

Appendix 6

Assessment and Evaluation of Ecological Impacts – Methodology

ASSESSMENT AND EVALUATION OF ECOLOGICAL IMPACTS - METHODOLOGY

Introduction

Ecological Impact Assessment (EclA) is identified as 'the process of identifying, quantifying and evaluating the potential impacts of defined actions on ecosystems or their components' (Institute of Ecology and Environmental Management (IEEM), 2005). This methodology sets out the processes applied by AMEC Earth & Environmental (UK) Ltd (AMEC) in order to complete professional EclA's which can be scientifically justified and defended.

This methodology has been developed by taking the following guidance into consideration:

- IEEM Guidelines for Ecological Impact Assessment. Final Consultation. February 2006;
- Department for Transport. Transport Assessment Guidance (TAG), TAG Unit 3.3.10. December 2004;
- Scottish Natural Heritage. A Handbook on Environmental Impact. 2002; and
- DMRB Volume 11 Environmental Impact Assessment.

The current guidelines rely on ecologists using their professional judgement throughout the EclA process and occasionally aspects of guidance are deemed inappropriate to a particular project/aspect of assessment. On these occasions, AMEC's professional experience of Environmental Impact Assessment is incorporated to ensure a reliable, realistic and honest assessment is completed.

Assessment of Ecological Impact Significance

The process of EclA fits within the overall EIA process. It comprises of four stages:

1. Ecological valuation of habitats/species/sites within the study area (zone of influence);
2. Prediction of ecological impacts;
3. Characterisation of ecological impacts; and
4. Assessment of ecological impact significance.

Ecological Valuation

An essential link between the description of ecological features and the assessment of impacts on them is the evaluation of their nature conservation value. Each ecological feature is therefore described in terms of its nature conservation importance (international, notable species etc) as well as its ecological function (biodiversity, geographical context, population size, conservation status etc). Table 1 sets out the key criteria used to define 'ecological value'.

For the purpose of Table 1, in order to derive an 'ecological value' for a particular feature the following ecological functions should be considered along with nature conservation importance :

- Favourable Conservation Status/Population Size/ Important Assemblages of Species;
- Rarity;

- Quality of feature;
- Geographical context, distribution and status;
- Other legal considerations other than those listed within Table 1;
- Presence of Injurious/legally controlled weeds;
- Biodiversity value;
- Secondary/supporting value (e.g. feature of no particular ecological interest but may assist in protecting a more important feature);

Once ecological value is ascertained, the following should be considered:

- Social benefits / community value; and
- Economic value;

Table 1. Ecological Criteria for Valuation.

| Importance | Description |
|----------------------|---|
| International | <p>A habitat/species/site which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in a world-wide context and there is limited/no potential for substitution.</p> <p>Sites include Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar (designated and fully qualified), World Heritage Sites (WHS) (features of interest on conservation objectives only).</p> <p>Species include European Protected Species listed within the EC Habitats Directive, EC Birds Directive and Habitats Regulations (bat, otter and great crested newt).</p> <p>Habitats include EC Habitats Directive priority habitats (Annex I) and plant communities (Annex II).</p> <p>The loss of, or significant impacts on, such a feature would be to the detriment of the national resource and mitigation against any such loss or impact should be undertaken as an integral part of the development proposals and extensive work should be undertaken to ensure the mitigation scheme is as successful as possible.</p> <p>'Very high' classification with respect to TAG methodology.</p> |
| National | <p>A habitat/species/site which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in the UK / Scotland. There is limited potential for substitution.</p> <p>Sites include Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Marine Nature Reserves (MNR).</p> <p>Species include protected species listed within the Wildlife and Countryside Act, 1981 (and amendments).</p> <p>Habitats include plant communities and habitat types meeting with criteria for the selection of SSSI's.</p> <p>'High' classification with respect to TAG methodology</p> |
| Regional | <p>A habitat/species/site that may be of nature conservation value within the region e.g. Highlands or Scottish Borders and may be designated as a non-statutory Site of Importance for Nature</p> |

| Importance | Description |
|-------------------|--|
| | <p>Conservation (SINC). There is potential for substitution.</p> <p>Sites include Ancient Woodland.</p> <p>The loss of such a feature would have some nature conservation implications and should be avoided where possible. Adequate mitigation measures may be required.</p> <p>'Medium' classification with respect to TAG methodology</p> |
| Local | <p>Feature of nature conservation value in a local context only (e.g. Local Plan Area) with insufficient value to merit a nature conservation designation. The nature conservation value of such a feature is based on a degree of local rarity, and it may be widespread outside the local area.</p> <p>Sites include Local Nature Reserves (LNR), Long-established Inventory woodland.</p> <p>Examples would include a habitat/species/site of importance within the relevant Local Plan or which meet with Local Authority/Wildlife Trust criteria for the selection of SINC's, Tree Preservation Orders (TPO's), 'important' hedgerows.</p> <p>Loss would be unlikely to have nature conservation implications except at the local or site level.</p> <p>'Lower' classification with respect to TAG methodology.</p> |
| Negligible | <p>Commonplace feature of little or no habitat/historical significance. Loss of such a feature would not be seen as detrimental to the ecology of the area.</p> <p>'Negligible' classification with respect to TAG methodology.</p> |

One criteria for nature conservation evaluation which is common to all features of interest is that of the replaceability of that feature if it were to be removed. For example, features such as ancient woodlands or grasslands which have developed over a long period of time and exist on highly developed mature soil profiles once destroyed cannot be recreated on any reasonable timescale. Such resources are referred to as Critical Natural Resources and their loss has far more serious implications for nature conservation than that of more replaceable resources. Therefore, in terms of nature conservation evaluation any feature which is considered to be critical natural resources has been weighted to reflect this.

Because, in practice, rarity is often the main criterion used in nature conservation evaluation the nature conservation values described in Table 1 below are described primarily on rarity within different geographical units. This geographical distinction is also useful in placing the values in the context of nature conservation designations, which tend to be ranked according to geographical importance.

There are, however, habitats or ecological resources which are re-creatable or which lend themselves to, for example, translocation. These non-critical natural resources, although of high nature conservation value for reasons such as rarity, can be replaced or re-created elsewhere should they be lost from one particular site. Therefore, their loss is not as

absolute as that of critical natural resources and this should be taken into consideration in nature conservation evaluation.

Even though a site benefits from a designation does not mean all of the ecological interests are automatically awarded the same importance level. Only the features of interest for the designated site or related habitat should be awarded the same level and this is where classification of importance requires professional ecological input.

There may be ecological features that are not formally designated but that may be considered by the ecologist to deserve a higher level of importance. This would cover sites that meet with certain criteria for designated sites such as the 'Guidelines for the selection of Biological SSSIs (Nature Conservancy Council, 1989), 'Local Nature Reserves in Scotland. A Guide to their Selection and Declaration' (Scottish Natural Heritage, 2000) or the 'list of habitats and species considered to be of principal importance for biodiversity' (Nature Conservation (Scotland) Act 2004). Likewise, there may be designated sites that are considered to no longer meet with the designation criteria.

A feature which is classified to fall between two different levels of importance should be given the higher level during any assessment.

Biodiversity Action Plan's (BAPs) were not created to indicate 'value' but to guide conservation action for particular species and habitats. BAPs should not be included in terms of Table 1, but should assist in classifying the value of a feature's ecological function and potential impacts that should be considered during an assessment.

Road Scheme Assessment

With particular reference to road schemes, DMRB Volume 11 requests that the 'Ratcliffe Criteria' are considered in order to assess ecological value. The 'Ratcliffe Criteria' (NCC, 1977) are often used as a basis for describing nature conservation value. The 'Ratcliffe Criteria', are actually guidelines as to matters requiring consideration. They include naturalness; size; rarity; diversity; fragility; typicalness; recorded history; position in an ecological/geographical unit; potential value; and intrinsic appeal (see Appendix A.1 for an explanation of all these categories). These criteria have been used to compliment the IEEM Guidelines for the assessment of ecological function.

The 'threshold level' of value (or level at which the feature is considered to require inclusion within the assessment) is determined as Regional or above in terms of this assessment.

Prediction of Ecological Impacts

Any predicted ecological impacts that are likely to arise as a result of the proposed construction and operation activities of the road scheme should be identified and assessed.

This should include the following:

- Extent of Impact – Area over which an impact will occur;
- Size or amount of an impact in quantitative terms ('magnitude' in IEEM Guidelines);
- Duration – Short term (< 5 years), Medium term (5 – 10 years) or Long term (> 10 years);
- Reversibility - Temporary (during construction only; reversible) or Permanent (during construction and operation; irreversible);
- Timing – At what stages of construction/time of year will the impact occur;
- Frequency – How often is the impact likely to occur;

- Certainty of impact occurring;
- Cumulative impact – what the outcome of several impacts actually completed might be; and
- Combined impacts – consideration of the possible effects of other plans, proposals or projects.

Characterising Ecological Impacts

The ecological impact is then quantified (as above) in terms of amount (percentage, acreage etc) of loss / impact and the certainty/confidence of the prediction identified.

Assessment of Ecological Impacts

The significance of the impact is then determined. This is done by determining the magnitude of the impact (based on the characterisation) and combining this with the ecological value. This methodology for road schemes is based on that of TAG, as opposed to the IEEM methodology (currently under consultation, which does not work on the basis of a defined magnitude/value matrix).

A significant impact is defined as 'an impact (adverse or positive) on the integrity of a defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, including cumulative impacts' (IEEM, 2004). Ecosystems change in time and space and boundaries are dynamic and permeable.

Table 2 sets out the criteria used in this assessment to define the magnitude of an impact (based on IEEM Guidelines and TAG methodology).

Table 2. Magnitude of Impact.

| Magnitude | Description |
|------------------------------|---|
| Positive | Gains to the integrity and the conservation status of the site, habitat or species are clearly evident. |
| Neutral | Not expected to affect the integrity or conservation status of the site, habitat or species under consideration in any way, therefore no noticeable effects on the ecological resource, even in the short term. |
| Minor Negative | Noticeable effect, but either sufficiently small or short duration to cause no harm to the integrity or conservation status of the site, habitat or species. Detectable in the short term but not in medium term. |
| Intermediate Negative | Significant but not adverse effects on the integrity or nature conservation status of the site, habitat or species, but would threaten the long-term integrity of the system. Detectable in the short term and medium term. If in the light of full information, it cannot be clearly demonstrated that the proposal will not have an adverse effect on integrity then the impact should be assessed as major negative. |
| Major Negative | Adverse effects on the integrity or nature conservation status of the site, habitat or species, likely to threaten the long-term integrity of the system. Detectable in the short term, medium term and long term. |

Table 3 presents a matrix in which ecological value and the magnitude of an impact are combined in order to present an overall grade of significance for a particular impact.

A significant impact is considered to be an overall impact that is classified as Moderate/Major or Critical, while Slight or Neutral impacts are considered insignificant. Mitigation will be identified for significant adverse impacts and a Residual Impact then identified. Where feasible and practical, mitigation, compensation and enhancement will be identified for all predicted impacts whether significant or not.

Table 3. Matrix defining overall grade of significance.

| Ecological Value | Magnitude of Impact | | | | |
|----------------------|---------------------|-----------------------|----------------|---------|------------|
| | Major Negative | Intermediate Negative | Minor Negative | Neutral | Positive |
| International | Critical Adverse | Major Adverse | Slight Adverse | Neutral | Beneficial |
| National | Critical Adverse | Major Adverse | Slight Adverse | Neutral | Beneficial |
| Regional | Moderate Adverse | Moderate Adverse | Slight Adverse | Neutral | Beneficial |
| Local | Slight Adverse | Slight Adverse | Slight Adverse | Neutral | Beneficial |
| Negligible | Neutral | Neutral | Neutral | Neutral | Neutral |

APPENDIX A.1 EXPLANATION OF THE RATCLIFFE CRITERIA

This explanation has been adapted from the Design Manual for Roads and Bridges, (1993) Volume 11, Section 3, Part 4, Annex VI. The original work was completed by Ratcliffe for the Nature Conservancy Council in the 1970's (NCC, 1977).

Fragility

Some habitats, communities and species are particularly sensitive to environmental change. Such habitats tend to be rare, having been subject to past fragmentation. In some cases, fragile areas may be vulnerable to change distant from the site itself. For this reason, activities at sites distant from a fragile habitat should be considered for their potentially damaging effects eg drainage, stormwater run-off, and nutrient build-up (eutrophication). One example of a fragile site would be a marsh or bog, where the maintenance of the ecosystem would be dependent on the continuation of a particular water level and quality, as in the Somerset Levels and Norfolk Broads.

Rarity

Rarity is one of the prime reasons for the establishment of protected areas. The threat of loss of a particular habitat or species lends value to the habitat/organism and the site it occupies. Rarity is also a matter of definition. A species or habitat can be internationally rare, but relatively common locally or nationally. Likewise, a nationally rare species can in some circumstances be more common at international level.

Rare species can be distributed in a number of ways. They can either be sparsely distributed within widely separated sites (eg the Dartford warbler), or they can be widespread within a large area, but locally infrequent (eg the peregrine falcon). In addition some species are rare, but in the few locations where they occur, they may be found in large numbers (for example, the avocet). Whether a species has rarity value therefore depends upon the context.

Size (Area or Extent)

Size plays a major part in determining the ecological interest of an area. It is also a relative concept. For example, a 30 acre woodland or a one acre meadow could have a similar degree of nature conservation importance. An area of moorland or upland grassland would normally need to be more extensive to be of similar importance. This is in part due to the differing range requirements of species supported by these habitats.

A reduction in size of an area (eg through fragmentation) can reduce its nature conservation value considerably. An example of this is the Dorset heaths where, over a period of time, the heathland has been fragmented into increasingly smaller areas. At some point a size is reached below which the nature conservation value is lost because the range requirements of important species are no longer met. It is also worth noting that a site which has been divided in some way will not normally be able to support the same number and range of species as it did before fragmentation occurred. In the case of heaths, small sites may be occupied by more common and widespread generalist species rather than the true heathland specialists.

Diversity

The diversity of a site can be expressed in three ways:

- as diversity of species (where the number and variety of species is great);
- as diversity of habitats (eg Thursley Common, Surrey, which contains heath, woodland, grassland and bog);
- as diversity of numbers (where a habitat is seen to support large numbers of one or more individual species). Morecambe Bay, for example, supports over a quarter of the country's winter population of oyster catchers, turnstones, knots and godwits.

Both low and high diversity have a high nature conservation value under different circumstances. High species diversity would be important for areas such as herb-rich grassland or ancient woodland, whereas low diversity would be an important attribute for moorland, heathland or reedbeds. It is not a question of the greater the diversity the greater the value.

Potential Value

Some sites have the potential to provide greater nature conservation interest than presently exists. Examples of such sites, include abandoned quarries, mine workings, spoil heaps, flooded gravel pits and low intensity agricultural land.

Position within the Ecological/Geographical Unit

A site which is near or adjacent to other similar habitats may have a higher nature conservation value than an isolated one because the range of animals can be greater. This is particularly so if the area is joined to adjacent sites by linear features which can act as wildlife corridors (eg hedgerows, verges, and riverbanks).

Typicalness

When a site is viewed in the context of the local or regional area, certain habitats assume importance because they are good examples of what is, or has historically been, typical of the area. As a response to post-war habitat loss in Britain, efforts have been made to safeguard representative areas to prevent what was once common becoming fragmented or rare.

Recorded History

The history of a site is important, especially where it is to be used for research and education. A well documented past with detailed biological and/or natural history records of species and habitat change, presents a valuable insight into the ecology of the site. Such information also provides a basis for current and future management built upon knowledge of the past.

Naturalness

Naturalness is a measure of the degree to which an area has been modified by human activity. In Britain, unmodified habitats are extremely rare or non-existent, being restricted to remote, inaccessible areas such as cliffs and some saltmarshes. The bulk of Britain's land surface (and possibly all of it) is either semi-natural, improved or

artificial. Naturalness is ascertained by site surveys which detail the species present (looking for key indicator species). In this way, an area can be valued according to the degree to which it represents the former natural landscape which was once present.

Intrinsic Appeal

This refers to value in a popular rather than ecological sense. A host of golden daffodils in Wordsworth country can be as valuable as a colony of rare orchids in popular perception. This highlights the fact that value is also derived from society's preferences for landscape and other aesthetic features, and is not just based on ecological considerations.