
A83 Rest and Be Thankful

LTS EIAR VOLUME 4, APPENDIX 18.2 - MAJOR ACCIDENTS AND
DISASTERS METHODOLOGY

Transport Scotland

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18-2. Major Accidents and Disasters

Methodology

18-2.1. Introduction

A18-2.1. The major accidents and disasters (MA&D) assessment of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance, including DMRB LA104, described in Volume 4, Appendix 18.1 - Major Accidents and Disasters Legislation, Policy and Guidance.

Key Definitions

A18-2.2. The definition of key terms used in this technical chapter are provided in Table A18.2.1 below. These definitions have been developed by reference to the definitions used in EU and UK legislation and guidance relevant to MA&D as well as professional judgement in the context of the Proposed Scheme.

Table A18-2.1: Key Terms and Definitions Relevant to this Chapter

Term	Definition
(Major) Accident	In the context of the Proposed Scheme, an event that threatens immediate or delayed serious damage to human health, welfare and/or the environment and requires the use of resources beyond those of Transport Scotland or its contractors to respond to the event. Serious damage includes the loss of life or permanent injury and/or permanent or long-lasting damage to an environmental receptor that cannot be restored through minor clean-up and restoration efforts. The significance of this effect will take into account the extent, severity and duration of harm and the sensitivity of the receptor.
Adaptive Capacity	The capacity of receptors to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.

Term	Definition
ALARP	"ALARP" stands for "as low as reasonably practicable". Reasonably practicable involves weighing a risk against the trouble, time and money needed to control it. Thus, ALARP describes the level to which the Health & Safety Executive (HSE) expects to see workplace risks controlled.
Disaster	In the context of the Proposed Scheme, a naturally occurring phenomenon such as an extreme weather event (for example storm, flood, temperature) or ground-related hazard events (for example subsidence, landslide, earthquake) with the potential to cause an event or situation that meets the definition of a Major Accident as defined above.
External Influencing Factor	A factor which occurs beyond the limits of the Proposed Scheme that may present a risk to the Proposed Scheme, e.g. if an external disaster occurred (e.g. earthquake, Control of Major Accident Hazard (COMAH) site major accident) it would increase the risk of serious damage to an environmental receptor associated with the Proposed Scheme.
Hazard	Anything with the potential to cause harm, including ill-health and injury, damage to property or the environment; or a combination of these.
Internal Influencing Factor	A factor which occurs within the limits of the Proposed Scheme that may present a risk to the Proposed Scheme.
Magnitude of Impact	<p>The magnitude of an impact is typically defined by the following factors:</p> <ul style="list-style-type: none"> • extent – the area over which an effect occurs • duration – the time for which the effect occurs • frequency – how often the effect occurs and • severity – the degree of change relative to existing conditions.

Term	Definition
Major Event Group	A MA&D which can be grouped as either a Natural Hazard (Disaster) or Technological or Manmade Hazard (Major Accident).
Major Event Category	A set of values used to categorise events within a related parent MA&D Group.
Major Event Type	A set of values used to sub-categorise events within a MA&D Category.
Risk	The likelihood of an impact occurring combined with effect or consequence(s) of the impact on a receptor if it does occur.
Risk Event	An identified, unplanned event, which is considered relevant to the Proposed Scheme and has the potential to be a MA&D subject to assessment of its potential to result in a significant adverse effect on an environmental receptor.
Sensitivity	<p>The sensitivity of a receptor is a function of its value, and capacity to accommodate change reflecting its ability to recover if it is affected. It is typically defined by the following factors:</p> <ul style="list-style-type: none"> • adaptability – the degree to which a receptor can avoid, adapt to or recover from an effect. • tolerance – the ability of a receptor to accommodate temporary or permanent change. • recoverability – the temporal scale over and extent to which a receptor will recover following an effect.
Vulnerability	In the context of the 2014 EU Directive , the term refers to the ‘exposure and resilience’ of the Proposed Scheme to the risk of a MA&D. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact.

MA&D Impact Assessment Methodology

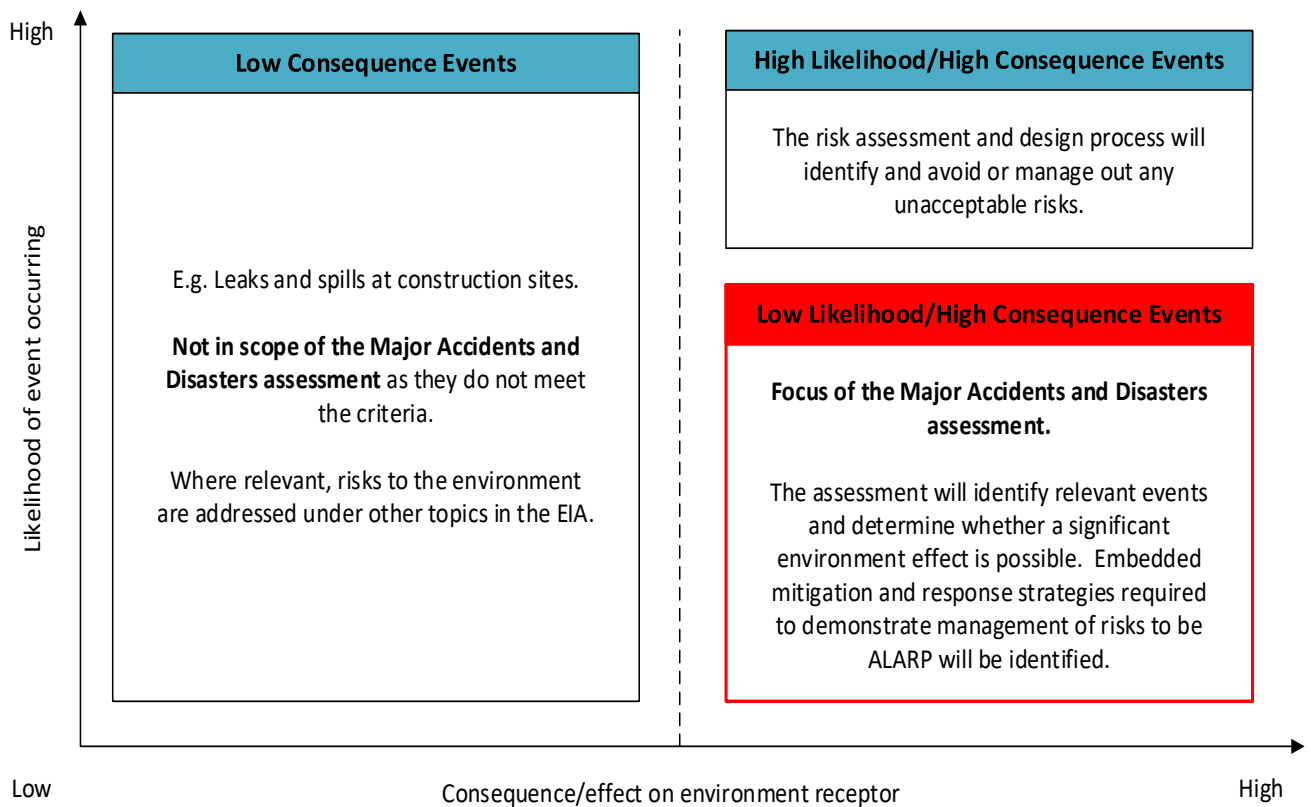
- A18-2.3. Chapter 16 of the EIA Scoping Report considered a list of potential major event categories and types to which the Proposed Scheme may be at risk of vulnerability during construction and operation phases. The EIA Scoping Report identified, based on the type of development and the location of the Proposed Scheme, those major event types which required further assessment, namely landslides and fluvial and pluvial flooding. The vulnerability of the Proposed Scheme to these major event types has been assessed using the methodology outlined below.
- A18-2.4. The following major event types were scoped out from further assessment:
- Geophysical – earthquakes, volcanic activity, sinkholes and tsunamis.
 - Hydrological – coastal flooding, groundwater flooding and avalanches.
 - Climatological and meteorological – cyclones, hurricanes, typhoons, storms and gales, thunderstorms, wave surges, extreme temperatures: heatwaves, low (sub-zero) temperatures and heavy snow, droughts, severe space weather: solar flares, severe space weather: solar energetic particles, severe space weather: coronal mass ejections, fog, wildfires: forest fire, bush/brush, pasture and poor air quality.
 - Biological – disease epidemics: viral, bacterial, parasitic, fungal and prion, animal diseases: zoonotic (avian influenza, West Nile virus, rabies), non-zoonotic (foot and mouth, swine fever) and plants.
 - Societal – extensive public demonstrations which could lead to violence and loss of life, widespread damage to societies and economies, the need for large-scale multi-faceted humanitarian assistance, the hinderance or prevention of humanitarian assistance by political and military constraints, significant security risks for humanitarian relief workers in some areas, famine and displaced population.
 - Industrial and Urban Accidents – major accident hazard chemical sites, major accident hazard pipelines, nuclear, fuel storage, dam breaches, mines and storage caverns and fires.

- Transport accidents: road, rail, waterways and aviation.
- Pollution accidents: air, land and water.
- Utilities failure: electricity, gas, water supply and sewage system.
- Malicious attacks – unexploded ordnance, attacks: chemical, biological, radiological and nuclear, transport systems, crowded places, cyber and infrastructure.
- Engineering accidents and failures – bridge failure, flood defence failure, mast and tower collapse, property or bridge demolition accidents and tunnel failure/fire.

Identify Risks

- A18-2.5. The major events which will be considered in the assessment are rare events.
- A18-2.6. All low consequence events, whatever their likelihood, do not meet the definition of a major event as defined in IEMA's Primer. For example, minor spills which may occur during construction, but would be limited in area and volume and temporary in nature, do not meet the definition of a major event. Such minor events would be dealt with under the Principal Contractor's Environmental Management System (EMS) and will fall within the scope of this assessment. Similar events during operation would adopt the same approach.
- A18-2.7. The assessment will focus on low likelihood, but potentially high consequence events as illustrated in Figure A18.1.1 which is based on Figure 2 in IEMA's Primer.

**Figure A18-2.1: Graphical Representation of Major Accidents and Disasters
Consequence Significance**



A18-2.8. Low likelihood is defined for the purposes of the assessment, as: may occur during the lifetime of the Proposed Scheme, so no more than once in 10 years for the construction phase, and no more than once in 100 years for the operational phase. This is an upper boundary for low likelihood. Very low likelihood events will also be included in the assessment, which may only occur at most once in every 1,000 years. Mitigation measures will reflect what is reasonable for such rare events, considering their potential consequence, within the guiding principle of risks being ALARP.

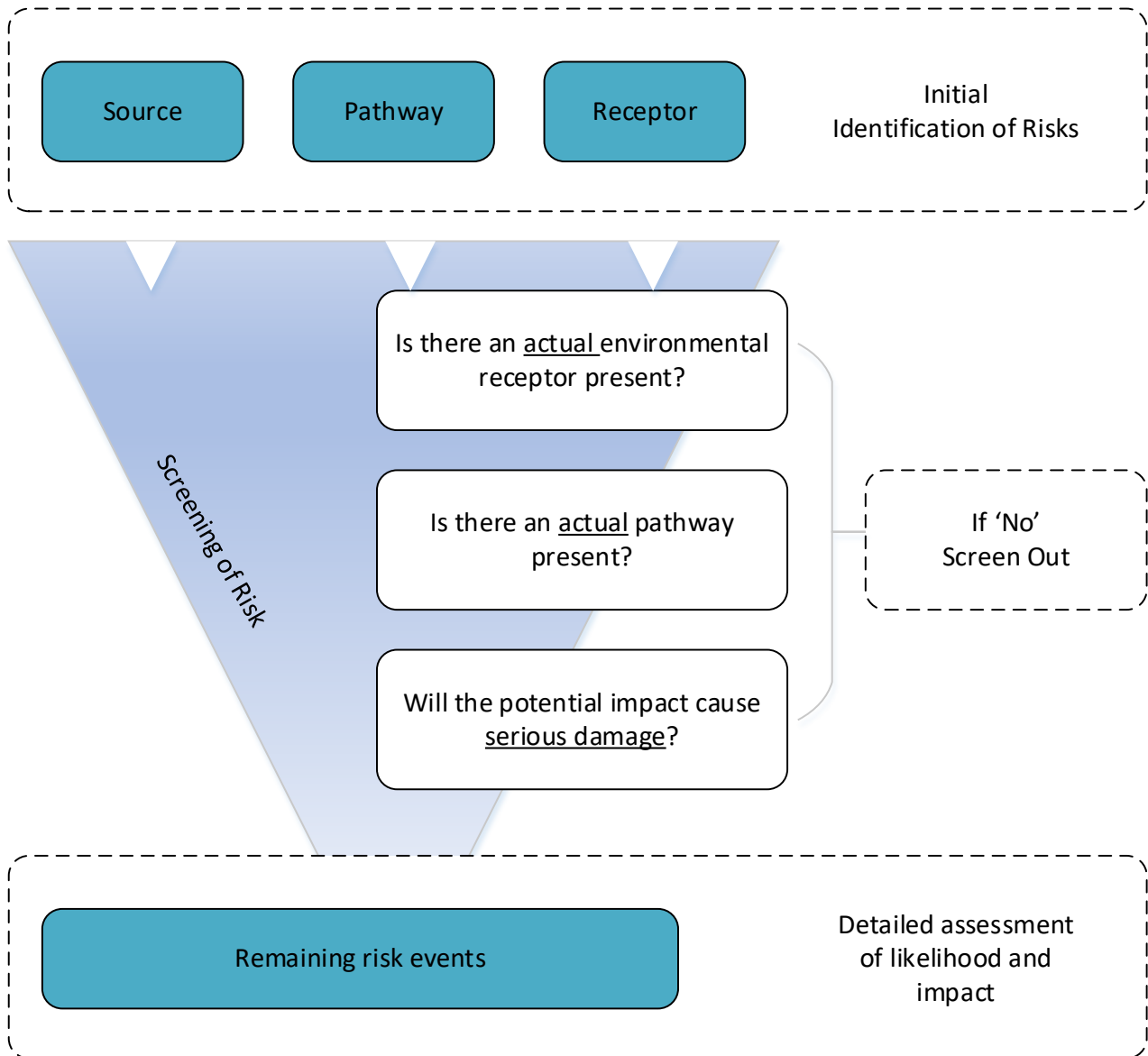
A18-2.9. High likelihood is defined as: may occur during the lifetime of the Proposed Scheme, so more than once in 10 years for the construction phase, and more than once in 100 years for the operational phase.

- A18-2.10. High consequence events are considered to lead to a significant adverse effect (i.e. loss of life, permanent injury and temporary or permanent destruction of an Environmental Receptor which cannot be restored through minor clean-up and restoration).
- A18-2.11. The risk identification process will use existing sources of information wherever possible, such as risk assessments undertaken for the Proposed Scheme as part of other processes (many of which are required by law) or Risk Events identified within the UK's current National Risk Register. No additional risk assessments will be undertaken and the risk identification activity will focus on collating and reviewing existing sources.
- A18-2.12. In order to identify whether a Risk Event has the potential to be a major event, which also has the potential to have a significant adverse effect on an environmental receptor, three components need to be present: a source, a pathway (between source and receptor) and a receptor. As such, and as recommended by DEFRA, the assessment will use the following conceptual model:
- the source is the original cause of the hazard, which has the potential to cause harm
 - the pathway is the route by which the source can reach the receptor and
 - the receptor, which is the specific component of the environment that could be adversely affected, if the source reaches it.
- A18-2.13. Risk Events which do not have all three components will be screened out from the assessment.

Screen Risks

- A18-2.14. The following major events screening process will be used to identify those Risk Events which would require further consideration within the assessment as illustrated in Figure 18.1.2 below:

Figure A18-2.2: Screening Process Flow Diagram



A18-2.15. For those Risk Events which are not screened out during the three-step process, the following assessment methodology will be used. The assessment forms the basis for recommending additional mitigation measures, as appropriate.

Define Impact

A18-2.16. Several mechanisms are in place to reduce the vulnerability of the Proposed Scheme to major events or mitigate significant effects on the environment should they occur. All measures to manage and reduce the risk of significant adverse effects occurring as a result of the vulnerability of the Proposed Scheme to major events will be considered to be primary mitigation measures for the purposes of the assessment.

A18-2.17. It will be assumed that:

- The design, installation, commissioning, operation and maintenance of plant, drainage systems, equipment and machinery, including associated systems, will take into account Good Engineering Practice to ensure compliance with applicable regulatory regimes.
- The construction stage(s) of the Proposed Scheme will be managed through the implementation of the Construction Phase Plan (required under the CDM Regulations 2015) and mitigation measures relating to major events would be set out by the Principal Contractor for approval prior to construction as part of their Construction Environmental Management Plan (CEMP).

A18-2.18. A reasonable worst-case environmental impact(s) will be identified for each scoped-in Risk Event. Impacts will be identified in consultation with relevant disciplines for each environmental factor assessed within the EIA Report. The environmental impacts will be identified through a qualitative process which seeks to answer the question '*could this event constitute a major event in terms of the definitions provided?*'. Where relevant, specific sensitive receptors around the Proposed Scheme will be considered. The outcome of this process will be recorded in a Risk Record (refer to Appendix 18.3: Risk Record).

Assess Risk

A18-2.19. The likelihood of the reasonable worst-case environmental effect(s) occurring will be evaluated taking into account the following:

- the likelihood of the Risk Event occurring considering the measures already embedded into the design and execution of the Proposed Scheme

- the likelihood that an environmental receptor is affected by the Risk Event.

A18-2.20. Likelihood assessments evaluate whether the effect (for example, loss of life) is a possible outcome of the Risk Event.

A18-2.21. This evaluation will refer to existing risk assessments as well as consultation with relevant discipline specialists.

A18-2.22. The assessment of the risk will be carried out in line with the IEMA Primer on Major Accidents and Disasters in EIA. Where likely significant adverse effects are identified, mitigation measures must be in place, commensurate with the likelihood of the event occurring. The assessment will consider, in consultation with relevant environmental topics, whether the risk to the environmental receptor is managed to be ALARP with the existing measures. If gaps are identified, where the existing measures do not represent management of risks to an environmental receptor to be ALARP, then additional measures would be required. The outcome of the assessment will be recorded in a Risk Record (refer to Appendix 18.3: Risk Record).

Appraise Risk Management Options

A18-2.23. Risk management options fall into the following categories:

- eliminate (or 'avoid') the risk, by adopting alternative processes in order to eliminate the source of the hazard, or remove the receptor
- reduce the risk by adapting proposed processes such that either the likelihood or the impact of the Risk Event can be reduced
- isolate the risk, by using physical measures to ensure that should the Risk Event occur, it can be effectively isolated such that there is no pathway
- control the risk, by ensuring that appropriate control measures are in place (for example emergency response) so that should a Risk Event occur, it can be controlled and managed appropriately. The mitigation hierarchy of repair and compensate any significant damage to environmental receptors may then apply following a control measure
- exploit the risk if it presents potential benefits or new opportunities.