VOLUME 11 ENVIRONMENTAL ASSESSMENT
SECTION 2 ENVIRONMENTAL IMPACT ASSESSMENT

PART 5

HA 205/08

ASSESSMENT AND MANAGEMENT OF ENVIRONMENTAL EFFECTS

SUMMARY

This Advice Note provides guidance for determining the significance of environmental effects, including for cumulative effects, and for the management of those effects.

INSTRUCTIONS FOR USE

1. Remove Contents pages from Volume 11 and insert new Contents pages for Volume 11 dated August 2008.

2. Insert the new Advice Note HA 205/08 into Volume 11, Section 2.

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DESIGN MANUAL FOR ROADS AND BRIDGES

HA 205/08
Volume 11, Section 2,
Part 5

THE HIGHWAYS AGENCY

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THE DEPARTMENT FOR REGIONAL DEVELOPMENT
NORTHERN IRELAND

Assessment and Management of Environmental Effects

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REGISTRATION OF AMENDMENTS

Amend No	Page No	Signature & Date of incorporation of amendments	Amend No	Page No	Signature & Date of incorporation of amendments

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Contents

Chapter

1. INFORMATION ASSEMBLY

1.1 The task of identifying and assessing environmental effects should commence at the early inception of the project. Increasingly the potential for significant effects will have been recognised in plans or programmes. Where a Strategic Environmental Assessment (SEA) or Assessment of Implications on European Sites (AIES) has supported plans or programmes (or strategies in Scotland and Wales) it may also inform the scope of project environmental impact assessment activities (refer to SECTION 2, Part 1, Chapter 3). This scope may also have been informed by consultation with stakeholders, including the public and statutory environmental bodies.

1.2 This first chapter sets out the approach to identifying the factors and information needed to undertake the assessment of environmental effects and includes the following:

I. Defining the project.

II. Defining the study area.

III. Defining assessment years and scenarios.

IV. Information assembly.

V. Project objectives and environmental impact assessment.

VI. Environmental impact assessment and design.

VII. Exploring alternatives.

VIII. Identifying the most appropriate design.

IX. Potential impacts.

X. Mitigation, enhancement and monitoring.

XI. Environmental performance.

XII. Reporting.

XIII. Uncertainty and validity of the assessment process.

I. DEFINING THE PROJECT

1.3 Correctly defining the project is essential. The Overseeing Organisation should ensure that the assessment matches the project that is the subject of the decision-making and legal procedures, and that this relationship is made clear in the reporting (refer to SECTION 2, Part 6). Where statutory Environmental Impact Assessment (EIA) is completed, and an Environmental Statement produced, the Statement should be made public in accordance with the EIA Regulations, whether or not a Public Inquiry is required. Consideration of the Environmental Statement by the Secretary of State or equivalent before proceeding with a project is a mandatory part of the statutory decision-making process.

1.4 Division of a large project into small projects to avoid mandatory EIA is not only unacceptable, but is likely to be illegal and subject to challenge. Furthermore, the creation of smaller projects for management and administrative reasons needs to ensure that for the purposes of meeting the requirements of EIA Regulations (refer to SECTION 2, Part 2, Chapter 1), the defined projects are autonomous, neither dependent on other projects nor necessitating new additional projects in order to function. Project changes during the lifetime of that project, need to be screened and reviewed, and reported appropriately, to identify whether changes are significant enough to require further assessment.

II. DEFINING THE STUDY AREA

1.5 The study area for the assessment should be defined on a case-by-case basis reflecting the project and the surrounding environment over which significant effects can reasonably be thought to have the potential to occur both from that project and in combination with other projects. For the assessment of cumulative effects, the spatial boundary of the receptor/resource with potential to be affected directly or indirectly will also need to be considered. The study area will be set for each individual topic and it is good practice for this to be identified at an early stage (refer to SECTION 2, Part 4).

1.6 Where practical, establishing a common boundary across the assessment topics is desirable. For most projects the study area will be in the immediate environs around the project. However, for others it is possible that sensitive receptors and resources may be located beyond the immediate environs of the project, if there are ways through which the receptors and resources may experience effects associated with the project.

Consultation with stakeholders, including the public and statutory environmental bodies, and identification of potential receptors/resources and potential significant effects should inform the definition of the study area.

III. DEFINING ASSESSMENT YEARS AND SCENARIOS

1.7 The objective of environmental impact assessment is to gain an appreciation of the significant environmental effects predicted to result from a project. This process is outlined below.

1.8 The process involves forecasting the effects by comparing a scenario with the project against one without the project over time.

1.9 The absence and presence of the proposed projects are referred to as the Do-Minimum and Do-Something scenarios respectively. The potential significant environmental effects need to be defined for the Do-Minimum and Do-Something scenarios in the baseline year and a future year, or series of future years depending on the topic.

1.10 Table 1.1 sets out the assessment for the Do-Minimum and Do-Something scenarios.

Assessment Scenarios	Baseline year	Year 15 (or worst in first fifteen years)
Existing condition	✗/✓	✗
Do-Minimum	✓	✓
Do-Something	✓	✓

Table 1.1 Assessment Scenarios and Assessment Years

1.11 If one were forecasting the effects of construction, the baseline year would be chosen to represent the conditions prior to construction starting. This would be compared with the conditions during construction.

1.12 For the assessment of effects arising from the operation of the project, (such as the effects of traffic on noise and air quality) the baseline would again be chosen to represent the situation prior to any effect, i.e., without the project and its traffic. This would then be compared with the conditions once the project is open to traffic.

1.13 Figure 1.1 shows an indicative assessment timeline for construction and operational effects.

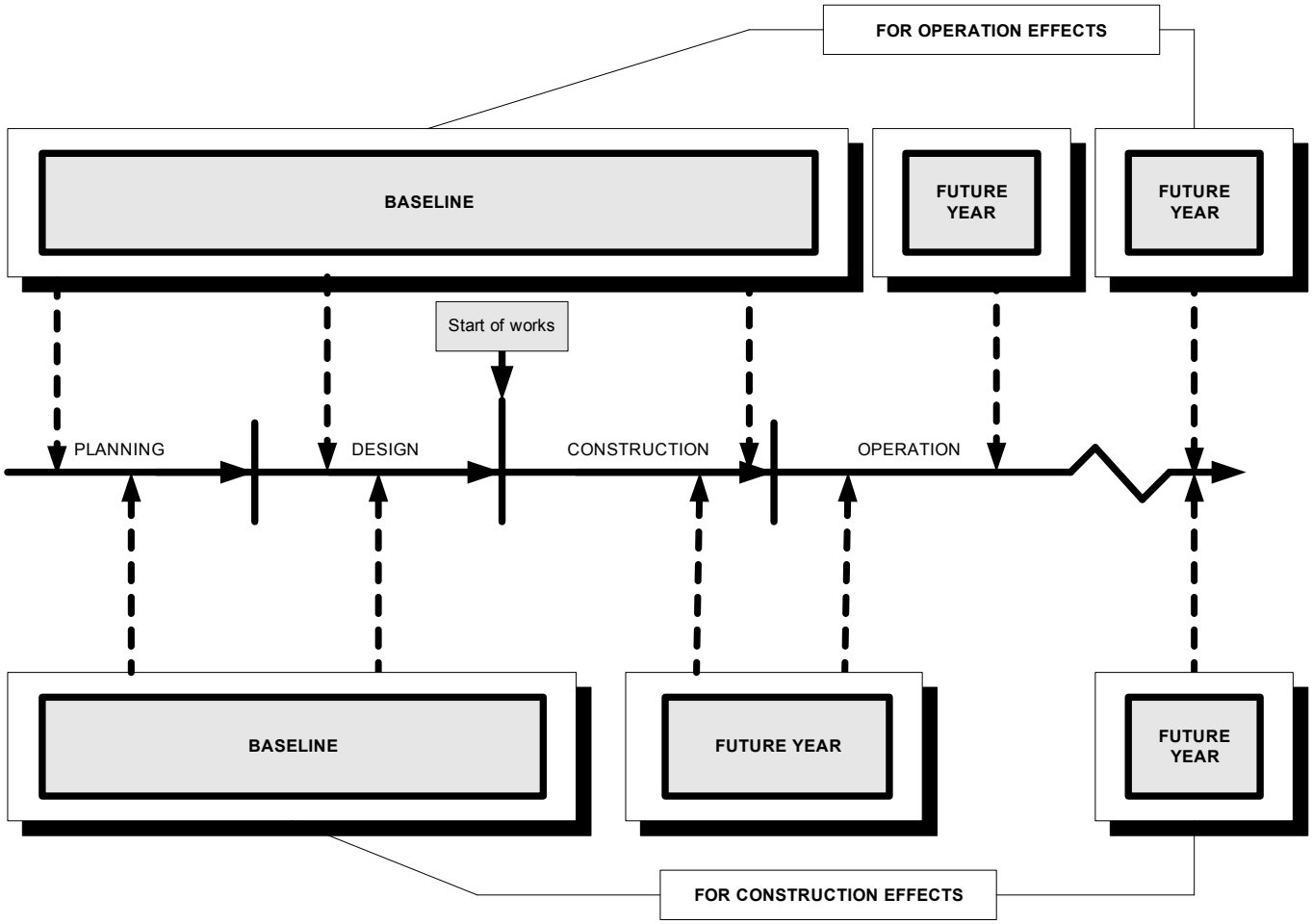

Figure 1.1 Assessment Scenarios

1.14 The topic chapters in SECTION 3 give specific guidance on baseline and future year choices for their topic. The future years are chosen to reflect any significant effects that may be predicted to arise and will be topic specific. For some topics, the worst year within the first 15 year period needs to be assessed. For others, particular target years may be assigned. Year 15 is typically the year chosen as it is likely that the mitigation measures will have achieved a significant effect by this time. For example, landscaping can typically take 15 years to deliver the mitigation of a significant effect.

1.15 To inform the likely baseline and future assessment years, each potentially affected receptor and resource should be scoped in accordance with the guidance set out in SECTION 2, Part 4. Where known, historic or current actions contributing to the state of the resource should be reviewed, indicating whether the effects are increasing or decreasing over time. Both Do-Minimum and Do-Something scenarios could be influenced by changes in legislation, land use and climate change, transport and community activities. Relevant legislation and regulation, standards and policies should therefore be identified and examined in an attempt to determine the various changes that are likely to occur regardless of the road project. These can inform the choice of assessment year(s).

IV. INFORMATION ASSEMBLY

1.16 There is a great deal of environmental information readily available to Designers from Government Organisations and agencies, academic and charitable organisations as well as the Overseeing Organisation. Data, survey and assessment needs should, therefore, be the subject of the scoping process as well as the overall project management process. It is important that the gathering of site environmental information does not lead to unnecessary anxiety amongst local people and the possible blighting of properties. However, increasingly projects will

have been identified in publicly available Transport Plans. Before the Designer undertakes a site visit, consideration should be given to the sensitivity of receptors and resources and the confidentiality of particular interests. Approval should also be sought from the Overseeing Organisation prior to approaching landowners and undertaking site visits.

1.17 Some environmental surveys should be undertaken at specific times of the year to ensure that appropriate data are obtained (see topic specific advice in SECTION 3). In order not to encounter delay, the Designer should determine the need for time sensitive surveys as early as possible in the option choice, planning, assessment and design process and then incorporate these into the project planning schedule unless impractical or unnecessary e.g., where the risk is small. Where justifiable constraints limit the scope of surveys these should be discussed with the relevant statutory environmental bodies to determine an appropriate approach and reported appropriately (refer to SECTION 2, Part 6).

1.18 Environmental data collated during the assessment process can help to populate asset databases and inform performance reporting and it should therefore be recorded, where it doesn't already exist, in line with the requirements of the Overseeing Organisation (e.g., in England, environmental data resulting from data collection should be recorded in EnvIS). Equally, data held by the Overseeing Organisation is likely to be a valuable source of data to inform the assessment process.

V. PROJECT OBJECTIVES AND ENVIRONMENTAL IMPACT ASSESSMENT

1.19 Whilst not a statutory requirement of the EIA Regulations it is useful to define the project's objectives in the early stages of a project. The objectives are the measures against which the success of the project can be judged. Project objectives can therefore be used as a benchmark against which the performance of a project can be measured (refer to SECTION 2, Part 5, Chapter 1, Section XI).

1.20 It is important to establish and understand if there is a hierarchy of objectives from national, even international, policy objectives through to the specific objectives for local areas and individual communities. For example, project objectives may be linked to objectives set out in any higher level plans or programmes (or strategies) as described via SEA reports or transport appraisal reports and plans. An awareness of conflicting objectives is needed and approaches followed to minimise the adverse risk of conflict.

1.21 The project objectives will contribute to the reporting of the extent to which:

- national, regional and local policies and strategic objectives are achieved;
- statutory obligations and project-specific objectives (including those confirmed in Public Inquiries) are achieved; and
- problems have been resolved.

1.22 The reporting of the environmental impact assessment process can therefore be used as a tool to demonstrate the effectiveness of the option choice, design and mitigation in relation to the project objectives at the time of assessment.

1.23 Objectives that are developed specifically for the project should be agreed in consultation with the Overseeing Organisation. Such objectives should be robust, be achievable in terms of affordability and value for money and measurable where appropriate, to ensure that they can be monitored and validated.

VI. ENVIRONMENTAL IMPACT ASSESSMENT AND DESIGN

1.24 One key requirement of environmental impact assessment is to ensure that there is a regular flow of information between the Designers and the topic area specialists. This is to ensure that the emerging findings of the assessment are conveyed and the feasibility of 'designing-out' potential significant adverse environmental effects is adequately considered and then carried out as an iterative process.

1.25 Avoiding, reducing and remedying significant adverse environmental effects through option choice and by inclusive design of mitigation measures is an integral part of the iterative design and planning of a project. Some mitigation may be incorporated as part of the design process for the project, for example, the selection of vertical and horizontal alignment or the location of junctions. The incorporation of other additional mitigation measures such as noise barriers or earth bunds can be separately identified to complement the chosen alignment to produce an efficient and cost-effective design.

1.26 During environmental impact assessment of a project, due regard should be given to effects that may

arise not just when the project is constructed or opened, but also in the longer term. Permanent and temporary, direct, indirect, secondary, cumulative, short, medium and long-term, positive and negative effects all need to be addressed via the design process (i.e., future effects of project implementation, operation and maintenance). Opportunity to incorporate environmental enhancement measures into the design should also be given due consideration.

1.27 In determining the most appropriate form of design solutions there should be no ambiguity. Only those measures which the Overseeing Organisation has power to control or implement and which are committed (refer to SECTION 2, Part 5, Chapter 1, Section X) should be assessed; any measures dependent upon agreement with third parties should be presented as such and not be construed as part of committed measures. Such mitigation by agreement should not feature in the assignment of effect significance unless it has been agreed to an extent that it is reasonably certain it can be secured.

1.28 Addressing the interaction of effects between the separate environmental topics requires integrated working practices with effective co-ordination between topic specialists throughout the assessment process.

1.29 It is possible that Environmental Reports prepared for plans and programmes (and strategies) under the SEA Regulations and the Assessment of Implications on European Sites process (where applicable) will impose requirements upon the design of projects. Indeed, it is possible that strategic mitigation measures may need to be delivered via individual projects. Consequently, the Designer needs to be aware of any such obligations placed on their project. The effectiveness of the project design in meeting the strategic measures defined in SEA Environmental Reports and implemented through projects may also be the subject of monitoring and auditing as part of the review reporting process defined by the SEA Regulations (refer to SECTION 2, Part 1, Chapter 3).

1.30 The assessment should reflect upon the extent to which land use and management change, and indeed how climate change, may alter future conditions. As a result of this, a new problem or opportunity may arise that does not exist under the current conditions. If dealt with as part of the assessment, cost effective solutions may be identified early when the problem is anticipated rather than left to become evident over time.

1.31 The effect of climate change is a key consideration in the assessment process. The headline changes in climate that the UK is expecting to experience as climate change manifests itself are:

a) more extreme and variable weather conditions;

b) increased fluvial flooding; and

c) changes in sea level.

1.32 There is likely to be a regional variation in the extent to which these changes occur, with the whole of the UK experiencing change, but with a greater regional emphasis on some aspects. Current UK climate change predictions, produced by the UK Climate Impacts Programme, look at 3 time frames, the 2020s, 2050s, and the 2080s, with the climatic changes becoming more pronounced the further away from the present we move. Until recently, the assumption has been that the aggregated weather observations of the past provided a good indication of current and future weather patterns. The pace of climate change is seriously challenging this presumption, and it is now important to consider the life and purpose of design features, and ensure that they continue to function under the increasing challenges of a changing climate.

1.33 Some environmental features may benefit under climate change, whilst others may deteriorate. It is down to the professional judgement (informed by relevant up to date studies, research and expert opinion where these are available) of the specialists to assess the effect of climate change, in the context of the assessment of the proposed works, on the elements under their examination, and determine the extent to which it requires a formal consideration. If climate change impacts are anticipated to increase the pressure on the element under examination, within the design life of the proposed project, then the latest UK climate change scenarios, published by the Met Office, should be considered as part of the assessment. In addition, the Designer should refer to the specific policy requirements of the Overseeing Organisation on climate change.

1.34 The separate topics areas in SECTION 3 each address climate change in greater detail.

VII. EXPLORING ALTERNATIVES

1.35 The formulation of alternatives needs to be driven by a regard to the project objectives rather than focussed on the narrow pursuit of one or two primary objectives. The aim of exploring alternatives is to ensure consideration of possible solutions that offer the best outcomes across the full range of objectives set by the Overseeing Organisation. The number and significance of adverse effects should, therefore, be minimised.

1.36 Transport projects are increasingly identified as a result of plans, programmes, strategies or studies in which an appraisal of alternatives has already been undertaken in the establishment of the project brief. Where a project contributes towards a higher-level plan, programme, strategy or study that has been the subject of, for example, a Multi-Modal Study, or Regional Spatial Strategy, then a wider range of alternatives may have previously been examined and reported in the public domain. Where this higher-level appraisal has considered alternatives, there is no requirement to duplicate the process. Therefore the consideration of alternatives should concentrate only on those alternative designs that emerge in pursuit of the project objectives.

1.37 Consequently, the Overseeing Organisation may need to consider the following types of alternatives including the "Do-Minimum" option:

a) **demand alternatives:** to meet the need through demand management techniques;

b) **activity alternatives:** such as provision of traffic calming instead of a new road;

c) **location alternatives:** selection of different corridors or access routes;

and as a sub-set of these main alternatives:

d) **delivery alternatives:** alternatives that reflect different means of delivering the desired end point in production terms, for example, a clear span bridge or one with piers and abutments in the river;

e) **scheduling alternatives:** programming the activities to avoid periods of enhanced environmental sensitivity. Alternative temporary land-take during construction should be considered;

f) **input alternatives:** use of different materials, lighting strategies or different designs; and

g) **mitigation alternatives:** a variety of solutions may be available to mitigate the adverse consequences of a proposal.

1.38 Not all alternatives need to be explored to an equal level of detail. Some alternatives will be examined in less detail than others, as a short study may reveal that they can be eliminated early in the process. Others may survive to a later stage in the project delivery process. The amount of investigation should be proportionate to the feasibility and benefits that an alternative may generate. An audit trail of such alternatives that have been examined, and the reason for not pursuing them, should be put in place.

1.39 To meet the requirements of the EIA Regulations (refer to SECTION 2, Part 2, Chapter 1), a summary of the main alternatives studied by the Overseeing Organisation that emerge in pursuit of the project objectives, the reason for the Overseeing Organisation's choice of project (taking into account potential significant environmental effects), and an indication of the main reasons for continuing with the project taking consideration of potential significant environmental effects, must be provided in the Environmental Statement. The main alternatives typically relate to 'Demand', 'Activity' or 'Location' alternatives e.g., those considered and presented at public consultation for a major project. It should be noted that consideration of alternatives for other assessment processes (e.g., Assessment of Implications on European Sites) might be different from the above.

VIII. IDENTIFYING THE MOST APPROPRIATE DESIGN

1.40 In determining the most appropriate design, the following considerations should be made:

a) the long-term effectiveness of the proposed design to secure the project objectives;

b) the ability for the design to incorporate measures to avoid, reduce or remedy significant adverse environmental effects;

c) the effect the design may have on other environmental receptors or resources;

d) the deliverability and practicality of the proposed design; and

e) the full cost of successful implementation including the practicalities of establishment and future management and maintenance costs.

1.41 The mitigation of significant adverse environmental effects should be dealt with as an iterative part of the option choice, planning and design stage. Failure to do so may result in: failure to deliver the project; and failure to avoid, reduce or remedy significant adverse environmental effects, particularly where land is not secured to allow delivery or future maintenance. Expensive solutions may also arise if the mitigation measures are implemented post construction. The following principles can be identified:

a) mitigation measures perform to an acceptable standard in safety, environmental, economic, social and community terms;

b) the mitigation measures can be fully implemented and all mitigation measures are agreed with the Overseeing Organisation. The implications for management and maintenance should be recognised by the Designer and the Overseeing Organisation (e.g., the provision of planting to form a visual screen entails a commitment to establishment maintenance in the early years and a long-term management obligation); and

c) the Overseeing Organisation should ensure that the design and mitigation measures do not unnecessarily restrict the flexibility during implementation to achieve the same or improved level of environmental performance by alternative means.

1.42 The iterative assessment and design processes should seek to incorporate measures to avoid or reduce the significant environmental effect following a hierarchical system, where avoidance is always the first mitigation measure to be considered:

a) Avoidance – consider and incorporate measures to prevent the effect (for example, consider alternative design options or phase the project to avoid environmentally sensitive periods).

b) Reduction – where avoidance is not possible, then methods to lessen the effect should be considered and incorporated into the project design. Consultation with the Overseeing Organisation will determine whether any remaining 'residual' effect is considered to be environmentally acceptable.

c) Remediation – where it is not possible to avoid or reduce a significant adverse effect, then measures to offset the effect should be considered.

1.43 The costs for environmentally sound project design and mitigation should be considered at all stages when the overall costs for funding of the project are calculated and planned, but the most cost effective and environmentally acceptable solutions will be delivered where potential environmental effects are given early consideration.

IX. IDENTIFYING POTENTIAL IMPACTS

1.44 In assessing the environmental effects of a project it is first necessary to identify the impacts that may arise as a result of project implementation. The EIA Regulations require the assessment to cover the likely significant effects arising from the permanent and temporary, direct, indirect, secondary, cumulative, short, medium and long-term, positive and negative impacts of a project.

1.45 While the majority of impacts potentially associated with road projects are well known, local circumstances may have the potential to generate unique or controversial situations. Through the process of establishing an appreciation of the problems and opportunities within the study area, an awareness of the likely impacts will emerge. These likely impacts should be identified and considered initially at the scoping stage, prior to identifying needs for further assessment.

1.46 All impacts, whether real or perceived by the community, are worthy of consideration during the environmental impact assessment process. However, the time and resource devoted to purely perceived impacts should be commensurate with that needed to secure understanding. Different impacts may overlap and the interaction of these impacts should be identified during the environmental impact assessment process.

a. Permanent and temporary impacts

1.47 Recognition should be made that permanent impacts will be more significant than those of a temporary nature. For example, the impact may only occur during a single phase of the project construction and be temporary. Alternatively, the impact may be long-term or irreversible and hence permanent. It is, therefore, important that the assessment distinguishes between permanent and temporary impacts.

1.48 Temporary impacts are those that are considered to be short or medium-term. Therefore, where the impact will be temporary, consideration should be given to the likely duration of the impact.

1.49 SECTION 3 provides further guidance on the analysis of permanent and temporary impacts associated with each environmental topic.

b. Direct, indirect and secondary impacts

1.50 The assessments should not just concentrate on the direct impacts that are generally very obvious, for example, the noise benefits of reduced traffic.

Assessments should also consider indirect impacts which occur in two basic forms:

i. impacts related to pressure as a result of project-induced change. For example, an environmental resource may experience increased pressures as the result of the implementation of a project. For example, the removal of hedgerows to make severed fields more viable; and

ii. those that alter the character, behaviour or functioning of the affected environment because of the knock-on impacts of the project over a wider area or timescale. For example, the removal of hedgerows above may lead to changes in soil retention.

1.51 Discovering indirect impacts early in the project delivery process helps determine whether to proceed or to modify the proposed design so that the long-term indirect consequences are consistent with the long-term needs and goals of the affected area as set out in adopted plans and programmes (and strategies).

1.52 SECTION 3 provides further guidance on the analysis of direct, indirect and secondary impacts associated with each environmental topic.

c. Cumulative impacts

1.53 The EIA Regulations require cumulative impacts to be considered in EIA. In addition, it is good practice to consider cumulative impacts in non-statutory environmental impact assessment.

1.54 Cumulative impacts result from multiple actions on receptors and resources and over time and are generally additive or interactive (synergistic) in nature. Cumulative impacts can also be considered as impacts resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the project[1]. Therefore, in setting the baseline scenario (refer to SECTION 2, Part 5, Chapter 1, Section III) it should be recognised that a cumulative assessment may be needed.

1.55 There are principally two types of cumulative impact in environmental impact assessment. These are:

i. cumulative impacts from a single project; and

ii. cumulative impacts from different projects (in combination with the project being assessed).

1.56 In the first type (i.e., cumulative impacts from a single project), the impact arises from the combined action of a number of different environmental topic-specific impacts upon a single receptor/resource.

1.57 In the second type (i.e., cumulative impacts from different projects, in combination with the project being assessed), the impact may arise from the combined action of a number of different projects, in combination with the project being assessed, on a single receptor/resource. This can include multiple impacts of the same or similar type from a number of projects upon the same receptor/resource.

1.58 For the purposes of this guidance, 'reasonably foreseeable' is interpreted to include other projects that are 'committed'. These should include (but not necessarily be limited to):

- Trunk road and motorway projects which have been confirmed (i.e., gone through the statutory processes).

- Development projects with valid planning permissions as granted by the Local Planning Authority, and for which formal EIA is a requirement or for which non-statutory environmental impact assessment has been undertaken.

1.59 In each case, other projects to be considered in the assessment of cumulative effects should be determined in consultation with the Local Planning Authority and other statutory bodies and confirmed with the Overseeing Organisation on a project-by-project basis.

1.60 SECTION 3 provides further guidance on the approach to identify and analyse the interrelationship between impacts associated with each environmental topic. It is important that there is good co-ordination of the sharing of results between topic areas to ensure a comprehensive identification and understanding of the interaction between impacts.

[1] *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interaction*, European Commission, May 1999.

X. MITIGATION, ENHANCEMENT AND MONITORING

1.61 Legislation provides the Overseeing Organisation with powers to:

> *"acquire land for the purpose of mitigating any adverse effect which the existence or use of a highway constructed or improved by them, or proposed to be constructed or improved by them, has or will have on the surroundings of the highway.*[2]*"*

1.62 Within these limitations and in accordance with the relevant legislation, the Designer should actively explore the feasibility and costs of delivering schemes that deliver across all the project's objectives and make effective contributions towards sustainable development.

1.63 Some measures may mitigate more than one effect. For example, planting can reduce visual effects for people and also benefit wildlife; balancing ponds may be designed with pollution control measures and deliver the required hydrological regime. Occasionally, measures can produce adverse as well as beneficial effects, e.g., an environmental barrier might severely increase visual effect or the excavation of balancing ponds may affect buried archaeological sites. It is important to manage measures to ensure that legal requirements are fulfilled and that the project objectives and anticipated benefits and commitments are achieved. Similarly, it may be necessary to monitor particular measures to ensure their successful implementation. These requirements should be covered by the standard Environmental Management System used for the project (refer to SECTION 2, Part 5, Chapter 3).

1.64 There are principally two types of mitigation; essential or desirable. Determining whether mitigation is essential or desirable relies on the professional judgement of the topic specialist. If mitigation is defined as essential, and it can be provided under the requirements and powers of the relevant legislation, then the Overseeing Organisation has statutory powers with which to deliver this. This type of mitigation can therefore be guaranteed and is taken into consideration during the assessment process. Desirable mitigation is a measure considered to be environmentally beneficial but that cannot usually be achieved using statutory powers. For example, desirable mitigation may require third party agreement. Unless this agreement is in place prior to the statutory processes, it cannot be guaranteed and therefore should not be considered when assigning significance. This is because, where a decision has been taken that the project can proceed given the reported level of environmental performance, then changes that undermine that decision may threaten the future integrity of the project, and this is more likely to arise where mitigation is purely desirable. The reporting and implementation of desirable mitigation should therefore be considered on a project-by-project basis, as agreed with the Overseeing Organisation. SECTION 2, Part 5, Chapter 1, Section VIII discusses the hierarchical approach for developing mitigation.

1.65 At each stage in the project planning process, the design and the mitigation measures should be agreed with the Overseeing Organisation. The mitigation and management commitments and requirements should also be reported appropriately in accordance with the requirements of the Environmental Management System (refer to SECTION 2, Part 5, Chapter 3). The Overseeing Organisation should ensure that appropriate skills are available to design and deliver the measures agreed during project assessment. Of crucial importance are those measures affecting and reducing the significance of adverse effects (i.e., essential mitigation). The likely effectiveness of these measures should be clearly evaluated and reported. The Overseeing Organisation should ensure that appropriate powers in accordance with relevant legislation are used to ensure that essential mitigation can be delivered. It is important that the Overseeing Organisation monitors its commitments to mitigate for adverse significant environmental effects and enhance the environment where required (for example, the duty to enhance biodiversity under Section 40 of the Natural Environment Rural Communities Act 2006). Follow-up management processes should be in place to ensure the delivery of essential features or controls takes place. In addition, the success of mitigation should be reported in accordance with the specific requirements of the Overseeing Organisation to inform continuous improvement of performance. The cost associated with the construction and establishment of measures should be included in the overall project cost, throughout the project planning and construction process.

1.66 Any commitments made earlier in the environmental assessment process should not be overlooked, particularly as these commitments and any associated measures may need to be reported to fulfil statutory obligations. Where they are no longer needed

[2] Highways Act 1980 (as amended), Part XII, Section 246.

to deliver an objective, then an audit trail should record this situation.

XI. ENVIRONMENTAL PERFORMANCE

1.67 In defining the design and mitigation solutions, rather than being overly prescriptive, the project objectives and level of environmental performance that the solution is to achieve should be specified early in the assessment process, preferably at the Scoping phase (refer to SECTION 2, Part 4).

1.68 Defining objectives specific to the project allows for the consideration of novel or innovative measures. On the other hand, there may be situations that require strict adherence to mitigation measures that are known to be successful. Due consideration of risk, failsafe and corrective measures to achieve the objective of the mitigation should be made when novel or innovative approaches are being considered. Particular care should be taken to ensure that the setting of a single performance objective does not then result in a secondary unforeseen adverse effect.

1.69 In consultation with the Overseeing Organisation, the Designer should explore alternative means of minimising mitigation costs and maintaining flexibility, whilst ensuring that the requirements of the project objectives are fulfilled and the level of environmental performance is not compromised. Where alternatives arise, these should be explored with the Overseeing Organisation to ensure there is no trade-off between maintaining flexibility and environmental performance. The level of environmental performance required may be appropriately documented as a commitment in an Environmental Management System (EMS) (refer to SECTION 2, Part 5, Chapter 3) in accordance with the specific requirements of the Overseeing Organisation. Ensuring that the proposed design and mitigation measures achieve their purpose and fulfil the project objectives is fundamental to minimise the significant adverse effects of any project and to meet any legal requirements.

1.70 Monitoring and validating of the project objectives should be undertaken to establish whether the project obligations have been met. The timescale for monitoring and validating should be agreed with the Overseeing Organisation.

1.71 Further guidance regarding project objectives is given in SECTION 2, Part 5, Chapter 1, Section V.

1.72 Environmental commitment data should be recorded as part of the process of reporting environmental impact assessments. Performance monitoring should be recorded in accordance with the requirements of the relevant Overseeing Organisation (for example, through EnvIS in England).

XII. REPORTING

1.73 SECTION 2, Part 6 provides guidance on the reporting of the environmental impact assessment process.

XIII. UNCERTAINTY AND VALIDITY OF THE ASSESSMENT PROCESS

1.74 The environmental impact assessment process should recognise that there may be some uncertainty attached to the prediction of environmental effects and this should be recognised in each of the SECTION 3 topic areas. The following are key sources of uncertainty:

- the validity of baseline data;
- the effect of the passage of time on the validity of data;
- future changes that could affect the conclusions of an assessment; and
- assumptions and predictions.

1.75 The sources of uncertainty and their implications should be clearly identified and documented, usually in qualitative terms, as the assessment progresses. Where it is meaningful to do so, the uncertainty should be expressed quantitatively, e.g., reflecting the error range associated with a particular prediction. The passage of time and environmental knowledge or change may alter uncertainty. There is, therefore, a link between uncertainty and validity in time.

1.76 One source of uncertainty is the time period or window between the various stages in project development or environmental impact assessment reporting. This influences the validity of the assessment since the data on which predictions are based may become out of date (e.g. through changes in the baseline environment). Similarly, where the environmental impact assessment places reliance upon data drawn from studies of plans or programmes (or strategies), or data gathered during a previous stage in the project delivery process, then the validity of this information should be confirmed. This may require the gathering of updated information through site visits and consultations.

1.77 Apart from considering the validity of the baseline data, the likely period over which the project and individual topic assessments would remain valid should also be considered. Retaining previously gathered data would improve the efficiency of subsequent assessments. In certain circumstances, and if agreed with the Overseeing Organisation, it may be cost effective to continue data collection during periods of inactivity, reviewing the data once the project is to be taken forward. Alternatively, continual data collection may be necessary in order to establish greater confidence in the baseline data.

1.78 Designers and the Overseeing Organisation need to be aware of the changes that may occur that question the validity of environmental data. They should consider the following variables:

i. the baseline environment changes, e.g., community expansion or species movement;

ii. the problem being addressed by the project changes and the project varies with consequentially different impacts arising;

iii. environmental values change e.g. new designations; and

iv. societal values change e.g. change of policy or legislation; new environmental design and mitigation possibilities emerge.

1.79 In some planning situations, typically urban situations, the environment may be subject to rapid change such that it is difficult to forecast the future situation. Consequently, some of the data, assumptions and predictions may become invalid. The environmental impact assessment should provide a commentary upon the likely period over which the data is envisaged to be valid and the degree of uncertainty attached to such data.

1.80 Projects emerging from plans and programmes (and strategies) may have been assessed at different levels of detail using data of potentially variable quality. Appropriate validation of the assessment from the plan or programme (or strategy) may be necessary at the commencement of the project development process since several years may elapse prior to the project development process commencing.

2. DETERMINING SIGNIFICANCE OF ENVIRONMENTAL EFFECTS

2.1 The purpose of environmental impact assessment is not to assess or characterise the environment for its own sake, but rather to influence design and option choice and ensure effort to mitigate effects is focussed on those more significant effects. The criterion for arriving at the assessment of environmental effects can be considered in a formulaic manner. In most cases the output of an environmental impact assessment will be to report on the significance of a particular effect.

2.2 The significance of the effect is formulated as a function of the receptor or resource environmental value (or sensitivity) and the magnitude of project impact (change). In other words, significance criteria are used to report the effect of the impact.

2.3 This second chapter sets out the approach to determining significance of environmental effects and includes the following:

I Assigning environmental value.

II Assigning magnitude of impact.

III Assigning significance.

IV Cumulative effects.

I ASSIGNING ENVIRONMENTAL VALUE

2.4 Typical SECTION 3 descriptors and criteria for the environmental value of an environmental resource are listed in Table 2.1. Note that not all of the SECTION 3 topics will use all the following value categories.

Value (sensitivity)	Typical descriptors
Very High	• Very high importance and rarity, international scale and very limited potential for substitution.
High	• High importance and rarity, national scale, and limited potential for substitution.
Medium	• High or medium importance and rarity, regional scale, limited potential for substitution.
Low (or Lower)	• Low or medium importance and rarity, local scale.
Negligible	• Very low importance and rarity, local scale.

Table 2.1 Environmental Value (or Sensitivity) and Typical Descriptors

II ASSIGNING MAGNITUDE OF IMPACT

2.5 Typical SECTION 3 descriptors and criteria which define the magnitude of an impact of a project are listed in Table 2.2.

Magnitude of impact	Typical criteria descriptors
Major	• Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	• Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Moderate	• Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	• Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Minor	• Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	• Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	• Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	• Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	• No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Table 2.2 Magnitude of Impact and Typical Descriptors

III ASSESSING SIGNIFICANCE

2.6 The approach to assigning significance of effect relies on reasoned argument, professional judgement and taking on board the advice and views of appropriate organisations. For some disciplines, predicted effects may be compared with quantitative thresholds and scales in determining significance. Assigning each effect to one of the five significance categories enables different topic issues to be placed upon the same scale, in order to assist the decision-making process at whatever stage the project is at within that process. These five significance categories are set out in the Table 2.3.

Significance category	Typical descriptors of effect
Very Large	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
Large	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
Moderate	These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Table 2.3 Descriptors of the Significance of Effect Categories

2.7 It is important to note that significance categories are required for positive (beneficial) as well as negative (adverse) effects. The five significance categories give rise to eight potential outcomes. Applying the formula, the greater the environmental sensitivity or value of the receptor or resource, and the greater the magnitude of impact, the more significant the effect. The consequences of a highly valued environmental resource suffering a major detrimental impact would be a very significant adverse effect. The typical significance categories presented in Table 2.4 and within SECTION 3 topics have been prepared specifically for decision-making on projects and they may not necessarily be appropriate to other projects.

ENVIRONMENTAL VALUE (SENSITIVITY)	MAGNITUDE OF IMPACT (DEGREE OF CHANGE)					
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Table 2.4 Arriving at the Significance of Effect Categories

2.8 Change can be either beneficial or adverse, and effects can also, therefore, be either beneficial or adverse. In some cases above the significance is shown as being one of two alternatives. In these cases a single description should be decided upon with reasoned judgement for that level of significance chosen.

2.9 The significance should be assigned after consideration of the effectiveness of the design and committed mitigation measures (in line with the Overseeing Organisation's requirements). That is, significance is assigned with mitigation in place allowing for the positive contribution of all mitigation that is deliverable and committed. In Scotland and Wales, the assignment of significance before the consideration of the effectiveness of the design and committed mitigation measures should also be undertaken, allowing for the case or reason for and the effectiveness of mitigation to be described.

2.10 At the early stages of project design, the details of mitigation are likely to be poorly defined. The significance assigned to effects by the Designer should be based upon the assumption that only standard mitigation practices should be put in place. Where other mitigation measures may be feasible or desirable to address the effects, then these should be noted but these should not influence the significance score that is assigned at this early stage. The uncertainty regarding their adoption needs to be made clear and subsequently resolved by the Overseeing Organisation at the later stages of the project assessment and design.

2.11 The SECTION 3 topics seek to ensure that the following questions, where relevant, should be considered in evaluating the significance of potential effects:

i. Which receptors/resources would be affected and in what way?

ii. Is the receptor/resource of a local, regional, national or international importance, sensitivity or value?

iii. Does the effect occur over the long or short term; is it permanent or temporary and increase or decrease with time?

iv. Is the change reversible or irreversible?

v. Are environmental and health standards (e.g., local air quality standards) being threatened?

vi. Are feasible mitigating measures available?

2.12 SECTION 3 guidance provides advice on the significance criteria for individual topics. If necessary the description of the criteria may be adjusted to reflect the specific effects that a project may generate but the overall criteria levels should not be adjusted. If changes are made, it is advisable to agree these with the Overseeing Organisation and in turn the statutory environmental bodies in advance of forecasting the actual significance criteria.

IV DETERMINING SIGNIFICANCE OF CUMULATIVE EFFECTS

2.13 When considered in isolation, the environmental effects of any single project upon any single receptor/resource may not be significant. However, when individual effects are considered in combination, the resulting cumulative effect may be significant. The focus in assigning significance to cumulative effects should be determined by the extent to which the impacts can be accommodated by the receptor/resource. Thresholds (limits beyond which cumulative change becomes a concern) and indicative levels of acceptable performance of a receptor/resource may also aid the assessment process.

2.14 The following factors should be considered in determining the significance of cumulative effects:

- Which receptors/resources are affected?
- How will the activity or activities affect the condition of the receptor/resource?
- What are the probabilities of such effects occurring?
- What ability does the receptor/resource have to absorb further effects before change becomes irreversible?

2.15 It is useful to standardise significance criteria for cumulative effects. The 5 categories below could be used as a framework for determining significance of cumulative effects:

Significance	Effect
Severe	Effects that the decision-maker must take into account as the receptor/resource is irretrievably compromised.
Major	Effects that may become key decision-making issue.
Moderate	Effects that are unlikely to become issues on whether the project design should be selected, but where future work may be needed to improve on current performance.
Minor	Effects that are locally significant.
Not Significant	Effects that are beyond the current forecasting ability or are within the ability of the resource to absorb such change.

Table 2.6 Determining Significance of Cumulative Effects

2.16 It should be noted that the assessment of air quality and other assessment processes, for example Assessment of Implications on European Sites, might have different requirements for the consideration of cumulative effects.

3. MANAGEMENT OF ENVIRONMENTAL EFFECTS

Introduction

3.1 Advice on good environmental design, mitigation measures associated with specific environmental topics and on the implementation and management of environmental issues in projects is given in DMRB Volume 10 (or its updates), in SECTION 3 and in guidance specific to the relevant Overseeing Organisation. This chapter advises on how a project's likely significant environmental effects, as identified by the environmental impact assessment process, should be managed in order to mitigate adverse project consequences and to proactively protect the environment.

The Environmental Management Process

3.2 In order to maintain a project's long-term environmental performance and delivery of its objectives it is essential that a link is built between the project design and assessment process and the environmental management process. A structured and formalised approach will allow environmental planning, implementation, review and reporting to work as one. Environmental Management Systems (EMS), such as those specified in the ISO 14000 series of standards and the Eco-Management and Audit Scheme (EMAS), cover such a structured approach. For England, cross reference should be made to DMRB's guidance for EnvIS, which sets out environmental management information requirements for EnvIS (a Geographical Information System (GIS) based Environmental Information System which houses environmental asset and management information). Reference should be made to the specific requirements for EMS of each of the Overseeing Organisations.

3.3 The environmental management process addresses the how, when, who, where and what of integrating environmental mitigation measures and management throughout an existing or proposed operation or activity. It encompasses all the elements that are sometimes addressed separately in option choice, consultation, design, mitigation, monitoring and action plans. The function of the environmental management process is, therefore, to:

i. assist in the identification of significant environmental effects;

ii. assist in the co-ordination of the option choice, design and implementation of measures;

iii. ensure awareness of the project's commitments to design, mitigation, enhancement and monitoring measures made in project design and reporting;

iv. provide a checklist of measures;

v. measure environmental performance; and

vi. provide the basis for monitoring and auditing the delivery of environmental measures.

3.4 The environmental management process may typically be divided into four main stages:

i. Planning and Design: covering activities related to:

   – feasibility;

   – outline design;

   – detailed design.

ii. Construction: covering activities:

   – prior to construction (e.g. site preparation);

   – during construction (e.g. works);

   – during establishment (e.g. site reinstatement).

iii. Handover: covering:

   – the transfer of scheme-specific environmental information from new-build to network management agents.

iv. Operation and Maintenance: covering environmental management in the course of network:

   – operation;

   – maintenance.

3.5 The environmental management process is complementary to the activities undertaken during the environmental impact assessment process and collates all appropriate and relevant information that should exist within the project Designer's teams. To support the delivery of project mitigation, a suitable environmental management process should accompany all environmental impact assessments. This process should fulfil the specific requirements of the Overseeing Organisation.

4. REFERENCES

Legislation:

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5. ENQUIRIES

All technical enquiries or comments on this Advice Note should be sent in writing as appropriate to:

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