A83 Rest and Be Thankful

LTS EIAR VOLUME 4, APPENDIX 17.2 - CLIMATE
VULNERABILITY METHODOLOGY

Transport Scotland

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A17-2. Climate Vulnerability Methodology

A17-2.1. Introduction

A17-2.1.1.   The methodology presented here reflects what was presented in the Stage 3 Scoping report. The study area for assessing the vulnerability of the Proposed Scheme to climate change will be based on the construction footprint/project boundary (including compounds and temporary land take).

A17-2.1.2.   The climate vulnerability assessment will follow the approach set out in DMRB LA 114 and be informed by best practice climate assessment approaches and literature, as well as professional judgement.

A17-2.2. Assessment Methodology

A17-2.2.1.   There are four stages to the climate vulnerability assessment method:

- Stage 1 - Identify the hazards (and benefits) and receptors
- Stage 2 - Assess the likelihood of impacts on each receptor
- Stage 3 - Assess the consequence of impacts for each receptor
- Stage 4 - Determine the significance of each impact based on a combination of the likelihood of an impact occurring and the consequences of that impact.

Stage 1 – Identification of hazards and receptors

A17-2.2.2.   Receptors which may be affected by climate change hazards have been identified with consideration of the characteristics of potential future extreme weather events as well as gradual changes to the climate that could occur in the study area over the Proposed Scheme's design life. Identification of these is based on an assessment of climate projections from United Kingdom Climate Projections 2018 (UKCP18). These projections have been developed by the Met Office Hadley Centre Climate Programme which is supported by the Department of Business, Energy and Industrial Strategy (BEIS) and the

DEFRA. They provide the most up-to-date assessment of how the climate of the UK may change over the 21st Century.

A17-2.2.3. In accordance with Section 3.34 of the DMRB LA 114, the assessment has considered the impacts of climate change on the following receptors:

- construction process and activities (including workers)
- the assets and their operation, maintenance, and refurbishment (including pavements, structures, earthworks and drainage and technology assets such as signals and signs)
- end-users (including drivers, recreational users (e.g. cyclists and pedestrians) and maintenance workers).

Stage 2 – Assess the likelihood of impacts

A17-2.2.4. In accordance with DMRB LA 114, the likelihood of potential climate changes and events occurring are determined using available data (such as the known recurrence interval of extreme weather events) and professional judgement, based on knowledge and experience of other similar schemes. The likelihood categories and associated frequencies are provided in Table A17-2.1 (adapted from DMRB Climate: LA 114 Table 3.39a).

Table A17-2.1: Likelihood categories

Likelihood category	Description (probability and frequency of occurrence)
Very high	The event occurs multiple times during the lifetime of the project (60 years) e.g. approximately annually, typically 60 events.
High	The event occurs several times during the lifetime of the project (60 years) e.g. approximately once every five years, typically 12 events.
Medium	The event occurs limited times during the lifetime of the project (60 years) e.g. approximately once every 15 years, typically four events.
Low	The event occurs during the lifetime of the project (60 years) e.g. once in 60 years.

Likelihood category	Description (probability and frequency of occurrence)
Very low	The event can occur once during the lifetime of the project (60 years).

Table Notes: Project lifetime is considered to include construction and operational phases; In accordance with LA 114, the Proposed Scheme lifetime is taken to be 60 years.

Stage 3 – Assess the consequence of impacts

A17-2.2.5.   The consequence of climate change impacts on the Proposed Scheme receptors are categorised using the criteria in Table A17-2.2 (adapted from DMRB Climate: LA 114 Table 3.39b).

Table A17-2.2: Measure of consequence

Consequence of impact	Description
Very large adverse	Operation – national level (or greater) disruption to strategic route(s) lasting more than one week.
Large adverse	Operation – national level disruption to strategic route(s) lasting more than one day but less than one week or regional level disruption to strategic route(s) lasting more than one week.
Moderate adverse	Operation – regional level disruption to strategic route(s) lasting more than one day but less than one week.
Minor adverse	Operation – regional level disruption to strategic route(s) lasting less than one day.
Negligible	Operation – disruption to an isolated section of a strategic route lasting less than one day.

Table Note: Consequence can be adverse or beneficial. Beneficial consequences would result in a beneficial outcome in Stage 4.

Stage 4 – Determine significance of impacts

A17-2.2.6. The results of the likelihood and consequence assessments are combined to derive a significance classification as outlined in Table A17-2.3 (adapted from DMRB LA 114 Table 3.41*).*

Table A17-2.3: Significance matrix

Impact consequence	Impact likelihood – Very Low	Impact likelihood – Low	Impact likelihood – Medium	Impact likelihood – High	Impact likelihood – Very High
Very large	NS	S	S	S	S
Large	NS	NS	S	S	S
Moderate	NS	NS	S	S	S
Minor	NS	NS	NS	NS	NS
Negligible	NS	NS	NS	NS	NS

Table notes: NS = Not Significant, S = Significant. Impacts can be adverse or beneficial (where consequence is beneficial).

Limitations and Assumptions

A17-2.2.7. The climate vulnerability assessment provides a broad, high-level indication of the potential impacts of climate change on the Proposed Scheme based on professional judgement.

A17-2.2.8. The climate projections used are from UKCP18. The UKCP18 projections do not provide a single precise prediction of how weather and climate will change years into the future. Instead UKCP18 provides ranges that aim to capture a spread of possible climate responses. This better represents the uncertainty of climate prediction science. It should also be noted that the level of uncertainty of the projections is dependent on the climate variable, for example, there is greater confidence around changes in temperature than there is in wind. In the climate vulnerability assessment this is considered when assessing the likelihood of impacts.

A17-2.2.9.	The climate vulnerability assessment is based on data from Representative Concentration Pathway (RCP) 8.5. This is a Greenhouse Gas (GHG) concentration trajectory under which it is assumed that emissions continue to rise throughout the 21st Century. There is considerable uncertainty regarding if, how far and how quickly emissions will be reduced in the future. Using RCP 8.5 represents a conservative position.

A17-2.2.10.	Other key caveats and limitations of UKCP18 data are presented on the Met Office website.