2. Environmental Impact Assessment Methods

2.1. Design Manual for Roads and Bridges

2.1.1. The methodology and guidance for the Environmental Impact Assessment of the scheme is set out in the Design Manual for Roads and Bridges (DMRB) (1993 and amendments), with Volume 11 (Environmental Assessment) of the DMRB providing specific relevant guidance and a suite of assessment techniques for road schemes.

2.1.2. The DMRB provides a comprehensive manual system that accommodates all current design standards, advice notes and other published documents relating to the design, assessment and operation of trunk roads.

2.1.3. The Aims and Objectives of Environmental Assessment (DMRB, Volume 11, Part1: HA 200/08) are identified in Table 1 the Environmental Impact Assessment Topics. Volume 11 of the DMRB is currently being updated and at present only some of the topics have published updated guidance therefore some topics rely on current guidance.

2.1.4. This Environmental Statement has been undertaken with respect to the environmental topics described in DMRB Volume 11. The objective and components relating to a Stage 3 Assessment for each environmental parameter are detailed as follows:

Air Quality – Chapter 4

Objective –

- To provide a simple air quality assessment of the proposed scheme.

Components –

- Calculate change in total emissions resulting from the proposed scheme and,
- Estimate pollution concentrations.

Cultural Heritage – Chapter 5

Objective –

- To identify the significance of impacts on historic buildings and sites likely to arise from the proposed scheme.

Components –

- Undertake consultations with Historic Scotland and any other necessary bodies;
- Produce a plan illustrating the cultural heritage features and scheme; and,
- Identify potential constraints and their associated value, significance of impacts and mitigation measures.

Ecology and Nature Conservation – Chapter 6

Objective –

- To undertake sufficient investigation to allow the identification of any significant impacts likely to arise as a result of the proposed scheme.

Components –

- Undertake surveys to provide sufficient information on the ecology of the preferred scheme. Provide the survey results;
- Consult with Scottish Natural Heritage and any other appropriate nature conservation bodies; and,
- Produce a plan illustrating the different habitats and potential for protected species along the proposed scheme.

Landscape Effects – Chapter 7

Objective –

- Assess the landscape and visual effects of the proposed scheme.

Components –

- Undertake a landscape assessment of the proposed scheme;
- Identify the number of properties that are likely to experience visual changes;
- Provide an illustrated description of the visual impact of the proposed scheme, assessment methodology, properties and how they will be affected by the scheme; and,
- Identify suitable mitigation measures.

Land Use – Chapter 8

Objective –

- Assess the location, status and importance of the land which could be lost as a result of the proposed scheme.

Components –

- Calculate land take and type of land to be taken;
- Identify mitigation measures for agricultural land lost; and,
- Undertake an agricultural assessment of land use, severance and boundary impacts for individual farms and future viability of the farms.

Noise and Vibration – Chapter 9

Objective –

- Assess the noise and vibration on the proposed scheme.

Components –

- Undertake noise surveys of relevant properties where traffic will alter;
- Provide an illustration of the current and predicted noise levels; and,
- Provide suitable mitigation for households where traffic noise and vibration will increase.

Pedestrians, Cyclists, Equestrians and Community Effects – Chapter 10

Objective –

- To provide information on routes used by pedestrians, cyclists, equestrians and community facilities and the effect on these by the proposed scheme.

Components –

- Predict the number and location of pedestrians, cyclists and equestrians affected by the proposed scheme. Provide suitable mitigation; and,
- Consult with appropriate bodies on walkers and cyclists.

Vehicle Travellers – Chapter 11

Objective –

- To assess the proposed scheme upon vehicle travellers

Components –

- Assess the view from the road, taking account of landscape assessment of the proposed scheme.
- Assess the driver stress for the preferred scheme.

Road Drainage and the Water Environment – Chapter 12

Objective –

- To identify the likely impacts on water quality and road drainage for the proposed scheme.

Components –

- Provide a plan illustrating the locations of watercourses, any ground water protection zones, flood plains and areas at risk of flooding;
- Assess the sensitivity of watercourses, and the risk of spillages and pollution incidences; and,
- Identify suitable mitigation measures.

Geology and Soils – Chapter 13

Objective –

- Undertake sufficient assessment of the geology and soils on the proposed scheme and identify any constraints, including contaminated land.

Components –

- Provide a plan showing the location of any designated geological sites and areas of contaminated land;
- Consult with Scottish Natural Heritage and any other appropriate bodies; and,
- Identify appropriate mitigation measures.

Policies and Plans – Chapter 14

Objective –

- Undertake assessment to determine the significance of impact arising from the construction of the proposed scheme on meeting local, regional and national objectives.

Components –

- Assess the impact of the proposed scheme on policies; and,
- Obtain views of South Ayrshire Council.

2.1.5. Best practice guidelines and legislation has been followed for each of these environmental parameters.

2.2. Determination of Impact Significance

2.2.1. Impact significance is determined as a function of a receptor's sensitivity (environmental value) and the magnitude (extent of change) of the impact.

2.2.2. This section sets out the approach to determining impact significance through:

- Assigning receptor sensitivity;
- Assigning impact magnitude;
- Assigning significance; and,
- Cumulative impacts.

Assigning Receptor Sensitivity

2.2.3. The typical descriptors and criteria for the sensitivity of a receptor are listed in Table 2.1 Determination of Receptor Sensitivity.

Table 2.1 Determination of Receptor Sensitivity	
Sensitivity	**Typical Criteria 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	Low or medium importance and rarity, local scale
Negligible	Very low importance and rarity, local scale

Assigning Impact Magnitude

2.2.4. The typical descriptors and criteria which define the impact magnitude are listed in Table 2.2 Determination of Impact Magnitude.

Table 2.2 Determination of Impact Magnitude	
Magnitude	**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; extensive restoration or enhancement, major improvement of attribute quality (Beneficial)
Moderate	Loss of resource, but not affecting 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 (possibly more) key characteristics, features or elements (Adverse)
	Minor benefit to, or addition of, one (possibly more) key characteristics, features or elements, some beneficial impact on attribute or a reduced risk of a 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.

Assigning Impact Significance

2.2.5. Assigning impact significance relies on reasoned argument, professional judgement and consideration of the views and advice of appropriate organisations. Some topics may have their predicted impacts assessed using quantitative thresholds and scales in the determination of significance.

2.2.6. Assigning each impact to one of five significance categories enables different topic issues to be placed within the same scale to allow a direct comparison. The five significance categories are illustrated in Table 2.3 Significance Descriptors.

Table 2.3 Impact Significance Descriptors

Significance Category	Typical Criteria Descriptors
Very Large	Only adverse impacts are normally assigned this level of significance, and represents key factors in decision-making process. These impacts 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 integrity. A major change in a site or feature of local importance may also enter this category.
Large	These beneficial or adverse impacts are considered to be very important considerations. They are likely to be pertinent in the decision-making process.
Moderate	These beneficial or adverse impacts 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 impact on a particular resource or receptor.
Slight	These beneficial or adverse impacts 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 impacts of those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

2.2.7. It is important to note that significance categories are required for positive (beneficial) and negative (adverse) impacts. Within this report all impacts are assumed to be negative unless otherwise stated.

2.2.8. The greater the receptor sensitivity and the greater the impact magnitude, the more significant the impact. The consequence of a highly sensitive receptor suffering a major detrimental impact would be a very large significant adverse impact.

2.2.9. The determination of impact significance as illustrated in Table 2.4, and within DMRB Volume 11, Section 3 has been specifically prepared for decision-making on projects.

2.2.10. In some cases, the significance is shown as being one of two alternatives. In these cases a single description should be decided on and a reasoned judgement included for the level of significance chosen.

Table 2.4 Determination of Impact Significance

		Impact Magnitude				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
Receptor Sensitivity	**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

Mitigation Measures

2.2.12. Mitigation of negative impacts associated with a project is based on guidance provided within Planning Advice Note (PAN) 58 (recently superseded by Planning Advice Note 1/2013:Environmental Impact Assessment), which involves a combination of three approaches:

- Prevention – Prevention of negative effect at source – e.g. alignment in a cutting to prevent any visual impact from surrounding receptors;
- Reduction – Reduction of negative impacts that cannot be eliminated by prevention, e.g. environmental barriers in the form of mounds, fencing or tree planting to reduce the noise/visual impacts to acceptable levels; and,

- Offsetting – The provision of alternative or compensatory measures where appropriate and feasible, e.g. the creation of new habitats to compensate for loss of habitat as a result of the proposed alignment.

2.2.13. The assignment of significance should be undertaken before and after consideration of the effectiveness of the design and committed mitigation measures. This will allow the case for and the effectiveness of mitigation to be described.

2.2.14. The DMRB Volume 11, Section 3 provides advice on the significance criteria for individual topics. It is advisable to agree any changes to the scheme due to mitigation with Statutory Bodies prior to predicting the impact significance.

Determination of Cumulative Impact Significance

2.2.15. When a receptor is assessed in isolation, the impact may not be significant, however when individual impacts are considered in combination, the resulting cumulative impact may be significant.

2.2.16. The cumulative impact significance should be determined by the degree to which impacts can be accommodated by the receptor. The following factors should be considered when determining cumulative impact significance.

- Which receptors are affected?
- How will receptor condition be affected?
- What is the probability of the impact occurring?
- The ability of the receptor to absorb impacts before change becomes irreversible.

2.2.17. The five categories of cumulative impact significance can be standardised as shown in Table 2.5 Determination of Cumulative Impact Significance.

Table 2.5 Determination of Cumulative Impact Significance

Significance	Impact
Severe	Receptor is irretrievably compromised. Decision maker must take into account.
Major	May become key decision making issue.
Moderate	Unlikely to become issues on design selection, but may require improvement of performance.
Minor	Locally significant.
Not significant	Beyond current forecasting ability or within receptor ability to absorb change.