Ecology Guidelines for Electricity Transmission Projects

A Standard Approach to Ecological Impact Assessment of High Voltage Transmission Projects
# Table of Contents

**Foreword**  
2  
**Acknowledgements**  
4  
**Summary**  
6  

**Part 1 - Background**

1. **ECOLOGICAL IMPACT ASSESSMENT OF HIGH VOLTAGE POWER LINES**  
   1.1 Introduction  
   1.2 Strategic Environmental Assessment  
   1.3 Key Considerations for EcIA  
   8  

2. **EVALUATION OF ECOLOGICAL SITES**  
   2.1 Requirements of an ecologist  
   19  

3. **POTENTIAL IMPACTS OF HIGH VOLTAGE TRANSMISSION PROJECTS ON ECOLOGY**  
   3.1 Ecological Impacts (general)  
   3.2 Potential Impacts on birds  
   3.3 Vulnerable bird species  
   3.4 Potential Impacts on Habitats  
   3.5 Potential Impacts on Watercourses  
   25  

**Part 2 - The Planning of Electrical Transmission Projects and Guidance on Ecological Impact Assessment at Each Phase**

4. **PROJECT PLANNING FOR HIGH VOLTAGE OVERHEAD ELECTRICITY TRANSMISSION PROJECTS**  
   4.1 EirGrid Project Development Roadmap  
   4.2 Ecological assessment within the process of transmission planning  
   4.3 Consultations  
   36  

5. **ECOLOGICAL REQUIREMENTS FOR STAGE 1: CONSTRAINTS AND ROUTE CORRIDOR ASSESSMENT**  
   5.1 Introduction  
   5.2 Stage 1 Part A: Ecological Constraints  
   5.3 Stage 1 Part B: Route corridor assessment and identification of emerging preferred corridor  
   47  


6 ECOLOGICAL REQUIREMENTS FOR STAGE 2: PREFERRED CORRIDOR EVALUATION
6.1 Evaluation of Preferred Corridor

7 ECOLOGICAL IMPACT ASSESSMENT SCOPING (FOR EIS) AND APPROPRIATE ASSESSMENT SCREENING
7.1 Introduction

8 ECOLOGICAL REQUIREMENTS FOR STAGES 3 AND 4: ECOLOGICAL IMPACT ASSESSMENT OF TRANSMISSION PROJECT
8.1 Introduction
8.2 Approach (See Section 5.2)
8.3 Contents of Ecology Chapter of EIS or Environmental Report
8.4 Appropriate Assessment (if Natura 2000 sites are impacted)
8.5 Stage 3 and 4 - Alternative Solutions and IROPI

9 POST ENVIRONMENTAL IMPACT STATEMENT
9.1 Environmental Management Plan
9.2 Ecological Monitoring
9.3 Maintenance

10 REFERENCES
Irish Red Data Books and Lists (downloadable as pdf files from npws.ie)

APPENDICES
APPENDIX 1. CRITERIA FOR ASSESSING IMPACT SIGNIFICANCE
APPENDIX 2. SOURCES OF INFORMATION
APPENDIX 3. HERITAGE COUNCIL HABITAT CLASSIFICATION
APPENDIX 4. TYPICAL ELECTRICITY STRUCTURES 110 KV, 220 KV AND 400 KV
APPENDIX 5. PROJECT SPECIFIC MITIGATION MEASURES
APPENDIX 6. GLOSSARY OF TERMS
Foreword

EirGrid is delighted to publish our first Ecology Guidelines for Electricity Transmission Projects which outlines the principles to be applied for the protection of Ireland’s Ecological Heritage developed in conjunction with ESB Networks, prepared by Natura Environmental Consultants and in consultation with the National Parks and Wildlife Service.

EirGrid is the independent electricity Transmission System Operator (TSO) in Ireland and the Market Operator in the wholesale electricity trading system. EirGrid is responsible for developing a safe, secure, reliable, economical and efficient transmission system, having due regard for the environment. It is also responsible for obtaining statutory consent in respect of new high voltage transmission network (110/220/400kV) developments and ensuring that all reasonable demands for electricity are met.

The existing high voltage transmission network system includes approximately 6,000 km of overhead lines and underground cables and over 100 transmission stations. High voltages are used to avoid power losses which would otherwise occur when transferring power over long distances in a lower voltage system.

To ensure that the transmission system will meet international standards with respect to electricity supply, a major programme, known as Grid25, is underway to develop and reinforce the transmission system. The Grid25 programme includes the building of new transmission lines, cables and stations, line upratings and refurbishments. Grid25 has provided for growth in the demand for electricity over recent years, and for predicted future growth and integration of renewables onto the system.

EirGrid is fully committed to ensuring that these developments are carried out in an environmentally sensitive manner, protecting our natural environment.

Dermot Byrne
Chief Executive
EirGrid
Acknowledgements

The authors, Maeve Flynn (EirGrid) and Richard Nairn (Natura Environmental Consultants) wish to express gratitude to the individuals and organisations that provided advice, recommendations and information for this guidance document.

In particular, the authors would like to thank:

- The National Parks and Wildlife Service
- The EPA
- Inland Fisheries Ireland
- Bat Conservation Ireland
- BirdWatch Ireland.

The authors gratefully acknowledge the contributions provided by project Ecologists at Natura Environmental Consultants: Carmel Brennan, Ciara Hamilton, Katharine Duff and Andrew Speer.

Contributions from EirGrid Regional Managers, Programme Management Office and legal department are also gratefully acknowledged. Bart Moriarty of ESB Networks also provided direction and contributed to the guidance document. Input from ESB International is also acknowledged.

For information regarding impacts on birds, the authors wish to acknowledge Damian Clarke, Dr Richard Collins and Dr Marc Ruddock.

Disclaimer

While every care has been taken to ensure that the content is useful and accurate, EirGrid plc, and any contributing third party, shall have no legal responsibility for the content or the accuracy of the information so provided or for any loss or damage arising directly or indirectly in connection with reliance on the use of such information.

February 2012
110 kV transmission line with wooden pole sets
These guidelines have been developed by EirGrid to provide best practice guidance for ecological impact assessment (flora and fauna) in the planning and construction of high voltage transmission projects.

The guidelines aim to provide a standard approach to ecological impact assessment (EcIA) of high voltage transmission projects and associated infrastructure and to provide greater consistency in impact assessment. They are based on a review of Environmental Impact Statements (EIS) and Environmental Reports (ER) prepared for high voltage electricity transmission projects, published national and international best practice and legal obligations in relation to protected species of flora and fauna, protected habitats and Nature Conservation Sites.

It is envisaged that these guidelines will be updated on a regular basis to reflect any changes in legislation as it relates to the protection of biodiversity.

The consideration of the impacts of a project on flora and fauna are required as part of the Environmental Impact Assessment (EIA) process in addition to impacts on other disciplines such as landscape and visual, socio-economics, water etc. Where EIA is not required, it is normal EirGrid practice that a non-statutory Environmental Report will detail impacts on flora and fauna. However, without a systematic approach to ecological impact assessment of transmission projects, the standard and scope of ecological reporting can vary considerably.

This guidance document has been prepared for professional consultants and ecologists carrying out ecological impact assessment.

**Part I** of this document provides an introduction to the process of ecological impact assessment and its role in EIA and within the planning process for electrical transmission systems. Key components of the natural environment are described and potential impacts of overhead power lines and associated infrastructure on ecology are presented.

**Part II** provides detailed technical guidance for the assessment of ecology at various stages of the planning and design process for transmission projects. Recommendations for post construction monitoring are provided in order to monitor the effectiveness of proposed mitigation measures, and to assist in the preparation of an environmental management plan.

**Objectives of the Guidelines**

1. To provide best practice guidance and a systematic approach for ecological impact assessment of high voltage overhead power line infrastructure projects.

2. To provide best practice guidance on ecological topics of particular relevance to high voltage overhead power lines including:
   - The risks of collision by birds with high voltage overhead power lines
   - The impacts of electricity transmission projects on sensitive habitats, particularly wetlands, peatlands and watercourses.
220 kV double circuit transmission line
Part I - Background

1. Ecological impact assessment of high voltage power lines

1.1 Introduction

EirGrid is the statutory Electricity Transmission System Operator with the exclusive statutory function to operate and develop Ireland’s high voltage electricity grid. It also operates the all-island electricity market. EirGrid is a state-owned company delivering quality connection, transmission and market services to electricity generators, suppliers and customers. EirGrid’s mission, as transmission system operator, is to operate and develop a safe, secure, reliable, economic and efficient power system in Ireland, while taking into account the needs of the environment.

The Transmission System is a meshed network of high voltage power lines and cables for the transmission of bulk electricity supplies around Ireland. It is commonly known as the national grid and is made up of over 6,000 km of high voltage lines and cables. It is the backbone of the electricity transmission system in the country. The transmission network plays an important role in transporting the power from the variety of generation sources, both conventional and renewable, to towns and cities for onward distribution to every home.

The Irish national grid is largely composed of a 110 kilovolts (kV) network but, as the demand for electricity has grown, high capacity 220 kV and 400 kV lines have been built. There is still a growing demand for electricity supply throughout the country and thus, expansion of the national grid is ongoing. EirGrid’s Grid Development Strategy, Grid25 provides an approach for development over the next decade and beyond with strong focus on the facilitation of renewable generation to the grid. Approximately 1,150 km of new high voltage circuits will be required to be built. Low voltage systems will be addressed in a separate document.

The construction of new electricity transmission systems will invariably have impacts on the environment. These guidelines have been developed to improve the manner in which ecology is assessed in Environmental Impact Statements (EIS) and Environmental reports for high voltage transmission projects by providing best practice guidance on the treatment of ecology and biodiversity impacts for such schemes.

Ecology is the scientific study of the distribution and abundance of living organisms and how distribution and abundance are affected by interactions between the organisms and their environment. It is commonly used as a synonym for biodiversity and, for the purpose of these guidelines, refers to the study of flora, fauna (including fisheries) and their habitats, both terrestrial and aquatic (including freshwater, coastal and marine).

Ecological impact assessment (EcIA) is the non-statutory process of identifying, quantifying and evaluating the potential impacts of defined actions on ecosystems or their components (Trewick, 1999). It is usually a component of broader Environmental Impact Assessment (EIA) studies, addressing specifically the EIA topics of Flora and Fauna.

Certain public and private projects that are likely to have significant effects on the environment are subject to Environmental Impact Assessment (EIA) requirements under EU Directive 85/337/EEC (as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC). This process includes consideration of the impacts of these projects on flora and fauna and the interrelationships between, for example, flora and fauna and hydrology and landscape and visual.
Projects where EIA is mandatory are identified in Annex I of the EIA Directive. For example, the EIA Directive requires an EIA for electrical power lines with a voltage of 220 kilovolts or more and a length of more than 15 kilometers.

This requirement is transposed into Irish law in the Planning and Development Acts 2000 to 2010 and associated Regulations 2001-2011.

The process and various stages of electrical transmission planning and the preparation of an EIS or Environmental Report are examined in Part II, Chapters 5 to 9 of this document.

**Environmental Impact Assessment - EIA**

The process of examining the environmental effects of development / projects - from consideration of environmental aspects at design stage through to preparation of an Environmental Impact Statement, evaluation of the EIS by a competent authority and the subsequent decision as to whether the development should be permitted to proceed, also encompassing public response to that decision.

**Environmental Impact Statement - EIS**

A statement of the effects, if any, which the proposed development, if carried out, would have on the environment.

**An EIS is mandatory for:**

- Development involving transmission of electricity by overhead cables where the voltage is 200kV or more and a length of more than 15km.

**An EIS may be required for:**

- Sub-threshold development involving transmission of electricity by overhead cables where the voltage is below 200kV or where the voltage is 200kV and the length is less than 15km and where significant impacts on the environment are likely (as determined by the decision maker).

**An ER is required for:**

- Development of transmission projects which do not require an EIS. This includes sub-threshold development which has been deemed by the competent authority as not having likely significant impacts on the environment.

Ecological resources and risks of effects on the environment must also be taken into consideration for sub threshold projects that do not require an EIS, as defined by the scale of the project, by its proximity to nature conservation sites, its potential for encountering strictly protected species of flora or fauna and its potential to impact ‘natural habitats and protected species’ and cause environmental damage as per the Environmental Liability Directive and associated Regulations. Ecological impact assessments are carried out to evaluate the full biodiversity resources of the area in terms of the habitats and species potentially affected, some of which may be legally protected and to demonstrate and record that good environmental practice has been followed. Baseline data, full impact assessment and appropriate mitigation measures should be presented in an Environmental Report.
1.2. Strategic Environmental Assessment

It should also be noted that under the European Union Strategic Environmental Assessment Directive (Directive 2001/42/EC), flora and fauna and biodiversity considerations and their interrelationships with other disciplines may enter into the planning of transmission schemes before the project stage. SEA is a formal statutory process, involving the systematic evaluation of the likely significant environmental effects and applies to plans or programmes. Energy is one of the sectors specified under the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 to 2011. Accordingly, the Grid25 Implementation Programme was subject to SEA and Appropriate Assessment.

Mitigation measures proposed as part of the Appropriate Assessment of the SEA included two levels of mitigation. The first level of measures are strategic in nature and include new procedures and resources which together comprise a Strategic Environmental Framework by which EirGrid approaches all projects for transmission infrastructure development. New positions have been created including the creation of an in-house dedicated Grid25 Programme Management Office (PMO) and the direct employment of public planners and an ecologist. New structures and datasets are in place, including Strategic Environmental Constraints Mapping, as well as the SEA and AA, both of which have informed the Grid25 Implementation Programme. Studies have been commissioned to determine the actual effect of the construction and existence of power projects in a representative range of typical Irish environmental conditions. These evidence-based studies will provide data and information to inform Evidence-Based Design Guidelines for Power Projects in Ireland. Project specific mitigation measures are detailed in Appendix 5.

1.3. Key Considerations for EcIA

1.3.1 Nature Conservation Sites

Nature Conservation Sites include European Sites (SACs, SPAs including candidate and proposed sites) and nationally protected sites (NHAs, including proposed sites).

In the Republic of Ireland, the national protected area network for nature conservation covers over 10% of the total land area (EPA data) and includes sites of international and national importance (See Table 1).

Sites are designated by the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht under national and European legislation and other international directives and conventions. These areas are considered to be of prime importance for the conservation of important components of the natural environment (biodiversity, ecosystems, habitats and species).

European Sites are designated in Ireland under the EU Habitats Directive, which is transposed into Irish law by S.I. No. 477 of 2011 (European Communities (Birds and Natural Habitats) Regulations 2011).

European Sites account for the majority of Ireland's protected areas network with 423 cSACs currently protected. The areas chosen as SAC in Ireland cover an area of approximately 13,500 sq. km. Roughly 53% is land, the remainder being marine or large lakes. A total of 121 SPAs have been designated since 1985. 25 other sites have legal protection and will shortly be designated as SPAs. Ireland is also in the process of establishing an additional network of sites - Natural Heritage Areas (NHAs). To date 148 NHAs have been established. Natural Heritage Areas are established in Ireland under the Wildlife Act (1976) and Wildlife (Amendment) Act (2000).
Table 1:

Key Nature Conservation Sites and Areas of Importance for Nature in Ireland

<table>
<thead>
<tr>
<th>Nature Conservation Site*</th>
<th>Abbreviation</th>
<th>Importance</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Candidate) Special Area of Conservation</td>
<td>cSAC</td>
<td>Natura 2000/ European site</td>
<td>EU Habitats Directive (92/43/EEC) European Communities (Birds and Natural Habitats) Regulations 2011</td>
</tr>
<tr>
<td>Special Protection Area (including proposed sites)</td>
<td>SPA</td>
<td>Natura 2000/ European site</td>
<td>EU Birds Directive (79/409/EEC) European Communities (Birds and Natural Habitats) Regulations 2011</td>
</tr>
<tr>
<td>Ramsar Site</td>
<td>None</td>
<td>International</td>
<td>Ramsar Convention on Wetlands</td>
</tr>
<tr>
<td>Biogenetic Reserve</td>
<td>None</td>
<td>International</td>
<td>None</td>
</tr>
<tr>
<td>UNESCO Biosphere Reserve</td>
<td>None</td>
<td>International</td>
<td>None</td>
</tr>
<tr>
<td>Salmonid Water</td>
<td>None</td>
<td>International</td>
<td>EU Freshwater Fish Directive (78/659/EEC)</td>
</tr>
<tr>
<td>Proposed Natural Heritage Area</td>
<td>pNHA</td>
<td>National</td>
<td>Protected through spatial planning</td>
</tr>
<tr>
<td>National Park</td>
<td>NP</td>
<td>National</td>
<td>None</td>
</tr>
<tr>
<td>Local biodiversity areas</td>
<td>None</td>
<td>Regional</td>
<td>Identified by heritage/ biodiversity plan. May be protected through spatial planning</td>
</tr>
</tbody>
</table>

*For more information on these sites consult NPWS (http://www.npws.ie)
1.3.2 Rare and protected species

Special consideration must be given in the planning of electricity transmission projects to species of flora and fauna that are protected by national or international legislation or that are considered to be rare in a national or international context. It is an offence to damage or disturb a protected species and its habitat (including breeding and resting places). Information on records of rare and protected species can be obtained from the NPWS (see www.npws.ie) or from the National Biodiversity Data Centre (see www.biodiversityireland.ie). However, there are many areas throughout the country which lack official records of rare species due to lack of survey.

Information on those species listed in the Annexes to the EU Habitats Directive is given by NPWS (2008). The status of nationally rare species is reviewed in the Red Data Books and other similar publications (Curtis & McGough 1988, Stewart & Church 1992, Whilde 1993, Lynas et al., 2007) where they are listed as data deficient, least concern, near threatened, vulnerable, endangered, critically endangered etc. All current Red Lists are available for download from NPWS (see www.npws.ie).

The main legislation for the protection of species is presented Table 2.
### Table 2

**Legally Protected Species of Flora and Fauna in Ireland**

<table>
<thead>
<tr>
<th>Principal legislation</th>
<th>Annex(es)</th>
<th>Category of species</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000</strong></td>
<td>Schedules 4,5</td>
<td>All wild plant listed on Flora Protection Order and all wild birds (excluding those on Schedule 3) animal species listed on schedules 4 and 5 (including fish and invertebrates) apart from certain species relevant to fisheries (whether commercial or recreational), which will be excluded by regulations.</td>
</tr>
<tr>
<td><strong>Flora Protection Order, 1999</strong></td>
<td>Schedule 1</td>
<td>68 vascular plant species 4 liverworts 1 lichen 2 stoneworts 14 mosses.</td>
</tr>
<tr>
<td><strong>EU Birds Directive (79/409/EEC)</strong></td>
<td>Annex I</td>
<td>All bird species occurring in the wild, with particular emphasis on rare, vulnerable and endangered species in Annex I, all migratory species with particular emphasis on wetland species.</td>
</tr>
<tr>
<td><strong>Annex IV: Animal and plant species of European importance in need of strict protection</strong></td>
<td>Whiskered Bat (Myotis mystacinus) Natterer’s Bat (Myotis nattereri) Daubenton’s Bat (Myotis daubentoni) Leisler’s Bat (Nyctalus leisleri) Pipistrelle (Pipistrellus pipistrellus) Brown Long-eared Bat (Plecotus auritus) Lesser Horseshoe Bat (Rhinolophus hipposideros) Bottle-nosed Dolphin (Tursiops truncates) Harbour Porpoise (Phocoena phocoena) Otter (Lutra lutra) Natterjack Toad (Bufo calamita)</td>
<td></td>
</tr>
<tr>
<td><strong>Kerry Slug (Geomalacmus maculosus) Slender Naiad (Najas flexilis) Yellow Marsh Saxifrage (Saxifraga hirculus) Killarney Fern (Trichomanes speciosum)</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


220 kV transmission line - County Galway
1.3.3 Environmental Liability Directive


The Regulations implement the ‘polluter-pays’ principle, to prevent and remedy environmental damage. It holds operators, whose activities have caused environmental damage, financially liable for remedying this damage and holds those whose activities have caused an imminent threat of environmental damage liable to taking preventive actions.

The definition of protected species and natural habitats under the terms of the Directive is:

(a) the species mentioned in Article 4(2) of the Birds Directive or listed in Annex I thereto or listed in Annexes II and IV to the Habitats Directive, and

(b) the habitats of species mentioned in Article 4(2) of the Birds Directive or listed in Annex I thereto or listed in Annex II to the Habitats Directive, and the natural habitats listed in Annex I to the Habitats Directive and the breeding sites or resting places of the species listed in Annex IV to the Habitats Directive.

Under the terms of the Directive, environmental damage is defined as:

- Direct or indirect damage to species and natural habitats protected at Community level by the Birds Directive or the Habitats Directive;
- Direct or indirect damage to the aquatic environment covered by the Water Framework Directive.
- Direct or indirect contamination of the land which creates a significant risk to human health.

The Environmental Protection Agency (EPA) has been designated as the competent authority for all aspects of these Regulations and should be consulted in conjunction with the National Parks and Wildlife Service (NPWS). Guidance (EPA, 2011) on the implementation of the European Communities (Environmental Liability) Regulations 2008 is available at: http://www.epa.ie/downloads/consultation/Guidance_Document.pdf

1.3.4 Article 10 of Habitats Directive

Article 10 of the Habitats Directive recognises the importance of ecological coherence in protecting European Sites and requires Member States to protect landscape features that are of major importance for wild flora and fauna through land use planning and development.

These features are those which, because of their linear and continuous structure or their ability to function as “stepping stones” are essential for migration, dispersal and genetic exchange within the landscape. Examples given in the Directive are rivers with their banks, traditional field boundary systems, ponds and small woods. Under the Planning and Development Acts (2000-2010), Development Plans must include objectives for the encouragement of the management of features of the landscape, such as traditional field boundaries, important for the ecological coherence of the Natura 2000 network and essential for the migration, dispersal and genetic exchange of wild species.

Electricity transmission projects should consider, inter alia, the network of landscape features within the zone of influence and ensure that connectivity within and between ecological sites is maintained. The long-term survival of many species and habitats is dependent upon maintaining the ecological coherence of the ecosystems in which they occur and allowing free movement of species and genetic resources within the landscape.
1.3.5 Other Areas of Biodiversity Value

There are many areas of natural or semi-natural habitat in Ireland that are important for biodiversity but are not covered by designation. All areas that are important for wildlife, natural and semi-natural habitats must be considered in relation to the potential impacts of electricity transmission projects (see below for examples). While not formally protected by legislation, such areas may support protected species or examples of protected and/or rare habitats. The Environmental Liabilities Directive now gives a measure of protection to all Annexed habitats and their species, and most Annexed species and regularly occurring migratory birds and their habitats.

The overall ecological value of an area, through which a high voltage transmission project occurs, must also be considered. This should include the interconnections between habitats in the vicinity of the transmission project, which may be affected by fragmentation of habitat. Many species (particularly birds, mammals and fish) have large, dynamic territories that extend beyond site boundaries, making them vulnerable to changes in external or local environmental conditions.

1.3.6 National Biodiversity Plan

Ireland is one of 188 countries that signed the Convention on Biological Diversity (CBD) which was drawn up at the Earth Summit held in 1992 in Rio de Janeiro (UNCED, 1992). Ireland ratified its commitment to the CBD in 1996 and in 2002 the Irish Government published the first National Biodiversity Plan (NBP). In November 2011, Ireland’s second Biodiversity Plan was published - Actions for Biodiversity 2011-2016. A key concept of the plan is the integration of biodiversity into sectors.

Examples of areas of natural and semi-natural habitat of potentially high ecological value

- Fringe habitats bordering Nature Conservation Sites
- Rivers or stream systems and other wetland areas including lakes, turloughs, large ponds, canals, reed beds and marsh
- Areas of species-rich grassland
- Areas of deciduous and mixed woodland
- Hedgerows, treelines and other wildlife corridors
- Areas of heath and scrub
- Bogs and fens
- Upland and mountain habitats
- Coastal and estuarine habitats

Integration of Biodiversity into Sectors
(11 actions)

From National Biodiversity Plan (2002)

Action 1
Relevant Government Departments and State Agencies to prepare with stakeholders their own biodiversity action plans in line with agreed guidelines and to ensure and promote the conservation and sustainable use of biodiversity.

Action 4
Ensure all relevant plans and programmes and all new legislation, and key existing legislation, incorporates provisions requiring the conservation of biological diversity.
Therefore, under the NBP, EirGrid is obliged to take cognisance of nature conservation issues, including biodiversity, and to ensure that all plans incorporate provisions for the conservation of biodiversity.

A comprehensive assessment of ecological impacts of a particular scheme should examine all the relevant levels of biodiversity. The main considerations are presented in Chapter 2 and range from areas of biodiversity importance (e.g. Nature Conservation Sites, areas of local importance) to individual species of flora and fauna.

1.3.7 Reintroduced species

Since the late 1990s, a number of schemes aimed at increasing Ireland’s biodiversity through the reintroduction of once native species, have been initiated. These include the reintroduction of Golden Eagle in Co. Donegal (from 2001), Red Kite in Co. Wicklow (from 2007) and White-tailed Sea Eagle in Co. Kerry (from 2007). Although the reintroductions are recent and localised in Ireland, these species can be expected to extend their current range and should be considered where any electricity transmission project is proposed.

1.3.8 Non-native Species

Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 prohibit the introduction and dispersal of certain species of flora and fauna listed in the Third Schedule of the Regulations. Multi-disciplinary surveys undertaken as part of an EIS/ER must record these species, if present, and measures should be specified to prevent their dispersal.

Red Kite
2. Evaluation of Ecological Sites

The evaluation of the significance of ecological sites that may be affected by the construction and operation of high voltage transmission projects and associated structures is an important element in the objective assessment of impacts. This has significance at all phases in project planning, from information gathering at the constraints phase to preparation of the EIS or ER.

A standard scheme for assessing the ecological importance of sites was developed and published by Nairn and Fossitt (2004) and subsequently adopted by the NRA (2009) in their Guidelines for Assessment of Ecological Impacts of National Road Schemes (Version 3). This scheme for assessing the value of ecological sites grades sites according to the following geographic frames of reference:

- Internationally important
- Nationally important
- County Importance
- Locally important (higher value)
- Locally important (lower value)

It should be noted that the emphasis is on identification and evaluation of areas defined as ‘ecological sites’ i.e. comprising of various habitat types that make up a discrete area or site as opposed to an evaluation of individual habitats.

Examples of valuation for each geographic scale are given in Table 3. Sites containing Nature Conservation Sites or equivalent criteria may be easily evaluated at the higher end of the geographic scale. The evaluation of sites at the lower end of the geographic scale will require some understanding of the distribution and abundance of that resource on a county or local level. All ecological resources should be valued and selected by competent experts. Further information on the selection and evaluation of ecological resources is available on http://www.nra.ie/RepositoryforPublicationsInfo/file,16634,en.pdf

The scheme has been widely used in ecological assessments and EIA for road schemes and other linear developments such as pipelines. As electricity transmission line projects are also linear developments through the landscape, it is recommended that the same scheme be used in the assessment of impacts of electricity transmission development on ecological sites. In addition, as this evaluation scheme has been published and tested, it affords a degree of consistency between various ecological assessments and EIA for electrical transmission projects.

The scheme presented has application through the various project planning and design stages. However, it may not suffice in all situations e.g. when determining the significance of impacts on a specific habitat type or species. Other guidelines that provide evaluation criteria include IEEM guidelines (IEEM, 2006 http://www.ieem.net/ecia/) and Habitats Directive Annex III criteria (http://www.ecolinst.hu/html/natura2000/annex_III_hab.pdf).
Table 3

Site Evaluation Scheme (From NRA, 2009)

From Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009)
Ecological Valuation Scheme.

**International Importance:**

- ‘European Site’ including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
- Proposed Special Protection Area (pSPA).
- Site that fulfills the criteria for designation as a ‘European Site’ (see Annex III of the Habitats Directive, as amended).
- Features essential to maintaining the coherence of the Natura 2000 Network.
- Site containing ‘best examples’ of the habitat types listed in Annex I of the Habitats Directive.
- Resident or regularly occurring populations (assessed to be important at the national level) of the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
- Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
- Biosphere Reserve (UNESCO Man & The Biosphere Programme).
- Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).
- Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).
- Biogenetic Reserve under the Council of Europe.
- European Diploma Site under the Council of Europe.
- Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).

**National Importance:**

- Site designated or proposed as a Natural Heritage Area (NHA).
- Statutory Nature Reserve.
- Refuge for Fauna and Flora protected under the Wildlife Acts.
- National Park.
- Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.
- Resident or regularly occurring populations (assessed to be important at the national level) of the following:
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Site containing ‘viable areas’ of the habitat types listed in Annex I of the Habitats Directive.
### County Importance:

- Area of Special Amenity.
- Area subject to a Tree Preservation Order.
- Area of High Amenity, or equivalent, designated under the County Development Plan.
- Resident or regularly occurring populations (assessed to be important at the County level) of the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
- Species protected under the Wildlife Acts; and/or
- Species listed on the relevant Red Data list.
- Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
- County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared.
- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

### Local Importance (higher value):

- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;
- Resident or regularly occurring populations (assessed to be important at the Local level) of the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;
- Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

### Local Importance (lower value):

- Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;
- Sites or features containing non-native species that are of some importance in maintaining habitat links.

**SAC** = Special Area of Conservation; **SPA** = Special Protection Area; **NHA** = Natural Heritage Area
**BAP** = Biodiversity Action Plan (these have been published for many local authority areas)
2.1 Requirements of an ecologist

The survey and assessment of the natural environment for ecological impact assessment requires relevant expertise, experience, independence and objectivity (NRA, 2004). The EPA (2002) provides guidance on the requirements of environmental specialists and this includes the need for qualified ecologists/environmental scientists to carry out the ecological impact assessment of electricity supply schemes. The DoEHLG Guidance (2009) on Appropriate Assessment advises that the Natura Impact Statement “must be prepared by a person or persons with the requisite ecological expertise and experience ... and produced in a scientifically complete, professional and ...... objective manner”. Ideally, the ecologist employed to carry out an ecological impact assessment should be an accredited member (or associate member) of a professional body such as the Institute of Ecology and Environmental Management (IEEM) where members are bound by a code of conduct and must partake in continuous professional development (CPD).

The requirements of an ecologist are as follows (adapted from NRA, 2004):

- The ecologist should be capable of characterising the existing environment and evaluating its significance.
- The ecologist must also predict how the proposed electricity transmission project will interact with the receiving environment.
- Where mitigation measures are required, the ecologist must be capable of assisting in design of such measures prior to any decision made in respect of an application for development consent.
- The ecologist should have a knowledge of the relevant legislation and standards that apply to the subject; be familiar with the relevant standards and criteria for evaluation and classification of significant impacts; be able to interpret the specialised documentation of the construction sector, in so far as it is relevant to the natural environment; and be able to clearly and comprehensively present the findings.

Note: a single individual may not be qualified or have the relevant experience to conduct all parts of the assessment. Specialists may be required to undertake detailed surveys for fauna (e.g. birds, bats or invertebrates), flora (e.g. rare plants), vegetation communities or freshwater or marine habitats and fisheries.

For further details of survey standards see: http://www.ieem.net/surveymethods.asp
220 kV double circuit transmission line

3.1 Ecological Impacts (general)

The impacts of high voltage transmission projects are a function of the spatial alignment of the grid, the structures and conductors required for various voltages, the extent to which pre-existing corridors are used, and how the transmission line is operated and maintained (CIGRE, 2003). The range of potential ecological impacts and their significance depend on the area and circumstances of individual schemes.

Potential Impacts of High Voltage Overhead Power Line Systems

The potential impacts of a grid interconnection on biodiversity and wildlife result from the interaction of species and their habitats with the physical features of the interconnection infrastructure itself - rights-of-way, conductors, poles/towers, and substations - and the activities and hazards associated with building, operating, and maintaining the transmission line and substations. These activities include land clearing, access routes and construction work. In addition to direct impacts on habitats and species, transmission facilities and associated hazards can also affect biodiversity indirectly by altering natural relationships and competitive balances (From CIGRE 2003).

The following are examples of potential ecological impacts associated with the construction and operation of electricity transmission structures.

- Habitat loss (direct loss through land take for structures: hedgerows of high ecological value, lowland blanket bog, heath, mixed broadleaved woodland, upland bog)
- Habitat damage (during construction, site access e.g. of sensitive wetland habitats)
- Habitat fragmentation (creation of barriers, fragmentation of habitats, sites or corridors, subdivision of animal territories)
- Change in hydrology (water flows) of wetland habitats
- Hazards to birds - through collision and/or electrocution with power lines
- Loss of species (e.g. during construction and operation e.g. directly though land clearance)
Impacts may be subdivided into (1) temporary impacts as a result of construction activity (areas that subsequently recover) and (2) permanent impacts as a result of land lost to construction and during operation of the scheme.

Impacts can also be subdivided into direct and indirect impacts. The latter are defined as impacts that are caused by the interaction of effects, by indirect means, such as disturbance of species due to construction noise or by associated or off-site developments. Cumulative (or in-combination) impacts are often indirect (EPA 2002).

- Pollution or siltation of watercourses from construction activities with associated negative impacts on fisheries
- Disturbance associated with construction (e.g. noise from construction activities can drive species away from home ranges and may impact on breeding success of certain species e.g. ground-nesting birds)
- Creation of new habitats and edge effects (e.g. ecotones between cleared wayleave and adjacent habitats)
- Introduction of non-native invasive species (e.g. Japanese Knotweed, Rhododendron)
- Increased risk of fire in corridor
- Disturbance during operation (e.g. maintenance personnel or increased human activity in the area due to opening of access roads)
- Disturbance during periods of management and maintenance (e.g. tree and scrub trimming)
3.2 Potential Impacts on birds

The potential impacts of high voltage overhead electricity lines and structures such as angle masts on birds are of particular concern and the main risks posed by electricity transmission schemes are presented below.


1. Risk of collision

Birds in flight may collide with conductors or earth-wires of power lines. Collisions occur when birds cross transmission lines during display flights, when moving from roosting to feeding areas, when juveniles leave the nest site and when birds migrate though an area. Rain, fog, darkness and other low visibility conditions can contribute to a higher collision risk.

Body size, manoeuvrability and the height at which birds fly may also contribute to collision risk. Swans, geese and herons are all large aquatic birds with high vulnerability to collision. The vulnerability of raptors is thought to result from the birds pursuing quarry at speed.

2. Risk of electrocution

Birds sitting or perching on power poles and/or conducting cables may be killed if they cause short circuits and large species, such as raptors, are most at risk. This happens where the electricity structure dimensions are such that a phase-to-phase or phase-to-ground contact can be made between the bird and the structure.

Note: The risk of electrocution is low on Irish electricity transmission systems as the structures are such that phase-to-phase/ phase-to-ground contacts are not possible, even for our largest bird species (Mute Swan and White-tailed Eagle), due to the dimensions and spacing of conductors. For example, conductor spacing at 110kV is 4.5m (Appendix 4) while the wing span of Mute Swan and White-tailed Eagle may be up to 2.4m.

3. Risks of displacement or loss of habitat quality in breeding and wintering areas

Some bird species may be displaced from suitable habitat by the proximity of electricity transmission lines, which can act as a partial barrier to movement. Indirect loss of breeding or wintering habitats for bird species of conservation concern in Ireland (Lynas et al., 2007) may occur if they do not use traditional feeding or roosting sites after installation of a new power line. There is also the possibility of loss of breeding habitat for ground-nesting waders and raptors requiring a large display area.
Whooper Swans in flight
3.3 Vulnerable bird species

Those bird species most vulnerable to collision are generally “poor” fliers, while electrocution victims are usually birds of prey, ravens and thermal soarers. Bird species have been categorised by wing morphology and risk of either collision or electrocution. Three categories have been identified: species with a high risk of collision, species with a high risk of electrocution and a third mixed group, susceptible to both these causes of death. The matrix (Table 4) is suggested as a way of objectively assessing the significance of impacts on species occurring in Ireland.

There is a lack of published data on the issue of bird collision with overhead cables or powerlines in Ireland. Consultations with ornithologists in Ireland have verified some cases of collision by both raptors and water birds. The raptor species concerned were Peregrine (Falco peregrinus), Common Buzzard (Buteo buteo) and reintroduced Red Kite (Milvus milvus). Large water birds such as swans are also known to be vulnerable to collisions with overhead wires. Collins and Whelan (1994), in a study of marked birds in the Dublin-Wicklow area, recorded 191 cases of Mute Swans colliding with obstacles of which 44% concerned overhead wires. Swans venturing into an unfamiliar area may be more vigilant and, paradoxically, less vulnerable. Some work on lead poisoning in Mute Swans has shown that birds which carry a high internal load of this contaminant in their flesh may be more vulnerable to collisions as their ability to avoid hazards is impaired (O’Halloran et al., 1989).

Recent research suggests that some birds, such as raptors, may spend most of their time, when in flight, looking down or laterally but not forwards. Such behaviour may be usual and could result in certain species being at least temporarily blind in the direction of travel. This may partly explain some collisions with overhead wires and other obstacles (Martin, 2011).

A matrix has been prepared to allow the vulnerability of bird species to collision with electricity transmission lines in Ireland to be objectively evaluated (see Table 4). This involves a comparison of the susceptibility of species to collision and the level of conservation concern for that species in Ireland (Lynas et al., 2007).

Level of impacts on birds

The vulnerability of the various species should be considered in association with the relative population levels and the conservation value of the species concerned. Thus, any species which has a high risk of collision with overhead electricity lines and which is relatively rare or vulnerable at a national or international level would be considered to suffer the most significant impacts from a proposed electricity transmission project. Of particular concern are species listed under Annex I of the EU Bird Directive (2009/147/EC), Red-listed birds of conservation concern (Lynas et al., 2007), and migratory waterbirds. In particular, the vulnerable species include:

- species using flight-lines on migration routes, travelling between molting and breeding ground, or to and from roosting sites, and foraging beyond breeding grounds;
- recently reintroduced large raptors may be susceptible due to their foraging ranges, roosting locations, sub-adult gathering areas and to the absence of parental guidance.
Table 4

Proposed matrix for assessing vulnerability of bird species in Ireland to collision with electricity transmission lines

<table>
<thead>
<tr>
<th>SUSCEPTIBILITY TO COLLISION WITH POWERLINES</th>
<th>LEVEL OF CONSERVATION CONCERN</th>
<th>High (Red list)</th>
<th>Medium (Amber list)</th>
<th>Low (Green list)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
<td>Barnacle goose (w)</td>
<td>Greylag Goose</td>
<td>Other geese</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Black guillemot</td>
<td>Little Grebe</td>
<td>Other ducks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Black-throated diver</td>
<td>Mute Swan</td>
<td>Other grebes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brent goose (w)</td>
<td>Pochard</td>
<td>Pheasant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coot</td>
<td>Red-throated Diver</td>
<td>Great Northern Diver (w)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cormorant</td>
<td>Scaup (w)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eider</td>
<td>Shelduck</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gadwall</td>
<td>Slavonian Grebe</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Garganey</td>
<td>Teal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Goldeneye</td>
<td>Tufted Duck</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Goosander</td>
<td>Water Rail</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Great Crested Grebe</td>
<td>Whooper Swan (w)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Greenland White-fronted Goose (w)</td>
<td>Wigeon (w)</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td>Bar-tailed Godwit (w)</td>
<td>Ringed Plover</td>
<td>Other corvids</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Black-tailed Godwit</td>
<td>Ruff (w)</td>
<td>Woodpeckers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chough</td>
<td>Snipe</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Common Sandpiper</td>
<td>Stock Dove</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dunlin</td>
<td>Swallow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Greenshank</td>
<td>Swift</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grey Plover (w)</td>
<td>Turtle Dove</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oystercatcher</td>
<td>Woodcock</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td>Arctic Terr</td>
<td>Pied Flycatcher</td>
<td>Other passerines</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Common gull</td>
<td>Red Kite</td>
<td>Grey heron</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Common Terr</td>
<td>Redstart</td>
<td>Little egret</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Goshawk</td>
<td>Reed Warbler</td>
<td>Long-eared Owl</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grasshopper Warbler</td>
<td>Roseate Terr</td>
<td>Peregrine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Great black-backed Gull</td>
<td>Sandwich Terr</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hen Harrier</td>
<td>Short-eared Owl</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>House Martin</td>
<td>Skylark</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>House Sparrow</td>
<td>Spotted Flycatcher</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kestrel</td>
<td>Starling</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kingfisher</td>
<td>Tree Sparrow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lesser Black-backed Gull</td>
<td>Wheatear</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lesser Whitethroat</td>
<td>Whinchat</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Linnet</td>
<td>Wood Warbler</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Little Tern</td>
<td>Yellow Wagtail</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Merlin*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1. Excluded are true seabirds (those that do not enter freshwater) as these would not fly in areas where overhead powerlines exist.
2. (bold type) indicates species on Annex I of the EU Birds Directive (2009/147/EC)
3. (w) indicates wintering populations only present in Ireland
In many cases, there is a lack of information on bird flight-lines and on the populations and distribution of individual species of conservation concern in Ireland.

There is a strong consensus that the risk posed to birds depends on the technical construction type and detailed design of power line facilities. A detailed review of pole structures and safety measures for birds is presented in Haas et al. (2005) and endorsed by BirdLife International (2007).

**Mitigation measures**

When planning for high voltage transmission projects, areas identified as SPA and locations of known concentrations of vulnerable bird species and flight paths should be avoided wherever feasible.

Where potential for interactions between vulnerable bird species and high voltage overhead lines are identified through ecological impact assessment, mitigation measures can be employed to significantly reduce or remove the risk of collision.

Where possible, a buffer zone around SPAs or other important areas should be implemented. Where this is not a feasible solution, various types of bird diverters have been developed to increase the visibility of overhead wires (conductors and/or earth wires) to birds. These structures are attached directly onto the lines.

Few comprehensive experimental studies on ways to reduce avian collisions with power lines have been carried out. Mitigation options considered include: reviewing the placement of proposed new lines; removing the earth-wire which is usually the highest, thinnest and most problematic component in an overhead power line configuration; or fitting this wire with markers – brightly coloured ‘aviation’ balls, thickened wire coils, luminous, shiny or hinged flashing or flapping devices. All of these options reduce bird collision frequency overall by at least 50–60%, although the efficacy of line marking may vary between species. There remains some uncertainty about the best-performing marking...
3.4 Potential Impacts on habitats

Ecological impact issues include construction effects on vegetation and the associated impacts on wildlife habitats. Specific issues include vegetation clearance, erosion effects to adjacent habitats (e.g. rivers and streams), impacts on wetlands from direct disturbance caused by construction equipment or from erosion, and impacts from structure placement or from existence of the completed line.

Some habitats are more sensitive to disturbance than others. Wetland and peatland habitats, which depend on specific hydrological conditions, are particularly vulnerable to disturbance. Construction of power lines and associated corridors through wetland areas can generate long-term impacts to these sensitive habitats and ecosystems (Nickerson et al., 1989).

Ground conditions can pose engineering and access difficulties, particularly in areas of deep peat and other wetland habitat. Wetland vegetation and soils, particularly peats, can be damaged and destabilised during pole and tower construction and conductor stringing activities and also during repeat works such as pole repair/ replacement. Erosion may affect physical conditions in the wetland, thereby altering the plant community composition (Jackson et al., 1994).

The use of bog mats and wide-tracked vehicles can be used to minimise these impacts, however, deep peat areas should be avoided as far as is practicable. An example of the types of impacts that could occur on bog habitats can be found on page 33.
Example of potential impacts of construction activities on bogs

Bogs are susceptible to damage from both pedestrian and vehicular traffic associated with the construction and, to a limited extent, operation and maintenance of power lines. The most severe impacts relate to heavy localised traffic over wet, *Sphagnum* dominated bog (Brooks and Stoneman, 1997) which can damage and destabilise peat.

The main forms of damage to bogs resulting from vehicle pressure are physical damage to the plants and disruption to the peat surface. Even low ground-pressure vehicles can damage the bog surface as the shearing motion of tyres and tracks damages fragile vegetation. A number of factors are important in determining the degree of damage caused to plants and the peat structure:

- Operational and vehicle parameters such as speed, acceleration, wheel-track pressure.
- Surface topography.
- Degree of slope - sloping terrain is more susceptible to erosion.
- Time of year - damage maybe expected to be more severe when the ground is wetter.
- Type of vegetation - wet marshy areas experience greater disturbance than well drained areas.

In addition to damage caused by vehicles, the physical effect of trampling by people may change the surface topography. The severity of the impacts on these habitats will relate to the extent of land utilized for construction, the type of machinery used and the measures employed to reinstate disturbed areas. Repeat visits and replacement of polesets can be a particular problem in deep wet bogs.

3.5 Potential Impacts on Watercourses

A number of potential impacts on water quality and fisheries value of watercourses may result from the construction and maintenance of transmission lines and their corridors (CIGRE, 2003, Eastern Regional Fisheries Board 2004). These potential impacts include:

**Sedimentation:** Erosion from soils stripped of vegetation during power line corridor clearance and power line construction. Erosion impacts are likely to be of concern particularly in areas where forests on hillsides must be felled to create a transmission right of way. This is a particularly significant potential impact where there are records of the protected Freshwater Pearl Mussel (*Margaritifera margaritifera*) in the affected watercourse or within the catchment area.

Erosion from access road construction and, during power line operation, from vehicular traffic on existing and new access roads can result in significant direct and indirect impact on surrounding habitats, particularly sensitive peatland habitats and wetlands.

Accidental spills and other emissions of liquids used in transmission infrastructure, including lubrication oil and fuel leakage and other emissions from heavy machinery used in power lines.

**Disturbance of riparian habitat and fisheries habitat:** Impacts of heavy machinery operation in rivers channels and on river banks can disturb fisheries habitat and also the habitat of protected aquatic species such as White-clawed Freshwater Crayfish, lamprey species and Otter.
Barriers to fish passage: Potential impacts of poorly designed temporary or permanent river crossings (access roads) can include barriers to fish passage. This is particularly significant in the case of migratory fish such as salmonids and lamprey species which need to move upstream at certain times of year to spawn.

The above impacts on watercourses can have a direct impact on water quality, riparian habitats and protected species of aquatic fauna. Indirect impacts can affect downstream ecosystems through changes in water quality and siltation and disturbance of fisheries habitat.

Tree felling: Many pipelines go through plantations and this necessitates felling and ongoing management. This can be a particular problem in Freshwater Pearl Mussel catchments or sub-basins.
Part 2 - The Planning of Electrical Transmission Projects and Guidance on Ecological Impact Assessment at Each Phase

4 Project planning for high voltage overhead electricity transmission projects

4.1 EirGrid Project Development Roadmap

This section of the document provides guidance on how to approach the planning and implementation of an ecological impact assessment for high voltage transmission projects. The principles of avoidance, mitigation and compensation are central to the EIA process (Nairn and Fossitt, 2004) and therefore guide the planning and design of transmission projects.

The EirGrid approach to planning for high voltage overhead power line projects is based on five stages in the EirGrid Project Development Roadmap and these are presented below. Table 5 depicts the various stages in the EirGrid Roadmap process along with ecological assessment requirements at each stage of the Roadmap.

During Stage 1 of the Project Development Roadmap (a) the main ecological constraints within the study area are identified and (b) there is an ecological evaluation of each route corridor / site option and the emerging preferred route corridor / site is identified. These ecological evaluations form part of the Stage 1 Lead Consultants Report. Following the publication of the Stage 1 Lead Consultants Report detailing constraints and route corridor / site options, a period of public and stakeholder consultation is undertaken on the emerging preferred route / site.

Stage 2 of the Project Development Roadmap involves the incorporation of public and stakeholder consultation. The emerging preferred corridor / site is re-evaluated, including any modifications as a result of the consultation and the process of identifying an indicative route/line within the corridor begins. This process typically involves workshops with the design team and environmental specialists. The identification of a line enables EIA screening and scoping to commence and for an Appropriate Assessment screening report to be compiled during Stage 2 of the Project Development Roadmap.

Stage 3 involves conducting environmental surveys to inform the EIS / Environmental Report on the confirmed line / site, incorporating all feedback from consultation with stakeholders.

Stage 4 involves the compilation of the EIS / Environmental Report and submission of the planning application.

Stage 5 is concerned with the preparation of construction management plans and wayleaving for the proposed development.

1 In the context of an application for approval made to An Bord Pleanála pursuant to section 182A of the Planning and Development Acts 2000 to 2010.
EirGrid Project Development Roadmap

**STAGE 1**
Information Gathering
- Identify Project Study Area
- Identify environmental & other constraints
- Identify feasible options (corridor/sites)
- Publication of Stage 1 Report
- Pre-application consultation with An Bord Pleanála

**STAGE 2**
Evaluate Options
- Consideration of all feedback from Stage 1
- Identification of EirGrid’s emerging preferred option (route corridor/site)
- Identification of indicative line within corridor or site boundary
- Identify & meet landowners of indicative line/site: initial survey
- Publication of Stage 2 Report
- Pre-application consultation with An Bord Pleanála

**STAGE 3**
Confirm Design
- Consideration of all feedback from Stage 2
- Conduct environmental studies and surveys
- Confirmation of design of line/site proposal including construction methodology
- Ongoing engagement with landowners on preferred line route or site
- Pre-application consultation with An Bord Pleanála

**STAGE 4**
Prepare Planning Application
- Complete reports and prepare planning application
- Preparation of Environmental Impact Statement (EIS) or Environmental Report as required
- Consultation of Pre-application consultation with An Bord Pleanála
- Submit application to An Bord Pleanála

**STAGE 5**
Wayleaving and Construction
- Preparation of construction plans
- Serve Wayleave notice to landowners & agree access for construction
- Commerce construction

Public
- Public and stakeholder consultation on study area and constraints
- Public and stakeholder consultation on findings of Stage 1 Report

Public
- Public and stakeholder consultation on findings of Stage 2 Report

Public
- Ongoing public information
- Public can make submissions to An Bord Pleanála once application submitted

Public
- Ongoing public information
- Evaluation of Public Consultation process
4.2 Ecological assessment within the process of transmission planning

The early consideration of ecological impacts in evaluating options helps to identify key potential issues, including sensitive ecological sites and important bird sites.

EirGrid commence high level environmental review in tandem with technical and financial scoping of projects at the earliest stage of strategic transmission reinforcement i.e. at the pre-planning stage. Strategic environmental constraints mapping has been prepared on a national basis which identifies key significant environmental constraints including Nature Conservation Sites and Annex I habitats, particularly sensitive areas and landscapes and suitable corridors for development.

Once the need for a project has been clearly established and capital approval has been granted, the transmission project enters Stage 1 of the EirGrid Project Development Roadmap. Ecological considerations for each stage of this process are described in detail in sections 5 (Stage 1), 6 and 7 (Stage 2), 8 (Stages 3 and 4) and 9 (Stage 5).
Table 5

Summary of the stages involved in the planning of EirGrid high voltage transmission projects

<table>
<thead>
<tr>
<th>Stages in the Project Development Roadmap</th>
<th>Ecological Requirements</th>
<th>Appropriate Assessment Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Confirmation and nature of project including general study area</td>
<td>Identification of environment and other constraints with the study area</td>
</tr>
<tr>
<td></td>
<td>Route Corridor Assessment</td>
<td>Ecological Route Corridor Assessment</td>
</tr>
<tr>
<td></td>
<td>Identification of ecological restraints</td>
<td>Stage 1 Screening AA (if required)</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Identification of a Preferred Corridor (and route within corridor)</td>
<td>Ecological Route Corridor Assessment (Preferred Corridor)</td>
</tr>
<tr>
<td></td>
<td>EIS or Environmental Report of the Preferred Corridor</td>
<td>Ecological Impact Assessment</td>
</tr>
<tr>
<td></td>
<td>Planning Approval</td>
<td>Stage 1 Screening and Stage 2 AA (if required)</td>
</tr>
<tr>
<td></td>
<td>Ecological Report on Monitoring where required by Planning Authority</td>
<td></td>
</tr>
</tbody>
</table>

Public & Statutory Consultation
4.2.1 Appropriate Assessment (EU Habitats Directive)

In tandem with the ecological impact assessment process as part of EIA / ER, the process of Appropriate Assessment must be conducted. Where a high voltage (110kV, 220kV or 400 kV) transmission project, alone or in combination with other plans or projects is likely to have significant impacts on European Sites i.e. Special Areas of Conservation (SAC) and Special Protection Areas (SPA), also known as Natura 2000 sites, or the risks of such effects cannot be excluded, Appropriate Assessment is required under the EU Habitats Directive.

Article 6 of the EU Habitats Directive (92/43/EEC) sets out provisions which govern the conservation and management of Natura 2000 sites (i.e. Special Area of Conservation (SAC) and Special Protection Area (SPA)). The article has three main sets of provisions. Article 6(1) relates to the establishment of necessary conservation measures. Article 6(2) relates to the obligation of member states to avoid habitat deterioration and significant disturbance to species. Articles 6(3) and 6(4) set out procedural safeguards governing projects and plans likely to have a significant effect on a Natura 2000 site (EC, 2000).

The general approach and stages of requirements of Appropriate Assessment are clearly laid out in the methodological guidance documents (EC, 2000 & 2001, NPWS 2009) and include four general stages:

**Stage 1: Screening** - identifies likely impacts on affected Natura 2000 site, if they are significant and whether a full Appropriate Assessment is needed.

**Stage 2: Appropriate Assessment** - impact on the integrity of the site and assessment of potential mitigation. Preparation of a Natura Impact Statement.

**Stage 3: Assessment of alternative solutions** - alternative ways to proceed with project that would avoid adverse impacts on integrity of Natura 2000 site.

**Stage 4: Assessment where no alternative solutions exist and where adverse effects remain** - assessment of compensatory measures where, in light of assessment of imperative reasons of overriding public interest, the project is allowed to proceed.

The European Commission has published a number of guidance documents to assist in a standard interpretation of Article 6 across the European Union:


- Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (European Communities, 2001).

The Irish Government has also published relevant guidance as follows:

Flow chart of the Article 6 (3) and (4) procedure (from MN2000) in relation to the stages of the guidance.

CONSIDERATION OF A PLAN OR PROJECT (PP) AFFECTING A NATURA 2000 SITE

1. Is the PP directly connected with or necessary to the site management for nature conservation?
   - No
   - Yes

2. Is the PP likely to have significant effects on the site?
   - Yes
   - No

   Assess implications for site’s conservation objectives
   - Yes
   - No

   Will the PP adversely affect the integrity of the site?
   - Yes
   - No

   Are there alternative solutions?
   - Yes
   - No

   Redraft the PP
   - Yes
   - No

3. Are there imperative reasons of overriding public interest?
   - Yes
   - No

   Does the site host a priority habitat or species?
   - Yes
   - No

   Are there imperative reasons of overriding public interest?
   - Yes
   - No

   Authorisation must not be granted
   - Yes
   - No

   Authorisation may be granted for other imperative reasons of overriding public interest, following consultation with the Commission. Compensation measures have to be taken.
   - Yes
   - No

   Authorisation may be granted.

   Authorisation may be granted. Compensation measures are taken. The Commission is informed.

   Authorisation may be granted.
The provisions of the Habitats Directive have been integrated into the Planning and Development Acts 2000 to 2010 and associated Regulations (2001-2011) and the European Communities (Birds and Natural Habitats) Regulations 2011. Plans and projects must be screened for any potential impacts on areas designated as SACs and SPAs including any proposed or candidate sites (i.e. Natura 2000 sites).

Therefore all proposed high voltage transmission projects must be screened for Appropriate Assessment to determine if the project, alone or in combination with other plans or projects, is likely to have a significant effect on a European site.\(^2\)

\(^2\) See Department of Environment, Heritage and Local Government Circular letter NPWS 2/07, PD 2/07, NPWS 1/07 and SEA 1/08, NPWS 1/08 and NPWS 2009.
Appropriate Assessment of a proposed development is required if it cannot be demonstrated, on the basis of objective information and scientific evidence, that the proposed development (individually or in combination with other plans or projects) will not have a significant effect on a European site in view of its conservation objectives. Thus, where there is a possibility of a significant effect, or uncertainty, Appropriate Assessment must be carried out to determine, inter alia, whether or not a proposed development would adversely affect the integrity of a European site. Recent EU guidance on wind energy development and Natura 2000 sites (EU Commission 2010) is relevant to this process.

The integrity of a site involves its ecological functions: the coherence of the site's ecological structure and function, across its whole area or habitats, complex of habitats and/ or populations of species for which the site is or will be classified (UK DoE, 1994). The decision as to whether it is adversely affected should focus on and be limited to the site's conservation objectives (EC, 2000). Where a proposed electricity transmission project (alone or in combination with other developments) is likely to have adverse effects on the integrity of a Natura 2000 site containing “non-priority” habitats or species, permission to proceed should only be granted where there is no feasible alternative solution that is less damaging and where there are Imperative Reasons of Overriding Public Interest (IROPI) in favour of granting permission, including those of a social or economic nature.

The Screening Report and/or Natura Impact Statement must be produced as stand-alone documents but may be attached, as appendices, to an Environmental Impact Statement (NPWS 2009).

It should be noted that screening for Appropriate Assessment (Stage 1) and Appropriate Assessment itself (Stage 2) may be required in situations where an EIS is not required. This may arise in a situation where an existing high voltage power line is being extended or uprated and where these activities may impact on a Natura 2000 site.

**Site investigations and Minor Works in Natura 2000 sites**

It should be noted that potentially damaging or disturbing activities such as Site Investigation, Geophysical Investigation works or archaeological testing, or other advance works may require regulation in nature conservation sites - whether requiring planning (classes of exempted development that may no longer be exempted in nature conservation sites - Article 9 of the Planning and Development Regulations 2001 as amended by S.I. 454 of 2011) or Ministerial consent. In terms of electricity transmission works, this may include the repair of lines or uprating of lines.
APPROPRIATE ASSESSMENT

Article 6 of EU Habitats Directive 92/43/EEC

The relevant sections of the Directive are:

Paragraph 3

Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site’s conservation objectives.

In the 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.

Paragraph 4

If, in spite of a negative assessment of the implications for the 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, the Member State 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 of the Commission, to other reasons of overriding public interest.

4.3 Consultations

Consultation with statutory and non-statutory bodies is an important part of the ecological impact assessment process (Table 6). Consultation should be initiated at the information gathering stage (Stage 1) to ensure that ecological issues are fully considered at the earliest stage in the process and sensitive areas avoided where feasible.

Early consultation allows the relevant agencies time to consider requests and to identify site specific issues and assessments required. In addition, early consultation allows for adequate time to conduct additional surveys (e.g. rare plant surveys) if requested and to apply for derogation licences if necessary (NPWS Circular Letter 2/07).
Table 6

Summary of Statutory and non-statutory bodies that should be consulted regarding ecology for transmission projects.

Statutory and non-statutory bodies that should be consulted regarding ecology

<table>
<thead>
<tr>
<th>Statutory bodies:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• National Parks and Wildlife Service (NPWS) of Department of Arts, Heritage and the Gaeltacht (DAHG)</td>
</tr>
<tr>
<td>Note: Information and data are made available on the NPWS website where possible and this source should be consulted first. Data requests can also be made and a standard form is available on the website. Pre-planning consultations with NPWS/DAHG related to a project should be initiated through the Development Applications Unit (DAU).</td>
</tr>
<tr>
<td>• Inland Fisheries Ireland (see link <a href="http://www.fisheriesireland.ie/">http://www.fisheriesireland.ie/</a>)</td>
</tr>
<tr>
<td>• Heritage Officers and Biodiversity Officers of the relevant local authorities (see link <a href="http://www.heritagecouncil.ie/county-heritage-services/contacts/heritage-officers/">http://www.heritagecouncil.ie/county-heritage-services/contacts/heritage-officers/</a>)</td>
</tr>
<tr>
<td>• An Taisce (see link <a href="http://www.antaisce.org">www.antaisce.org</a>)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-statutory bodies:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• BirdWatch Ireland Headquarters and local area branch (see link <a href="http://www.birdwatchireland.ie">www.birdwatchireland.ie</a>).</td>
</tr>
<tr>
<td>• Irish Raptor Study Group (see link <a href="http://www.goldeneagle.ie/portal.php?z=283">http://www.goldeneagle.ie/portal.php?z=283</a>)</td>
</tr>
<tr>
<td>• Irish Peatland Conservation Council (see link <a href="http://www.ipcc.ie">www.ipcc.ie</a>)</td>
</tr>
<tr>
<td>• Bat Conservation Ireland (see link <a href="http://www.batconservationireland.org">www.batconservationireland.org</a>)</td>
</tr>
<tr>
<td>• National Biodiversity Data Centre (see link <a href="http://www.biodiversityireland.ie">www.biodiversityireland.ie</a>)</td>
</tr>
</tbody>
</table>

Correspondence with consultees should define the nature and stage of the project and include maps identifying the location of the development. The scope of studies and surveys that are proposed and guidance to be followed should also be included in information provided to the consultee.

Further consultation may also be required during the planning process as design details develop. This is particularly important where significant issues arise and adverse effects cannot be avoided or mitigation is required.

In addition to identifying issues, many organisations and agencies are responsible for holding ecological data and records, which should be considered in assessing the study area.
### Table 7

**Informational to be included in Consultation Process**

<table>
<thead>
<tr>
<th>Consultation body/agency</th>
<th>Issues to be addressed in consultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Parks and Wildlife Service (NPWS)</td>
<td>• Any proposed changes to boundaries of nature conservation sites within/ close to the study area.</td>
</tr>
<tr>
<td></td>
<td>• Any additional surveys of rare or protected species that might be required for the ecological impact assessment.</td>
</tr>
<tr>
<td>BirdWatch Ireland</td>
<td>• Location of any important bird area within or close to the study area (i.e sites of international, national and local importance)</td>
</tr>
<tr>
<td></td>
<td>• Information on any endangered, rare or protected species that may breed or over-winter within or close to the study area.</td>
</tr>
<tr>
<td></td>
<td>• Information /advice on any further constraints and mitigation that should be considered in the ecological impact assessment</td>
</tr>
<tr>
<td>Inland Fisheries Ireland (IFI)</td>
<td>• Information on salmonid (Atlantic Salmon and trout) status of watercourses within the study area/ crossed by the power line route</td>
</tr>
<tr>
<td></td>
<td>• Information on significant spawning areas for salmonid species.</td>
</tr>
<tr>
<td></td>
<td>• Information on important areas for angling along impacted stretches of river.</td>
</tr>
<tr>
<td></td>
<td>• Information /advice on any further constraints and mitigation that should be considered in the ecological impact assessment</td>
</tr>
<tr>
<td>Irish Peatland Conservation Council (IPCC)</td>
<td>• Information on ecological significance of peatlands within the study area/ power line footprint.</td>
</tr>
<tr>
<td></td>
<td>• Information /advice on any further constraints and mitigation that should be considered in the ecological impact assessment</td>
</tr>
</tbody>
</table>
5. Ecological requirements for Stage 1: Constraints and route corridor assessment

5.1 Introduction

This section deals with the requirements for ecology in terms of Stage 1 of the EirGrid Project Development Roadmap. It consists of (a) identification of ecological constraints and (b) ecological route corridor / site assessment. These ecological assessments form part of the Lead Consultants Stage 1 Report.

5.2 Stage 1 Part A: Ecological Constraints

The ecology element of the constraints study is primarily a desk review of information available on flora, fauna and fisheries within the defined study area. It should include a familiarisation visit to the study area. Ecological constraints identified from the review should be identified on study area maps for ease of reference. Potential ecological constraints outside the given study area (within the zone of influence) should also be considered. This is particularly important for wetland systems or river catchments, which could be indirectly impacted.

Figures Illustrating the Route selection process with constraints mapping
### 5.2.1 Consultation

Consultations with the National Parks and Wildlife Service (NPWS), the relevant Regional Fisheries Board and BirdWatch Ireland should be initiated at this stage (refer to Section 4.3).

#### Example of Ecological Constraints Mapping

<table>
<thead>
<tr>
<th>Stages in the Project Development Roadmap</th>
<th>Ecological Requirements</th>
<th>Appropriate Assessment Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirmation and nature of project including general study area</td>
<td>Identification of ecological restraints</td>
<td>Stage 1 Screening AA (if required)</td>
</tr>
<tr>
<td>Identification of environment and other constraints with the study area</td>
<td>Ecological Route Corridor Assessment</td>
<td></td>
</tr>
<tr>
<td>Route Corridor Assessment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Example of Ecological Constraints Mapping**
5.2.2 Project Description

The proposed project should be described adequately and in non-technical language.

5.2.3 Background information on the study area

The information collected on ecological constraints within the study area will inform the ecology section for the Stage 1 report. This should include a brief overview of the existing environment and ecological interests of the study area, including topography and landscape features, the main land uses, nature conservation sites, the main habitats of conservation value and the main surface water or drainage features.

The following ecological constraints should be detailed (where applicable):

- Nature Conservation Sites and sites proposed for protection within the study area (www.npws.ie),
- Nature Conservation Sites and sites proposed for protection within the zone of influence of the project (www.npws.ie),
- All the main inland surface waters (e.g. rivers, streams, canals, lakes and reservoirs) that are intersected by the study area, including their fisheries value and any relevant designations (www.epa.ie),
- Any known or potentially important sites for rare or protected flora or fauna, including important bird sites, that occur within the zone of influence of the project (www.birdwatchireland.ie; www.npws.ie),
- Any other sites of potential ecological value, identified from aerial photographs, along or in close proximity to the study area,
- Any other relevant conservation designations or programmes (e.g. local biodiversity areas, catchment management schemes, habitat restoration or recreation projects, community conservation projects, etc)
- Any other features of particular ecological or conservation significance within the study area,
- Any potential issues such as access to sensitive sites.
- Freshwater Pearl Mussel catchments/sub-basins
- Local biodiversity areas
- Habitat areas – natural or semi-natural areas, Annex I habitats
- Natural habitats and protected species as per Environmental Liability Directive and Regulations

Other key sources of information on the natural environment such as the Office of Public Works (OPW) flood mapping database (www.floodmaps.ie) and the Geological Survey of Ireland (GSI) Karst features database (www.gsi.ie) should be checked.

The legal status of all the ecological constraints should be clearly identified. Any other information relevant to the ecological constraints should also be set out.

5.2.3 Figures and drawings

Figures to accompany the assessment of ecological constraints should include a map (scale 1:50,000 or larger dependent on the size and scale of the project) of the ecological constraints within and in close proximity to the study area (with identifying site codes, site names or numbers), the main surface waters referred to in the text and the general locations of rare or protected species (if they occur outside nature conservation sites).
Stage 1 Part B: Route corridor assessment and identification of emerging preferred corridor

Following the process of identifying environmental and other constraints within the study area, a number of potential route corridors are put forward by the project team for assessment during Stage 1 of the Project Development Roadmap.

The aim of the ecology section of the route selection assessment is to undertake sufficient assessment to identify the ecological issues along each of the proposed corridors, and the significance of the likely impacts of a proposed power line located within those wider corridors. The process will include initial screening for Appropriate Assessment for each of the proposed corridors and a comparative assessment undertaken (refer to NRA, 2009).

Screening should be undertaken without inclusion of mitigation, unless potential impacts can clearly be avoided through the modification or redesign of the plan or project, in which case the screening is repeated on the altered design (NPWS, 2009). In-combination impacts (impacts with other plans or projects) must be assessed during the Appropriate Assessment screening. It is important that the Route Selection stage is as detailed and rigorous as is necessary, depending on the sensitivities that arise.

If any of the proposed corridors impact on a Natura 2000 site, it is important that consideration is given to whether route options can pass the tests of Article 6(3). If there are risks of adverse effects on a Natura 2000 site arising from the final scheme on its own and in combination with other plans and projects, the consideration of alternatives becomes critically important in pursuing an IROPI case.

Appropriate assessment will be required to assess any likely adverse effects to the site in view of its conservation objectives (European Communities (Birds and Natural Habitats) Regulations 2011). Ecological assessments as part of Appropriate Assessments will require targeted surveys for the

### Checklist of essential items for ecological constraints review for Stage 1 Report

1. List and map all Nature Conservation Sites including proposed and candidate sites within study area – SAC, cSACs, SPAs, NHA (and pNHAs), nature reserves etc. including a summary of the key information
2. List and map all Nature Conservation Sites within an appropriate distance of the study area, including a summary of the key information
3. Documented bird sites (IWeBS or other data e.g. Important Bird Areas - IBAs)
4. Documented locations of rare and protected species (outside of Nature Conservation Sites)
5. Documented watercourses and associated fisheries value (i.e. salmonid status)
6. List other sites of ecological importance identified from aerial photography
7. Note major ecological features to be avoided
8. Highlight any issues for special attention in later phases
9. Preparation of map detailing all ecological constraints within the study area
5.3.1 Consultation
Further consultations with statutory agencies, including NPWS and IFI should be undertaken to present the proposed corridors, detail the scope of the studies being undertaken, and provide an opportunity for comment. BirdWatch Ireland should also be consulted regarding important areas for birds. Any relevant information about recent or proposed changes in site designations, site boundaries or in the conservation status of species or habitats should be sought.

5.3.2 Project Description
The proposed project should be described adequately and in non-technical language.

5.3.3 Background information on the study area
A brief overview of the existing environment and ecological interests of the study area (i.e. area of transmission project and zone of influence), including topographic, geomorphological, hydrological and landscape features, Nature Conservation Sites, the dominant land uses, the main habitats of ecological significance and the main surface water or drainage features should be provided.

5.3.4 Methodology
The Stage 1 report should include a statement of how and when the study was carried out, including data and information sources and all consultations. Field survey techniques should be clearly described and any limitations in the methodology or approach should be highlighted. Details of the site evaluation scheme used (chapter 3) and impact assessment criteria (see Appendix 1) should also be presented. While the study should focus primarily on the route corridors under consideration, study areas should reflect the potential impact type and should extend beyond the routes where habitat fragmentation is an issue and/or if wetlands may be indirectly impacted.

5.3.5 Ecological Survey and Requirements
The route corridor selection involves a combination of desk study and field survey to identify, map, describe and evaluate sites of known or potential ecological value, and to assess the significance of the likely impacts of a transmission line within those corridors. Sites are identified from various sources including aerial photography. Field survey may be required to verify the results of the desk study and ensure that sufficient data are available to enable decisions to be made on the choice of route corridors. The width of the corridors will vary depending on the scale of the project and will be determined on a case by case basis. For example a 500m wide corridor may be indicated for a 110kV project with up to 1km corridor considered for a 400kV project and similarly the width of the corridor will be dependent on the habitats and species present in the area.

Species specific surveys may also need to be commenced as part of the route selection process, particularly where issues relating to bird species have been identified in the constraints study. It should be noted that surveys for protected species may require several seasons of data collection.

5.3.6 Assessment of impacts
The assessment of likely impacts should take into account the ecological value (rating) of sites as per Table 3 in Section 2 of these guidelines.
- Internationally important
- Nationally important
- County Importance
- Locally important (higher value)
- Locally important (lower value)
In accordance with the NRA system (NRA, 2009), ecological sites of below ‘Local Importance (higher value)’ should not be selected as ‘key ecological receptors’ for which detailed ecological assessment is required during subsequent stages of the process. An impact is considered significant if it would affect the long-term distribution, structure or function of the habitat in question as well as the long-term survival of its associated species. If impacts are not found to be significant at the highest level at which the site has been valued (as per Table 3, Section 2), they may be significant at a lower level, and this should be tested sequentially (NRA, 2009). Further information on assessment methods is available at: http://www.nra.ie/RepositoryforPublicationsInfo/file,16634,en.pdf

Professional judgement should be used in applying any impact assessment scheme. Numerical scoring of impacts should be avoided, as this tends to give a false suggestion of precision and will rely on weighting systems which, in themselves, are difficult to justify objectively.

The levels of impact assigned to particular corridors make the assumption that standard mitigation measures will be implemented and this should be clearly stated. However, site-specific mitigation measures are normally excluded in the assessment of impacts of the scheme, at this stage.

The results of the assessment should include a map of sites, areas and species of ecological value (updated from the constraints study), including important areas for bird populations and significant watercourses and wetlands that are likely to be impacted by the proposed transmission corridor options.

The process of selecting a least constrained corridor for a proposed high voltage power line project typically involves a comparative evaluation of a number of corridors so that alternative options can be evaluated and compared.
Table 8

Example of a summary Matrix table for route corridor evaluation (Ecology)

<table>
<thead>
<tr>
<th>Element</th>
<th>Corridor A</th>
<th>Corridor B</th>
<th>Corridor C</th>
<th>Corridor D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecology (Flora and Fauna)</td>
<td>Natura 2000 sites (SAC, SPA)</td>
<td>Crosses area where whooper swan may be present, potential indirect effects on SPA, SAC and over-wintering fields for swans</td>
<td>NHA, pNHA</td>
<td></td>
</tr>
<tr>
<td>Rare and protected species</td>
<td>Freshwater Pearl mussel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NHA, pNHA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Areas of Biodiversity Value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisheries</td>
<td>Atlantic Salmon and protected aquatic species</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Least Constrained.** From initial review, route corridors in this group best avoid all constraints identified.
- **Less Preferred.** From initial review, route corridors in this group are somewhat less preferred, as some indirect effects on identified constraints may occur. It is, however, expected that with further investigation and/or minor route diversions, no indirect effects will occur, and these corridors could become emerging preferred.
- **Least Preferred.** From initial review, route corridors in this group are the least preferred of the options, as some direct effects on identified constraints may occur. However, it may be the case that, with further investigation, mitigation and/or minor route diversions no significant direct or indirect effects could occur.
### 5.3.7 Checklist for Power Line Route Corridor Assessment

Checklist of essential items for power line corridor selection study. Includes desk study and field survey of targeted sites.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Define ecological sites from aerial photography</td>
</tr>
<tr>
<td>2.</td>
<td>List Nature Conservation Sites within appropriate distance of the route corridors</td>
</tr>
<tr>
<td>3.</td>
<td>Field visits to affected sites and adjoining habitats</td>
</tr>
<tr>
<td>4.</td>
<td>Brief description and rating of ecological sites</td>
</tr>
<tr>
<td>5.</td>
<td>Consult NPWS re: protected species and sites</td>
</tr>
<tr>
<td>6.</td>
<td>Consult BirdWatch Ireland (IWeBS data) re: important bird sites</td>
</tr>
<tr>
<td>7.</td>
<td>Consult Fisheries Board re: fisheries waters, Annex II species</td>
</tr>
<tr>
<td>8.</td>
<td>Assess impact level on affected sites and species</td>
</tr>
<tr>
<td>9.</td>
<td>Prepare impact matrix of sites/power line routes</td>
</tr>
<tr>
<td>10.</td>
<td>Assessment of cumulative impacts with other environmental disciplines.</td>
</tr>
<tr>
<td>11.</td>
<td>Prepare final report and drawings</td>
</tr>
</tbody>
</table>

220 kV double circuit transmission line
6. Ecological requirements for stage 2: preferred corridor evaluation

6.1 Evaluation of Preferred Corridor

This section deals with the requirements for ecology in terms of Stage 2 of the EirGrid Project Development Roadmap. It consists of evaluating the preferred route corridor. Following from this, EIA scoping and Appropriate Assessment Screening can commence.

The first task in the Stage 2 Corridor Evaluation is for EirGrid to review and evaluate stakeholder feedback on the emerging preferred corridor as presented in the Stage 1 report. This may result in some modification of the emerging preferred corridor. In this instance, the corridor is re-evaluated in terms of environmental and other issues to establish if the modifications change the preference rating of the corridor.

Dependent on whether modifications have been made to the preferred corridor, the Stage 1 Appropriate Assessment Screening may need to be updated to reflect any changes made.

6.1 Evaluation of Preferred Corridor

Any modification to the emerging preferred corridor following the integration of stakeholder feedback should be evaluated in terms of potential impacts to ecological sites (as previously described in Section 5) to establish if the modifications change the preference rating of the corridor, with particular care in relation to impacts on Natura 2000 sites. Based on this assessment, a final preferred corridor is identified. A Stage 2 Route Corridor Evaluation Report with identification of the preferred corridor is produced. Any changes in terms of ecological rating as a result of any modifications will be documented in this report.
7. Ecological impact assessment scoping (for EIS) and appropriate assessment screening

7.1 Introduction

The identification of an indicative power line route within the preferred corridor is published in a Stage 2 Lead Consultants Report which is open to stakeholder consultation. By identifying the indicative route, the scope of the EIA or Environmental Report (in case of sub threshold projects) can be developed and the indicative line can be screened for Appropriate Assessment. It also allows for landowner engagement, which opens the way for requesting access onto lands for survey. Based on information gathered in the previous stages it may be necessary to undertake or begin more specialised targeted surveys, particularly for birds or other species of fauna or flora with seasonal constraints, at a pre-EIS stage so that the data can be collected for the EIS and that unnecessary delays are avoided.

7.1.1 Screening for impacts on Natura 2000 sites

The line route within the preferred corridor for the high voltage power line will be screened for any potential in-situ and ex-situ impacts on Natura 2000 sites in accordance with Article 6 of the Habitats Directive, and with the European Communities (Birds and Natural Habitats) Regulations 2011. Screening determines the first two tests in relation to Article 6(3):

(i) whether a plan or project is directly connected to or necessary for the management of the site, and
(ii) whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site in view of its conservation objectives.

The screening process identifies the potential for significant adverse effects on any Natura 2000 site(s) arising from implementation of a proposed plan or project. If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to stage 2 of the Appropriate Assessment process. The Screening for Appropriate Assessment will comprise the following steps:

1. Determine whether the project is directly connected with the management of Natura 2000 site.
2. Define the qualifying interests of the Natura 2000 site;
3. Define the conservation objectives of the Natura 2000 site;
4. Define the key elements and potential effects of the project;
5. Define the “in combination” effects of other plans and projects;
6. Assessment of significance and identification of the necessity to proceed to Stage 2 of the AA process;
7. Prepare a formal Screening for Appropriate Assessment Report following standard guidance documents.

7.1.2 Scoping

The ecological impact assessment (Stage 3 of the Project Development Roadmap) should begin by scoping the nature and detail of the information to be contained in the report. Scoping may be a formal or informal process, but should at least define the likely areas of potential impact and the appropriate methods by which to evaluate them prior to the commencement of detailed data collection or assessment (EPA, 2002).
8. Ecological requirements for Stages 3 and 4: Ecological impact assessment of transmission project

8.1 Introduction

Stages 3 and 4 of the Project Development Roadmap involve the ecological impact assessments which will inform the Flora and Fauna Chapter of the EIS or Environmental Report.

The objective of the flora and fauna chapter of an EIS or Environmental Report for a proposed high voltage transmission project is to identify, quantify and qualify the likely significant impacts on flora, fauna and fisheries. Significant impacts are those which by their character, magnitude, duration or intensity alter a sensitive aspect of the environment.

This chapter is produced based on the final proposal for line route and structure locations design report.

It should include detailed mitigation measures and list residual impacts that remain after mitigation.


Guidelines specific to power lines should also be consulted and referenced where appropriate e.g. CIGRE Working group (1999, 2003) and Council of Europe Document on Protecting Birds from Power lines (Haas et al., 2005).
8.2 Approach (See Section 5.2)

The ecology section of an EIS or Environmental Report builds on the information contained in the earlier constraints study and the route corridor assessment (Stages 1 and 2 of EirGrid project Road Map) and should follow the process as set out in section 5 and below.

Table 9

Summary of the stages involved in the EIA process and where ecological considerations fit in at the various stages.

<table>
<thead>
<tr>
<th>EIA Process</th>
<th>Ecology considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening includes constraints report and route selection</td>
<td>Identify issues of ecological significance within the study area and select route with least potential adverse effect on ecology: The planning authority/Board decided whether EIS is necessary for sub-threshold Projects. Screening for impacts on Natura 2000 sites.</td>
</tr>
<tr>
<td>Scoping</td>
<td>What are the potential ecological impacts of preferred power line route and associated structures. What surveys/data are required?</td>
</tr>
<tr>
<td>Consultation (ongoing)</td>
<td>NPWS, Inland Fisheries Ireland, BirdWatch Ireland, Bat Conservation Ireland etc.</td>
</tr>
<tr>
<td>Description and evaluation of existing environment</td>
<td>Collection of relevant data and field surveys to classify and evaluate habitats and species.</td>
</tr>
<tr>
<td>Impact prediction and assessment</td>
<td>What are the magnitude and significance of impacts on ecology? Is Appropriate Assessment of impacts on Natura 2000 sites required?</td>
</tr>
<tr>
<td>Mitigation, Environmental Management Plan (EMP) and monitoring requirements</td>
<td>Describe ecology mitigation measures. Is an EMP necessary for construction and and operation phase? Is an ecological monitoring programme necessary?</td>
</tr>
<tr>
<td>Submission of EIS to planning authority/An Bord Pleanála</td>
<td>Competent authority assesses application and makes decision on granting planning permission.</td>
</tr>
<tr>
<td>Environmental/ecological monitoring</td>
<td>Monitoring of environmental indicators during construction/operation of project if so required</td>
</tr>
</tbody>
</table>
8.2.1 Consultation (See Section 4.3)
Early consultation with the relevant statutory and non-statutory agencies is an important part of the scoping process and may identify the need for additional specialist surveys. The process of non-statutory consultation is laid out in section 4.3. Consultations will have been initiated at Stage 1 Information Gathering (the constraints and route selection stage). The relevant statutory and non-statutory agencies should be informed of the preferred route, once selected, and of the procedure and guidance being followed, the scope of the surveys being undertaken and an opportunity to comment should be provided. Ultimately, the applicant for planning approval is required by statute to send a copy of the application, the EIS and/or Natura Impact Statement to the relevant prescribed authorities.

8.2.2 Description of existing environment
The baseline ecology in the area of the proposed transmission project and associated ancillary development needs to be described to a standard which allows for defensible and robust impact predictions to be made. The description will utilise information and reports from the previous stages of the process and will usually involve new survey work and habitat mapping to generate up-to-date and site-specific data on the ecology and biodiversity of the confirmed transmission project. The description of existing ecology in terms of habitats, flora and fauna and fisheries value is the foundation for the entire ecological impact assessment process as a prediction of change is only as effective as the baseline information collected.

A significant amount of background ecological information will have been collected in the preceding stages of the transmission project development (Stages 1 and 2). The following should be considered in describing the ecological baseline and for making a plan for detailed field survey of the transmission line route:
• A review of information gathered from earlier stages in the project; an overview of the scheme in relation to the surrounding landscape, interpretation of recent colour aerial photographs at an appropriate scale, preparatory work for field survey including identification of likely important ecological sites and areas for mammals, birds, fish etc.,
• A review and collation of information obtained from consultees both public and statutory; e.g the sourcing of local information, the knowledge of local naturalists or county recorders of the Botanical Society of the British Isles.
• A review of scientific literature and key references appropriate to the study area and the species or habitats that may be affected.
• The collection of other relevant information on other similar projects/activities in the general area e.g. ecological assessments, EISs, AAs, SEAs prepared for other projects or plans.

8.2.3 Survey Requirements
The ecological survey should involve a multidisciplinary walk-over survey to describe ecological sites, habitats and species likely to be affected. Surveys should be conducted using standard methodology and should employ the Heritage Council’s Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2011). Habitats should be classified according to the Heritage Council’s Guide to Habitats in Ireland (Fossitt, 2000) and Annex I of the Habitats Directive. Where the multidisciplinary survey identifies the need for further detailed survey for protected species of flora and/or fauna, the NRA guidance document Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes should be consulted.
There may be instances where accessing land for ecological survey is restricted and thus access to sites or features that may be of nature conservation importance or that could support protected species will not be available. In each case a precautionary approach should be adopted, relying on observations from the nearest locations for which access can be obtained, coupled with remote information (e.g. aerial photography and LiDAR) and collating any existing information that might be available (NRA 2009). Any technical difficulty or a matter that affected the availability of data should be clearly identified in the report.

Where sites of high conservation value (e.g. those hosting habitats listed in the EU Habitats Directive) are likely to be significantly affected by the transmission project, they may require more detailed biological description and classification to determine the location of key parts of these sites to be avoided.

Aquatic and riparian habitats within the study area should be described and assessed. Where a river or stream is to be crossed by the construction of a temporary feature (bridge or culvert), the in-stream and riparian habitats should be assessed at the crossing point and for an appropriate distance downstream of the impact. It may be necessary to collect data on water quality if little is known of rivers/streams status. Biological (McGarrigle et al., 2002) and or physicochemical sampling should be included as part of the ecological survey if this is the case.

The field survey should include an assessment of mammal activity in the immediate vicinity of the route of the power line and also of associated ancillary services e.g. access roads etc. by recording the presence of mammal signs (such as tracks, droppings, feeding signs, etc.).

Depending on the study area and its suitability for birds, or the known occurrence of certain bird species, detailed bird survey may have commenced in the earlier stages of the project. Further or new survey may be necessary at the EIS stage. The survey should be undertaken by a qualified and experienced ornithologist and conducted according to standard, published methodologies and at the appropriate time of year (see Bibby et al., 2000, Gilbert et al. 1998.). Data gathered for birds should allow for inter-year variability to be assessed for a range of species.

The need for, and purpose of, additional specialist survey of other terrestrial fauna, fish, aquatic invertebrates and rare and protected plants should be established early in the ecological impact assessment process. Results of these surveys will be presented in the ecology section of the EIS/Environmental Report.

8.2.4 Evaluation (See Chapter 3)

The assessment of the importance of identified ecological sites within the study area should be carried out using a standard approach as described in Chapter 3.

8.2.5 Impact prediction (See Appendix 1)

The processes of impact prediction and assessment of impacts on ecology are based on the data collected in the ecology survey. Where possible, quantitative predictions should be made on ecological impacts i.e. direct measurements of habitat loss etc. However, qualitative impact prediction may be acceptable in certain cases.

The assessment of impacts should be undertaken in relation to the baseline conditions within the study that are expected to occur if the development were not to take place (IEEM, 2006).

Quantifying impacts on ecological sites, habitats and species should be based on a standard approach. Criteria that should be used in ecological impact assessment are presented below (EPA, 2002).
Direct impacts will occur through habitat loss in the immediate vicinity of the transmission project. The significance of such impacts varies according to the voltage of the power line and its associated structures and the habitats that are impacted.

The installation of double wood pole structures in the case of 110kV projects results in very limited direct habitat impacts in the majority of cases. Angle towers and steel lattice pylons required for higher voltage lines (220kV and 400kV) require foundations to be constructed which increases the footprint of the impact. Access tracks to and from the areas of installation are likely to result in temporary habitat impact and degradation.

Access tracks should be clearly marked and the area required minimised as far as is practicable.
CRITERIA THAT SHOULD BE USED IN ECOLOGICAL IMPACT ASSESSMENT

(EPA 2002, IEEM 2006)

Positive or Negative:
Is the impact likely to be positive or negative?
International and national policy now push for projects to deliver positive outcomes for biodiversity.

Context (Magnitude and extent):
A scheme may affect only a small part of a site but the area of habitat affected in that location (in hectares) should be given in the context of the total area of such habitat available (e.g. 1ha of a woodland which measures 30ha in total).

Character:
The type of habitat (e.g. natural or highly modified woodland; mature or recently established, wet or dry) is important, as is the quality of the site (e.g. undamaged active blanket bog).

Significance:
State whether a site has a designation, such as SAC or NHA, or contains a listed (Annex I) habitat. The ecological value of a site can be assigned a rating using an evaluation scheme, such as that described in Chapter 2 (e.g. undesignated areas of semi-natural broadleaved woodland are normally rated as high value, locally important).

Sensitivity:
Indicate changes that would significantly alter the character of an aspect of the environment (e.g. changes in hydrology of a wetland due to construction of access road).

Duration:
Indicate the time for which the impact is expected to last prior to recovery or reinstatement of impacted habitats and/or species.
The duration of an activity may differ from the duration of the resulting impact caused by the activity (e.g. short-term construction activities may cause disturbance to birds during the breeding season, however, there may be longer-term impacts due to a failure to reproduce in the disturbed area during that season).

Reversibility:
Identify whether an ecological impact is permanent (non-reversible) or temporary (reversible - with or without mitigation).

Timing and Frequency:
Some changes may only cause an impact if they happen to coincide with critical life-stages or seasons (for example, the bird nesting season). This may be avoided by careful scheduling of the relevant activities.
8.2.6 Mitigation

Mitigation is the design of measures which aim to minimise or even eliminate the negative impacts that are likely to arise as a result of a particular project or scheme (EC, 2007). Mitigation in the context of EIA is conventionally considered under three headings: mitigation by avoidance, mitigation by reduction and mitigation by remedy (EPA, 2002).

Mitigation by avoidance

The best form of mitigation is avoidance through design (location of structures and routing of lines) and the ecological constraints and route assessment studies should aim to avoid areas of significant ecological importance (i.e. Nature Conservation Sites and areas of importance for birds) before the EIS / ER stage.

Even if ecological sites or habitats of high value are within the corridor of a proposed power line route, it may be possible to avoid direct impacts on the sites by the careful planning of the location and erection of structures. For example, structures can be placed so as to avoid impacts on high value hedgerows, treelines, watercourses or sensitive areas of certain habitats.

Mitigation by avoidance also includes avoiding works at certain times of the year for the protection of certain species. The most important seasonal restrictions for construction activity relate to:

1) Salmonids under the Fisheries (Consolidation) Act 1959.
2) Annex IV species under the EU Habitats Directive (92/43/EEC). Article 12.1. prohibits ‘The deterioration or destruction of breeding sites or resting places’ (such as otter holts, badger setts and bat roosts).
4) Wintering waterbirds are normally present in significant wetland sites between September and April and due consideration should be given to avoiding disturbance during these months.

For watercourses containing salmonids or lamprey, in-stream works should be restricted during the peak spawning period between the months of November to June inclusive. This may vary in different regions and even between watercourses therefore Inland Fisheries Ireland should be consulted.

Buildings or mature trees that are known to contain bats should not be demolished or otherwise disturbed during the months June to August (breeding season), or November to April (hibernation) inclusive (Refer to Kelleher and Marnell, 2006).

Where programmed construction activities permit, there should be no removal of hedgerows, trees, treelines or areas of semi-natural habitat during the bird breeding season of March to August inclusive.

Any works in the vicinity of active badger setts or any sett that requires exclusion, if unavoidable, will be conducted under licence during the period July to October inclusive to avoid the cubbing season and the winter period.

Mitigation by reduction

Where negative impacts cannot be avoided, it may be possible to reduce impacts by reducing the area of impact or the length of time that a habitat or species is exposed to a disturbance.

For example, where areas of sensitive habitat need to be crossed during the construction phase, measures to reduce the impact of vehicles on wetland or bog should be considered including the use, for example, of low pressure vehicles and the laying of protective geotextile on the vegetation to be crossed.
Within the mitigation section of the EIS / ER, it should be made clear how the measures will act to avoid or reduce impacts on ecological sites/habitats/species. Evidence of how each mitigation measure will be implemented should be provided. A timeframe of when mitigation measures are to be put into practice should be outlined in terms of the project plan. A system of monitoring the effectiveness of the mitigation measures should be put in place and contingency for ineffective measures established.

The use of wide wheel/tracks will minimise damage caused to the peat layer due to their larger surface area thereby preventing rutting. Examples shown are (left) Ford TW 15 with triple wheels to rear and double wheels to front, (right) Ackerman EC150 with wide tracks fitted.

In some cases, where access for machinery is particularly difficult due to the sensitive nature of habitats or difficult terrain, the aerial transport of materials and machinery by helicopter may be considered.

**Mitigation by remedy**

Where impacts cannot be avoided or reduced, it may be possible to carry out further works to compensate for these impacts or to restore some aspect of the natural environment to an approximation of its previous condition.

Mitigation measures should also take into account the operational phase of the electricity transmission project. One way of reducing the impact on bird species is to deter bird species from overhead power lines. To avoid collision with overhead conductors, bird flight deflectors or bird warning spheres should be installed in areas identified as vulnerable for birds. Examples of the various types of structures that can be utilised are presented in Chapter 3.

**TYPES OF MITIGATION BY REMEDY**
*(From Treweek, 1999)*

**Relocation / translocation**
- Removal of turves / vegetation sods for reinstatement

**Repair, reinstatement, restoration:**
- Reinstatement of habitat
- Re-seeding of grassland

Within the mitigation section of the EIS / ER, it should be made clear how the measures will act to avoid or reduce impacts on ecological sites/habitats/species. Evidence of how each mitigation measure will be implemented should be provided. A timeframe of when mitigation measures are to be put into practice should be outlined in terms of the project plan. A system of monitoring the effectiveness of the mitigation measures should be put in place and contingency for ineffective measures established.
8.3 Contents of Ecology Chapter of EIS or Environmental Report

8.3.1 Introduction
This section introduces the subject of ecology: flora, fauna and fisheries to the EIS / ER. The electricity transmission project is described in brief and the ecologist or ecological consultancy engaged in the assessment is named.

8.3.2 Methodology
This section should clearly describe the methodology used for surveys, together with details of evaluation and impact assessment criteria used. It should provide details of consultations with statutory agencies and other groups, including those throughout the previous stages (Stage 1 and Stage 2 of the Project Development Roadmap). The dates of the field survey(s) should be specified and any limitations to survey noted (including, for example, refusal of landowners to grant access for walk-over surveys).

8.3.3 Description and evaluation of existing environment and results of ecological survey
This section of the report should contain an accurate description of aspects of the existing environment ‘to ensure systematic, accurate and comprehensive descriptions of the context, character, significance and sensitivity’ and to predict the likely significant impacts of the proposed high voltage transmission project.

The section should be laid out clearly under a set of logical headings and in a systematic manner to allow easy cross-reference between text and drawings e.g.

- General description of study area
- Nature Conservation Sites
- Rare and protected species of flora
- Ecological sites and habitat descriptions
- Watercourses and fisheries and protected aquatic species
- Fauna including birds, mammals, invertebrates

This section will include an evaluation of ecological sites and habitats and species present (See evaluation table, Chapter 3).

8.3.4 Impact assessment
The criteria used to define the significance of the likely impacts should be clearly set out (see Appendix 1). The significance of the likely impacts of the preferred route on the natural environment will be assessed, before taking into account any mitigation measures for impacts. Impact assessment will address predicted impacts (including cumulative impacts) at each stage of the project:

- Construction (including access and storage of materials)
- Operation
- Maintenance and upgrading
- Decommissioning

8.3.5 Residual impacts
A residual impact is an impact that remains after implementation of the project and all associated mitigation and other environmental management measures. Such impacts and their overall significance should be listed in this section, e.g. the permanent loss of an area of habitat.

8.3.6 Non technical summary
A non technical summary is required under the EIA Directive and Irish law. It comprises a summary of the main points and findings of each discipline examined in the EIS.

The ecology section should be summarised and laid out in a similar but condensed format to that in the main EIS. It should be short and avoid technical terms but should make reference to all the above
information. It may be produced as a separate and self-contained document that can be widely distributed to the general public.

8.4 Appropriate Assessment (if Natura 2000 sites are impacted)

In tandem with the EcIA, the Stage 2 Appropriate Assessment process, if required, will commence in order to provide information to the Competent Authority. In assessing impacts on a Natura 2000 site as part of Appropriate Assessment (if a Natura 2000 site is impacted by the project), the impact of the project (either alone or in combination with other projects or plans) on the integrity of the site is considered with respect to the conservation objectives of the site and to its structure and function (EC, 2001). In addition to generic conservation objectives, detailed conservation objectives are becoming available for SAC sites on the NPWS website.

Stage 2: Appropriate Assessment (Natura Impact Statement)

This stage considers whether the plan or project, alone or in combination with other projects or plans, will have adverse effects on the integrity of one or more Natura 2000 sites, and includes any mitigation measures necessary to avoid, reduce or offset negative effects. The assessment of the impacts is considered with respect to the conservation objectives of the site and to its structure and function. This stage, if required, involves the following steps:

**Checklist of items for EIS or Environmental Report.**

1. Desk study collating all background and published information on flora, fauna and fisheries within the study area.

2. Multidisciplinary walk over survey(s) (habitats and general mammal and bird survey) of ecological sites. The dates of these survey(s) should be specified and any limitations to survey noted (including, for example, refusal of landowners to grant access for walk-over surveys).

3. Biological assessment of watercourses crossed by the project.

4. Specialist surveys: particularly of bird usage and flight patterns (if required), protected species such as bats, otter etc.

5. Assess potential impacts on a site basis (ecological sites)

6. Assess impacts associated with construction (including access and storage), operation, maintenance/upgrading and decommissioning

7. List impacts before mitigation

8. Detail site specific mitigation measures and how mitigation will be implemented

9. List residual impacts after mitigation

10. List any technical difficulty or a matter that affected the availability of data.

11. Include an overview map of the route corridor showing principal habitats affected.

12. Prepare final report in compliance with EPA Guidelines
8.4.1 Information required
Gather any additional data and information required for the assessment (e.g. information on groundwater sensitivity of certain habitats within Natura 2000 sites). It should be noted that additional expertise and assessments may be required for the Stage 2 Appropriate Assessment e.g. Hydrogeological assessments.

8.4.2 Conservation objectives
• Review conservation objectives and qualifying interests of Natura 2000 sites from information gathered.
• Assess the adverse effects on the integrity of the sites as defined by their conservation objectives.

8.4.3 Impact prediction
• Identify potential impacts arising from the project on the integrity of the Natura 2000 sites including direct and indirect impacts and in-combination effects with other plans and projects.
• Direct impacts could include habitat loss and fragmentation of sites by the transmission project. Indirect impacts could include a review of possible hydrological impacts, pollution and disturbance.
• This step will identify key impact sites and key impact issues. As per the IEEM Guidelines (2010), in the context of Appropriate Assessment, traditional assessments of significance cannot be used – there are three clear options that can only be made by the Competent Authority:
  - there will be no adverse effect on the integrity of a Natura 2000 site; or
  - it cannot be ascertained that there will be no adverse affect on the integrity of a Natura 2000 site; or
  - there will be an adverse affect on the integrity of a Natura 2000 site.

8.4.4 Mitigation measures
• Where it cannot be shown that there will be no risk of adverse effects on the integrity of the sites, it is necessary to define appropriate mitigation measures to protect Natura 2000 sites.
• The aim of the mitigation measures will be to cancel out adverse effects or reduce them sufficiently to nullify the adverse impact on site integrity. Care will also be taken to ensure that any mitigation measures undertaken will not have an adverse effect on site integrity.

Stage 2 of the AA process forms the basis for the Natura Impact Statement which provides the information to enable the Competent Authority to carry out the Appropriate Assessment.

Throughout the process, the precautionary principle will be applied where there is:
• Potential for negative effect resulting from implementation of the project; or
• Insufficient data to determine with sufficient certainty the risk in question.

8.4.5 Mitigation
Mitigation measures should be identified and agreed with the project team and the residual impacts after mitigation should be described. Details of how and when mitigation measures will be achieved will be clearly outlined. Mitigation measures should be identified under the following headings where appropriate:
• Mitigation by avoidance
  e.g. location of structures outside of significant hedgerows/treelines, watercourses, sensitive habitats, areas of known rare and protected plants.
• Mitigation by reduction
  e.g. reducing the working corridor around
sensitive habitats and watercourses; the use of low pressure vehicles or aerial transport of materials on to areas of sensitive habitats.

- **Mitigation by remedy**
  e.g. erection of bird warning devices on flight lines in areas likely to be used by birds.

### 8.5 Stage 3 and 4 – Alternative Solutions and IROPI

In the event that the Stage 2 AA identifies that there will be adverse effects on the integrity of a Natura 2000 site, feasible alternatives must be examined in order to, where possible, avoid adverse effects on Natura 2000 site integrity. Before a project or plan that either alone or in combination with other projects or plans has adverse effects on a Natura 2000 site can proceed for Imperative Reasons of Overriding Public Interest (IROPI), it must be objectively concluded that no less-damaging alternative solutions exist. Therefore, this stage becomes critical if it appears that derogation procedures may need to be pursued (DEHLG, 2009).

The Competent Authority is likely to require additional information on each feasible alternative in the form of a Natura Impact Statement for each alternative and a comparative assessment will be required.

In the absence of feasible alternatives or where the alternatives are likely to have more of a negative impact on Natura 2000 site integrity or where adverse impacts remain on site integrity, the Competent Authority must decide whether the project can be considered to be necessary for IROPI. A Statement of Case that IROPI exists must be prepared and the compensatory measures that are necessary to ensure the overall coherence of the Natura 2000 network must be proposed.

Where the project has the potential to adversely impact non-priority habitats within the Natura 2000 site, IROPI includes reasons of a social or economic nature. Where the project has the potential to adversely impact a priority natural habitat 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.

**Compensatory measures**

Compensatory measures should not be included as mitigation measures. In the context of Article 6 of the Habitats Directive, mitigation measures must be clearly distinguished from compensatory measures. Compensatory measures are considered independent of the project and are intended to offset the negative effects of the project that remain in spite of mitigation measures. In the case of Natura 2000 sites, they are intended to maintain the overall coherence of the network of Natura 2000 sites. IROPI cases should be avoided, and all feasible alternatives must be excluded before compensatory measures are developed.

As part of Appropriate Assessment, compensatory measures should only be considered after it has been ascertained that a project will have a negative impact on the integrity of a Natura 2000 site.
Compensatory measures appropriate to adverse effects on Natura 2000 sites consist of (EC, 2007):

**Restoration:**
restoring the habitat to ensure maintenance of its conservation value and conservation objectives of the site;

**Creation:**
creating new habitat on a new site or through enlargement of the existing site;

**Enhancement:**
improving the remaining habitat proportional to that which is lost due to the project or plan;

**Preservation of habitat stock:**
measures to prevent further erosion of the coherence of the Natura 2000 network.

**Definition of compensatory measures under the Habitats Directive (European Commission, 2000, 2007)**

The compensatory measures constitute measures specific to a project or plan, additional to the normal practices of implementation of the ‘Nature’ Directives. They aim to offset the negative impact of a project and to provide compensation corresponding precisely to the negative effects on the species or habitat concerned. The compensatory measures constitute the ‘last resort’. They are used only when the other safeguards provided for by the directive are ineffectual and the decision has been taken to consider, nevertheless, a project or plan having a negative effect on the Natura 2000 site.
9. Post environmental impact statement

9.1 Environmental Management Plan

Preparation of environmental management plan for transmission project construction and ongoing maintenance and operation.

An Environmental Management Plan (EMP) can be a useful means of drawing together mitigation, compensation, enhancement, management and monitoring proposals, which have been assessed prior to development consent being granted (IEEM, 2006). Although not required under current EIA legislation, the preparation of an EMP should be considered for all high voltage electricity transmission projects.

It serves as a practical link between the EIS/ER and the implementation of previously-assessed mitigation measures by the contracted construction company. The EMP should form part of the construction contract and there should be a requirement under the contract to report on the implementation of the EMP during construction and operation.

In preparing such a management plan, provisions of Circular Letter PD 2/07 and NPWS 1/07 (Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites should be considered i.e. the preparation of such a plan cannot be used to compensate for an inadequate EIS or to develop mitigation measures not considered in the EIS. It is also important to note that the EMP may not introduce changes from the permitted project, unless by prior agreement with the consent authority. Changes may invalidate assessments undertaken.

Issues that should be addressed in an environmental management plan (construction) include:

- Implementation of previously-assessed construction techniques in sensitive areas
- Erosion and sedimentation control
- Vegetation management (including the need to comply with conditions set by any consents / derogation licences)
- Fauna protection (including the need to comply with conditions set by any consents / derogation licences)
- Storage and disposal of excavated material
Issues that should be addressed in maintenance management plan include:

- Access track maintenance and reinstatement
- Vegetation management
- Fauna management
- Maintenance of mitigation measures e.g. bird deflectors and warning devices
- Weed control
- Invasive species
- Monitoring

Note: These items must be addressed in the EIS/Environmental Report – it is the management of these items during construction and maintenance that should be included in the Environmental/ Maintenance Management Plan.

9.2 Ecological Monitoring

Monitoring is the taking of repeated observations or measurements to evaluate changes in condition and progress toward meeting a management objective (Elzinga et al. 2001).

<table>
<thead>
<tr>
<th>Stages in the Project Development Roadmap</th>
<th>Ecological Requirements</th>
<th>Appropriate Assessment Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 5</td>
<td>Planning Approval</td>
<td>Ecological Report on Monitoring where required by Planning Authority</td>
</tr>
</tbody>
</table>

Monitoring is not required by EIA legislation, however, inclusion of monitoring programmes is important to provide a realistic evaluation of predictions of the EIS / ER and the effectiveness of mitigation measures which will vary according to each project. Indeed, it is appropriate to monitor the effectiveness of proposed mitigation measures in relation to known environmental effects, or mitigation measures proposed in an EIS that must be implemented.

9.3 Maintenance

Maintenance or uprating (upgrading of an overhead electricity line) may be required during the life time of the transmission project to maintain the existing power line or bring it up to new standards. Key issues in relation to ecology will be direct impacts on habitats and the timing of works. Electricity transmission infrastructure may be located in Nature Conservation Sites.
Where Natura 2000 sites are potentially affected, an appropriate assessment will be required. Maintenance works within all Nature Conservation Sites (NHAs, SACs and SPAs) may involve development which requires planning permission, or other activities or operations that are potentially damaging to the sites. These are called Activities Requiring Consent and can only be carried out with the permission of the Minister for Arts, Heritage and the Gaeltacht. Prior consultation must be carried out with NPWS and authorisation received before any work may begin. In the case of NHAs, 3 months written prior notice is required to be given to the Minister before undertaking any notifiable activities.

General maintenance of power lines will require occasional tree and hedgerow cutting and trimming as vegetation may interfere with the operation of over-head power lines. The Wildlife Act, 1976, as amended by the Wildlife (Amendment) Act, 2000 gives some protection to hedgerows and semi-natural vegetation. Under section 40 of the 1976 Wildlife Act, as amended by Section 46 of the Wildlife Amendment Act, 2000, the cutting or removal of hedgerows or other vegetation during the bird nesting season, from the 1st of March to the 31st of August each year is not permitted. However, there are exemptions to this ruling based on implications for health and safety and for which essential maintenance of power lines is also exempt. However, where possible, scheduled trimming/coppicing works should be scheduled outside this period. Vegetation management/disturbance may constitute an Activity Requiring Consent in nature conservation sites.

Where watercourses are crossed or impacted, it is essential to consult with the local IFI officer and a method statement agreed prior to any work commencing. Works that are potentially damaging to watercourses or water bodies may constitute an Activity Requiring Consent in nature conservation sites. Seasonal restrictions apply to works within watercourses with works are prohibited between October to April inclusive. Further information is available through the IFI and in the publication Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites.

http://www.fishingireland.net/environment/fullconstructionanddevelopment.htm#boards
10. References


BirdLife International (2007). Position Statement on birds and Power lines: on the risks to birds from transmission facilities and how to minimise any such adverse effect.


Eastern Regional Fisheries Board (2004) Requirements for the protection of fisheries habitat during the construction and developments works at river sites. Dublin.


Irish Red Data Books and Lists (downloadable as pdf files from npws.ie)

Invertebrates


Vertebrates


Vascular Plants

The Irish Red Data Book: 1 Vascular Plants [399KB], Wildlife Service Ireland, The Stationery Office, Dublin. (out of print)
Birds

NPWS and the Northern Ireland Environment Agency are currently formulating All-Ireland red lists and books, which will include many more Irish species in need of conservation assessment. Red data lists and books are underway for the following groups; Fish, Moths, Butterflies, Dragonflies, Lichens, Bryophytes, and Seaweeds as well as an update of the Red list for Vascular Plants.

APPENDICES
APPENDIX 1. CRITERIA FOR ASSESSING IMPACT SIGNIFICANCE

These criteria are based on IEEM (2006, 2011) and NRA (2009) guidance.

The following parameters should be addressed:

- Whether the impact is positive or negative
- The magnitude of the impact
- The extent of the impact
- The duration of the impact
- Whether the impact is reversible
- The timing and frequency of the impact

Positive or Negative
Is the impact positive or negative?

Magnitude
The size or amount of an impact should be determined on a quantitative basis if possible eg. the area of habitat impacted.

Extent
The area over which the impact occurs (extent is the same as magnitude for certain parameters eg. area of habitat impacted).

Duration
The duration over which the impact is likely to last until recovery or reinstatement. This should be quantified in terms of the ecological processes and not necessarily on a human timescale.

Reversibility
Whether the impact is reversible (spontaneously or through specific action) and the likelihood of this occurring.

Timing and Frequency
The timing of the impact in relation to critical life-stages or seasons should be identified and the frequency of the impact should be assessed.
## APPENDIX 2. SOURCES OF INFORMATION

<table>
<thead>
<tr>
<th>Type of information</th>
<th>Available as:</th>
<th>Available from:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat information arising from national surveys</td>
<td>Digitised data</td>
<td>NPWS Forest07 – Forest Service Teagasc habitat indicator mapping</td>
</tr>
<tr>
<td>Wetland birds</td>
<td>Counts of wintering birds at wetland sites (IWeBS)</td>
<td>BirdWatch Ireland <a href="http://www.birdwatchireland.ie">http://www.birdwatchireland.ie</a></td>
</tr>
<tr>
<td>Water quality</td>
<td>Biological assessment of water quality on all major rivers (and lakes)</td>
<td>Environmental Protection Agency interactive website <a href="http://www.epa.ie/rivermap/data/rivmaptop.html">http://www.epa.ie/rivermap/data/rivmaptop.html</a></td>
</tr>
<tr>
<td>Fisheries</td>
<td>General data on angling locations Location of main salmonid waters Some fish stock data</td>
<td>Inland Fisheries Ireland <a href="http://www.fisheriesireland.ie/">http://www.fisheriesireland.ie/</a> About-Us/contact-us.html</td>
</tr>
<tr>
<td>Aerial photographs</td>
<td>Available as prints or as digitised files One tile normally covers 2km x 1.5km</td>
<td>Ordnance Survey</td>
</tr>
</tbody>
</table>
## APPENDIX 3. HERITAGE COUNCIL HABITAT CLASSIFICATION

### NON-MARINE

<table>
<thead>
<tr>
<th>Code</th>
<th>Habitat</th>
<th>Code</th>
<th>Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Freshwater</td>
<td>GA1</td>
<td>Improved agricultural grassland</td>
</tr>
<tr>
<td>FL</td>
<td>Lakes and ponds</td>
<td>GA2</td>
<td>Amenity grassland (improved)</td>
</tr>
<tr>
<td>FL1</td>
<td>Dystrophic lakes</td>
<td>GS</td>
<td>Semi-natural grassland</td>
</tr>
<tr>
<td>FL2</td>
<td>Acid oligotrophic lakes</td>
<td>GS1</td>
<td>Dry calcareous and neutral grassland</td>
</tr>
<tr>
<td>FL3</td>
<td>Limestone/marl lakes</td>
<td>GS2</td>
<td>Dry meadows and grassy verges</td>
</tr>
<tr>
<td>FL4</td>
<td>Mesotrophic lakes</td>
<td>GS3</td>
<td>Dry-humid acid grassland</td>
</tr>
<tr>
<td>FL5</td>
<td>Eutrophic lakes</td>
<td>GS4</td>
<td>Wet grassland</td>
</tr>
<tr>
<td>FL6</td>
<td>Turloughs</td>
<td>GM</td>
<td>Freshwater marsh</td>
</tr>
<tr>
<td>FL7</td>
<td>Reservoirs</td>
<td>GM1</td>
<td>Marsh</td>
</tr>
<tr>
<td>FL8</td>
<td>Other artificial lakes and ponds</td>
<td>H</td>
<td>Heath and dense bracken</td>
</tr>
<tr>
<td>FW</td>
<td>Watercourses</td>
<td>HH</td>
<td>Heath</td>
</tr>
<tr>
<td>FW1</td>
<td>Eroding/upland rivers</td>
<td>HH1</td>
<td>Dry siliceous heath</td>
</tr>
<tr>
<td>FW2</td>
<td>Depositing/lowland rivers</td>
<td>HH2</td>
<td>Dry calcareous heath</td>
</tr>
<tr>
<td>FW3</td>
<td>Canals</td>
<td>HH3</td>
<td>Wet heath</td>
</tr>
<tr>
<td>FW4</td>
<td>Drainage ditches</td>
<td>HH4</td>
<td>Montane heath</td>
</tr>
<tr>
<td>FP</td>
<td>Springs</td>
<td>HD</td>
<td>Dense bracken</td>
</tr>
<tr>
<td>FP1</td>
<td>Calcareous springs</td>
<td>HD1</td>
<td>Dense bracken</td>
</tr>
<tr>
<td>FP2</td>
<td>Non-calcareous springs</td>
<td>P</td>
<td>Peatlands</td>
</tr>
<tr>
<td>FS</td>
<td>Swamps</td>
<td>PB</td>
<td>Bogs</td>
</tr>
<tr>
<td>FS1</td>
<td>Reed and large sedge swamps</td>
<td>PB1</td>
<td>Raised bog</td>
</tr>
<tr>
<td>FS2</td>
<td>Tall-herb swamps</td>
<td>PB2</td>
<td>Upland blanket bog</td>
</tr>
<tr>
<td>G</td>
<td>Grassland and marsh</td>
<td>PB3</td>
<td>Lowland blanket bog</td>
</tr>
<tr>
<td>GA</td>
<td>Improved grassland (highly modified)</td>
<td>PB4</td>
<td>Cutover bog</td>
</tr>
<tr>
<td>PB5</td>
<td>Eroding blanket bog</td>
<td>WS4</td>
<td>Short rotation coppice</td>
</tr>
<tr>
<td>------</td>
<td>-------------------------------------------</td>
<td>------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>PF</td>
<td>Fens and flushes</td>
<td>WS5</td>
<td>Recently-felled woodland</td>
</tr>
<tr>
<td>PF1</td>
<td>Rich fen and flush</td>
<td>WL</td>
<td>Linear woodland and scrub</td>
</tr>
<tr>
<td>PF2</td>
<td>Poor fen and flush</td>
<td>WL1</td>
<td>Hedgerows</td>
</tr>
<tr>
<td>PF3</td>
<td>Transition mire and quaking bog</td>
<td>WL2</td>
<td>Treelines</td>
</tr>
<tr>
<td>W</td>
<td>Woodland and scrub</td>
<td>E</td>
<td>Exposed rock/disturbed ground</td>
</tr>
<tr>
<td>WN</td>
<td>Semi-natural woodland</td>
<td>ER</td>
<td>Exposed rock</td>
</tr>
<tr>
<td>WN1</td>
<td>Oak-birch-holly woodland</td>
<td>ER1</td>
<td>Exposed siliceous rock</td>
</tr>
<tr>
<td>WN2</td>
<td>Oak-ash-hazel woodland</td>
<td>ER2</td>
<td>Exposed calcareous rock</td>
</tr>
<tr>
<td>WN3</td>
<td>Yew woodland</td>
<td>ER3</td>
<td>Siliceous scree and loose rock</td>
</tr>
<tr>
<td>WN4</td>
<td>Wet pedunculate oak-ash woodland</td>
<td>ER4</td>
<td>Calcareous scree and loose rock</td>
</tr>
<tr>
<td>WN5</td>
<td>Riparian woodland</td>
<td>EU</td>
<td>Underground rock and caves</td>
</tr>
<tr>
<td>WN6</td>
<td>Wet willow-alder-ash woodland</td>
<td>EU1</td>
<td>Non-marine caves</td>
</tr>
<tr>
<td>WN7</td>
<td>Bog woodland</td>
<td>EU2</td>
<td>Artificial underground habitats</td>
</tr>
<tr>
<td>WD</td>
<td>Highly modified/non-native woodland</td>
<td>ED</td>
<td>Disturbed ground</td>
</tr>
<tr>
<td>WD1</td>
<td>(Mixed) broadleaved woodland</td>
<td>ED1</td>
<td>Exposed sand, gravel or till</td>
</tr>
<tr>
<td>WD2</td>
<td>Mixed broadleaved/conifer woodland</td>
<td>ED2</td>
<td>Spoil and bare ground</td>
</tr>
<tr>
<td>WD3</td>
<td>(Mixed) conifer woodland</td>
<td>ED3</td>
<td>Recolonising bare ground</td>
</tr>
<tr>
<td>WD4</td>
<td>Conifer plantation</td>
<td>ED4</td>
<td>Active quarries and mines</td>
</tr>
<tr>
<td>WD5</td>
<td>Scattered trees and parkland</td>
<td>ED5</td>
<td>Refuse and other waste</td>
</tr>
<tr>
<td>WS</td>
<td>Scrub-transitional woodland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS1</td>
<td>Scrub</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS2</td>
<td>Immature woodland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS3</td>
<td>Ornamental/non-native shrub</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### APPENDIX 3. HERITAGE COUNCIL HABITAT CLASSIFICATION - cont.

#### NON-MARINE

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Cultivated and built land</td>
</tr>
<tr>
<td>BC</td>
<td>Cultivated land</td>
</tr>
<tr>
<td>BC1</td>
<td>Arable crops</td>
</tr>
<tr>
<td>BC2</td>
<td>Horticultural land</td>
</tr>
<tr>
<td>BC3</td>
<td>Tilled land</td>
</tr>
<tr>
<td>BC4</td>
<td>Flower beds and borders</td>
</tr>
<tr>
<td>BL</td>
<td>Built land</td>
</tr>
<tr>
<td>BL1</td>
<td>Stone walls and other stonework</td>
</tr>
<tr>
<td>BL2</td>
<td>Earth banks</td>
</tr>
<tr>
<td>BL3</td>
<td>Buildings and artificial surfaces</td>
</tr>
</tbody>
</table>

| CD   | Sand dune systems            |
| CD1  | Embryonic dunes              |
| CD2  | Marram dunes                 |
| CD3  | Fixed dunes                  |
| CD4  | Dune scrub and woodland      |
| CD5  | Dune slacks                  |
| CD6  | Machair                      |

| CC   | Coastal constructions        |
| CC1  | Sea walls, piers and jetties |
| CC2  | Fish cages and rafts         |

#### MARINE

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Coastland</td>
</tr>
<tr>
<td>CS</td>
<td>Sea cliffs and islets</td>
</tr>
<tr>
<td>CS1</td>
<td>Rocky sea cliffs</td>
</tr>
<tr>
<td>CS2</td>
<td>Sea stacks and islets</td>
</tr>
<tr>
<td>CS3</td>
<td>Sedimentary sea cliffs</td>
</tr>
<tr>
<td>CW</td>
<td>Brackish waters</td>
</tr>
<tr>
<td>CW1</td>
<td>Lagoons and saline lakes</td>
</tr>
<tr>
<td>CW2</td>
<td>Tidal rivers</td>
</tr>
<tr>
<td>CM</td>
<td>Salt marshes</td>
</tr>
<tr>
<td>CM1</td>
<td>Lower salt marsh</td>
</tr>
<tr>
<td>CM2</td>
<td>Upper salt marsh</td>
</tr>
<tr>
<td>CB</td>
<td>Shingle and gravel banks</td>
</tr>
<tr>
<td>CB1</td>
<td>Shingle and gravel banks</td>
</tr>
<tr>
<td>L</td>
<td>Littoral (intertidal)</td>
</tr>
<tr>
<td>LR</td>
<td>Littoral rock</td>
</tr>
<tr>
<td>LR1</td>
<td>Exposed rocky shores</td>
</tr>
<tr>
<td>LR2</td>
<td>Moderately exposed rocky shores</td>
</tr>
<tr>
<td>LR3</td>
<td>Sheltered rocky shores</td>
</tr>
<tr>
<td>LR4</td>
<td>Mixed substrata shores</td>
</tr>
<tr>
<td>LR5</td>
<td>Sea caves</td>
</tr>
<tr>
<td>LS</td>
<td>Littoral sediment</td>
</tr>
<tr>
<td>LS1</td>
<td>Shingle and gravel shores</td>
</tr>
<tr>
<td>LS2</td>
<td>Sand shores</td>
</tr>
<tr>
<td>LS3</td>
<td>Muddy sand shores</td>
</tr>
<tr>
<td>LS4</td>
<td>Mud shores</td>
</tr>
<tr>
<td>LS5</td>
<td>Mixed sediment shores</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>S</td>
<td>Sublittoral (subtidal)</td>
</tr>
<tr>
<td>SR</td>
<td>Sublittoral rock</td>
</tr>
<tr>
<td>SR1</td>
<td>Exposed infralittoral rock</td>
</tr>
<tr>
<td>SR2</td>
<td>Moderately exposed infralittoral rock</td>
</tr>
<tr>
<td>SR3</td>
<td>Sheltered infralittoral rock</td>
</tr>
<tr>
<td>SR4</td>
<td>Exposed circalittoral rock</td>
</tr>
<tr>
<td>SR5</td>
<td>Moderately exposed circalittoral rock</td>
</tr>
<tr>
<td>SR6</td>
<td>Sheltered circalittoral rock</td>
</tr>
<tr>
<td>SS</td>
<td>Sublittoral sediment</td>
</tr>
<tr>
<td>SS1</td>
<td>Infralittoral gravels and sands</td>
</tr>
<tr>
<td>SS2</td>
<td>Infralittoral muddy sands</td>
</tr>
<tr>
<td>SS3</td>
<td>Infralittoral muds</td>
</tr>
<tr>
<td>SS4</td>
<td>Infralittoral mixed sediments</td>
</tr>
<tr>
<td>SS5</td>
<td>Circalittoral gravels and sands</td>
</tr>
<tr>
<td>SS6</td>
<td>Circalittoral muddy sands</td>
</tr>
<tr>
<td>SS7</td>
<td>Circalittoral muds</td>
</tr>
<tr>
<td>SS8</td>
<td>Circalittoral mixed sediments</td>
</tr>
<tr>
<td>MW</td>
<td>Marine water body</td>
</tr>
<tr>
<td>MW1</td>
<td>Open marine water</td>
</tr>
<tr>
<td>MW2</td>
<td>Sea inlets and bays</td>
</tr>
<tr>
<td>MW3</td>
<td>Straits and sounds</td>
</tr>
<tr>
<td>MW4</td>
<td>Estuaries</td>
</tr>
</tbody>
</table>
APPENDIX 4. TYPICAL ELECTRICITY STRUCTURES 110KV, 220KV AND 400KV

Note: dimensions are indicative only

110kV Earthwire Woodpole
(Typical Dimensions)
Number of Foundations = 2
Leg Spacing = 5m
Foundation Depth = 2.3m (min)

110kV Angle Tower
(Typical Dimensions)
Number of Foundations = 4
Leg Spacing = 5m
Foundation Depth = 3m (min)
Foundation Width = 2.5m x 2.5m
220kV Intermediate Tower  
(Typical Dimensions)  
Number of Foundations = 4  
Leg Spacing = 6.3m  
Foundation Depth = 3m  
Foundation Width = 2.5m x 2.5m

400kV Intermediate Tower  
(Typical Dimensions)  
Number of Foundations = 4  
Leg Spacing = 7.6m  
Foundation Width = 4.6m x 4.6m
General Habitat Loss and Disturbance

• Where possible, direct habitat loss within Nature Conservation Sites will be avoided.
• When construction occurs within a Nature Conservation Site, sensitive construction techniques will be used such as the use of bog mats for machinery access, particularly if underground cables are proposed or in remote bogland areas. Aerial access will be considered – for both machinery and workforce – in exceptionally sensitive sites.
• Ecological monitoring will be undertaken at sensitive sites during construction as appropriate. Such sites will be identified on a case by case basis.
• Restricted working areas will be imposed to ensure minimal disturbance to sensitive habitats.
• Redistribute vegetation and soil stripped from the construction areas to provide a seedbank and do not re-seed with Perennial Ryegrass.
• Land within the working area will be reinstated as near as practical to its former condition.

Bogs and Peatland Areas

• Areas of deep and active peat shall be avoided, where possible.
• Detailed peat slip risk assessments should be carried out for all proposed developments in areas where peat substrates occur.
• Construction machinery should be restricted to sites roads and designated access routes. Machinery should not be allowed to access, park or travel over areas outside development construction zones.
• Peat excavated during construction activity should not be stored (temporarily or otherwise) on areas of adjacent mire habitats or near flushes or drains. Temporary storage of spoil material excavated during the construction phase of development should be stored at suitable locations away from watercourses.
• All spoil material excavated during the construction phase should be reinstated following the completion of the construction phase of a proposed development.
• Where disturbance of peat soils cannot be avoided, there should be some consideration given to possible re-seeding with native species to stabilize the peat and accelerate recovery of the vegetation.

Birds

• Where feasible, site clearance involving the cutting or destruction of vegetation and hedgerows shall not take place in the bird breeding season between 1st March and 31st August, inclusive.
• On the advice of relevant ornithological experts and agencies, bird warning devices shall be put in place where crossings of sensitive flight corridors cannot be avoided.

Bats

• The removal of bat commuting and foraging habitat shall be avoided where possible, during the construction and operation phase of infrastructure.
• Where the removal of commuting or foraging habitat cannot be avoided, alternative habitat should be established prior to such habitat removal.
• Trees scheduled for felling as part of site clearance shall be checked by a bat specialist for the presence of bats.
• Where bats are noted to be within a tree prior to felling operations, it will be necessary to postpone felling to create the opportunity for bats to cease usage. If bats do not leave a tree within a reasonable time frame, it may be possible...
for a bat specialist to seed to exclude the bats (or otherwise remove them to safety). This shall be carried out by a qualified bat specialist with written permission from the NPWS of the Department of Arts, Heritage and the Gaeltacht by way of licence to derogate from the protection afforded bats by Irish and EU law. All licences shall be put in place prior to felling procedures, as to destroy a roost without licence is an offence.

Otters
- Works shall avoid active otter holts where possible. In the event that an active otter holt cannot be avoided by the works, it will be necessary to seek a derogation licence from NPWS to exclude otters from the holt.
- No works shall be undertaken within 150m of any holts at which breeding females or cubs are present.
- No wheeled or tracked vehicles (of any kind) should be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance, should also not take place within 15m of such holts, except under licence.

Other Protected Species
- The breeding and resting sites of protected species shall be avoided during the appropriate seasons.
- A derogation licence from the Wildlife Acts shall be sought, and works shall not be commenced without such consent, where it appears that protected species or their habitats are likely to be unavoidably disturbed.

Water Dependant Habitats and Species
The following measures are designed to mitigate impacts on surface water dependent habitats and species such as salmon, lamprey, freshwater pearl mussel and white clawed crayfish.

In all cases where works have the potential to impact on protected surface water or riparian habitats, the Inland Fisheries Ireland document Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites shall be adhered to. Development of transmission infrastructure adjacent to designated fisheries shall be carried out in consultation with Inland Fisheries Ireland, to minimise the potential effects on designated surface waters.

Freshwater Pearl Mussel
- Action measures, as outlined in the Freshwater Pearl Mussel Sub Basin Management Plans, shall be taken into account where development is considered adjacent to areas associated with Freshwater Pearl Mussels.
- In the vicinity of waters that sustain a population of Freshwater Pearl Mussel, the following mitigation measures shall be employed:
  - There shall be no in-stream crossing by machinery
  - Silty waters will be collected in settlement ponds prior to discharge to watercourses.
  - Buffering strips will be provided near watercourses.

Fisheries
- All works involving open cut crossings shall be carried out during the period May to September to avoid interruption of salmonid spawning runs, spawning, incubation of eggs and the early developmental stages.
- Where appropriate and practical, bank vegetation and bed material which has been removed shall be stored to facilitate its replacement when channel works in the vicinity of the watercourse have been completed.
• Works in the vicinity of a watercourse shall be carried out with reference to a water quality protection plan for each site, which shall ensure that:
  - All necessary measures shall be taken to minimise the generation and release of sediments into all watercourses.
  - Levels of suspended solids in the river shall be monitored during the course of the works.
  - Precautions shall be put in place to avoid spillages of diesel, oil, or other polluting substances.

Accidental Spillage of Fuel or Chemicals Causing Pollution to Water or Ground
• Develop, implement and enforce a Water Pollution Prevention and Environmental Emergency Response Plan for all work sites. This should include good site practices as described in the Good Practice Guidance Notes proposed by EA/SEPA/EHS.

Suspended Solids and Sediment Deposition
• Precautions shall be put in place to avoid or minimise the generation and release of sediments into all watercourses.

Physical Damage to Watercourses
• Develop, implement and enforce a code of best practice for construction and reinstatement methods to be used for unavoidable construction works in the vicinity of watercourses.

Habitats Not Within Designated Sites
Article 10 of the Habitats Directive requires Member States to encourage the management of features of the landscape which are of major importance for wild flora and fauna. These features are those which, because of their linear and continuous structure or their function as ‘stepping stones’ are essential for migration, dispersal and genetic exchange.

In the context of the development of an electricity transmission network, it is important to ensure that features such as trees and hedgerows are afforded protection during construction and maintenance activities.

Mature Trees
• Where construction work is required close to trees, the National Joint Utilities Group ‘Guidelines for the Planning Installation and Maintenance of Utility Services in Proximity to Trees’ (NJUG 10) will be followed.

Hedgerows
• Where technically feasible, every effort will be made to avoid significant negative impacts on hedgerows and boundaries identified as being of very high / high ecological value.

• All disturbed hedgerows will be re-planted as soon as possible after construction, using Irish nursery stock and indigenous species. Planting will be maintained until vigorous re-growth has been established. Where hedgerows of particular value are encountered, the extent and duration of the works shall be minimized. For species-rich banks, turf will be stripped and stored separately for replacement or re-instatement.
APPENDIX 6. GLOSSARY OF TERMS IMPACTS


Quality of impacts
Positive Impact
A change that improves the quality of the environment (e.g. by increasing species diversity, or improving the reproductive capacity of an ecosystem, or removing nuisances or improving amenities).

Neutral Impact
A change that does not affect the quality of the environment.

Negative Impact
A change that reduces the quality of the environment (e.g. lessening species diversity or diminishing the reproductive capacity of an ecosystem, or damaging health or property or by causing nuisance).

Significance of Impacts
Imperceptible Impact
An impact capable of measurement but without noticeable consequences.

Slight Impact
An impact that causes noticeable changes in the character of the environment without affecting its sensitivities.

Moderate Impact
An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends.

Significant Impact
An impact that, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.

Profound Impact
An impact that obliterates sensitive characteristics.

Duration of Impacts
Short-term Impacts
Impact lasting one to seven years.

Medium-term Impact
Impact lasting seven to fifteen years.

Long-term Impact
Impact lasting fifteen to sixty years.

Permanent Impact
Impact lasting over sixty years.

Temporary Impact
Impact lasting for one year or less.

Types of Impacts
Cumulative Impact
The addition of many small impacts to create one larger, more significant, impact.

‘Do Nothing Impact’
The environment as it would be in the future should no development of any kind be carried out.

Indeterminable Impact
When the full consequences of a change in the environment cannot be described.

Irreversible Impact
When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.

Residual Impact
The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
OTHER DEFINITIONS

Aquifer
Underground water body.

Biodiversity
The total range of variability among ecosystems and organisms at the following levels of organisation: bioregional, landscape, ecosystem, habitat, communities, species, populations, individuals, genes and the structural and functional relationships within and between these different levels.

Ecology
The science of the interrelationships between living organisms and their environment (other organisms and the physical environment including the soil, air, climate).

Ecological Impact Assessment
Non-statutory process of defining, quantifying and evaluating the potential impacts of defined actions on ecosystems or their components.

Ecosystem
An interacting community of independent organisms and the environment they inhabit.

Environmental Impact Assessment
The process of examining the environmental effects of development / projects.

Environmental Impact Statement
Report presenting the findings of the environmental impact assessment process.

Estuarine
Pertaining to the area where a river enters the sea.

Fauna
A collective term for all kinds of animals.

Flora
A collective term for all kinds of plants.

Habitat
A place in which a particular plant or animal lives. Often used in the wider sense referring to major assemblages of plants and animals found together.

Intertidal
Area that is between high and low water mark.

Invertebrates
Animals without a backbone.

I-WeBS
Irish Wetland Birds Survey.

Macroinvertebrates
Animals without backbones that are large enough to be easily visible to the naked eye.

Marine
Area that is always covered by seawater.

Mitigation
Measures taken to reduce adverse impacts e.g. modifications or additions to the design of the development, such as the creation of reed bed silt traps to prevent polluted water running directly into ecologically important watercourses.

Natura 2000 Sites
Natura 2000 sites are protected habitats for flora and fauna of European importance. They comprise Special Areas of Conservation, designated under the Habitats Directive and Special Protection Areas, designated under the Birds Directive.

Nature Conservation Site
Area of high ecological value that has been legally protected for conservation, these comprise of European Sites (SACs, SPAs including proposed and candidate sites) and nationally protected sites (NHAs and pNHAs).
Precautionary Principle
The principle that the absence of complete information should not preclude action to mitigate the risk of significant harm to the environment. In a case where information is incomplete, then the assessment should assume that impacts will occur.

Raptor
Bird of prey that depends of other animal species for food.

Riparian
The edge of streams or rivers.

Scoping
Determination of the scope of topics and studies required as part of Environmental Impact Assessment.

Species Diversity
A measure of species richness and the relative abundance of species.

Transmission
In relation to electricity, means the transport of electricity by means of a transmission system, that is to say, a system which consists, wholly or mainly, of high voltage lines and electric plant and which is used for conveying electricity from a generating station to a substation, from one generating station to another, from one substation to another or to or from any interconnector or to final customers but shall not include any such lines which the Board (ESB) may, from time to time, with the approval of the Commission, specify as being part of the distribution system but shall include any interconnector owned by the Board (Electricity Regulation Act 1999).

Transmission Network
The transmission network plays a vital role in the supply of electricity, providing the means to transport power from the generators to the demand centres using a system comprising of 400 kV, 220 kV and 110 kV networks.