main construction activity since last Visit:

\_\_\_\_\_

\_\_\_\_\_

Date:

Start Time:

End Time:

Visit No.:

Weather Conditions:

Construction activity on day of site visit:

\_\_\_\_\_

\_\_\_\_\_

Excavations	Required	Y	N	Comments
Is material from excavations being stored sufficient distance from open trenches to prevent contamination of water within trenches?	Yes			
Is dewatering equipment and silt control equipment available if required?	Yes			
Is all spoil being stored in the agreed locations as per CMS/CEMP?	Yes			
Is all spoil being stored away from sensitive habitats?	Yes			
Is temporary stock piled material causing an obstruction to road traffic?	No			
Is stockpiled material battered to safe angle of repose?	Yes			
Is stockpiled material stored at an appropriate stockpile height?	Yes			
Are any existing sediment control structures damaged by excavation works?	No			
Reinstatement	Req. 1	Y	N	Comments
Are there any areas requiring revegetation works?				
Are all topsoil and catclay being stored separately?	Yes			
Are all topsoil and catclay being stored in the agreed locations as per CMS/CEMP?	Yes			
Are stored turves adequately maintained and watered where required?	Yes			
Is reseeded carried out using the correct seeding specification?	Yes			
Site Compound		Y	N	Comments
Are there any pollution risks at the site compound?	No			
Is sufficient storage available within waste receptacles in the site compound?	Yes			
Are all covers in place over waste receptacles to prevent wind blown wastes?	Yes			
Are mobile fuel bowser(s) stored in a bunded area?	Yes			
Is a spill kit available to respond to major incidents?	Yes			
Are all materials stored in designated areas?	Yes			
Do the mobile welfare units require maintenance (toilets etc.)?	No			
Does the wastewater holding tank need to be emptied?	No			
Plant and Equipment		Y	N	Comments
Are all kits available to all machinery and mobile bowsers?	Yes			
Are all manufacturers' covers present on all equipment?	Yes			
Is machinery confined to working corridor / alignment of permitted access track?	Yes			
Is a spill tray being used beneath pumps?	Yes			
Does the spill tray have sufficient storage capacity?	Yes			
On visual inspection are there any leaks from machinery?	No			
Drainage		Y	N	Comments
Is surface water run-off present?	No			

Are there any visual indications that surface water entering watercourses is contaminated?	No			
Are all required check dams installed on drainage ditches?	Yes			
Do any silt traps require maintenance?	No			
Are additional check dams, silt fences etc required?	No			
Are discharges from sedimentation ponds 50 metres away from watercourses?	Yes			
<b>Ecological</b>		Y	N	Comments
Have any Curlews or Hen Harriers been observed by any of the works crew?				
Have any notable animal sightings and / or signs been observed by any of the works crew?				
Are there any ecological issues with the sedimentation ponds?	No			
<b>General Observations</b>		Y	N	Comments
Is dust suppression being conducted during periods of dry weather onsite?	Yes			
Are all work areas free of litter?	Yes			
Are works following all environmental requirements set out in the CMS / CEMP and Method Statements?	Yes			
Are there wind-blown dusts from excavated or stored materials?	No			
Are all oil drums etc. stored in bunded areas?	Yes			
Are concrete washout areas (locations agreed as per CMS / CEMP) being maintained?	Yes			

1. Required Response: A deviation from the required response must trigger an action item.

Actions / Comments Resulting From this Audit: Audit 001 (xx/xx/xx)

Actions/Comments	Due Date	Status

Audit Date:	
Auditor:	
Auditee:	

**ATTACHMENT 11**

**PRELIMINARY SETTLEMENT POND SIZE CALCULATIONS**

**Graffy Wind Farm  
Settlement Pond Calculations**

**Hydraulic Calculations**

$$Q \text{ (m}^3\text{/sec)} = A \text{ (ha)} \times I \text{ (mm/hr)} \times R \times \text{Growth Factor} / 360$$

Design Storm Event = 10<sub>year</sub>, 1<sub>hour</sub>

Rainfall Intensity ( $I_{10}$ ) = 22.7

Rainfall depths taken from Met Eireann Extreme Rainfall data.

Rainfall Growth Factor<sub>10</sub> = 1.37

Design Storm Event = 100<sub>year</sub>, 1<sub>hour</sub>

Rainfall Intensity ( $I_{100}$ ) = 37.4

Rainfall depths taken from Met Eireann Extreme Rainfall data.

Rainfall Growth Factor<sub>100</sub> = 1.96

Runoff Coefficient (R) = 0.7

**Sediment Pond Calculations**

Particle Size = 63μm

Settling Velocity ( $V_s$ ) for a 63μm Particle = 0.002m/sec (Stoke's Law)

Factor of Safety = 1.2

$$\text{Minimum Pond Area (m}^2\text{)} = Q_{10\text{year}} \text{ (m}^3\text{/sec)} / V_s \text{ (m/sec)} \times \text{FOS}$$

**Discharge Pipe Calculations**

$$\text{Discharge Capacity} = Q \text{ (m}^3\text{/sec)} = cA \times \sqrt{2 \times g \times h}$$

Discharge Coefficient (c) = 0.6 (Sharp Crested Weir)

Area (A) = 0.071 (300mm φ pipe)

Hydraulic Head (h) = 0.3

**Discharge Capacity**

$$\begin{aligned} \text{Discharge Capacity} = Q \text{ (m}^3\text{/sec)} &= cA \times \sqrt{2 \times g \times h} \\ &= 0.103 \end{aligned}$$

**Settlement Pond Sizes**

Settlement Pond Location	Catchment Area	$Q_{10\text{year}}$ (m <sup>3</sup> /sec)	$Q_{100\text{year}}$ (m <sup>3</sup> /sec)
Pond @ turbine T01	0.56	0.034	0.080
Pond @ turbine T02	0.53	0.032	0.076
Pond @ turbine T03	0.67	0.041	0.095
Pond @ turbine T04	0.95	0.057	0.135
Pond @ turbine T05	0.67	0.041	0.095
Pond @ turbine T06	0.57	0.034	0.081
Pond @ turbine T07	0.72	0.044	0.103
Pond @ turbine T08	0.58	0.035	0.083
Pond @ Substation	0.9	0.054	0.128

**Graffy Wind Farm**  
**Settlement Pond Calculations**

Settlement Pond Location	Catchment Area	Q <sub>10year</sub> (m <sup>3</sup> /sec)	Required Settlement Pond Area (m <sup>2</sup> )	Length (m)	Width (m)	Settlement Pond Area (m <sup>2</sup> )	Depth (m)
Pond @ turbine T01	0.56	0.034	14.1	7.5	2.5	18.8	1.5
Pond @ turbine T02	0.53	0.032	13.4	7.0	2.0	14.0	1.5
Pond @ turbine T03*	0.67	0.041	16.9	7.5	2.5	18.8	1.5
Pond @ turbine T04	0.95	0.057	23.9	8.8	2.8	24.6	1.5
Pond @ turbine T05	0.67	0.041	16.9	7.5	2.5	18.8	1.5
Pond @ turbine T06	0.57	0.034	14.4	7.0	2.2	15.4	1.5
Pond @ turbine T07*	0.72	0.044	18.1	7.5	2.5	18.8	1.5
Pond @ turbine T08	0.58	0.035	14.6	7.0	2.2	15.4	1.5
Pond @ Substation	0.9	0.054	22.7	8.8	2.8	24.6	1.5

**Notes:**

1. Ponds to settle out particles >63um (i.e. fine sand) with 100% efficiency.
2. Ponds to settle out particles <63um (i.e. silt and clay) with 31% efficiency.
3. Buffer zones with minimum width of 30m and maximum gradient of 6% to settle out remaining particles <63um with 97% efficiency.
4. Based on a pond inlet trigger level limit of 1,000mg/l, a concentration of 20mg/l TSS on discharge to watercourses is designed.
5. Ponds to have three chambers, separated by geotextile (silt curtain) supported by clean gravel filter stone (10mmφ).
6. Discharge from pond to be via floating intake to decant the cleanest water. Manual shut-off valve to be provided.
7. Discharge from pond to be to level spreader.
8. \* - indicates that settlement pond is not proposed due to natural runoff characteristic of location.



**ATTACHMENT 12**  
**INCIDENT REPORTING FORM**

### SITE ENVIRONMENTAL INCIDENT REPORT

Site		Date	
Time		Weather:	

Report By:		Position:	
Client personnel present:		Position:	
Contractor Personnel Present:		Position:	

Description of incident:

Item Spilled	
Estimate of Volume of Spillage:	

List of actions followed once incident was noted	Time	Corrective Action By	
		Action	By
Who first observed incident?			
First action		-	
Next Action			
Time Pollution Hotline was contacted			
Other			

**SITE ENVIRONMENTAL INCIDENT REPORT**

Details of Clean-Up contractor or how contamination was removed from site:

Details of how this could be avoided in future:	          
Details of review of internal procedures as result of this incident:	          

DATE REPORT COMPLETED \_\_\_\_\_

## Appendix I: Collision Risk Model (Woodrow Sustainable Solutions Ltd)

## **1 Statement of Authority**

This report was compiled Aoife Moroney (BSc, MSc) and Mike Trewby (BSc, Post grad. dip., CIEEM), with guidance and input from Will Woodrow (MSc., MSc. (Arch), CIEEM, CEcol) throughout the analysis and assessment.

Will is a Director and Principal Ecologist at Woodrow Sustainable Solutions Ltd (Woodrow). He has been studying and working in ecology, including avian ecology, since 1985 and has worked as an ecological consultant since 2004. Will has worked on numerous wind farm projects, including over 20 impact assessments and has undertaken collision risk modelling on over 8 wind farm proposals to date.

Mike is a Senior Ecologist at Woodrow and from 1997 has worked on a range of ecology projects and since 2011 has been an ecological consultant specialising in avian ecology on wind farms in Ireland, including undertaking of impact assessments and collision risk modelling.

Aoife is an Assistant Ecologist with Woodrow. She has completed a B.Sc. in Engineering at University College Dublin and M.Sc. in Environmental Engineering (specialising in Environmental Management) at the Technical University of Denmark and the Royal Institute of Technology, Sweden. Aoife is highly proficient in data analysis and management. She regularly assists in the compilation of environmental reports (including for Appropriate Assessment and Ecological Impact Assessment) as part of larger and smaller scale infrastructure projects.

## **2 Overview**

The proposed Application is for an eight-turbine wind farm on Graffy Hill, Co. Donegal, which is located along the lower southern slopes of An Eachla (Aghla Mountain), c. 8 km east of Na Gleannta (Glenties). The central grid reference for the site is IGG 90603-97329 [Lat. 54.8238, Long. -8.1469]. The proposed wind turbines (WT) are located within the following townlands: An Dearachán Mór - Dalraghan More (WT01, WT02), Min na Manrach - Meenamalragh (WT03, WT04, WT05, WT06) and An Ghrafaidh - Graffy (WT07, WT08).

The intention of this report is to display modelled data, based on observed bird usage of the area, to provide an indication of the likely collision risk imposed by the proposed wind farm on potentially sensitive avian populations. The report uses bird usage data derived from vantage point (VP) watches conducted by appropriately experience ornithological surveyors from Woodrow Sustainable Solutions Ltd (Woodrow) over two years between October 2018 and August 2020 inclusive.

As shown in Figure 1 in Appendix I, flight data for selected target species was collected from four vantage points (VPs) over two years. Appendix II provides details of timings for VP watches and demonstrates that the minimum requirement of 36 hours per VP per season was achieved across the

two year, amounting to a total of 577.26 hours of VP watch data. Conducting of VP watches simultaneous by two surveyors was largely avoided over the two-year study. Simultaneous VP watches were only undertaken on 10 out of 98 survey days. When simultaneous VP watches did occur, care was taken to ensure that the viewsheds of the VPs did not overlap, i.e. only VP1 and VP2 covering opposite ends of the site could be done at the same time to avoid overlap. Therefore, no correction factor to account for simultaneous observer effort was required.

The flight risk volume applied in this analysis is based on a buffer extending 500 m from turbine towers (as shown in Figure 2 in Appendix I), which equates to area of 412 Ha. Two turbine models have been specified, the Enercon E-126 and Nordex 133, and the model has been run for both scenarios. The collision risk zone was defined as 18 to 150 m. This was based on the lowest minimum swept height and highest maximum swept height of the two turbine models, as detailed in **Table 1**.

CRM was undertaken for those species with > 200 flight seconds occurring with the potential collision risk zone (CRZ) over the two years (i.e. at collision risk height and within the turbine envelope = 500 m turbine buffer). Therefore, CRMs were run for 12 species including:

- Whooper swan                      7,148 flight seconds in CRZ
- White-tailed eagle              3,144 flight seconds in CRZ
- Hen harrier                        212 flight seconds in CRZ
- Sparrowhawk                    386 flight seconds in CRZ
- Buzzard                            7,383 flight seconds in CRZ
- Golden eagle                    3,657 flight seconds in CRZ
- Kestrel                            3,014 flight seconds in CRZ
- Merlin                            1,058 flight seconds in CRZ
- Snipe                               1,327 flight seconds in CRZ
- Lesser black-backed gull      2,402 flight seconds in CRZ
- Herring gull                    19,500 flight seconds in CRZ
- Great black-backed gull      1,018 flight seconds in CRZ

CRM was not undertaken for black-headed gull or peregrine, as records of these target species were limited to one and two observations (single birds) respectively within the 500m turbine buffer (BH 124 sec. / PE 18 sec. & 13 sec.); and in the case of the peregrine observations, both flight-lines were below the CRZ (judged to be at 10 to 15m). Similarly, no CRM was undertaken for woodcock, as records were of wintering birds that were flushed by surveyors.



### 3 Collision Risk Model – Approach

Flight data for selected target species was run through a collision risk model (CRM), as detailed in SNH (2000)<sup>1</sup> and Band *et al.* (2007)<sup>2</sup>. This model uses two approaches for different situations. The first approach is for birds that take regular flights through a wind farm area; and the second is for birds that may occupy an area, including a wind farm, as a regular territory. The model approach used in this case is the second approach, relating to birds occupying a given area.

#### 3.1 Stage 1 - Number of birds flying through rotors

This stage involved a number of sequential steps:

1. Identify a 'flight risk volume'  $V_w$  which is the area of the windfarm multiplied by the height of the rotors, as shown in Equation 1.

$$V_w = Area_{windfarm} * rotor\ diameter \quad (1)$$

2. Calculate the combined volume swept out by the windfarm rotors using Equation 2:

$$V_r = X\pi R^2(d + l) \quad (2)$$

where  $X$  is the number of wind turbines,  $d$  is the depth of the rotor back to front, and  $l$  is the length of the bird.

3. Estimate the bird occupancy  $n$  within the flight risk volume. This is the number of birds present, multiplied by the time spent flying in the flight risk volume, within the period (usually one year) for which the collision estimate is being made.
4. The bird occupancy, in bird-seconds, of the volume swept by the rotors  $b$  is then calculated using Equation 3.

$$b = n \left( \frac{V_r}{V_w} \right) \quad (3)$$

5. Calculate the time taken for a bird to make a transit through the rotor and completely clear the rotors  $t$ , see Equation 4:

$$t = \frac{d + l}{v} \quad (4)$$

where  $v$  m/sec is the speed of the bird through the rotor.

6. To calculate the number of bird transits through the rotors  $N$ , divide the total occupancy of the volume swept by the rotors in bird-secs by the transit time  $t$ , as shown in Equation 5:

$$N = \frac{n \left( \frac{V_r}{V_w} \right)}{t} \quad (5)$$

Note in this calculation that the factor  $(d + l)$  cancels itself out, so only assumed values need be used - it is used above to help visualise the calculation.

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<sup>1</sup> Scottish Natural Heritage (2000). Windfarms and Birds - Calculating a theoretical collision risk assuming no avoiding action. SNH Guidance Note.

<sup>2</sup> Band, W., Madders, M., and Whitfield, DP., (2007). Developing Field and Analytical Methods to Assess Avian Collision Risk at Wind Farm Sites. In: de Lucas, M., Janss, G. & Ferrer, M. (Eds) 2007. Birds and Wind Farms – Risk Assessment and Mitigation. Quercus Editions, Madrid, 259-279

Within this stage, a weighting system is also applied to the value for bird occupancy  $n$ , which is intended to take account of the fact that the observations arise from different Vantage Points (VPs), that different vantage points cover varying area extents (in terms of total hectareage), and that the combination of the areas seen from all VPs may not always incorporate the entire site being assessed. The weighting factor for each VP is worked out by the percentage cover of the 15 m viewshed, as well as the combined percentage cover of all the VPs.

### 3.2 Stage 2 - Probability of bird being hit when flying through the rotors

This stage uses data relating to bird and rotor characteristics in order to compute the likelihood of a bird being hit when flying through the rotor. The turbine and operational model inputs are shown in **Table 1** and **Table 2** provides the model input for dimensions/attributes of target species. This, together with the output from Stage 1, allows for a model output of the likely number of collisions per year.

Data relating to the likelihood of a bird being hit when flying through the rotor is derived from a spreadsheet available from NatureScot (formerly Scottish Natural Heritage). The outputs from this spreadsheet are provided for each target species in **Table 3**.

Following the above steps, the number of bird transits per year through the rotors can be combined with the probability of a bird being hit when flying through the rotor to give a likely collision risk per year (assuming no avoidance). An avoidance figure is then applied in order to get a predicted likely collision rate, and thus a likely mortality rate. This stage also considers the proportion of time that turbines are likely to be operational. Avoidance rate are given in SNH (2016, 2018) and Furness (2019), which are used to provide estimates of the number of collisions per annum and for the life of the project (30 years).

**Table 1.** Turbine and operational inputs for the Enercon E-126 and Nordex 133

Turbine parameter	Unit	E-126	N133
Number of blades		3	3
Hub height	meters	85.94	83
Rotor diameter	meters	127	133.2
Minimum swept height	meters	24.85	18.6
Maximum swept height	meters	147.03	147.4
Maximum rotor depth d	meters	4	4
Maximum rotor chord	meters	4	4
Blade pitch <sup>3</sup>	degrees	25	25
Dynamic operating range	rpm	5-12.1	6.9-13
Rotation period <sup>4</sup>	seconds	6	5
Turbine operation time	percentage	0.85	0.85

<sup>3</sup> Pitch varies between  $-5^{\circ}$  and  $90^{\circ}$  depending on windspeed. The value of  $25^{\circ}$  is based on Band (2012) which suggests a pitch of  $25^{\circ}$  to  $30^{\circ}$ . This, however, is based on large off-shore turbines and is therefore considered a precautionary value for onshore turbines.

<sup>4</sup> The values chosen for rotation period are slightly higher than the average rotation period calculated using the dynamic operating range. This is due to the site being an upland site and likely experiencing relatively high wind speeds.

**Table 2.** Avian biometrics<sup>5</sup> and flight speeds<sup>6 7 8</sup> model inputs

Species	Length (cm)	Average (cm)	Wing-span (cm)	Average (cm)	Flight speed (m/s)
Whooper swan	145-160	153	218-243	231	17.3
White-tailed eagle	70-90	80	200-240	220	13.6
Hen harrier	44-52	48	100-120	110	9.1
Sparrowhawk	28-38	33	55-70	63	10.0
Buzzard	51-57	54	113-128	121	11.6
Golden eagle	75-88	82	204-220	212	11.9
Kestrel	32-35	34	71-80	76	10.1
Merlin	25-30	28	52-62	57	10.1*
Snipe	25-27	26	44-47	46	17.1
Lesser black-backed gull	52-64	58	135-150	143	11.9
Herring gull	55-64	60	138-150	144	12.8
Great black-backed gull	64-78	71	150-165	158	13.7

\*No flight speeds were found for merlin and the same flight speed as for kestrel was therefore employed in the CRM

**Table 3:** Average collision probability (Band 2007)

Species	E-126	N133	Avoidance Rate
Whooper swan	8.79%	9.77%	99.5 <sup>9</sup>
White-tailed eagle	8.04%	8.87%	95.0
Hen harrier	8.52%	9.87%	99.0
Sparrowhawk	7.02%	8.09%	98.0
Buzzard	7.36%	8.36%	98.0
Golden eagle	8.72%	9.83%	99.0
Kestrel	7.07%	8.13%	95.0
Merlin	6.72%	7.73%	98.0
Snipe	4.73%	5.10%	98.0
Lesser black-backed gull	7.50%	8.47%	99.5 <sup>10</sup>
Herring gull	7.23%	8.09%	99.5 <sup>10</sup>
Great black-backed gull	7.33%	8.18%	99.5 <sup>10</sup>

As would be expected, given the longer blade diameter, collision probability is higher for of the Nordex N133 turbine when compared with the smaller rotor swept area of the Enercon E-126. Therefore, the Nordex N133 turbine represents the worst-case scenario.

<sup>5</sup> Snow, D. & Perrins, C.M. 1998. The Birds of the Western Palearctic: 2 Volume Set: Volume 1, Non-passerines; Volume 2, Passerines.

<sup>6</sup> Alerstam, T., Rosen M., Backman J., G P., Ericson P & Hellgren O. 2007. Flight Speeds among Bird Species: Allometric and Phylogenetic Effects. *PLoS Biol.* 5, 1656-1662.

<sup>7</sup> Bruderer, B & Boldt, A. (2001). Flight characteristics of birds: I. radar measurements of speeds. *Ibis* 143, pp 178-204.

<sup>8</sup> Provan, S. & Whitfield, D. P. (2006). *Avian flight speeds and biometrics for use in collision risk modelling*. Report from Natural Research to Scottish Natural Heritage. Natural Research Ltd, Banchory

<sup>9</sup> SNH (2018) Avoidance Rates for the onshore SNH Wind Farm Collision Model v2. Scottish Natural Heritage

<sup>10</sup> Furness, R.W. (2019). Avoidance rates of herring gull, great black-backed gull and common gull for use in the assessment of terrestrial wind farms in Scotland. Scottish Natural Heritage Research Report No. 1019.

### 3.3 Viewshed spatial coverage

Vantage point (VP) locations used were the same during all survey periods. Viewshed spatial coverages for each VP were calculated using ArcGIS Pro. Spatial coverage of these VPs, both in relation to the spatial area of the viewshed (at 15 m) within the study area and proportion of the study area, is given **Figure 3** and **Figure 4** of **Appendix I: Avi-fauna..** The locations of these vantage points in relation to the site and study area (500m buffer from the turbines) and the spatial coverage of each viewshed are mapped in **Figure 3** and **Figure 4** of **Appendix I: Avi-fauna.**

**Table 4:** Spatial visual coverage of 500 m buffer (area = 389 ha) and collision risk zone (CRZ)

Vantage Point (VP)	Turbines locations visible from VP (ground level to tip)	Additional turbine locations where majority of rotor swept area visible (within 2km of VP)	Area of CRZ visible within 500m turbine buffer (Ha)	% Coverage	VP survey effort non-breeding season (hrs)	VP survey effort breeding season (hrs)	Total VP survey effort (hours)
VP1	T8	T7	66	16 %	72.17	72.00	144.17
VP2	T2, T3, T4	T5, T6	210	51 %	72.00	72.17	144.17
VP3	T4, T5, T6, T7	T1, T2, T3, T8	304	74 %	72.17	72.00	144.17
VP4	T1, T2, T5, T6, T7	T3, T4, T8	321	78 %	72.75	72.00	144.75

### 3.4 Recorded Flight Activity

Surveys were undertaken for four seasons between October 2018 and August 2020. Flight times within the study area and at risk height are provided in **Table 5** for the 12 target species included in the model.

**Table 5.** Flight seconds in CRZ for target species from each vantage point (VP): Oct-2018 to Aug-2020

Species	VP1	VP2	VP3	VP4	Total (flight seconds)
Whooper swan	175	10		6,963	7,148
White-tailed eagle	117	47	2,670	310	3,144
Hen harrier		212			212
Sparrowhawk	15	70	301		386
Buzzard	594	1,396	3,813	1,580	7,383
Golden eagle	520	212	2,183	742	3,657
Kestrel	982	18	1,228	786	3,014
Merlin		866	192		1,058
Snipe			1,327		1,327
Lesser black-backed gull	1,847	0	555	0	2,402
Herring gull	19,500				19,500
Great black-backed gull	390	137	371	120	1,018

## 4 Collision risk assessment

As detailed above, the collision risk assessment is undertaken in two stages, with Stage 1 being to ascertain the number of bird flights through the rotors and Stage 2 being to ascertain the probability of a bird being hit by the rotors as it passes through.

**Table 1 to Table 5** show the model inputs for both turbine and bird parameters, as well as the basis of weighting for observational effort.

### 4.1 STAGE 1 - Number of birds flying through rotors

As detailed in the preceding section, the first part of Stage 1 is defining the 'flight risk volume'  $V_w$ . This is derived from the wind farm area (4,115,425.31 m<sup>2</sup>) multiplied by the rotor diameter (rotor swept area). This is shown below as 522,659,014 m<sup>3</sup> for the E-126 and 548,174,651 m<sup>3</sup> for the N133 and calculated using Equation 1. The 'rotor swept volume'  $V_r$  is then worked out based on the rotor swept area multiplied by the number of turbines, the depth of the rotor and the length of the bird. This is shown for both turbine models in **Table 6** and calculated using Equation 2.

<b>E-126</b>	<b>N133</b>
$V_w = Area_{windfarm} * rotor\ diameter$ $= 3888829 * (127) = 522659014m^3$	$V_w = Area_{windfarm} * rotor\ diameter$ $= 388829 * (133.2) = 548174651m^3$
$V_r = X\pi R^2(d + l) = 8\pi \left(\frac{127}{2}\right)^2 (4 + l)$	$V_r = X\pi R^2(d + l) = 8\pi \left(\frac{133.2}{2}\right)^2 (4 + l)$

**Table 6.** Risk Volume  $V_r$  and rotor transit time  $t$  for each species using both turbine dimensions

Species	E-126		N133	
	$V_r$ (m <sup>3</sup> )	$t$ (s)	$V_r$ (m <sup>3</sup> )	$t$ (s)
Whooper swan	560418.472	0.31965	616472.133	0.31965
White-tailed eagle	486439.180	0.35294	535093.352	0.35294
Hen harrier	454009.901	0.49231	499420.462	0.49231
Sparrowhawk	438808.677	0.43300	482698.795	0.43300
Buzzard	460090.391	0.39138	506109.129	0.39138
Golden eagle	488466.010	0.40504	537322.908	0.40504
Kestrel	439822.092	0.42970	483813.573	0.42970
Merlin	433741.602	0.42376	477124.906	0.42376
Snipe	431714.772	0.24912	474895.350	0.24912
Lesser black-backed gull	464144.051	0.38487	510568.240	0.38487
Herring gull	466170.881	0.35938	512797.796	0.35938
Great black-backed gull	477318.445	0.34380	525060.352	0.34380

The next stage of the calculations is to determine the bird occupancy  $n$  within the flight risk volume. This is worked out individually for each VP and then averaged to find the mean occupancy across the site. The observation effort (see Equation 6) of each VP (in hectare hours) is first calculated by

multiplying the area viewed from the VP (see **Table 4**~~Error! Reference source not found.~~) by the number of VP hours undertaken (recommended 36 hours per VP per season by SNH). Occupancy  $n$  is then calculated, using Equation 7, by dividing the flight time at risk height (in hours) by the observation effort and then multiplying that value by the study area (500m turbine buffer) and the total hours the birds are active across the site. The time the birds are active is defined as the product of the number of days in the season/year and the mean day length. This is assumed to be an average of 12 days daylight for 365 days in the year for species that were present throughout the year (i.e. 4,380 hours). For wintering species 1,704 hours was used and for species that were only present during the breeding season 2,400 hours was applied. For snipe, a species known to fly at night a correction of 25% was applied to account for potential nocturnal flight time. The figures calculated for occupancy, in bird-seconds, are shown in **Table 7**.

$$\text{Observation effort} = \text{Area}_{\text{viewshed}} * \text{Survey effort} \quad (6)$$

$$n = \frac{\text{Flight time at risk height (hrs)}}{\text{Observation effort}} * \text{Area}_{500\text{m turbine buffer}} * \text{Daylight hours} \quad (7)$$

**Table 7.** Occupancy  $n$  (bird-secs) values calculated for each Vantage Point

Species	VP1	VP2	VP3	VP4
Whooper swan	7.11369	0.12883	0.00000	58.08181
White-tailed eagle	6.11969	0.77730	30.50346	3.34060
Hen harrier	0.00000	2.73128	0.00000	0.00000
Sparrowhawk	0.78458	1.15768	3.43878	0.00000
Buzzard	31.06918	23.08753	43.56168	17.02628
Golden eagle	27.19861	3.50613	24.93972	7.99589
Kestrel	51.36353	0.29769	14.02931	8.47004
Merlin	0.00000	15.67709	2.40668	0.00000
Snipe	0.00000	0.00000	20.79210	0.00000
Lesser black-backed gull	105.99608	0.00000	6.95681	0.00000
Herring gull	1019.94785	0.00000	0.00000	0.00000
Great black-backed gull	20.39896	2.26575	4.23850	1.29314

As previously described, a weighting factor was used to account for the varying extents of cover of each VP as well as the combined cover of each VP not accounting for the entire site. Weighted values for  $n$  were calculated using the values for percentage cover described in **Table 4**. In this case, the combined VPs do not cover the entirety of the site and therefore the total cover is 0.98.

$$n_{\text{weighted}} = \frac{n_{VP} (0.16) + n_{VP} (0.51) + n_{VP} (0.74) + n_{VP} (0.78)}{0.97}$$

Once a value for  $n$  and  $n_{\text{weighted}}$  has been calculated for each VP, this is then used to generate the mean activity for the site as a percentage of time (i.e. a percentage occupancy) within the risk



zone,  $n_{avg}$ . This is calculated by adding the values for  $n$  calculated for each VP then dividing by the number of VPs. In this case, both weighted and unweighted values for  $n_{avg}$  were obtained, as shown in **Table 8**.

**Table 8.** Values obtained for  $n_{avg}$  and  $n_{weightedavg}$  (bird-secs)

Species	$n_{avg}$	$n_{weightedavg}$
Whooper swan	16.3311	11.9648
White-tailed eagle	10.1853	6.8219
Hen harrier	0.6828	0.3585
Sparrowhawk	1.3453	0.8379
Buzzard	28.6862	16.0122
Golden eagle	15.9101	7.9316
Kestrel	18.5401	6.5355
Merlin	4.5209	2.5149
Snipe	5.1980	3.9505
Lesser black-backed gull	28.2382	5.7206
Herring gull	254.9870	42.3278
Great black-backed gull	7.0491	2.2087

The bird occupancy of the rotor swept volume  $b$  is then worked out using Equation 3 by multiplying  $n_{avg}$  by  $\frac{v_r}{v_w}$ .

The bird occupancy of the swept volume  $b$  is used to ascertain the number of bird transits through the rotors  $N$  by dividing  $b$  by the rotor transit time  $t$ , see Equation 4-5. **Error! Reference source not found.** The number of transits through the rotors  $N$  is then adjusted by a factor of 0.85<sup>11</sup> to obtain  $Tn$ , which takes into account likely wind turbine down time. Calculations for the number of transits through the rotors are shown in **Table 9** for the E-126 and **Table 10** for the N133.

<sup>11</sup> This operational period of 85% is referenced from a report by the British Wind Energy Association (BWEA) (2007) which identifies the standard operational period of the wind turbines in the UK to be roughly 85%.

**Table 9.** Values obtained for number of transits through the rotors  $T_n$  for the E-126

Species	Weighted			Unweighted		
	$b$	$N$	$T_n$	$b$	$N$	$T_n$
Whooper swan	63.0393	197.2116	167.6299	46.1851	144.4850	122.8122
White-tailed eagle	34.1260	96.6902	82.1867	22.8568	64.7609	55.0467
Hen harrier	2.1353	4.3373	3.6867	1.1210	2.2771	1.9355
Sparrowhawk	4.0660	9.3903	7.9817	2.5324	5.8486	4.9713
Buzzard	90.9075	232.2747	197.4335	50.7433	129.6526	110.2047
Golden eagle	53.5292	132.1572	112.3336	26.6859	65.8842	56.0016
Kestrel	56.1661	130.7091	111.1027	19.7989	46.0759	39.1645
Merlin	13.5065	31.8729	27.0920	7.5134	17.7301	15.0706
Snipe	15.4568	62.0449	52.7381	11.7472	47.1541	40.0810
Lesser black-backed gull	90.2764	234.5609	199.3768	18.2886	47.5185	40.3907
Herring gull	818.7422	2278.2392	1936.5033	135.9112	378.1877	321.4595
Great black-backed gull	23.1753	67.4101	57.2986	7.2615	21.1216	17.9533

**Table 10.** Values obtained for number of transits through the rotors  $T_n$  for the N133

Species	Weighted			Unweighted		
	$b$	$N$	$T_n$	$b$	$N$	$T_n$
Whooper swan	66.1168	206.8393	175.8134	48.4398	151.5385	128.8078
White-tailed eagle	35.7919	101.4105	86.1989	23.9726	67.9224	57.7341
Hen harrier	2.2395	4.5490	3.8667	1.1758	2.3882	2.0300
Sparrowhawk	4.2645	9.8487	8.3714	2.6561	6.1341	5.2140
Buzzard	95.3455	243.6141	207.0720	53.2206	135.9821	115.5848
Golden eagle	56.1425	138.6090	117.8176	27.9887	69.1006	58.7355
Kestrel	58.9080	137.0902	116.5266	20.7655	48.3252	41.0764
Merlin	14.1659	33.4289	28.4146	7.8801	18.5957	15.8063
Snipe	16.2114	65.0738	55.3127	12.3206	49.4561	42.0377
Lesser black-backed gull	94.6836	246.0119	209.1101	19.1814	49.8383	42.3625
Herring gull	858.7123	2389.4603	2031.0412	142.5462	396.6504	337.1528
Great black-backed gull	24.3067	70.7009	60.0958	7.6160	22.1527	18.8298

## 4.2 Stage 2 - Probability of bird being hit when flying through the rotors

**Table 3** provides the collision probability of the selected target species passing through the rotors. The average collision probability is applied within the CRM and is based the collision probability of a bird travelling upwind and one travelling downwind. All collision probability calculations were undertaken using the setting for birds flapping, as opposed to the setting for gliding birds. This is appropriate for birds, like golden plover and snipe that predominately employ a flapping mode of flight. The flapping setting generates higher values for collision probability in species that incorporate gliding in their flight behaviour, in particular larger raptors, like buzzards. The higher (flapping) value has been retained for these species and will generate a more precautionary estimate for collision risk.

The model was also run for different rotation periods to examine the relationship between varying dynamic operation ranges and collision risk. The results of the varying collision probabilities for each species and each turbine model are shown in **Table 11**.

**Table 11.** Variation in collision risk probability for low and high rotation periods

<b>Species</b>	<b>High rotation period</b>		<b>Low rotation period</b>	
	<b>E-126 (5s)</b>	<b>N133 (4s)</b>	<b>E-126 (12s)</b>	<b>N133 (9s)</b>
Whooper swan	9.90%	11.61%	6.89%	7.08%
White-tailed eagle	8.99%	10.49%	6.64%	6.61%
Hen harrier	9.93%	12.09%	5.54%	6.27%
Sparrowhawk	8.15%	9.88%	4.70%	5.23%
Buzzard	8.44%	10.10%	5.34%	5.69%
Golden eagle	9.93%	11.81%	6.58%	6.86%
Kestrel	8.18%	9.90%	4.82%	5.31%
Merlin	7.78%	9.42%	4.56%	5.04%
Snipe	5.20%	5.94%	4.11%	4.03%
Lesser black-backed gull	8.55%	10.18%	5.60%	5.88%
Herring gull	8.19%	9.68%	5.58%	5.75%
Great black-backed gull	8.27%	9.75%	5.76%	5.89%

**Table 12.** Collision risk model results for the Enercon E-126

Species	Unweighted					Weighted				
	Collisions/year		Stats			Collisions/year		Stats		
	No avoid	Avoid	Per 10 years	Per 30 years	1 bird every x years	No avoid	Avoid	Per 10 years	Per 30 years	1 bird every x years
Whooper swan	14.74	0.03	0.29	0.88	33.92	10.80	0.02	0.22	0.65	46.30
White-tailed eagle	7.29	0.36	3.64	10.93	2.74	4.88	0.24	2.44	7.32	4.10
Hen harrier	0.36	0.01	0.07	0.22	137.42	0.19	0.00	0.04	0.11	261.76
Sparrowhawk	0.65	0.01	0.13	0.39	77.39	0.40	0.01	0.08	0.24	124.26
Buzzard	16.51	0.33	3.30	9.91	3.03	9.22	0.18	1.84	5.53	5.43
Golden eagle	11.04	0.11	1.10	3.31	9.06	5.50	0.06	0.55	1.65	18.17
Kestrel	9.03	0.45	4.51	13.54	2.22	3.18	0.16	1.59	4.77	6.28
Merlin	2.09	0.04	0.42	1.26	23.88	1.16	0.02	0.23	0.70	42.92
Snipe	2.69	0.05	0.54	1.61	18.58	2.05	0.04	0.41	1.23	24.45
Lesser black-backed gull	16.88	0.08	0.84	2.53	11.85	3.42	0.02	0.17	0.51	58.49
Herring gull	156.64	0.78	7.83	23.50	1.28	26.00	0.13	1.30	3.90	7.69
Great black-backed gull	4.68	0.02	0.23	0.70	42.69	1.47	0.01	0.07	0.22	136.25

**Table 13.** Collision risk model results for the Nordex 133

Species	Unweighted					Weighted				
	Collisions/year		Stats			Collisions/year		Stats		
	No avoidance	With avoidance	Per 10 years	Per 30 years	1 bird every x years	No avoidance	With avoidance	Per 10 years	Per 30 years	1 bird every x years
Whooper swan	17.18	0.03	0.34	1.03	29.11	12.59	0.03	0.25	0.76	39.73
White-tailed eagle	7.65	0.38	3.82	11.47	2.62	5.12	0.26	2.56	7.68	3.91
Hen harrier	0.38	0.01	0.08	0.23	131.03	0.20	0.00	0.04	0.12	249.58
Sparrowhawk	0.68	0.01	0.14	0.41	73.79	0.42	0.01	0.08	0.25	118.48
Buzzard	17.32	0.35	3.46	10.39	2.89	9.67	0.19	1.93	5.80	5.17
Golden eagle	11.58	0.12	1.16	3.47	8.63	5.77	0.06	0.58	1.73	17.32
Kestrel	9.47	0.47	4.73	14.20	2.11	3.34	0.17	1.67	5.01	5.99
Merlin	2.20	0.04	0.44	1.32	22.76	1.22	0.02	0.24	0.73	40.92
Snipe	2.82	0.06	0.56	1.69	17.72	2.14	0.04	0.43	1.29	23.31
Lesser black-backed gull	17.70	0.09	0.89	2.66	11.30	3.59	0.02	0.18	0.54	55.76
Herring gull	164.28	0.82	8.21	24.64	1.22	27.27	0.14	1.36	4.09	7.33
Great black-backed gull	4.91	0.02	0.25	0.74	40.70	1.54	0.01	0.08	0.23	129.91



## 5 Results and observations

The output figures from stage 1 (bird transits through the rotors per year) and stage 2 (probability of a bird being hit while passing through the rotors) are multiplied to get an estimated collision/mortality rate per year in the absence of any avoidance. An avoidance rate is then applied to this value – see **Table 3**. These results are detailed in **Error! Reference source not found.** for the Enercon E-126 and **Table 13** for the Nordex N133.

The results generated by running this version of the CRM are considered to represent high levels of theoretical collision risk posed to the target species recorded within the turbine envelope based on the flight data collected from October 2018 to August 2020, due to the parameters entered into the model being notably precautionary, including turbine dimensions, higher than average rotational period and selecting flapping flight behaviour for each species. It is also important to note that, as is always the case with a modelled approach, the collision risk model outputs are only considered to be indicative of the level of risk of fatalities resulting from the proposed wind farm site and should be considered in conjunction with other discussions within the Avi-fauna section in the Biodiversity Chapter of the EIS. For instance, the outputs from the model do not take account of potential displacement of birds from the wind farm envelope, which for species breeding within or directly adjacent to the site may be more of a cause for concern, e.g. sparrowhawk, merlin and snipe. It is also acknowledged that the application of CRMs to smaller, evasive species like sparrowhawk, merlin and snipe may not provide an accurate estimate of collision risk, as these species can be difficult to detect over the full extent of the viewsheds for VPs, due to diminutive size, cryptic nature and/or flight behaviour.

The worst-case CRM for Graffy Wind Farm (N133 turbines) generated notably low levels of theoretical collision risk for eight of the target species recorded. Less than 1.5 collisions (weighted) were predicted over the 30-year life span of the project for the following species:

- Whooper swan 0.76 collisions per 30 years (weighted)
- Hen harrier 0.12 collisions per 30 years (weighted)
- Sparrowhawk 0.25 collisions per 30 years (weighted)
- Merlin 0.73 collisions per 30 years (weighted)
- Snipe 1.29 collisions per 30 years (weighted)
- Lesser black-backed gull 0.54 collisions per 30 years (weighted)
- Great black-backed gull 0.23 collisions per 30 years (weighted)

The low levels of collision risk generated for some of these species were driven by low recorded usage within the turbine envelope, in particular for hen harriers (four observations of single birds over the two-years). This was also the case for *Larus* gulls, with relatively low numbers and observation recorded for lesser black-backed gulls (11 observations of 1 to 4 birds over the two-years) and great black-backed gulls (6 observations of 1 to 2 birds over the two-years). The predicted collision risk for

herring gulls although higher at 4.09 collisions per 30 years (weighted), was the result of a single observations of c. 150 birds circling through the site for c. 2 minutes, and overall, there were only three observations of herring gulls within the turbine envelope over the two years and the other observations were of only one and two birds. There were no regular gull flight paths identified through the turbine envelope and the occasional gull flocks recorded during VP watches were birds linked to the mink farm, c. 3.5 km to the west of the wind farm site, where several hundred gulls were regularly recorded, presumably attracted by the food feed to the captive mink. Therefore, based on recorded usage the proposed Graffy Wind Farm poses a negligible impact in terms of predicted collision risk for gulls and hen harrier.

As mentioned above, the accuracy of predicted collision rates generated for some target species may be less certain due to lower detection rates resulting from cryptic plumage, smaller size and evasive flight behaviour. Sparrowhawk, merlin and snipe all provide examples of species where collision rates may need further interpretation. It is all acknowledged that the application of CRMs to smaller, evasive species like sparrowhawk, merlin and snipe may not provide an accurate estimate of collision risk, as these species can be difficult to detect over the full extent of the viewsheds for VPs, due diminutive size and/or flight behaviour.

Higher collision rates were registered for four raptor species, which given the low fecundity of some larger raptors could potentially result in effects at the population level:

- White-tailed eagle                      7.68 collisions per 30 years (weighted)
- Buzzard                                      5.80 collisions per 30 years (weighted)
- Kestrel                                        5.01 collisions per 30 years (weighted)
- Golden eagle                                1.73 collisions per 30 years (weighted)

The population-level consequences of predicted collision risks can be assessed by considering the additional mortality that would be caused (assuming that the collision risk is non-additive) relative to background mortality rates in the population, with a threshold level of a 1% increase in annual mortality used to determine whether the impact will be significant (Percival, 2003). Estimates of the potential increase in annual mortality rates for target species are discussed within the impact assessment, where relevant.

In relation to CRM for white-tailed eagle, the model applies an avoidance rate of 95% to generate predicted collision for the proposed development, as per SNH (2018), which is based on the findings of May *et al.* (2010)<sup>12</sup>. Applying a higher avoidance rate of 98% for this species can be justified based

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<sup>12</sup> May, R., Hoel, P.L., Langston, R., Dahl, E.L., Bevanger, K., Reitan, O., Nygård, T., Pedersen, H.C., Roskafi, E. & Stokke, B.G. (2010). *Collision risk in white-tailed eagles. Modelling collision risk using vantage point observations in Smola wind-power plant*. Norwegian Institute for Nature Research NINA Report 639. Trondheim, Norway

on the updated assessment for this research project, as described in May *et al.* (2011)<sup>13</sup> which details the collision risk study using radio tagged birds and actual mortality rates for white-tailed eagles at a wind farm site in Norway. Applying a 98% avoidance rate generates a lower predicted value for collision related mortality, with a worst-cased scenario (Nordex N133) of 3.07 collisions predicted over 30 years, equivalent to 1 bird every *c.* 9.5 years (weighted and based on realistic operating conditions). The predicted risk is lowered further when the model is run using the specifications of the smaller alternative turbine (Enercon E-126) of 2.79 collisions predicted over 30 years, equivalent to 1 bird every *c.* 10.5 years (weighted and based on realistic operating conditions).

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<sup>13</sup> May R, Nygård T, Dahl EL, Reitan O, Bevanger K. (2011). *Collision risk in white-tailed eagles. Modelling kernel-based collision risk using satellite telemetry data in Smøla wind-power plant*. Norwegian Institute for Nature Research 2011: 22. Trondheim, Norway.

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Table 14. Seasonal breakdown for target species flight lines recorded within 500 m turbine buffer

Target species*	Total flight secs	Season 1: Non-breeding 2018-19				Season 3: Non-breeding 2019-20			
		Mean No. of birds (range) No. of flight observations	Flight seconds in height bands			Mean No. of birds (range) No. of flight observations	Flight seconds in height bands		
			0 to 18m	18 to 150m	> 150m		0 to 18m	18 to 150m	> 150m
Grey heron	136	1.00 (range: na) 1 observation		75					
<b>Whooper swan</b>	7,148	14.00 (range: 5 to 23) 2 observations		7,075		3.00 (range: na) 1 observation		63	
Mallard	126								
<b>White-tailed eagle</b>	3,694	1.00 (range: na) 3 observations		247	40				
<b>Hen harrier</b>	296	1.00 (range: na) 3 observations	39	167					
Sparrowhawk	757					1.00 (range: na) 4 observations	56	75	
Buzzard	8,011	1.11 (range: 1 to 2) 9 observations	17	2,128		1.25 (range: 1 to 2) 4 observations	4	1,289	
<b>Golden eagle</b>	4,729	1.00 (range: na) 2 observations		702		1.00 (range: na) 5 observations		907	38
<u>Kestrel</u>	3,811	1.00 (range: na) 2 observations	0	347		1.00 (range: na) 11 observations	109	940	476
<b>Merlin</b>	2,102	1.00 (range: na) 1 observation	5			1.00 (range: na) 2 observations	10	143	
<b>Peregrine</b>	31					1.00 (range: na) 1 observation	18		
<b>Red grouse</b>	22	1.00 (range: na) 1 observation	22						
<u>Jack snipe</u>	6								
<u>Snipe</u>	1,339								
<b>Black-headed gull</b>	124								
<u>Lesser black-backed gull</u>	3,002	2.00 (range: na) 1 observation		368		3.00 (range: na) 1 observation		90	
<b>Herring gull</b>	20,005	1.00 (range: na) 1 observation	105						
<u>Great black-backed gull</u>	1,130					1.50 (range: 1 to 2) 2 observations		376	
<u>Mixed gull flocks</u>	7,500								

Target species	Season 2: Breeding 2019				Season 4: Breeding 2020			
	Mean No. of birds (range) No. of flight observations	Flight seconds in height bands			Mean No. of birds (range) No. of flight observations	Flight seconds in height bands		
		0 to 18m	18 to 150m	> 150m		0 to 18m	18 to 150m	> 150m
Grey heron	1.00 (range: na) 1 observation	9			1.00 (range: na) 2 observations	27	25	
<b>Whooper swan</b>	1.00 (range: na) 1 observation		10					
Mallard	2.50 (range: 2 to 3) 2 observations	126						
<b>White-tailed eagle</b>	1.00 (range: na) 3 observations		117	510	1.00 (range: na) 2 observations		2,780	
<b>Hen harrier</b>					1.00 (range: na) 3 observations	45	45	
<u>Sparrowhawk</u>	1.00 (range: na) 3 observations	83	171		1.00 (range: na) 4 observations	45	140	187
Buzzard	1.09 (range: 1 to 2) 11 observations	20	2,565	587	1.11 (range: 1 to 2) 10 observations		1,401	
<b>Golden eagle</b>	1.00 (range: na) 1 observation			201	1.18 (range: 1 to 2) 11 observations		2,048	833
<u>Kestrel</u>	1.00 (range: na) 3 observations		359		1.2 (range: 1 to 2) 5 observations		1,368	212
<b>Merlin</b>	1.31 (range: 1 to 3) 13 observations	201	199	681	1.07 (range: 1 to 2) 15 observations	147	716	
<b>Peregrine</b>	1.00 (range: na) 1 observation	13						
<b>Red grouse</b>								
<u>Jack snipe</u>	1.00 (range: na) 1 observation		6					
<u>Snipe</u>	1.33 (range: 1 to 2) 1 observation		787		1.00 (range: na) 2 observations	12	540	
<b>Black-headed gull</b>	1.00 (range: na) 1 observation		124					
<u>Lesser black-backed gull</u>	1.00 (range: na) 4 observations		271		2.20 (range: 1 to 4) 5 observations		1,673	600
<b>Herring gull</b>					76.00 (range: 2 to 150) 2 observations		19,500	400
<u>Great black-backed gull</u>					1.00 (range: na) 4 observations		642	112
<u>Mixed gull flocks</u>					50.00 (range: na) 1 observation			7,500

\*Primary target species are highlight in **Bold** (Annex I BoCCl red listed), secondary target species indicated by underline (BoCCl amber listed) and BoCCl green listed target species are played in plain text.

