REPORT TO INFORM SCREENING FOR APPROPRIATE ASSESSMENT

FOR THE

DRAFT WIND ENERGY DEVELOPMENT GUIDELINES 2019

for: Department of Housing, Planning and Local Government

Custom House,
Dublin 1

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4 DECEMBER 2019

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1 Introduction

1.1 Background

CAAS prepared this document on behalf of the Department of Housing, Planning and Local Government in support of the screening for, and if necessary, undertaking of an Appropriate Assessment (AA) of the draft Wind Energy Development Guidelines 2019 in accordance with the requirements of Article 6 of the Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) ("Habitats Directive"). The overall aim of the Habitats Directive is to maintain or restore the "Favourable Conservation Status" of habitats and species of European Community Interest. These habitats and species are listed in the Habitats Directive and Council Directive 2009/147/EC on the conservation of wild birds ("Birds Directives") with Special Areas of Conservation and Special Protection Areas designated to afford protection to the most vulnerable of them. These two designations are collectively known as European sites.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in European sites at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations (in particular Part XAB of the Planning and Development Act 2000, as amended, and the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477) (often referred to as the Habitats Regulations) to ensure the ecological integrity of these sites. Screening for AA comprises an analysis of whether a plan or project, alone and in combination with other plans or projects, could have significant effects on a European site in view of the site's conservation objectives. If likely significant effects are predicted or cannot be ruled out then an AA must be carried out.

1.2 Legislative Context

Screening for AA comprises an analysis of whether a plan or project, alone and in combination with other plans or projects, could have significant effects on a European site in view of the site's conservation objectives. These sites consist of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) and provide for the protection and long-term survival of Europe's most valuable and threatened species and habitats.

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 an EU-wide network of sites known as Natura 2000. In Ireland, these are candidate Special Areas of Conservation (cSACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/ECC), hereafter referred to as European sites.

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect European sites. Article 6(3) establishes the requirement for AA:

> *"Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to AA 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) sets out the provisions for plans or projects which are likely to result in significant adverse effects on the integrity of a European site however there are no alternative solutions available; there are imperative reasons of overriding public interest for the plan/programme/project to proceed; and adequate compensatory measures are put in place:

> *If, in spite of a negative assessment of the implications for the [Natura 2000] 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.*
>
> *Where the site concerned hosts a priority natural habitat type and/or a priority species the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest."*

These requirements are implemented in Ireland by the Planning and Development Act 2000, as amended, and the European Communities (Birds and Natural Habitats) Regulations 2011.

This report details a Screening for AA to inform the AA Screening Determination (as to whether subsequent stages of AA are necessary) to be made by the Minister of Housing, Planning and Local Government.

1.3 Guidance

This AA Screening has been prepared in accordance with the following guidance:

- *AA of Plans and Projects in Ireland. Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government, 2010.*
- *Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission Environment DG, 2002.*
- *Managing Natura 2000 sites: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC: European Commission, 2019.*
- *Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg (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. Office for Official Publications of the European Communities, Luxembourg (EC 2007).*
- *Wind Energy Developments and Natura 2000, Publications Office of the European Union, Luxembourg (EU 2011)*
- *Guidance on Energy Transmission Infrastructure and EU nature legislation (2018)*

In addition, a detailed online review of published scientific literature and 'grey' literature was conducted. This included a detailed review of resources available on the National Parks and Wildlife Service's Website.

Definitions of conservation status, integrity and significance used in this assessment are defined in accordance with 'Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC' (EC, 2000) as follows:

- The conservation status of a natural habitat is defined as the sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species;
- The conservation status of a species is defined as the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its population;
- The integrity of a European site is defined as the coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified;
- Significant effect should be determined in relation to the specific features and environmental conditions of the protected site concerned by the plan or project, taking particular account of the site's conservation objectives.

1.4 Approach

1.4.1 Overview

There are four main stages in the AA process; the requirements for each depending on likely impacts to European sites.

Stage One: Screening
The process which identifies the likely impacts upon a European site of a project or plan, either alone or in combination with other projects or plans and considers whether these impacts are likely to be significant.

Stage Two: AA
The consideration of the impact on the integrity of European sites as a result of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts. If adequate mitigation is proposed to ensure no significant adverse impacts on European sites, then the process may end at this stage. However, if the likelihood of significant impacts remains, then the process must proceed to Stage 3.

Stage Three: Assessment of Alternative Solutions
The process which examines alternative ways of achieving the objectives of the project or plan that avoids adverse impacts on the integrity of the European site.

Stage Four: Assessment where no alternative solutions exist and where adverse impacts remain
An assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed.

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. First, the Guidelines should aim to avoid any impacts on European sites by identifying possible impacts early in the Guidelines-making process and writing the Guidelines in order to avoid such impacts. Second, mitigation measures should be applied, if necessary, during the AA process to the point where no adverse impacts on the site(s) remain. If the Guidelines are still likely to result in impacts on a European site or sites, and no further practicable mitigation is possible, then it must be rejected. If no alternative solutions are identified and the Guidelines are required for imperative reasons of overriding public interest (IROPI test) under Article 6(4) of the Habitats Directive, then compensation measures are required for any remaining adverse effect.

The Habitats Directive establishes the requirement to assess potential effects of plans/projects on the qualifying interests, and conservation objectives (including structure and function) of designated European sites (and, where relevant, non-qualifying interests that are important to the overall functioning of the site and its conservation objectives under Articles 10, and 12-16 of the Habitats Directive). Similarly, Article 4(4) of the Birds Directive identifies a requirement to consider special conservation interest species, pollution and the deterioration of bird habitats, which requires considerations beyond the footprints of designated areas.

The draft Guidelines will be non-spatially specific and will include high-level policies, objectives and methods to be employed in all future wind energy developments.

The Guidelines will be supplementary to and will inform policy, plans and programmes within the wider planning framework that are subject to their own preparation, review and associated environmental assessment processes. Projects will be required to comply with these provisions, the Guidelines and with all relevant environmental protection and management legislation. The draft Guidelines are examined in relation to their compliance with the Habitats and Birds Directives. To this end, the AA process follows a Source-Pathway-Receptor Model.

1.4.2 Source-pathway-receptor model

Ecological impact assessments of potential effects on European sites are conducted following a standard source-pathway-receptor model, where, in order for an effect to be established all three elements of this mechanism must be in place. The source looks at where the pollution/environmental risk comes from. The pathway shows how the pollution/environmental risk can travel through the environment and the receptor details who or what could be affected by the pollution/environmental risk. A single source may have a number of pathways and receptors. The absence or removal of one of the elements of the mechanism is sufficient to conclude that a potential effect is not of any relevance or significance.

In the interest of this report, receptors are the ecological features and constitutive characteristics of the ecological niche which are known to be utilised by the qualifying interests or special conservation interests of a European site. A source is any identifiable element of the draft Guidelines which is known to have interactions with ecological processes. The pathways are any connections or links between the source and the receptor. This report determines if direct, indirect and cumulative adverse effects, however minor, will arise from the proposed development.

1.4.3 Zone of influence

The Guidelines will not be spatially constrained/specific beyond their application at the national level. Therefore, all European sites and their sensitive receptors within Ireland and relevant sites and receptors in Northern Ireland will be considered in the assessment. The Habitats Directive Article 17 reports for 2013 and 2017 are used to inform the assessment as well as the national report on Article 12 of the Birds Directive. Following the precautionary principle, the assessment focuses on the identification of potential sources for effects; an examination of the measures that facilitate the avoidance of sources and provide a framework for ensuring that ecological considerations are an integral role of the planning process for wind energy developments.

2 The Draft Wind Energy Development Guidelines

The Department of Housing, Planning and Local Government has prepared Draft Wind Energy Development Guidelines 2019. This work has been carried out in association with the Department of Communications, Climate Action and the Environment which is responsible for renewable energy policy. The Guidelines will apply to future planning applications for new onshore wind energy developments and to the repowering or renewals of existing wind energy developments currently in operation.

The Guidelines offer advice to planning authorities on planning for wind energy through the development plan process and in determining applications for planning permission. The draft Guidelines are also intended to ensure a consistency of approach throughout the country in the identification of suitable locations for wind energy development and the treatment of planning applications for wind energy developments. They should also be of assistance to developers and the wider public in considering wind energy developments.

3 Screening for Appropriate Assessment

3.1 Introduction to Screening

3.1.1 Background to screening

This stage of the process identifies any likely significant affects to European sites from a project or plan, either alone or in combination with other projects or plans. A series of questions are asked during the Screening Stage of the AA process in order to determine:

- Whether the draft Guidelines can be excluded from AA requirements because they are directly connected with or necessary to the management of European sites; and
- Whether the draft Guidelines will have a likely significant effect on European sites, either alone or in combination with other projects or plans, in view of conservation objectives.

An important element of the AA process is the identification of the "'conservation objectives", "Qualifying Interests" (QIs) and/ or "Special Conservation Interests" (SCIs) of European sites requiring assessment. QIs are the habitat features and species listed in Annexes I and II of the Habitats Directive for which each European site has been designated and afforded protection. SCIs are wetland habitats and bird species listed within Annexes I and II of the Birds Directive. It is also vital that the threats to the ecological / environmental conditions that are required to support QIs and SCIs are considered as part of the assessment.

Site-Specific Conservation Objectives (SSCOs) have been designed to define favourable conservation status for a particular habitat or species at that site. According to the European Commission interpretation document 'Managing Natura 2000 sites: The provisions of Article 6 of the Habitats Directive 92/43/EEC', paragraph 4.6(3) states:

> *"The integrity of a site involves its ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the site's conservation objectives."*

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 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.

The screening stage of the AA takes account of the elements detailed above as relevant with regard to the details and characteristics of the draft Guidelines to determine if potential for significant effects on European sites are likely.

3.1.2 Desktop studies

The ecological desktop study completed comprised the following elements:

- Review of status and current understanding of features/attributes designated under the Habitats Directive and Birds Directive as reported by the National Parks and Wildlife Service;
- Habitats Directive Article 17 reports for 2013 as well as the national report on Article 12 of the Birds Directive;

- A series of ecological desk studies were undertaken in February and August 2018. This included but is not limited to the collation of information on protected species including Bats, Otters, Bird species (including Annex I species) [1], Annex II habitat types, protected and Red Data Book Flora species, invertebrates and amphibians. Sensitivity mapping of birds in relation to wind energies published from BirdWatch Ireland. www.birdwatchireland.ie/OurWork/PolicyAdvocacy/BirdSensitivityMapping/tabid/1312/Default.aspx

3.2 Identification of Relevant European sites

In determining the potential for likely significant effects (if any), the absence of any controls, conditions, or mitigation measures is assumed and a number of factors are taken into account as relevant. Firstly, the sensitivity and reported threats to European sites. Secondly, the individual elements of the draft Guidelines and the potential effect they may cause to the European site(s) are considered. This section of the screening process describes the European sites which exist within the Zone of Influence of the site. The DEHLG (2009) Guidance on AA recommends a 15km buffer zone be considered around the site. Similarly, a distance of 15km is currently recommended in the case of plans, and derives from UK guidance (Scott Wilson et al., 2006). For projects, the distance could be much less than 15km, 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. Although the guidelines only relate to onshore wind energy projects, the effects of such project could result in potential effects to off shore European sites. This is a national strategy for Ireland and therefore all designated sites on the island of Ireland must be considered.

European sites that occur in Ireland are illustrated in Figure 3.1 below. Details on the specific qualifying interests and special conservation interests of each European site can be found on the NPWS[2] and Joint Nature Conservation Committee (JNCC)[3] websites which both have dedicated databases for European sites. As the draft Guidelines are to be implemented in Ireland, NPWS data for Irish sites was reviewed and considered and is provided for information purposes in Appendix A. The data issued by the JNCC was also reviewed and considered and remains available from on the JNCC website.

In order to determine the potential for effects from the draft Guidelines, information on the qualifying features, known vulnerabilities and threats to ecological integrity pertaining to potentially affected European sites was reviewed. Background information on threats to individual sites and vulnerability of habitats and species that was used during this assessment included the following:

- *Ireland's Article 17 Report to the European Commission "Status of EU Protected Habitats and Species in Ireland" (NPWS, 2019).*
- *JNCC (2013) The UK Approach to Assessing Conservation Status for the 2013 EU Habitats Directive Article 17 Reporting. JNCC, Peterborough. Available to download from http://jncc.defra.gov.uk/page-6563 or http://jncc.defra.gov.uk/page-6564*[4]*.*
- *Site Synopses.*
- *NATURA 2000 Standard Data Forms.*

Since the draft Guidelines are high level non-spatial guidelines that provides a framework to support wind energy developments in Ireland, the assessment considers potential interactions with high level landscape-scale ecological processes; as well as ensuring the draft Guidelines provides a robust framework to ensure all lower-tiered plans/projects will be developed in accordance with the Habitats and Birds Directives having due consideration for the potential effects of wind energy projects, plans and related developments.

[1] Including Birdwatch Ireland: Bird Sensitivity Mapping for Wind Energy Developments, available at: https://www.birdwatchireland.ie/OurWork/PolicyAdvocacy/BirdSensitivityMapping/tabid/1312/Default.aspx
[2] NPWS (2019) Online Database Resource of all Protected Sites in Ireland; available at https://www.npws.ie/protected-sites
[3] JNCC (2019) last accessed 11th July 2019; http://archive.jncc.gov.uk/page-4
[4] The JNCC report and associated databases were reviewed.

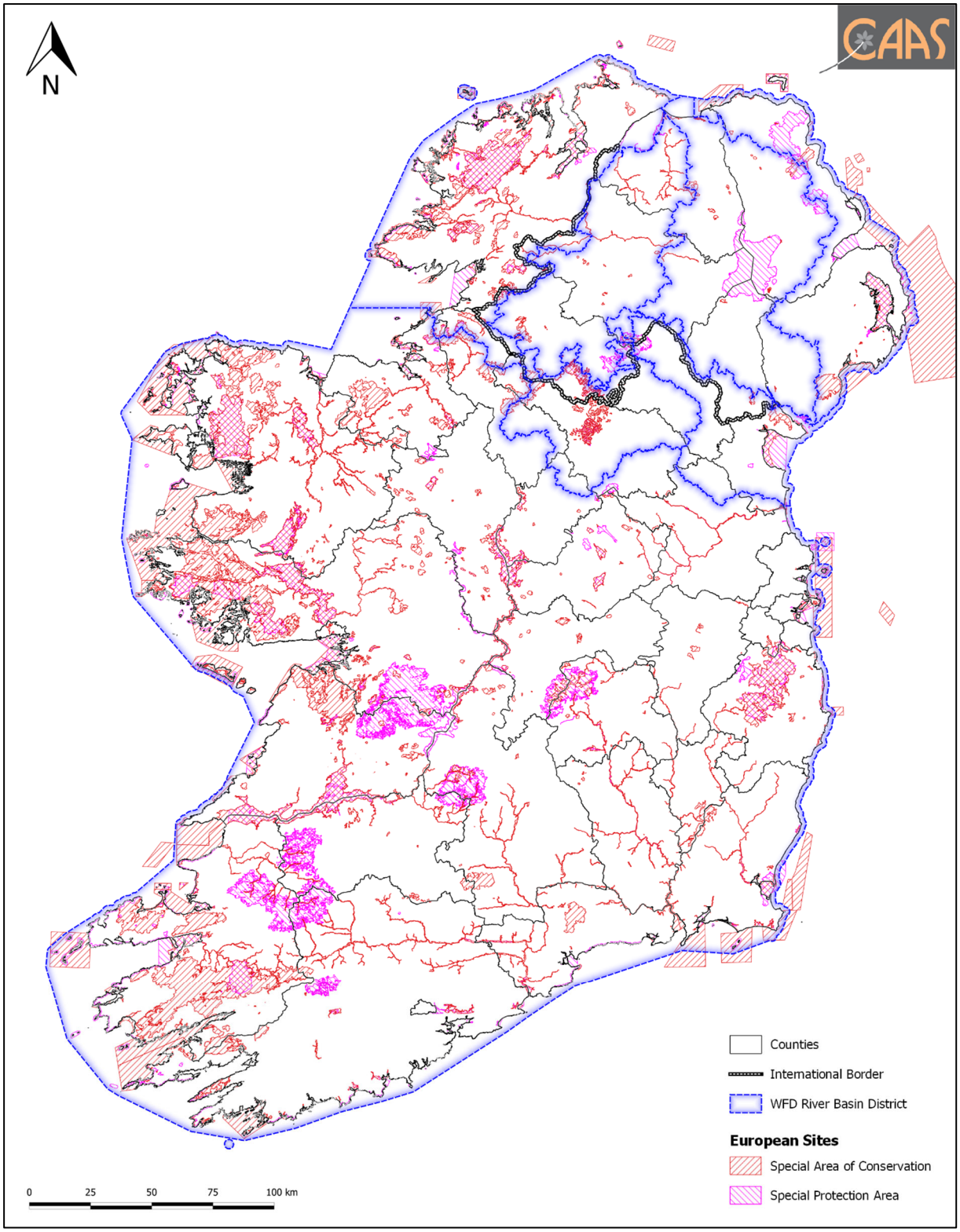

Figure 3.1 Distribution of European sites across Ireland

3.3 Screening Assessment Criteria

3.3.1 Are the draft Guidelines necessary to the management of European sites?

Under the Habitats Directive, Guidelines that are directly connected with or necessary to the management of European sites do not require AA. For this exception to apply, management is required to be interpreted narrowly as nature conservation management in the sense of Article 6(1) of the Habitats Directive. This refers to specific measures to address the ecological requirements of annexed habitats and species (and their habitats) present on a site(s). The relationship should be shown to be direct and not a by-product of the Guidelines, even if this might result in positive or beneficial effects for European sites.

The primary purpose of the draft Guidelines is not the nature conservation management of the sites, but to offer advice to planning authorities on planning for wind energy through the development plan process and in determining applications for planning permission. Therefore, the draft Guidelines are not considered by the Habitats Directive to be directly connected with or necessary to the management of designated European sites.

3.3.2 Elements of the draft Guidelines with potential to give rise to effects

Wind turbines are known to have the potential to negatively affect biodiversity due to the introduction of effects such as collision risk, barotrauma, habitat loss and/or habitat fragmentation etc. Potential significant effects can be avoided through effective planning processes which consider ecological sensitivities and processes, throughout the design process. The draft Guidelines advise that environmental - including ecological - considerations are integrated into the design of wind energy projects, thereby contributing towards the protection of European sites. In addition, the draft Guidelines state that local authorities should follow a sieve mapping analysis looking at the key environmental, landscape, technical and economic criteria which must be balanced in order to identify the most suitable location for wind energy development within their catchment. It is noted that the draft Guidelines provide a framework for wind energy strategies and wind energy developments; where a wind energy project is proposed it will be subject to compliance with all relevant legislation and local area policies and objectives as well as the policies and objectives within the draft Guidelines.

The draft Guidelines are non-spatially specific beyond their application to national onshore areas and they do not directly provide for the development of wind energy plans/projects. Rather they provide advisory measures that will contribute towards the protection of ecological processes. The details of the draft Guidelines relate to high-level processes to shape and inform the design of potential future developments. The screening assessment focused on the potential effects of wind energy developments on each of the Qualifying Interest and Special Conservation interest species with regard for their vulnerabilities and sensitivities. Details of these considerations for each of the QI's and SCI's can be found in Appendix A.

This Screening for AA recognises that the draft Guidelines offer advice to planning authorities on planning for wind energy through the development plan process and in determining applications for planning permission. The guidelines are also intended to ensure a consistency of approach throughout the country in the identification of suitable locations for wind energy development and the treatment of planning applications for wind energy developments. They should also be of assistance to developers and the wider public in considering wind energy development. The draft Guidelines do not provide for the development of any infrastructure but seek to coordinate the planning and development process. Therefore, effects typically associated with wind energy developments will be reduced by the implementation of the guidelines. Typical effects associated with wind energy developments include:

- Barotrauma/Collision Risk;
- Subsidence or Soil Stability Interactions;
- Water Quality Interactions; and
- Habitat Loss/Fragmentation.

4 Screening Conclusion

The draft Guidelines will contribute to the planning consent process for future wind energy plans and projects, therefore in the absence of mitigation measures effects to European sites could arise as a result of wind energy development. These potential effects include:

- Barotrauma/Collision Risk;
- Subsidence or Soil Stability Interactions;
- Water Quality Interactions; and
- Habitat Loss/Fragmentation.

The likely effects that could arise from the draft Guidelines have been examined in the context of a number of factors that could potentially affect the integrity of any European site. On the basis of the findings of this Screening for AA, it is concluded that, in the absence of mitigation measures, the draft Guidelines:

- Are not directly connected with or necessary to the management of a European site; and
- Likely significant effects on some European sites cannot be ruled out.

Therefore, applying the precautionary principle and in accordance with Article 6(3) of the Habitats Directive, a Stage 2 AA is required.

This report will inform the AA Screening Determination to be made by the Minister of Housing, Planning and Local Government.

Appendix A Background information on Sensitive Receptors

List of Qualifying Interests

Code	Qualifying Interest Name	Vulnerability | Likely Significant Effect from wind energy development
1110	Sandbanks which are slightly covered by sea water all the time	The NPWS state that it is considered that current pressures and future threats are unlikely to significantly impact this habitat.
1130	Estuaries	Pollution and fishing/aquaculture related activities are identified as the biggest threat to habitat quality by the NPWS.
1140	Mudflats and sandflats not covered by seawater at low tide	Pollution, fisheries/aquaculture and diverse use of the foreshore are likely to affect habitat quality particularly eelgrass beds; according to the NPWS.
1150	Coastal lagoons	Drainage, siltation and pollution have been identified by the NPWS as being the largest threat to this habitat type. It is noted that agriculture is the biggest contributor to these effects.
1160	Large shallow inlets and bays	Fishing and aquaculture related activities are identified as being likely to affect this habitat type by the NPWS.
1170	Reefs	This habitat type has been identified by the NPWS to be sensitive to deep sea fishing particularly.
1180	Submarine structures made by leaking gases	No specific threats were identified by the NPWS.
1210	Annual vegetation of drift lines	Pressures associated with recreation such as beach cleaning and coastal defences are identified as the main threat to the habitat type by the NPWS.
1220	Perennial vegetation of stony banks	Pressures associated with recreation and coastal defences are identified as the main threat to the habitat type by the NPWS.
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	Site management issues such as invasive species, coastal defences and pathway management are identified by the NPWS as the most significant effects to the habitat.
1310	Salicornia and other annuals colonising mud and sand	Erosion and invasive species issues are the main threats identified by the NPWS.
1320	Spartina swards (*Spartinion maritimae*)	No specific threats were identified by the NPWS for this habitat type.
1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	Grazing is the only threat identified by the NPWS and this effect is reported to be low.
1410	Mediterranean salt meadows (*Juncetalia maritimi*)	Grazing is the only threat identified by the NPWS and this effect is reported to be low. The location of these habitats in Ireland limit their potential interaction with Wind Energy developments.
1420	Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)	This habitat only exists along the south coast of Wexford and eastern Waterford. It has an extremely restricted range and population size. The location of these habitats in Ireland limit their potential interaction with Wind Energy developments.
2110	Embryonic shifting dunes	Recreational pressure and coastal defences are the identified threats by the NPWS.
2120	Shifting dunes along the shoreline with Ammophila arenaria (white dunes)	Recreational pressure and coastal defences are the identified threats by the NPWS.
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)	Recreational pressure and inadequate grazing are the identified threats by the NPWS.
2140	Decalcified fixed dunes with *Empetrum nigrum*	Under grazing and intensive agriculture practices are the main threats identified by the NPWS.
2150	Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)	Under grazing and intensive agriculture practices are the main threats identified by the NPWS.
2170	Dunes with Salix repens ssp. argentea (*Salicion arenariae*)	Under grazing, forestry and intensive agriculture practices are the main threats identified by the NPWS.
2190	Humid dune slacks	Local hydrological interactions, recreation and agriculture are the main threats to this habitat.
21A0	Machairs (* in Ireland)	This habitat type is known to be directly reliant on grazing regimes, which require strict management. Machair is a coastal habitat that relies heavily on grazing regimes to maintain the community assemblages of the habitat. Wind energy developments do not directly interact with agricultural practices or land management regimes; however, land use change or land purchasing etc could result in alterations to management practices. Therefore potential effects to this habitat type could occur through direct land take within the immediate vicinity of the turbines and other infrastructure building.
3110	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	Eutrophication, drainage and effects to peatland are main threats to this habitat as identified by the NPWS. Agriculture and forestry sources are highlighted as the main contributors to these effects.
3130	Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*	The main threats to this habitat type as identified by the NPWS are eutrophication and water quality issues. Agriculture and domestic waste water treatment is noted as the primary driver for these effects. Peatland and forestry management are also highlighted as contributing factors.
3140	Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.*	The main threats to this habitat type as identified by the NPWS are eutrophication and water quality issues. Agriculture as well as municipal and industrial waste water treatment is noted as the primary driver for these effects. The movement of pollutants through groundwater are a key concern for the habitat.
3150	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation	The main threats to this habitat type as identified by the NPWS are eutrophication and water quality issues. Agriculture as well as municipal and industrial waste water treatment is noted as the primary driver for these effects. The movement of pollutants through groundwater are a key concern for the habitat.
3150	Natural dystrophic lakes and ponds	Changes to hydrological characteristics, turbidity and ammonia concentrations are the main threats identified by the NPWS to this habitat. Forestry and land use management are the key drivers for this.

Code	Qualifying Interest Name	Vulnerability | Likely Significant Effect from wind energy development
3180	Turloughs	Groundwater pollution and inadequate grazing regimes are the only threats identified by the NPWS.
3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	Nutrient and organic losses from agriculture and municipal and industrial discharges are the most significant pressures identified by the NPWS for the habitat type.
3270	Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation	No threats were identified by the NPWS. The EEA (2012)[5] report identifies hydrodynamic interactions, invasive, agriculture and pollution to be the main threats to the habitat type. Wind energy developments have potential to introduce sources for effects to hydrological interactions, pollution sources and changes to agricultural practices. The interactions between wind energy developments and hydrodynamics are site and project specific.
4010	Northern Atlantic wet heaths with *Erica tetralix*	Afforestation and agricultural improvements are a threat to this habitat type by the NPWS. These threats are related to land use management activities. Agriculture and forestry are currently the leading cause of these interactions. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes.
4030	European dry heaths	Afforestation and agricultural improvements are a threat to this habitat type by the NPWS. These threats are related to land use management activities. Agriculture and forestry are currently the leading cause of these interactions. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes.
4060	Alpine and Boreal heaths	Ineffective grazing regimes and trampling due to hillwalkers along the ridges causing erosion have been identified as a threat to the habitat by the NPWS.
5130	*Juniperus communis* formations on heaths or calcareous grasslands	Low recruitment levels and ineffective grazing regimes are the mean threats.
6130	Calaminarian grasslands of the *Violetalia calaminariae*	Threats to this habitat type include household dumping, overgrazing, erosion, abandonment to cores vegetation as toxicity declines through leeching and trampling.
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	Scrub encroachment and agricultural practices are the main threats to this habitat as identified by the NPWS. This habitat is reliant on the structure of the communities and the management practices at a local scale to ensure its conservation[6]. Wind energy development introduces sources for effects on these conditions with respect to potential direct land take, land management interactions, construction phase effects and potential collision risk during the operational phase.
6230	Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in continental Europe)	Scrub encroachment and abandonment of management practices are the main threats to this habitat as identified by the NPWS. This is a hard soil substrate habitat which is sensitive to alterations to management leading to floral composition change. Wind energy development introduce sources for effects on these conditions with respect to potential direct land take, land management interactions, construction phase effects and potential collision risk during the operational phase.
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	Forestry and agricultural practices are the main threats to this habitat as identified by the NPWS. These threats are related to land use management activities. Wind energy developments do not displace agricultural practices beyond the immediate footprint of the turbines and other physical structures during the operational phase. Developments of any kind have potential to contribute to these pressures through vectors such as the clearance of coniferous plantations leading to increased acidification or the mobilisation of soils/nutrients. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes.
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	Grazing, habitat management and agricultural practices are identified as the main threats to this habitat type by the NPWS. The draft Guidelines may introduce sources for effects such as potential direct land take, land management interactions, construction phase effects and potential collision risk during the operational phase.
6510	Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)	Grazing, habitat management and agricultural practices are identified as the main threats to this habitat type by the NPWS.
7110	Active raised bogs	Active raised bogs are hydrogeologically sensitive to effects from draining, shrinking, and slumping. These threats are related to land use management activities. Agriculture and forestry are currently the leading cause of these interactions. Developments of any kind have potential to contribute to these pressures through vectors such as the clearance of coniferous plantations leading to increased acidification or the mobilisation of soils/nutrients. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes.
7120	Degraded raised bogs still capable of natural regeneration	Degraded raised bogs are hydrogeologically sensitive to effects from draining, shrinking, and slumping. These threats are related to land use management activities. Agriculture and forestry are currently the leading cause of these interactions. Developments of any kind have potential to contribute to these pressures through vectors such as the clearance of coniferous plantations leading to increased acidification or the mobilisation of soils/nutrients. The operational phase elements of the wind energy guidelines could promote renewable energy sources which would contribute to a reduction in greenhouse gas emissions. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions.
7130	Blanket bogs (* if active bog)	Threats include overgrazing, trampling, peat extraction, burning and development. These threats are related to land use management activities. Agriculture and forestry are currently the leading cause of these interactions. Developments of any kind have potential to contribute to these pressures through vectors such as the clearance of coniferous plantations leading to increased acidification or the mobilisation of soils/nutrients. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes.
7140	Transition mires and quaking bogs	The main threats identified are peat extraction, wetland reclamation and infilling. These threats are related to land use management activities. Agriculture and forestry are currently the leading cause of these interactions. Developments of any kind have potential to contribute to these pressures through vectors such as the clearance of coniferous plantations leading to increased acidification or the mobilisation of soils/nutrients. The operational phases of wind energy developments have relatively passive with collision

[5] EEA (2012) Report under the Article 17 of the Habitats Directive Period 2007-2012

[6] NPWS (2013) Irish Semi-natural Grasslands Survey: Leinster (except Offaly, Longford, Dublin and Kildare)

Code	Qualifying Interest Name	Vulnerability | Likely Significant Effect from wind energy development
		risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes.
7150	Depressions on peat substrates of the Rhynchosporion	Sheep grazing, peat cutting, drainage and compaction are the main threats. These threats are related to land use management activities. Agriculture and forestry are currently the leading cause of these interactions. Developments of any kind have potential to contribute to these pressures through vectors such as the clearance of coniferous plantations leading to increased acidification or the mobilisation of soils/nutrients. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions.
7210	Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*	The main threats identified are peat extraction, wetland reclamation, changes to hydrogeology, abstraction and infilling etc. These threats are related to land use management activities. Agriculture and forestry are currently the leading cause of these interactions. Developments of any kind have potential to contribute to these pressures through vectors such as the clearance of coniferous plantations leading to increased acidification or the mobilisation of soils/nutrients. Construction phase effects are temporary and ecological systems are highly resilient to temporary effects. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes.
7220	Petrifying springs with tufa formation (*Cratoneurion*)	Drainage land reclamation, unsuitable grazing regimes, pollution and water abstraction are the main threats identified for this habitat type. The draft Guidelines do not introduce any source for potential water abstraction or interactions with grazing regimes. The interactions between wind energy developments and hydrodynamics are site and project specific.
7230	Alkaline fens	The main threats identified are peat extraction, wetland reclamation and infilling. These threats are related to land use management activities. Agriculture and forestry are currently the leading cause of these interactions. Construction phase effects are temporary and ecological systems are highly resilient to temporary effects. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes.
8110	Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)	The main threats identified are grazing, invasive species and recreation. The operational phases of wind energy developments are relatively passive with collision risk being the biggest risk in terms of ecological interactions. Consideration must be given to the soil stability and potential pathways for effects through hydrological vectors.
8120	Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*)	The main threats identified are grazing, invasive species and recreation. Consideration must be given to the soil stability and potential pathways for effects through hydrological vectors.
8210	Calcareous rocky slopes with chasmophytic vegetation	The main threats identified are grazing, invasive species and recreation.
8220	Siliceous rocky slopes with chasmophytic vegetation	The main threats identified are grazing, invasive species and recreation.
8240	Limestone pavements	Encroachment and ineffective grazing conditions are the main threats identified.
8310	Caves not open to the public	Dumping and vandalism are identified as threats to this habitat type.
8330	Submerged or partially submerged sea caves	No specific threats were identified for the habitat.
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	Grazing and fragmentation are the main threats identified by the NPWS.
91D0	Bog woodland	No specific threats were identified for the habitat.
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)	Fragmentation, invasive species, and encroachment from problematic native species are identified as the main threats.
91J0	*Taxus baccata* woods of the British Isles	No specific threats were identified for the habitat.
1013	*Vertigo geyeri*	These species occupy a very narrow niche and are very reliant on microhabitats and fine scale management activities[7]. Grazing regimes are a key element of these species conservation; the draft Guidelines do not interact with these effects.
1014	*Vertigo angustior*	
1016	*Vertigo moulinsiana*	
1024	*Geomalacus maculosus*	No specific threats were identified by the NPWS for this species. This species is regionally isolated. The only effect to this species are through potential direct habitat interaction effects in terms of construction phase mobilisation of suspended solids, dust, site run off etc.
1029	*Margaritifera margaritifera*	Sedimentation, nutrients, in stream works and recreational fishing are identified threats to this species by the NPWS. The draft Guidelines will not interact with fishing practices. These species are freshwater which are sensitive to alterations to hydrological condition, sedimentation and water quality. Wind energy developments have potential to introduce sources for these effects. The interactions between wind energy developments and hydrodynamics are site and project specific.
1065	*Euphydryas aurinia*	Low breeding success and small population requiring intervention are the threats identified by the NPWS.
1092	*Austropotamobius pallipes*	Invasive species and associated zoonotic are the main threat for this species. Wind energy developments do not interact with the speed of zoonotic or invasive species; therefore, there are no sources for effects in this regard imposed by the draft Guidelines.

[7] NPWS (2011) Monitoring and Condition Assessment of Populations of Vertigo geyeri, Vertigo angustior and Vertigo moulinsiana in Ireland. Irish Wildlife Manuals, No. 55

Code	Qualifying Interest Name	Vulnerability | Likely Significant Effect from wind energy development
		These species are all freshwater which are sensitive to alterations to hydrological condition, sedimentation and water quality. Wind energy developments have potential to introduce sources for these effects. The interactions between wind energy developments and hydrodynamics are site and project specific.
1095	*Petromyzon marinus*	Limited access to juvenile spawning grounds is the main threat. Wind energy developments do not limit the movement patterns of aquatic species; therefore, there are no sources for effects in this regard imposed by the draft Guidelines.
1096	*Lampetra planeri*	No specific threats were identified by the NPWS for this species. These species are all freshwater which are sensitive to alterations to hydrological condition, sedimentation and water quality. Wind energy developments have potential to introduce sources for these effects. The interactions between wind energy developments and hydrodynamics are site and project specific.
1099	*Lampetra fluviatilis*	
1103	*Alosa fallax fallax*	Water quality issues and hybridization are identified as threats to the species. Wind energy developments have no effect on hybridization. This species is sensitive to alterations to hydrological condition, sedimentation and water quality. Wind energy developments have potential to introduce sources for these effects. The interactions between wind energy developments and hydrodynamics are site and project specific.
1106	*Salmo salar*	Habitat and water quality issues are the main threats identified for the species. There are a number of studies focusing on the effects of off-shore wind energy developments on salmon. However, the draft Guidelines refer only to onshore wind energy developments. In this regard the noise and vibration effects to salmon are negligible. This species is sensitive to alterations to hydrological condition, sedimentation and water quality. Wind energy developments have potential to introduce sources for these effects. The interactions between wind energy developments and hydrodynamics are site and project specific.
1303	*Rhinolophus hipposideros*	Loss of roosts, direct disturbance, alteration in agricultural practices and habitat fragmentation are the threats for this species. Wind energy developments have the potential to create barriers to movement for this species. The literature shows that direct impacts to bats through collision risk and/or barotrauma[8] etc. can occur through ineffective design of wind developments[9]. There are a number of studies that have shown that wind energy developments can exist in harmony with bats. Adjusting rotor blade angles, turbine speed, and activity during low wind conditions for example have been shown to be effective measures for reducing bat mortality[10,11].
1349	*Tursiops truncatus*	Availability of prey, pollution, habitat degradation and fisheries conflicts are identified as the main threats.
1351	*Phocoena phocoena*	Availability of prey, pollution, habitat degradation and fisheries conflicts are identified as the main threats.
1355	*Lutra lutra*	No specific threats were identified by the NPWS for this species. There are no known effects of wind energy developments on otter populations that are specific to wind energy and not standard considerations/effects due to development under that developmental framework[12]. Development related effects include disturbance during construction, water quality etc, loss of holts etc.
1364	*Halichoerus grypus*	Availability of prey, pollution, habitat degradation, fisheries conflicts and direct disturbance through recreation are identified as the main threats.
1365	*Phoca vitulina*	Availability of prey, pollution, habitat degradation, fisheries conflicts and direct disturbance through recreation are identified as the main threats by the NPWS.
1393	*Drepanocladus vernicosus*	No specific threats were identified by the NPWS for this species. These species are all freshwater or marshy species which are sensitive to alterations to hydrological conditions, sedimentation and water quality. Wind energy developments have potential to introduce sources for these effects. The interactions between wind energy developments and hydrodynamics are site and project specific.
1395	*Petalophyllum ralfsii*	
1421	*Trichomanes speciosum*	
1528	*Saxifraga hirculus*	
1990	*Margaritifera durrovensis*	
1833	*Najas flexilis*	Enrichment through eutrophication, acidification and peatland damage are identified as threats to this species. These threats are related to land use management activities. Agriculture and forestry are currently the leading cause of these interactions. Developments of any kind have potential to contribute to these pressures through vectors such as the clearance of coniferous plantations leading to increased acidification or the mobilisation of soils/nutrients. Construction phase effects are temporary and ecological systems are highly resilient to temporary effects. The operational phases of wind energy developments have relatively passive with collision risk being the biggest risk in terms of ecological interactions. These interactions can be managed through effective planning and design processes.
5046	*Alosa fallax killarnensis*	Water quality issues are identified as threats to the species by the NPWS. This species is sensitive to alterations to hydrological condition, sedimentation and water quality. Wind energy developments have potential to introduce sources for these effects. The interactions between wind energy developments and hydrodynamics are site and project specific.

[8] Baerwald, E.F., D'Amours, G.H., Klug, B.J. and Barclay, R.M., 2008. Barotrauma is a significant cause of bat fatalities at wind turbines. *Current biology*, *18*(16), pp. R695-R696.
[9] Bat Conservation Ireland (2012) Bats and Appropriate Assessment Guidelines, Version 1, December 2012. Bat Conservation Ireland, www.batconservationireland.org.
[10] Arnett, E.B., Huso, M.M., Schirmacher, M.R. and Hayes, J.P., 2011. Altering turbine speed reduces bat mortality at wind-energy facilities. *Frontiers in Ecology and the Environment*, *9*(4), pp.209-214.
[11] Baerwald, E.F., Edworthy, J., Holder, M. and Barclay, R.M., 2009. A large-scale mitigation experiment to reduce bat fatalities at wind energy facilities. *Journal of Wildlife Management*, *73*(7), pp.1077-1081.
[12] NPWS (2009) Threat Response Plan: Otter (2009-2011)

Summaries of Current Threats and Sensitivity to effects for ornithological interests

Special Conservation Interests	Vulnerabilities of Special Conservation Interests
Ornithological interest species listed in the Birds directive.	Direct habitat loss is a serious concern for bird species, as well as the reduction in habitat quality. Habitat degradation could occur through effects such as local enrichment due to agricultural practices or damage to habitat through activities such as trampling[13]. The maintenance of migrating corridors is a key concern for bird species in relation to wind energy developments[14] Wind energy developments have the potential to create barriers to movement for these species. The literature shows that direct impacts to bird species through collision risk and/or barotrauma etc. can occur through ineffective design of wind developments[15]. There are a number of studies that have shown that wind energy developments can exist in harmony with birds with minor impacts to birds[1617]. Adjusting rotor blade angles, turbine speed, and activity during low wind conditions for example have been shown to be effective measures for reducing bird mortality[18].
Wetland and Waterbirds [A999]	This habitat is sensitive to alterations to hydrological condition, sedimentation and water quality. Wind energy developments have potential to introduce sources for these effects. The interactions between wind energy developments and hydrodynamics are site and project specific.

[13] Birdwatch Ireland (2013). Birds of Conservation Concern in Ireland 2014-2019. Birdwatch Ireland.
[14] Kuvlesky Jr, W.P., Brennan, L.A., Morrison, M.L., Boydston, K.K., Ballard, B.M. and Bryant, F.C., 2007. Wind energy development and wildlife conservation: challenges and opportunities. *Journal of Wildlife Management*, *71*(8), pp.2487-2498.
[15] Drewitt, A.L. and Langston, R.H., 2006. Assessing the impacts of wind farms on birds. Ibis, 148(s1), pp.29-42.
[16] Erickson WP, Wolfe MM, Bay KJ, Johnson DH, Gehring JL (2014) A Comprehensive Analysis of Small-Passerine Fatalities from Collision with Turbines at Wind Energy Facilities. PLoS ONE 9(9): e107491.
[17] Farfán, M.A., Vargas, J.M., Duarte, J. and Real, R., 2009. What is the impact of wind farms on birds? A case study in southern Spain. Biodiversity *and Conservation*, *18*(14), p.3743.
[18] Marques, A.T., Batalha, H., Rodrigues, S., Costa, H., Pereira, M.J.R., Fonseca, C., Mascarenhas, M. and Bernardino, J., 2014. Understanding bird collisions at wind farms: An updated review on the causes and possible mitigation strategies. *Biological Conservation*, *179*, pp.40-52.