

3 Approach and Methods

3.1 Introduction

The aims of the DMRB Stage 3 EA are:

- To expand on the DMRB Stage 2 information collated regarding the environment of the study area and to focus on the most significant aspects;
- To identify and assess predicted environmental impacts associated with the scheme; and
- To identify measures to avoid or mitigate adverse impacts and enhance beneficial impacts so that these can be incorporated into the scheme detailed design, construction and operation.

This chapter describes the general approach to the environmental assessment and methods used in the assessment process for each environmental subject area.

3.2 General Approach to the Assessment

3.2.1 The Design Manual for Roads and Bridges Volume 11

This ES has been completed in accordance with the DMRB (1993 and amendments).

The DMRB was introduced in 1992 in England and Wales, and subsequently in Scotland and Northern Ireland. It provides a comprehensive manual system that accommodates, within a set of loose-leaf volumes, all current design standards, advice notes and other published documents relating to the design, assessment and operation of trunk roads (including motorways). DMRB, Volume 11 (Environmental Assessment) provides guidance on the level of environmental impact assessment required at key stages in the development of such schemes and the requirements for reporting of the potential effects on the environment.

As advised in DMRB, the EA for proposed road schemes comprises three stages that progressively require greater levels of assessment detail. A Stage 1 Environmental Assessment is a preliminary assessment aimed at identifying environmental advantages, disadvantages and constraints associated with broad route corridors or improvement strategies. An indication of potential effects is provided which at this stage is unlikely to take into account detailed road alignments or mitigation measures.

A Stage 2 Environmental Assessment aims to identify factors and effects that require investigation in order to select a preferred route or improvement strategy.

At Stage 3, a detailed assessment of the preferred scheme is undertaken. This may involve the production of an Environmental Assessment Report (EAR) or the publishing of an ES.

This Stage 3 Environmental Assessment has been undertaken with respect to the twelve environmental topics described in DMRB Volume 11. The objective and components relating to a Stage 3 assessment for each environmental parameter are detailed below.

Air Quality

Stage 3 Objective: To provide a more detailed air quality assessment of the preferred road improvement option.

Stage 3 Components:

- Calculate change in total emissions resulting from the scheme compared to the do-minimum.
- Where parts of the preferred option have changed significantly from those assessed at Stage 2 or traffic data has been revised, estimate the pollutant concentrations.
- If localised air pollution effects are likely to be significant, a detailed air quality assessment should be undertaken.

Cultural Heritage

Stage 3 Objective: To identify the significance of impacts on historic buildings and sites likely to arise from the preferred route and to identify the location type and importance of constraints associated with the route.

Stage 3 Components:

- Check with Historic Scotland that no further sites likely to be affected by the preferred route have been identified. Obtain the views of Historic Scotland on the effects of the preferred route.
- A statement describing the constraints and their relative value, assessing the significance of possible impacts, taking into account and agreed mitigation measures. Assess the probable residual effects after mitigation.
- Prepare an updated plan showing the preferred route and all archaeological and built heritage features.

Disruption Due To Construction

Stage 3 Objective: To identify the factors and effects associated with disruption due to construction for the preferred scheme option.

Stage 3 Components:

- Verify the estimated number of properties within 100m of the preferred scheme, indicating those properties particularly sensitive to disruption.
- Check on the presence of areas or features of ecological, archaeological or historic value within 100m of the preferred route that may need to be protected from adverse impact.
- Note any construction operations which may have a potentially significant impact.
- Assess the extent of potential impacts, taking agreed mitigation into account.
- Estimate likely quantities of surplus material and borrow associated with the scheme. Where borrow or surplus material need to be won / disposed of off site, further consultation and assessment of impacts may be required.

Ecology and Nature Conservation

Stage 3 Objective: To undertake sufficient assessment to identify any significant nature conservation impacts likely to arise from the preferred route and to identify the location, type and importance of all areas of significant nature conservation interest that may be affected.

Stage 3 Components:

- Confirm that the detailed desk study and surveys already undertaken provide sufficient information on the preferred route's nature conservation impacts. Undertake further field survey where deemed necessary.
- Obtain the views of SNH and SEPA on the impacts of the preferred route.
- Prepare a map illustrating the different types and quality of habitat likely to be affected by the preferred route including designated sites and any other nature conservation constraints.
- Describe the nature conservation value of the study area and assess the significance of ecological impacts on sites of nature conservation value, before and after taking agreed mitigation into account.
- Describe the results of any specialist surveys, assessing the relative importance of the populations or communities of the species surveyed and the impact of the preferred route on them, without and then with agreed mitigations measures in place.

Landscape Effects

Stage 3 Objective: To assess the landscape and visual effects of the preferred route.

Stage 3 Components:

- Refine the earlier landscape assessment in light of any changes in the alignment of the preferred route. Check that no new landscape areas have been designated in the vicinity of the preferred route. Conduct a visual impact assessment.
- Broadly estimate the number of properties that are likely to experience visual changes.
- Provide an illustrated statement on the impacts of the preferred route on the landscape character and quality of the area. Include a description of the methodology used to assess character and the criteria to determine quality.
- Provide an illustrated description of the visual impact of the preferred route and properties and location to which the public has access. Include: a description of assessment methodology; a list of all properties and locations surveyed with an evaluation of how their amenity would be affected by the scheme; a map showing the preferred route; and the location of affected properties and how their visual amenity would be affected by the scheme.

Land Use

Stage 3 Objective: To update the Stage 2 assessment in terms of the type and number of properties, which might need to be demolished and to assess the location, status and importance of land used by the public, which could be lost. To assess the value of agricultural land and the effects upon it as a result of the preferred scheme.

Stage 3 Components:

- Determine the exact number of properties needing to be demolished.
- Describe the impact on land used by the public, taking mitigation into account.
- Update information provided at Stage 2 in relation to effects on development land.
- For non-designated agricultural land (Classes 3₂, 4 and 5), calculate total land take and estimate area within each of the classes.
- For land classes 1, 2 and 3₁ or land within a designated agricultural area: consider additional mitigation measures if necessary; calculate total

agricultural land take and estimate area within each of the classes; and if a designated agricultural area affected obtain views of the authority responsible for its designation.

- Update the agricultural assessment of land use, severance and boundary impacts for individual farm units undertaken at Stage 2 for the preferred scheme. Comment on the likely future viability of affected farm units.

Traffic Noise and Vibration

Stage 3 Objective: To assess the noise and vibration effects of the preferred scheme.

Stage 3 Components:

- Conduct a noise assessment of all properties and other relevant locations where existing traffic is likely to increase by at least 25% or reduce by at least 20%. This should show predicted noise changes and noise nuisance changes. Agreed mitigation should be taken into account.
- Provide a statement of ambient and predicted noise levels for all properties and other relevant locations, with plans showing impacts at key and typical sites taking agreed mitigation into account. Estimate the number of properties likely to be eligible for statutory noise insulation.
- Where appropriate, assess traffic-induced vibration for unscreened properties within 40m of the scheme.

Pedestrians, Cyclists, Equestrians and Community Effects

Stage 3 Objective: To update the information provided at Stage 2 on routes used by pedestrians, cyclists and equestrians and community facilities and the effects on these as a result of the preferred scheme.

Stage 3 Components:

- Refine the information on community facilities and routes used by pedestrians and others. Estimate the number and location of pedestrians and others and their community facilities affected by the preferred scheme, after allowing for agreed mitigation. Particular attention should be given to vulnerable groups.
- Verify any earlier assessment of changes in journey length and amenity and community severance.
- Where cyclists would be significantly affected, obtain the views of the CTC and any other appropriate organisations.

- Provide a map of community facilities, their catchment areas and the main routes used by pedestrians and others that are affected by the scheme.

Vehicle Travellers

Stage 3 Objective: To update the assessment undertaken at Stage 2 for the preferred scheme.

Stage 3 Components:

- Update the Stage 2 assessment of the view from the road, taking account of any further landscape assessment and modifications to the preferred route.
- Update the Stage 2 assessment of driver stress for the preferred scheme, taking into consideration finalised junction arrangements etc.

Road Drainage and the Water Environment

Stage 3 Objective: To update and expand where necessary the Stage 2 assessment to identify the likely impacts on water quality and fisheries for the preferred scheme.

Stage 3 Components:

- Refine, as appropriate, the map showing the location of flood plains, principal watercourses, ground water protection zones and mark those areas considered to be most sensitive to changes in water quality, hydrological or physical change.
- Assess the sensitivity of watercourses, identify groundwater considerations and assess the effect of soluble/insoluble pollutants and the risk of spillages on water quality. Confirm the spillage risk calculations carried out at Stage 2.
- Evaluate any discharges that pose a threat to water quality of fisheries. Identify appropriate mitigation measures.
- Consider water-related ecological effects and cross-reference to the ecological assessment, with reference to Disruption due to Construction, Geology and Soils, Landscape Effects and Land Use where appropriate.

Geology and Soils

Stage 3 Objective: To undertake sufficient assessment of the preferred route to identify any significant impact on geology and soils, and, where appropriate, contaminated land.

Stage 3 Components:

- Check that no new sites have been designated or areas of contaminated land identified and whether any new survey work has been carried out since Stage 2.
- Where a site of geological / geomorphological interest will be affected, obtain the views of the relevant authority. Describe the significance of any impacts on it.
- Undertake a site investigation of any contaminated land and detail method of treatment. Discuss receptor sites where removal off-site is proposed.

Policies and Plans

Stage 3 Objective: To undertake sufficient assessment to determine the significance of impacts arising from construction of a preferred route on achieving national, regional, county and local level policies objectives.

Stage 3 Components:

- Check that the information obtained at Stage 2 is still accurate and update the schedule of policies produced for Stage 2.
- Assess the likely impact of the preferred route on the policy objectives.
- Obtain the views of the planning authority.

3.2.2 Other Best Practice Guidance / Legislation

In addition to the DMRB, the EA has been supplemented by current best practice guidance as listed in Table 3.1.

In accordance with DMRB Volume 11, the EA has been undertaken for the following environmental parameters:

- Air Quality;
- Cultural Heritage;
- Land Use;
- Ecology and Nature Conservation;
- Landscape Effects (includes visual issues);
- Traffic Noise and Vibration;
- Pedestrians, Cyclists, Equestrians and Community Effects;
- Vehicle Travellers;
- Road Drainage and the Water Environment;
- Geology, Soils and Contaminated Land;
- Disruption due to Construction; and

Policies and Plans.

Table 3.1. Best Practice Guidance / Legislation.

Subject	Best Practice Guidance
General EIA	<ul style="list-style-type: none"> • Environmental Impact Assessment (Scotland) Regulations 1999. • PAN58 Environmental Impact Assessment, Scottish Executive Environment Department, 1999. • Circular 8 2007 - The Environmental Impact Assessment (Scotland) Regulations 1999, The Scottish Government. • A Handbook on Environmental Impact Assessment – Guidance for Competent Authorities, Consultees and others involved in the Environmental Impact Assessment Process in Scotland, SNH 2006.
Air Quality	<ul style="list-style-type: none"> • The Environment Act 1995, Part IV. • The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, The Stationery Office, 2000. • The Air Quality Strategy for England, Scotland, Wales and Northern Ireland Addendum, The Stationery Office, 2003. • The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, July 2007. Department of Environment, Food and Rural Affairs. • The Air Quality (Scotland) Regulations, The Stationary Office, 2000. • The Air Quality (Scotland) Amendment Regulations, The Stationery Office, 2002. • Scottish Transport Appraisal Guidance STAG, Scottish Executive 2006 Update.
Cultural Heritage	<ul style="list-style-type: none"> • NPPG 5 Archaeology and Planning, Scottish Office, 1994. • NPPG 18 Planning and the Historic Environment. Scottish Office, 1999. • Planning Advice Note 42: Archaeology – the Planning Process and Scheduled Monument Procedures, Scottish Office, 1994. • Planning Advice Note 71: Conservation Area Management, Scottish Executive, 2004.
Ecology and Nature Conservation	<ul style="list-style-type: none"> • Guidelines for Ecological Impact Assessment, The Institute of Ecology and Environmental Management (IEEM) Version 7, July 2006. • Guidelines for EIA (IEMA), 2004. • National Planning Policy Guideline (NPPG)14, Natural Heritage, Scottish Office Development Department, 1999. • Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive). • Council Directive 79/409/EEC on the conservation of wild birds (The Birds Directive). • 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') (Scottish Executive, 2000). • Conservation (Natural Habitats, &c.) Regulations 1994. • Wildlife and Countryside Act 1981. • Protection of Badgers Act 1992. • Nature Conservation (Scotland) Act 2004.

Subject	Best Practice Guidance
Landscape and Visual	<ul style="list-style-type: none"> • Landscape and Visual Assessment Supplementary Guidance, Scottish Executive 2002. • Cost Effective Landscape: Learning from Nature, Scottish Office, 1998. • Guidelines for Landscape and Visual Assessment, Institute of Environmental Management and Assessment, 2002. • Landscape Character Assessment Reports, various, Scottish Natural Heritage.
Traffic Noise and Vibration	<ul style="list-style-type: none"> • The Noise Insulation (Scotland) Regulations, 1975. • Memorandum on the Noise Insulation (Scotland) Regulations, 1975. • BS7385: 1993. Part 2, Evaluation and Measurement for Vibration in Buildings, British Standards Institution, 1993. • Planning Advice Note PAN56: Planning and Noise, The Scottish Office Development Department, 1999. • Scottish Transport Appraisal Guidance STAG. Scottish Executive 2003. • BS5228: Part 1: 1997. Noise and Vibration Control on Construction and open Sites. Code of Practice for Basic Information and Procedures for Noise and Vibration Control, British Standards Institution. 1997. • The Calculation of Road Traffic Noise, Department of Transport and The Welsh Office, 1988. • Advisory Leaflet AL72: Noise Control on Building Sites, Department of the Environment (out of print), 1972.
Water Resources and Drainage	<ul style="list-style-type: none"> • Sustainable Urban Drainage Systems: Design Manual for Scotland and Northern Ireland, CIRIA 2000. • Scottish Planning Policy, SPP7: Planning and Flooding, Scottish Executive Development Department, 2004. • PAN 61: Planning and Sustainable Urban Drainage Systems. • Water Environment and Water Services (Scotland) Act 2003.
Policies and Plans	<ul style="list-style-type: none"> • NPPG5: Archaeology and Planning, The Scottish Office Environment Department, 1994. • NPPG11: Sport, Physical Recreation and Open Space, The Scottish Office Development Department, 1996. • NPPG14: Natural Heritage, The Scottish Office Development Department, 1999. • NPPG15: Rural Development, The Scottish Office Development Department, 1999. • NPPG17: Transportation and Planning, The Scottish Office Development Department, 1999. • NPPG18: Planning and the Historic Environment, The Scottish Office Development Department, 1999. • SPP1: The Planning System, The Scottish Executive Development Department, 2002. • SPP2: Economic Development, The Scottish Executive Development Department, 2002. • SPP7: Planning and Flooding, The Scottish Executive Development Department, February 2004. • SPP17: Planning for Transport: Consultative Draft, Scottish Executive Development Department, 2004.

3.2.3 Assessment Methods

The assessment of impacts has been undertaken in accordance with the following general process for all environmental parameters:

- identification of baseline conditions of the site and its environs;
- consideration of potential impacts and an assessment of impact significance, taking into account sensitivity of resources and magnitude of impact;
- identification of mitigation measures to address the impacts identified; and
- assessment of the significance of residual impacts.

Consideration has also been given to the potential for cumulative / interactive (also in-combination) impacts associated with the preferred scheme. In a broad sense, cumulative impacts refer to the accumulation of effects on the environment relative to other past, present or foreseeable actions that occur in an additive or interactive manner.

Baseline Conditions

The impact assessment for each environmental parameter has been undertaken in comparison with the 'baseline' situation. The 'baseline' refers to the existing site conditions and how these are predicted to change if the scheme did not proceed.

Baseline information has been gathered through site visits, the review of maps, data collection, reports obtained from statutory and non-statutory organisations and field surveys.

Assessment of Impacts

Predicted impacts arising from the scheme have been identified and described and an assessment of the level of significance (major, moderate, slight, negligible, neutral) for each effect determined as far as practical.

Significance varies according to the environmental aspect and the context in which the assessment is made and depends to a large degree on the availability of data relating to existing environmental conditions and the value applied to these conditions. However, in general, the level of significance of impacts has been defined using a combination of the sensitivity (e.g. high, medium and low) of the environmental feature and the magnitude of impact (e.g. major, moderate, slight and negligible). The exact criteria used to assign a sensitivity value and a magnitude level has been defined for each environmental parameter in the appropriate chapter of the ES. The overall significance of an impact, taking the relationship between sensitivity and the magnitude level into consideration, is also defined for each environmental subject.

Sensitivity has generally been defined according to the relative value or importance of the feature, i.e. whether it is of international, national, regional or local importance or by the sensitivity of the receptor in the case of the air quality and noise assessment.

Magnitude of impact has been determined by reference to any legislative or policy standards or guidelines, and the following factors:

- the degree to which the environment is affected, e.g. whether the quality is enhanced or impaired;
- the scale of the change, e.g. the size of land area or number of people affected and degree of change from the existing situation;
- the scale of change resulting from impacts; and
- whether the effect is temporary or permanent.

An impact is considered to be significant if the overall impact is recorded as moderate or major. Mitigation measures for significant impacts will then be required in order to reduce the impact to an insignificant level. For negligible or slight impacts, the impact is not considered to be significant and no specific mitigation is required, although suggestions for best practice and other ways to minimise impacts may be identified or required by law.

The nature of impacts may vary and may be direct or indirect, secondary, cumulative, short, medium or long-term, permanent or temporary and have beneficial or adverse effects. These types of impacts have all been considered.

Consideration has also been given to the potential for cumulative / interactive (also in-combination effects) impacts associated with the proposed improvement options. In a broad sense, cumulative impacts refer to the accumulation of effects on the environment relative to other past, present or foreseeable actions that occur in an additive or interactive manner.

Mitigation Measures

Mitigation measures have been developed based on guidance provided in Planning Advice Note (PAN) 58 on EIA as illustrated in Table 3.2. PAN 58 considers mitigation as a hierarchy of measures ranging from prevention of environmental effects by avoidance, through to compensatory measures for effects that cannot be remedied.

The approach to the mitigation of adverse environmental impacts has been to avoid them wherever possible. This has been achieved by consideration of ways in which to prevent adverse effects at source, rather than relying on measures to mitigate the effects. This has been achieved during the design phase through consideration of scheme design, by the incorporation of special features into the design (such as access arrangements for vehicles or pedestrians), or by proposals relating to

operational equipment or working methods for inclusion in the Contract Documents.

Where avoidance of impacts is not feasible (due to engineering or economic requirements), measures have been proposed to minimise or reduce potential impacts through abatement measures either at source, at the site (for example, by the use of noise attenuation measures or screen planting and landscaping), or at the receptor (for example, translocation of plant species).

Where adverse effects cannot be prevented or reduced, consideration has been given to the specification of measures in the Contract Documents that offset or, in certain circumstances, compensate for any damage. These will require further assessment and incorporation into scheme design or Contract Documents as the scheme progresses.

Residual Effects

The significance of residual effects is determined using the criteria stated in the relevant chapters of this report. Major or moderate effects are deemed to be significant and, if adverse, require mitigation to reduce the significance of the impact. The assessment of residual effects takes into account mitigation measures to be adopted as identified in this ES.

Table 3.2. Hierarchy of Mitigation Measures.

Level of Mitigation	Definition
Prevent	To prevent adverse environmental effects at source, for example, through choice of site or specification of construction equipment.
Reduce	If adverse effects cannot be prevented, steps are taken to reduce them through such methods as minimisation of cause of impact at source, abatement on site and abatement at receptor.
Remedy/offset	When effects remain that cannot be prevented or reduced, they are offset by such remedial or compensatory action as provision of environmental improvements, opportunities for access and informal recreation, creation of alternative habitats and prior excavation of archaeological features.