



CIEEM

**Chartered
Institute of
Ecology and
Environmental
Management**

GUIDELINES FOR ECOLOGICAL IMPACT ASSESSMENT IN THE UK AND IRELAND

Terrestrial, Freshwater and Coastal

Second Edition
January 2016

PREFACE TO SECOND EDITION

The *Guidelines for Ecological Impact Assessment* were originally commissioned by the Council of the Institute of Ecology and Environmental Management (IEEM) and produced by a Working Group formed from its members. They were first published in 2006. The Guidelines were developed with the involvement of a wide range of interested parties to establish and set out good practice for each stage in the EclA process.

This second edition of the Guidelines has been revised by a Technical Review Group formed from members of the Chartered Institute of Ecology and Environmental Management (CIEEM) and continues the aim of the Guidelines to:

- promote good practice
- promote a scientifically rigorous and transparent approach to Ecological Impact Assessment (EclA)
- provide a common framework to EclA in order to promote better communication and closer cooperation between ecologists involved in EclA; and
- provide decision-makers with relevant information about the likely ecological effects of a project.

The purpose of the revision was to:

- update the 2006 Guidelines
- expand the 2006 Guidelines to be applicable to the Republic of Ireland
- address feedback from practitioners on the application of the Guidelines since 2006
- take account of changes in legislation since 2006
- achieve alignment between the revised Guidelines and the *Guidelines for Ecological Impact Assessment in Britain and Ireland: Marine and Coastal (2010)* (*EclA Marine Guidelines 2010*).

*Biodiversity: Code of practice for planning and development*² published by the British Standards Institute (BS 42020:2013) cites CIEEM EclA Guidelines as the acknowledged reference on ecological impact assessment. These guidelines are consistent with the British Standard on Biodiversity, which provides recommendations on topics such as professional practice, proportionality, pre-application discussions, ecological surveys, adequacy of ecological information, reporting and monitoring.

The following organisations have endorsed these Guidelines



ASSOCIATION OF
Local Government Ecologists



Cyfoeth
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DOE
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AMENDMENTS AND CORRECTIONS

(Minor amendments and corrections will be added during the lifetime of this document.)

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SUMMARY

The Chartered Institute of Ecology and Environmental Management (CIEEM) has developed these Guidelines to promote good practice in Ecological Impact Assessment (EclA) relating to terrestrial, freshwater and coastal environments (to the mean low water mark) in the UK and Ireland. They update the Institute's 2006 Guidelines and align with *CIEEM's EclA Marine Guidelines 2010*: there will be examples on the coast where a project will be subject to both marine and terrestrial consent processes and both sets of guidance may be relevant.

EclA is a process of identifying, quantifying and evaluating potential effects of development-related or other proposed actions on habitats, species and ecosystems³. The findings of an assessment can help competent authorities understand ecological issues when determining applications for consent. EclA can be used for the appraisal of projects of any scale including the ecological component of Environmental Impact Assessment (EIA). When undertaken as part of an EIA, EclA is subject to the relevant EIA Regulations. However unlike EIA, EclA on its own is not a statutory requirement. It is a best practice evaluation process undertaken to support a range of assessments.

EclA is a process that is most effective if all contributing ecologists and other specialists work in collaboration. An EclA report (or the ecological chapter of an EIA Environmental Statement) should clearly and simply describe the significant effects of any project so that all interested parties understand the implications of what is proposed. These Guidelines explain the key elements of the EclA process:

Chapter 1 – Introduction. Overview of the EclA process and underpinning principles.

Chapter 2 – Scoping. Determining the matters to be addressed in the EclA, including consultation to ensure the most effective input to defining the scope. Scoping is an ongoing process – the scope of the EclA may be modified following further ecological survey/research and during impact assessment.

Chapter 3 – Establishing the baseline. Collecting information and describing the ecological conditions in the absence of the proposed project, to inform the assessment of impacts.

Chapter 4 – Important ecological features. Identifying important ecological features (habitats, species and ecosystems, including ecosystem function and processes) that may be affected, with reference to a geographical context in which they are considered important.

Chapter 5 – Impact assessment. An assessment of whether important ecological features will be subject to impacts and characterisation of these impacts and their effects⁴. Assessment of residual ecological impacts of the project remaining after mitigation and the significance of their effects, including cumulative effects.

Chapter 6 – Avoidance, mitigation, compensation and enhancement. Incorporating measures to avoid, reduce and compensate ecological impacts, and the provision of ecological enhancements. Monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.

Chapter 7 – Consequences for decision making. Consideration of the legal and policy framework throughout the EclA process.

1. INTRODUCTION

- 1.1. The purpose of these Guidelines is to promote good practice in Ecological Impact Assessment (EclA) relating to terrestrial, freshwater and coastal environments to the mean low water mark in the UK and Ireland.
- 1.2. The context of EclA is well established. The EU Biodiversity Strategy⁵ and national biodiversity strategies⁶ reflect the need to conserve biodiversity in the face of pressure from development, other land use change and climate change. International work on the benefits of nature to society (natural capital and ecosystem services), the UK National Ecosystem Assessment⁷ and *The Economic and Social Aspects of Biodiversity in Ireland*⁸, have increased understanding of the importance of conserving biodiversity for human wellbeing and the economy. This is reflected in national policy objectives for nature conservation, such as the Natural Environment White Paper⁹ in England, White Paper on Natural Resources¹⁰ in Wales, the *Land Use Strategy for Scotland*¹¹ and *Actions for Biodiversity – Ireland’s National Biodiversity Plan 2011-2016*¹². EclA supports implementation of national biodiversity strategies and national planning policies for safeguarding biodiversity and supporting the delivery of sustainable development.
- 1.3. EclA is a process of identifying, quantifying and evaluating the potential effects of development-related or other proposed actions on habitats, species and ecosystems.** EclA can be used for the appraisal of projects of any scale: it is a systematic, repeatable process applicable to a wide range of projects.
- 1.4. Two particular uses of EclA are:
 - providing the ecological component of Environmental Impact Assessment (EIA) required under EIA Regulations; and
 - demonstrating how a project accords with relevant planning policy and legislation where an EIA is not required.
- 1.5. The EclA process can be fitted seamlessly into the EIA process or it can stand alone. Summary information on EIA is provided in Box 1.

Box 1: Environmental Impact Assessment

EIAs are carried out to meet the requirements of Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment, as amended by Council Directives 97/11/EC, 2003/35/EC and 2009/31/EC and redrafted in a codified version Directive 2011/92/EU. The amended Environmental Impact Assessment (EIA) Directive 2014/52/EU entered into force in 2014 to simplify the rules for assessing the potential effects of projects on the environment and Member States have to apply these rules from May 2017¹³.

The Directive requires EIA to be carried out before development consent is granted for projects that are likely to have significant environmental effects. EIA is a mandatory requirement for projects listed in Annex I of the Directive. It is also required for projects that meet the criteria for Annex II development and are likely to have significant environmental effects (as defined in Annex III of the Directive). EIAs should provide a comprehensive understanding of the implications of a project proposal, including consideration of impacts on fauna and flora, and interactions with soil, water and air.

EIA Regulations are particular to each country and to different types of development or activity. The main statutory instruments that implement the Directive in the UK are available on the website for UK legislation¹⁴. In the Republic of Ireland the EIA Directive was transposed in planning legislation in 2000 and given further effect in 2013¹⁵.

- 1.6. Work undertaken for EclA can inform Habitats Regulations Assessments (HRAs) and Water Framework Directive (WFD) Assessments. These Guidelines do not cover these Assessments, but a summary is provided in Box 2.

Box 2: Habitats Regulations Assessment and Water Framework Directive Assessment

Projects affecting designated sites protected by the Habitats Directive¹⁶ (transposed into national Regulations¹⁷) will require specific assessments in accordance with the Directive. Similarly, projects affecting water bodies may require assessment under the Water Framework Directive (WFD)¹⁸. These Guidelines do not explain the specific assessment processes to be applied or the criteria governing decisions. Guidance on implementing the Habitats Directive is provided by the European Commission in *Managing Natura 2000 sites the provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC*¹⁹ and in more detail in *The Habitats Regulations Assessment Handbook*²⁰ and in *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities*²¹. Information on the WFD is available on the Joint Nature Conservation Committee website²² and on the Irish Water Framework Directive website²³.

Information assembled for an EclA that is relevant to subsequent Habitats Regulations Assessment (HRA) and/or WFD assessments should be presented in a format that can be readily extracted for these other assessments.

Use of these Guidelines

- 1.7. These Guidelines should be followed by ecologists undertaking EclA. The Guidelines also provide regulators, decision-makers and those submitting projects with an indication of the information needed to adequately consider projects in the light of biodiversity legislation and policy.
- 1.8. These Guidelines are applicable to ecologists acting for:
 - a project proposer such as a developer submitting a planning application;
 - a competent authority making the decision about consent for a proposed project;
 - public bodies with biodiversity and landscape duties and/or WFD duties; and
 - consultees such as those who advise the competent authority in a statutory or voluntary capacity.

Differing Scales of EclA and a Proportionate Approach

- 1.9. EclA can be applied to projects of widely varying scales. The EclA principles and process outlined in this guidance are relevant to all developments that may impact on ecological features - this term is used throughout to cover 'habitats, species and ecosystems'. However, the level of detail required in an EclA will inevitably be proportionate to the scale of the development and complexity of its potential impacts. These Guidelines do not prescribe exactly how to undertake an EclA, but provide guidance to practitioners for refining their own methodologies.
- 1.10. Scoping (Chapter 2) should be proportionate to potential effects on ecological features. For smaller developments expected to have low impact on ecological features, it may not be necessary to undertake a comprehensive scoping process: it may be sufficient to use Preliminary Ecological Appraisal (Box 5). Professional ecologists need to use their knowledge and experience to judge the resources required to complete an adequate and effective EclA.
- 1.11. Emphasis in EclA is on 'significant effects' (see 5.25) rather than all ecological effects. Relevant legislation, regulations, plans and policies should be considered at an early stage, as these will have a bearing on the scope of investigations, how potential effects are interpreted, and the criteria needed for determining significance.

A Rigorous and Transparent Approach

- 1.12. A scientifically rigorous and transparent approach to EclA is essential. EclA should be undertaken by qualified professionals with an appropriate level of experience in ecological survey and impact assessment who are recognised by a relevant professional body such as CIEEM.
- 1.13. All interested parties should understand the assessment process and who is responsible for implementing and monitoring the actions needed to deliver biodiversity objectives. The EclA must provide reliable and defensible information about, and interpretation of, the likely significant ecological effects from inception to operation and, where appropriate, decommissioning.
- 1.14. Account needs to be taken of existing information and understanding, in conjunction with the results of EclAs undertaken elsewhere. CIEEM encourages all practitioners to share data and results, for example through Local Record Centres (LRCs) in Britain²⁴, the Centre for Environmental Data and Recording (CEDaR) in Northern Ireland²⁵ and the National Biodiversity Data Centre in Ireland²⁶. Consideration should also be given to the publication of findings to allow review and learning by others.
- 1.15. The EclA should consider the significant ecological effects of a project in the light of relevant planning policies and legislation. Legislation relating to terrestrial, freshwater and coastal environments is evolving and practitioners should always check for changes and revisions. These Guidelines are based on requirements at the time of publication and changes in legislation and policy may necessitate periodic review. The Guidelines do not attempt to explain legislative detail, and users should refer to relevant legislation and case law or seek specialist legal advice.
- 1.16. EclA benefits from early consultation with the competent authority (usually the local planning authority), Statutory Nature Conservation Organisations (SNCOs), Environment(al) Protection Agencies (EPAs) and Non-Governmental Organisations (NGOs). Through EclA the developer/project proposer can be made fully aware of matters such as site designations, protected habitats and protected species, and their implications, before pursuing a project. Engagement with consultees on a regular basis will help refinement of the proposal, smooth progression through the planning process and minimise misunderstanding and controversy.
- 1.17. There will be examples on the coast where a project will be subject to both marine and terrestrial consent processes. Early consultation provides an opportunity to agree the scope of the assessment and arrangements for the assessment process in these circumstances.
- 1.18. Good communication is essential between ecologists and other professionals engaged in the assessment process (e.g. geomorphologists, hydrologists, social practitioners, EIA coordinators), together with proponents, to help inform judgements and refine proposals.

Key Principles

1.19. The following principles²⁷ underpin EclA:

Avoidance	Seek options that avoid harm to ecological features (for example, by locating on an alternative site).
Mitigation	Adverse effects should be avoided or minimised through mitigation measures, either through the design of the project or subsequent measures that can be guaranteed – for example, through a condition or planning obligation.
Compensation	Where there are significant residual adverse ecological effects despite the mitigation proposed, these should be offset by appropriate compensatory measures.
Enhancements	Seek to provide net benefits for biodiversity over and above requirements for avoidance, mitigation or compensation.

The EclA Process

1.20. The EclA process is summarised in Box 3. EclA is an iterative process; for example, scoping is an ongoing process - the initially proposed scope of the EclA may be modified following further ecological survey/research and during impact assessment.

Box 3: Summary of the EclA process

Initial project design

At the outset of the project, the proponent's ecologist(s) should:

- obtain information on the project, any alternatives that have been studied and existing ecological information;
- undertake a gap analysis between known and needed information and plan and prioritise gap filling;
- review ecological implications of alternatives;
- discuss key ecological considerations about the project design (and alternatives) with the project proposer and the design team (e.g. engineers, architects);
- recommend modifications to the design to avoid negative ecological impacts or, where this is not possible, to reduce them; and
- explore opportunities for ecological enhancements as early as possible.

Screening (EIA only)

The project proposer may seek a formal screening opinion from the competent authority to determine the need for EIA under the EIA Regulations.

Scoping EclA

Scoping determines the issues to be covered by the EclA. Where an EIA is required, the competent authority must provide a 'scoping opinion' if requested by the developer. In all other cases it is advisable to seek the competent authorities and key consultees' views on the proposed scope of the EclA.

In all cases, scoping will need to:

- identify any potential licensing requirements for survey and/or development regarding legally protected species;
- identify all proposed construction, operating, maintenance, closure and decommissioning activities that may generate significant ecological impacts;
- identify significant other developments that may give rise to cumulative impacts
- identify potentially important ecological features;
- identify for assessment those important ecological features that could sustain significant positive or negative impacts;
- identify relationships with other issues e.g. water, landscapes
- identify data gaps;
- propose suitable spatial and temporal scopes for the assessment and identify the main ecological issues to be addressed;

- undertake preliminary assessment of potential ecological impacts on identified features, incorporating existing data/information;
- reconsider spatial and temporal scope and amend the extent of preliminary investigations if necessary;
- list those features that do not need further assessment, with appropriate justification;
- identify suitable survey/research methodologies that (ideally) have been agreed with consultees;
- confirm potential opportunities for avoidance of impacts, mitigation and enhancement of biodiversity; and
- ensure compliance with standards and consistency with formal methods of evaluation.

For EIA projects, and as good practice for non-EIA projects, scoping should also:

- involve appropriate consultation with the competent authorities, statutory agencies, other regulatory bodies, and possibly relevant NGOs and other non-statutory consultees, regarding the project and the proposed scope of the assessment; and
- produce a scoping report/summary that can be circulated for comment and modified accordingly.

Impact assessment

The EclA team will be involved in the following assessment process, which should cover construction, operation maintenance, closure and decommissioning stages of any project:

- determine the importance of ecological features affected, through survey and/or research;
- assess impacts potentially affecting important features;
- characterise the impacts by describing their extent, magnitude, duration, reversibility, timing and frequency;
- identify cumulative impacts; and
- identify significant effects of impacts in the absence of any mitigation.
-

The surveys and research that are undertaken may indicate that the scope of the assessment should be adjusted and further studies carried out.

Evolution of project design and mitigation

The design process should include the following steps:

- consider alternative location(s) or layouts for the proposed development;
- identify mitigation measures and explain their likely success;
- identify opportunities for enhancement;
- design and agree monitoring strategy and monitoring of mitigation performance with the competent authority (and, in some cases, consultees); and
- provide sufficient information for mitigation measures to be implemented effectively, e.g. through an Environmental management Plan (EMP).

Identify significant residual effects and their legal, policy and development management consequences

The authors of the report should ensure that they:

- produce a clear summary of the residual impacts and the significance of their effects following incorporation of avoidance and mitigation measures;
- consider the implications of significant effects on the features of interest in accordance with planning policies and legislation;

Reporting

The final EclA report (or for EIAs, the Environmental (Impact) Statement) should clearly set out all the ecological information necessary for a robust decision to be made. Key aspects include a description of the following:

- ecological baseline and trends if the project were not to go ahead;
- criteria used to evaluate ecological features;
- criteria used to assess the significance of impacts of the project;
- justification of methods used;
- the identification of likely impacts (positive and negative) on ecological features together with an explanation of the significance of their effects
- mitigation, compensation and enhancement measures;
- legal and policy consequences;
- a note of any key data that were unavailable or missing; and
- a presentation of any analytical techniques used and the analysis itself.

Follow-up and monitoring

The final stage of the process should :

- confirm the implementation of conditions/planning agreements;
- audit predicted impacts against the actual situation; and
- take measures to rectify unexpected negative impacts and ineffective mitigation, compensation, enhancement measures.

EclA Reports

1.21 EclA reports should be tailored to suit individual circumstances and different formats are acceptable. However CIEEM considers it important that the structure and content of EclA reports are standardised. A logical structure for a report is provided in CIEEM Guidelines for Ecological Report Writing and is reproduced in Appendix 2. Where an EIA is required, the Ecological Impact Assessment will be presented in a way that fits the overall style and structure of the Environmental (Impact) Statement, However, the content of Appendix 2 remains relevant. Where elements of this content lie outside the presentation of the main Ecological Impact Assessment (usually an ecological chapter of the EIA), cross reference should be included.

Note: The following definitions are used for the terms 'impact' and 'effect':

Impact – Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow.

Effect – Outcome to an ecological feature from an impact. For example, the effects on a dormouse population from loss of a hedgerow.

2. SCOPING

Purpose and Objectives of Scoping

- 2.1. Scoping is the process of determining the ecological issues to be addressed in the EclA. It sets out the methods and resources to be used and establishes the spatial and temporal limits for surveys and assessments.
- 2.2. Scoping is essential to:
 - establish an initial understanding of the baseline ecological conditions and the potential significant effects that could arise (see 5.25);
 - determine and agree the zone of influence of the project and which important ecological features could be significantly affected;
 - determine and agree the proposed surveys and methods for survey, evaluation and assessment; and
 - determine and agree the content of the EclA.
- 2.3. Scoping ensures that the project proposer is aware of the matters that need to be considered, and the likely costs and timeframes associated with the EclA. Scoping requires collation of any pre-existing and/or relevant background information and the use of professional judgement to determine the sites, species, ecosystems and habitats that are likely to require assessment.
- 2.4. The timing of scoping is very important. It should begin at the earliest opportunity to ensure sufficient time is allowed to adequately inform the EclA process. Early scoping will also allow for effective consultation and any adjustment to the scope of the assessment if necessary. It will also enable early identification of potential impacts and the opportunity to refine the proposal in response. Some of the benefits of scoping are outlined in Box 4.

Box 4: The benefits of scoping

- Early stakeholder engagement and input, identifying issues of concern.
- Early identification of possible changes to scheme location and design needed to avoid or reduce significant ecological effects.
- A proportionate assessment focused on significant effects.
- Clear terms of reference for all engaged in the EclA, including an understanding of the criteria that will be used to evaluate the significance of findings.
- Early identification of existing data and data gaps, and how these will be addressed.
- Justification for the exclusion of potential impacts on ecological features from the EclA where appropriate.
- Identification of the fieldwork required, methods to be used and timescales required including timings for seasonally dependent surveys.
- Identification of the data needed from other members of the assessment team, such as noise or traffic data.

- 2.5. National, regional and local policies expect projects to achieve biodiversity benefits, not simply no net loss through avoiding or mitigating negative effects. Scoping provides an early opportunity for ecologists to work with others to achieve national and local policy objectives and lays the foundation for the whole consultation and assessment process.

Initial and ongoing scoping

- 2.6. Where an EclA is carried out as part of an EIA under EIA Directive 2011/92/EU²⁹ (Directive 2014/52/EU by 2017), competent authorities are required to provide a 'scoping opinion' if requested by a developer. A scoping opinion summarises the specific advice of the competent authority concerning the required coverage and content of the EIA. Although not a legal requirement, a scoping opinion can help to avoid problems by ensuring consensus on the scope of the assessment.
- 2.7. Where EclA is not part of an EIA, it is also advisable to seek the views of the competent authority and key consultees on the proposed scope of the EclA. Published documents such as statutory agencies' standing advice and use of a Preliminary Ecological Appraisal can also assist the scoping of the EclA (see Box 5).
- 2.8. The results of scoping can be presented as a formal report and/or letter to the competent authority. This is strongly recommended for any project that requires detailed ecological survey, and particularly where it is important to get stakeholder agreement on the terms of reference for the EclA. For EclAs that are part of EIAs, a scoping report/letter can be used as the basis for applying for a formal scoping opinion from the competent authority.
- 2.9. This initial scoping (and any scoping opinion) represents the proposed scope at a specific moment in time. However, the process of scoping is iterative and may continue throughout the early stages of a project. The proposed scope of an EclA may change following the preparation of a scoping report/letter/initial consultation.

This may be in response to concerns identified by statutory or other consultees, changes in the project design, or availability of environmental information. It is good practice to record the final scope of the assessment within the EclA report or, when in relation to an EIA, in the Environmental (Impact) Statement.

Box 5: Preliminary Ecological Appraisal

Preliminary Ecological Appraisal³⁰ (PEA) can be undertaken in a variety of contexts, often as a preliminary assessment of likely impacts of a development scheme. PEA can help the project proposer and planning authority to agree the appropriate scope of any subsequent impact assessment or determine that ecological issues will not be significant in determining the application. A PEA, together with any ecological evaluation undertaken, does not replace an EclA. A PEA may be prepared before undertaking a full EclA or may be a stand-alone document where no EclA is required.

The Scoping Process

Overview

- 2.10. Scoping should be a flexible, adaptive and iterative process based on consultations, literature searches, site visits and discussions with the wider project team. Box 6 outlines the key activities in the scoping process.

Box 6: Key activities in scoping

- obtain information about the project from the project proposer or their engineers/designers;
- identify any particular environmental aims or objectives of the project;
- liaise with other environmental specialists to enable consistent assessment across environmental disciplines;
- identify stakeholders and establish a consultation strategy;
- establish the zone(s) of influence of the proposed activities (area(s) over which ecological features may be affected by the biophysical changes caused by the proposed project and associated activities) or identify the need for modelling to determine the zone(s) of influence (see Box 9) – this can be an iterative process following further research and survey;
- carry out a desk study and site visit to assess likely issues and concerns and to identify habitats and species populations which may be exposed to change as a result of the proposed activities – this should include the full distribution or extent of any ecological features which overlap with the zone of influence;
- identify designated sites within the zone of influence;
- identify data gaps and agree details of proposed survey and research methodologies, including temporal; and spatial considerations – note that this does not preclude requests from stakeholders for further information at a later stage of the EclA;
- determine criteria for selecting ecological features to be included in the assessment, based on their importance (Chapter 4);
- identify relevant legislation, regulations, policies and plans and review their requirements;
- identify all relevant conservation objectives, including any specific objectives for designated sites;
- identify (as far as possible) the need for other consents, in addition to planning permission e.g. European protected species licences or water abstraction licences;
- identify information required to determine the baseline ecological conditions, including environmental trends, management activities, completed developments and development for which consent has been or is likely to be granted;
- identify the factors likely to affect habitats, species and ecosystems, including the structure and function of relevant ecosystems and habitats and the conservation status of relevant habitats and species;
- evaluate experience gained and outcomes of relevant previous projects;
- identify other projects/proposals that could result in significant cumulative effects;
- consider options with the developer and project team for changes in location, siting, phasing and design where significant effects are likely;
- identify opportunities for mitigation and enhancement, including protecting and enhancing ecological networks (Chapter 6); and
- continue to refine the scope, ‘scoping out’ (excluding) potential effects that are no longer considered likely to be significant (providing justification) and addressing newly identified effects that are likely to be significant.

Identifying and consulting with stakeholders

- 2.11. Consideration should be given to the best methods of engaging stakeholders. Where there are potentially significant effects on ecological features of particular value to local communities, it is important to consult with those communities or local groups.
- 2.12. Statutory and non-statutory consultees have an important role in providing site-specific data, contextual information and expertise. Consultation will enable evaluation and agreement of the scope and methods of any investigations, including the period for data collection.
- 2.13. Preliminary discussions with stakeholders should determine:
 - ecological features that could be affected; and
 - appropriate assessment methodologies.

There should also be discussions as early as possible with key stakeholders regarding:

- potential strategies to avoid or minimise any negative impacts;
 - potential ways of compensating for any significant negative residual effects (after mitigation); and
 - possible enhancement measures.
- 2.14. Where a project does not include a specific consultation stage, it is still important to consult with stakeholders. In some cases the details of a project will be confidential at the scoping stage, requiring the proponent's ecologist to scope the project without consultation. In such circumstances a precautionary approach to scoping should be taken and consultation carried out as soon as possible. Initial findings of scoping should be circulated to stakeholders for comment.

Defining the project and project activities

- 2.15. It is important to consider all development and activity associated with the main proposal to enable assessment of the impacts of the project as a whole. Associated development (such as transmission lines for a power station) may be subject to separate planning applications and consents and needs to be considered along with other relevant projects that may contribute to cumulative impacts (see 5.20).
- 2.16. Gathering accurate information about the project is essential:
 - What are the proposed activities during construction, operation, decommissioning/closure?
 - Where, when, how and for what period of time will they take place?
 - What biophysical changes in the environment are likely to occur?
 - What are the information gaps, including ecological information and data from other sources, such as traffic, air quality, hydrological or noise data?

Box 7 indicates the information required for effective scoping.

Box 7: Information about the project

Effective scoping in EclA requires information on:

- location, size, extent and spatial organisation of infrastructure and activities, including ancillary development;
- lifetime of project including decommissioning;
- activities likely to cause bio-physical changes during construction, operation and decommissioning, and their timing, frequency, duration, location, extent and magnitude e.g. emissions (type, volume, range), construction activities etc. (Box 8);
- zone(s) of influence of the activities, including activities off site that may be relevant, such as access route construction;
- other developments within the zone(s) of influence for which consent has been or is likely to be granted
- pathway for emissions (e.g. water, soil or air) and the receiving environment;
- best and worst case operating conditions including construction practices that could affect biodiversity; and
- proposed measures designed to deliver biodiversity enhancements.

To assess the effects of any alternatives considered, information will be needed on each alternative, for example:

- sites;
- designs/layouts;
- processes;
- timescales; and
- means of meeting the objectives of the project.

- 2.17. For projects that require an EIA, reference should be made to the relevant schedules of the country's EIA Regulations (see Box 1) that specify the type and scale of development requiring EIA and the key issues to consider.
- 2.18. Box 8 gives examples of activities with potential to generate ecological impacts. It can be difficult at the scoping stage to establish the full extent of likely effects, and a precautionary approach is needed to ensure that the study area incorporates all areas where significant effects could occur throughout the life of the project.

Box 8: Examples of activities that can generate ecological impacts

Preliminary activities prior to the main construction contract

- ground investigations e.g. for contaminated land;
- vegetation clearance; and
- archaeological excavation

Construction phase

- access and travel on/off-site, including temporary access routes for construction vehicles and vessels;
- areas for plant maintenance and for storage of oils, fuels and chemicals;
- movement of materials to/from or within a site;
- demolition operations;
- acoustic disturbance and vibration from construction activities;
- assembly areas for components of construction;
- blasting e.g. for minerals operations;
- dewatering or drawdown e.g. for reservoir safety works, mining;
- infilling of wetland;
- temporary diversion of water courses, water abstraction, discharge to a water body;
- dredging;
- dust generation;
- on-site borrow pits;
- soil stripping;
- environmental incidents and accidents e.g. spillages, noise and emissions;
- burning of waste;
- lighting;
- provision of services and utilities e.g. underground power lines, water supply and drainage;
- setup and subsequent removal of site offices/compounds and final site clearance after construction; storage areas for construction / excavated materials;
- structural works for new building and engineering;
- structural works to existing buildings, including conversions; and
- vegetation/habitat clearance including tree felling.
-

Occupation/operational phase

- access to site (both route and means);
- drainage;
- implementation of landscape design and habitat management (type and location);
- presence of people, vehicles and their activities e.g. increased public access and recreational pressure, risk of fires;
- lighting;
- physical presence of structures e.g. a new road or a wind turbine;
- presence of pets; and
- site operation and management e.g. maintenance operations, industrial processes generating emissions, lighting, noise, operation of wind turbines, use of a road by traffic etc.

Decommissioning phase

- blasting;
- water management pumps, mine shafts;
- removal of contaminated water or soil;
- removal or demolition of disused structures that may damage habitat or have been colonised e.g. roosting bats, barn owls;
- removal of ancillary developments including culverts; and
- removal or neglect of structures which might cause pollution.

Restoration phase

- where operations/phases have finished e.g. for mineral extractions.

Potential non-standard operations

- one-off incidents and accidents (including fuel leaks and spills, vandalism, erosion and sediment run-off).

Note that some developments, such as quarrying, will operate in continuous phases of construction, operation and restoration. Mitigation works may also be damaged by one-off incidents such as accidents or vandalism.

Adapted from: *Developing Naturally. A handbook for incorporating the natural environment into planning and development*³¹

Establishing zone(s) of influence

- 2.19. The 'zone of influence' for a project is the area over which ecological features may be subject to significant effects as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries. Activities associated with the construction, operation (best and worst-case operating conditions), decommissioning and restoration phases should be separately identified. The location and distribution of activities are best shown on geo-referenced maps or plans for overlaying onto maps of ecological features.
- 2.20. The zone of influence will vary for different ecological features depending on their sensitivity to an environmental change. It may be appropriate to identify different zones of influence for different features. The features affected could include habitats, species, and ecosystems and the processes on which they depend. Box 9 provides the key considerations in establishing the zone(s) of influence.

Box 9: Ecological considerations for establishing the zone(s) of influence

The following questions will help to determine the zone(s) of influence on ecological features:

- What 'important' ecological features (see Chapter 4) are known to occur within the project site and the surrounding area?
- What other 'important' ecological features could occur within the project site and surrounding area based on knowledge of the local distribution of relevant habitats and species?
- What activities may generate ecological impacts (see Box 8)
- Is the project likely to affect migratory species?
- Is the area used by mobile species that make regular movements to, from, or across the site?
- What are the key ecological processes or species activity periods? Are there seasonal variations in distribution, abundance and activity?
- Does the project affect any sites, directly or indirectly, that are designated or likely to be designated in the foreseeable future? What are the reasons for designation?
- What is required for the maintenance of particular ecosystems, networks, habitats or species populations? How would these be affected by project activities?
 - What are their distribution and status elsewhere for comparison?
 - What were their historical distributions, status and management compared with present?
 - Is anything known about the key factors influencing distribution and abundance of the feature(s)?
 - What are their scales of variation, vulnerability and likely exposure to the project?
- Are there any features whose disappearance would have significant consequences for other features?
- Are there any other projects planned within the same area or time-frame that may contribute to cumulative effects? (see 5.20)

- 2.21. Box 10 provides an example of how the zones of influence for a proposed quarry have been determined. It considers impacts on habitats and species within the site, but also on habitats and dependent species that are linked to the hydrology of the site, in some cases at some distance away.

Box 10: Example of defining the zones of influence of a proposed quarry

- All ecological features occurring within the area to be worked will be affected by changes in land cover caused by topsoil stripping and excavation.
- Blasting, noise, dust and changes in human activity will also affect species in adjacent habitats.
- If the quarry involves major, long-term dewatering operations, there could be consequences for water-dependent habitats and species that are many miles from the quarry. It may not be possible to determine the zone of influence of dewatering without undertaking hydrological/hydrogeological (cone of depression) modelling. The zone of influence should include all water-dependent features that could be significantly affected by the predicted draw-down, providing they are of sufficient importance to be considered in the assessment.
- If the quarry requires new infrastructure (e.g. roads, power supply or waste water disposal) there could be significant consequences for ecological features beyond the boundaries of the site in addition to those affected by dewatering.
- If the project could affect the breeding territory of a sub-population of a bird species, it would be necessary to consider the implications of localised effects in relation to the birds' wider population. If there were a number of sub-populations in the area, then it might be appropriate to consider the zone of influence to only include the specific sub-population of birds affected. However, if the birds were at the edge of their range, or the sub-population affected was an important link in the distribution pattern, then it might be necessary to consider implications for the zone of influence to include the regional, or even the national population.

- 2.22. Study boundaries should be drawn to include areas within the zone(s) of influence however remote from the project site. The results of professionally accredited or published scientific studies should be used, where available, to establish the spatial and temporal limits of the biophysical changes likely to be caused by specific activities and to justify decisions about the zone of influence. For example, the Somerset 'Econet' project³² has defined 'effect distances' for use in EclA based on home ranges and vulnerability to different activities e.g. disturbance to breeding birds caused by road traffic. Statutory organisations may also specify impact zones in standing advice or guidance documents e.g. Natural England's SSSI Impact Risk Zones and National Parks and Wildlife Services' (NPWS) likely zones of impact as discussed in Guidance for Planning Authorities. Indirect effects should also be taken into account (e.g. the effects of displaced individuals on other populations). Defining study boundaries will rely heavily on the professional judgment of an ecologist. Assumptions based on studies should be recorded.
- 2.23. The zone of influence should be regularly reviewed and amended as the project evolves. If inadequate information is available to properly define the zone of influence, this should be acknowledged and a precautionary approach adopted.

Transboundary effects

- 2.24. Projects may affect ecological features over several administrative areas. Impact assessments should cover the zone of influence regardless of administrative boundaries and information on transboundary effects should be notified to the relevant authorities to enable them to take appropriate action.

Selecting ecological features for detailed assessment

- 2.25. Once the likely direct and indirect impacts have been identified, it is necessary to undertake a systematic assessment of 'important' ecological features (Chapter 4) that could be significantly affected (including negative and positive effects). This is consistent with EIA Regulations which only require investigation of likely significant effects. Determining the significance of effects is explained in Chapter 5. To ensure clarity, the rationale and criteria used to select, or exclude, certain features for detailed assessment should be agreed with relevant stakeholders and documented during scoping.
- 2.26. In some cases the data collected as part of the scoping process will be sufficient to inform the assessment of effects on a given feature. In other cases additional surveys will need to be undertaken.

2.27. Ecologists undertaking ECIAs should determine whether an ecological feature within the zone of influence of a development should be 'scoped out' (excluded) and justify the reasons for doing so. Features can be scoped out of the assessment at this stage because they are not important enough to warrant further consideration (see Chapter 4) or because they will not be significantly affected. Where impacts on a feature are uncertain the feature should be 'scoped-in' (included) for more detailed assessment.

Conclusions of the Scoping Process

2.28. The outcomes of the scoping process should be:

- a description of the zone(s) of influence of the project;
- the identification of key ecological impacts which could be addressed through changes to project design, including consideration of alternatives;
- a list of the ecological features to be given detailed consideration in the ECIa and, in some cases, the specific impacts that will be considered in relation to each feature;
- a description of the surveys to be undertaken to provide the necessary data to inform the assessment, including methods and timing; and
- a list of relevant ecological features that will not be given detailed consideration in the ECIa and a justification for their exclusion.

3. ESTABLISHING THE BASELINE

Introduction

- 3.1. Ecological baseline conditions are those existing in the absence of proposed activities. The impact assessment determines how the conditions will change in relation to this baseline to facilitate a clear understanding of the effects of a project.
- 3.2. The conditions that define the baseline need to be carefully considered. This is because the baseline at the time when the project proceeds may differ from conditions that exist at the time an assessment is made. Assessing the impacts of any project and associated activities requires an understanding of the baseline conditions prior to and at the time of the project proceeding or specific activities taking place. If there is likely to be a lengthy time between project concept and inception, potential changes in the ecological baseline during that time should be identified.
- 3.3. It is the predicted baseline conditions at the time the project will be implemented that dictates the baseline against which the impact of the proposal should be assessed. The rationale and assumptions used in predicting the baseline will need to be set out with supporting evidence. Box 11 provides an example of predicting a future baseline scenario.

Box 11: Establishing the baseline: an example

A power station that draws cooling water from a river is to close down due to a rationalisation of the power supply network. During the many years that the power station has been in use, the riverine invertebrate, fish and bird assemblages in the immediate vicinity have adapted to reflect local, increased temperatures caused by the regular discharge of heated river water. Closure of the power station will mean that this discharge will stop. Once closed, it is proposed to convert the power station to residential units. The EclA for the residential development is being undertaken prior to closing down the power station. In this instance, the baseline for the EclA is the predicted post-closure situation, rather than that evident at the time of undertaking the EclA. The surveys and investigations to describe the baseline must be designed to predict the likely post-closure situation as accurately as possible.

- 3.4. Examples of factors that should be used to identify potential changes in baseline conditions include:
 - trends in species population and distribution;
 - rates of potential colonisation by new species and habitats;
 - ecological processes, such as succession;
 - likely changes in agricultural practice, including agri-environment schemes;
 - expected outcomes from current and predicted management practices;
 - trends in habitat quality e.g. resulting from pollution or pollution control;
 - environmental trends e.g. climate change;
 - management plans and conservation objectives for designated sites; and
 - the effects of other projects (see 3.7 and Box 12).
- 3.5. Any EclA therefore requires the identification of the likely baseline conditions at some point in the future, based on data collected in the past. In the majority of cases, ecological data are likely to have been collected within one or two years prior to an EclA being written and development activities may take place one or two years after. In these cases the survey data may represent a reliable indication of the baseline conditions. However in other cases the identification of the baseline based on survey data will be more difficult, for example:
 - where the feature is dynamic (such as coastal erosion) and changing in response to predictable activities such as habitat management, or
 - where there is a considerable time-lag between the date the assessment is written and the date when activities are likely to take place e.g. for multi-phase developments or projects where activity will occur well into the future.

In such cases it will be important to establish trends based on historical desk study information or field survey over more than one season. It is important to acknowledge any such limitations and uncertainties rather than report them as fact.
- 3.6. The baseline conditions for each ecological feature should be described clearly, objectively and succinctly within the EclA, using figures and plans where necessary. Where an extensive amount of survey data has been generated, this can be provided as appendices.

Considering Other Development Projects when Predicting the Baseline

- 3.7. In some cases, other development projects (besides the one being assessed) can influence the baseline and need to be taken into account. This will be the case in circumstances where another development has been consented or recently constructed and is predicted to have an impact on an ecological feature being considered as part of the EclA. The baseline may also be affected where another development has an ongoing incremental 'operational' phase effect. An example of this is given in Box 12. Impacts arising from other developments will, in some cases, need to be considered as cumulative impacts. Information on cumulative impact assessment is given in paragraphs 5.20 to 5.23.

Box 12: Establishing the baseline: consideration of other development projects

The scenario

An EIA is being carried out for a proposed wind farm in the uplands. The proposal includes 20 turbines and associated permanent infrastructure, and a temporary works area during construction. The wind farm adjoins a nationally designated site for nature conservation. Construction of another wind farm within the same range of hills is already underway.

Predicting the baseline

The approach to establishing the baseline should be agreed after discussion between the competent authority, the statutory nature conservation organisation and any other relevant agencies. It is likely to include consideration of:

- ecological and other trends affecting the baseline condition of upland habitats and their bird populations e.g. grazing pressure, afforestation, peat extraction, climate change, anticipated changes in the level of disturbance caused by the public;
- predicted impacts arising from the wind farm under construction, as reported in the Environmental (Impact) Statement; and
- predicted (but yet to occur) impacts of other completed, in-construction and consented projects e.g. the operational impacts of other wind farms elsewhere in the uplands.

Informing the Baseline

- 3.8. During scoping, spatial and temporal limits need to be established for obtaining the necessary baseline information and a clear rationale presented. Variation in populations, habitats or ecosystems over time in the absence of the project should always be considered. This may require more than one year or one season of data to give an accurate reflection of the situation. In many cases this may be determined from historical information, knowledge of general trends and management activities etc. and an understanding of how each feature/resource might respond.
- 3.9. The spatial and temporal extent of the baseline should also be informed by the potential for cumulative effects, as well as the need for information to support design of suitable mitigation and compensation measures.
- 3.10. The spatial extent of baseline studies should be flexible to accommodate different needs. For example, impacts on part of an ecosystem, habitat or population may have implications for the whole ecosystem, habitat or population so that a larger study area may be needed. Vulnerability of different habitats and species may vary greatly depending on the type of project (see 'zone of influence' 2.19).

Data

- 3.11. Data used to establish baseline conditions can be obtained from a range of sources, including desk study and field surveys. These surveys may have been carried out during scoping, or scoping may have identified the need for further baseline survey to address gaps. Standard survey methods should be used to ensure that the data collected are robust and results can be easily interpreted and compared with those from other investigations. Details of how methods have been tailored to meet the needs of the study should be included. If survey methods vary from accepted good practice this should be explained and justified, and reliability of the results discussed.
- 3.12. Any limitations of surveys, such as information, access or seasonal constraints, should be outlined (see BS 42020³⁶, clause 6.7). However these limitations should be avoided wherever possible, for example by undertaking additional surveys. All surveys should be carried out by suitably skilled and experienced staff. Certain protected species surveys must be carried out under the appropriate licence. If surveys are undertaken out of the optimal survey season, or there are other substantive limitations to the data collected, further information may be needed to ensure that the EclA is robust.
- 3.13. If it is not feasible to gain access to land beyond the project site, it may be possible to undertake a basic survey³⁷

from public highways or other accessible public spaces³⁸. The considerable limitations of this type of survey and the influence on confidence in the conclusions should be assessed and reported. Where feasible, survey limitations should be addressed at a later date: for example if access to private land can be gained, survey findings should be updated.

- 3.14. Desk study information can be obtained from a range of sources, including the local biodiversity records centre, local nature conservation groups and individuals, previous survey reports for the site or other sites in the surrounding area, and various web-based sources. Aerial photographs or satellite images can provide insight into spatial and temporal relationships and supplement data gathered in the field.

4. IMPORTANT ECOLOGICAL FEATURES

Introduction

- 4.1. One of the key challenges in EclA is to decide which ecological features (habitats, species, ecosystems and their functions/processes) are important and should be subject to detailed assessment. Such ecological features will be those that are considered to be important and potentially affected by the project. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable. This does not mean that efforts should not be made to safeguard biodiversity in its entirety, as emphasised in the EU Biodiversity Strategy 2020³⁹. The EU Strategy and national policy documents emphasise the need to achieve no net loss of biodiversity and enhancement of biodiversity.
- 4.2. Ecological features can be important for a variety of reasons and the rationale used should be explained to demonstrate a robust selection process. Importance may relate, for example, to the quality or extent of designated sites or habitats, to habitat/species rarity, to the extent to which they are threatened throughout their range, or to their rate of decline.

Determining Importance

- 4.3. The EclA should demonstrate how a proposal will comply with statutory requirements and policy objectives for biodiversity. European, national and local governments and specialist organisations have identified a large number of sites, habitats and species that provide the key focus for biodiversity conservation in the UK and Ireland, supported by policy and legislation. These provide an objective starting point for identifying the important ecological features that need to be considered in EclA (Box 13).

Box 13: Key sites, habitats and species for nature conservation in the UK and Ireland

Designated Sites

- Statutory sites designated or classified under international conventions or European legislation, for example
 - World Heritage Sites, Biosphere Reserves, Wetlands of International Importance (Ramsar sites), Special Areas of Conservation, Special Protection Areas*
- Statutory sites designated under national legislation, for example
 - Sites of Special Scientific Interest (England, Wales, Scotland)
 - Areas of Special Scientific Interest (Northern Ireland)
 - Natural Heritage Areas (Ireland)
 - National Nature Reserves (UK)
 - Nature Reserves (Ireland)
 - Refuges for Fauna (Ireland)
 - Wildfowl Sanctuaries (Ireland)
 - Local Nature Reserves (UK)
- Locally designated wildlife sites.

Country Biodiversity Lists

- Habitats and species of principal importance for the conservation of biodiversity: England⁴⁰ and Wales;⁴¹
- Scottish Biodiversity List;⁴²
- Northern Ireland priority habitats⁴³ and species;⁴⁴ and
- Protected and rare species in Ireland.**⁴⁵

Biodiversity Action Plan lists

- UK BAP*** priority habitats⁴⁶ and priority species.⁴⁷
- Local BAP priority species and habitats.⁴⁸

Red Listed, Rare, Legally Protected Species

- Species of conservation concern, Red Data Book (RDB) species – UK⁴⁹; Ireland.⁵⁰
- Birds of Conservation Concern – UK⁵⁵; Ireland.⁵⁴
- Nationally rare and nationally scarce species – UK⁵³; Ireland.⁵⁴
- Legally protected species – UK⁵⁵; Ireland.⁵⁶

Note: there is overlap in these lists and many habitats and species appear on several.

*Including candidate SACs and proposed SPAs, SACs and Ramsar sites

** Ireland: Local authority BAPs or Heritage Plans also identify locally important species and habitats.

***The UK BAP lists of priority habitats and species have been superseded by the country biodiversity lists, but they are a useful reference source.

- 4.4. Ecologists may identify ecological features that are not included in lists of important sites or features, but considered important on the basis of expert judgment e.g. because of their local rarity or because they enable effective conservation of other important features. For example, an area of low quality grassland neighbouring a designated saltmarsh could be considered important to allow the saltmarsh to migrate landward as a consequence of sea level rise.
- 4.5. Ecological features might also be important because they play a key functional role in the landscape e.g. as 'stepping stones' for migratory species to allow them to move during their annual migration cycle, as well as for species to move between sites, to disperse populations to new locations, to forage, or move in response to climate change⁵⁷.
- 4.6. Various characteristics contribute to the importance of ecological features. Examples include:
- Naturalness;
 - animal or plant species, sub-species or varieties that are rare or uncommon, either internationally, nationally or more locally, including those that may be seasonally transient;
 - ecosystems and their component parts, which provide the habitats required by important species, populations and/or assemblages;
 - endemic species or locally distinct sub-populations of a species;
 - habitat diversity;
 - habitat connectivity and/or synergistic associations;
 - habitats and species in decline;
 - rich assemblages of plants and animals;
 - large populations of species or concentrations of species considered uncommon or threatened in a wider context;
 - plant communities (and their associated animals) that are considered to be typical of valued natural/semi-natural vegetation types, including examples of naturally species-poor communities; and
 - species on the edge of their range, particularly where their distribution is changing as a result of global trends and climate change.

Geographic context

- 4.7. The importance of an ecological feature should be considered within a defined geographical context. It is recommended that the following frame of reference be used, or adapted to suit local circumstances:
- International and European
 - National
 - Regional
 - Metropolitan, County, vice-county or other local authority-wide area
 - Local
- 4.8. Various approaches can be adopted for defining local importance, including assessment within a district or borough context or within a zone of influence. Consideration of impacts at all scales is important, and essential if objectives for no net loss of biodiversity and maintenance of healthy ecosystems are to be achieved.
- 4.9. The following paragraphs provide guidance on how to apply the concept of importance to assess the impacts of land use change on designated nature conservation sites, habitats, species and ecosystem services.

Designated sites

- 4.10. For designated sites, importance should reflect the geographical context of the designation. For example, Local Wildlife Sites may be designated according to criteria applied in a county or district context, and should be considered important accordingly.
- 4.11. Sites that are considered to be important in an international, European and national context and protected through international and national legislation are identified on the Joint Nature Conservation Committee (UK)⁵⁸ and NPWS (Ireland)⁵⁹ protected sites webpages. Information on international and national designated sites in Scotland is also provided on SNH SiteLink⁶⁰ webpages and for Northern Ireland on the Northern Ireland Environment Agency⁶¹ website. Where there is potential for a significant effect on such sites, the effect should be assessed in accordance with the respective statutory procedures and relevant Government policy.
- 4.12. Where a site has multiple designations the EclA should consider the impacts of the development in respect of each of the features of each of the designations, carefully distinguishing between them in accordance with the respective legislation and policy. For example, where a site is both a SSSI and a SPA or SAC (in the UK), or SPA/SAC and a NHA (in Ireland), the impacts need to be assessed in respect of each of the interests and for each of the qualifying features of the SSSI, SPA, SAC or NHA, carefully applying the differing legislative and policy requirements in respect of each designation, as may be necessary.
- 4.13. In both UK and Ireland it is also necessary to have regard to impacts on features for which a site may be notified, designated or classified in the future. In particular, in Ireland, proposed Natural Heritage Areas (pNHAs) that have not yet been formally designated should be considered important at the national scale. Proposed NHAs are legally protected from damage and competent authorities are obliged to take into account the ecological value

of pNHAs in planning and licensing. European case law also requires member states to ensure adequate and appropriate levels of protection for sites that may, or should, be classified as SPAs or designated as SACs.

- 4.14. On the rare occasion that a site no longer appears to meet the criteria relating to its designation or proposed designation, discussions should be held with the designating authority to agree how the site should be treated. Where this relates to internationally/nationally designated sites, unless the site has been formally 'de-notified', the designation still applies and the relevant national government has legal and policy obligations to ensure that the site is restored to favourable condition. It must be demonstrated in the EclA that development will not be detrimental to the recovery of these sites.
- 4.15. Conversely, there may be occasions when an undesignated site is considered to meet published selection criteria for statutory or non-statutory site designation, or have substantive potential to meet them. This should be used to guide the assessment of importance and discussions should be held with the potential designating authority to agree how the site should be treated.

Habitats

- 4.16. Habitat types of European (International) conservation importance are listed on Annex I of the Habitats Directive. Habitat types that are considered priorities for conservation in England and Wales are listed as habitats of principal importance under sections 41/42 of the Natural Environment and Rural Communities Act 2006⁶². Habitats considered of principal importance for biodiversity in Scotland (the Scottish Biodiversity List) are listed under Part 1 section 2(4) of the Nature Conservation (Scotland) Act 2004⁶³. *Valuing Nature - A Biodiversity Strategy for Northern Ireland to 2020* refers to priority habitats and this list is hosted on the Northern Ireland Environment Agency website as the 'biodiversity list for priority habitats'⁶⁴. Habitats protected at national level in Ireland are listed in Actions for Biodiversity – Ireland's National Biodiversity Plan 2011-2016 and under the Wildlife Acts, 1976 to 2012⁶⁵. Additional locally important habitats may be listed in local Biodiversity Action Plans⁶⁶.
- 4.17. There may be cases where important habitat types are affected but they are currently in a degraded or unfavourable condition. Whilst the current baseline condition of a habitat may be sub-optimal, its potential value should be considered, including its possible contribution to conservation objectives. It is essential not to under-estimate the importance of habitats in sub-optimal condition where there is potential for restoration.

Species

- 4.18. Species of European (International) conservation importance are listed on Annexes II, IV and V of the Habitats Directive and Annex I of the Birds Directive. Species that are considered to be priorities for conservation in England and Wales are listed as species of principal importance under sections 41/42 of the Natural Environment and Rural Communities Act, 2006. Species considered of principal importance for biodiversity in Scotland are listed under Part 1 section 2(4) of the Nature Conservation (Scotland) Act 2004. The Northern Ireland Biodiversity Strategy lists 'Priority Species' and the list is hosted on the Northern Ireland Environment Agency website⁶⁷. There is no equivalent list of national priority species in Ireland, apart from species protected under the Wildlife Acts 1976 to 2012⁶⁸, Red Lists⁶⁹ and Birds of Conservation Concern in Ireland⁷⁰ species. Additional locally important species may be listed in local Biodiversity Action Plans (see Box 13 for additional lists of important species for nature conservation).
- 4.19. Deciding the importance of species populations should make use of existing criteria where available. For example there are established criteria for defining nationally and internationally important populations of waterfowl. The scale within which importance is determined could also relate to a particular population, e.g. the breeding population of common toads within a suite of ponds or an otter population within a catchment.
- 4.20. When determining the importance of a species population, contextual information about distribution and abundance is fundamental, including trends based on historical records. For example, a species could be considered particularly important if it is rare and its population is in decline.

Legally protected species

- 4.21. Specific species have legal protection under Annex IV of the EC Habitats Directive⁷¹ and the appropriate national regulations. In the UK other species are protected under Schedules 1, 5 and 8 of the Wildlife and Countryside Act 1981 (as amended), the Wildlife and Environment (Northern Ireland) Act 2011⁷² and the Nature Conservation (Scotland) Act 2004⁷³. In Ireland, species are protected under the Wildlife Acts 1976 to 2012, which includes the Flora (Protection) Order, 1999, and the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011⁷⁴).

- 4.22. Lists of legally protected species may require careful interpretation. For example, in England and Wales birds listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) have special legal protection during the breeding season in addition to the general protections afforded to birds throughout the year. Caution should also be applied when referring to the lists of animal and plant species of Community interest in Annex II of the EC Habitats Directive lists and Annex 1 the EC Birds Directive⁷⁵. These species have no specific legal protection under these Annexes except insofar that SACs and SPAs may be designated because of the presence of these species and that they should be conserved on these sites as defined.
- 4.23. Where protected species are present and there is the potential for a breach of the legislation, those species should be considered as ‘important’ features. It will always be necessary for the EclA to determine whether there could be a breach of the legislation as a result of the project, and the scheme being assessed needs to be designed/mitigated in such a way that the law will not be contravened.

Legally controlled species

- 4.24. Consideration should also be given to ensuring that land use changes do not result in contravention of laws relating to legally controlled plant and animal species⁷⁶ under Schedule 9 of the Wildlife and Countryside Act 1981 in Britain (e.g. Japanese knotweed, Himalayan balsam, giant hogweed), under the Wildlife (Northern Ireland) Order 1985 (as amended), under the Wildlife and Natural Environment (Scotland) Act 2011, under the Wildlife Acts 1976 to 2012 in Ireland, and under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011). See also Invasive Species Ireland (Ireland North & South)⁷⁷. In addition, five plants (common ragwort, broad-leaved dock, curled dock, creeping thistle, spear thistle) are identified as injurious in the Weeds Act 1959 (as amended by The Ragwort Control Act 2003 (England and Wales))⁷⁸. The relevant agricultural weed control legislation for Ireland is the Noxious Weeds Act 1936, and weed species to which the Act applies have been added by ministerial orders. EclA should, where appropriate, identify how such species will be controlled. It is important to be aware that the new EU Regulation⁷⁹ on invasive alien species came into force on 1 January 2015.

Ecosystem services and natural capital

- 4.25. Ecosystem services are the benefits that people derive from the natural environment. The natural environment can be considered as a stock of ‘natural capital’ from which many benefits – social, health-related, cultural or economic – flow. Box 14 includes policy guidance on ecosystem services and a summary of types of ecosystem services is provided in Box 15.

Box 14: Ecosystem services in policy

*UK National Ecosystem Assessment (UKNEA) (2011) and UKNEA Follow-on (2014)*⁸⁰

The UK Government conducted a full national ecosystem assessment to enable effective policy responses to degradation of ecosystem services. Consistent with the Millennium Ecosystem Assessment (2005), it identifies four broad categories of ecosystem services. It provides a starting point for identifying links between ecological features (e.g. broad habitats) and ecosystem services and assessing how land use change might affect the value that ecosystems provide. The UKNEA Follow-on further developed the assessment and its applicability to decision and policy making.

*Natural Environment White Paper (2011) – The natural choice: securing the value of nature*⁸¹

This sets out a broad 50-year vision for the natural environment and how Government in England intends to put natural capital at the heart of economic thinking and decision making. The White Paper outlines a number of initiatives to restore the natural environment, new programmes for connecting people and nature, and several proposals for capturing the economic value of nature and measuring green growth.

*Towards the Sustainable Management of Wales’ Natural Resources (2013) – Environment Bill White Paper consultation*⁸²

This White Paper sets out the Welsh Government’s proposals to provide a modern statutory framework for the sustainable management of natural resources by legislating for a more joined-up and proactive process to deliver lasting economic, social and environmental benefit.

*Applying an ecosystems approach to land use: Information Note (2011)*⁸³

This publication by The Scottish Government encourages the application of an ecosystems approach in decision-making processes affecting land use. It gives examples of the application of this approach in Scotland and elsewhere in the UK.

*2020 Challenge for Scotland’s Biodiversity (2013)*⁸⁴

This is Scotland’s response to international biodiversity targets. The chapter on natural capital reflects the TEEB (The Economics of Ecosystems and Biodiversity) and UKNEA reports and includes principles for sustaining the value of Scotland’s natural capital.

*Sectoral Impacts on Biodiversity and Ecosystem Services (SIMBIOSYS) (2013)*⁸⁵

This project funded by the Irish Government examined the impacts of human activity on biodiversity and the benefits of biodiversity to society. It quantifies impacts of particular activities in Ireland (e.g. cultivation of bioenergy crops, road landscaping and aquaculture) on genetic, species and landscape biodiversity and the ecosystem services they provide, including pollination, biological pest control, carbon sequestration and resistance to alien species.

*Actions for Biodiversity 2011-2016 Ireland's National Biodiversity Action Plan*⁸⁶

This Action Plan includes a commitment that the conservation of ecosystem structure and functioning, to maintain ecosystem services, should be a priority target of the ecosystem approach.

Box 15: Types of Ecosystem services

Supporting services – services necessary for the production of all other ecosystem services including soil formation, photosynthesis, primary production, nutrient cycling and water cycling.

Provisioning services – products obtained from ecosystems, including food, fibre, fuel, genetic resources, biochemicals, natural medicines, pharmaceuticals and fresh water.

Regulating services – benefits obtained from the regulation of ecosystem processes, including air quality regulation, climate regulation, water regulation, erosion regulation, water purification, disease regulation, pest regulation, pollination, natural hazard regulation.

Cultural services – non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences – thereby taking account of landscape values.

- 4.26. EclA can provide ecological information to support the assessment of ecosystem services. It is important to recognise cases where ecosystem service provision might be affected as a result of a project's ecological effects. However, assessment of ecosystem services relies on separate specialist assessments of social and economic value. Ecologists can work together with other specialists to ensure that relevant data is collected during the EclA process to inform these separate assessments. This can enable the social and economic implications of ecological changes to be taken into account.

5. IMPACT ASSESSMENT

Introduction

5.1. The impact assessment process involves:

- identifying and characterising impacts;
- incorporating measures to avoid and mitigate (reduce) these impacts;
- assessing the significance of any residual effects after mitigation;
- identifying appropriate compensation measures to offset significant residual effects; and
- identifying opportunities for ecological enhancement.

The hierarchical process of avoiding, mitigating and compensating ecological impacts is explained further in 1.19 and Chapter 6.

5.2. In EclA it is only essential to assess and report significant residual effects (those that remain after mitigation measures have been taken into account - see 5.25). However it is good practice for the EclA to make clear both the potential significant effects without mitigation and the residual significant effects following mitigation, particularly:

- a) where the mitigation proposed is experimental, unproven or controversial; or
- b) to demonstrate the importance of securing the measures proposed through planning conditions or obligations - see 6.23.

5.3. Assessment of ecological impacts is required at the following stages:

- during initial scoping – to provide the basis for selecting ecological features within the zone(s) of influence that require systematic assessment;
- during the evolution of the project – to identify the need for avoidance and mitigation and opportunities for enhancement; and
- after mitigation strategies have been devised and their likely success considered – to assess residual effects and whether these are significant and require compensation.

5.4. The assessment should include potential impacts on each ecological feature determined as 'important' (Chapter 4) from all phases of the project, e.g. construction, operation and decommissioning. It should consider direct, indirect, secondary and cumulative impacts and whether the impacts and their effects are short, medium, long-term, permanent, temporary, reversible, irreversible, positive and/or negative.

5.5. The assessment of impacts takes into account the baseline conditions to describe:

- how the baseline conditions will change as a result of the project and associated activities; and
- cumulative impacts of the proposal and those arising from other developments.

5.6. The significant effects must be assessed in the context of the predicted baseline conditions within the zone(s) of influence during the lifetime of the development (Chapter 3). Information may be required from other specialists as impacts may relate to noise, air quality, hydrology, water quality etc. Liaison with other disciplines will enable more robust predictions for project-related bio-physical changes and assessment of their ecological implications. Cross-reference should be made to other assessments submitted with the proposal.

Predicting Ecological Impacts and Effects

5.7. The process of predicting ecological impacts should take account of relevant aspects of ecosystem structure and function – see Box 16.

Box 16: Aspects of ecological structure and function to consider when predicting impacts and effects

Available resources

- territory – hunting/foraging grounds, shelter and roost sites, breeding sites, corridors for migration and dispersal, stop-over sites;
- food and water (quantity and quality);
- soil minerals and nutrients; and
- solar radiation and gaseous resources.

Environmental processes

- flooding, drought, wind blow and storm damage, disease, eutrophication, erosion, deposition and other geomorphological processes, fire and climate change.

Ecological processes

- population dynamics – population cycles, survival / reproduction rates, competition, predation, seasonal behaviour, dispersal / genetic exchange; and
- vegetation dynamics – colonisation, succession, competition, and nutrient-cycling.

Human influences

- animal husbandry; cutting, burning, mowing, draining, irrigation, culling, hunting;
- excavations, dredging, ground profiling;
- ploughing, seeding, planting, cropping, fertilising, pesticides, herbicides;
- pollution; introduction of exotics, weeds and genetically modified organisms;
- disturbance from public access, pets.

Historical context

- natural range of variation over recorded historical period and
- irregular perturbations beyond normal range (e.g. very infrequent storm events).

Ecological relationships

- food webs, predator-prey relationships, herbivore-plant relationships, herbivore-carnivore relationships, adaptation, and dynamism.

Ecological role or function

- decomposer, primary producer, herbivore, parasite, predator, keystone species.

Ecosystem properties

- fragility and stability, carrying capacity, productivity, community dynamics;
- connectivity;
- source/sink;
- numbers in a population or meta-population, minimum viable populations;
- sex and age ratios;
- patchiness and degree of fragmentation; and
- ecological coherence.

Other environmental influences

- air quality;
- hydrology and water quality; and
- nutrient status and salinity.

Adapted from: Developing Naturally. A handbook for incorporating the natural environment into planning and development ⁸⁷

5.8. There could be any number of possible impacts on important ecological features arising from a development. However it is only necessary to describe in detail the impacts that are likely to be significant (see 5.25). Impacts that are either unlikely to occur, or if they did occur are unlikely to be significant, can be scoped out. For transparency, justification for scoping out any ecological impact should be provided. If in doubt the potential impact should be assessed.

Characterising Ecological Impacts

5.9. When describing ecological impacts reference should be made to the following characteristics:

- positive or negative;
- extent;
- magnitude;
- duration;
- timing;
- frequency; and
- reversibility.

5.10. The assessment only needs to describe those characteristics relevant to understanding the ecological effect and determining the significance. For example, timing of the removal of a hedgerow is unlikely to be of particular relevance to the assessment of the effect on hedgerows, although it may be relevant in assessing the effect on a species using the hedgerow, such as nesting birds. It should be noted, however, that the clearance of vegetation in Ireland (including hedgerows) is subject to restrictions under the Wildlife Acts 1976 to 2012.

Positive or negative

5.11. Positive and negative impacts/effects should be determined according to whether the change is in accordance with nature conservation objectives and policy:

- Positive impact – a change that improves the quality of the environment e.g. by increasing species diversity, extending habitat or improving water quality. Positive impacts may also include halting or slowing an existing decline in the quality of the environment.
- Negative impact – a change which reduces the quality of the environment e.g. destruction of habitat, removal

of species foraging habitat, habitat fragmentation, pollution.

Extent

5.12. The extent is the spatial or geographical area over which the impact/effect may occur.

Magnitude

5.13. Magnitude refers to size, amount, intensity and volume. It should be quantified if possible and expressed in absolute or relative terms e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population.

Duration

5.14. Duration should be defined in relation to ecological characteristics (such as a species' lifecycle) as well as human timeframes. For example, five years, which might seem short-term in the human context or that of other long-lived species, would span at least five generations of some invertebrate species.

5.15. The duration of an activity may differ from the duration of the resulting effect caused by the activity. For example, if short-term construction activities cause disturbance to birds during their breeding period, there may be long-term implications from failure to reproduce that season. Effects may be described as short, medium or long-term and permanent or temporary. Short, medium, long-term and temporary will need to be defined in months/years.

Frequency and timing

5.16. The number of times an activity occurs will influence the resulting effect. For example, a single person walking a dog will have very limited impact on nearby waders using wetland habitat, but numerous walkers will subject the waders to frequent disturbance and could affect feeding success, leading to displacement of the birds and knock-on effects on their ability to survive.

5.17. The timing of an activity or change may result in an impact if it coincides with critical life-stages or seasons e.g. bird nesting season.

Reversibility

5.18. An irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation.

5.19. In some cases, the same activity can cause both reversible and irreversible effects. For example placement of a temporary access through an ancient wood could cause the loss of food and shelter for common woodland birds that may be reversible, but the compaction of fragile woodland soils and damage to ancient woodland ground flora along the access route is effectively irreversible.

Assessment of Cumulative Impacts and Effects

5.20. Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects are particularly important in EclA as many ecological features are already exposed to background levels of threat or pressure and may be close to critical thresholds where further impact could cause irreversible decline. Effects can also make habitats and species more vulnerable or sensitive to change.

5.21. Different types of actions can cause cumulative impacts and effects:

- Additive/incremental – multiple activities/projects (each with potentially insignificant effects) added together to give rise to a significant effect due to their proximity in time and space. The effect may be additive ($1+1 = 2$) or synergistic ($1+1 = 3$).
- Associated/connected – a development activity 'enables' another development activity e.g. phased development as part of separate planning applications. Associated developments may include different aspects of the project which may be authorised under different consent processes. It is important to assess impacts of the 'project' as a whole and not ignore impacts that fall under a separate consent process.

5.22. Developments to be included in the cumulative impact assessment should be in accordance with national guidance and, if possible, agreed with the competent authority during scoping. In most cases other projects to be considered would include the following types of future development within the same zone of influence:

- proposals for which consent has been applied which are awaiting determination in any regulatory process (not necessarily limited to planning permission);
- projects which have been granted consent (not limited to planning permissions) but which have not yet been started or which have been started but are not yet completed (i.e. under construction);
- proposals which have been refused permission but which are subject to appeal and the appeal is undetermined; or
- to the extent that their details are in the public domain, proposed projects that will be implemented by a public body but for which no consent is needed from a competent authority.

In some situations it may be necessary to also consider:

- constructed developments whose full environmental effects are not yet felt and therefore cannot be accounted for in the baseline
- developments specifically referenced in a National Policy Statement, a National Plan or a Local Plan.

5.23. Information about developments within the zone(s) of influence may be available in other EclAs, Local Plan documents, Strategic Environmental Assessments (SEAs), Sustainability Appraisals (SAs), Water Framework Directive Assessments (WFDAs), and Habitats Regulations Assessments/Appraisals (HRAs), including 'Natura Impact Statements' (NISs) / 'Natura Impact Reports' (NIRs), 'Information / 'Reports to Inform an Appropriate Assessment', 'Shadow Habitats Regulations Assessments' and, for Nationally Significant Infrastructure Projects, 'Reports on the Implications for European Sites' (RIES). The local planning authority, Wildlife Trust and SNCO may also be able to advise on appropriate development projects to consider.

Assessment of Residual Impacts

5.24. After assessing the impacts of the proposal all attempts should be made to avoid and mitigate ecological impacts (Chapter 6). Once measures to avoid and mitigate ecological impacts have been finalised, assessment of the residual impacts should be undertaken to determine the significance of their effects on ecological features. Any residual impacts that will result in effects that are significant, and proposed compensatory measures, will be the factors considered against ecological objectives (legislation and policy) in determining the outcome of the application (Chapter 7).

Significant Effects

5.25. Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of EclA, 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' (explained in Chapter 4) or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local.

5.26. A significant effect is simply an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. A significant effect is a positive or negative ecological effect that should be given weight in judging whether to authorise a project: it can influence whether permission is given or refused and, if given, whether the effect is important enough to warrant conditions, restrictions or further requirements such as monitoring. A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant negative ecological effects can be lawfully permitted following EIA procedures as long as the mitigation hierarchy has been applied effectively as part of the decision-making process.

5.27. In broad terms, significant effects encompass impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution).

5.28. Significant effects should be qualified with reference to an appropriate geographic scale. For example, a significant effect on a Site of Special Scientific Interest or Natural Heritage Area (Ireland) is likely to be of national significance. European case law is specific regarding significance in relation to European sites and Annexed habitats⁸⁸. However, the scale of significance of an effect may not be the same as the geographic context in which the feature is considered important (Chapter 4). For example, an effect on a species which is on a national list of species of principal importance for biodiversity may not have a significant effect on its national population. Examples of other relevant scales include regional and county. It should be noted that effects may be significant at the local scale, particularly in view of policies for no net loss of biodiversity.

5.29. When seeking mitigation or compensation solutions, efforts should be consistent with the geographical scale at which an effect is significant. For example, mitigation and compensation for effects on a species population significant at a county scale should ensure no net loss of the population at a county scale. The relative geographical scale at which the effect is significant will have a bearing on the required outcome which must be achieved.

Determining Ecologically Significant Effects

Designated/defined sites and ecosystems

5.30. Significant effects encompass impacts on structure and function of defined sites and ecosystems. The following need to be determined:

- For designated sites – is the project and associated activities likely to undermine the site's conservation objectives, or positively or negatively affect the conservation status of species or habitats for which the site is designated, or may it have positive or negative effects on the condition of the site or its interest/qualifying features?
- For ecosystems – is the project likely to result in a change in ecosystem structure and function?

Consideration should be given to whether:

- any processes or key characteristics will be removed or changed
- there will be an effect on the nature, extent, structure and function of component habitats; or
- there is an effect on the average population size and viability of component species.

- 5.31. Consideration of functions and processes acting outside the formal boundary of a designated site is required, particularly where a site falls within a wider ecosystem e.g. wetland sites. Predictions should always consider wider ecosystem processes.
- 5.32. Many ecosystems have a degree of resilience to perturbation that allows them to tolerate some biophysical change. Ecological effects should be considered in the light of any information available or reasonably obtainable about the capacity of ecosystems to accommodate change.

Habitats and species

- 5.33. Consideration of conservation status is important for evaluating the effects of impacts on individual habitats and species and assessing their significance:
- Habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area.
 - Species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.
- 5.34. In many cases (e.g. for species and habitats of principal importance for biodiversity), there may be an existing statement of the conservation status of a feature and objectives and targets against which the effect can be judged. However, not all species or habitats will be described in this way and the conservation status of each feature being assessed may need to be agreed with the relevant SNCO and set out in the EclA. The conservation status of a habitat or species will vary depending on the geographical frame of reference.
- 5.35. When assessing potential effects on conservation status, the known or likely background trends and variations in status should be taken into account. The level of ecological resilience or likely level of ecological conditions that would allow the population of a species or area of habitat to continue to exist at a given level, or continue to increase along an existing trend or reduce a decreasing trend, should also be estimated.

Precautionary Principle

- 5.36. The evaluation of significant effects should always be based on the best available scientific evidence. If sufficient information is not available further survey or additional research may be required. In cases of reasonable doubt, where it is not possible to robustly justify a conclusion of no significant effect, a significant effect should be assumed. Where uncertainty exists, it must be acknowledged in the EclA.

Alternative Approaches

- 5.37. There are a number of approaches for determining the significance of effects on ecological features. This includes methods for scoring and ranking impacts on the basis of subjective criteria. Results are often presented in the form of a matrix, for example in which ecological value/importance and magnitude of impact are combined into a significance score. If using this approach, it is very important to make a clear distinction between evidence-based and value-based judgements so that decision-makers and other stakeholders are aware of the level of subjective evaluation that has been used. Spurious quantification should be avoided in which numerical scores or significance rankings are used without a clear definition of the criteria and thresholds that underpin them.
- 5.38. This guidance avoids and discourages use of the matrix approach. In circumstances where ecologists are required to fit an assessment into a different format than that outlined in these Guidelines, it is recommended that the approach set out here is applied as far as possible to enable decision-makers to understand the evidence base.

Example Assessment of the Significance of Effects

- 5.39. The example assessment in Appendix 1 considers the likely effects of a road-widening scheme on a Cetti's warbler population. These changes are described and their effects on the population are characterised by reference to the ecosystem on which the birds rely. The likely effect on the conservation status of the population is considered with reference to current status and conservation objectives to determine whether the effects are significant or not. A summary of impacts is given in a separate table at the end of Appendix 1.
- 5.40. The example assessment documents both the significance of the effects without mitigation, and the significance of the effects of the residual impacts taking mitigation into account. Some EclAs only document the significant effects of the residual impacts. Both methods are acceptable. However, documenting the effects of impacts without mitigation can help to make the EclA more transparent and can be useful to the competent authority when assessing the adequacy of proposed mitigation.

6. AVOIDANCE, MITIGATION, COMPENSATION AND ENHANCEMENT

Introduction

- 6.1. A sequential process should be adopted to avoid, mitigate and compensate ecological impacts. This is often referred to as the 'mitigation hierarchy' (see 1.19 and 5.1). For most projects, avoidance, mitigation, compensation and enhancement measures should be identified as part of the EclA process.

Avoidance and Mitigation

- 6.2. Impacts should always be avoided where possible, for example by deciding not to locate a project in a particular area or making a change to scheme layout to ensure no negative impacts. Avoidance can also be part of mitigation. Mitigation includes measures to avoid or reduce the negative impacts of a project, for example careful timing of an activity to prevent an impact occurring.
- 6.3. Avoiding and/or minimising impacts is best achieved through consideration of potential impacts of a project from the earliest stages of scheme design and throughout its development. Many impacts can be avoided or reduced by consideration of alternatives.
- 6.4. Measures incorporated into the scheme design are often described as 'embedded mitigation' or 'mitigation by design'. This can include the re-design of the layout of the scheme, or adjusting the location of certain activities. Mitigation by design is particularly beneficial as there is greater certainty that it will be delivered. Wherever possible mitigation should be by design rather than left to a request by the competent authority. In Ireland, NPWS has produced guidance for developers in the construction and extractive sectors⁸⁹. The efficacy and any potential knock-on effects of both embedded and non-embedded mitigation should always be assessed.

Compensation

- 6.5. Compensation describes measures taken to make up for residual effects resulting in the loss of, or permanent damage to, ecological features despite mitigation. For example, it may take the form of replacement habitat or improvements to existing habitats. Compensation can be provided either within or outside the project site (defined by the red line of a planning application).
- 6.6. As a general rule, compensation should be focused on the same type of ecological features as those affected and equivalent levels of ecological 'functionality' sought. There will be cases when it is not possible to achieve ecological equivalence through compensation. Any replacement area should be similar in terms of ecological features and ecological functions that have been lost or damaged, or with appropriate management have the ability to reproduce the functions and conditions of those ecological features. Compensation should be provided as close as possible to the location where effects have occurred and benefit the same habitats and species as those affected.
- 6.7. Due to the uncertainty inherent in compensation, particularly in cases which require ecological restoration or habitat creation, replacement ratios greater than one-to-one may be appropriate for delivery of compensatory habitats or ecosystems. The scientific basis for deriving appropriate ratios is not exact and will vary depending on the habitat or species concerned. Increased replacement ratios can also help take account of the time lag in delivering compensation and regaining the same maturity, complexity and diversity of habitats and the full complement of associated species.
- 6.8. Biodiversity offsets is a concept that can provide a comprehensive approach to compensation and ensuring 'no net loss'⁹⁰. Box 17 summarises biodiversity offsets.

Box 17: Biodiversity offsets

Biodiversity offsets are a form of compensation which may be considered when a development is expected to have significant residual impacts on biodiversity despite planned mitigation measures. Biodiversity offsets have a formal requirement for measurable outcomes. The main requirement is to quantify losses (through effects) and gains (through offsets) using the same 'metric', for example hectares of habitat of a particular quality⁹¹. Using an offset metric in this way provides for transparency of outcome and enables explicit demonstration of 'no net loss'.

'Biodiversity' or 'habitat' banks are a useful component of an offset system, holding stocks of land where biodiversity improvements are/have been made and can be made available for compensatory provision. They are particularly useful where there are high levels of uncertainty about restoration success or where there could be a long delay between an impact occurring and successful restoration/creation. An offset metric should be used to determine the equivalence of the compensatory provision in comparison with the impacts and effects.

- 6.9. The delivery of compensation measures, including biodiversity offsets, is likely to involve access to land, or land purchase, outside a scheme footprint and a commitment to long-term management through legal agreements. They therefore require early consideration in project design. The principles of offsetting should be agreed with the competent authority at an early stage, particularly where this is not clearly set out in a policy or biodiversity offsetting strategy.
- 6.10. The distinction between mitigation and compensation can be difficult to determine. Where ecological equivalence can be delivered within the project site this is sometimes incorrectly considered mitigation rather than compensation. However, the correct distinction between mitigation and compensation is that mitigation reduces the extent of effects occurring and compensation addresses effects which are residual, after avoidance and mitigation have been considered. Measures to address impacts and effects that will occur should therefore be referred to as compensation whether the compensation is located within or outside of the project site.

Enhancement

- 6.11. It is important that development is sustainable and that projects produce a net gain for biodiversity and nature conservation. National policy promotes the inclusion of measures to enhance biodiversity within development proposals. Enhancement of biodiversity should be an objective of all projects.
- 6.12. Enhancement is the provision of new benefits for biodiversity that are additional to those provided as part of mitigation or compensation measures, though they can be complementary. For example, mitigation for bats may involve erecting bat boxes in a woodland to replace suitable bat roosting features that have been removed, and the woodland habitat itself may be enhanced for foraging bats by increased woodland planting and the creation of glades. Enhancement could be linked to the delivery of wider socio-economic benefits such as wetland restoration and flood risk management. Enhancement measures should be described in the EclA.
- 6.13. Enhancement measures should be designed to deliver biodiversity objectives that are specified in relevant policy documents, and evidence should be provided to support the likelihood of delivering the predicted benefit. They should be incorporated into scheme design and assessed within the EclA. To ensure that enhancements are enduring, their delivery and management should normally be guaranteed through a legal obligation, such as, in England and Wales, a planning obligation under section 106 of the Town and Country Planning Act 1990⁹², or its equivalent provision elsewhere, as well as other permits and consents.

Designing Mitigation and Compensation

- 6.14. The design of mitigation and compensation measures is an iterative process. It needs to consider what is realistically achievable and the likely extent to which success can be guaranteed, based on good practice guidance and evidence⁹³. Measures need to be agreed and a commitment made by the developer before a planning application is submitted to the competent authority. Such commitments must then also be agreed with the competent authority and secured through appropriate planning conditions, consents, permits and/or legal agreements. The aim should be to provide the competent authority with as much certainty as possible over the likely effectiveness and deliverability of the proposed measures (see BS 42020 clauses 6.6 and 8.1⁹⁴).
- 6.15. Mitigation and compensation measures should address specific effects. For example, where a development will result in an effect on the conservation status of a population of great crested newts (or, for example, common frog and smooth newts in Ireland) through the loss of terrestrial foraging habitat, compensation should involve the provision of new foraging habitat rather than new breeding ponds. Mitigation and compensation measures should achieve long-term results. Their duration should match the duration of the impact.
- 6.16. Mitigation, compensation and enhancement measures should have defined criteria for success, which allows success or failure to be measured by monitoring. It is not appropriate to propose measures that cannot be delivered within a reasonable time frame, or simply present a wish-list of measures.
- 6.17. However, mitigation measures can include 'contingency measures' where there is uncertainty as to whether or not an effect will occur. For example, this may be relevant to effects that only occur if activities take place at particular times of year (such as site clearance during the bird nesting season), or as a result of unpredictable changes (such as where a badger sett, absent at the time of the EclA, has been established prior to construction). In such cases the contingency measures should identify how such issues will be resolved and consider the possible effects on the project programme.
- 6.18. For many species, particularly those with legal protection, there is published guidance that describes appropriate approaches to mitigation. In some cases it will be necessary to design new approaches to mitigate an effect, and the advice of relevant experts and statutory and non-statutory consultees should be sought. If standard methods are not being used, this will need to be explained and justified.
- 6.19. In some cases compensation measures will need to be in place and 'functioning' before the significant harm occurs. This is particularly likely where the effect is on designated sites or legally protected species. Lead-in times to deliver the measures will need to be carefully considered and explicitly stated in the EclA.
- 6.20. The design of mitigation and compensation measures should be revisited with other members of the design team as there may be constraining factors or knock-on effects that need to be considered by other specialists: an integrated approach will increase successful delivery of the design. Should mitigation for one habitat or species

have an adverse effect on another, it may still be appropriate to implement the mitigation, although the adverse effects will need to be considered in the assessment.

Delivery

- 6.21. Mitigation and compensation measures often carry a degree of uncertainty. Uncertainty associated with a design will vary according to a number of factors, and where necessary these should be discussed in the relevant section of the EclA. Factors to be considered include:
- Technical feasibility of what is proposed – using experience from projects where a similar measure has been carried out.
 - Overall quantity of what is proposed – Is it large enough to be viable? Is it of equivalent function to any habitat lost?
 - Overall quality of what is proposed – Does it compare favourably with features lost or damaged?
 - Level of commitment – Is there a realistic understanding of the resources and effort required to achieve predicted outcomes?
 - Provision of long-term management.
 - Timescale for predicted benefits.

Reporting Mitigation, Compensation and Enhancement

- 6.22. The description of mitigation, compensation and enhancement measures within the EclA must be sufficient to allow the competent authority and relevant stakeholders to see clearly how effects will be addressed. The level of detail needed will vary between schemes, between different measures within a scheme and should include quantity, location, timing, techniques and resources.
- 6.23. It is helpful to set out how a project has evolved in response to ecological considerations and to indicate how mitigation that has been incorporated into the scheme design has avoided or minimised adverse impacts. Presenting the results of the assessment ‘with’ and ‘without’ mitigation allows the need for mitigation and/or compensation to be clearly identified. Where mitigation is fully integrated into the scheme and there is high confidence that it will be implemented, it may be appropriate simply to assess the significance of effects of the mitigated project, with this assessment reflecting the likelihood of the incorporated measures being successful. Where there is any uncertainty, then the with/without mitigation approach to assessment described above should be used to ensure transparency.
- 6.24. Ideally, details of mitigation, compensation and enhancement measures will be incorporated into an Ecological Design Strategy (EDS) or Environmental Management Plan (EMP)⁹⁵ which sets out methods and responsibilities for delivery. The plan should detail timescales for delivery and key criteria for judging success.

Monitoring

- 6.25. The EclA should identify where monitoring is required for mitigation, compensation and enhancement measures, setting out the methods to be used, the criteria for determining success/failure, appropriate timing, mechanisms for implementation, frequency and duration of monitoring, and frequency of reporting.
- 6.26. Monitoring should be secured through a planning condition or obligation built into legal agreements, which the proponent must implement fully (Chapter 7). Monitoring may be used to determine:
- whether the measures have been implemented as agreed;
 - the success/effectiveness of the measures;
 - early warning of proposed measures which are not proving effective; and
 - how to remedy the situation should any of the implemented measures fail e.g. due to lack of management.
- 6.27. Where measures are routinely applied and can be relied upon to deliver well tried and tested mitigation, monitoring is unlikely to be necessary, so long as the competent authority is able to enforce the measures. However, where there are uncertainties in predicting the effectiveness of measures, or mitigation packages are novel, monitoring will be required to determine whether the predicted efficacy of the mitigation meets expectations.
- 6.28. It is vital that monitoring has clear indicators of success or failure, set against a suitable baseline. Monitoring needs to have clear aims and objectives to specifically determine the success of the measures, both in the short-term and longer-term. Longer-term monitoring is appropriate where:
- the success or failure of the measures will take longer to assess – such as for some habitat creation/management measures; or
 - the mitigation is relevant to a feature upon which the effects may vary during the life of the project.
- 6.29. It is important that there is an agreed robust feedback mechanism to ensure that where objectives have not been met, provision is made for remedial measures and these are implemented.
- 6.30. Ideally the results of monitoring should be widely shared, to inform the design of mitigation, compensation and enhancement measures of other projects.

7. CONSEQUENCES FOR DECISION-MAKING

Introduction

- 7.1. The competent authority determines whether the mitigated project:
 - complies with legal requirements e.g. for protected species;
 - meets national and local policy goals and objectives; and
 - requires conditions and legal obligations attached to the consent concerning detailed design, implementation and monitoring of the project.
- 7.2. The scoping stage presents the first opportunity to make explicit the legal and policy context. Everyone engaged in the process should be fully aware of, and constantly referring back to, the legal and policy context that applies to the area and issues being studied, and the context of the case. Failure to take account of the legal and policy context, and to provide sufficient information to comply with this, may lead to delay and can result in an application being refused or a decision challenged.
- 7.3. The consequences, in terms of development control/management, will depend on the importance of the ecological features and the significance of effects upon them and the relevant legislation, policy, and guidance.

Legal Implications

- 7.4. The legal implications arising out of an EclA should be made explicit and legal advice sought as necessary. Where an EclA is undertaken to inform an EIA it is subject to the relevant EIA Regulations.
- 7.5. The findings of an EclA are a material consideration in the planning process and other consent regimes. The competent authority must be provided with all the information needed to assess and evaluate the likely significant environmental effects of a project. The competent authority has the duty to consider the environmental information before it reaches a decision regarding the granting of consent. Key aspects of the EclA report that the competent authority should take into account when determining an application include⁹⁶:
 - The soundness of technical content of ecological information including
 - adequate and up-to-date data
 - ecological methods in accordance with good practice
 - departures from good practice made clear.
 - Whether ecological features are likely to be affected and all potential impacts are described adequately.
 - Whether effects are significant and, if so, are capable of being mitigated.
 - Whether the mitigation hierarchy has been applied.
 - Whether it is adequately demonstrated that the proposal will deliver stated outcomes, with regard to likely effectiveness and certainty over deliverability.
 - Whether the measures are capable of being secured through appropriate planning conditions and/or obligations, and/or are likely to be permitted through other consent regimes e.g. licences for European Protected Species.
 - Whether the proposals are compliant with statutory obligations and policy.
 - Whether there is clear indication of likely significant losses and gains for biodiversity.
 - Whether any material considerations have been identified that might require changes to the application.
- 7.6. When determining a planning application, the competent authority should not adopt a 'wait and see' approach. It should not impose a condition requiring further work to identify the likely environmental effects after permission has been granted. It is a well-established principle that the planning authority should ensure it takes account of all material considerations before making its decision (and does not take account of immaterial considerations not relevant to planning). It is therefore crucial that all information about the potentially significant ecological effects of the proposal is available to the planning authority before it grants permission.
- 7.7. Where the competent authority considers that the information is insufficient it can request further information or evidence to verify the information already provided. Working closely with the decision-maker, statutory bodies and other consultees during the assessment process should help reduce the likelihood of the competent authority needing to do this.

Policy Implications

- 7.8. All parties engaged in EclA should be familiar with the national and local policies that are relevant to a project. Key national policy documents that should be considered during EclA can be found on government websites and local policy documents are usually available on local authority websites.
- 7.9. If the project being assessed has emerged from the process of preparing a development plan for which a SA or SEA has been undertaken, the results of the SA/SEA may be relevant to the EclA: SA/SEA requires the explicit consideration of alternatives to the project, biodiversity objectives and outcomes. These results should be taken into account along with any mitigation measures, recommendations and monitoring.

Implications for Detailed Design and Implementation

- 7.10. Conditions, planning obligations and legal agreements are often needed to secure and enforce the implementation of mitigation, compensation and enhancement measures outlined in an EclA. These obligations can be enforced by the competent authority. This can be particularly challenging when the obligations were developed with one organisation but a different organisation implements the consent.
- 7.11. All parties should understand the actions they need to take during the implementation stages of a project. This will mean identifying and designing in detail the measures necessary to avoid, mitigate and compensate negative effects, and any measures necessary to achieve enhancements. Details of these measures will be set out in the EclA and may be presented in an Environmental Management Plan (EMP) or similar document.
- 7.12. The project proposer should demonstrate commitment to the package of mitigation, compensation and enhancement measures. This is most effectively done by proposing to enter into a legally enforceable agreement, such as, in England and Wales, a planning obligation under section 106 of the Town and Country Planning Act 1990, consent /permit conditions in Ireland and/or its equivalent provision elsewhere. It would normally be between the proposer / developer / landowner and the planning authority, with input from the professional ecologist working on the project. The relevant instrument can include specific obligations which may be set out in detail in a schedule, and may take the form of a Mitigation, Compensation and Monitoring Agreement (MCMA) in the UK or a Monitoring Programme/Plan in Ireland. This should include a detailed explanation of what is to be done, how it will be achieved, where and when it is to be carried out, and who is responsible for ensuring that works are undertaken as proposed. The information provided should include:
- summary of the impacts to be addressed, with clear description of whether they will be dealt with by mitigation measures or compensation measures, and explicit reference to supporting data to ensure an audit trail;
 - details of how the proposed measures will be funded;
 - location and extent of the proposed measures on scale plans;
 - a timetable for implementation of design options and integration with phases of development e.g. construction, operation, habitation, decommissioning, restoration;
 - expertise of persons responsible for implementing design options;
 - availability and security of land to implement the design options;
 - a description of all other resources required to implement the design options;
 - a statement of how design options will be secured within the planning process or consent process;
 - details of proposed liaison with local experts and how local people can contribute ideas;
 - supervision during works by an Ecological Clerk of Works or Project Ecologist;
 - a monitoring scheme to evaluate the success of mitigation measures and/or compensation measures;
 - remedial measures in the event that mitigation measures and/or compensation measures are unsuccessful or there are unforeseen effects; and
 - proposed auditing/reporting and publication procedures.
- 7.13. A clear audit trail should be maintained by both the project proposer and the competent authority to explain the rationale behind the adoption of particular conditions, offsetting measures and monitoring. This is particularly important where the final project is completed by a successor body inheriting these responsibilities.

APPENDIX 1: Example Assessment of the Significance of Effects: Impacts of road widening on a population of Cetti's warblers

Note: The worked example provided below, whilst intended to be as realistic as possible, is fictitious and for illustrative purposes only. Its aim is to show the general principles of how the approach to EclA recommended in these Guidelines might be applied in practice. The actual values of various parameters and the conclusions reached could differ in a real situation; other parameters could be relevant and other research findings brought to bear.

The scheme proposals and key biophysical changes

The hypothetical road scheme involves widening a 3 km stretch of two-lane road (c. 9.3 m wide) into a dual carriageway with hard strips (final hard surface increase to c. 19.1 m). This scheme is being implemented largely to take traffic out of the centre of a country town. The widening will require the removal of improved grassland in this location. The scheme is located within the county of Cymrent in the west of Britain and is aligned north-south. Once commissioned, the scheme would permit an almost three-fold increase in traffic volume from 9,500 to an estimated 28,000 vehicles per day and an increase in average speed from 80 kph to 100 kph (c. 50 mph to 60 mph). Site clearance would occur over a six week period, and it is intended to complete the construction works within eight months.

Description of ecological features

- The feature being assessed is a local population of five breeding pairs of Cetti's warblers *Cettia cetti*.
- Approximately 50 m to the east of the A road is a 25.5 ha County Wildlife Site (CWS) called 'The Cuts', which runs parallel to the A road for some 400 m and some 640 m away from it to the east. 'The Cuts' supports five pairs of Cetti's warblers (as well as a diverse range of other species including whitethroat, willow warbler in notable numbers and occasional uncommon migrants, which are not considered further here but which might experience similar impacts to the Cetti's warblers). 'The Cuts' comprises six marshy grassland fields, demarcated by ditches and hedgerows on low bunds. These hedges consist of dense stands of blackthorn, bramble, common alder and grey and goat willow. Common nettle and great hairy willow-herb occur densely adjacent to the bunds. There is a 0.5 ha area of open water and a 1.5 ha reedbed at the centre of one field, but due to natural succession this zone is rapidly being invaded by scrub. The territories of the Cetti's warblers are localised along the bunds, extending typically for lengths of up to 400 – 500 m (in four of the five cases along two or three sides of a field) the birds defending areas of hedgerow, ditch and tall marshland up to c. 20 m either side of the mid-point of the bunds. This average territory size is in keeping with that found in other sites in Britain, though there is high variability (see Snow and Perrins 2000). According to the local Wildlife Trust, territories extend neither into the easternmost c. 150 m of 'The Cuts', where the ditches are dry due to the over-abstraction from local watercourses and boreholes for agriculture, nor into the westernmost 100 m or so (nearest the existing road).
- The Cetti's warbler was unknown in Britain until 1961. Breeding was first recorded in Kent in the early 1970s. This is a species on the northern edge of its European range that is expanding fairly rapidly in population size and geographical extent (northwards) in response to the recent series of relatively mild winters. It is thought susceptible to very cold winter weather and its population in the mid-eastern counties of England was eradicated by some of the cold winters in the 1980s. The current population size is estimated at over 850 breeding pairs (based on numbers of singing males in 2002), two thirds of this population being in the south-eastern counties of England. Wales was colonised from 1980. The population in Cymrent has been estimated at 50 pairs (singing males).
- Male Cetti's warblers advertise territory with loud song sung from deep cover. Recent research has shown that these songs are highly individual and that recognition of specific neighbours occurs.
- 'The Cuts' is accessed by a footpath usable by the landowner and permit-holding members of the local Wildlife Trust and there is a bird watching hide near the reedbed.
- Habitat throughout 'The Cuts' is still largely in overall 'good' condition for the species, but water supply to the marshy grassland has been steadily diminishing, mainly as a result of increasing agricultural abstraction to the east combined with a climatic pattern of dry summers. Associated with this change, some willow encroachment is occurring and beginning to shade out the reedbed and open water habitat. This steady reduction in water table has also been associated with reports of diminished insect abundance by the local Wildlife Trust which monitors the site, especially in the eastern parts of the site where the ditches have in places dried up.
- On the other side of the road to 'The Cuts', but 500 m from it to the west, is a larger area of similar wetland, which supports a further three pairs of Cetti's warblers; this is on private land with no public access.

Legal and policy framework

- Cetti's warbler is a species listed on Annex II of the Berne Convention and Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Legal protection in Britain prohibits killing, injury, damage/destruction of nests, and disturbance of adults/young while a nest is in use or being built. Cetti's warbler is not listed on Annex 1 of the Birds Directive and is considered a 'green list' species (status secure) by the RSPB.
- Cetti's warbler is on the statutory nature conservation organisations' 'sensitive species trigger list'.
- Despite this 'secure status' nationally, the Cymrent Local BAP requires the maintenance at favourable conservation status of all existing viable areas of habitat for Cetti's warbler. The Local BAP also prescribes the creation of a further 50 ha of habitat for Cetti's warbler in the County. The Local Development Framework requires that care is taken not to adversely affect wetlands of ecological value.
- Sections 238(1) and 246(1) of the Highways Act 1980 gives a Highway Authority the power to:
'Acquire land, compulsorily or by agreement, for the purpose of mitigating any adverse effect which the existence or use of a highway constructed or improved by a Highway Authority has or will have on the surroundings of the highway.'

Mitigation under these powers, however, does not include compulsory land purchase for the purposes of net ecological enhancement. Highways Authorities also have the duties of ensuring the wise spending of public money and that roads are safe.

Factors on which the Cetti's warbler population depends

- Continuity of physical habitat: many areas of suitable habitat have been lost through conversion to intensive agriculture, infill for development, and dumping.
- Appropriate water supply: many areas of suitable habitat have been lost indirectly through changes in water status, including reduced water supply and water quality. Eutrophication through leaching and run-off from fertiliser applied to agricultural land can lead to increased growth and dominance of vigorous plant species that can then lead to a loss of biodiversity and may also cause reed death.
- Appropriate management: lack of, or inappropriate management of fens and reedbeds, can lead to drying, scrub encroachment and succession to woodland.
- Control of disturbance: Cetti's warbler is a songbird and hence likely to be affected by traffic noise. In the absence of species-specific data it is assumed that Cetti's warbler response to road noise is an average for passerines (see below).
- Genetic interchange with other populations: this is necessary to avoid extinction through inbreeding depression in a small population.

Importance of Cetti's warbler population

- At the time of study the British population is estimated at over 850 pairs and the Cymrent population at over 50 pairs. Thus, five pairs represent 10% of the county population in this example. The recent series of mild winters has facilitated a great increase in population of this species as well as an expansion of its range northwards and westwards into Wales. However, this is still an uncommon breeding bird species, dependent on a vulnerable wetland habitat type and a species that is very susceptible to the effects of any potential cold winters. Taken together, these factors suggest that the local population of Cetti's warblers in 'The Cuts' is at least of County Importance for biodiversity.
- 'The Cuts' is deemed by members of the local Wildlife Trust to be one of the best sites in Cymrent to hear and see Cetti's warblers, and the site also attracts a number of other interesting species on passage migration. The site is therefore considered to be of County importance for social/community value.

Ecological Impact Assessment

- It has been shown in this case (for simplicity) that the hydrology of 'The Cuts' would not be directly or indirectly affected by the dualling of the road. There would be no direct physical impact on the marshy fields or habitat of the Cetti's warblers through the works or any associated ancillary works. The potential negative effects on the Cetti's warblers to be considered then are those that would result from increased disturbance levels during construction and operation and the increased risk of killing birds and isolation of birds during operation.

Construction impacts: site clearance during the breeding season

Proposed activity, duration of activity, biophysical change and relevance to the feature in terms of ecosystem structure and function

Site clearance and construction activities would result in increased noise over eight months. Ambient noise level increases would be variable, but at times there could be considerable increases in noise levels. This would change the noise environment within and near bird territories, creating the potential for impact on the audibility of territorial song and an increase in general stress levels, and hence negative effects on the ability of birds to hold territories and breed successfully.

Characterisation of unmitigated impact on the feature

If works were to take place within the breeding season, there would be a negative impact, probably extending c. 500 m from the road and affecting the whole Cetti's warbler population of 'The Cuts'. It is not possible to quantify the magnitude of effect from the available literature. The effect of the construction noise would last longer than the duration of the noise and should be considered effectively permanent through the construction period. The duration of effect would be just one breeding season, but abandonment could be permanent for some individuals. Nevertheless, the effect would be likely to be reversible in time, once construction was over.

Rationale for prediction of effect

The effects of such variable noise disturbance on breeding of both Cetti's warblers in particular, and birds in general, at different distances from the source of disturbance, are very little understood. Even though the Cetti's warbler song is particularly loud, clarity or individual recognition ability might be lost against background noise. It is also possible that construction noise might cause increased general stress (Reijnen et al. 2002), if not site abandonment. Cetti's warbler is very susceptible to cold weather and a small population could be wiped out in a severe winter especially if already 'stressed'. On a precautionary basis, it is considered likely that this temporary impact could negatively affect the conservation status of the local population.

Effect without mitigation

A significant negative effect at the County level is concluded. The Cetti's warbler is listed on Schedule 1 of the Wildlife and Countryside Act 1981 and hence protected from disturbance whilst breeding. The potential therefore exists for a breach of relevant legislation.

Mitigation

Construction works in the stretch should avoid the breeding season as far as possible. If this were not possible, then the only practicable means of reducing the noise would be the installation of a permanent sound barrier in advance of construction works.

Significance of effects of residual impacts after mitigation

Any effect of construction outside the breeding season would not be significant. With the sound barrier, any effect of construction noise would be unlikely to be significant.

Operational impacts 1: increased background noise due to increased traffic volume and speed

Proposed activity, duration of activity, biophysical change and relevance to the feature in terms of ecosystem structure and function

Increased traffic volume and speeds in perpetuity would lead to a permanent increase in ambient noise levels, which would penetrate further into the Cetti's warbler habitat. This would have a potential impact on audibility of territorial song and hence ability of birds to hold territories and breed successfully. This impact, combined with increased background visual sources of potential disturbance (car lights and movement), could increase general stress levels. Such impacts can extend for several hundreds of metres from a road (see Reijnen et al. 1995).

Characterisation of unmitigated impact on the feature

The result of such changes, if unmitigated, would be a negative effect on the Cetti's warbler population in 'The Cuts'. Its extent would encompass all currently viable breeding habitat for the Cetti's warbler in 'The Cuts' (see 1.3 below). The effect would be effectively permanent and not reversible, as noise would always be affecting the population.

Rationale for prediction of effect

Although not specifically developed in relation to Cetti's warblers in Britain, the best available model for predicting impacts in this case is the guidance developed to predict the effects of road noise on song-birds in Holland including warbler species (Reijnen et al. 1995). The tables in this publication have been used to inform the present example. This Dutch model

is considered to be applicable as the road in question meets all of the criteria set by the model. The distance from the road at which no impact on songbirds in fairly open habitat (<30% woodland) generally would be expected to occur with mean traffic speeds of 80 kph (50 mph) and 9,500 vehicles per day, would be around 185 m (Reijnen et al. 1995 Table 2). The local population of Cetti's warblers in 'The Cuts' should accordingly be assumed (on a precautionary basis) to be already somewhat compromised and/or limited by the availability of habitat that is free from road-related disturbance. Such disturbance applies to at least the first 135 or so metres of 'The Cuts' (20%) from the western edge (nearest the road) and might explain the relative lack of sightings of Cetti's warblers reported by the local Wildlife Trust from this band of 'The Cuts'. With the increase in traffic volume to 28,000 vehicles per day and speed to 100 kph (60 mph), this impact distance could increase by over 300%, to at least 565 m (Reijnen et al. 1995 Table 5), that is, 580 m from original A road edge, as the dual carriageway is c. 15 m wider. This predicted impact zone would, therefore, encompass the whole area of 'The Cuts' containing habitat currently suitable for Cetti's warbler. These biophysical changes would decrease the quality of the breeding habitat. The Cetti's warblers might relocate their breeding locations to other parts of 'The Cuts', in which case territories would be smaller and possibly extend into less suitable habitats, negatively affecting fitness. It is likely that it would lead to site abandonment by several pairs (based on the average reductions noted by Reijnen et al. 1995, p.33, loss of at least 2 to 3 pairs is likely). Accordingly, it is considered that the conservation status of Cetti's warbler in 'The Cuts' would be negatively affected.

Effect without mitigation

There will be a significant negative effect at the County scale.

Mitigation

Policy and the legal requirement to avoid intentional or reckless disturbance to a Schedule 1 bird clearly indicate a need to mitigate fully for this impact. Two measures are proposed to achieve this:

(a) The purchase of the land between the road and the wetland and its planting with both a native woodland (willow, poplar and alder) belt c. 50 m in width with dense understorey scrub, extending this some 150 m north and south of 'The Cuts' and in addition, by agreement with the local Wildlife Trust (or by purchase if necessary), the extension of the same planting into the first 50 m of 'The Cuts' from the west. It is likely that this measure would reduce the impact distance on Cetti's warbler compared with an unmitigated scheme (based on an increase in 'wood fraction' to 0.5 to 0.9, see Reijnen et al. 1995 Table 4) to just 230 m from the old A road edge. Design of this woodland belt would need to consider potential impacts on other species e.g. barn owls. Whilst the impact distance after this mitigation would still extend some 95 m further into 'The Cuts' than it did before construction of the dual carriageway, the area of breeding territory away from the road (out of the impact zone) would be greater than this, and the net area of good habitat for Cetti's Warbler should remain the same or increase slightly.

(b) The re-establishment of hydrological conditions that are favoured by Cetti's warbler in the part of 'The Cuts' that is currently too dry and lacking territories. This would be achieved with the agreement of the landowner through the amendment of the provision of a new water supply to the land for the farmer; via legal agreement in perpetuity. This should allow the Cetti's warblers to extend their breeding activity in the 140 m farthest from the road, outside of the predicted noise 'impact distance'.

Accordingly, it is considered that these measures, taken together, would mitigate the loss of quality of much of the Cetti's warbler habitat in 'The Cuts' and hence maintain the conservation status of the population. Note that if agreement could not be obtained from the local Wildlife Trust to plant up the western edge of 'The Cuts', then a similar level of noise reduction would need to be obtained via the installation of an expensive, proprietary, noise barrier along the whole length of 'The Cuts' and 150 m beyond on either side, instead of woodland planting (Reijnen et al. 1995, Table 5.2). Such an installation could well be controversial in landscape terms and would require detailed assessment in this regard as well as ecologically.

Significance of residual effects after mitigation

There would be a short-term, (c. 5 years) negative effect on the Cetti's warbler population, significant at the County level until maturation of the mitigation measures with respect to habitat. However, in the long-term, it is likely that full mitigation would be achieved and the importance of the feature be returned to County level and there would be no residual effect of significance on the Cetti's warbler population in 'The Cuts'.

Operational impacts 2: increased barrier effect and collision risk

Proposed activity, duration of activity, biophysical change and relevance to the feature in terms of ecosystem structure and function

The scheme would result in > 50% physical increase in any barrier effect that the road might already be exerting on dispersal of adults and/or post-breeding dispersal of juveniles. This is especially the case given the presence of another known population of Cetti's warblers 500 m west of the A road out with the CWS. There would also be an increase in collision risk due to

increased traffic speeds, and perhaps volumes (though increased traffic volumes can actually increase the deterrent for crossing the road and hence actually reduce collision risk).

Characterisation of unmitigated impact on the feature

The biophysical change would exert a permanent negative impact on the whole local population of Cetti's warblers in 'The Cuts' and would be in practical terms irreversible (though compensation would be feasible).

Rationale for prediction of effect

It is considered that the existing A road is already acting to an extent as a deterrent to post-breeding or post-fledging dispersal of some individuals, and this effect might increase with the > 50% increase in width of the barrier and higher vehicular speeds. There are no means of quantifying this possible impact based on existing scientific knowledge. Any reduced dispersal could result in reduced genetic interchange between populations and increase the risk of genetic isolation and inbreeding depression. It is also the case that any individuals dispersing across the road would be exposed to a higher risk of collision with vehicles. This additional risk is also currently unquantifiable, but any adult mortality (or substantial juvenile mortality) in such a small population could notably increase local extinction risk. It is concluded that both the increased barrier effect of the nearby road and the increased collision hazard would negatively affect the conservation status of the Cetti's warblers in 'The Cuts'.

Effect without mitigation

It is considered that there would be a negative effect, significant at the County scale.

Mitigation

The potential impact cannot be confidently mitigated because 'green crossings' over roads are expensive and their likely success in attracting Cetti's warblers to cross safely rather than through the traffic stream is not possible to quantify from previous studies.

Significance of residual effects after mitigation

It is considered that the population of Cetti's warblers in 'The Cuts' will experience a permanent loss of conservation status, which would constitute a significant negative effect at the County scale.

Compensation

Compensation should be feasible by increasing the potential for population growth in other places in Cymrent. The County BAP has identified a strategy to achieve this, which includes the provision of a grant for land-owners to encourage them to manage existing habitats, or create new habitats for Cetti's warblers. An appropriate long term contribution to this grant fund will be made by the Highway Authority. It is likely that the proposed compensation would, in the longer term, increase the chances of success of a county-wide population enhancement strategy, resulting in no significant effect on Cetti's warblers in the county as a whole.

Monitoring

Linked to these mitigation proposals there would be a requirement for monitoring of the success of the mitigation in keeping with legal requirements. It is likely that the Highways Authority in this instance would monitor the growth and maturation of the proposed tree belt and arrange separate monitoring of the Cetti's warbler population, in this case almost certainly through the local Wildlife Trust.

Note that a summary of impacts is given below on page 49

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APPENDIX 1 cont'd: Summary of impacts of road widening on a population of Cetti's warblers (a population important at a county scale)

Impacts	Characterisation of unmitigated impact on the feature	Effect without mitigation	Mitigation	Significance of effects of residual impacts (after mitigation)
Construction Impacts – site clearance and construction				
Increased noise disturbance	Increased noise disturbance affecting the ability of birds to hold territory if construction took place in the breeding season. There would be a negative impact (variable over the day/night cycle, but effectively constant) extending up to 500 m from the road and affecting c. 80% of the local population to varying extents over one breeding season.	Negative effect on breeding success in one season. Possible reduction in population size. Significant negative effect at the County scale. Possibly reversible as construction is only for one season.	<p><i>Option 1:</i> Avoidance of construction in the breeding season.</p> <p><i>Option 2:</i> Construction of permanent sound barrier in advance (see below).</p>	<p><i>Option 1:</i> Negative effect on breeding success is avoided. There is no negative effect on the population or its conservation status</p> <p><i>Option 2:</i> Tried and tested engineering technique. Negative effect on breeding success is avoided. There is no effect on the population or its conservation status</p>
Operational Impacts – increased traffic volume and speed				
Increased noise disturbance	Increased noise disturbance affecting the ability of birds to hold territory. Although there would be some year-round and night to day variation in levels of noise, the overall negative effect would be permanent. The extent would be at least 400 m beyond the current limit of effect of the existing road. This would not be reversible as noise will always be affecting the population without mitigation.	Permanent negative effect on breeding success. Reduction in population size. Significant negative effect at the County scale.	Combination of woodland buffer planting (or planting plus sound barrier), plus restoration of eastern part of the CWS to support Cetti's warblers.	Negative effect on breeding success. Significant negative effect on regional/ County population in the short-term (c. 5 years), Insignificant effect at in the long-term.

<p>Increased barrier to bird movement</p>	<p>Increased barrier to bird movement and collision risk. Permanent impact on dispersal ability due to increased road width, higher vehicular speeds and collisions.</p>	<p>Permanent negative effect on breeding success and bird mortality. Reduction in population size. Significant negative effect at the County scale.</p>	<p>Cannot be readily mitigated.</p>	<p>Negative effect on breeding success and bird mortality at the County scale. Permanent negative effect on the local population. Compensation proposed by long term financial contribution to the provision of grants to land owners for the improvement of habitat for the species within the County. With compensation effects are not likely to be significant in the long-term at a County scale.</p>
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APPENDIX 2: Template for Ecological Impact Assessment (EclA)

This template, which is taken from CIEEM’s Guidelines for Ecological Report Writing, should be used in accordance with the recommendations presented in those Guidelines. The template is intended to provide a logical and reasonable structure for those preparing Ecological Impact Assessment reports that will be submitted in support of a planning application. The template should be used to guide the topics and content to be included in such a report.

For assessments which clearly relate to a single species or species group (such as assessments relating to bats in a proposed barn conversion) it will be appropriate to simplify the report structure by combining sections or deleting headings for sections which are not needed (for example, cumulative effects or compensation may not be required in some cases, particularly for very small scale projects). However, whilst it may be appropriate to simplify the structure of the report, it is likely that the contents set out below will be relevant for schemes of any scale, and any major departures from this approach should therefore be clearly justified.

Section	Content
B1. Cover page	Report title. Date of report. Name and contact details of principal author. Name of individual/organisation who commissioned the report. Unique reference number so that the report can be referred to, including version number.
B2. Quality Assurance	Details of QA protocol
B3. Contents table	Provide page numbers for each section (and possibly also sub-sections), as well as figures, tables and appendices.
B4. Summary	A one page summary of: <ul style="list-style-type: none"> • Purpose of the report • Description of the scheme • Methodology • Key impacts and mitigation measures • Conclusions <p>Consider also use of a finalised Ecological Constraints and Opportunities Plan (ECOP) as specified in BS42020 clause 5.4 as a graphical means of presenting key information.</p>

Section	Content
B5. Introduction	<p>Name and qualifications of principal author. Name of individual/organisation who commissioned the report. Purpose of the report. Site name. Brief description of the site. Reference to a plan showing the site boundaries with an OS base. A brief description of the project, e.g. an outline planning application for residential development of the site. Reference to any previous reports provided for the site (e.g. a Preliminary Ecological Appraisal). Clear statement of the purpose of the report e.g.:</p> <ul style="list-style-type: none"> • To identify and describe all potentially significant ecological effects associated with the proposed development • To set out the mitigation measures required to ensure compliance with nature conservation legislation and to address any potentially significant ecological effects • To identify how mitigation measures will/could be secured • To provide an assessment of the significance of any residual effects • To identify appropriate enhancement measures • To set out the requirements for post-construction monitoring
B6. Planning policy and legislation	<p>Provide all key relevant planning policies (national and local). List all relevant legislation. It is important that this section is scheme-specific. Where a piece of legislation is relevant, explain why (i.e. which protected species are present).</p>
B7. Methodology B7.1 Scope of the assessment	<p>Describe the scope of the assessment, including:</p> <ul style="list-style-type: none"> • A description of the Zone of Influence • List the types of ecological features considered, e.g. designated sites, habitats and species of principal importance for conservation of biodiversity, protected species, etc. • Describe any consultation that has taken place in relation to determining the scope of the assessment
B7. Methodology B7.2 Desk study	<p>List the individuals or organisations that have been contacted. List the websites that have been used to search for relevant data. Describe the information that has been requested/searched for. Describe the study area (likely to vary in relation to different resources). State when data searches were carried out. List any ecological reports that have been reviewed, such as previous reports for the same site, or reports for adjacent sites (appropriately referenced).</p>

Section	Content
B7. Methodology B7.3 Field survey	<p>For each field survey undertaken provide:</p> <ul style="list-style-type: none"> • Brief description of methodology • Names and qualifications of surveyors • Date(s) of surveys • Study area • Weather conditions at time of survey(s) and time of day (if relevant) • Reference to relevant guidance document (where appropriate) • Explanation of any departures from recommended guidance • Limitations <p>Note: Where multiple survey visits have been undertaken, dates, times and weather conditions of surveys can be provided in a table in an appendix. Note: Detailed descriptions of survey methodologies can be provided in an appendix. Note: Where the field survey was an 'extended Phase 1 habitat survey' (or the equivalent in Ireland³⁷), it is important to explain what was done in addition to the standard habitat survey, such as an assessment of the likely value of the hedgerows for dormice, or identification of any buildings or trees suitable for use by roosting bats, etc.</p>
B7. Methodology B7.4 Assessment	<p>Describe the assessment methodology used. In particular:</p> <ul style="list-style-type: none"> • How has significance been determined. • What geographical contexts are used, and how have these been determined. • State which years have been assumed for the assessment of impacts (and for which baseline conditions have been described).
B8. Baseline ecological conditions (General)	<p>Provide a clear description of the baseline conditions for all ecological features. This should be based on the conditions at the time that the activity giving rise to an impact occurs, assuming the absence of the development. In some cases this may require consideration of the baseline conditions in multiple years (for example, to account for operational phase impacts).</p> <p>Include a statement of the geographical context within which each ecological feature is considered to be important. Provide a summary table listing all of the relevant ecological features and the geographical context within which each is considered to be important.</p>
B8. Baseline ecological conditions B8.1 Designated sites	<p>Provide details of all designated sites of relevance (or possible relevance) to the assessment, including name, level of designation, location relative to the site, and reasons for designation. In some cases it will be relevant to include a plan showing the location of designated sites.</p>

Section	Content
B8. Baseline ecological conditions B8.2 Habitats	<p>Provide a description of the habitat types present within the site and on immediately adjacent land. Focus should be given to habitat types identified as being of national or local importance for the conservation of biodiversity. This should make reference to a habitat map of the site, normally drawn in accordance with Phase 1 habitat survey methodology (or equivalent in Ireland). However, it should be noted that the habitat categories used by the Phase 1 habitat survey methodology do not mirror the habitat types considered to be conservation priorities, and further details will therefore need to be provided in some cases.</p> <p>The description should include all relevant information, such as dominant plant species present, notable plant species, and current management.</p>
B8. Baseline ecological conditions B8.3 Species and species groups Note This can be sub-headed as follows, for example: i. Plants ii. Invertebrates iii. Amphibians iv. Reptiles v. Cirl buntings vi. Other birds vii. Bats viii. Badgers ix. Other mammals	<p>Provide a description of the use of the site (or likely use of the site) by important species (national or local conservation priorities, or protected species). This should be based on a combination of desk study information, field survey data, and an assessment of the likely value of the habitats for each species present. The description for each species/group should combine the information provided from the various data sources, rather than including desk study and field survey information for the same species/group in different parts of the report.</p> <p>The detailed results of field surveys should be presented on plans (for some sites they can be included on the Phase 1 habitat map, or the equivalent in Ireland) and/or in appendices.</p> <p>In some cases it will be appropriate to group species together into species groups to avoid repetition.</p> <p>It will be appropriate to include the following species/species groups as a minimum for all sites:</p> <ul style="list-style-type: none"> • Plants • Invertebrates • Amphibians • Reptiles • Birds • Bats • Badgers • Other mammals <p>Additional species or species groups may also be appropriate, and it may be appropriate to further sub-divide the groups to provide a detailed description of certain species for example, such as marsh fritillary butterflies, great crested newts, cirl buntings, barbastelle bats, etc.</p>
B9. Description of the proposed development	<p>Provide a detailed description of the proposals with reference to appropriate drawings.</p> <p>Include a description of how the scheme has been designed to avoid/minimise ecological effects, if relevant.</p>

Section	Content
<p>B10. Assessment of effects and mitigation measures</p> <p>Note: This can be sub-headed as follows, for example:</p> <p>B.10.1 Reptiles</p> <ul style="list-style-type: none"> • Potential impacts • Mitigation measures • Significance of residual effects <p>Potential impacts can be divided into different phases, but the significance of residual effects should relate to the project as a whole (i.e. all phases combined)</p>	<p>Identify and describe all of the potential impacts of the proposed development on each ecological feature identified in the 'Baseline Conditions' section, including impacts associated with all phases (construction, operation, restoration, de-commissioning, etc).</p> <ul style="list-style-type: none"> • Where no impact on a particular ecological feature is predicted a clear statement to this effect should be provided with appropriate justification. • It is important that this section follows the same sub-headings as the Baseline Conditions section to enable the reader to see how the impacts on each ecological feature present has been assessed <p>Identify and describe the mitigation measures required and a clear statement of how these can be secured.</p> <p>Provide an assessment of the significance of any residual effects. This should comprise a description of the effect and a statement of the geographic level at which the effect is likely to be significant (e.g. Significant at the national level, Significant at the county level, Not significant, etc).</p> <p>The assessment must include a robust justification for the assessment, based on information clearly presented in the report. In many cases, this is likely to require reference to be made to appropriate publications.</p> <p>Provide a summary table listing the significance of residual effects for each ecological feature, the mitigation measures required and the means by which mitigation measures can be secured to allow the local planning authority to ensure that appropriate planning conditions / obligations are included with any consent.</p>
<p>B.11 Cumulative effects</p> <p>Note: This can be included within the 'Assessment of effects and mitigation measures' or dealt with as a separate section</p>	<p>Identify any other projects which could give rise to a significant cumulative effect.</p> <p>Describe and assess any potential cumulative effects and determine whether they would be significant or not (and in which geographical context).</p> <p>Provide a robust justification for the conclusions reached.</p>
<p>B12. Compensation (if relevant)</p>	<p>Where compensation measures are considered necessary to off-set significant residual effects these should be described and assessed.</p>
<p>B13. Enhancement</p>	<p>Provide a description of the enhancement measures proposed, over and above any mitigation required, and how these will be secured.</p>
<p>B14. Monitoring</p>	<p>Identify and describe any monitoring surveys required, including details of methods and timing, where appropriate.</p>

Section	Content
B15. Conclusions	<p>Draw conclusions on the overall ecological effects of the scheme, justifying how the project accords with relevant legislation and planning policy. Demonstrate compliance with or deviation from relevant development plan policies and statutory obligations.</p> <p>Identify mechanisms to secure commitment to and delivery of recommended measures e.g. through planning conditions and/or through EPS licences.</p> <p>Explain clearly what the likely outcomes are for biodiversity if the proposed development is granted planning permission. Such implications may be presented as a table and/or as a statement of 'net losses and gains' and should provide the decision-maker with a clear understanding of the likely consequence for habitats and species likely to be affected significantly by the proposals.</p>
B16. References	<p>All documents referred to in the text should be listed and appropriately referenced.</p>
B17. Figures	<p>Provide a plan showing the ecological features referred to in the report (normally based on a Phase 1 habitat map or equivalent in Ireland³⁷).</p> <p>It may be appropriate to provide other plans/figures to show the locations of specific ecological features referred to in the report.</p> <p>It can be helpful to overlay the scheme layout or parameter plans with the ecological features.</p>
B18. Appendices	<p>Provide detailed survey methodologies and results in appendices. Site photographs can also be provided in an appendix.</p>

APPENDIX 3: Sources of Contextual Information

The following list provides some sources of information that may be useful when undertaking an Ecological Impact Assessment.

ALERC Association of Local Environmental Record Centres (UK)⁹⁷
Ancient Woodland Inventory (UK)⁹⁸
Biodiversity Planning Toolkit (UK)⁹⁹
Biodiversity Strategies/Action Plans – national¹⁰⁰
Biodiversity Strategies/Action Plans – local¹⁰¹
British Trust for Ornithology¹⁰², BirdWatch Ireland¹⁰³ (Wetland Bird Survey (WeBS) or I-WeBS data)
Centre for Environmental Data and Recording (CEDaR) (Northern Ireland)¹⁰⁴
CORINE LandCover 2006 raster data (UK and Ireland)¹⁰⁵
Department of the Environment, Community and Local Government (DECLG) Ireland¹⁰⁶
Environmental Protection Agency (EPA), including Geoportal Site (Ireland)¹⁰⁷
Joint Nature Conservation Committee (JNCC) Protected Sites (UK)¹⁰⁸
Land Cover Map 2000 (LCM2000) (UK)¹⁰⁹
LANDMAP (Wales)¹¹⁰
Living Landscape (UK)¹¹¹
Local Records Centres Wales¹¹²
Multi-Agency Geographical Information for the Countryside (MAGIC) (Great Britain)¹¹³
National Biodiversity Data Centre (Ireland)¹¹⁴
National Biodiversity Network (NBN) (UK)¹¹⁵
National Museums Northern Ireland Habitats¹¹⁶
National Parks and Wildlife Service (Ireland)¹¹⁷
National Planning Policy and Planning Guidance¹¹⁸
National Spatial Strategy 2002-2020 (Ireland)¹¹⁹
Natural Areas (England)¹²⁰
Natural Heritage Futures (Scotland)¹²¹
Northern Ireland Environment Agency¹²²
Northern Ireland Landscape Character Areas¹²³
Ordnance Survey Ireland map viewer (Ireland)¹²⁴
RSPB Futurescapes (UK)¹²⁵
Sitelink (Scotland)¹²⁶

GLOSSARY

Appropriate Assessment	Appropriate Assessment In the UK - an assessment required by the Habitats Directive and Regulations where a project (or plan) would be likely to have a significant effect on a European site, either alone or in combination with other plans or projects (part of the Habitats Regulations Assessment process) . In Ireland the term Appropriate Assessment is more widely used for the full process known as Habitat Regulations Assessment in the UK.
Assemblage	A group of species found in the same location.
Avoidance	Prevention of impacts occurring, having regard to predictions about potentially negative environmental effects (e.g. project decisions about site location or design).
Baseline conditions	The conditions that would pertain in the absence of the proposed project at the time that the project would be constructed / operated / decommissioned. The definition of these baseline conditions should be informed by changes arising from other causes (e.g. other consented developments).
Biodiversity	The biological diversity of the earth's living resources. The total variability among organisms and ecosystems. In common usage, and within these Guidelines, biodiversity is used to describe the conservation of the natural environment, rather than describing the variation within it.
Biodiversity offsets	Measurable conservation outcomes resulting from actions designed to compensate for unavoidable significant negative effects on biodiversity. The goal of biodiversity offsets is to achieve no net loss, or preferably a net gain, of biodiversity.
Biophysical change	Alteration in biological and/or physical conditions of the environment (e.g. changes in the atmospheric concentration of carbon dioxide, altered soil pH or change in the frequency of a plant species in an area).
Carrying capacity	The maximum number of organisms or amount of biomass that can be supported in a given area or by an ecosystem.
Compensation	Measures taken to make up for the loss of, or permanent damage to, ecological features despite mitigation. Any replacement area should be similar in terms of biological features and ecological functions that have been lost or damaged, or with appropriate management have the ability to reproduce the ecological functions and conditions of those biological features.
Competent authority	An organisation or individual who is responsible for determining an application for consent for a project. In the context of the UK Habitats Regulations, 'competent authority' has a wider meaning, which includes any Minister, government department, public or statutory undertaker, public body of any description or person holding a public office. Competent authorities in relation to Appropriate Assessment in Ireland are set out in SI 477 of 2011.
Connectivity	A measure of the functional availability of the habitats needed for a particular species to move through a given area. Examples include the flight lines used by bats to travel between roosts and foraging areas or the corridors of appropriate habitat needed by some slow colonising species if they are to spread.
Conservation objective	Objective for the conservation of biodiversity (e.g. specific objective within a management plan or broad objectives of policy).
Conservation status	The state of a species or habitat including for example, extent, abundance, distribution and their trends.
Cumulative impact / effect	Additional changes caused by a proposed development in conjunction with other developments or the combined effect of a set of developments taken together.
Distribution	The geographical presence of a feature. This can depend on factors such as climate and altitude.
Ecological feature	Habitats, species or ecosystems.
Ecological network	An interconnected system of ecological corridors.

Ecosystem	A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.
Ecosystem services	Ecosystem services are the benefits that people derive from the natural environment. The natural environment can be considered as a stock of 'natural capital' from which many benefits flow – social, health-related, cultural or economic.
Effect	Outcome to an ecological feature from an impact. For example, the effects on a dormouse population from loss of a hedgerow. See also 'Impact'.
Enhancement	Improved management of ecological features or provision of new ecological features, resulting in a net benefit to biodiversity, which is unrelated to a negative impact or is 'over and above' that required to mitigate/compensate for an impact.
Environmental Impact Assessment (EIA)	Assessment of projects carried out under the EIA Directive and Regulations.
Environmental (Impact) Statement	A document describing the effects of a project on the environment prepared during EIA. Referred to as 'Environmental Statement' in the UK and 'Environmental Impact Statement' in Ireland.
Favourable condition	Satisfactory condition of an ecological feature. In some cases favourable condition is specifically defined (e.g. for some designated sites).
Fragility	The degree of sensitivity of habitats, communities and species to environmental change.
Fragmentation	The breaking up of a habitat, ecosystem or land-use type into smaller parcels with a consequent impairment of ecological function.
Geographic scale	The geographic context for evaluation.
Habitat	The place or type of site where an organism or population naturally occurs. Often used in the wider sense referring to major assemblages of plants and animals found together.
Habitat Bank	A biodiversity compensation mechanism that is based on the concept of biodiversity offsets.
Habitats Regulations Assessment	An assessment of projects (or plans) potentially affecting European sites in the UK, required under the Habitats Directive and Regulations.
Impact	Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow. See also 'Effect'.
Important ecological features	Ecological features requiring specific assessment within EclA. Ecological features can be important for a variety of reasons (e.g. quality and extent of designated sites or habitats, habitat / species rarity).
Local sites	'Non-statutory' sites of nature conservation value that have been identified 'locally' (i.e. excluding SSSIs, ASSIs, NHAs, SPAs, SACs, and Ramsar sites). Local Nature Reserves are included as they are a designation made by the Local Authority rather than statutory country conservation agencies. These are often called Wildlife Sites, Local Nature Conservation Sites, Sites of Importance for Nature Conservation or other, similar names.
Mitigation	Measures taken to avoid or reduce negative impacts. Measures may include: locating the development and its working areas and access routes away from areas of high ecological interest, fencing off sensitive areas during the construction period, or timing works to avoid sensitive periods. An example of a reduction measure is a reed bed silt trap that is designed to minimise the amount of polluted water running directly into an ecologically important watercourse. See also compensation (which is separate from mitigation).
Natura Impact Statement / Natura Impact Report	Under the [Irish] European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011), an EclA report including the scientific assessment of a plan (NIR) or project (NIS) in relation to relevant Natura 2000 sites and other information required to enable a competent authority to carry out a Stage 1 Appropriate Assessment.
Net ecological gain	The point at which the quality and quantity of habitats or species improves compared to their original condition i.e. improvements over and above those required for mitigation/compensation.

Population	A collection of individuals (plants or animals), all of the same species and in a defined geographical area.
Precautionary Principle	The principle that the absence of complete information should not preclude precautionary action to mitigate the risk of significant harm to the environment.
Project	In these guidelines 'project' is used to refer to all types of proposals to which EclA might be applied (e.g. development proposal/scheme or other land use change).
Rarity	A measure of relative abundance.
Replacement	The creation of a habitat that is an acceptable substitute for the habitat which has been lost.
Restoration	The re-establishment of a damaged or degraded system or habitat to a close approximation of its pre-degraded condition.
Scoping	The determination of the extent of an assessment (for an EclA or full EIA).
Screening	Determination of whether or not an EIA is necessary.
Screening Report	Report containing information to inform Stage 1 of the Appropriate Assessment process (Ireland)
Significant effect	An effect that either supports or undermines biodiversity conservation objectives for 'important ecological features'
Synergistic effect	Occurs when the sum of two effects together is greater than the sum of the effects separately.
Zone(s) of Influence	The area(s) over which ecological features may be affected by the biophysical changes caused by the proposed project and associated activities.

LIST OF ABBREVIATIONS

AA	Appropriate Assessment
CEDaR	Centre for Environmental Data and Recording
CIEEM	Chartered Institute of Ecology and Environmental Management
CWS	County Wildlife Site
EclA	Ecological Impact Assessment
ECOP	Ecological Constraints and Opportunities Plan
EDS	Ecological Design Strategy
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPS	European Protected Species
HRA	Habitat Regulations Assessment
IEEM	Institute of Ecology and Environmental Management
JNCC	Joint Nature Conservation Committee
LRC	Local Records Centre
MCMA	Mitigation, Compensation and Monitoring Agreement
NGO	Non-Governmental Organisation
NHA	Natural Heritage Area
NIR	Natura Impact Report
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
PEA	Preliminary Ecological Appraisal
RDB	Red Data Book
RIES	Reports on the Implications for European Sites
SA	Sustainability Appraisal
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SNCO	Statutory Nature Conservation Organisation
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SA	Sustainability Appraisal
TEEB	The Economics of Ecosystems and Biodiversity
UKNEA	United Kingdom National Ecosystem Assessment
WFD	Water Framework Directive
WFDA	Water Framework Directive Assessment

ENDNOTES

- ¹Guidelines for Ecological Impact Assessment in Britain and Ireland: Marine and Coastal (2010) <http://www.cieem.net/ecia-guidelines-marine->
- ²Biodiversity: Code of practice for planning and development (2013) BS 42020:2013 <http://shop.bsigroup.com/en/ProductDetail/?pid=00000000030258704>
- ³Adapted from the definition of Ecological Impact Assessment originally published in Treweek, J (1999) Ecological Impact Assessment, Blackwell
- ⁴The terms ‘impact’ and ‘effect’ are explained in the Introduction and Glossary
- ⁵Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (2011) <http://ec.europa.eu/environment/nature/biodiversity/comm2006/2020.htm>
- ⁶The biodiversity strategies and updates for England, Scotland, Wales and Northern Ireland are available from the Joint Nature Conservation Committee (JNCC) website <http://jncc.defra.gov.uk/default.aspx?page=5701>
The biodiversity strategy for Ireland – Actions for Biodiversity 2011-2016 (2011) <http://www.npws.ie/legislationandconventions/nationalbiodiversityplan/>
- ⁷UK National Ecosystem Assessment and ‘Follow-on Phase’ <http://uknea.unep-wcmc.org/>
- ⁸The Economic and Social Aspects of Biodiversity (2008) http://www.npws.ie/publications/archive/Bullock_et_al_2008_Economic_&_Social_Benefits_of_Biodiversity.pdf
- ⁹The natural choice: securing the value of nature (2011) <https://www.gov.uk/government/publications/the-natural-choice-securing-the-value-of-nature>
- ¹⁰Towards the Sustainable Management of Wales’ Natural Resources (2013) <http://wales.gov.uk/docs/desh/consultation/131029environment-bill-white-paper-consultation-en.pdf>
- ¹¹Land Use Strategy for Scotland (2011) <http://www.scotland.gov.uk/Topics/Environment/Countryside/Landusestrategy>
- ¹²Actions for Biodiversity – Ireland’s National Biodiversity Plan 2011-2016 (2011) <http://www.ahg.gov.ie/en/Publications/HeritagePublications/NatureConservationPublications/Actions%20for%20Biodiversity%202011%20-%202016.pdf>. See also A Draft National Landscape Strategy for Ireland 2014-2024 (2014) <http://www.ahg.gov.ie/en/Publications/HeritagePublications/ArchitecturalPolicyPublications/NLSJuly2014v2.pdf>
- ¹³The EIA Directive, amendments, codified version and 2014 review are available from <http://ec.europa.eu/environment/eia/eia-legalcontext.htm>
- ¹⁴England – The Town and Country Planning (EIA) Regulations 2011 <http://www.legislation.gov.uk/uksi/2011/1824/made>
Wales – The Town and Country Planning (EIA) (England and Wales) Regulations 1999 <http://www.legislation.gov.uk/uksi/1999/293/made>
Scotland – The Town and Country Planning (EIA) (Scotland) Regulations 2011 <http://www.legislation.gov.uk/ssi/2011/139/made>
Northern Ireland – The Planning (EIA) Regulations (Northern Ireland) 2012 <http://www.legislation.gov.uk/nisr/2012/59/made>
- ¹⁵Republic of Ireland – S181 of the Planning and Development Act 2000 <http://www.irishstatutebook.ie/2000/en/act/pub/0030/sec0181.html#sec181>
and Statutory Instrument No. 403/2013 European Union (EIA and Habitats) <http://www.irishstatutebook.ie/2013/en/si/0403.html>
- ¹⁶Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
- ¹⁷The Conservation of Habitats and Species Regulations for England, Scotland, Wales and Northern Ireland are available

from the Joint Nature Conservation Committee (JNCC) website

<http://jncc.defra.gov.uk/page-1379>

Republic of Ireland – S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011 <http://www.irishstatutebook.ie/2011/en/si/0477.html> and <http://www.npws.ie/legislationandconventions/irishlaw/euregulations/>

¹⁸EU Water Framework Directive http://ec.europa.eu/environment/water/water-framework/index_en.html

¹⁹Guidance on implementing the Habitats Regulations http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision_of_art6_en.pdf

with the guidance on Article 6(4) updated 2012 at http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/new_guidance_art6_4_en.pdf but note that this document is currently subject to review

²⁰The Habitats Regulations Assessment Handbook (2014) <http://www.dtapublications.co.uk/handbooks>

²¹Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities (2009 Rev2 2010) <http://www.npws.ie/media/npws/publications/codesofpractice/AA%20Guidance%2010-12-09.pdf>

²²Refer to: <http://jncc.defra.gov.uk/page-1375>

²³Refer to: <http://www.wfdireland.ie/>

²⁴Local Record Centres in Britain can be found through the Association of Local Record Centres (ALERC) <http://www.alerc.org.uk/>

²⁵The Centre for Environmental Data and Recording (CEDaR) in Northern Ireland <http://www.nmni.com/cedar>

²⁶National Biodiversity Data Centre in Ireland <http://www.biodiversityireland.ie/>

²⁷Adapted from Royal Town Planning Institute (RTPI) (2000) Planning for Biodiversity (out of print)

²⁸Guidelines for Ecological Report Writing (2015)

<http://www.cieem.net/guidelines-for-ecological-report-writing>

²⁹The EIA Directive, amendments, codified version and 2014 review are available from <http://ec.europa.eu/environment/eia/eia-legalcontext.htm>

³⁰Guidelines for Preliminary Ecological Appraisal (2012)

<http://www.cieem.net/guidance-on-preliminary-ecological-appraisal-gpea->

³¹Oxford, M (2001) Developing Naturally. A handbook for incorporating the natural environment into planning and development. Association of Local Government Ecologists (out of print)

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³⁴Refer to: <https://www.gov.uk/construction-near-protected-areas-and-wildlife>

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³⁷UK – JNCC: Phase 1 Habitat Survey jncc.defra.gov.uk/page-4258

Ireland – Heritage Council Best Practice Guidance for Habitat Survey and Mapping (2009) <http://www.heritagecouncil.ie/wildlife/publications/>

- ³⁸CIEEM Professional Guidance Series: Access to Land (2011) (Available to CIEEM members) <http://www.cieem.net/publications/19/access-to-land>
- ³⁹Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (2011) <http://ec.europa.eu/environment/nature/biodiversity/comm2006/2020.htm>
- ⁴⁰Listed under S41 of the Natural Environment and Rural Communities Act 2006 <http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx>
- ⁴¹Listed under S42 of the Natural Environment and Rural Communities Act 2006 <http://www.biodiversitywales.org.uk/49/en-GB/Section-42-Lists>
- ⁴²Listed under S2(4) of The Nature Conservation (Scotland) Act 2004 <http://www.biodiversityscotland.gov.uk/advice-and-resources/scottish-biodiversity-list/how/>
- ⁴³Refer to: <http://www.doeni.gov.uk/niea/biodiversity/habitats-2.htm>
- ⁴⁴Refer to: http://www.doeni.gov.uk/niea/biodiversity/sap_uk.htm
- ⁴⁵Refer to: http://www.npws.ie/media/npwsie/content/files/publications/Listed_species_checklist_Dec12.pdf
- ⁴⁶Refer to: <http://jncc.defra.gov.uk/page-5718>
- ⁴⁷Refer to: <http://jncc.defra.gov.uk/page-5717>
- ⁴⁸England – many Local Biodiversity Action Plans are now overseen by Local Nature Partnerships <https://www.gov.uk/government/policies/protecting-biodiversity-and-ecosystems-at-home-and-abroad/supporting-pages/local-nature-partnerships>
Wales <http://www.biodiversitywales.org.uk/53/en-GB/Local-Biodiversity-Contacts>
Scotland <http://www.biodiversityscotland.gov.uk/area/lbaps/>
Northern Ireland <http://www.biodiversityni.com.gridhosted.co.uk/>
Ireland – Local Authority Biodiversity Action Plans may be found on the LA websites and others on the Heritage Council's website, for example <http://www.corkcoco.ie/co/pdf/734358998.pdf> and http://www.heritagecouncil.ie/fileadmin/user_upload/Publications/County_Heritage_Services/Wicklow/County_Wicklow_Biodiversity_Action_Plan.pdf
- ⁴⁹Species of conservation concern UK <http://jncc.defra.gov.uk/page-5335>
- ⁵⁰Irish Red Lists <http://www.npws.ie/publications/redlists/>
- ⁵¹Birds of Conservation Concern UK http://www.rspb.org.uk/wildlife/birdguide/status_explained.aspx
- ⁵²Birds of Conservation Concern Ireland <http://www.birdwatchireland.ie/OurWork/SpeciesHabitatConservationinIreland/BirdsofConservationConcern/tabid/178/Default.aspx>
- ⁵³Nationally rare and nationally scarce species UK <http://jncc.defra.gov.uk/page-3425>
- ⁵⁴Nationally rare and nationally scarce species Ireland http://www.npws.ie/media/npwsie/content/files/publications/Listed_species_checklist_Dec12.pdf
- ⁵⁵Legally protected species UK <http://jncc.defra.gov.uk/page-3415>
- ⁵⁶Legally protected species Ireland <http://www.npws.ie/legislationandconventions/irishlaw/>
- ⁵⁷See Article 10 of the Habitats Directive <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:HTML>
- ⁵⁸JNCC protected areas designations directory for the UK <http://jncc.defra.gov.uk/page-1527>
- ⁵⁹NPWS protected sites in Ireland <http://www.npws.ie/protectedsites/>

- ⁶⁰Scottish Natural Heritage Sitelink <http://gateway.snh.gov.uk/sitelink/>
- ⁶¹NIEA protected sites webpages for Northern Ireland http://www.doeni.gov.uk/niea/protected_areas_home
- ⁶²England <http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspecies-importance.aspx>
Wales <http://www.biodiversitywales.org.uk/49/en-GB/Section-42-Lists>
- ⁶³Scotland <http://www.biodiversityscotland.gov.uk/advice-and-resources/scottish-biodiversity-list/>
- ⁶⁴Northern Ireland <http://www.doeni.gov.uk/niea/biodiversity/habitats-2.htm>
- ⁶⁵Ireland: Wildlife Acts 1976 to 2012 <http://www.npws.ie/legislation> and Actions for Biodiversity – Ireland’s National Biodiversity Plan 2011-2016 (2011) <http://www.ahg.gov.ie/en/Publications/HeritagePublications/NatureConservation-Publications/Actions%20for%20Biodiversity%202011%20-%202016.pdf>.
- ⁶⁶Local biodiversity strategies – refer to individual websites e.g. local authorities, local BAP partnerships, local nature partnerships
- ⁶⁷Northern Ireland protected species http://www.doeni.gov.uk/niea/northern_ireland_priority_species_list.pdf
- ⁶⁸Wildlife Acts 1976 to 2012 <http://www.npws.ie/legislation>
- ⁶⁹Red lists <http://www.npws.ie/publications/red-lists>
- ⁷⁰BoCCI List (for Ireland and NI):
<http://www.birdwatchireland.ie/LinkClick.aspx?fileticket=EjODk32LNcU%3D&tabid=178>
- ⁷¹Habitats Directive available at <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:HTML>
- ⁷²The Wildlife and Natural Environment Act (2011) amended the Wildlife (Northern Ireland) Order 1985 <http://www.legislation.gov.uk/ni/2011/15/contents>
- ⁷³Legislation for UK protected species <http://jncc.defra.gov.uk/page-3415>
- ⁷⁴Legislation for Irish protected species <http://www.npws.ie/legislationandconventions/irishlaw/>
- ⁷⁵Designations associated with international listings <http://jncc.defra.gov.uk/page-3424>
- ⁷⁶Guidance on invasive plants is available at <https://www.gov.uk/japanese-knotweed-giant-hogweed-and-other-invasive-plants>.
- ⁷⁷Guidance for Ireland and Northern Ireland at <http://invasivespeciesireland.com/>
- ⁷⁸Refer to: <http://www.naturalengland.org.uk/ourwork/regulation/wildlife/enforcement/injuriousweeds.aspx>
- ⁷⁹See <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1417443504720&uri=CELEX:32014R1143>
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- ⁸⁴*2020 Challenge for Scotland’s Biodiversity (2013)* <http://www.scotland.gov.uk/Publications/2013/06/5538>

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- ⁸⁸See <http://curia.europa.eu/juris/document/document.jsf?jsessionId=9ea7d0f130de92a650d40b0a4d9ba731825c203c5de0.e34KaxiLc3eQc40LaxqMbN4ObxiNe0?text=&docid=136145&pageIndex=0&doclang=en&mode=lst&dir=&occ=first&part=1&cid=420683>
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- ⁹⁰Biodiversity Offsetting <https://www.gov.uk/biodiversity-offsetting>
- ⁹¹See for example the Business and Biodiversity Offsets Program (BBOP) bbop.forest-trends.org/
- ⁹²Town and Country Planning Act 1990 <http://www.legislation.gov.uk/ukpga/1990/8/contents>
- ⁹³Evidence-based conservation www.cebc.bangor.ac.uk/ebconservation.php?menu=6&catid=6365&subid=0
- ⁹⁴Biodiversity: Code of practice for planning and development (2013) BS 42020:2013 <http://shop.bsigroup.com/en/ProductDetail/?pid=000000000030258704>
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- ⁹⁸UK Woodland Habitats including Ancient Woodland Inventory <http://jncc.defra.gov.uk/page-1437>
- ⁹⁹Biodiversity Planning Toolkit www.biodiversityplanningtoolkit.com/
- ¹⁰⁰UK country biodiversity strategies – refer to: <http://jncc.defra.gov.uk/page-5701>
Irish Biodiversity strategy <http://www.npws.ie/legislationandconventions/nationalbiodiversityplan/>
UK Biodiversity Action Plan – refer to: <http://jncc.defra.gov.uk/ukbap>
- ¹⁰¹Local biodiversity strategies – refer to individual websites e.g. local authorities, local BAP partnerships, local nature partnerships
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- ¹¹⁰LANDMAP Information system for Wales <http://www.ccw.gov.uk/landmap>
- ¹¹¹The Wildlife Trust's Living Landscape programme <http://www.wildlifetrusts.org/living-landscape>
- ¹¹²Local Records Centres Wales www.lrcwales.org.uk
- ¹¹³Multi-Agency Geographical Information for the Countryside (MAGIC) <http://www.natureonthemap.naturalengland.org.uk/>
- ¹¹⁴National Biodiversity Data Centre (Ireland) www.biodiversityireland.ie/
- ¹¹⁵National Biodiversity Network www.nbn.org.uk
- ¹¹⁶National Museums Northern Ireland: Habitats <http://www.habitas.org.uk>
- ¹¹⁷National Parks and Wildlife Service <http://www.npws.ie/> – includes protected sites information, habitats and species datasets (including national survey of native woodlands), licensing, links to legislation and map-viewer <http://www.npws.ie/mapsanddata/>
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- ¹²⁰Natural Areas (England) www.naturalengland.org.uk/ourwork/conservation/biodiversity/englands/naturalareas.aspx
- ¹²¹Natural Heritage Futures (Scotland) <http://www.snh.gov.uk/about-snh/what-we-do/nhf/>
- ¹²²Key source for Northern Ireland <http://www.doeni.gov.uk/niea/>
- ¹²³Landscape Character Areas www.doeni.gov.uk/niea/natural/country/country_landscape.shtml
- ¹²⁴Ordnance Survey Ireland - Online Map Viewer maps.osi.ie/publicviewer/
- ¹²⁵RSPB Futurescapes <http://www.rspb.org.uk/whatwedo/futurescapes/>
- ¹²⁶Scottish Natural Heritage's Sitelink <http://gateway.snh.gov.uk/sitelink/index.jsp>