

Appendix E

**Capacity Assessment
Calculations**

E1 CRF Capacity Calculation Formula

The CRF of a link is calculated by the formula:

$$CRF = CAPACITY * NL * Wf * 100 PkF * 100 / PkD * AADT / AAWT$$

Where:

- CAPACITY is the maximum hourly lane throughput (Capacity = A – (B x Pk%H) vehicles, where A and B are lane capacity factors, and Pk%H is the % HGV);
- NL is the number of lanes per direction;
- Wf is a width factor;
- PkF is the proportion (percentage) of the total daily flow (2-way) that occurs in the peak hour;
- PkD is the directional split (percentage) of the peak hour flow;
- AADT is the annual average daily traffic flow on the link; and
- AAWT is the annual average weekday traffic flow on the link.

E1.1 CRF Capacity Assessment for Existing Conditions

A CRF assessment of the existing A8 (at Craiginorne) has been undertaken using the guidance set out in TA 46/97, as follows:

$$Capacity = A - (B \times Pk\%H)$$

A and B are parameters dependant on road standard. For a single carriageway, TA 46/97 suggests values of 1380 and 15.0 respectively. Pk%H is the proportion of HGVs during the peak hour, which is approximately 8.6%.

Capacity of existing A8 is calculated as follows:

$$1380 - (15 * 8.6) = 1251 \text{ vehicles per hour per lane}$$

Assessment of the CRF for the A8 has been based upon the parameters set out in Table E.1. This assumes that the standard DMRB values for a single carriageway road, although the carriageway width is assumed to be 8m.

Table E.1: Calculation of Existing Congestion Reference Flow (CRF)

Parameter	Value
Number of lanes (NL)	1
Width factor (Wf)	1.1
Percentage of daily flow in the peak hour (PkF)	9.04
Directional split percentage in the busiest direction (PkD)	61.07
Annual average daily traffic (AADT)	14,386
Annual average weekday traffic (AAWT)	15,906

The calculation of CRF for the existing S2 carriageway has been based upon the following CRF assessment equation:

$$CRF = CAPACITY * NL * Wf * 100 PkF * 100 / PkD * AADT / AAWT$$

$$CRF (S2) = 22,913 \text{ vehicles/ day}$$

E1.2 CRF Capacity Assessment for a WS2 Carriageway

The parameters outlined in TA 46/97 for road traffic capacity do not differentiate between S2 and WS2 and therefore the lane capacity of a WS2 carriageway has been assessed as 1251 vehicles per hour, the same as an S2 carriageway. See section 5.3.1 for calculation details.

Assessment of the CRF for the A8, improved to a WS2 carriageway has been undertaken based upon the parameters set out in Table E.2.

Table E.2: Parameters used for CRF Assessment for WS2 Carriageway

Parameters		Value
Number of lanes	NL	1
Width factor	Wf	1.46
Percentage of daily flow in the peak hour	PkF	9.04
Directional split percentage in the busiest direction	PkD	61.07
Annual average daily traffic	AADT	14,386
Annual average weekday traffic	AAWT	15,906

The calculation of CRF for the WS2 carriageway option has been based upon the following CRF assessment equation:

$$CRF = CAPACITY * NL * Wf * 100 * PkF * 100 / PkD * AADT / AAWT$$

$$CRF (WS2) = 29,922 \text{ vehicles/ day}$$

E1.3 CRF Capacity Assessment for a D2AP Carriageway

The lane capacity for a D2AP carriageway has been assessed in accordance with TA 46/97, as follows.

$$Capacity = A - (B \times Pk\%H)$$

A and B are parameters dependant on road standard. For a single carriageway, TA 46/97 suggests values of 2100 and 20.0 respectively. Pk%H is the proportion of HGVs during the peak hour, which is approximately 8.6%.

Capacity of existing A8 is calculated as follows:

$$2100 - (20 * 8.6) = 1928 \text{ vehicles per hour per lane}$$

Assessment of the CRF for the A8 has been based upon the parameters set out in Table E.3.

Table E.3: Parameters used for CRF Assessment for D2AP Carriageway

Parameter		Value
Number of lanes	NL	2
Width factor	Wf	1
Percentage of daily flow in the peak hour	PkF	9.04
Directional split percentage in the busiest direction	PkD	61.07
Annual average daily traffic	AADT	14,386
Annual average weekday traffic	AAWT	15,906

The calculation of CRF for the D2AP carriageway option has been based upon the following CRF assessment equation:

$$CRF = CAPACITY * NL * Wf * 100 PkF * 100 / PkD * AADT / AAWT$$

$$CRF (D2AP) = 60,575 \text{ vehicles/ day}$$

Appendix F

**Assessment
Methodologies**

F1 Engineering Assessment

An engineering assessment of each corridor has been undertaken in accordance with the DMRB methodology in TD 37/93, to provide the necessary supporting information to inform the Environmental, Economy and Safety Objectives detailed below. At this stage only a broad assessment of the issues can be made, and the following assessment criteria have been used:

- Geometry and Departures from Standard (DMRB TD9/93);
- Structures;
- Drainage;
- Utility Services;
- Geotechnics;
- Construction Issues; and
- Traffic assessment.

F1.1 Geometry and Departures from Standard

The geometric composition of each option has been assessed in relation to the DMRB highway link design standards set out in TD 9/93. At this early stage the assessment has focused on the ability to achieve a horizontal and vertical alignment that complies with the standard for a 120kph design speed. Therefore coarse horizontal and vertical alignments were produced to identify if any relaxations or departures from standard would be required and to identify any significant constraints on the geometry.

F1.2 Structures

At this stage it has only been possible to undertake an assessment of the likely number and location of structures. Initial comments are provided as to where existing structures may be affected; however, a further assessment of the structural requirements identifying and summarising the key structural issues will be undertaken at the next stage.

F1.3 Drainage

The Stage 1 drainage assessment of each corridor has focused on the ability to incorporate a highway drainage system. However, this is not considered to suggest one corridor over another and further, more detailed, assessment will be required at the next stage once vertical alignments for the routes have been developed. The impacts on watercourses and on the 1:100 year floodplain are covered in the environmental assessment (see section F2.5.7).

F1.4 Utility Services

The potential impact of each option upon the existing utility services has been assessed.

F1.5 Geotechnics

Geology, geomorphology and ground conditions have been assessed for each option based on the Stage 1 desk-based study.

F1.6 Construction Issues

Constructability is an important issue for option comparison. The potential construction issues associated with each corridor have been considered. However, at this stage they are generally limited to the traffic management issues and it is considered that this would not advise one corridor in favour of another.

F1.7 Traffic Assessment

The traffic flows for each of the different corridors are broadly similar in that there is a limited route choice for north to south travel through the assessment area. The traffic and operational capacity of each of the route options are therefore considered equal and a major improvement in relation to the do-minimum scenario (refer to chapter 5). The traffic assessment for each option has been used to inform the Environmental, Economy and Safety Objective assessments.

F2 Environmental Objective

F2.1 Assessment Methodology

A comparison of the WebTAG Environmental Sub-objectives and the DMRB environmental assessment criteria is provided in Table F.1 below and it can be seen that there are clear differences between the two sets of assessment guidance.

With reference to the guidance in WebTAG Unit 2.6, the environmental assessment and option comparison for this scheme assessment has been based upon the most appropriate WebTAG and DMRB assessment criteria for a road improvement scheme and these are detailed below in Table F.1.

Table F.1: Comparison of Environmental Sub-Objectives between DMRB and WebTAG

WebTAG	DMRB	Chosen Sub-Objective	Comments
Noise	Noise and Vibration	Noise	DMRB/WebTAG methodology used to inform the Noise Sub-objective
Local Air Quality	Air Quality	Local Air Quality	DMRB/WebTAG methodology used to inform the Local Air Quality Sub-objective
Regional Air Quality		-	Regional air quality is not deemed to be applicable for a road scheme
Greenhouse Gases		Greenhouse Gases	DMRB/WebTAG methodology used to inform the Greenhouse Gases

			Sub-objective
Landscape	Landscape Effects	Landscape and Townscape	DMRB/WebTAG methodology used to inform the Landscape Sub-objective
Townscape		-	Townscape is included in the DMRB landscape effects assessment and is reported under the Landscape Sub-objective
Biodiversity	Ecology and Nature Conservation	Biodiversity	DMRB/WebTAG methodology used to inform the Biodiversity Sub-objective
Heritage/Historical Resources	Cultural Heritage	Heritage/Historic Resources	DMRB/WebTAG methodology used to inform the Heritage/Historical Resources Sub-objective
Water Environment	Road Drainage and the Water Environment	Water Environment	DMRB/WebTAG methodology used to inform the Water Environment Sub-objective
-	Land Use	Land Use	DMRB methodology used to inform the Economy, Accessibility and Integration Objectives
Physical Fitness	Pedestrians, Cyclists, Equestrians and Community Effects	Physical Fitness	DMRB/WebTAG methodology used to inform the Physical Fitness Sub-objective
		Community Effects	DMRB methodology used to inform the Accessibility Objective
Journey Ambience	Vehicle Travellers	Journey Ambience	DMRB/WebTAG methodology used to inform the Journey Ambience

			Sub-objective
-	Geology and Soils	-	DMRB methodology - covered in the Engineering assessment under 'Geotechnics' and used to inform the Economy Objective
-	Impact of Road Schemes on Policies and Plans	-	DMRB methodology used to inform the Integration Objective. A section on relevant planning policy is included in chapter 3 of this report

Only the WebTAG environment sub-objectives have been scored within the AST for each corridor. The details of how the other assessment criteria have been assessed and reported are summarised in Table F.1 above.

The Environment Objective assessment in this report is summarised in a series of Assessment Summary Tables (AST's) provided at the end of each corridor assessment chapter.

The significance of the effect on each of the environment sub-objectives has been assessed as a function of:

- The value of the resource (international, national, regional and local level importance);
- The magnitude of the effect, be it adverse or beneficial;
- The timescale involved, temporary or permanent;
- The number and sensitivity of the receptor and numbers affected; and
- The reversibility of the effect.

For the majority of the sub-objectives, the qualitative and quantitative assessments have primarily been undertaken in accordance with DMRB guidance, but supplemented by WebTAG guidance if that was deemed more relevant or up-to-date. The appraisal scoring has generally been reported in accordance with the specific seven point scales detailed in the relevant WebTAG Units. For the Physical Fitness and Journey Ambience Sub-objectives, the qualitative assessments are based on a generic seven point scale that has been produced in line with the other specific significance scales and are detailed in Table F.2.

Table F.2 Environmental Significance Criteria

Large Beneficial Impact	It is extremely unlikely that any proposal incorporating the construction of a new transport route (road) would fit into this category. However, proposals could have a large positive impact if it is predicted that it will result

	<p>in a very or highly significant improvement to environmental attribute(s), with insignificant adverse impacts on other attributes.</p>
Moderate Beneficial Impact	<ul style="list-style-type: none"> • Where the proposal provides an opportunity to enhance the environment, because it results in predicted: • • significant improvements for at least one attribute, with insignificant adverse impacts on other attributes; • very or highly significant improvements, but with some adverse impacts of a much lower significance. <p>The predicted improvements achieved by the proposal should greatly outweigh any potential negative impacts.</p>
Slight Beneficial Impact	<p>Where the proposal provides an opportunity to enhance the environment, because it provides improvements in attributes which are of greater significance than the adverse effects.</p>
Neutral	<p>No effects or those, which are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.</p>
Slight Adverse Impacts	<p>These effects may be raised as local issues but would be unlikely to be of importance in the decision making process. Nevertheless, they are of relevance in the detailed design of the project and consideration of mitigation, enhancement or compensation measures.</p>
Moderate Adverse Impacts	<p>These effects while important at a local scale, would not be likely to be key decision making issues. They represent issues where effects would be experienced but mitigation measures and detailed design work could ameliorate/enhance some of the consequences upon affected communities or interests. Some residual effects could still arise.</p>
Large Adverse Impact	<p>These effects would be likely to be important considerations at a regional or district scale but, if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision making process. Mitigation measures and detailed design work would be unlikely to remove all of the effects upon the affected communities or interests.</p>
Very Large Adverse Impact	<p>These effects would represent key factors in the decision making process. These effects are generally, but not exclusively, associated with sites and features of national importance and resources/features which are unique and which, if lost, could not be replaced or relocated.</p>

F2.2 Information Collation and Review

A desk-based analysis was conducted involving the collation of relevant and available published information from key Government agencies, local councils, and other stakeholders to the scheme. Information was obtained on land use, biodiversity, water features and flood risk, cultural heritage, landscape, and visual amenity and the local climate. This exercise enabled key environmental constraints to be identified and mapped in drawing numbers A8-ENV-001 to A8-ENV-003 (Appendix D).

F2.3 Constraints Identification and Mapping

Environmental constraints mapping has been produced to assist with the corridor assessment process. The constraints map was produced using the following information:

- ordnance survey produced by the Ordnance Survey of Northern Ireland;
- aerial photography that was obtained in 2008;
- records held by the DoE - NIEA in relation to designated statutory and non-statutory nature conservation sites, listed buildings and historic monuments, water quality etc;
- records held by the DARD – Rivers Agency for flooding, gauging stations and river flows;
- records held by the DARD for agriculture land quality,
- records held by the DCAL for inland fisheries;
- climatic data held by the Met Office;
- local area plans held by Ballymena and Belfast City Councils; and
- other relevant published reports and mapping data.

The principal environmental constraints identified within and immediately surrounding the study area are shown on drawing A8-ENV-001 (Appendix D). Land use, including agricultural land classification is shown on drawing A8-ENV-002 (Appendix D).

F2.4 Consultation and Scoping

Relevant statutory and non-statutory consultees were contacted during the Stage 1 scheme assessment process. This is discussed in section 6.3.

F2.5 Environment Sub-Objectives Assessment Methodologies

F2.5.1 Noise and Vibration

The noise assessment seeks to identify any positive and negative impact due to increased noise levels along the proposed corridors. Due to the rural nature of the surrounding environment, the current major contributor to noise in the area is the existing A8. Any change in alignment may potentially cause an increase or decrease in noise level at dwellings.

For Stage 1, a qualitative assessment has been undertaken to identify areas of potential acoustic sensitivity to provide guidance for further route development.

The approach adopted for the consideration of noise issues as part of the Stage 1 scheme assessment work has largely followed the methodologies set out under DMRB Volume 11 (Section 3, Part 7).

Early traffic flow predictions indicate that future traffic flows for the do-minimum and do-something scenarios (for all corridors) will increase by approximately 15% by 2016 (the estimated opening year). The DMRB methodology states that noise should only be assessed when changes in traffic flow are greater than 25%. Therefore, in accordance with DMRB, there is no requirement to assess noise where corridors are on the line of the existing A8, as the associated noise change would be insignificant.

Given that the proposed corridors all cover large areas that are not representative of a road alignment, identification of noise impact on specific properties has not been possible for Stage 1. Therefore the required methodology of counting properties within distance bands has not been possible.

Appraisal Methodology

At DMRB Stage 1 no noise calculations have been made, and it has not been possible to estimate the number of properties within 300m. However, an indication of the effects to sensitive receptors has been made, which has informed a simple qualitative appraisal.

F2.5.2 Local Air Quality

The approach adopted for the consideration of air quality issues as part of the Stage 1 scheme assessment work has followed the relevant aspects of the methodology set out under DMRB Volume 11 (Section 3, Part 1) *Air Quality* for local air quality. This section has recently been revised replacing a Stage 1 Assessment with a Simple Assessment. This has involved:

- reviewing existing air quality situation through data available from the National Air Quality Archive, Northern Ireland Air, the Northern Ireland Environment Agency and through the respective Larne and Newtownabbey Borough Council's Review and Assessment of Air Quality documents;
- a review of the meteorological data supplied from the nearest Meteorological Office monitoring station;
- identification of the key airborne pollutants that are likely to result from the scheme proposals;
- identification of sensitive receptors including existing and planned properties, where there may be a change in local air quality, near the affected roads;
- identification of any Designated Sites (e.g. SACs, SPAs, SSSIs and Ramsar sites) which could be adversely affected by the scheme proposals; and
- identification of the potential for discernible changes in local air quality due to the scheme proposals and qualitative commentary on the potential changes.

Clements Wood conservation site (non-statutory) is located within 200m of the existing A8 road therefore this is an important resource in the context of the existing road. However, the effects from air pollution deposition on this resource is unknown at this stage as records of protected species and their

potential sensitivity to pollution within the site is limited and therefore no assessment of this specific impact has been undertaken within this Stage 1 scheme assessment.

Given that the proposed corridors all cover large areas that are not representative of a road alignment, identification of air quality impacts on specific properties has not been possible for Stage 1. Therefore the required methodology of counting properties within distance bands has not been possible.

Appraisal Methodology

This Stage 1 assessment has only included a coarse qualitative assessment of potential effects to sensitive receptors. This has been based upon estimated changes in traffic flows, traffic speeds and levels of congestion.

F2.5.3 Greenhouse Gases

The approach adopted for the consideration of air quality issues as part of the Stage 1 scheme assessment work has followed the relevant aspects of the methodology set out under DMRB Volume 11 (Section 3, Part 1) *Air Quality* for regional air quality. This section has recently been revised replacing a Stage 1 Assessment with a Simple Assessment.

The approach adopted for the consideration of greenhouse gases involved a desktop, qualitative review of relevant national policy and guidance on climate change in Northern Ireland. No local documentation was available.

The magnitude of the greenhouse gas impact of each corridor will be similar as vehicular demand for the A8 is expected to be relatively consistent for all the corridors under consideration. It is also possible, that there could be a reduction in greenhouse gas emissions as a result of the scheme proposals, due to vehicles travelling at optimum speeds and reduced congestion, even though there is a slight difference in the length of each corridor.

A route within the proposed corridors could provide both positive and negative impacts for climate change. However, at this stage there is not enough scheme detail to quantify this and for this Stage 1 assessment Greenhouse Gases has been scoped out because there is not enough information to differentiate between the eight corridors.

F2.5.4 Landscape and Townscape

The methodology for landscape and visual impact assessment follows the guidelines set out in the following documents:

- DMRB Volume 11, Section 3, Part 5 Landscape Effects. June 1993/ updated August 1994; and
- guidelines for Landscape and Visual Impact Assessment. The Landscape Institute/ Institute of Environmental management and Assessment. Second Edition. 2002.

The landscape and visual impact assessment has been undertaken by a combination of desk study and field survey. At this stage there are no details of potential mitigation and therefore no allowance for this has been made in the assessment. At this stage it is assumed that there would be no new areas of lighting within any of the proposed corridors. Should lighting columns be required, at key junctions for example, light spillage and sky glow could become an issue.

This initial stage has identified key receptors in the landscape and undertaken the following:

- a review of the existing situation (topography, land use, patterns, scale, settlement, transport routes etc.). This included identification of sensitive elements or groups of elements in the landscape (landscape receptors);
- a review of documentation relating to landscape character, including Local Area Plans and the NIEA website;
- a review of the condition of the landscape through a site visit;
- any special values that may apply to the landscape, generally identified by statutory or non-statutory designations (e.g. AONB, ASI, TPOs) which convey an inherent sensitivity in the landscape. Cultural associations may also be noted; and
- trends or anticipated changes in the landscape.

In terms of Visual Baseline, the existing visual envelope for the A8 corridor has been assessed to provide an account of the visual amenity and the impact of the existing A8 on visual receptors. Residential and publicly accessible receptors (public footpaths, informal recreation sites) are inherently more sensitive than, for example, commercial receptors and therefore have a higher resource value.

Appraisal Methodology

The WebTAG method draws on the information collected as part of Stage 1 DMRB Landscape Assessment. The appraisal score for Landscape and Townscape is derived from WebTAG Unit 3.3.6, 3.3.7 and 3.3.8.

F2.5.5 Heritage/Historic Resources,

The approach adopted for the consideration of Heritage and Historic Resource as part of the Stage 1 scheme assessment work has followed the methodologies set out under and DMRB Volume 11 Section 3, Part 2, *Cultural Heritage*. For the purpose of this report, the assessment methodology has principally involved:

- a desktop review of relevant published information, including reports, Larne Local Plan 2010 and BMAP, and aerial photography;
- a review of listed building and scheduled monument listings provided by DOE – NIEA (Built Heritage);
- a search of the Monuments and Building Records maintained by DOE – NIEA Built Heritage to obtain information on the location of designated sites;
- the identification and mapping of known archaeological features and cultural heritage sites, such as scheduled monuments and listed buildings, in the study area and their immediate surrounds; and
- consultation has been undertaken with DOE – NIEA (Built Heritage and Archaeology) - who are responsible for the identification, recording and protection of archaeological sites and monuments and other buildings of architectural and historic interest - on the nature of the local heritage resource, particularly the distribution of known and designated heritage sites of interest within and immediately surrounding the study area.

Protection of historic resources is carried out by The Historic Monuments and Archaeological Objects (Northern Ireland) Order 1995. PPS6 *Planning, Archaeology and Built Heritage* sets out the DoE planning policies for the protection and conservation for historic assets.

A plan showing areas of archaeological and built heritage has been provided drawn from the desktop study (Drawing A8-ENV-001, in Appendix D).

Appraisal Methodology

The appraisal score is derived from WebTAG Unit 3.3.6 and 3.3.9.

F2.5.6 Biodiversity

The approach adopted for the consideration of biodiversity issues as part of the Stage 1 scheme assessment work has followed the methodology set out under DMRB Volume 11 (Section 3, Part 4) *Ecology and Nature Conservation*. This has principally involved:

- a desktop literature review (to assess available citation sheets) and database searches of the study area to collate available information on the ecological and biodiversity values and to identify potential ecological issues and constraints. Records for habitats and species recorded in the study area were obtained from the Centre for Environmental Data and Recording (CEDaR);
- a preliminary Phase 1 Habitat Survey (in accordance with the approved methodology under the Joint Nature Conservation Committee (JNCC) Handbook for Phase 1 Habitat Survey (2003)). The survey comprised the production of a habitat map using available aerial photography, a preliminary walkover survey from existing public walkways and roads and local vantage points in order to map habitats present within the study area;
- identification and mapping of statutory designated sites of nature conservation interest;
- consideration of relevant legislative requirements; and
- consultations with key stakeholders such as the NIEA, The Wildlife Trust, the Royal Society for the Protection Birds (Northern Ireland), and local wildlife groups such as Northern Ireland Bat Group.

Appraisal Methodology

The biodiversity resource draws on the information collected as part of Stage 1 DMRB Assessment. The appraisal score is derived from WebTAG Unit 3.3.6 and 3.3.10.

F2.5.7 Water Environment

The approach adopted for the consideration of issues on the local water environment as part of this Stage 1 scheme assessment has followed the methodology set out under DMRB Volume 11 Section 3, Part 10, *Road Drainage and the Water Environment*, for a simple assessment. The purpose of this assessment is to undertake a desk study to collect data to determine if there is a potential for impact from routine runoff, spillage and flooding on surface waters and the pathways and vulnerability of groundwater. This has principally involved:

- consultation with the DARD - Rivers Agency, Department of Culture, Arts and Leisure – Inland Fisheries Unit, NIEA – Water Unit and

Natural Heritage to obtain relevant background information on key surface water features, flooding history and water quality;

- consultation with DoE - NIEA (Water Management Unit) to obtain relevant background information on water quality;
- identification of areas sensitive to water pollution, including surface waters and groundwater; and
- description of potential impacts on overland flow regimes, local water quality and flood risk.

Appraisal Methodology

The magnitude and significance of the potential impact on a water feature is assessed in line with the methodology described in WebTAG Unit 3.3.6 and 3.3.11.

F2.5.8 Land Use

DMRB Vol.11 Section 3 Part 6, *Land Use*, indicates that the Stage 1 assessment for Land Use should be sufficient to provide an appreciation of the likely consequences of land-take. This includes residential, commercial, industrial and agricultural.

The overall approach was to examine the existing land use pattern, assess the likely areas of land lost and the resultant impact on land use.

The main impacts covered in the assessment of land use effects are as follows:

- demolition of private property and associated land take;
- loss of land used by the community;
- loss of development land; and
- loss of agricultural land.

Community land is land used by the community and includes common land, town and village greens and general public open spaces.

Development land is land identified in the local and structure plans that have been allocation for potential future development. The development may be housing or industry or business based.

Private property looks at the demolition of private properties but also the impacts on business/commercial properties.

The assessment of the effects on agricultural land will aim to outline in broad terms the likely consequences of land-take for UK agriculture and identify constraints associated with the eight corridor options. The Agricultural Land Classification System has six grades of land. Grades 1, 2 and 3a are considered the 'Best and Most Versatile' agricultural land, with Grades 3b, 4 and 5 outside of the best and most versatile land and therefore classified land with limitations for agriculture. Drawing A8-ENV-002 (Appendix D) shows the land classification for the study area.

Appraisal Methodology

Taking the information produced from the assessment outlined above, an initial appraisal has been made of the impact on land use. The appraisal of impact upon agricultural land has been undertaken in accordance with the DMRB Volume 11 Section 3 Part 6 and used to inform the Economy, Accessibility and Integration Objectives.

F2.5.9 Physical Fitness

A qualitative assessment has been undertaken for physical fitness. The approach adopted for the consideration of these issues has largely followed the methodologies set out under DMRB Volume 11 (Section 3, Part 8) *Pedestrians, Cyclists, Equestrians and Community Effects*, and has principally included:

- identification of existing community facilities, cycleways, and footpaths within the study area; and
- identification of the potential impacts likely to result from the scheme proposals on pedestrians and cyclists in terms of lengthening or reducing journeys and amenity value.

Appraisal Methodology

Taking the information produced from the DMRB assessment outlined above, an initial qualitative comment has been made of the impact on physical fitness in line with the methodology described in WebTAG unit 3.3.12.

F2.5.10 Journey Ambience

A qualitative assessment has been undertaken for journey ambience. The approach adopted for the consideration of these issues has largely followed the methodologies set out under DMRB Volume 11 (Section 3, Part 9) *Vehicle Travellers* Stage 1 assessment and has principally included a forecast as to whether the proposed corridor options would be likely to produce a low or moderate driver stress. Traveller stress consists of three components:

- frustration;
- fear of potential accidents; and
- uncertainty relating to the route being followed.

Appraisal Methodology

Taking the information produced from the DMRB assessment outlined above, an initial appraisal has been made of the impact on journey ambience. For the Journey Ambience Sub-objectives, a qualitative appraisal of impact significance is provided in line with the methodology described in WebTAG unit 3.3.13.

F2.5.11 Community Effects

The approach to assess the potential Community Effects has been drawn from the methodology described under DMRB Volume 11, Section 3, Part 11 '*Pedestrians, Cyclists Equestrians and Community Effects*'. Community effects are also considered as part of the Accessibility objective under WebTAG Unit 3.6.2. Discussion of community effects seeks to focus on:

- changes in amenity; and
- community severance (New severance or relief from existing severance).

This assessment of impacts on the community has not been scored; it has been used to inform the assessment of the Severance Sub-objective within the Accessibility Objective, which assesses the level of severance for Non-Motorised Users (NMUs) with each of the route options, especially for pedestrians, cyclists and equestrians.

Appraisal Methodology

Taking the information produced from the DMRB assessment outlined above, an initial appraisal has been made of the impact on community. For the

Community Sub-objectives, a qualitative appraisal for impact significance is provided.

F2.5.12 Geology and Soils

Assessment of geology and soils has been undertaken as a separate assessment, as part of the engineering assessment of the corridors, and is detailed in section F1.5.5.

F3 Safety Objective

The safety objective comprises two sub-objectives:

- Accident Sub-objective; and
- Security Sub-objective.

F3.1 Accidents

WebTAG provides a methodology for assessing accidents for road schemes which involves assessing the degree of change (positive or negative) in the accident rate for a scheme compared with the do-minimum scenario.

Given the early stage of assessment based upon corridors and not specific routes, a qualitative discussion has been provided by a safety auditor outlining the likely level of reduction in accident rates for each corridor.

F3.2 Security

The security sub-objective assesses the potential impact of a scheme with regard to how it may affect the level of security for road users. The aim of this sub-objective is to reflect both changes in security and the likely number of users affected.

For this particular highway scheme, security is not considered to be a significant issue, and it is considered that this sub-objective would not advise one corridor in favour of another, Therefore, the security sub-objective has not been assessed this Stage 1 assessment.

F4 Economy Objective

F4.1 Cost-Estimate

Preliminary cost-estimates were undertaken for possible road schemes within each of the corridors. The methodology adopted for the Stage 1 cost-estimates is described below.

F4.1.1 Cost-Estimate Assumptions

To allow the development of a cost estimate for each corridor a coarse horizontal and vertical alignment was developed for an example route within each corridor. The length of the route and proportion of online and off-line sections were then used to develop the cost estimate. Although a vertical alignment was developed, this was only used to identify areas of potential significant rock cut (where a unit rate for road construction would not be suitable).

No quantified risk assessment was undertaken for the Stage 1 assessment. It is proposed to undertake a fully quantified risk analysis during Stage 2.

The following comments or exclusions apply to the costing for all of the corridors:

- estimates were based on prices from three road projects in Northern Ireland, adjusted to prices at 2nd Quarter 2008;
- costs (unless stated otherwise) were based on a indicative rate per m²;
- the estimate included for the preparation and supervision of the scheme at 9% and 6% of construction cost, respectively;
- contractor's overheads and profit were included at 11%;
- by using a combination of target cost, actual cost and forecast out-turn cost data, the cost estimate for each corridor represented an assessment of the eventual out-turn cost of the project;
- optimism bias was included (see section F4.1.2), but no risk allowance was included; and
- all costs excluded VAT.

F4.1.2 Optimism Bias

Optimism bias was applied in accordance with the Roads Service guidance note *BEM 91/05 Major Works Estimates*. This guidance requires a maximum of 44% optimism bias to be applied as an upper limit estimated for this stage of scheme design, but includes a mechanism to reduce the level of optimism bias based upon the detailed knowledge of the scheme and the potential cost risks. At this early stage of assessment, and in the absence of a quantified risk assessment, the full optimism bias of 44% was adopted for the construction element of the cost and an optimism bias of 25% was adopted for the land and compensation element of the cost-estimates.

F4.2 WebTAG Assessment of Economy

The economy objective comprises four sub-objectives in WebTAG:

- Public Accounts,
- Transport Economic Efficiency,
- Reliability, and
- Wider Economic Benefits.

F4.2.1 Public Accounts

The distribution of impacts between Governments and society is a key issue in the justification of Government action. Thus, the DfT requires an aggregation of costs that highlight the impact of a proposal on public accounts.

At this early stage of assessment an assessment of public accounts has been made based on operating costs, investment costs, and indirect tax revenues.

It should be noted that *DMRB Volume 13 (COBA Manual)*, section 1, chapter 4, paragraph 4.4 states that the default value year in COBA is 2002. This is in line with WebTAG guidance which states the base year for discounting, to which all costs and benefits should be discounted, is 2002. Therefore, the public account results are presented as 2002 prices in this report.

F4.2.2 Transport Economic Efficiency

For each corridor under consideration an assessment has been undertaken of the economic benefit due to the scheme, which is presented as the present value of benefits (PVB).

These benefits include:

- travel time (i.e. representing saving in travel time due to the scheme which is converted to monetary values based on the ‘values of time’);
- Vehicle Operating Cost Savings which are reductions in fuel consumption and in other non-fuel vehicle operating costs;
- user charges, which represent tolls and charges which are not applicable to this assessment and hence values as zero;
- the monetary effect of the scheme on carbon emissions; and
- Accident Benefits representing the possible monetary benefits of improving the safety of the road and reducing the number and severity of accidents.

In addition, an analysis of monetised costs and benefits has been produced to demonstrate the overall economic impacts of the corridors in terms of net present value (NPV) and benefit to cost ratio (BCR). However, it should be recognised that this assessment of the economic performance of the corridors is only coarse: it is intended only to provide an indication of the likely economic performance. The following limitations should be recognised when viewing the results:

- central traffic growth has been assumed;
- traffic forecast years have been taken as 2016 (notional scheme opening year) and 2031 (the design year);
- scheme costs include an optimism bias of 44% for construction costs and 25% for land and compensation;
- maintenance cost have been calculated using rates from DMRB Volumes 13 and 14 for annual routine and major maintenance respectively; and
- at this early stage of assessment, delays to road users due to maintenance works have not been included in this assessment. This will be included at the next stage of assessment.

As stated in section F4.2.1, *DMRB Volume 13 (COBA Manual), section 1, chapter 4, paragraph 4.4* states that the default value year in COBA is 2002. Therefore, the transport economic efficiencies are presented as 2002 prices in this report.

F4.2.3 Reliability

The difference between the corridors, in terms of reliability, is likely to be insignificant in terms of corridor preference. Therefore, reliability has not been considered for this Stage 1 assessment.

F4.2.4 Wider Economic Impacts

The wider economic impacts sub-objective is an assessment of the economic effects of the scheme outside those assessed in the other three economy sub-objectives. The primary purpose of this sub-objective is to appraise the wider economic impacts of a scheme designed to stimulate economic activity in a regeneration area. This could include such impacts as providing improved transport links to a rural area to facilitate regeneration and enhance the potential for increased investment.

These impacts are likely to be similar for all the corridors assessed and would be unlikely to provide any differentiation between any of the corridors. Wider economic impacts has therefore not been assessed at this stage of the study.

F5 Accessibility Objective

The accessibility objective comprises three sub-objectives:

- Corridor Values,
- Severance, and
- Access to the Transport System.

F5.1 Corridor Values

WebTAG describes the corridor values sub-objective as particularly important for the scheme assessment if the scheme proposals will substantially change the availability of the transport services within the study area. This sub-objective is therefore mainly considered with the provision of new transport services, the removal of existing ones and the availability of these services. This is not the case for this improvement of the existing A8 road and therefore corridor values have not been assessed for this Stage 1 assessment.

F5.2 Severance

This sub-objective is concerned with severance (as a result of a proposed scheme) to non-motorised modes, especially pedestrians. Cyclists and equestrians should also be considered but are less susceptible to severance because they can travel more quickly than people on foot. The severance sub-objective does not deal with individual land owner severance issues.

WebTAG provides a methodology for assessing severance which states it is usually appropriate to assess severance at a number of locations across the network. The majority of pedestrian movements across and in the vicinity of the A8 are in the village of Ballynure and this is considered a key point to assess severance for this Stage 1 assessment.

F5.3 Access to the Transport System

For this sub-objective, WebTAG states that the most important determinate of access to the transport system is the availability of a vehicle for private use. None of the proposed corridors would deliver any significant difference for the assessment of this sub-objective, it has therefore been scoped out of the Stage 1 study.

F6 Integration Objective

The integration objective comprises three sub-objectives:

- Transport Interchange,
- Land Use Policy, and
- Other Government Policies.

F6.1 Transport Interchanges

The transport interchange sub-objective is aimed at assessing a scheme against the Government's objective of achieving truly integrated transport.

The corridors being considered for the A8 dualling scheme are likely to perform to an equal standard when assessed for the transport interchange, and the sub-objective has therefore not been assessed at this stage.

F6.2 Land Use Policy and Other Government Policies

The approach adopted to determine the compatibility of the A8 scheme proposals with relevant legislative and planning policy provisions has largely followed methodologies set out under DMRB Volume 11 (Section 3, Part 12). This has principally involved:

- a review of relevant Northern Ireland legislation and planning policy statements to determine the compatibility of the scheme against such provisions;
- consideration of local land use and transport plans and guidance contained under the *Draft Northern area Plan 2010* and the *Antrim, Ballymena and Larne Area Plan 2016* and the *Belfast Metropolitan Area Plan (BMAP)*;
- a review of the key strategic transport and planning guidance in Northern Ireland such as, *Shaping Our Future: The regional Development Strategy for Northern Ireland 2025*, *A Planning Strategy for rural Northern Ireland*, the *Regional Strategic Transport Network Plan 2015* and the *Sub-Regional Transport Plan 2015*;
- a review of DoE – Planning Service online database (inset web details) to obtain information on all current and proposed development applications and plans in the study area which may either have an impact on or be impacted by the scheme proposals;
- analysis to determine whether the route corridors would achieve, or comply with, requisite national policy objectives and directions; and
- determination as to whether the scheme proposals would broadly achieve the objectives of all relevant plans and policies.

F7 Supporting Analysis

In addition to the scheme assessment against the Government's five over-arching objectives of environment, economy, safety, integration and accessibility, which take the perspective of the overall public interest at a national level (as reported in the AST's), WebTAG affords the opportunity to assess the proposals against 'supporting analysis', which centres around the issues of Affordability, Practicality and public consultation/Public Acceptability. These supplementary objectives are focussed around specific users and funders of the proposals, rather than the general public which is the focus of the five over-arching objectives. Supporting analyses are likely to be of interest to Central Government and the regional and local authorities, as well as the local people.

The Affordability of each corridor is reported factually in the Stage 1 scheme costs within the corridor assessment chapters, under the Economy Objective. This study has avoided commenting on whether a corridor is affordable, or not as this is a decision to be taken by the funding organisation.

The Practicality of each of the route options has been reported as part of the Construction Issues section of the Engineering Assessment of each corridor and has not been reported separately. This qualitative assessment has been used to inform the recommendation of the 'preferred corridor'.

An initial Information day event was undertaken and the public identified some concerns with the scheme, as outlined in section 6.3. However, these concerns

were general in nature because no corridors or routes were presented to the public and no formal questions were put to the public. However, comments received during the event were taken on board in the development of Stage 1 corridors and therefore have assisted in the recommendation of the 'preferred corridor'.