

18. Major Accidents and Disasters

18.1. Introduction

- 18.1.1. This chapter provides the outcome of the assessment of the potential vulnerability of the Proposed Scheme to the risk of major accident(s) and/or disaster(s) (hereafter referred to as major events) as required by [The Roads \(Scotland\) Act 1984 \(Environmental Impact Assessment\) Regulations 2017](#) (EIA Regulations).
- 18.1.2. Major events are situations that have the potential to affect the Proposed Scheme causing immediate or delayed serious damage to human health, welfare and the environment. The assessment considers the risks of major events during construction and operation of the Proposed Scheme caused by natural hazards or manmade hazards (including operational failure).
- 18.1.3. The major event types to which the Proposed Scheme is not considered to be vulnerable and justification for reaching that conclusion, were recorded within the Environmental Impact Assessment (EIA) Scoping Report and was agreed with the A83 Environmental Steering Group (ESG) (further details on which can be found in Chapter 6: Consultation and Scoping. Those major event types which have been scoped out have not been considered within this assessment. The scoped in major event types which have been considered within this assessment during both the construction and operational phases are:
- Landslides
 - Fluvial flooding
 - Pluvial flooding
- 18.1.4. It is considered highly unlikely that the Proposed Scheme would be demolished after its design life as it is likely to have become an integral part of the infrastructure in the area. In the unlikely event of demolition, this would be part of the relevant statutory process at that time. Therefore, the demolition phase of the Proposed Scheme has not been assessed in this chapter.

- 18.1.5. This chapter describes the assessment methodology and the baseline conditions relevant to the assessment and provides a summary of the likely significant effects resulting from the vulnerability of the Proposed Scheme to the risk of major events. Where appropriate, this chapter includes the further mitigation measures required to prevent, reduce or offset the assessed significant adverse effects, the preparedness for and proposed response to emergencies, and the expected residual effects after these measures have been employed.

18.2. Approach and Methods

- 18.2.1. The assessment has been carried out in accordance with the [Design Manual for Roads and Bridges \(DMRB\) LA 104](#). The approach and methods have been informed by legislation, policy and guidance relevant to major events outlined in Volume 4, Appendix A18.1: Major Accidents and Disasters Legislation, Policy and Guidance.

Study Area

- 18.2.2. Risk sources for major events have been considered both within and outside the Proposed Scheme Boundary along with potential internal and external influencing factors.
- 18.2.3. The internal and external influencing factors, which may have high adverse consequences on the Proposed Scheme, were reviewed for the varying distances outlined in the EIA Scoping Report. As presented in the Scoping Report, it was identified that the key influencing external factors were within a 500m corridor of the Proposed Scheme Boundary. Therefore, the extent of the Study Area used for the major events assessment has been reduced to 500m.

Sensitive Receptors

- 18.2.4. Schedule 1A of the EIA Regulations sets out the information that should be included in an EIA Report where that information is relevant to the specific characteristics of the development. As such, this chapter has considered the following receptors:
- members of the public and local communities

- infrastructure and the built environment
- the natural environment, including ecosystems, surface and groundwater resources and landscape
- the historic environment, including archaeology and built heritage and
- the interaction between the factors above.

18.2.5. Receptors that have been excluded from the assessment, are set out in Table 18.1 below.

Table 18.1 - Excluded Receptors

Receptor	Justification for Exclusion
Employees of Transport Scotland and/or its suppliers, whether during construction, operation, or maintenance of the Proposed Scheme	Employer’s commitment and obligations to manage risks to employees are addressed in the Health and Safety at Work etc Act 1974 .
Members of the public who are wilfully trespassing, for example, a breach of the Proposed Scheme security fencing during construction.	Transport Scotland’s commitment and obligations under the Construction (Design and Management) (CDM) Regulations 2015 to manage risks during the construction stage are addressed through the requirement to produce a suitable risk assessment that informs the identification and subsequent implementation of appropriate mitigation measures. In addition, those wilfully trespassing are outside the occupier’s legal requirements under the Occupiers’ Liability (Scotland) Act 1960 .

Method of Baseline Collection

- 18.2.6. A desk-based assessment was undertaken to collate baseline data within the 500m Study Area. This information has been collated from the following sources which have also been used to support the identification of potential major events:
- [The Cabinet Office National Risk Register \(2023 Edition\)](#)
 - [The International Federation of Red Cross & Red Crescent Societies Early Warning, Early Action](#)
 - [The International Disaster Database](#)
 - [British Geological Survey \(BGS\) GeoIndex Onshore](#)
 - [Health and Safety Executive's \(HSE\) Planning Advice Web App](#)
 - [HSE's COMAH 2015 Public Information Search](#)
 - [Google aerial and street view maps](#) and
 - EIA Report Technical topic Chapters (Chapters 7 to 17 and Chapters 19 to 20).
- 18.2.7. The Baseline desk study sources used adhere to relevant national and international legislation including:
- [Control of Major Accident Hazards Regulations 2015](#)
 - [Nuclear Installations Act 1965](#)
 - [Health and Safety at Work etc. Act 1974](#)
 - [Directive 2012/18/EU of the European Parliament and of the Council](#) and
 - [Council Directive 2009/71/Euratom](#).

Consultation

- 18.2.8. The Scoping Consultation Responses from the A83 Environmental Steering Group (ESG) did not include any specific comments in relation to major events.
- 18.2.9. No specific consultation relating to major events has been undertaken to inform the DMRB Stage 3 EIA Assessment. However, consultation has been undertaken by other technical disciplines with regards to landslide and flood risk.

Assessment Methodology

- 18.2.10. To date, there is no specific regulatory guidance on how to consider major events within the context of the EIA Regulations. However, the assessment takes account of the following emerging good practice:
- [Design Manual for Roads and Bridges \(DMRB\) LA 104](#)
 - [IEMA Major Accidents and Disasters in EIA Guide](#)
 - [EIA Quality Mark Article: What is this MADness?](#)
 - [EIA Quality Mark Article: Major Accidents and Disasters in EIA](#) and
 - [Disasters in EIA](#)
- 18.2.11. In addition, other relevant documentation, including the [Cabinet Office's National Risk Register](#) has been considered.
- 18.2.12. The assessment of major events has been achieved through a review of available documentation and regulatory requirements. It should be noted that the assessment does not involve evaluation from 'first principles', given that existing health and safety legislation already identifies risks and control measures to protect human beings and the environment.
- 18.2.13. The assessment presents any identified risks and considers whether these are managed to be As Low As Reasonably Practicable (ALARP) or whether further mitigation actions (beyond those already embedded into the design) are required for the Proposed Scheme.
- 18.2.14. In accordance with [LA104](#) and the [IEMA Primer on Major Accidents and Disasters in EIA](#), the potential for identified relevant major events to result in a significant adverse environmental effects have been evaluated using a risk-based approach. The approach considered the environmental consequences of a major event, the likelihood of these consequences occurring, taking into account planned design and embedded mitigation, and the acceptability of the subsequent risk to the relevant receptor (as presented in Volume 4, Appendix A18.3: Risk Record). The following process has been applied to each of the included major event categories

and are described further in Volume 4, Appendix 18.2: Major Accidents and Disasters Methodology:

- identifying risks
- screening these risks
- defining the impact
- assessing the risk and
- appraising risk management options.

Significance Criteria

18.2.15. By definition, a major event would have a major significant effect on people or the environment. Accordingly, any risks that could result in a major event without suitable mitigation, management or regulatory controls in place will be assessed as significant.

Limitations of the Assessment

18.2.16. The following limitations apply to this assessment:

- Where information was not available, professional judgement was used to reach a conclusion.
- Historical records of landslides associated with The Cobbler have not been obtained. However, it is not considered that the lack of historical landslide data for The Cobbler would affect the outcome of the assessment.
- Historical records of flood of the Croe Water have not been obtained however, the Major Events assessment has considered the return events set out within Volume 4, Appendix 19.6 – Flood Risk Assessment. It is not considered that the lack of historical flooding data would affect the outcome of the assessment.
- In accordance with good safety management principles, it was assumed that all risks that have the potential to be major events, and could impact a local environmental receptor, would be managed using the ALARP principle.

18.3. Baseline Conditions

18.3.1. The baseline relevant to this topic comprises:

- features external to the Proposed Scheme that contribute a potential source of hazard to the Proposed Scheme
- sensitive receptors at risk of significant effect and
- current (without the Proposed Scheme) major event risks for the existing locality.

18.3.2. The baseline conditions described for major events have been derived from the desk study sources outlined in paragraph 18.2.6.

18.3.3. The baseline features within the 500m Study Area have been identified using professional judgement and are shown in Table 18.2.

18.3.4. The review of the baseline study sources did not identify any major accident hazard installations or pipelines, nor any nuclear facilities within the Study Area.

Table 18.2 - Major Events Baseline

Baseline Features	Hazard Source / Potential Receptor	Activities	Date when Event Last Occurred	Likelihood of Future Occurrence	Approximate Distance and Direction from Proposed Scheme
Beinn Luibhean	Source	Landslide risk.	Appendix B of the Basis of Geotechnical Design presents an inventory of historical landslide events.	Future landslide events will occur.	Adjacent to east of A83 Trunk Road.

Baseline Features	Hazard Source / Potential Receptor	Activities	Date when Event Last Occurred	Likelihood of Future Occurrence	Approximate Distance and Direction from Proposed Scheme
The Cobbler	Source	Landslide risk.	Information unavailable.	Future landslide events will occur.	Adjacent to east of A83 Trunk Road.
Croe Water	Source and potential receptor	River and floodplain.	Information unavailable.	Volume 4, Appendix 19.6 – Flood Risk Assessment considers potential future flood return periods.	Beneath and adjacent to A83 Trunk Road.
Old Military Road (OMR)	Potential receptor	Road	Not applicable	Not applicable	Within 200m.

Future Baseline

18.3.5. In the future baseline and in the absence of the Proposed Scheme, it is considered that the current land use within the Study Area and the vulnerability to major events (associated with flooding and landslides) would remain the same. The potential major events that have been considered within this chapter have been assessed against likely climate hazards, as set out within Chapter 17: Climate Vulnerability.

- 18.3.6. Chapter 17: Climate Vulnerability considers the extent to which climate change may influence the future climate which could in turn have outcomes as worsened or lessened environmental effects. The vulnerability of the Proposed Scheme to the risk of major events identified are not anticipated to change as a result of these hazards.
- 18.3.7. The major events assessment, in terms of its methodology, inherently considers the vulnerability of the Proposed Scheme to in-combination climate effects. The major events which have been assessed in this chapter have taken into consideration the potential impacts of climate change.
- 18.3.8. The future baseline is not anticipated to differ significantly from the current baseline with regards to the vulnerability of the Proposed Scheme to the risk of major events.

Sub-Topics Scoped Out of the Assessment

- 18.3.9. The major event types which have been scoped out and justification for the decision to scope these out are presented in Appendix D – Major Events Scoping Record of the DMRB Stage 3 EIA Scoping Report. A list of the major event types which have been scoped out are presented in Appendix 18.2: Major Accidents and Disasters Methodology.

18.4. Embedded Mitigation

- 18.4.1. As part of the design process, opportunities for embedded mitigation, to reduce vulnerability to the risk of major events, has been identified and incorporated within the Proposed Scheme design described in Chapter 4: The Proposed Scheme. The design of the Proposed Scheme includes a Debris Flow Shelter combined with a catchpit and a Debris Flow Wall to reduce the vulnerability of the Proposed Scheme to landslides. The design also includes measures to reduce the vulnerability of the Proposed Scheme to fluvial and pluvial flooding including the installation of culverts to convey watercourses under the A83. Embedded mitigation measures also include a programme of hazard studies (such as road safety audits) to produce an inherently safe design and to ensure residual risks are managed to be ALARP.

18.5. Potential Impacts

Assessment of Vulnerability to the Risk of Major Events

- 18.5.1. This section details the output of the assessment of the vulnerability of the Proposed Scheme to the risk of major events, taking account of the mitigation measures detailed in Sections 18.4 and 18.6 and in the Risk Record presented in Volume 4, Appendix 18.3: Risk Record.
- 18.5.2. Major events to which the Proposed Scheme may be vulnerable during the construction phase and the operation phase are summarised below.

Construction Phase

- 18.5.3. One major event has been identified to which the Proposed Scheme may be vulnerable during the construction phase as detailed in Table 18.3 below. All events that have been considered are set out in Volume 4, Appendix 18.3: Risk Record.

Table 18.3 - Potential Major Events during the Construction Phase Grouped by High Level Risk Event

Risk Record Entry Number	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
2	Construction works cause ground movement leading to a landslide onto the OMR.	Harm to people	Death and / or injury to members of the public.

- 18.5.4. Based on the assumptions and mitigation measures presented in Volume 4, Appendix 18.3: Risk Record and put forward in other relevant technical chapters, it is considered that the identified potential major events above would all be managed to be ALARP.

Operational Phase

18.5.5. Three major events have been identified to which the Proposed Scheme may be vulnerable during the operational phase as detailed in Table 18.4 below. All events that have been considered are set out in Volume 4, Appendix 18.3: Risk Record.

Table 18.4 - Potential Major Events during the Operational Phase Grouped by High Level Risk Event

Risk Record Entry Number	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
3	Adverse weather causes ground movement leading to a landslide onto the A83.	Harm to people.	Death and/or injury to members of the public.
5	Fluvial flooding associated with Croe Water leading to damage to infrastructure and deterioration of materials (e.g. scouring and erosion of embankments).	Extreme weather (flood).	Flooding of the A83 leading to a road traffic accident.
7	Surface water flooding due to flood water overwhelming the drainage system leading to damage to infrastructure and deterioration of materials (e.g. scouring and erosion of embankments).	Extreme weather (flood).	Flooding of the A83 leading to a road traffic accident.

18.5.6. Based on the assumptions and mitigation measures presented in Volume 4, Appendix 18.3: Risk Record and put forward in other relevant technical chapters, it is considered that the identified potential major events above would all be managed to be ALARP.

18.6. Mitigation

- 18.6.1. The measures outlined in Section 18.4 above and the specific mitigation measures which are detailed in Volume 4, Appendix 18.3: Risk Record have been assumed in the assessment. These mitigation measures are outlined in Table 18.5 below.

Table 18.5 - Essential Mitigation Measures

Mitigation Reference	Mitigation Measure
MAD-1	Construction Environmental Management Plan (CEMP) which will be embedded within the Construction Contract for the Proposed Scheme and as such is considered within the initial impact assessment.
MAD-2	<p>Transport Scotland has committed to constructing and managing the Proposed Scheme in accordance with the following non-exclusive list of standards and systems:</p> <ul style="list-style-type: none"> • operational and maintenance phase Environmental, Health & Safety Management Systems which will be implemented prior to the road re-opening • manage all construction risks in accordance with the CDM Construction Phase Plan which will be prepared prior to the commencement of construction activities • supplier management environmental, health & safety standards (for example, Construction Skills Certification Scheme) will be considered prior to procuring contractors undertaking work during both the construction and maintenance phases • Risk Management Systems will be developed and implemented prior to the construction and the operational and maintenance phases and • Construction and Environmental Management Systems (including the Construction Environmental Management Plan (CEMP)) will be developed and implemented prior to the construction phase.

Mitigation Reference	Mitigation Measure
MAD-3	Bespoke emergency preparedness and response plan developed by Transport Scotland and/or their contractors which will identify the actions to be taken should a major event occur. The specific mitigation measures and emergency preparedness and response plan will be in place for the construction and operation of the Proposed Scheme to ensure that any potential major events are managed to be ALARP.
MAD-4	Ground investigations to be undertaken to determine the ground conditions and understand the areas of site that are at greatest risk from instability.
MAD-5	The construction contractor will plan the works and apply appropriate controls to mitigate potential instability (e.g. top-down excavations, installation of slope stabilisation systems).
MAD-6	Use of slope monitoring systems to help identify ground movements in advance of significant events.
MAD-7	Existing debris flow and rockfall fences and catchpits upslope of the A83, which will help retain landslide events.
MAD-8	Existing geotechnical measures (e.g. soil nails, rock blankets, retaining walls) installed to stabilise areas immediately downslope of the A83. Should a landslide occur, there is an existing debris flow barrier to mitigate the risk of land-slipped material affecting the OMR.
MAD-9	Site specific landslide management plan to manage the risk to road users. Mitigation measures within this plan include: site-specific weather forecasts; real-time rainfall monitoring; slope inspections; and landslide patrols.

Mitigation Reference	Mitigation Measure
MAD-10	Remote monitoring instrumentation to be trialled (and if successful adopted) to providing pre-cursor information on landslide events.
MAD-11	The CEMP will include a Flood Response Plan which will set out the mitigation measures to be implemented, (e.g. checking for flood alerts, monitoring river levels, installation of temporary drainage systems, withdrawal from works close to or within the water features should flooding be predicted, where practicable plant and materials will be stored in areas outside the functional floodplain, in addition, where practicable haul routes will be located out of the functional floodplain).
MAD-12	Routine inspections and preventative maintenance will be carried out throughout the lifetime of the scheme.

18.7. Residual Effects

18.7.1. Based on the assumptions and mitigation measures put forward in this chapter and other relevant technical chapters, it is considered that the identified potential major events identified during the construction, operation and maintenance phases will all be managed to be ALARP.

Compliance with Planning Policy

18.7.2. The conclusion of the assessment of the vulnerability of the Proposed Scheme to major events is that the Proposed Scheme is compliant with the relevant policies identified in Volume 4, Appendix 18.1: Major Accidents and Disasters Legislation, Policy and Guidance.