



GUIDELINES FOR ECOLOGICAL IMPACT ASSESSMENT IN THE UNITED KINGDOM

Endorsed by:



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SUMMARY

These Guidelines have been developed by the Institute of Ecology and Environmental Management (IEEM) 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.

'Ecological Impact Assessment is the process of identifying, quantifying and evaluating the potential impacts of defined actions on ecosystems or their components. If properly implemented it provides a scientifically defensible approach to ecosystem management^a' (Treweek, 1999)¹.

EclA may be carried out as part of a formal environmental impact assessment (EIA) or to support other forms of environmental assessment or appraisal. EclA should include the following stages:

- **scoping**, involving consultation to ensure the widest possible input to the definition of the scope of an EclA (in practice, scoping is iterative throughout the EclA process);
- identification of the likely **zone of influence** arising from the whole lifespan of the project;
- identification and evaluation of **ecological resources and features** likely to be affected;
- identification of the **biophysical changes** likely to affect **valued ecological resources and features**;
- assessment of whether these biophysical changes are likely to give rise to a significant ecological impact, defined as an impact on the **integrity of a defined site or ecosystem** and/or the **conservation status of habitats or species within a given geographical area**, including cumulative impacts;
- refinement of the project to incorporate **ecological enhancement** measures, **mitigation measures** to avoid or reduce negative impacts, and **compensation measures** for any residual significant negative impacts;
- **assessment of the ecological impacts** of the refined project and definition of the significance of these impacts;
- provision of advice on the **consequences for decision making** of the significant ecological impacts, based on the value of the affected resource or feature; and
- provision for **monitoring** and following up the implementation and success of mitigation measures and **ecological outcomes**, including feedback in relation to predicted outcomes.

The EclA process should be iterative and be able to respond to increasing knowledge of a project and its impacts as the project evolves. It is also a 'partnership' process, which is most effective if all relevant ecologists and other specialists work in collaboration. The product of an EclA should provide the means of gaining understanding of the findings and support for its proposals from non-specialists by making clear the impacts of any proposal.

^a The word 'management' in this context is used to reflect the fact that EclA has potential applications in all areas of natural resource management and planning.

1. INTRODUCTION

Background

- 1.1 The variety of life forms, the ecological roles they perform and the genetic diversity they contain (Wilcox, 1984²) - biodiversity - provides the support systems that sustain human existence; it affects the quality of our lives and our standard of living. As the leading professional Institute in the UK for ecologist and environmental managers, IEEM seeks to advance the science and practice of ecology and environmental management for the public benefit in the United Kingdom and internationally, and to further environmentally sustainable management and development. IEEM therefore wishes to improve outcomes for biodiversity by promoting a more scientifically rigorous and transparent approach to Ecological Impact Assessment (hereafter referred to as EclA). EclA is *'the process of identifying, quantifying and evaluating the potential impacts of defined actions on ecosystems or their components. If properly implemented, it provides a scientifically defensible approach to ecosystem management'* (Trewick, 1999)¹. A common framework for EclA will help promote better communication and closer cooperation between all ecologists involved in the process.
- 1.2 EclA is a key component of Environmental Impact Assessments (EIAs) 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 environment³, as amended by Council Directive 97/11/EC⁴. The statutory instruments that implement these Directives in the UK together with associated guidance are listed in Appendix 8 of *Environmental Impact Assessment: guide to procedures*⁵ and can be sourced via the HMSO's web site⁶ and/or web sites of the UK Government and the devolved governments of Northern Ireland, Scotland and Wales. The statutory instruments are particular to each country and to different types of development. Collectively, they are referred to throughout this document as the EIA Regulations. Where an EclA is undertaken as part of an EIA, it is subject to the relevant EIA Regulations.
- 1.3 EclAs can also be undertaken in a wide range of other situations, for example to provide ecological information for applications for changes to agricultural land and forestry, for an application for a consent for which EIA is not required, to guide a development brief or to inform a management plan. This document is intended to provide guidance for these circumstances. However, the assessment method and scope should be fit for the purpose.
- 1.4 These Guidelines have been developed with the involvement of a wide range of interested parties to establish and set out widely accepted good practice for each stage in the EclA process.
- 1.5 They are based on an understanding of the legal requirements of the relevant legislation at the time of publication. However, they are not legally binding and other approaches may be valid and appropriate in some situations. For clarification of the legal requirements, users of these Guidelines should refer to the relevant legislation and case law, and if appropriate seek legal advice.
- 1.6 Changes in legislation and policies generating a requirement for EclA, as well as developments in the science, which underpin the assessment process, may necessitate periodic review and revision of these Guidelines.

Purpose and Context of the Guidelines

- 1.7 The purpose of EclA is to provide decision-makers with clear and concise information about the likely significant ecological effects associated with a project. Good outcomes for biodiversity depend on input from ecologists at all stages in the decision-making and planning process, from the early design of a project through to its implementation.
- 1.8 These Guidelines provide practical advice for ecologists involved in EclA for any type of project in the terrestrial, freshwater and coastal environments to the mean low water mark in the UK. They are intended for everyone involved in the process, whether they are acting as ecologists for:

- the proponent e.g. the developer (required to provide necessary information);
- a competent authority (charged with making the final decision);
- consultees (who may advise the competent authority in a statutory or voluntary capacity);
or
- any other party (e.g. a local campaign group or other members of the public).

1.9 Where possible, issues of particular relevance to both different roles and constituent countries of the UK have been identified.

1.10 Whilst these Guidelines look to promote a scientifically rigorous approach, it is important to recognise that EclA relies on ecologists using their professional judgement. Judgements should be made on the basis of an objective assessment of the best information available. Good communication between ecologists and other professionals involved in the assessment process, together with proponents and relevant specialists will reduce the risk associated with making such judgements. Where limitations are identified, these should be clearly stated and their implications considered. Limitations may include:

- data;
- time;
- season;
- scientific understanding of ecological processes;
- experience of the assessor;
- information about the project;
- experimental mitigation strategies;
- commitment to delivery of mitigation strategies; and
- enforcement of mitigation strategies.

1.11 Where there is reasonable doubt, a precautionary approach should be taken.

Terminology

1.12 Consistent use of terminology is important to avoid ambiguity in EclA. A glossary of terms has been included to indicate how terminology has been used for the purposes of these Guidelines.

Relationship with other Guidance

1.13 These Guidelines have been developed to expand upon existing guidance summarised in Box 1. In those circumstances when ecologists are required to fit an assessment into a proscribed format, it is recommended that an explanation is given to relate it to the approach recommended here. An example of how this could be done using Transport Analysis Guidance (Department of Transport) is available separately (see web link in Box 1).

The Aims of the Ecological Assessment Process

1.14 Those involved in EclA should seek to obtain the best possible biodiversity outcomes from land use changes. It is important that all interested parties can understand the process by which the assessment has been made, and how and by whom any actions needed to deliver biodiversity objectives will be implemented and monitored. Therefore, the EclA must provide reliable information about, and interpretation of, the ecological implications of any project, from its inception to its operation and, where appropriate, its decommissioning.

1.15 It is the role of all ecologists involved in EclA to:

- provide an objective and transparent assessment of the ecological effects of the project to all interested parties, including the general public;
- facilitate objective and transparent determination of the consequences of the project in terms of national, regional and local policies relevant to nature conservation and biodiversity; and

- set out what steps will be taken to adhere to legal requirements relating to designated sites and legally protected or controlled species.

Box 1: Selected existing guidance relevant to EclA

- Office of the Deputy Prime Minister *Environmental Impact Assessment: guide to procedures*⁵
<http://www.odpm.gov.uk/index.asp?id=1143250>
- *Note on Environmental Impact Assessment Directive for Local Planning Authorities*
<http://www.odpm.gov.uk/index.asp?id=1143273>⁷
- Institute of Environmental Management and Assessment (2004) *Guidelines for Environmental Impact Assessment*. IEMA, Lincoln⁸
- Department for Transport (2004) *Transport Analysis Guidance (TAG)* www.webtag.org.uk
- Scottish Transport Appraisal Guidance (STAG)
<http://www.scotland.gov.uk/Topics/Transport/integrated-transport/stag>
- Welsh Transport Analysis Guidance (WelTAG) (in draft)
- Environment Agency (May 2002) *Environmental Impact Assessment (EIA): A handbook for scoping projects*⁹
- Scottish Natural Heritage (January 2002) *A Handbook on Environmental Impact Assessment*¹⁰
- Oxford, M, Association of Local Government Ecologists (2001) *Developing Naturally. A handbook for incorporating the natural environment into planning and development*¹¹
- Byron, H. (2000) *Biodiversity Impact – biodiversity and environmental impact assessment: a good practice guide for road schemes*¹² and
- RSPB *et al* (2000) summary leaflet *Biodiversity Impact – biodiversity and environmental impact assessment: a new approach*¹³
- Planning Advice Note 58 (October 1999) - *Environmental Impact Assessment*¹⁴
- The Environmental Impact Assessment (Scotland) Regulations 1999 Circular 15/1999¹⁵
- Institute of Environmental Assessment (1995) *Guidelines for Baseline Ecological Assessment*¹⁶
- DoT, Scottish Office, Welsh Office & DoE Northern Ireland (1993) *Design Manual for Roads & Bridges Volume 11 Environmental Assessment (Section 3, Part 4)*¹⁷

1.16 IEEM endorses the following principles, recommended by the Royal Town Planning Institute¹⁸, for optimising the biodiversity outcomes of planning decisions:

- Information: Obtain sufficient information on the environmental resources and natural processes to assess the impacts of the project.
- Avoidance: Consider options that avoid harm to environmental resources or natural processes.
- Reduction: Where adverse effects are unavoidable then these should be mitigated either through the design of the project or through measures that can be subsequently guaranteed – for example, through a condition or planning obligation.
- Compensation: Where, despite the mitigation proposed, there are significant residual adverse environmental effects these must be offset by appropriate compensatory measures nearby/elsewhere.
- New Benefits: Seek to provide net benefits for biodiversity over and above requirements for mitigation or compensation.

1.17 These principles are applicable to projects requiring consent not only under the Town and Country Planning Act but also other legislation.

Contents of the Guidance

- 1.18 This guidance is structured around the main stages in the EIA process (see Box 2) as these are relevant to most ECIAs, whether or not they are undertaken as part of an EIA. Although described in this staged way, it is important to recognise that EClA is an iterative process, with early stages (notably project design and scoping) having to be revisited as the assessment proceeds.
- 1.19 Chapter 2 addresses the task of '**scoping**' an EClA. For projects that may require an EIA, this chapter also outlines ecological considerations that relate to the task of determining whether or not an EIA is required ('**screening**').
- 1.20 It may not be appropriate or necessary to study all possible ecological impacts to the same level of detail. Effort must be focused on those features or resources that are sufficiently important to merit more detailed consideration. A clear rationale should be given for deciding which features and resources should be subject to more detailed consideration (a key purpose of scoping), to enable all those involved in the assessment to understand the reasoning behind the scope of investigations. Policy considerations will influence the criteria that will be appropriate for determining the threshold in any particular case.
- 1.21 Ecological '**valuation**', the assigning of values to ecological features and resources, including those that have been designated for their nature conservation interest. This is described in Chapter 3.
- 1.22 The concept of '**significance**' lies at the heart of EClA and subsequent decision-making. This subject is discussed further in Chapter 4. An EClA must include a description of the ecologically significant impacts of a project and of how likely they are to occur. This, together with the value of the affected resource or feature, should then be given due consideration; firstly when identifying the need for mitigation and secondly, in determining whether to give consent to a particular project and what conditions or legal obligations should be attached to this consent in order to safeguard ecological interests.
- 1.23 There are differences in the various criteria currently used for **determining whether ecological impacts are significant** and decisions are often subjective. This guidance suggests a systematic and consistent approach to determining whether an ecological impact is significant that should help to reduce the need for subjective judgement. In this guidance a significant impact, in ecological terms (whether negative or positive), is defined as an impact on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area.
- 1.24 Chapter 5 provides advice on '**mitigation**', '**compensation**' and '**enhancement**'. It is important to ensure that any significant residual impacts are clearly identified after taking mitigation into account; in such cases compensation may be necessary.
- 1.25 Chapter 6 sets out the consequences of a significant impact, in terms of the legal and policy framework within which a decision should be taken by a competent authority.

Box 2: EclA Process

Initial project design

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

- obtain information on the project, any alternatives that have been studied and existing ecological information;
- review ecological implications of alternatives;
- discuss key ecological considerations about the project design (and alternatives) with the proponent and the design team (e.g. engineers, architects); and
- seek opportunities for ecological enhancements as early as possible, as well as opportunities to modify the design to avoid or reduce negative ecological impacts.

Screening (EIA only)

The proponent may seek a formal screening opinion from the competent authority concerning the need for EIA under the EIA Regulations.

- For Schedule 1 projects, EIA is mandatory.
- For Schedule 2 projects the need for EIA is determined based on the significance of anticipated environmental effects as influenced by, *inter alia*, the nature, size and location of the project. Ecologists working for the competent authority will need to determine whether significant ecological impacts are likely. The decision will be based on the criteria set out in the relevant EIA Regulations for establishing whether or not EIA is required and should take into account the guidance provided in Chapters 3, 4 and 5.

Scoping

It is recommended that all ecologists should ensure that scoping:

- involves contact with other members of the EclA team (*i.e.* including the proponent's, competent authority's and other relevant ecologists);
- involves appropriate consultation with regulatory bodies regarding the proposed scope of the assessment;
- identifies non-statutory consultees;
- identifies any potential licensing requirements for survey and/or development regarding legally protected species;
- identifies all proposed activities that may generate significant ecological impacts;
- identifies potentially important ecological features or resources that could suffer significant impacts and therefore require detailed assessment;
- proposes suitable spatial and temporal scopes for the assessment and identifies the main ecological issues to be addressed;
- undertakes preliminary assessment of potential ecological impacts on identified features or resources, incorporating existing data/information;
- reconsiders spatial and temporal scope and amends the extent of preliminary investigations if necessary;
- recommends suitable survey/research methodologies that have been agreed with consultees;
- results in a scoping report/summary that can be circulated for comment and modified accordingly; and
- confirms potential opportunities for ecological enhancement or avoidance of impacts.

In relation to EIA, the proponent may seek a formal scoping opinion from the competent authority. In all other cases it is advisable to seek the competent authority's and key consultees' views on the proposed scope of the EclA (to agree the likely significant effects to be investigated and the assessment methods to be used).

Impact assessment

Ideally, the EclA team (*i.e.* including the proponent's, competent authority's and other relevant ecologists) will be involved in the following assessment process, which should cover construction, operation and any decommissioning stages of any project:

- determine the value of ecological features and resources affected, through survey and/or research;
- assess impacts affecting those important features and resources, which meet or exceed a defined threshold value, with reference to ecological processes and functions as appropriate;
- quantify the extent, magnitude, duration, timing and frequency of the impacts;
- assess impact reversibility;
- explain the level of confidence in these predictions; and
- identify likely significant 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 should be undertaken as required.

Evolution of project design and mitigation

- Identify measures to avoid or reduce negative impacts;
- identify opportunities for enhancement;
- demonstrate likely success of mitigation measures; and
- provide sufficient information for mitigation measures to be implemented effectively, e.g. through an Environmental Action Plan (EAP^b).

Identify significant residual impacts and their legal, policy and development control consequences

- Produce a clear summary of the significant residual impacts of the project incorporating mitigation and enhancement measures;
- where significant impacts cannot be avoided/reduced, identify compensation measures to be implemented;
- consider the consequences of significant residual impacts in the light of planning policies and legislation; and
- include mitigation, compensatory actions and enhancements in the EAP or similar.

Reporting

The final EIA report or, for EIAs, the Environmental Statement, should include, set out clearly, all the ecological information necessary for a decision to be made. Key aspects include:

- description of ecological baseline and trends if the project were not to go ahead;
- explanation of the criteria used to evaluate ecological resources and assess the significance of impacts of the project;
- statement of ecological methods used;
- presentation of any analytical techniques used and the analysis itself;
- identification of likely ecological impacts and an explanation of their significance and the level of certainty with which this can be stated; and
- description of legal and policy consequences.

Follow-up and monitoring

- Implementation of conditions/planning agreements;
- design and agree monitoring strategy with consultees;
- audit predicted impacts against actual situation; and
- take measures to rectify unexpected impacts/ineffective mitigation/compensation measures.

^b In these Guidelines EAP has been used to denote Environmental Management Plans and Environmental Design Management systems.

2. SCREENING AND SCOPING

Screening

- 2.1 Screening is the determination of whether or not an EIA is required under the EIA Regulations; EIA is a mandatory requirement for projects listed in Schedule 1 of these Regulations. It is also required for types of projects that meet the criteria for Schedule 2 development and are likely to have significant environmental effects (*i.e.* as defined using the selection criteria in Schedule 3 of the Regulations). These might include, for example, effects on a Site of Special Scientific Interest (SSSI), Area of Special Scientific Interest (ASSI), Special Protection Area (SPA), Special Area of Conservation (SAC) or Wetland of International Importance (Ramsar site).
- 2.2 A proponent may seek a formal screening opinion from the competent authority concerning the need for an EIA or may decide to carry out an EIA in any case. When a competent authority receives an application for consent, without an accompanying Environmental Statement (ES), and there appears to be a possibility that it is for a Schedule 1 or 2 development, the authority must adopt a screening opinion (unless a pre-application screening opinion or a screening direction from the relevant Secretary of State has already been adopted).
- 2.3 Under the EIA Regulations, there is provision for a competent authority to request ecological or other environmental information if it considers that an ES is inadequate. When an EIA is not required, there may also be circumstances when a proponent can be required to provide further ecological information. For example, this applies to developments that are taken forward under town and country planning legislation, for which the planning authority determines that additional ecological information is needed to enable it to determine the planning application. An EclA will often provide the competent authority with the information that it requires.

Scoping

- 2.4 *'Scoping is the process of determining the content and extent of matters that should be covered in the environmental information to be submitted to a competent authority or other decision making body'*¹⁹.
- 2.5 The process of scoping is essential to all EclAs. It helps to clarify key issues and promote dialogue with consultees and other stakeholders concerning key ecological issues and proposed methods for survey, evaluation and assessment.
- 2.6 Key benefits of scoping include:
- early stakeholder input, so issues of concern are identified and dealt with at an early stage;
 - an assessment focused on likely significant impacts;
 - clear terms of reference for all ecologists involved in the EclA, including an understanding of the criteria that will be used to evaluate the significance of their findings; and
 - early identification of the need for seasonally dependent surveys so that they can be accommodated in scheduling.
- 2.7 Trends in national, regional and local policies are also leading to a requirement for projects to achieve biodiversity benefits, not simply to avoid negative impacts. For example, Planning Policy Statement 9 (PPS9)²⁰ states that *'Planning policies and planning decisions should aim to maintain, and enhance, restore or add to biodiversity and geological conservation interests'*. The scoping process can provide a good, early opportunity for ecologists to work together to achieve these objectives and lays the foundations for the whole consultation and assessment process.
- 2.8 It is widely accepted good practice for the results of scoping to be presented as a formal report or letter. Such a document is valuable for any project that requires detailed ecological survey, particularly where stakeholder-input is essential in defining terms of reference acceptable to all

parties. For EIAs, a scoping report/letter is often used as the basis for applying for a formal scoping opinion (see paragraph. 2.9 below).

- 2.9 It is important to recognise that the proposed scope of an EclA may change following the preparation of a scoping report/letter. This may be in response either to requirements or concerns identified by statutory or other consultees, or to changes in the project's design or available environmental information. It is good practice to report the final scope of the assessment within the EclA report (or ES).

Statutory Position and Responsibilities

- 2.10 Although there is no legal requirement for scoping, proponents are entitled, under the EIA Regulations, to seek a formal 'scoping opinion' from the competent authority. The 'scoping opinion' summarises the specific advice of the competent authority concerning the required coverage and content of the ES for a particular application. In preparing a scoping opinion, the competent authority is required to consult with the proponent and with relevant statutory consultees. Statutory consultees can play an important role in providing contextual information and advice on any legal/statutory requirements and good practice. The preparation of a 'scoping opinion' does not preclude the competent authority from asking for further information at a later stage in the EIA process.
- 2.11 In the absence of a formal 'scoping opinion' it will usually fall to the proponent's ecologist to advise the proponent on the scope of ecological information and investigations likely to be required, having also consulted with other stakeholders, if possible.

The Scoping Process

Overview

- 2.12 Scoping should be seen as a flexible, adaptive and iterative process, usually based on preliminary consultations, literature searches, site-visits and preliminary ecological surveys.
- 2.13 Scoping may be considered more effective when results are already available from preliminary ecological surveys, or it may be seen as a mechanism for stakeholders to guide the design and implementation of such surveys. There is no set formula, but it should include the elements identified in Box 3. If scoping commences at an early stage in the assessment, it may be necessary to delay the completion of some of these elements, until adequate information has become available. More information on each of the stages described in Box 3 is provided in subsequent sections.

Box 3: Stages in Scoping

Proponent's ecologist to:

- obtain information about the project from the proponent or their engineers/designers;
- identify project activities likely to cause ecological damage, stress or disturbance. Obtain any available information about their spatial extent, timing, frequency and duration;
- concurrently, identify opportunities for enhancing biodiversity and delivering biodiversity objectives;
- identify stakeholders, consultees and all ecologists who should be involved and establish a consultation strategy;
- produce a scoping report as a basis for further consultation with the competent authority, statutory consultees and others involved in the consultation strategy; and
- refine the scope of the assessment based on feedback on the scoping report. Continue to refine the scope - scoping out potential impacts that are no longer considered likely to be significant and addressing newly identified impacts that are likely to be significant. The final scope provides the terms of reference for the remainder of the EclA.

The competent authority's ecologist may produce a scoping opinion.

All stakeholders to:

- identify relevant legislation, regulations and policies and review their requirements. This may include the need for a licence before some activities can go ahead;
- develop an understanding of the ecological context based on existing ecological information, data gathering, literature searches, site visits and any baseline studies already carried out;
- determine a threshold for selecting ecological features to be included in the assessment, based on their value, using measures explained in Chapter 3;
- identify those ecological resources reaching the threshold value which could be affected by the project;
- identify the factors affecting the integrity of the relevant ecosystems and the conservation status of relevant habitats and species;
- identify ecological features likely to be significantly affected and therefore requiring further study and explain the selection criteria used;
- consider potential sources of cumulative effects;
- consider alternatives including the best environmental option;
- agree details of proposed survey/research methodologies. Confirm the study area and the criteria that will be used to assess its nature conservation value; and
- consider potential mitigation/enhancement or compensation opportunities.

Information about the project

- 2.14 The first step is to review proposed activities and identify those likely to cause ecological impacts or deliver biodiversity enhancements: what are the proposed activities; where and when will they take place; are they permanent and if not, how long will they last; and what biophysical changes are they likely to cause? Activities may differ throughout the lifetime of a project, so identify activities associated with construction, operation (best and worst-case operating conditions), decommissioning and restoration as appropriate. If possible map the location of infrastructure and the distribution of the related activities. Identify areas and resources that may be affected by the biophysical changes caused by the identified activities, however remote from the project site, to identify the **zone of influence** (see Box 4). The zone of influence should be continually reviewed and if appropriate, amended as the scheme evolves. If inadequate information is available to properly define the zone of influence, this should be acknowledged.

Box 4: Example illustrating factors to consider when defining the zone of influence of a proposed quarry.

- All ecological features or resources occurring within the area to be worked will be affected by changes in land cover caused by topsoil stripping and excavation.
- 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 that are many miles from the quarry. It may not be possible to determine the zone of influence of dewatering without undertaking hydrological/hydrogeological modelling. The zone of influence should include all water-dependent receptors that could be significantly affected by the predicted draw-down, providing they are of sufficient value to be considered in the assessment (*i.e.* they are above the defined threshold value).
- 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. The zone of influence should include all such features that are of sufficient value to be included in the assessment.

- 2.15 It can be difficult at the scoping stage to establish the full extent of changes caused by a project, in which case it is better to err on the side of caution to ensure that the study area incorporates all areas where impacts could occur.

- 2.16 The information likely to be required about a project is summarised in Box 5. For projects that require EIA, reference should be made to the relevant schedules in the EIA Regulations, which specify information about the project that should be included in an ES. Examples of activities that may generate ecological impacts are given in Box 6.

Box 5: Information about the project

A wide variety of information is required to carry out EclA effectively:

- location, size, extent and spatial organisation of infrastructure and activities;
- lifetime of project including decommissioning;
- activities likely to cause ecological impacts during construction, operation and decommissioning, their timing, duration, location, extent and magnitude, e.g. emissions (type, volume, range), construction activities, etc. (see Box 6);
- activities designed to deliver biodiversity enhancements;
- 'impact zones' or 'effect areas' for main activities;
- receiving environment or 'pathway' for emissions (e.g. water, soil or air); and
- best and worst case operating conditions.

To define the baseline conditions that are expected to occur at the time that the development takes place and to address cumulative effects, it is necessary to consider:

- environmental trends;
- completed developments; and
- other developments for which consent has been granted.

Further information about the definition of baseline conditions and cumulative impact assessment is included in Chapter 4.

To assess the impacts of alternatives the following information will be needed:

- alternative sites;
- alternative designs;
- alternative processes; and
- alternative means of meeting objectives of the project.

Box 6: Examples of activities likely to generate impacts

Preliminary activities prior to the main construction contract (e.g. ground investigations)

Construction phase

- Access and travel on/off-site.
- Assembly areas for components of construction.
- Blasting, e.g. for minerals operations.
- Construction of structures and hard surfaces.
- Demolition operations.
- Environmental incidents and accidents (e.g. spillages, noise and emissions).
- Fires.
- Ground and excavation works.
- Lighting.
- Provision of services and utilities (e.g. underground power lines, water supply and drainage).
- Removal or disruption of top-soil/sub-soil etc.
- Siting and subsequent removal of site offices/compounds and final site clear away after construction.
- Storage areas for construction materials.
- Structural works for building and engineering.

- Structural works to existing buildings, including conversions.
- Temporary access routes for construction vehicles - both on and offsite.
- Vegetation clearance.

Occupation/Operational phase

- Access (both route and means).
- Drainage.
- Damage to mitigation work through accident or vandalism.
- Implementation of landscape design and habitat management (type and location).
- Presence of people, vehicles and typical uses and activities (including factors likely to cause disturbance, e.g. increased public access and recreational pressure, risk of fires, lighting, noise, regular emissions).
- Presence of pets.
- Site operation and management (e.g. maintenance operations, industrial processes generating emissions, etc.).

Decommissioning phase

- Removal of contaminated water or soil.
- Removal or demolition of disused structures that may have been colonised by, e.g. roosting bats, barn owls.
- Removal of ancillary developments including culverts.
- Removal or neglect of structures which might cause pollution if they fail.

Restoration phase (where operations/phases have finished, e.g. for mineral extractions).

Potential non-standard operations (e.g. one-off incidents and accidents).

(Based on Oxford 2001)¹¹

Stakeholders, consultees and key players

- 2.17 At an early stage, the competent authority and the proponent's ecologist must review the requirements for ecological input and any other specialist skills that are needed to undertake the EclA. In undertaking this review, consideration should be given as to who will finally advise the competent authority on the ecological consequences and possible environmental liability resulting from the project. Consideration should also be given to the important role of statutory and non-statutory ecological consultees in providing not only site-specific data but also contextual information and local expertise.
- 2.18 At an early stage in the EclA, it is also advisable to engage ecological consultees in discussions over possible project alternatives, in order to help in identifying the alternative(s) that are likely to cause the least ecological damage or greatest benefits. Consultation will allow discussion about the scope and methods of any investigations that may be needed to investigate alternatives. Involvement of the public is good practice in situations where significant impacts are likely on wildlife resources and landscapes known to provide benefits to local communities.
- 2.19 It is desirable for the scoping report (or letter), which summarises the findings of the scoping work undertaken up to that point, to be circulated for discussion amongst consultees. Scoping workshops may be considered, to provide all major stakeholders with an opportunity to discuss a project and reach consensus on the scope of the assessment. This can significantly reduce consultation time and avoid delays caused by stakeholders requesting additional survey or other work at a later stage. All agreements on the scope of ecological survey work should be confirmed by the parties concerned in writing, at as early a stage as possible, ideally before initiating the survey and assessment work that has been proposed.

- 2.20 There should be some preliminary discussions about potential strategies to provide biodiversity benefits and avoid, minimise or compensate for any negative impacts. This will enable the preparation of such strategies to concentrate on those approaches most likely to meet with stakeholders' approval.
- 2.21 In judging whether the effects of a development are likely to be significant, competent authorities should always have regard to the possible cumulative effects with any existing or approved development. Cumulative impact assessment is discussed in Chapter 4. The detailed approach to be taken should be agreed between all parties concerned during scoping.

Legislation and policy requirements

- 2.22 It is important to consider relevant legislation, regulations and policies (for EIAs see *Environmental Impact Assessment: guide to procedures*, Appendix 8⁵) at an early stage, as they may have a bearing on the required scope of investigations, how impacts should be interpreted, or the criteria that need to be used for determining significance.

Ecological resources affected – establishing the baseline

- 2.23 Having defined the zone of influence (paragraph 2.14), there is a need to investigate the ecological resources that could be affected by the project.
- 2.24 Direct impacts on part of a habitat or population/assemblage may have implications for the whole habitat or population and the study limits should be adjusted accordingly. Furthermore, species may have different vulnerability distances and periods, so the spatial scope of studies must also vary.
- 2.25 For example, if the zone of influence impinged on the breeding territory of a sub-population of Cetti's warblers, it would be necessary to consider the implications of localised impacts in relation to the birds' wider population. If there were a number of sub-populations in the area, then it might be appropriate to restrict the study to 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 regional, or even the national population.
- 2.26 Consideration needs to be given to what constitutes the baseline, as it may not be the same as the conditions at the time of the assessment. In order to determine this, it is necessary to try to predict any changes that will alter conditions prior to the start of the proposed construction and subsequent to it (see Box 7). There may be overlap between establishing the baseline in this situation and considering cumulative impacts that might be expected (see Chapter 4). This should be determined through discussion between relevant stakeholders in the EclA process.

Box 7: Example illustrating setting the baseline

A power station drawing cooling water from a river is to close down, due to a rationalisation of the power supply network. During the century in which the power station has been in use, the riverine invertebrate, fish and bird assemblages in the immediate vicinity of the power station 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 building to residential units. For reasons of timing, the EclA for the residential development must be undertaken prior to closing down the power station.

In this instance, the baseline for the EclA of the conversion to residential use 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 enable the likely post-closure situation to be predicted as accurately as possible.

- 2.27 Additionally, it may be appropriate to consider the variation in a population over time, rather than take a single year's data as an accurate reflection of the situation.
- 2.28 The results of professionally accredited or published scientific studies should be used, where available, to establish the likely spatial and temporal limits of ecological impacts for specific activities and to justify decisions made at the scoping stage. For example, the Somerset 'Econet' project²¹ has defined 'effect distances' for use in EclA based on published literature about home ranges and vulnerability to different activities (e.g. for disturbance to breeding birds caused by road traffic²²).
- 2.29 Study boundaries should be drawn to include any areas that are affected, both directly or indirectly. For example, with major roads, the zone of direct disturbance could extend up to 1 km on either side of the carriageway. If indirect effects are also taken into account (e.g. the effects of displaced individuals on the occupancy of alternative habitat), then the 'effect zone' could be considerably larger. Box 8 provides a summary of the information required to establish the spatial scope of baseline studies.

Box 8: Considerations relevant to establishing baseline conditions for ecological resources within the zone of influence

Designated sites

- Are there any sites designated for nature conservation that fall within the zone of influence?
- Does the project affect any sites likely to be designated in the foreseeable future?
- Is there any policy presumption in favour of habitat protection/creation/restoration in the area?

General ecological considerations

- What ecological features at or above the defined threshold level of value may occur within the zone of influence?
- What are their distribution and status elsewhere for comparison?
- What were their historical distributions, status and management compared with the present?
- What are their scales of variation, vulnerability and likely exposure to the project?
- What are the key ecological processes or species activity periods; are there seasonal variations in distribution, abundance and activity?
- Are there any species, the disappearance of which would have significant consequences for others?
- Are there any other projects planned within the same area or time-frame that may contribute to cumulative effects?

- 2.30 Contextual information is essential to confirm spatial and temporal scope. Such information may be available from the ecological consultees and in local and national Biodiversity Action Plans (see Box 9). Adequate time and resources should be allowed to undertake such vital contextual research. These references will also provide the information required in order to value ecological receptors (see Chapter 3).

Box 9: Sources of contextual information

- English Nature's Natural Area Profiles www.english-nature.org.uk/templates/naturalareas²³
- For specific locations, it is usually possible to obtain information from local biological records centres, Wildlife Trusts and local naturalists' societies, e.g. badger, bat, amphibian and reptile groups, but bear in mind the limited resources available to some data providers (especially small voluntary organisations).
- Land Cover Map 2000 (LCM2000) (Centre for Ecology and Hydrology)²⁴
- LANDMAP Wales (under construction) also www.ccw.gov.uk/lead_map/²⁵
- Local Biodiversity Action Plan (available locally or see www.ukbap.org.uk)²⁶
- Multi-Agency Geographical Information for the Countryside web site (mainly England but

includes coastal and estuary data for Scotland and Wales) (www.magic.gov.uk)

- National Biodiversity Network <http://www.nbn.org.uk/>
- Nature conservation and biodiversity strategies (e.g. for urban areas)²⁷
- Northern Ireland Landscape Character Areas²⁸
- Scottish Natural Heritage's 'Natural Heritage Futures' initiative²⁹

- 2.31 A habitat survey of the zone of influence should be undertaken. The survey should use established methodologies such as extended Phase 1 or Integrated Habitat System³⁰. The habitat survey will identify the main plant communities and habitat types that may be affected by the project and provide a documented basis for determining the scope of more detailed surveys.
- 2.32 If it is not feasible within the context of a given project to gain access to land beyond the project site, it should be possible to undertake a simple Phase 1 survey from public highways or other accessible public spaces in the zone of influence. The survey limitations should be described and their effects on the confidence in the conclusions should be assessed.
- 2.33 For assessments with a wide geographic coverage (e.g. for proposed roads or pipelines), it may be worth buying aerial photographs or satellite images or even commissioning new ones. These can provide insights into spatial relationships, so that the impact assessment can be designed to 'capture' ecological distributions, processes and interactions at an appropriate scale.

Selecting ecological resources and issues requiring detailed assessment

- 2.34 As it is impossible to investigate all issues in detail, it is necessary to focus further study on those likely to generate significant ecological impacts (negative or positive). This is consistent with the EIA Regulations, which only require investigation of likely significant effects. The rationale and criteria used to select certain aspects for more detailed study (and others excluded from further investigation) should be agreed and documented during scoping.
- 2.35 Issues to consider when selecting ecological resources for further investigation include the following:
- a. Whether the feature or resource is sufficiently valuable for an impact to be significant in terms of biodiversity, social/community value and/or economic value; legal protection needs to be considered separately. A clear rationale should be developed for deciding the threshold above which features and resources should be subject to more detailed consideration. This should be based on the value of features, measured as described in Chapter 3. This will enable all those involved in the assessment to understand the reasoning behind the scope of the investigations. Policy considerations will influence the criteria that will be appropriate for determining the threshold in any particular case.
 - b. Whether the feature or resource is likely to receive a significant negative impact.
- 2.36 These issues are discussed in more detail in Chapters 3 and 4 respectively, where guidance is provided on methods for identifying important sites, habitats or species and determining whether impacts are significant.

Detailed survey and research requirements

- 2.37 Having completed the initial scoping work, which is normally based on existing data sources and a habitat survey of the zone of influence, it should be possible to identify any additional data required to predict impacts more fully. This may involve updating existing data. The geographic coverage and timing of further ecological studies should be agreed at the scoping stage. These can be revised later if necessary, as progressively more information becomes available through the assessment process.
- 2.38 Terms of reference for additional studies are based on:

- information on ecological resources within the zone of influence;
- the timeframe for all phases of the project; and
- information gaps/survey needs that should be addressed in order to assess impacts and their significance.

2.39 Standard survey methods³¹ should be used wherever appropriate, so that results can be compared with those arising from other investigations. Details of how methods have been tailored to meet the needs of the study should be included. If the method used varies from accepted good practice this should be noted and the effect on the reliability of the results discussed.

3. DETERMINING VALUE

Introduction

- 3.1 This chapter provides guidance on how to assign values to ecological features and resources, including those that have been designated for their nature conservation interest.
- 3.2 The Guidelines encourage an approach to valuation that involves teasing apart the different values that can be attached to ecological features. The values that are identified are biodiversity value, social/community value and economic value. Legal protection needs to be considered separately from value. Features that are important for social/community or economic reasons should be identified as part of the assessment of the socio-economic or community effects of a project. The impacts on these features should be assessed by the ecologist but the significance of the impacts will then be determined by the socio-economic/community specialist.
- 3.3 The value that is attached to an ecological resource influences:
- whether, as part of screening, potentially affected features or resources are considered sufficiently valuable that there could be a significant effect that would trigger an EIA;
 - whether, as part of scoping, ecological features or resources are considered for inclusion in the EclA - this is influenced by their value in relation to a 'threshold' level of value that should be defined during scoping;
 - deciding what mitigation is appropriate. This is described in more detail in Chapter 5; and
 - considering legal and policy implications. See Chapter 6 for guidance on how this applies.
- 3.4 Guidance on EclA tends to set out categories of ecological or nature conservation value that relate to a geographical framework (e.g. international, local) together with examples of the ecological features or resources that qualify for each category. It is generally straightforward to evaluate designated sites against these categories (e.g. SSSIs or ASSIs are of national importance); although for sites of local value these may not be predetermined. The same problem often applies to evaluating habitats and species (although there are exceptions, e.g. recognised ways of defining internationally/nationally important populations of waterfowl).
- 3.5 Attempts were made during the development of the new Guidelines to define how habitats and species could be assigned to different levels of value. However, such definitions proved to be unworkable in that they cannot accommodate all of the factors that should influence the definition of value, for example in relation to the size or conservation status of species populations or, for habitats, their quality. Furthermore, the value of a species population or a habitat area may change depending on whether it is being assessed, for example, in the south of England or the north of Scotland. Consequently, tabulated boundaries between different categories of value become difficult to define with precision.
- 3.6 The Guidelines therefore propose an approach to valuing features that involves professional judgement, based on of available guidance and information, together with advice from experts who know the locality of the project and/or the distribution and status of the species or features that are being considered. The remainder of this chapter summarises key considerations to take into account when applying professional judgement to assign values to ecological features and resources.

Geographic Frame of Reference

- 3.7 The value or potential value of an ecological resource or feature should be determined within a defined geographical context. It is recommended that the following frame of reference be used (or be adapted to meet local circumstances):
- International;
 - UK;

- National (*i.e.* England/Northern Ireland/Scotland/Wales);
- Regional;
- County (or Metropolitan - *e.g.* in London);
- District (or Unitary Authority, City, or Borough);
- Local or Parish; and
- within zone of influence only (which might be the project site or a larger area).

3.8 In some EIAs (or other integrated assessments), the ecologist may be required to use other approaches to assigning levels of value (in order to be consistent across different technical subjects). In such cases, it is often helpful for the prescribed terms to be translated into the geographical scale that is set out above, so that the legal and policy consequences of any significant impact can be clearly understood by all ecologists. This is illustrated in the Transport Analysis Guidance example on the web.

Designated Sites and Features

Designated sites

3.9 Some sites have already been assigned a level of nature conservation value through designation, a list of which can be found on the Protected Sites Designations Directory³². The reasons for this designation need to be taken into account in EclA. Key published guidance on selecting designated sites is included in Box 10.

Box 10: Key guidance on selecting designated sites

- Brown, A.E., Burn, A.J., Hopkins, J.J. and Way, S.F. (1997) *The EC Habitats Directive: selection of Special Areas of Conservation in the UK*. Report 270. JNCC, Peterborough³³
- *Guidelines for selection of biological ASSIs*³⁴
- *Guidelines for selection of Earth Science SSSIs* (1977) JNCC³⁵
- Nature Conservancy Council (1989) *Guidelines for selection of biological SSSIs and supplements (Intertidal Marine Habitats and Saline Lagoons 1996, and revisions, Non-vascular Plants 1992, Bogs 1994, Freshwater habitats 1997, Freshwater and estuarine fish 1997)* JNCC³⁶
- Ratcliffe, D.A. (ed.) (1977) *A Nature Conservation Review*. Cambridge University Press, Cambridge³⁷
- Stroud *et al* (2001) *The UK SPA Network: its scope and content. Volume 1: Rationale for the selection of sites*. JNCC³⁸
- Stroud, D.A., Mudge, G.P. and Pienkowski, M.W. (1990) *Protecting internationally important bird sites*, NCC Peterborough³⁹

3.10 The World Heritage Convention⁴⁰ (WH) (adopted by UNESCO in 1972) was ratified by the UK in 1984. The Convention provides for the identification, protection, conservation and presentation of cultural and natural sites of 'outstanding universal value', and requires a WH List to be established under the management of an inter-governmental WH Committee. World Heritage Sites (WHS) that are included in this List may therefore be of international importance for their biodiversity. Some WHS may be designated for their other natural attributes or cultural heritage with no direct implications for their biodiversity value. Where this is the case, their biodiversity value should be determined on the basis of any other designations or attributes. However, sites designated by UNESCO as Biosphere Reserves (*e.g.* Braunton Burrows, North Norfolk Coast, Dyfi estuary, Beinn Eighe) are of international importance for the conservation of biodiversity⁴¹.

3.11 Internationally important sites include: SACs, SPAs and Ramsar sites. Candidate SACs, potential SPAs and proposed Ramsar sites should be given the same consideration as designated sites.

- 3.12 Nationally important sites are designated as SSSIs in England, Scotland and Wales or as ASSIs in Northern Ireland. They may also be designated as National Nature Reserves.
- 3.13 Local Authorities and The Wildlife Trusts have designated sites that are recognised as of importance at regional/county, district/borough, etc. levels. Whilst a variety of terms are used to describe these sites, they are now generally referred to collectively as Local Sites⁴².
- 3.14 Where a feature has value at more than one level, its overriding value is that of the highest level. For example, a site designated both as an SPA for internationally important features and as an SSSI for nationally importance features should be considered as being internationally important. The features for which the site has been designated at each level may differ and should be valued accordingly. Features of the site that are not the reasons for its designation(s) should be assessed and valued according to their intrinsic value.
- 3.15 It is possible that ecologists undertaking EclAs may identify areas that are not currently designated, but that they consider would meet the criteria for designation in a particular geographical context. Conversely, there may be occasions when a site is no longer considered to meet the criteria for designation. Where the latter relates to nationally designated sites (*i.e.* SSSIs, ASSIs), it is important to remember that, unless a site is formally 'denotified', the designation still applies and the Government has legal and policy obligations to ensure the site is restored to favourable condition. In the case of non-statutory sites, the potential to recreate the lost interest must be taken into consideration (paragraphs 3.40 – 3.42). In both sets of circumstances, ecologists should explain their rationale fully in the EclA and if possible discuss their conclusions with the relevant designating authority. If it is agreed by the relevant designating authority that the site merits a different designation, this should be reflected in the assessment. If agreement cannot be reached, the issues must be explained fully in the EclA. Where there is doubt, a conservative approach should be taken and the current designated value used.

Tree Preservation Orders TPOs

- 3.16 TPOs can be applied to all types of trees, including hedgerow trees, but not to hedges, bushes or shrubs. A TPO can be applied to one or more trees, an area of trees, or woodland. TPOs are used by Local Planning Authorities (LPAs) to protect selected trees and woodlands if their removal would have a significant impact on the local environment and its enjoyment by the public. LPAs are advised to develop ways of assessing the 'amenity value' of trees in a structured and consistent way, taking into account the following key criteria⁴³:
- visibility - the extent to which the trees or woodlands can be seen by the general public;
 - individual impact - relating to its size and form, its future potential as an amenity, taking into account any special factors such as its rarity, value as a screen, or contribution to the character or appearance of a (building) Conservation Area; and
 - wider impact - the significance of the trees in their local surroundings should also be assessed, taking into account how suitable they are to their particular setting, as well as the presence of other trees in the vicinity.
- 3.17 These amenity-related criteria do not incorporate any specific consideration of ecological value. The ecological value of trees with TPOs should therefore be assessed independently of their designation, using the criteria that are discussed later in this chapter for use in relation to other habitats/habitat features, or within the context of the value of any species that they support. The legal issues relating to TPOs are often addressed in landscape and visual assessments, but ecologists should be aware of the legal protection that they provide. Scotland⁴⁴ and Wales⁴⁵ have separate guidance.

Important Hedgerows (England and Wales only)

- 3.18 The Hedgerows Regulations 1997⁴⁶ provide arrangements for LPAs in England and Wales to protect important hedgerows by controlling their removal through a system of notification. To be 'important', as defined under the Regulations, all or part of the hedgerow must have existed for

30 years or more, and meet at least one of the criteria in Part II of Schedule 1, which is divided into 'Archaeology and history' and 'Wildlife and landscape'. *The Hedgerow Survey Handbook*⁴⁷ is available from Defra and is on the English Nature website.

- 3.19 The removal of any hedgerow to which the Regulations apply is permitted if it is required for carrying out development for which planning permission has been granted (and in other circumstances as set out under Regulation 6). Thus the notification system does not apply to many of the situations in which EclAs are carried out. Nevertheless, the Handbook and the Regulations can be useful for valuing hedgerows within the context of EclAs (the appendices contain 'standard' blank field survey forms as well as a form for a Hedgerow Regulations survey).

Biodiversity Value

- 3.20 There are various characteristics that can be used to identify ecological resources or features likely to be important in terms of biodiversity. These include:
- animal or plant species, subspecies or varieties that are rare or uncommon, either internationally, nationally or more locally;
 - ecosystems and their component parts, which provide the habitats required by the above species, populations and/or assemblages;
 - endemic species or locally distinct sub-populations of a species;
 - habitat diversity, connectivity and/or synergistic associations (e.g. networks of hedges and areas of species-poor pasture that might provide important feeding habitat for rare species such as the greater horseshoe bat);
 - notably large populations of animals or concentrations of animals 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 - these will include examples of naturally species-poor communities;
 - species on the edge of their range, particularly where their distribution is changing as a result of global trends and climate change;
 - species-rich assemblages of plants or animals; and
 - typical faunal assemblages that are characteristic of homogenous habitats.
- 3.21 Consultation, especially with local specialists, can be crucial for identifying less obvious important resources and features.
- 3.22 The relative ecological importance of different ecological features and resources in the landscape may also change in response to changing conditions. For example, climate change could increase the need for large-scale habitat networks that are designed to facilitate movement of species through the landscape to colonise suitable areas.
- 3.23 The following sections explain in more detail how the relative value and importance of ecological resources and features can be determined.

Valuing Habitats

- 3.24 The value of areas of habitat and plant communities should be measured against published selection criteria where available. For example, Annex III of the EC Habitats Directive sets out the criteria for selecting sites eligible for identification as sites of Community importance and designation as SAC. The Guidelines for the selection of biological SSSIs⁴⁸ set out criteria for habitats or plant communities to be designated as being of national importance. Some Local Authorities and Wildlife Trusts have prepared criteria for the selection of Local Sites. Where areas of a habitat or plant communities do not meet the necessary criteria for designation at a specific level, the ecologist may consider the local context if appropriate, but should take into account potential value (paragraphs 3.38 – 3.40).
- 3.25 Habitat Action Plans (HAPs) have been developed for numerous habitats as part of the UK Biodiversity Action Plan (BAP) and of other BAPs, (e.g. local BAPs and organisational BAPs

such as that produced by British Waterways for the inland waterway network). Those habitats considered to be particularly vulnerable are identified as 'priority habitats.' The statutory basis for priority species and habitats listed in the UK BAP is explained in Box 11.

Box 11: The statutory basis for the definition of priority species and habitats

The statutory basis for species and habitats listed in BAPs is currently provided by Section 74 of the Countryside and Rights of Way (CROW) Act 2000 in England and Wales, but this will be superseded by Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006⁴⁹. The NERC Act 2006 requires the respective Secretaries of State for England and Wales to publish lists of the living organisms and types of habitat, which in their opinion are of principal importance for the purpose of conserving biodiversity. Before publishing any list the Secretaries of State must consult Natural England and the Countryside Council for Wales as to the living organisms or types of habitat to be included in the list.

The habitats and species in Section 74 are those that the Secretary of State, following consultation with English Nature, considered were of principal importance for the conservation of biological diversity in England⁵⁰, in accordance with the 1992 UN Convention on Biological Diversity⁵¹. HAPs and SAPs under the UK Biodiversity Action Plan are already in place or under preparation for all the listed habitats and species. The Biodiversity Strategy for England⁵² sets out the means, by which the Government will comply with its duty under Section 74 and to take steps, or promote the taking of steps by others, to further the conservation of the listed habitats and species, including through the continued implementation of the Action Plans.

The Section 74 List for Wales⁵³ is published and differs from the England list in that it omits species that are extinct in Wales, or have never occurred, and adds a few distinctively Welsh ones.

Scotland's Biodiversity: It's in Your Hands sets out a strategy for the conservation and enhancement of biodiversity in Scotland⁵⁴. The Scottish Biodiversity List⁵⁵ is a list of species and habitats considered to be of principal importance for the purpose of biodiversity conservation in Scotland.

The Wildlife (Northern Ireland) Order 1985 is currently under review. It is proposed to include a statutory requirement for government departments and public bodies to further the conservation of biodiversity and for the Department of Environment to publish and regularly review a list of priority habitats and species considered to be of importance for biodiversity conservation.

- 3.26 The purpose of HAPs is to guide conservation action for the habitats concerned. That a HAP has been prepared should simply reflect the fact that the habitat concerned is in a sub-optimal state (and hence that action is required). It does not imply - and was never intended to imply - any specific level of value for the habitat. The value of any area of habitat covered by a HAP should therefore be determined on the basis of its intrinsic characteristics using the same approach as with other habitats.
- 3.27 The only exception to this should be where a HAP states that all areas of a particular habitat should be protected, as is often the case for priority habitats. In such cases, ecologists may decide that it is appropriate to treat applicable areas as being important at the level of the BAP in question. For example, if a county BAP identifies an action to protect all areas of a particular habitat (where there is no similar recommendation in the UK, national or regional BAP), each area could be considered to be of county importance. It should be noted that some BAPs do not qualify their recommendations about specific habitats, for example in relation to the size of habitat areas. Some interpretation may be needed to avoid obvious anomalies, for example, it may be inappropriate to classify a small patch of reedbed within a gravel pit as of county importance just because a county BAP action proposes the protection of all reedbeds.
- 3.28 BAPs are also useful in that they identify current factors causing loss and decline of particular habitats, e.g. pollution, fragmentation, etc. They can flag up important development types/impact types that should be considered in EclAs.

- 3.29 Ancient woodlands are ‘...valuable for the diversity of species and for the longevity of the woodland habitat...’ (PPS9). Ecologists may consider them to be important at a specified geographic level even if they are not designated at this level. It may be appropriate to adopt a similar approach for other habitats that cannot be restored or created within a reasonable time frame.
- 3.30 Other sources of assistance in valuing habitats may include Natural Area Profiles (England) Natural Heritage Futures: National Assessments (Scotland), development plans (structure and local) and descriptions of National Parks and Environmentally Sensitive Areas (ESAs).

Valuing Species

- 3.31 This part of the guidance deals with species that need to be assessed because they are of biodiversity value rather than because they are legally protected (although some species may fit in both categories). Legally protected species are discussed in paragraphs 3.52 – 3.55. There are also legal requirements relating to notifiable weeds and species that are controlled through legislation for public health and commercial reasons. Issues relating to injurious/controlled species are discussed in paragraphs 3.56 - 3.59.
- 3.32 In assigning value to a species, it is necessary to consider its distribution^{56,57} and status, including a consideration of trends based on available historical records. A non-mobile species can generally be assumed to occur regularly on a site, even after just one recent reliable record. However, records over a longer period, for example five years, may be needed for mobile species. The occurrence of species that are not typical of the habitat from which they have been recorded should be investigated in greater detail. It will be necessary to discuss the period over which data are needed with the relevant country conservation agency if there is a likelihood of there being an impact on a population or group of national or international importance.
- 3.33 The valuation of populations should make use of any relevant published evaluation criteria. For example, there are established criteria for defining nationally and internationally important populations of waterfowl⁵⁸.
- 3.34 Rarity is an important consideration because of its relationship with threat and vulnerability. Some species are inherently rare, so it is necessary to look at rarity in the context of status. A species that is rare and declining may be assigned a higher level of importance than one that is rare but known to be stable. Other rarity-related evaluation criteria include the need to protect populations where the UK holds a large or significant proportion of an international species, e.g. a European population.
- 3.35 There are numerous species whose populations are in decline throughout the UK. Many of those for which the decline is most serious, ‘priority species’ are the subject of Species Action Plans (SAPs) in the UK BAP. Other species are the subject of action plans in sub-national BAPs. The purpose of SAPs is to guide conservation action for the species concerned. As with habitats, the existence of a SAP should reflect the fact that the population of the species is in a sub-optimal state. It does not imply - and was never intended to imply - any specific level of value for the species. The value of the population of a species covered by a SAP should therefore be determined using the same approach as with other species
- 3.36 Other than in this context, the main application of a BAP in EclA is in the context of guiding the development of proposals for habitat creation/enhancement. As for habitats, SAPs can be useful in identifying development types/impact types that should be considered for particular species.
- 3.37 Inclusion of species in lists of declining species (e.g. the list of Birds of Conservation Concern⁵⁹) is not in itself a sufficient criterion for assigning a level of value to the species concerned. This is because such lists include species in decline for a number of different reasons and ecological value can vary between listed species.

Potential Value

- 3.38 Defra has a Public Service Agreement (PSA) target to have at least 95% of the SSSI area in recovering or favourable condition by 2010. The Scottish Executive has a published target of bringing 80% of the SSSI area into assured management arrangements by March 2006 and also to bring 80% of SSSI special features into favourable condition by March 2008. CCW has a Programme for Rationalising and Implementing Statutory Site Management' (PRISM), which is designed to help achieve by 2013 the target of 95% of SAC and 85% of SSSI features in 'favourable conservation status'. EHS is committed to ensuring that 95% of the features underlying the designation of its important wildlife sites are in, or approaching, favourable conservation condition by 2013. The existence of these targets means that the 'favourable condition' of a SSSI/ASSI should generally be the benchmark against which impacts are assessed. The main exception is likely to be where the statutory conservation agency agrees that it is not reasonable to expect that the favourable condition target can realistically be achieved without the developer's intervention.
- 3.39 The EC Habitats Directive 1992 Article 2(2) states '*Measures taken pursuant to this Directive shall be designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest*'. Article 3(1) states '*A coherent European ecological network of special areas of conservation shall be set up... this network, composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, shall enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range*'. Therefore, consideration of potential value in respect of habitats/species on Annexes I/II is important in the selection of SACs in order to achieve favourable conservation status for those species or habitats. This also therefore applies to consideration of any potential impacts upon such sites.
- 3.40 Potential value is also addressed in some BAPs. If a particular area of land is subject to a HAP, with existing detailed plans for enhancement or habitat creation and an associated delivery mechanism, and if the chance of failure is low, then it may be appropriate to value the site as if the intended resource already existed. There is already precedent for this approach in planning case law. In England, this principle has been further strengthened by the publication of PPS9, which includes the requirement for Regional Spatial Strategies to include policies to conserve and enhance biodiversity at the regional and sub regional levels and for Local Development Frameworks to: '*identify any areas or sites for the restoration or creation of new priority habitats which contribute to regional targets, and support this restoration or creation through appropriate policies*'.

Secondary or Supporting Value

- 3.41 Some features that are currently of no particular ecological interest in themselves may nevertheless perform an ecological function, e.g. because they act as a buffer against negative impacts, or because they enable in some other way the effective conservation of a more valuable feature. For example, an area of scrub may be included in a calcareous grassland SSSI to act as a buffer from agricultural spraying on adjoining farmland. In this instance, the scrub performs an important ecological function in protecting a feature of national importance.
- 3.42 It is also relevant to note that Article 10 of the Habitat Directive refers to '*Member States shall endeavour, where they consider it necessary, in their land-use planning and development policies and, in particular, with a view to improving the ecological coherence of the Natura 2000 network, to encourage the management of features of the landscape which are of major importance for wild fauna and flora. Such features are those which, by virtue of their linear and continuous structure (such as rivers with their banks or the traditional systems for marking field boundaries) or their function as stepping stones (such as ponds or small woods), are essential for the migration, dispersal and genetic exchange of wild species.*'

Social Value

3.43 People derive benefits from biodiversity in various ways, including:

- a population of a species that is enjoyed each year by large numbers of local people, e.g. a patch of bluebells in a local woodland;
- a population of woodland birds that are valued visitors to bird tables in a large number of adjoining gardens or schools;
- formal recreational enjoyment of hunting or fishing;
- health aspects;
- informal recreational activity e.g. countryside walks;
- sites that provide the only visually and/or physically accessible area of semi-natural green-space for a local community; and
- use of habitat areas for the purpose of learning about wildlife.

3.44 The extent to which a site and its wildlife provide a resource that people use or enjoy often informs the designation of Local Sites by Local Authorities, The Wildlife Trusts and others. In such cases, the social value that is attached to a site may be defined on the basis of the level of importance at which the site has been designated (e.g. county, district, etc.). In other circumstances, it may be necessary to make a judgement about the value of the site based on other criteria, such as the extent to which the site is used by local people and others and the availability of other accessible green space in the vicinity. Collis and Tyldesley (1993)⁶⁰ also deal with these issues.

3.45 It should be noted that even where designation systems reflect social values, they may not have involved a comprehensive survey of the social value of all green spaces within the relevant area. As a result, an EclA, EIA or other social/environmental studies may identify previously unrecognised (and un-designated) sites of social importance.

3.46 The social effects of a project that might affect a Local Site that has been designated partly for social reasons are often neglected in EclAs, as no one member of the team may feel able to fully address the issues. Effects on socially valued species (e.g. the population of bluebells in the example above) are even more likely to be neglected. To avoid this situation, it may be useful to separate 'social values' from those specifically related to the conservation of biodiversity in order to ensure that all potentially significant values are recognised. Wherever possible, subjective judgements about social value should be supported by comment from the Local Authority or even surveys of opinion by local residents if the issue is sufficiently critical.

3.47 Having identified the socially important sites/species, the ecologist should carry out the assessment of how the ecology of these sites/species might be affected by the project. Ideally, a sociologist would then make the assessment of the social consequences of the ecological changes. Information about social impacts can then be considered alongside biodiversity impacts in developing mitigation/compensation/enhancement measures, in determining the significance of impacts and, ultimately, in the decision-making process. The LANDMAP²⁶ system in Wales is an example of how such an assessment can be undertaken.

Economic Value

3.48 Economic implications may result from impacts on certain ecological features and resources that are financially valuable, for example:

- paying visit to bird hides;
- populations of cyprinid fish for angling;
- populations of shell fish in estuaries;
- rare breeding birds at publicly accessible breeding sites that attract large numbers of visitors, who bring economic benefits to the local economy (e.g. ospreys at certain sites in Scotland);
- red deer in areas where hunting or stalking takes place; and

- urban green space might play a valuable role in contributing to the health and wellbeing of local communities with consequent economic benefits;
- 3.49 Ecologists should be proactive in identifying situations where specialist economic input might be required. This will ensure that economic implications of ecological change are properly included in an assessment. Ecologists and economists may need to work together to identify economically important resources. The ecologist will be responsible for describing the ecological changes resulting from the project, which the economist will use to assess the economic impacts in qualitative or, preferably, quantitative terms.
- 3.50 Any economic appraisal should be open to consultation as soon as possible, with the methodology presented transparently so that stakeholders can give a view on the values assigned.
- 3.51 Criteria relating to economic value typically reflect considerations such as the contribution to the economy derived from the ecological resource, e.g. the number of jobs that are supported. These need to be considered in relation to direct 'upstream' and 'downstream' economic activities. This would normally be done in the context of values adopted in the wider socio-economic assessment. Guidance on this subject is beyond the scope of this document.

Legal Issues

Legally protected sites and species

- 3.52 The EC Habitats Directive Annex II lists animal and plant species of Community interest whose conservation requires the designation of SACs and Annex IV lists animal and plant species of Community interest in need of strict protection. The EC Birds Directive Article 4(1) states '*...species mentioned in Annex I shall be the subject of special conservation measures concerning their habitat...member states shall classify...the most suitable...as special protection areas...*' and Article 4(2) '*...take similar measures for regularly occurring migratory species not listed in Annex I...*' There is also a requirement under Article 4(4) that member states '*...take appropriate steps to avoid pollution or deterioration of habitats...outside these protection areas...*' Other species are protected under Schedules 1, 5 and 8 of the Wildlife and Countryside Act 1981 (as amended) and the Wildlife (Northern Ireland) Order 1985, and the Nature Conservation (Scotland) Act 2004. This national legislation also provides the legal framework for the notification of SSSIs and ASSIs.
- 3.53 Other legislation that is relevant to EclA includes the Protection of Badgers Act 1992, the Wild Mammals (Protection) Act 1996 and the Hedgerow Regulations 1997.
- 3.54 Some mechanisms for legal protection or designation indicate what type of information is required to address ecological impacts (e.g. sites protected under the EC Habitats Directive). In all cases, legal and other guidance should be followed to determine whether a project will cause any contravention of legal status or protection, or have a significant effect on the integrity of a system, resource or feature.
- 3.55 The approach described in paragraphs 3.20 *et seq* should be used to evaluate the biodiversity value of a feature in order to provide advice on the policy implications of any impacts. In addition to this approach, EclA must demonstrate how the project being considered will be taken forward such that the legal requirements will be met. It should be noted that for some projects, features may be of insufficient biodiversity, social or economic value to merit assessment within an EclA (e.g. because they are below the defined threshold for biodiversity value) other than the need to consider them within the context of the relevant legislation. Examples of this might include species that are common in some parts of the UK, such as kingfisher, which is listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), and badger (in the context of the Protection of Badgers Act 1992). More generally, this will apply to foxes and other common mammals (in the context of the Wild Mammals (Protection) Act 1996).

Injurious and legally controlled weeds

- 3.56 Some species are legally identified as 'injurious weeds', or are controlled by the Wildlife and Countryside Act 1981 (e.g. Japanese knotweed, giant hogweed) and under the Wildlife (Northern Ireland) Order 1985. These must be controlled, chiefly for public health and commercial reasons.
- 3.57 Five weed species are identified as injurious in the Weeds Act 1959 (common ragwort, broad-leaved dock, curled dock, creeping thistle, spear thistle). The Secretary of State may serve an enforcement notice on the occupier of land on which injurious weeds are growing requiring the occupier to take action to prevent their spread. The Defra website has a colour guide 'Identification of Injurious Weeds'⁶¹. The Ragwort Control Act 2003 (England and Wales) amends the Weeds Act; the related code of practice on how to prevent the spread of common ragwort⁶² contains useful advice, including the identification of risk in order to prioritise control measures.
- 3.58 A small number of plant species are legally controlled in Great Britain by the Wildlife and Countryside Act 1981 and in Northern Ireland by the Wildlife (Northern Ireland) Order 1985 (this list of plants is longer). The two plants that are most frequently encountered in EclA are Japanese knotweed and giant hogweed. It is illegal to plant or to cause these plants to grow in the wild, and legal disposal methods for vegetation and soil subject to clearance from a site must be used. Guidance is available from the Environment Agency in respect of dealing with Japanese knotweed and with both these species as well as other invasive plant species not subject to legal controls including '*Guidelines on the control of invasive plants in or near fresh water*'⁶³ and a '*code of practice for the management, destruction and disposal of Japanese knotweed*'⁶⁴ (for more information and factsheets on invasive species, see the EA web page⁶⁵ and Scotland has a horticulture code of practice '*Helping to prevent the spread of invasive non-native species*'⁶⁶).
- 3.59 The presence of such species may be assessed as being an ecological, social or commercial disbenefit, although they may have some ecological merit. Advice should be provided on the legal consequences of their presence and the ecological impacts assessed in this context.

Multi-functional Features

- 3.60 Some habitats or species may have biodiversity, social and economic value. In this instance, the impact of a project on all three aspects should be assessed separately before an integrated assessment is carried out.

4. IMPACT ASSESSMENT

Introduction

- 4.1 Assessment of ecological impacts is required at the following stages:
- in scoping - a broad assessment is needed which forms the basis for selecting those valued ecological resources to be subject to detailed assessment due to likely significant impacts (see Chapter 2);
 - during the evolution of the project, in order to identify the need for impact avoidance and mitigation and opportunities for enhancement;
 - after the mitigation strategies have been fully devised and their likely success considered, the residual impacts are assessed; and
 - finally, if significant negative impacts are still likely, it may be necessary to consider the need for and value of ecological compensation. The positive impacts of such compensation proposals should be properly assessed.
- 4.2 The starting point for any assessment is to determine which ecological features or resources within the zone of influence are both of sufficient value to be included in the assessment and vulnerable to significant impacts arising from the project. The determination of value should make use of the guidance in Chapter 3. The rationale for selecting features for inclusion in the EclA will differ, depending on the situation, and so, ideally, it should be agreed through consultation during scoping, see paragraphs 2.35 and 2.36. For those ecological resources or features that are to be included in the assessment *i.e.* have been 'scoped in', the next step is to describe the changes to the baseline conditions likely to arise from the project and the resulting ecological impacts. If, at scoping these impacts are considered likely to be significant, they should be investigated further and clearly described in ecological terms, before the legal, policy, social or economic implications are considered.
- 4.3 The following guidance is in accordance with the mandatory requirements of the UK EIA Regulations.

Description of Baseline Conditions and Cumulative Impact Assessment

- 4.4 The assessment of impacts should be undertaken in relation to the baseline conditions within the zone of influence that are expected to occur if the development were not to take place. Thus, for example, if construction is programmed for 2012, construction impacts should be assessed against the baseline conditions predicted to occur in 2012 if the development were not to go ahead. Similarly, if the development is operational from 2013 onwards, the baseline for the EclA should be the baseline conditions predicted to occur, in the absence of the development, from 2013 onwards.
- 4.5 It is necessary to predict the future baseline conditions with reference to:
- environmental trends, for example, climate change;
 - completed developments which may affect the zone of influence in the future; and
 - any other developments for which planning consent has been granted.
- Relevant information may be available in Strategic Environmental Assessments (SEAs)^c or Sustainability Appraisals (SAs) that have been prepared for plans and programmes and in the ESs of completed or planned developments.
- 4.6 Predicting the future baseline in this way enables the EclA to address cumulative impacts. This is achieved by assessing the ecological impacts of the proposed development in the context of

^c Guidance on SEAs and biodiversity can be found in *Strategic Environmental Assessment and Biodiversity: Guidance for Practitioners* (June 2004).

the predicted baseline conditions, thereby assessing the cumulative impact (see example in Box 13).

- 4.7 The predicted baseline and approach to assessing cumulative impacts should be agreed between all relevant parties during scoping. Close liaison is required between the proponent team and the LPA and/or agencies involved.
- 4.8 'In-combination' assessments that are carried out as part of 'appropriate assessments' are not required as part of other EclAs, including EIAs.

Predicting and Characterising Ecological Impacts

- 4.9 Having identified the activities likely to cause significant impacts (see Chapter 2), it is then necessary to describe the resultant changes and to assess the impact on valued ecological resources. It will be necessary for the proponent's ecologist to liaise with other members of the proponent's team as the changes to be considered may relate, for example, to noise, air quality, hydrology or water quality.
- 4.10 This guidance recommends that the process of identifying impacts should make explicit reference to aspects of ecological structure and function on which the feature depends. Some of the elements that may be considered are identified in Box 12.
- 4.11 Impacts must be assessed in the context of the predicted baseline conditions within the zone of influence during the lifetime of the development. Predicting the baseline conditions for valued ecological resources should involve consideration of environmental trends and impacts from built and planned developments, as described in Chapter 2 and under the heading of 'Integrity' below. This ensures that cumulative impacts are properly addressed.

Box 12: Examples of aspects of ecological structure and function to consider when predicting impacts.

<p>Available resources</p> <p>Territory: hunting/foraging grounds; shelter and roost sites; breeding sites; corridors for migration and dispersal; stop-over sites.</p> <p>Food and water (quantity and quality).</p> <p>Soil minerals and nutrients and hydrochemistry.</p> <p>Solar radiation and gaseous resources.</p>
<p>Stochastic processes</p> <p>Flooding, drought, wind blow and storm damage, disease, eutrophication, erosion, deposition and other geomorphological processes, fire and climate change.</p>
<p>Ecological processes</p> <p>Population dynamics: population cycles; survival rates and strategies; reproduction rates and strategies; competition; predation; seasonal behaviour; dispersal and genetic exchange; elimination of wastes.</p> <p>Vegetation dynamics: colonisation; succession; competition; and nutrient-cycling.</p>
<p>Human influences*</p> <p>Animal husbandry, cutting, burning, mowing, draining, irrigation, culling, hunting, excavations, maintenance dredging, earth shaping, ploughing, seeding, planting, cropping, fertilising, pollution and contamination, use of pesticides and herbicides, introduction of exotics, weeds and genetically modified organisms and disturbance from public access and recreation, pets and transport.</p>
<p>Historical context</p> <p>Natural range of variation over recorded historical period.</p> <p>Irregular perturbations beyond normal range (such as very infrequent storm events).</p>

<p>Ecological relationships</p> <p>Food webs, predator-prey relationships, herbivore-plant relationships, herbivore-carnivore relationships, adaptation, and dynamism.</p>
<p>Ecological role or function</p> <p>Decomposer, primary producer, herbivore, parasite, predator, keystone species.</p>
<p>Ecosystem properties</p> <p>Fragility and stability, carrying capacity and limiting factors, productivity, community dynamics.</p> <p>Connectivity.</p> <p>Source/sink.</p> <p>Numbers in a population or meta-population, minimum viable populations.</p> <p>Sex and age ratios.</p> <p>Patchiness and degree of fragmentation.</p>
<p>* <i>Note:</i> Many of our semi-natural habitats and wild species have co-evolved with humans over many centuries and are adapted to traditional cultural management practices that now sustain their current conservation status.</p> <p>(Derived from Oxford 2001)¹¹</p>

Confidence in predictions

- 4.12 It is important to consider the likelihood that a change/activity will occur as predicted and also the degree of confidence in the assessment of the impact on ecological structure and function. The limitations to certainty should be described and the consequences for confidence in predictions must be stated clearly. A qualitative description may be adequate, though an objectively defined scale defined according to a stated convention is probably more helpful, and can be used even if the decision as to confidence level can only be based on expert judgement, rather than frequency data, as long as this limitation is stated. Hence, a scale that is meaningful in normal language might be: *Certain, Probable, Unlikely*. Alternatively, based on the fact that the 5% confidence level is conventionally chosen as the lowest limit for acceptable statistical significance in common scientific practice, a four-point scale that could be usefully employed is:
- Certain/near-Certain: probability estimated at 95% chance or higher.
 - Probable: probability estimated above 50% but below 95%.
 - Unlikely: probability estimated above 5% but less than 50%.
 - Extremely Unlikely: probability estimated at less than 5%.
- 4.13 The reason for including a confidence level category of 'extremely unlikely' is that some effects may be very improbable, but extremely serious should they occur and hence merit contingency planning. Where doubt exists as to which of two categories of probability best fits the level of professional confidence, the more conservative level should be cited.
- 4.14 In some cases, ongoing survey or monitoring may be required to refine predictions or activate mitigation proposals.
- 4.15 When describing changes/activities and impacts on ecosystem structure and function, reference should be made to the following parameters, which are discussed below:
- positive or negative;
 - magnitude;
 - extent;
 - duration;
 - reversibility; and
 - timing and frequency.

Positive or negative

- 4.16 Is the impact likely to be positive or negative? Positive impacts merit just as much consideration as negative ones, as international, national and local policies increasingly press for projects to deliver positive biodiversity outcomes.

Magnitude

- 4.17 Magnitude refers to the 'size' or 'amount' of an impact, determined on a quantitative basis if possible. For example: a likely increase of three in the number of otters killed per year on a road; a total loss of the structure and function of semi-natural grassland replaced by tarmac; a partial loss of the structure and function of grassland subject to increased risk of wind-blown biocide. Whilst it may not be possible to provide a quantitative assessment in the latter example, application of some of the following parameters will provide a more accurate understanding of the likely impact.

Extent

- 4.18 The extent of an impact is the area over which the impact occurs. When the receptor being considered is the habitat itself, magnitude and extent may be synonymous.

Duration

- 4.19 The time for which the impact is expected to last prior to recovery or replacement of the resource or feature. This should be defined in relation to ecological characteristics (for example species lifecycles) rather than human timeframes. For example, five years, which might seem short-term in the human context or that of any other long-lived species, would span at least five generations of dragonflies.
- 4.20 The duration of an activity may differ from the duration of the resulting impact caused by the activity. For example, if short-term construction activities cause disturbance to birds during their breeding period, there may be longer-term implications due to a failure to reproduce in the disturbed area during that season.

Reversibility

- 4.21 For the purposes of this guidance, an irreversible (permanent) impact is one from which recovery is not possible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A reversible (temporary) impact is one from which spontaneous recovery is possible or for which effective mitigation is both possible and an enforceable commitment has been made.
- 4.22 In some instances, the same activity may cause both irreversible and reversible impacts. For example, consider two of the potential impacts arising from the placement of a temporary access through an ancient wood that is subsequently allowed to grow over. The change experienced by common woodland birds of the loss of food and shelter in the woodland edge may be reversible in as little as ten years, as these resources will be replaced once the access route has grown over. Many birds are sufficiently mobile and adaptable to accommodate this change with no significant impact on populations. But, the impact on ground flora along the route of the access may be irreversible (or effectively so) if the fragile woodland soils on which they depend have been compacted.

Timing and frequency

- 4.23 Some changes may only cause an impact if they happen to coincide with critical life-stages or seasons (for example, the bird nesting season). This may be avoided by careful scheduling of the relevant activities, e.g. by the implementation of an EAP that specifies important constraints in relation to the timing of works.

- 4.24 The frequency of an activity and hence the resulting impact should also be considered. For example, there may be occasions when a single person walking a dog will have very limited effect on nearby waders using wetland habitat. However, if numerous walkers subject the waders to frequent disturbance, then feeding success may be significantly reduced. In extreme cases the birds could be permanently displaced.

Characterisation of the change and impact

- 4.25 In order to characterise the likely change and impact, it is necessary to take into account all the above parameters. An illustration of this is given below:

e.g. The operational phase of a temporary access road through a wood will create an increase in noise. An assemblage of breeding woodland-edge birds, in 5 ha of quality breeding habitat within a distance of 5 km from the road, will experience an increase on average, of 20 decibels of noise for three hours per day for two breeding seasons.

Confidence in describing these changes is high, based on information from the engineers and the noise and traffic assessments. However, the impact on the breeding success of the birds is less certain, as the response of all species to increased noise levels is not fully understood. From reference to published research, it is probable that the assemblage of breeding birds will change in composition, as the more susceptible species within the assemblage will fail to breed in the zone of influence during the operational period, but others will continue to breed and some may be more successful than usual, by taking advantage of the spare resources not employed by the susceptible species. As there is alternative suitable breeding habitat contiguous with the zone of influence, it is likely that the susceptible birds will move back in after the temporary access is removed, although it may be several generations before the assemblage resembles its baseline condition.

- 4.26 Box 13 gives an example of the way in which setting the baseline enables effective assessment of cumulative effects.

Box 13: Example scenario for setting the baseline and assessment of cumulative impacts

The scenario

An EIA is being carried out for a proposed extension to an existing port facility within an estuary. The extension will involve the removal of an area of inter-tidal mud and dredging of sub-tidal mud, both areas are out with, but adjoin, an SSSI. Expansion of another port in the same estuary is currently underway.

Analysis

The approach to setting the baseline and considering cumulative impacts should be agreed after discussion between the competent authority, the statutory nature conservation agency and any other relevant agencies. It is likely to include consideration of the following:

Predicting the Baseline

- Ecological and other trends affecting the baseline condition of inter-tidal habitats, e.g. sea-level rise, climate change or anticipated changes in the level of disturbance caused by the visiting public.
- Predicted impacts arising from the current port expansion, as reported in the ES.
- Predicted (but yet to occur) effects from completed projects, e.g. long-term erosion of inter-tidal habitats expected to occur as a consequence of the original port, acting together with the inter-tidal habitat erosion predicted to occur as a consequence of the proposed port expansion.

Considering cumulative impacts

The changes arising from the new project should be described in the context of the predicted baseline e.g. the current port expansion project is likely to include a capital dredge, which, together with environmental trends and predicted (but yet to occur) effects from completed projects, will change the

estuary morphology. This predicted situation is the baseline, against which any changes arising from the capital dredge for the new project should be assessed, such as changes to the hydraulic processes that act on the inter-tidal habitats of the SSSI.

Assessment of whether Impacts are Ecologically Significant

Determining ecologically significant impacts

- 4.27 Legislation and policy guidance often require significant negative or positive impacts to be distinguished from others, although there is little guidance on how this distinction should be made. In this guidance an ecologically significant impact is defined as an impact (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area. These terms are defined below in paragraphs 4.34 – 4.45.
- 4.28 The value of any feature that will be significantly affected is then used to identify the geographical scale at which the impact is significant. This value relates directly to the consequences, in terms of legislation, policy and/or development control at the appropriate level. So, a significant negative impact on a feature importance at one level would be likely to trigger related planning policies and, if permissible at all, generate the need for development control mechanisms, such as planning conditions or legal obligations, as described in those policies.
- 4.29 If an impact is found not to be significant at the level at which the resource or feature has been valued, it may be significant at a more local level. Thus, referring back to the example in paragraph 4.25, if the assemblage of birds represented 5% of this resource at one level, but 80% of the resource more locally, the impact is likely to be significant to the breeding birds there, even if it was not considered significant at the broader scale.
- 4.30 During the assessment process, it may be found that a site or ecosystem considered likely to be subject to a significant impact and therefore ‘scoped in’, is, on further investigation, unlikely to suffer a negative impact to its integrity. However, this will not preclude there being features within that site that are themselves of sufficient value to meet the threshold for the assessment and for which there is likely to be a significant effect on their conservation status. For example, whilst a particular impact may not be considered likely to have a negative effect on the integrity of an SPA, it may be found to be likely to have a significant impact on the conservation status of a population within the SPA (not a qualifying species) that is of local value.
- 4.31 To summarise 4.28 and 4.29, if an ecological resource or feature is likely to experience a significant impact, the consequences in terms of development control, policy guidance and legislation will depend on the level at which it is valued. Significant impacts on features of ecological importance should be mitigated (or compensated for) in accordance with guidance derived from policies applied at the scale relevant to the value of the feature or resource. Any significant impacts remaining after mitigation (the residual impacts), together with an assessment of the likelihood of success in the mitigation, are the factors to be considered against legislation, policy and development control in determining the application.
- 4.32 There may be conditions or legal agreements attached to a consent to ensure the delivery of the proposed mitigation. The willingness of the proponent to enter into such arrangements will influence the assessment of the likelihood of success of the mitigation.
- 4.33 An example of how this approach might be applied in practice is given at the end of this chapter.

Integrity

- 4.34 In order to test whether or not an impact will affect the integrity of a site or ecosystem (and is thereby significant) it is necessary to understand whether the changes arising from the proposed project are likely to move the baseline conditions at the site or ecosystem closer to, or further

from, the condition which constitutes 'integrity' for that system. Advice on the use of the concept of integrity is given below.

- 4.35 The term 'integrity' has a long lineage in the ecological literature. The concept of 'integrity' evolved to deal with ecosystems and can be applied to sites that can reasonably be considered to represent an ecosystem.
- 4.36 Development control under the EC Habitats Directive and associated national regulations, relating to SACs and SPAs requires that development shall normally not be permitted when it will negatively affect the 'integrity' of such sites. In this case, a particular definition of site integrity is provided in the *Government circular: biodiversity and geological conservation – statutory obligations and their impact within the planning system*⁶⁷ and in the equivalent Welsh guidance (TAN 5)⁶⁸ and Scottish guidance⁶⁹ as follows:

'The integrity of a site is the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified.'

- 4.37 A site/ecosystem that achieves this level of coherence is considered to be at favourable condition.
- 4.38 To help understand this further, the components of ecological integrity of a site/ecosystem may be identified from previous published discussion (see the review by Leo and Levin 1997⁷⁰) and include the following:
- the assemblage of different ecosystem processes, including human influences (some of the ecosystem processes and human influences are listed in Box 12);
 - the dynamics of the ecosystem at different scales; and
 - the levels of habitats and/or populations, where the desired condition is the average level that would be considered '*acceptably characteristic of the site or ecosystem*'.

- 4.39 For many sites, neither the favourable nor the baseline condition is described in these or any other terms. The ecologists contributing to the EclA will therefore have to make their own assessments of what constitutes the baseline and favourable conditions. This should be done with reference to the extent and size of habitats and populations present at the time of the assessment, but recognising that this composition may change over time, due to natural dynamism or other influences not related to the proposed project. In certain circumstances, the potential levels of resources may also be relevant.

- 4.40 In order to assist ecologists to determine whether there is likely to be an effect on the integrity of a site or ecosystem, the answers to the following questions should be considered:

1. Will any site/ecosystem processes be removed or changed?
2. What will be the effect on the nature, extent, structure and function of component habitats?
3. What will be the effect on the average population size and viability of component species?

This should be in the light of the overall question:

- Will this move the condition of the ecosystem/site towards or away from favourable condition?

- 4.41 It should be noted that it is very unlikely to be possible to evaluate impacts in terms of integrity without considering functions and processes acting outside a site's formal boundary, particularly where a site clearly falls within a wider ecosystem. Thus any predictions should always consider wider ecosystem processes.

- 4.42 Many ecosystems have a certain 'freeboard' in terms of biophysical change that can be absorbed before the fundamental ability of the site or ecosystem to support characteristic habitats or species populations is compromised. Clearly there will sometimes be an element of doubt as to

whether the change is sufficient to cause such changes to condition described above. This should be reflected in confidence levels attached to the prediction. Mitigation measures may then be proposed to increase the level of confidence in that prediction, even when a negative effect on integrity is not predicted.

- 4.43 When assessing potential impacts on sites with international and national designations, integrity should be considered with detailed reference to the published citations and conservation strategies. Many such strategies list conservation objectives with associated 'criteria features', 'attributes', 'measures' and 'targets' against which likely changes can be assessed (see e.g. Wheeldon 2003⁷¹). Similar information on the features of value and objectives for their conservation are also frequently available for SSSIs.
- 4.44 In cases of reasonable doubt, especially in relation to sites of European or national value, a precautionary view should always be taken, and a negative effect on integrity predicted.
- 4.45 For beneficial effects that may result in the creation of new sites or ecosystems, or intervention to restore degraded examples, the concept of integrity is equally applicable in that the intervention must be sufficiently robust as to *sustain* the new level of value created in all reasonably predictable scenarios.

Conservation status

- 4.46 It is recommended that the concept of 'conservation status' is used to determine whether an impact on a habitat or species is likely to be ecologically significant.
- 4.47 The EC Habitats Directive (Article 1, sections (e) and (i)) provide a helpful definition of 'conservation status' for habitats and species. This guidance uses slightly modified versions of these definitions so that evaluation of conservation status can be applied to habitats or species within any defined geographical area:
- for habitats, conservation status is determined by the sum of the influences acting on the habitat and its typical species, that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species within a given geographical area; and
 - for species, conservation status is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area.
- 4.48 Conservation status may be evaluated for any defined study area at any defined level of ecological value. The extent of the area used in the assessment will relate to the geographical level at which the feature is considered important. See Table 1.
- 4.49 In some cases, (e.g. for BAP species and habitats) there may be an existing statement of the conservation status of a feature with formal objectives and targets. Most species or habitats will not be described in this way. In this case, the conservation status of each feature being assessed should be agreed between the ecologists working on the assessment during the scoping process.
- 4.50 When assessing potential effects on conservation status, the same reasoning should be applied as set out above in relation to integrity. The known or likely trends and variations in population size should be considered. The level of ecological resilience or is likely to exist, in terms of the quality of physical and biotic conditions, that would permit the given population of a species or area of habitat to continue to exist at a given level, or continue to increase along an existing trend, should also be estimated.
- 4.51 A significant positive impact could be defined as one that prevented or slowed and existing decline as much as one that permitted a population or habitat area to increase.

Comparison with common current approaches towards impact assessment

- 4.52 There are a number of approaches for determining significance in current use. Most typically, significance is defined using a matrix in which ecological value and magnitude of impact are combined to determine different grades of significance, for example in Transport Analysis Guidance.
- 4.53 Using a wholly subjective link between value and 'magnitude', matrices generally assign different levels of significance to various cells in the matrix. Decision-makers using the results from such a matrix then have to distinguish between, for example, an impact of 'medium significance' against one of 'low significance' without any guidance other than an intuitive understanding of these terms which are inevitably subject to individual interpretation.
- 4.54 This type of matrix tends always to place negative impacts on a feature of local value into a 'low' significance category. This can downplay local values for biodiversity. A check should be made of planning policies to ascertain whether special provisions have been made for protecting such resources (e.g. in London there is a Local grade of nature conservation site below Borough Grade II level).

Worked example of this approach to EcIA

- 4.55 A worked example considers the changes affecting a Cetti's warbler *Cettia cetti* population (five breeding pairs) in the event of a road-widening scheme. Where possible these changes are measured and their impacts on the population are characterised by reference to the key aspects of the ecosystem upon which the birds rely. The likely effect on the conservation status of the population is then considered with reference to current status and conservation objectives to determine whether the impacts are significant or not.
- 4.56 A commentary provides the background to the analysis of the overall significance on integrity and conservation status of feature (that might be suitable for the main text of the ES), with a Table giving a summary of the analysis.

Worked Example: Characterisation of the 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 in question is the widening of a two-lane A road (c. 18.5 m wide) into a dual carriageway with hard shoulders (final hard surface increase to c. 34 m). This scheme is being implemented largely to take traffic out of the centre of a country town. All the widening in the stretch under consideration would take place to the east of the existing road necessitating the removal of improved grassland in this location. The scheme is located within the county of Cymrent in the west of the UK. The road in the area under consideration runs due 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 result in construction noise over six weeks. Construction activity would last eight months.

Description of feature

- 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 the UK, though there is high variability (see Snow and Perrins 1998). 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 the UK 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 though susceptible to very cold winter weather and its population in the mid-eastern counties of the UK 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 1991 (as amended). Legal protection in the UK 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 country conservation agency's '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 compromise the integrity of wetlands of ecological value.
- The erection of close-board or acoustic fencing in this area is considered to be associated with significant negative landscape and visual impacts.
- 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 Integrity or Conservation Status of 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.

Value of Cetti's Warbler Population

- At the time of study the UK 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 Value 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 value 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 impacts on the Cetti's warblers to be considered then are those that would result from increased disturbance levels during construction and operation and increased bird kill risk and isolation during operation.

Construction Impacts: Cause - Site Clearance during the Breeding Season

1.1 Proposed activity, duration of activity, biophysical change and relevance to receptor 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 possible adverse effects on the ability of birds to hold territories and breed successfully.

1.2 *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 conceivably be permanent for some individuals. Nevertheless, the effect would probably be reversible in time, once construction was over.

1.3 *Rationale for prediction of effect on integrity (of a site or ecosystem) or conservation status (of a habitat or population)*

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 **probable** that this temporary impact could negatively affect the conservation status of the local population.

1.4 *Significance without mitigation and confidence in assessment*

A significant negative impact at the County level is **probable**. Such an impact, if it occurred, would be potentially in breach of law, as the Cetti's warbler is a Schedule 1 species and hence protected from disturbance whilst breeding.

1.5 *Mitigation, enhancement and compensation*

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.

1.6 *Residual significance (confidence)*

It is **certain** that any effect of construction outside the breeding season would not be significant. With the sound barrier, the effect of construction noise would be **unlikely** to be significant.

Operational Effects 1: Cause - Increased Background Noise due to Increased Traffic Volume and Speed

1.1 *Proposed activity, duration of activity, biophysical change and relevance to receptor 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. This effect, perhaps 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).

1.2 *Characterisation of unmitigated impact on the feature*

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

1.3 Rationale for prediction of effect on integrity (of a site or ecosystem) or conservation status (of a habitat or population)

Although not specifically developed in relation to Cetti's warblers in the UK, the best available model for predicting likely 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 likely 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 effect 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 probably 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 effect 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 effect zone would, therefore, encompass the whole area of 'The Cuts' containing habitat currently suitable for Cetti's warbler. It is **certain** that 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 **probable** 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 probable). Accordingly, it is considered **probable** that the conservation status of Cetti's warbler in 'The Cuts' would be negatively affected.

1.4 Significance without mitigation and confidence in assessment

A significant negative impact at the County level is **certain**. Such an impact, if it occurred, would be potentially in breach of law, as the Cetti's warbler is a Schedule 1 species and hence protected from disturbance whilst breeding.

1.5 Mitigation, enhancement and compensation

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 **probable** that this measure would reduce the effect 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 effect 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 effect zone) would be greater than this, and the net area of good habitat for Cetti's Warbler should remain the same or increase slightly. (These actions would be mitigation measures, as they would not otherwise be implemented as part of the road scheme.)

(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 'effect distance'.

Accordingly, it is **probable** 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.

1.6 *Residual significance (confidence)*

It is **probable** that there would be a short-term, (c. 5 years) negative impact on the Cetti's warblers, significant at the County level until maturation of the mitigation measures with respect to habitat. However, in the long-term, it is **probable** that full mitigation would be achieved and the value of the feature be returned to County level and it is **probable** that there would be no residual impact of significance on the Cetti's warbler population in 'The Cuts' in relation to this biophysical change.

Operational Effects: 2: Cause - Increased Barrier Effect and Collision Risk

1.1 *Proposed activity, duration of activity, biophysical change and relevance to receptor 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).

1.2 *Characterisation of unmitigated impact on the feature*

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

1.3 *Rationale for prediction of effect on integrity (of a site or ecosystem) or conservation status (of a habitat or population)*

It is considered **probable** 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 **probably** negatively affect the conservation status of the Cetti's warblers in 'The Cuts'.

1.4 *Significance without mitigation and confidence in assessment*

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

1.5 *Mitigation, enhancement and compensation*

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. Nevertheless, 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 contribution to this grant fund would be made by the Highway Authority, were the scheme to be approved.

1.6 Residual significance (confidence)

It is considered **probable** that the population of Cetti's warblers in 'The Cuts' might experience a permanent loss of conservation status, which would constitute a significant negative impact at the County level. However, it is **probable** 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 residual 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.

References

Reijnen, M.J.S.M., Veenbaas, G. and Foppen, R.P.B. (1995). *Predicting the Effects of Motorway Traffic on Breeding Bird Populations*. Ministry of Transport and Public Works, Directorate General for Public Works and Water Management, Road and Hydraulic Engineering Division; DLO - Institute for Forestry and Nature Research, Rijkswaterstaat.

Reijnen, R., Foppen, R.F., Veenbaas, G. & Bussink, H. (2002). *Disturbance by Traffic as a Threat to Breeding Birds: Valuation of the Effect and Considerations in Planning and Managing Road Corridors*. In: B. Sherwood, D. Cutler and J. Burton (Eds.) *Wildlife and Roads: The Ecological Impact*. Imperial College Press, London.

Snow, D. and Perrins, C. (2000) *The Complete Birds of the Western Palearctic* on CD-rom. Oxford University Press.

Table 1: Summary Impact Table

Proposed Activity	Characterisation of unmitigated impact on the feature	Significance without mitigation and confidence level	Mitigation and Enhancement	Residual significance and confidence level
Construction Impacts				
Site clearance and construction	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. It is not possible to quantify the magnitude of this, but it is likely to be reversible after the end of construction.	Negative effect on conservation status: probable . Therefore, significant negative impact at the County level: probable .	<i>Option 1:</i> Avoidance of construction in the breeding season. <i>Option 2:</i> Construction of permanent sound barrier in advance (see below).	<i>Option 1:</i> Certain not to have a negative effect on conservation status therefore not significant . <i>Option 2:</i> Tried and tested engineering technique. Unlikely to have a negative effect on conservation status, therefore unlikely to be significant at the County level.
Operational Impacts				
Increased background noise due to increased traffic volume and speed.	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 probably 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.	Negative effect on conservation status: certain . Therefore significant negative impact at the County level: certain .	Combination of woodland buffer planting (or planting plus sound barrier), plus restoration of eastern part of the CWS to support Cetti's warblers.	Probable negative effect significant at the County level in the short-term (c. 5 years), Probable that effect on local population and at the County level in the long-term not significant .
Increased barrier effect and collision risk	The effect on dispersal ability due to increased road width, higher vehicular speeds and collisions would have a probable negative impact on the local Cetti's warbler population and would be effectively permanent, though compensation should be feasible.	Negative effect on the conservation status: probable . Therefore, significant negative impact at the County level: probable .	Cannot be readily mitigated. Compensation proposed by financial contribution to implementation of County BAP for the species.	Probable significant negative impact at the County level. With compensation probable that not significant in the long-term.
Overall Significance of Effect		Without mitigation: Negative effect at the County level: significant .		If all mitigation/enhancement undertaken: Negative effect at the County level in the medium term: significant . Negative effect at the County level in the longer term: not significant .

5. MITIGATION, COMPENSATION AND ENHANCEMENT

Overview

- 5.1 There is a growing body of opinion that new developments should deliver net ecological gain rather than simply being designed to achieve mere damage limitation. Therefore, right from the start, proponents of any scheme should incorporate, as part of the proposals for scheme design and implementation, measures that are required to deliver ecological enhancements as well as measures to:
- avoid negative ecological impacts - especially those that could be significant;
 - reduce negative impacts that cannot be avoided; and
 - compensate for any remaining significant negative ecological impacts.
- 5.2 Wherever possible, enhancement and mitigation measures should be developed and incorporated into a project as part of the design process, as measures that are fully integrated into a project have a greater guarantee of delivery. The objective should always be to agree the identified measures with the proponent of a project so that they become part of the scheme that is subject to detailed assessment. A shopping list of 'proposed mitigation' at the end of an EclA is of very little value as it requires the competent authority to enter into discussion with the proponent to agree what will be implemented. An EclA is effectively meaningless if it provides an assessment of the significance of the residual impacts of a scheme based on the proposed mitigation measures being implemented even though these measures have not been agreed by the developer⁷².
- 5.3 Priority should be given to the avoidance of impacts at source, whether through the re-design of a project or by regulating the timing or location of activities. If it is not possible to avoid significant negative impacts, opportunities should be sought to reduce the impacts, ideally to the point that they are no longer significant. If this is not possible, but the scheme is permitted, compensation may be appropriate. This should be designed to meet specific ecological objectives that will deliver meaningful compensation for the negative impacts that are predicted. The objectives may include:
- primary, high level objectives related to the reasons for compensation, gross area of compensation and overall quality of compensation; and
 - detailed objectives comprising specific ecological requirements for the habitat compensation scheme in terms of, for example, the number of birds and the habitats that they require.
- 5.4 However, compensation often carries a degree of uncertainty. Furthermore, even if it is effective, there may be a temporary or permanent loss of ecological value due to a time lag between damage occurring and the new habitat becoming fully functional.
- 5.5 Due to the uncertainty associated with the success of proposed mitigation (and particularly compensation) measures, evidence should be provided of the effectiveness of recommended mitigation, compensation and enhancement measures and to what extent their success can be guaranteed. If possible, information from similar projects should be used to support statements about the level of success that can be reasonably expected.
- 5.6 The uncertainty associated with a project will vary according to a number of factors, including the:
- technical feasibility of what is proposed (e.g. experience of projects where the proposed mitigation has been employed or carried out);
 - overall quantity of what is proposed (e.g. is it large enough to be viable; is it of equivalent extent to that of lost habitat?);
 - overall quality of what is proposed (e.g. does it compare favourably with features lost and those whose loss or damage is to be compensated?);

- level of commitment provided to achieve what is proposed (e.g. is there a realistic understanding of what resources and effort will be required to achieve predicted outcomes?); and
- timescale over which predicted benefits are to be realised.

5.7 Mitigation should be presented in terms of the integrity or conservation status of the resources or features to which it applies. For example, mitigation may be designed to ensure that the status of a species population can be maintained following development (see Table 1).

Monitoring of mitigation/compensation

5.8 If mitigation/compensation measures are part of planning conditions or obligations, the proponent has a requirement to implement them fully (see Chapter 6). These conditions or obligations may require the implementation of a monitoring programme and any remedial measures that are identified as being necessary. Where this is not the case, it is good practice to monitor the success of mitigation or compensation measures that are proposed as part of an EclA, and to remedy the situation should any of the implemented measures fail (e.g. due to lack of management). An Environmental Action Plan (EAP) can be a useful means of drawing together mitigation, compensation, enhancement, management and monitoring proposals. Joint agreement of EAPs by proponents and consultees can strengthen their implementation. An EAP may be enforced by legal agreement.

5.9 Follow-up and monitoring is more likely to take place if it is built into legal agreements or planning conditions. Ideally, measurable objectives, which set the trigger thresholds for remedial management action, should be agreed by all of the ecologists involved in the EclA process.

Reporting mitigation, compensation and enhancement

5.10 It is often helpful to set out in an EclA report how a project has evolved in response to ecological considerations and to indicate how mitigation that has been incorporated into the scheme design has enhanced ecological outcomes. Some ecologists present the results of impact assessment 'with' and 'without' mitigation, so that the need for mitigation is clearly justified. However, where mitigation is fully integrated into the scheme and there is high confidence that it will be implemented and will deliver the desired outcomes, it may be appropriate simply to assess the significance of impacts of the mitigated project.

6. CONSEQUENCES FOR DECISION-MAKING

Overview

- 6.1 This section considers the point at which the findings of the EclA are applied by a competent authority to the decision-making process. By this stage the significant impacts and the value of the affected ecological features and resources will have been determined. The purpose of this stage is for the competent authority to determine whether the mitigated project:
- complies with legal requirements e.g. the need to obtain a licence for any work affecting protected species or, the implications of the findings in respect of the relevant country regulation of the Conservation (Natural Habitats, &c.) Regulations^{73, 74, 75}. (These require a competent authority, before deciding to undertake or give any consent, permission or other authorisation for a plan or project, to make an 'appropriate assessment' of the implications for the site in view of the relevant European sites' conservation objectives.);
 - meets national and local policy goals and objectives; and
 - requires conditions and legal obligations attached to the consent that deal with aspects of the detailed design and implementation of the project.
- 6.2 The scoping stage presents the first opportunity to make explicit the legal and policy context in which the EclA process should take place. Everyone involved 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. Failure to take account of the legal and policy context, and to provide sufficient information to comply with this, may result in an application being refused.
- 6.3 Table 2 identifies many of the sources of relevant legislation and policies, and the development control tools available.

Legal Implications

- 6.4 The legal implications arising out of an EclA should be made explicit and where an EclA is undertaken as part of an EIA, it is also subject to the relevant EIA Regulations. (See paragraph 1.2)
- 6.5 The competent authority must obtain all the information needed to assess and evaluate the likely significant environmental effects of a project before it reaches its decision regarding the grant of consent. For EIA development, it has been confirmed in a recent judgement (see Box 14) that the competent authority cannot adopt a 'wait and see' approach or impose a condition requesting further work to identify the likely environmental impacts after permission has been granted. It is therefore crucial that all information relevant to describing likely significant ecological impacts is collected prior to the submission of an ES.
- 6.6 Where the competent authority considers that the information is insufficient it has the power to 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 exercise this power.
- 6.7 Where there are likely to be significant impacts on an SAC, SPA, or Ramsar site, it is the responsibility of the proponent to supply information about the predicted ecological impacts on the integrity of the site in a form that enables the relevant competent authority to write the 'appropriate assessment'.

Box 14: R v Cornwall County Council *ex parte* Jill Hardy (2001)⁷⁶

Planning permission was granted for a project for which the applicant prepared an ES under the EIA Regulations. Although it was known that the site could support bats and that the project was likely to have a negative impact on any bats that were present, the applicant did not investigate their presence. The planning authority, advised by English Nature, attached a condition to the planning permission requiring the applicant to carry out a survey to establish whether bats were present prior to commencing development. However, the Court held that the presence of bats could result in there being a significant effect and hence that information about bats should have been included in the ES, in order to comply with the EIA Regulations (Regulation 3(2)). The planning permission was quashed (the reason being the failure to investigate a likely significant effect rather than the fact that a legally protected species was present *per se*).

Policy Implications

- 6.8 All parties involved in EclA should be familiar with both the national and local policies that apply to a project. Key national policy documents that should be considered during EclA can be found on the relevant UK governing body web sites; local policy documents are also often available on the web (e.g. on local authority web sites). Relevant documents might include national and local BAPs, various forms of government planning guidance and advice, relevant Local Development Frameworks and existing Development Plans (including Structure, Local, Waste, Mineral and Unitary Development Plans).
- 6.9 The EclA should be prepared with this national and local policy context in mind. It should aim to provide sufficient information to enable a full and adequate determination to be made in light of these policies.
- 6.10 If the project being assessed has emerged from the process of preparing a development plan for which a Sustainability Appraisal (SA)/SEA has been undertaken, the results of the SA/SEA may be relevant to the EclA, particularly in the context of any consideration of alternatives to the project.

Implications for Detailed Design and Implementation if Consent is Granted

- 6.11 Conditions and legal agreements are often needed to enforce the implementation of mitigation, compensation and enhancement measures (see Chapter 5). These obligations must be enforced by the competent authority. This can be particularly challenging when the obligations were developed with one organisation but a different organisation then implements the consent, such as when a 'design and build contract' is let to implement an outline permission.
- 6.12 It is very important for all parties involved in the impact assessment process to understand fully the actions they need to take during the implementation stages of a project that has been subject to EclA. This will mean identifying and designing in detail the measures necessary to compensate and mitigate for negative impacts, and also any measures necessary to achieve enhancements.
- 6.13 It is important that a proponent is able to demonstrate commitment to the full implementation of the proposed mitigation, enhancement and compensation measures. Commitment can be demonstrated relatively easily through the submission of designs and supporting information. These 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 (e.g. in an EAP). More specifically, the information provided might include:
- details of how funding for the implementation of the proposed measures will be secured;
 - location and extent of the proposed measures shown on appropriate scale plans;
 - a timetable for implementation of design options and integration with various 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 successfully the design options;

- adequate provision of all other necessary resources required to implement the design options;
- a statement of how design options will be secured within the planning process, e.g. through the use of planning conditions and/or planning obligations;
- publication of monitoring data and its interpretation (to facilitate the monitoring of outcomes); and
- details of proposed liaison with local expertise (by the consultant and/or applicant) and the means by which local people can feed their ideas into any solutions.

6.14 If such detail is not provided initially in the EclA, then it must either be provided as a further submission prior to the decision-maker granting approval, or be made a condition of the approval (requiring submission within a specified period after approval). Within the planning process, planning conditions and obligations (for example, Section 106 Agreements in England and Wales, Section 75 Agreements⁷⁷ in Scotland and Section 40 Agreements⁷⁸ Northern Ireland) provide enforceable mechanisms to secure the subsequent submission of information for approval. Equally important, these mechanisms provide a means to ensure that identified measures are implemented in full.

Table 2: Examples of ecological, legal and policy implications

Importance of resource or feature	Ecological Implications	Legal Implications	Policy Implications	Implications for Development Control (Detailed Design and Implementation)
Negative Impacts				
International	<i>E.g.</i> Loss and fragmentation of a lowland heathland, negatively affecting the integrity of an SAC and permanent reduction in feeding and breeding habitat for a resident population of sand lizards (protected under Schedule 5 (Wildlife and Countryside Act 1981) and Annex II (EC Habitats Directive)).	Under the Regulations (Regulation 48 of the Habitat Regulations (1994) in England, Regulation 17 in Northern Ireland, Regulation 16 in Scotland); the competent authority may not be able to grant consent for the development. Affects Schedule 5 and Annex II protected species.	Project does not comply with development plan policies for the protection of internationally and nationally important sites, nor with policies relating to legally protected species.	Having been satisfied that, there are no alternative solutions and if, despite mitigation, it cannot be concluded that there will be no negative affects on the integrity of the heathland, by law planning permission cannot be granted, unless there are over-riding issues of public interest. Redesign of the project or relocation to another site may be necessary. If consent is granted, compensation for damage will be required by the Secretary of State under Regulation 53, and secured via planning conditions and obligations. Also, impacts on sand lizards must be avoided and/or mitigated, requiring licences from the relevant statutory body.
National	<i>E.g.</i> Permanent loss of 3 ha of unimproved neutral grassland designated as an SSSI/ASSI.	Likely conflict with the LPA's duty under section 28G of the Wildlife and Countryside Act 1981 (as amended), Section 12 Nature Conservation (Scotland) Act 2004. The Planning Authority will be required to consult with statutory conservation agency before authorising a damaging project.	Conflicts with development plan policies for the protection of nationally important sites.	If, despite mitigation, negative affects cannot be avoided, planning permission is likely to be refused; unless there are over-riding material planning considerations. If permission is granted, detailed compensation measures (related in scale and kind) should be secured through planning conditions and/or obligations. These should be in addition to mitigation and enhancement measures, which might also need to be secured through planning conditions and/or obligations.

Importance of resource or feature	Ecological Implications	Legal Implications	Policy Implications	Implications for Development Control (Detailed Design and Implementation)
Regional/ county	<i>E.g.</i> Permanent clearance of 0.5 ha of mature woodland designated as a Local Site.	May conflict with conditions for timber felling, licensed by Forest Authority or the Forest Service Northern Ireland May conflict with NERC Act 2006 where such sites host habitats/species are listed under Section 41.	Conflicts with development plan policies protecting Local Sites. May trigger 'no net loss' policies requiring adequate mitigation and compensation.	If, despite mitigation, negative affects cannot be avoided, permission is only likely to be granted if there are over-riding material planning considerations. If permission is granted, detailed compensation measures (related in scale and kind) should be secured through planning conditions and/or obligations. These should be in addition to mitigation and enhancement measures which might also need to be secured through planning conditions and/or obligations.
Local	<i>E.g.</i> Temporary reduction in breeding bird numbers in neighbourhood due to clearance of scrub, which will be allowed to then regenerate.	May conflict with Wildlife & Countryside Act 1981, Section 1, Nature Conservation (Scotland) Act 2004 Schedule 6, The Wildlife (Northern Ireland) Order 1985 Part II Sec.4; if implemented during the breeding season.	May trigger 'no net loss' policies in development plan requiring adequate mitigation and compensation.	Measures to provide compensation of an equal or greater area of scrub should be secured through planning conditions or obligations. Long-term management may be part of these measures. Clearance should be conditioned to avoid the bird nesting season.
Positive Impacts				
International	<i>E.g.</i> Creation of an extensive reedbed providing increased feeding and shelter in an area likely to attract and increase population of bittern. (Berne Convention (2), Bonn Convention (2), Birds Directive, Wildlife & Countryside Act 1981) Nature Conservation (Scotland) Act 2004).	May comply with planning policies responding to the statutory duty on LPA imposed by Planning and Compensation Act (1990) ⁷⁹ Schedule 12.	Makes significant contribution to national and local BAP targets to increase the extent of UK Priority Habitat.	The detailed design, physical installation and aftercare of the proposed reedbed should be secured through planning conditions and obligations. Provision for long-term management and monitoring should also be secured through (possibly) conditions and/or (more likely) by planning obligations. Where appropriate, transfer of the land to an appropriate body may also be necessary and secured through a planning obligation.

National	<i>E.g.</i> Provision of expanded feeding and shelter resources for dormice by planting native woodland adjacent to a large area of ancient woodland already containing dormice. (Berne Convention (3), EC Habitats Directive (4), Wildlife & Countryside Act 1981, Wildlife (Northern Ireland) Order 1985 (5, 6), Nature Conservation (Scotland) Act 2004 Schedule 6).	Contributes to the implementation of Habitat Regulations (37) (1994).	Complies with development plan policies seeking the management of landscape features of major importance for wild flora and fauna.	Detailed measures and adequate resources for habitat restoration and for long-term management should be secured through planning conditions and/or obligations (monitoring should ideally be an integral part of long-term management practices). Where appropriate, transfer of the land to an appropriate body may also be necessary and secured through a planning obligation.
Regional	<i>E.g.</i> Restoration and management of neglected wet grassland to provide improved opportunities for feeding and shelter for a small colony of marsh fritillary butterflies (Wildlife & Countryside Act 1981, Wildlife (Northern Ireland) Order 1985 (5), Nature Conservation (Scotland) Act 2004 Schedule 6).	May comply with planning policies responding to the statutory duty on LPAs imposed by Planning and Compensation Act (1990) Schedule 12.	Makes a modest contribution to national and/or local BAP targets to increase the extent of a semi-natural habitat and in the long-term to provide possible additional habitat for marsh fritillaries.	Detailed measures and adequate resources for habitat restoration and for long-term management should be secured through planning conditions and/or obligations (monitoring should ideally be an integral part of long-term management practices). Where appropriate, transfer of the land to an appropriate body may also be necessary and secured through a planning obligation.
Local	<i>E.g.</i> Planting of new hedgerow to increase movement opportunities for mobile species.	May comply with planning policies responding to the statutory duty on LPAs imposed by Planning and Compensation Act (1990) Schedule 12.	Complies with a development plan policy designed to achieve landscaping and nature conservation benefits.	Planting design, installation and aftercare should be secured in detail through the use of a planning condition.

¹ Schedule 12 of the Planning and Compensation Act (1990) requires local planning authorities to include in their development plans, policies for *'the conservation of the natural beauty and amenity of the land'* and *'the improvement of the physical environment'*. Development Plans may therefore include policies to secure net gains for biodiversity (especially where it is possible to make a contribution to national and/or local BAP targets).

Glossary

Appropriate Assessment	This is an assessment carried out under Regulation 48 of the Habitats Regulations.
Assemblage	A group of species found in the same location.
Avoidance	See mitigation.
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 range of variability among systems and organisms at the following levels of organisation: bioregional, landscape, ecosystem, habitat, communities, species, populations, individuals, genes and the structural and functional relationships within and between these different levels.
Buffer zone	An area (human-made or natural) that helps to protect a habitat from damage, disturbance or pollution. It is managed to protect the 'integrity' of the valued habitat and/or the conservation status of species that it supports.
Carrying capacity	The maximum number of organisms or amount of biomass that can be supported in a given area.
Compensation	Measures taken to make up for the loss of, or permanent damage to, biological resources through the provision of replacement areas. Any replacement area should be similar to or, with appropriate management, have the ability to reproduce the ecological functions and conditions of those biological resources that have been lost or damaged.
Competent authority	An organisation or individual who is responsible for determining an application for a consent for a project. In the context of the 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.
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.
Effect	These guidelines use the word impact rather than effect when referring to how ecological resources might be affected by a project.
Environmental Action Plan (EAP)	In these Guidelines EAP has been used to denote Environmental Management Plans and Environmental Design Management systems.
Environmental Impact Assessment (EIA)	This is an assessment carried out under the EIA Regulations.
EIA Regulations	The UK statutory instruments that are designed 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 Directive 97/11/EC.
Enhancement	A new benefit to biodiversity, unrelated to any negative impact.
Fragility	The degree of sensitivity of habitats, communities and species to environmental change. It requires a consideration of intrinsic and extrinsic factors.
Fragmentation	The breaking up of a habitat, ecosystem or land-use type into smaller parcels.
Habitat	A place in which a particular plant or animal lives. Often used in the wider sense referring to major assemblages of plants and animals found together.
Impact	The way in which an ecological resource/receptor is affected by a project (see effect).
Integrity	The coherence of a site's ecological structure and function across its whole area that

	enables it to sustain the habitat, complex of habitats and/or levels of populations of the species for which it was classified.
Local Sites	'Non-statutory' sites of nature conservation value that have been designated 'locally' (<i>i.e.</i> excluding SSSIs, ASSIs, SPAs, SACs, and Ramsar Sites). Local Nature Reserves are included as they are a designation made by the Local Authority not statutory country conservation agencies. These are often called Wildlife 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).
Natural Areas	Biogeographic regions in England as specified by English Nature.
Natural Heritage Futures	Biogeographic regions in Scotland as specified by Scottish Natural Heritage.
Network	An interconnected system of corridors.
Niche	The 'space' or 'ecological role' occupied by a species and the resources used by a species. Conceptually the niche is multidimensional and each resource (food, time of feeding, etc.) and each abiotic factor (salinity, temperature, etc.) can be considered to be a dimension of the niche.
Net gain	The point at which the quality and quantity of habitats or species improves compared to their original condition. <i>i.e.</i> improvements over and above those required for mitigation/compensation.
No net loss	The point at which habitat or biodiversity losses equal their gains, both quantitatively and qualitatively.
Population	A collection of individuals (plants or animals), all of the same species and in a defined geographical area.
Project	In these guidelines 'project' is used to refer to any development proposal(s)/scheme or other land use change for which it may be appropriate to undertake an EclA.
Rarity	A measure of relative abundance.
Receptor	Any ecological or other defined feature (<i>e.g.</i> human beings) that is sensitive to or has the potential to be affected by an impact.
Reduction	See mitigation.
Resource	Any ecological or other environmental component affected by an impact.
Restoration	The re-establishment of a damaged or degraded system or habitat to a close approximation of its pre-degraded condition.
Scale	The level or geographic context for evaluation.
Schedule 1	Development that falls within a relevant description in Schedule 1 to the EIA Regulations always requires EIA.
Schedule 2	Development of a type listed in Schedule 2 to the EIA Regulations requires EIA if it is development likely to have significant effects on the environment by virtue of factors such as its size, nature or location.
Scoping	Determination of the extent of an assessment (of an EclA or full EIA).
Screening	Determination of whether or not an EIA is necessary.
UK governing body websites	The websites of the Office of the Deputy Prime minister (ODPM), the Welsh Assembly, Scottish Executive and Department of the Environment Northern Ireland.
Zone of influence	The areas/resources that may be affected by the biophysical changes caused by activities

	associated with a project.
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Country Specific Information

<p>DEVELOPMENT PLANS</p>	<p>Strategic Environmental Assessment (SEA) of Unitary Development Plans Interim Good Practice Guide (Amendment to SEA Elements of Sustainability Appraisal of Unitary Development Plans, 2002) http://www.wales.gov.uk/subiplanning/content/devplans/sea-interim-good-prac-guide/strat_env_assess-e.pdf</p> <p>The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 Schedule 2 Development: Project Category 10(B) 'Urban Development Projects' http://www.wales.gov.uk/subiplanning/content/eia/aarhus-cons-e.pdf</p>
<p>DRAINAGE</p>	<p>Drainage (Environmental Impact Assessment) Regulations (Northern Ireland) 2001 Statutory Rule 2001 No. 394 http://www.opsi.gov.uk/sr/sr2001/20010394.htm</p> <p>Planning Advice Note PAN 61 Planning and Sustainable Urban Drainage Systems July 2001 http://www.scotland.gov.uk/library/pan/pan61-00.asp</p> <p>Land Drainage Act 1991 (c.59) Welsh Assembly Information http://www.wales.gov.uk/subiplanning/topics-e.htm</p> <p>Environmental Impact Assessment (Land Drainage Improvement Works) (Amendment) Regulations 2005 2005 No.1399 http://www.opsi.gov.uk/si/si2005/20051399.htm</p>
<p>EIA</p>	<p>Environmental Impact Assessment (Scotland) Regulations 2002 Regulatory Impact Assessment - June 2002 http://www.scotland.gov.uk/publications/2002/08/15068</p> <p>Environmental Impact Assessment (Scotland) Regulations 1999: Circular 15/1999 http://www.scotland.gov.uk/library2/doc04/eia-00.htm Circular Gives Guidance on The Environmental Impact Assessment (Scotland) Regulations 1999 (ssi 1999/1)</p> <p>Environmental Impact Assessment (Scotland) Regulations 1999 (SSI 1999/1) http://www.scotland.gov.uk/Publications/1999/08/circular-15-1999/circular-15-1999</p> <p>Environmental Impact Assessment http://www.snh.org.uk/www/sharinggoodpractice/eia_home.asp</p>

<p>FORESTRY</p>	<p>Statutory Rule 2002 No. 249 Environmental Impact Assessment (Forestry) (Amendment) Regulations (Northern Ireland) 2002 http://www.opsi.gov.uk/sr/sr2002/20020249.htm</p> <p>Environmental Impact Assessment (Forestry) Regulations (Northern Ireland) 2000 Statutory Rule 2000 No. 84 http://www.opsi.gov.uk/sr/sr2000/20000084.htm</p> <p>Statutory Instrument 1999 No. 2228 The Environmental Impact Assessment (Forestry) (England and Wales) Regulations 1999 http://www.opsi.gov.uk/si/si1999/99222803.htm</p> <p>Scottish Statutory Instrument 1999 No. 43 The Environmental Impact Assessment (Forestry) (Scotland) Regulations 1999 http://www.opsi.gov.uk/legislation/scotland/ssi1999/19990043.htm</p>
<p>FRESHWATERS</p>	<p>Water Framework Directive http://europa.eu.int/comm/environment/water/water-framework/index_en.html</p> <p>The Water Resources (Environmental Impact Assessment) Regulations (Northern Ireland) 2005 Statutory Rule 2005 No. 32 http://www.opsi.gov.uk/sr/sr2005/20050032.htm</p> <p>Statutory Instrument 2003 No. 164 The Water Resources (Environmental Impact Assessment) (England and Wales) Regulations 2003 http://www.opsi.gov.uk/si/si2003/20030164.htm</p> <p>Scottish Planning Series Planning Circular 3 2003 Environmental Impact Assessment (Water Management) (Scotland) Regulations 2003 http://www.scotland.gov.uk/library5/planning/pc303-00.asp</p> <p>Water Environment and Water Services (Scotland) Act 2003 http://www.opsi.gov.uk/legislation/scotland/acts2003/20030003.htm</p> <p>Environmental Impact Assessment (Water Management) (Scotland) Regulations 2003 http://www.sepa.org.uk/groundwater/legislation/environmental_impact_assessment_2003.htm</p> <p>The Water Environment (Controlled Activities) (Scotland) Regulations 2005: Policy Statement and Regulatory Impact Assessment http://www.scotland.gov.uk/Publications/2005/05/0995747/57510</p> <p>Policy Statement and Regulatory Impact Assessment accompanying the Controlled Activities Regulations</p>

	<p>http://www.scotland.gov.uk/Publications/2005/05/0995747/57481</p> <p>Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31991L0676&model=guichett</p> <p>Groundwater: Legislation Nitrates Directive (91/67/EEC) http://www.sepa.org.uk/groundwater/legislation/nitrates.htm</p> <p>Nitrates - Reducing Water Pollution from Agriculture Implementing the Nitrates Directive in England http://www.defra.gov.uk/environment/water/quality/nitrate/directive.htm</p> <p>Urban Waste Water Treatment Directive http://www.defra.gov.uk/environment/water/quality/uwwtd/default.htm</p> <p>The Urban Waste Water Treatment (Scotland) Regulations 1994 Statutory Instrument 1994 No. 2842 (S.144) http://www.opsi.gov.uk/si/si1994/Uksi_19942842_en_1.htm</p> <p>Groundwater: Legislation, Policy and Guidance http://www.sepa.org.uk/groundwater/lpg.htm</p>
HARBOUR WORKS	<p>The Harbour Works (Environmental Impact Assessment) Regulations (Northern Ireland) 2003 Statutory Rule 2003 No. 136 http://www.opsi.gov.uk/sr/sr2003/20030136.htm</p> <p>Statutory Instrument 1999 No. 3445 The Harbour Works (Environmental Impact Assessment) Regulations 1999 http://www.opsi.gov.uk/si/si1999/19993445.htm</p> <p>Statutory Instrument 2000 No. 2391 The Harbour Works (Environmental Impact Assessment) (Amendment) Regulations 2000 http://www.opsi.gov.uk/si/si2000/20002391.htm</p>
NATURE CONSERVATION	<p>Scottish National Nature Conservation designations are listed and described in: National Planning Policy Guidelines 14. http://www.scotland.gov.uk/Publications/1999/01/nppg14</p>
PLANNING	

	<p>The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999 Statutory Rule 1999 No. 73 http://www.opsi.gov.uk/sr/sr1999/19990073.htm</p> <p>Environmental Assessment of Plans and Programmes (Scotland) Regulations 2004 Scottish Statutory Instrument 2004 No. 258 http://www.opsi.gov.uk/legislation/scotland/ssi2004/20040258.htm</p> <p>Planning Advice Note Pan 58: Environmental Impact Assessment http://www.scotland.gov.uk/Publications/1999/10/pan58-root/pan58</p> <p>Scottish Executive's website Planning Home Page http://www.scotland.gov.uk/Topics/Planning-Building/Planning</p> <p>Planning Agreements and Positive Planning for Sustainable Communities in Scotland http://www.scotland.gov.uk/Publications/2005/09/0893247/32500#2</p>
PUBLIC PARTICIPATION	<p>The Public Participation Directive 2003/35/EC Proposals to formalize public participation in modifications and reviews of certain plans and programmes on environmental matters in Northern Ireland March 2005 www.doeni.gov.uk</p>
SEA	<p>Strategic Environmental Assessment (SEA) http://www.scotland.gov.uk/topics/environment/17108/14587</p> <p>A Handbook on Environmental Impact Assessment Guidance for Competent Authorities, Consultees and Others Involved in the Environmental Impact Assessment Process in Scotland http://www.snh.org.uk/pdfs/ww/sharinggoodpractice/environmental_impact_assessment.pdf</p>

<p>UNCULTIVATED LAND AND SEMI-NATURAL AREAS</p>	<p>Statutory Rule 2006 No. 90 Environmental Impact Assessment (Uncultivated Land and Semi-Natural Areas) Regulations (Northern Ireland) 2006 http://www.opsi.gov.uk/Sr/sr2006/20060090.htm</p> <p>Environmental impact assessment for use of uncultivated land or semi-natural areas for intensive agricultural purposes http://www.defra.gov.uk/enviro/eia/guidelines.pdf</p> <p>The Environmental Impact Assessment (Uncultivated Land and Semi-Natural Areas) (England) (Amendment) Regulations 2005 Statutory Instrument 2005 No. 1430 http://www.opsi.gov.uk/si/si2005/20051430.htm</p> <p>Environmental Impact Assessment (Uncultivated Land and Semi-Natural Areas) (Scotland) Regulations 2002 (2002 No 6) http://www.scotland.gov.uk/publications/2002/08/15083</p> <p>Welsh Statutory Instrument 2002 No. 2127 (W.214) The Environmental Impact Assessment (Uncultivated Land and Semi-Natural Areas) (Wales) Regulations 2002 http://www.opsi.gov.uk/legislation/wales/wsi2002/20022127e.htm</p>
<p>WINDFARMS</p>	<p>Renewables: Visual Assessment of Windfarms: Best Practice http://www.snh.org.uk/pubs/results.asp?o=title&q=windfarms</p> <p>Windfarms: Guidelines on the environmental impacts of windfarms and small-scale hydroelectric schemes http://www.snh.org.uk/pubs/results.asp?o=title&q=windfarms</p>
<p>OTHER</p>	<p>Table of European and United Kingdom Legislation Relevant to the Environment Agency http://www.environment-agency.gov.uk/commondata/acrobat/legislation.pdf</p>

References

- ¹ Treweek, J (1999) *Ecological Assessment*. Blackwell Science, Oxford
- ² Wilcox, B.A. (1984) In situ conservation of genetic resources: Determinants of minimum area requirements. P 640 in J. A. McNeely and K. R. Miller, eds. National parks Conservation, Congress on National Parks, Bali, Indonesia 11-22 October 1982. Smithsonian Institution Press, Washington D.C.
- ³ Commission of the European Communities (CEC) (1985) Council Directive 85/337/EEC on the Assessment of the effects of certain public and private projects on the environment. *Official Journal of the European Communities*, L175, 5.7.85, pp40-48. <http://ec.europa.eu/environment/eia/full-legal-text/85337.htm>
- ⁴ Commission of the European Communities (CEC) (1997) Council Directive 97/11/EC. Council Directive 97/11/EC of 3 March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment *Official Journal of the European Communities*, L73, 14.3.97, p5 <http://europa.eu.int/comm/environment/eia/full-legal-text/9711.htm>
- ⁵ Environmental impact assessment: guide to procedures <http://www.odpm.gov.uk/index.asp?id=1143250>
- ⁶ All country legislation can be viewed at: <http://www.hmso.gov.uk/legis.htm>
- ⁷ *Note on Environmental Impact Assessment Directive for Local Planning Authorities* <http://www.odpm.gov.uk/index.asp?id=1143273>
- ⁸ Institute of Environmental Management and Assessment (2004) *Guidelines for Environmental Impact Assessment*. IEMA, Lincoln
- ⁹ Environment Agency (2002) *Environmental Impact Assessment (EIA): A handbook for scoping projects*
- ¹⁰ Scottish Natural Heritage (2002) *A Handbook on Environmental Impact Assessment*
- ¹¹ Oxford, M (2001) *Developing Naturally. A handbook for incorporating the natural environment into planning and development*. Association of Local Government Ecologists
- ¹² Byron, H (2000) *Biodiversity Impact – Biodiversity and environmental impact assessment: a good practice guide for road schemes*. The RSPB, WWF-UK, English Nature and the Wildlife Trusts, Sandy
- ¹³ The RSPB, WWF-UK, English Nature and the Wildlife Trusts (2000) *Biodiversity Impact – biodiversity and environmental impact assessment: a new approach* summary leaflet
- ¹⁴ *Planning Advice Note Pan 58 - Environmental Impact Assessment (Scotland)* (1999) <http://www.scotland.gov.uk/Publications/1999/10/pan58-root/pan58>
- ¹⁵ The Environmental Impact Assessment (Scotland) Regulations 1999 Circular 15/1999 <http://www.scotland.gov.uk/Publications/1999/08/circular-15-1999/circular-15-1999>
- ¹⁶ Institute of Environmental Management and Assessment (1995) *Environmental Impact Assessment: Guidelines for Baseline ecological assessment*
- ¹⁷ DoT, Scottish Office, Welsh Office & DoE Northern Ireland (1993) *Design Manual for Roads & Bridges Volume 11 Environmental Assessment*
- ¹⁸ Royal Town Planning Institute (RTPI) (2000) *Planning for Biodiversity* <http://www.rtpi.org.uk/resources/publications/environment/biodiversity/>
- ¹⁹ ERM (2001) *Guidance on EIA Scoping* <http://europa.eu.int/comm/environment/eia/eia-guidelines/g-scoping-full-text.pdf>

-
- ²⁰ HMSO (2005) *Planning and Policy Statement 9: Biological and Geological Conservation*
- ²¹ Somerset EConet (undated) *Impact Zone Mapping. European Species Version. A User's Guide for Planners and Development*. Draft
- ²² Reijnen, M.J.S.M., Veenbaas, G. and Foppen, R.P.B. (1995) *Predicting the Effects of Motorway Traffic on Breeding Bird Populations*. Dutch Ministry of Transport, Public Works and Water Management. Rijkswaterstraat, RWS and DLO Institute for Forestry and Nature Research. ISBN 903693707B
- ²³ English Nature (1998) *Natural Area Profiles* (available as a CD Rom), or for summary profiles www.english-nature.org.uk/templates/naturalareas
- ²⁴ Land Cover Map 2000 (LCM2000) (Centre for Ecology and Hydrology) http://www.ceh.ac.uk/sections/seo/lcm2000_home.html
- ²⁵ LANDMAP Information system. <http://landmap.ccw.gov.uk/> (under construction) and www.ccw.gov.uk/lead_map/
- ²⁶ Local Biodiversity Action Plan -Available locally or at www.ukbap.org.uk
- ²⁷ See individual city strategies
- ²⁸ Landscape Character Areas http://www.ehnsi.gov.uk/natural/country/country_landscape.shtml
- ²⁹ Scottish Natural Heritage (2002) *Natural Heritage Futures* <http://www.snh.org.uk/futures/Data/index.htm>
- ³⁰ Integrated Habitat System (CD Rom version 1.101) Somerset Environmental Records Centre <http://www.somerc.com/>
- ³¹ Institute of Ecology and Environmental Management (2005) *Guidelines for Survey Methodology* (Unpublished) <http://www.ieem.org.uk/GuidanceonSurveyMethodology.pdf>
- ³² Protected Sites Designations Directory <http://www.jncc.gov.uk/page-1527>
- ³³ Brown, A.E., Burn, A.J., Hopkins, J.J. and Way, S.F. (1997) *The EC Habitats Directive: selection of Special Areas of Conservation in the UK*. Report 270. JNCC, Peterborough
- ³⁴ Guidelines for the selection of biological ASSIs http://www.ehnsi.gov.uk/natural/designated/science_survey.shtml
- ³⁵ Nature Conservancy Council (1989) *Guidelines for the Selection of Geological SSSIs* (Nature Conservancy Council, Peterborough) and JNCC supplements <http://www.jncc.gov.uk/page-2303>
- ³⁶ Nature Conservancy Council (1989) *Guidelines for the Selection of Biological SSSIs* (Nature Conservancy Council, Peterborough) and JNCC supplements <http://www.jncc.gov.uk/page-2303>
- ³⁷ Ratcliffe, D.A. (ed.) (1977) *A Nature Conservation Review*. Cambridge University Press, Cambridge
- ³⁸ Stroud *et al* (2001) *The UK SPA Network: its scope and content. Volume 1: Rationale for the selection of sites*. JNCC
- ³⁹ Stroud, D.A., Mudge, G.P. & Pienkowski, M.W. (1990) *Protecting internationally important bird sites*, NCC Peterborough
- ⁴⁰ UNESCO World Heritage Convention http://www.culture.gov.uk/historic_environment/World_Heritage.htm
- ⁴¹ UNESCO (1994) *Biosphere Reserves: the opportunities and potential benefits to people living in and around them*. Published by UNESCO/MAB/Defra. See also <http://www.unesco.org/mab/biodiv.shtml>
- ⁴² Defra (2006) *Local Sites Systems: Guidance on their Development and Management*

-
- ⁴³ ODPM (2000) *Tree Preservation Orders: a guide to the law and good practice* <http://www.odpm.gov.uk/index.asp?id=1127782> (Applies to England only)
- ⁴⁴ HMSO (1997) Town and Country Planning (Scotland) Act 1997 Chapter Part VII Special Controls Chapter I Trees <http://www.opsi.gov.uk/acts/acts1997/97008-aa.htm#159>
- ⁴⁵ Technical Advice Note (TAN) 10 - Tree Preservation Orders - 1997 http://www.wales.gov.uk/subiplanning/content/tans/tan10/tan10_home_e.htm
- ⁴⁶ HMSO (1997) *The Hedgerow Regulations 1997* - Statutory Instrument 1997 No. 1160 <http://www.opsi.gov.uk/si/si1997/19971160.htm>
- ⁴⁷ Defra (2002) *Hedgerow Survey Handbook: a standard procedure for local surveys in the UK*. Prepared on behalf of the Steering Group for the UK <http://www.english-nature.org.uk/pubs/publication/PDF/hedge1.pdf>
- ⁴⁸ Nature Conservancy Council (1989) *Guidelines for the Selection of Biological SSSIs*, Nature Conservancy Council, Peterborough <http://www.jncc.gov.uk>
- ⁴⁹ Natural Environment and Rural Communities Act (2006) <http://www.opsi.gov.uk/ACTS/acts2006/20060016.htm> <http://www.defra.gov.uk/rural/ruraldelivery/bill/#2>
- ⁵⁰ HMSO (2000) Countryside and Rights of Way Act 2000 (CROW) Section 74 List of habitats and species important to biodiversity in England <http://www.defra.gov.uk/wildlife-countryside/cl/habitats/minstatement.htm>
- ⁵¹ Convention on Biological Diversity <http://www.biodiv.org/convention/articles.asp>
- ⁵² Defra (2002) *Working with the grain of nature: a biodiversity strategy for England* http://www.ukbap.org.uk/EBG/england_biodiversity_strategy.asp
- ⁵³ HMSO (2000) Countryside and Rights of Way Act 2000 (CROW) Section 74 List for Wales. <http://www.wales.gov.uk/subienviroment/content/guidance/species-statement-e.htm>
- ⁵⁴ *Scotland's Biodiversity: It's In Your Hands A strategy for the conservation and enhancement of biodiversity in Scotland*. <http://www.scotland.gov.uk/Publications/2004/05/19366/37239>
- ⁵⁵ The Scottish Biodiversity List <http://www.biodiversityscotland.gov.uk/pageType2.php?id=35&type=2&navID=92>
- ⁵⁶ For more information see: <http://www.secretariat.gbif.net/portal/index.jsp>
- ⁵⁷ For more information see: <http://www.ceh.ac.uk/library/index.html>
- ⁵⁸ UK SPA Scientific Working Group 17 January 2002 *National and international waterbird population estimates* http://www.jncc.gov.uk/pdf/waterbirds_jan02.pdf
- ⁵⁹ RSPB *et al* (2002) *The Population Status of Birds in the UK. Birds of Conservation Concern: 2002-2007*
- ⁶⁰ Collis and Tyldesley (1993) *Natural Assets: Non-statutory Sites of Importance for Nature Conservation, The Local Government Nature Conservation Initiative*
- ⁶¹ MAFF (1999) *Identification of Injurious Weeds* <http://www.defra.gov.uk/envirom/weedsact/identify.pdf>
- ⁶² Defra (2004) *Code of Practice on how to prevent the spread of Ragwort* http://www.defra.gov.uk/envirom/weedsact/cop_ragwort.pdf
- ⁶³ Environment Agency (2003) *Guidance on the control of invasive weeds in or near fresh water*. http://www.environment-agency.gov.uk/commondata/105385/booklet_895604.pdf
- ⁶⁴ Environment Agency (2001) *Code of practice for the management, destruction and disposal of Japanese knotweed* <http://www.netregs.gov.uk/commondata/acrobat/knotweed.pdf>

-
- ⁶⁵ Information and factsheets on invasive species <http://www.environment-agency.gov.uk/subjects/conservation/840870/840894/840941/?version=1&lang=e>
- ⁶⁶ Scottish Executive *Helping to prevent the spread of invasive non-native species* <http://www.scotland.gov.uk/Topics/Environment/Wildlife-Habitats/InvasiveSpecies/HCOP>
- ⁶⁷ ODPM Circular 06/2005 & Defra Circular 01/2005 *Biodiversity and geological conservation - statutory obligations and their impact within the planning system* <http://www.odpm.gov.uk/index.asp?id=1144318>
- ⁶⁸ National Assembly of Wales (1996) *Planning Guidance (Wales)*, Technical Advice Note (Wales) 5, *Nature Conservation and Planning (1996)* <http://www.wales.gov.uk/subiplanning/content/tans/pdfs/tan-5-e.pdf>
- ⁶⁹ Scottish Executive (2000) *Nature conservation: implementation in Scotland of EC Directives on the conservation of natural habitats and of wild flora and fauna and the conservation of wild birds ('The Habitats and Birds Directives')*. Revised guidance updating Scottish Office Circular no. 6/1995 <http://www.scotland.gov.uk/library3/nature/habd-00.asp>
- ⁷⁰ De Leo, G.A. and Levin, S. (1997). *The multifaceted aspects of ecosystem integrity. Conservation Ecology* [online] 1(1)
- ⁷¹ Wheeldon, J. (2003). *The River Avon cSAC Conservation Strategy*. English Nature, Devizes
- ⁷² Newton, J., Williams, C., Nicholson, B., Venables, R., et al (2004) *Working with wildlife. A resource and training pack for the construction industry - training pack (C587TP)* <http://www.ciria.org.uk/acatalog/C587TP.html>
- ⁷³ Statutory Rule 1995 No. 380 *The Conservation (Nature Habitats, etc.) Regulations (Northern Ireland) 1995* http://www.opsi.gov.uk/sr/sr1995/Nisr_19950380_en_1.htm
- ⁷⁴ Scottish Statutory Instrument 2004 No. 475 *The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2004* <http://www.opsi.gov.uk/legislation/scotland/ssi2004/20040475.htm>
- ⁷⁵ Conservation (Natural Habitats, &c.) Regulations 1994 http://www.opsi.gov.uk/si/si1994/uksi_19942716_en_1.htm
- ⁷⁶ R v Cornwall County Council *ex parte* Jill Hardy [2001 JPL 786]. Note on environmental impact assessment directive for local planning authorities <http://www.odpm.gov.uk/index.asp?id=1143273>
- ⁷⁷ HMSO (1997) Town And Country Planning (Scotland) Act 1997 Chapter 8 Part III, Control Over Development <http://www.opsi.gov.uk/acts/acts1997/97008--l.htm>
- ⁷⁸ The Planning (Northern Ireland) Order 1991 Section 40 Agreements facilitating, regulating or restricting development or use of land Statutory Instrument 1991 No. 1220 (N.I. 11) http://www.opsi.gov.uk/si/si1991/Uksi_19911220_en_14.htm