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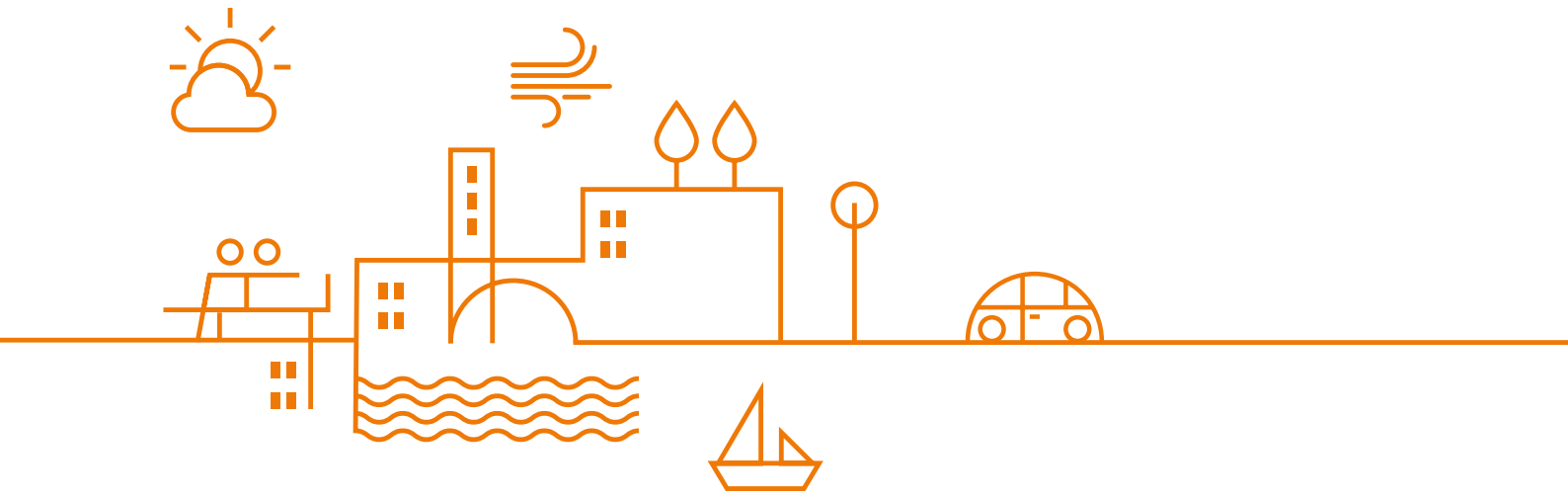
Major Accidents and Disasters in EIA: A Primer

September 2020



Contents

Context, aims and audience

What is a major accidents and/or disasters assessment?

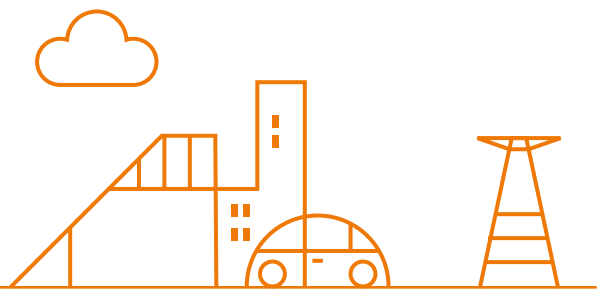
- The topic was introduced into the UK Environmental Impact Assessment (EIA) Regulations as a result of EU Directive 2014/52/EU (the EIA Directive).
- It covers the assessment of potentially significant adverse effects of a development on the environment deriving from its vulnerability to risks of relevant major accidents and/or disasters.
- A major accident is an event (for instance, train derailment or major road traffic accident) that threatens immediate or delayed serious environmental effects to human health, welfare and/or the environment and requires the use of resources beyond those of the client or its appointed representatives (i.e. contractors) to manage.
- Major accidents can be caused by disasters resulting from both man-made and natural hazards.
- A disaster is a man-made/external hazard (such as an act of terrorism) or a natural hazard (such as an earthquake) with the potential to cause an event or situation that meets the definition of a major accident.
- In general, major accidents and/or disasters should be considered as part of an assessment where the development has the potential to cause the loss of life, permanent injury and/or temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration.

What does this primer aim to provide?

- This primer aims to increase awareness of the major accidents and/or disasters EIA topic and its application.
- It offers an assessment methodology based on known current practice within the UK to date and identifies key terminology that can be used.
- It has been structured around a typical assessment approach and offers a proportionate method for considering major accidents and/or disasters through screening, scoping and assessment.
- It has been developed to generate comment and discussion, from which future guidance and institutional and regulatory change can evolve over time.

Who is this primer aimed at?

- The intended audience of this primer is impact assessment practitioners and those with an interest in improving working practice and awareness across impact assessment.
- It is assumed that the reader has basic knowledge of EIA in the UK. Further information on EIA more generally can be found within IEMA's resources.



Key terminology

Key terms used in this primer are set out below. Supplementary terminology, including sources from which the below has been drawn, is presented in Appendix A.

Key term	Definition
Adaptive capacity	The capacity of receptors to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.
As low as reasonably practicable (ALARP)	Involves weighing a risk against the trouble, time and money needed to control it. Thus, ALARP describes the level to which we expect to see risks controlled.
Disaster	May be a natural hazard (e.g. earthquake) or a man-made/external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident.
Reasonable worst-case scenario	A challenging manifestation of the scenario after highly implausible scenarios are excluded[1].
Magnitude of impact	The magnitude of an impact is typically defined by the following factors: extent – the area over which an effect occurs; duration – the time for which the effect occurs; frequency – how often the effect occurs; severity – the degree of change relative to existing environmental conditions.
Major accident	Events that threaten immediate or delayed serious environmental effects to human health, welfare and/or the environment and require the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g. train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events.

1 As defined in: www.gov.uk/government/publications/national-risk-register-for-civil-emergencies-2015-edition/national-risk-register-of-civil-emergencies-chapter-1-main-types-of-civil-emergency

Key term	Definition
Man-made hazards	For example (but not limited to): structural collapse building collapse human error/management failure design error sabotage/arson aircraft/rail/road/sea or river vessel disaster (crash/derailment/ collision/overloading/hull failure) terrorism cyber-attack industrial/ technological accident explosion (chemical, nuclear or other) pollution (oil, chemical or other) fire conflict displaced population crowd violence and disorder.
Natural hazards	For example (but not limited to): earthquake flooding dam collapse volcanic eruption avalanche extreme temperature (heat wave, cold snap) fire ground subsidence tropical storm storm surge landslide animal/insect infestation sandstorm high winds/storm wildfire tsunami/tidal wave drought biological hazard – epidemic, pandemic.
Pathway	The route by which the source can reach the receptor.

Key term	Definition
Receptor	The specific component of the environment that could be adversely affected if the source reaches it. Environmental receptor is specifically defined as: features of the environment that are subject to assessment under Article 3 of the EIA Directive, namely population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and landscape.
Risk	The likelihood of an impact occurring, combined with the 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 development and has the potential to result in a major accident and/or disaster, subject to assessment of its potential to result in a significant adverse effect on an environmental receptor.
Sensitivity	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: 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.
Significant environmental effect (in relation to a major accidents and/or disasters assessment)	Could include the loss of life, permanent injury and temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration.
Source	The original cause of the hazard, which has the potential to cause harm.
Source-pathway-receptor linkage	For a risk to arise there must be hazard that consists of a 'source' (e.g. high rainfall); a 'receptor' (e.g. people, property, environment); and a pathway between the source and the receptor (e.g. flood routes).
Vulnerability	Describes the potential for harm as a result of an event, for example due to sensitivity or value of receptors. In the context of the EIA Directive, the term refers to the 'exposure and resilience' of the development to the risk of a major accident and/or disaster. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact.

Introduction

Major accidents and/or disasters was a new EIA topic introduced by the 2014/52/EU EIA Directive (the EIA Directive). The objective of this primer is to present learning from existing development within the UK where the topic has been assessed, to share best practice and to promote a consistent approach across the general network of EIA professionals. It is not intended to be an introduction to risk management itself, rather to give impact assessment practitioners an introductory working knowledge of the topic and its application, and to stimulate further discussion and debate as the topic evolves.

As this is an emerging topic, this document is intended as a primer only to introduce the concept of the topic and offer an initial appreciation on methodology that could be adopted. It will prompt discussion upon which future guidance, and therefore practice, can evolve. The primer is intended to be updated as experience of the topic develops, and as the methodology is advanced and more widely agreed. There is a huge variance in the scope and extent of development that falls under EIA, and this primer is not intended to mandate a 'one size fits all' approach, nor to suggest one would be appropriate.

This primer aims to communicate the positive process of hazard identification, and avoidance, reduction or mitigation through the EIA process. The methodology outlined offers a transparent platform to communicate to stakeholders how development vulnerabilities to major accidents and/or disasters have been reduced to an acceptable level. As with any topic, the earlier in the process vulnerabilities to major accidents and/or disasters are identified and appraised the greater the likelihood of residual risks being appropriately controlled, and the scope of the EIA remaining proportionate.

Background

The EIA Directive was transposed into UK legislation in 2017, including but not limited to the Town and Country Planning (EIA) Regulations 2017 (devolved between England, Wales, Scotland and Northern Ireland), and the Infrastructure Planning (EIA) Regulations 2017 (collectively referred to as the EIA Regulations from here).

The EIA Regulations require:

> *'A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters...' (Schedule 4, Paragraph 8)*

The underlying objective of the assessment is to ensure that appropriate precautionary actions are taken for those developments which:

> *'...because of their vulnerability to major accidents and/or natural disasters (such as flooding, sea level rise, or earthquakes), are likely to have significant adverse effects on the environment.' (Paragraph 15 of Directive 2014/52/EU)*

A key aim of the EIA Directive update was to ensure efforts are not duplicated, reinforcing the need for proportionality. It further states:

> *'In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive 2012/18/EU of the European Parliament and the Council (13) and Council Directive 2009/71/Euratom (14), or through relevant assessments carried out pursuant to national legislation provided that the requirements of this Directive are met.' (Paragraph 15 of Directive 2014/52/EU)*

The UK already has a structured framework of risk management legislation in place. This guidance therefore suggests a 'sign-posting' approach to assessment, making efficient use of existing and available risk assessments rather than duplicating any risk quantification and management already undertaken on developments as part of the assessment approach.

This primer recognises that primary and tertiary mitigation (refer to Appendix A for definitions) of a development's vulnerability to major accidents and/or disasters, for infrastructure and other built environment developments, is covered by a wide range of other safety and non-safety-related legislation. This mitigation is generally sufficient to manage vulnerabilities to major accidents and/or disasters without the need for secondary mitigation in most circumstances. The guidance within this primer aims to help developments communicate this process to stakeholders through the Environmental Statement[2] to demonstrate how a development's vulnerability to major accidents is adequately managed to prevent or reduce potential significant adverse effects to environmental receptors.

2 Also known as an Environmental Report under the Scottish EIA Regulations. The term 'Environmental Statement' is used for the purpose of this primer to refer to any written output of the EIA process.

Structure of the remaining document

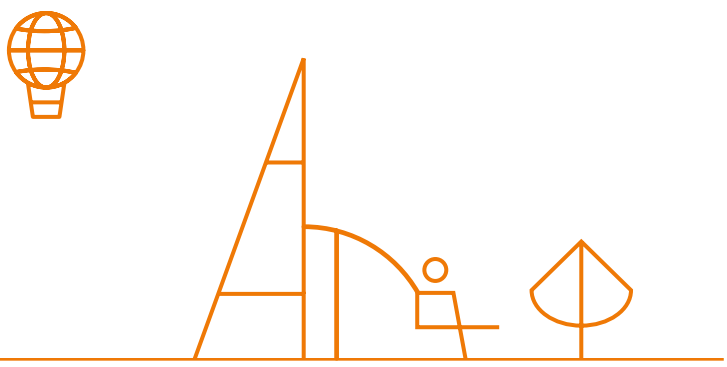
The remainder of this primer presents an assessment approach that can be adopted by impact assessment practitioners undertaking a major accident and/or disasters assessment. This can act as a basis for methodology to evolve as experience in the field grows.

The following steps are covered:

- Screening
  - Identifying if a development falls within the definition of EIA development under the EIA Regulations, by virtue of the likelihood of significant environmental effects from major accidents and/or disasters.
- Scoping
  - Deciding if a major accidents and/or disasters assessment should be scoped in or out of the EIA.
  - If scoped in, how to set out a proposed methodology as part of a scoping report.
- Assessment
  - Key steps to enable practitioners to undertake an assessment and identify any potential significant effects that require further mitigation.
  - Understanding risk management options as part of the process.

Further detail is included within the following appendices:

- **Appendix A –** supplementary terminology drawn from existing sources providing a background appreciation of current definitions that have informed key terminology for this topic.
- **Appendix B –** references to the broader legislative context surrounding the topic.
- **Appendix C –** a sample of existing case studies to demonstrate how this assessment approach can be applied.
- **Appendix D –** a hazard identification record template to support the assessment process.
- **Appendix E –** a selection of frequently asked questions that have arisen as the methodology for this topic has evolved.
- **Appendix F –** references that have informed this primer.



Screening for EIA

The level of effort required at the screening stage for major accidents and/or disasters is likely to be minimal. During screening it should be sufficient to *identify if a development has a vulnerability to major accidents and/or disasters* and to consider whether a development could lead to a significant effect.

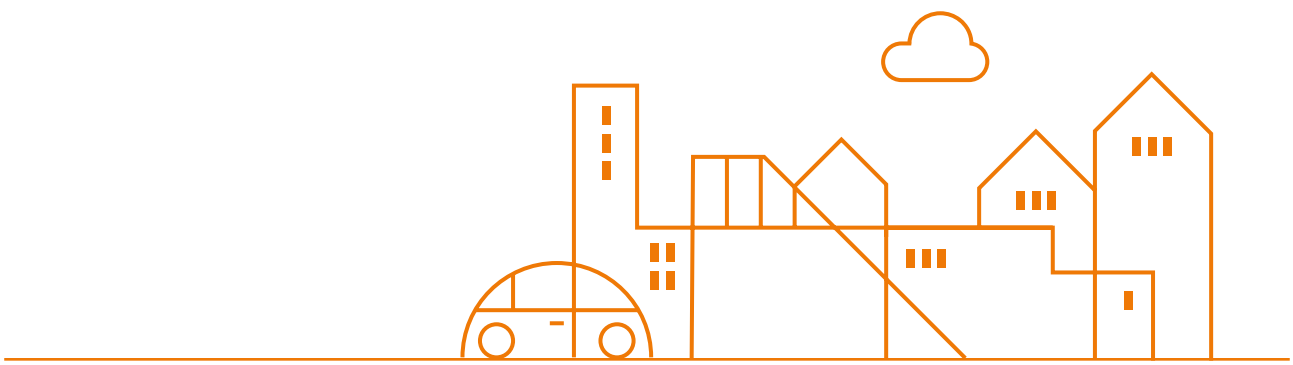
High-level questions to consider (which will be considered in more detail at the scoping stage if screened in) could include:

- Is the development a source of hazard itself that could result in a major accident and/or disaster occurring?
- Does the development interact with any sources of external hazards that may make it vulnerable to a major accident and/or disaster?
- If an external major accident and/or disaster occurred, would the existence of the development increase the risk of a significant effect to an environmental receptor occurring?

Considering these at a high level, without necessarily providing evidence at this stage, should help guide whether the development has the potential to be vulnerable to major accidents and/or disasters, or to increase vulnerability elsewhere.

It is valid to consider and identify proposed mitigation at the screening stage. If it is possible to demonstrate that proposed design measures, existing legal requirements, and codes and standards are likely to adequately control any potential vulnerability to a major accident and/or disaster then this should be factored into the conclusion.

If a development is not vulnerable to major accidents and/or disasters and is not likely to increase vulnerability elsewhere, it is unlikely to lead to an event that would cause a significant environmental effect upon a receptor. In these circumstances, it should be valid to propose that the requirement for EIA is not triggered in relation to major accidents and/or disasters risks.



Scoping for EIA

The aim of the scoping stage is to determine in more detail whether there is potential for significant effects as a result of major accidents and/or disasters associated with a development, and the resulting scope of and approach to the assessment if required.

Scoped in or out?

To guide the scoping decision, think carefully about what is relevant to the development specifically, such as its location, type, context, existing and future constraints, and likely receptors. A major accidents and/or disasters assessment will be relevant to some developments more than others, and for many developments it is likely to be scoped out of the assessment.

Figure 1 provides a process flow that can be used to help guide a scoping decision:

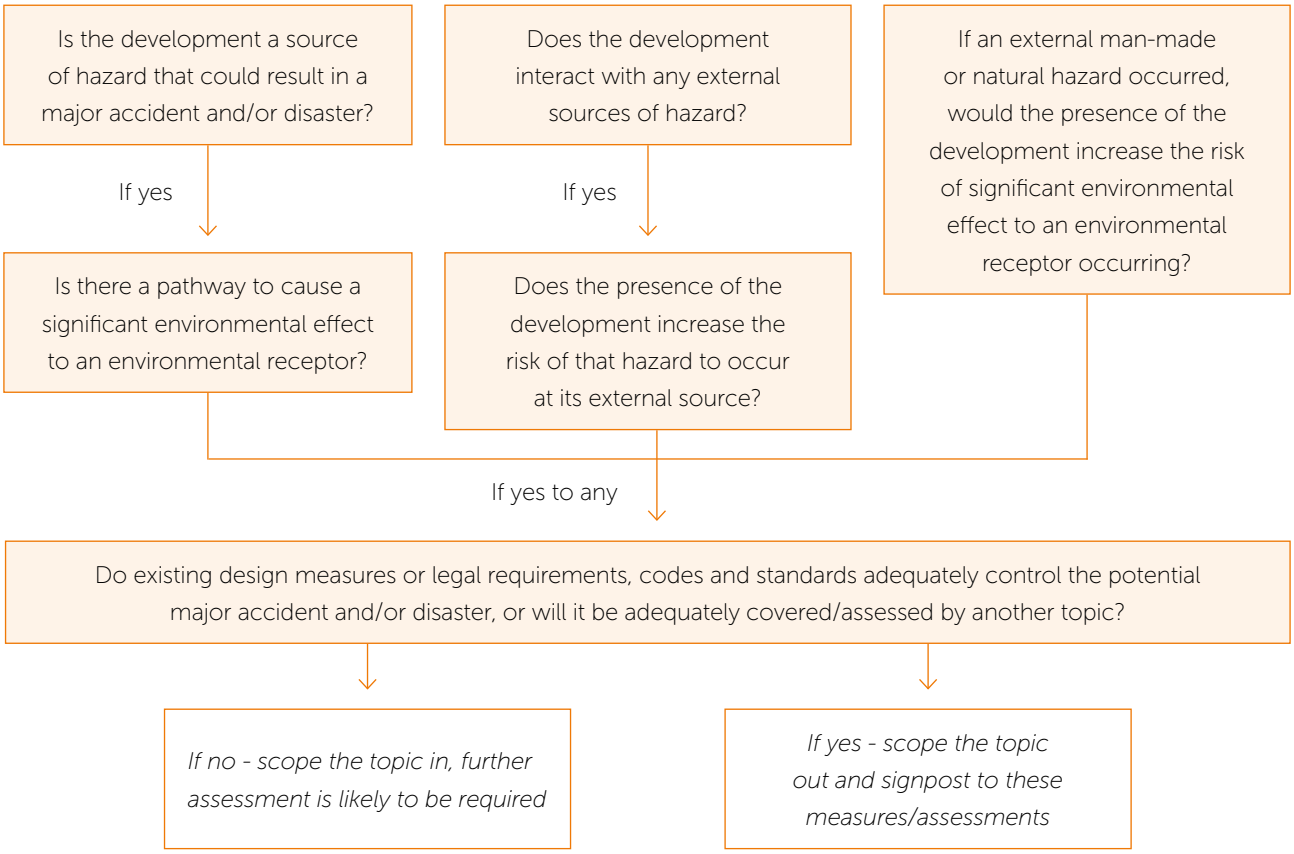


Figure 1 - scoping decision process flow

Major accidents and/or disasters can be scoped out of the assessment if you can clearly demonstrate that:

1. *there is no source-pathway-receptor linkage of a hazard that could trigger a major accident and/or disaster or potential for the scheme to lead to a significant environmental effect; or*

2. *all possible major accidents and/or disasters are adequately covered elsewhere in the assessment or covered by existing design measures[3] or compliance with legislation and best practice.*

The Scoping Report can be used to signpost to the evidence that justifies scoping the topic out.

However, if there is any uncertainty, a major accidents and/or disasters assessment should be scoped in. This is likely to require discussion with clients or other stakeholders to explain the benefits of the assessment with reference to the need for clarity in the communication of development risks and how they will be managed.

Examples of scoping decisions for this topic on a variety of developments are provided in Appendix C.

- Scoped in – defining the scope

Even in circumstances when the topic is scoped into the assessment, it is likely that it can be limited to specific elements of the development or the baseline environment and therefore remain limited in scope. This needs to be clearly set out in the scoping report to manage expectations at an early stage, with a focus on proportionality and likely significant effects.

The scoping report should set out the following:

Baseline

In line with the EIA Directive, this will be existing sources of risk assessment or other relevant studies, rather than collecting survey data (as might typically be the case for other EIA topics for receptors that the major accidents and/or disasters topic may impact upon)[4]. Duplication of data gathering and risk assessment should be avoided, and standalone risk assessments for the topic should only be undertaken if the information is not available from existing sources.

Sources of risk assessment might include the developments Construction Design Management (CDM) risk register, relevant development studies such as geotechnical desk-based assessments, and System Safety Hazard Records. Other sources of information such as the UK's current National Risk Register[5], and its associated local community risk registers[6], may also provide useful prompts for any risks not captured in development-specific documentation. Data from the Health and Safety Executive, Environment Agency, and their counterparts in Scotland (Scottish Environment Protection Agency) and Wales (Natural Resource Wales), as well as local authorities, on adjacent Control of Major Accident Hazards (COMAH) and other potentially hazardous sites or installations should also be set out within the baseline.

You will need to consult with your development team, client and stakeholders to fully agree the extent of baseline information available and to be used. This will differ development to development.

3 For instance, altering the internal spatial layout of a scheme to simply avoid a hazard could be embedded as a primary mitigation measure at the scoping stage.

4 This is in accordance with Paragraph 15 of the EIA Directive 2014 to avoid duplication.

5 www.gov.uk/government/collections/national-risk-register-of-civil-emergencies

6 www.gov.uk/guidance/local-resilience-forums-contact-details

The above information will provide the list of hazards (the source part of the source-pathway-receptor linkage) that will then be collected and considered further in the assessment.

At the scoping stage, this data does not need to be collected or reported in full. The list of sources that will be used in the assessment should be set out in the scoping report for agreement with stakeholders, along with a request for any other sources of information they may wish to draw attention to.

Receptors

Receptors are features of the environment that are subject to assessment under Article 3 of the EIA Directive, namely population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and landscape.

Relevant receptors can be identified through a review of base mapping and aerial photography, as well as through consultation with the development team and other EIA topic leads that may have identified receptors specific to their environmental topic.

For smaller developments, this might involve identifying, for instance, certain designated sites/areas that will be assessed as part of your assessment.

For larger-scale developments, this might instead focus on identifying groups of receptor types and focus on a more development-wide approach.

An environmental receptor that could be vulnerable to a major accidents and/or disasters risk, but is outside the scope of the wider EIA, is very unlikely so it is important to ensure these receptors align with the other topics considered under the EIA.

Deciding on a proportionate assessment

Not all potential events will fall into the scope of a major accidents and/or disasters assessment. The level of risk therefore needs to be defined to inform what types of events are within the scope of the major accidents and/or disasters assessment.

Events that have a high likelihood of occurring and would be of high consequence are a **high risk** and would be unacceptable for any development. These should already be managed or designed-out by a development. These might include, for example, an element of highway design that did not comply with standards leading to a major road traffic collision. These are therefore likely to be outside the scope of the assessment.

At the other end of the scale, low-impact events whatever the likelihood, such as minor spills, are **low risk** and are unlikely to be considered a major accidents and/or disasters risk. These events would not threaten immediate or delayed serious environmental effects to human health, welfare and/or the environment that require the use of resources beyond those of the client or its appointed representatives to manage. These are also therefore likely to be outside the scope of the assessment.

The assessment will typically focus on *low likelihood but potentially high consequence events,* refer to Figure 2.

Risks that are likely to lead to an event occurring, such as effects knowingly caused by a development like noise and vibration, are already assumed to be accounted for in other topics of the EIA and are not replicated. These impacts are a known impact, rather than an unplanned event, that would knowingly occur as the result of a development and would be specifically mitigated for. For example, the risk of irreversible impacts to human health caused by noise could meet the definition of a major accident and/or disaster, but the assessment and mitigation is covered elsewhere, in this instance under the EIA topic of noise.

The definition of a low likelihood event may be shaped through further practice. For the purposes of this primer it is considered to be an event that could occur but is unlikely to. Specific time definitions for a development could be defined as part of scoping, recognising the likely timescales of construction and operation. For example, no more than once in X years for the construction phase, and no more than once in Y years for the operational phase. If a development risk matrix is available, reference can be made to this to define risk categories that are within the scope of the assessment.

Alternatively, professional judgement can be used when categorising events into their respective categories, provided there is a clear justification for the judgement made.

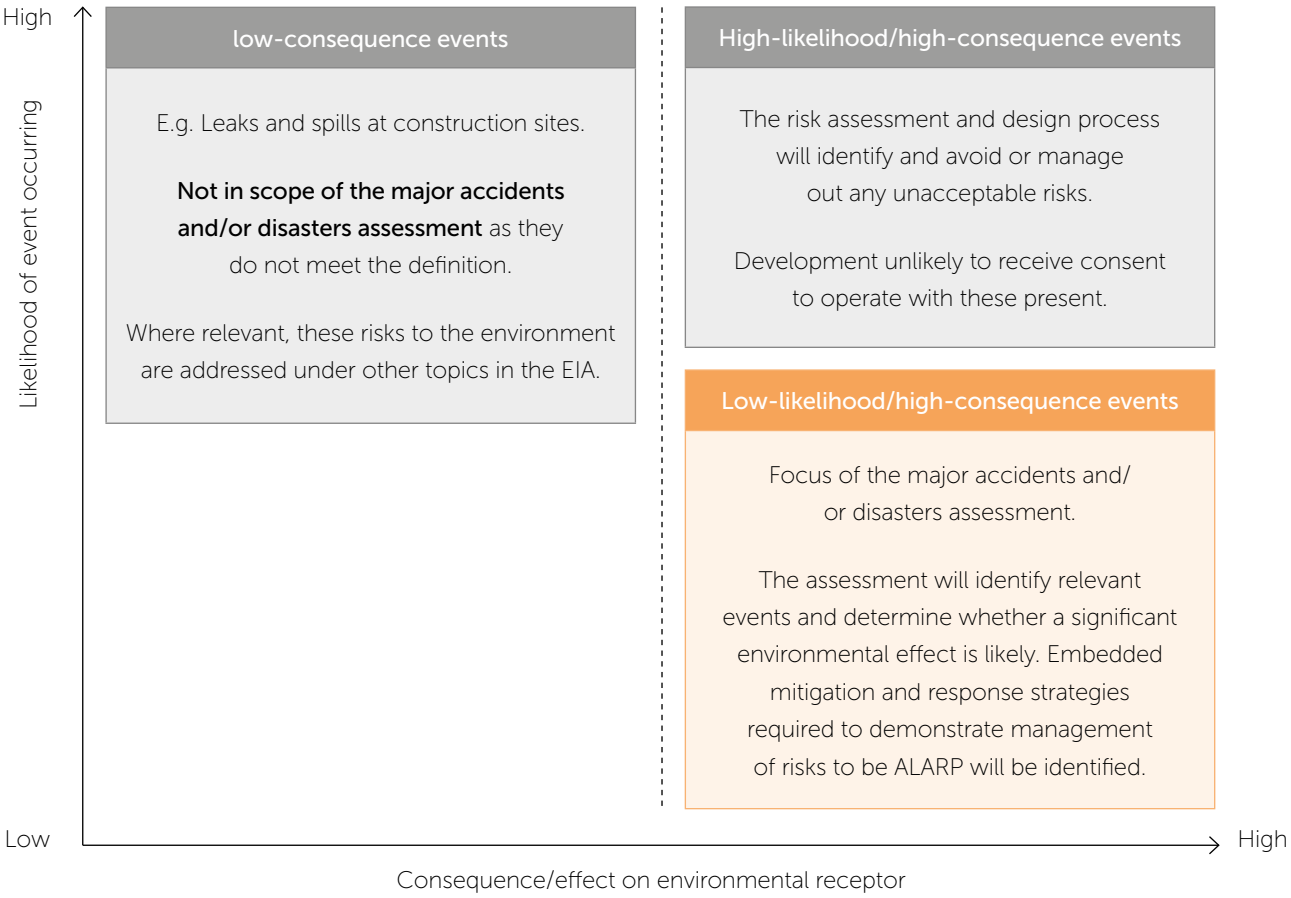


Figure 2 - Summary of Risk Events considered in the scope of the assessment for major accidents and disasters

Setting the spatial scope

This should include external features that may present a hazard to the development, even if these are beyond the scheme boundaries. For instance, the presence of a particular hazardous site may be beyond the development's construction and operational boundary, but still have the potential to interact with the development.

The assessment can be undertaken at a development (rather than receptor) level, depending on the nature of the scheme. However, where relevant, any locations considered more vulnerable to a major accident and/or disaster and/or sensitive to significant adverse effect, should be clearly identified.

Defining significance

As part of scoping, it will be important to agree what the definition of a significant effect will be. Factors that can be considered include:

- the geographic extent of the effects. Effects beyond the development boundaries are more likely to be considered significant;
- the duration of the effects. Effects which are permanent (i.e. irreversible) or long-lasting are more likely to be considered significant;
- the severity of the effects in terms of number, degree of harm to those affected and the response effort required. Effects which trigger the mobilisation of substantial civil emergency response effort are more likely to be considered significant;
- the sensitivity of the identified receptors; and
- the effort required to restore the affected environment. Effects requiring substantial clean-up or restoration efforts are more likely to be considered significant.

Drawing from criteria within Annex VI of the Seveso III Directive, a significant adverse effect can be specified (see Appendix B).

As an example, the significance threshold could be set at anything that causes the loss of life or permanent injury, and/or permanent or long-lasting damage to an environmental receptor. However, this is just one example and the threshold set will differ depending on multiple factors on different developments. Significance criteria are also likely to be shaped through further practice.

Defining exclusions

It is important to define conditions to which vulnerabilities to major accidents and/or disasters do not apply, and any elements scoped out of the assessment as a result, subject to detailed consideration by the development team (including any legal advisors) and agreement with stakeholders. These should be clearly communicated in the scoping report and might include, for example:

- low-consequence (regardless of likelihood) events – the EIA Regulations focus on major accidents and/or disasters, both of which terms imply significant harm. So, for example, likely construction-related accidents such as slips, trips and falls should not fall within the scope;
- high-likelihood, high-consequence events – these should be addressed elsewhere, and being unacceptable by definition, are implicitly outside scope;
- any hazards for which there is no credible source-pathway-receptor linkage;
- this will be a development-specific decision, but it may be appropriate to consider excluding effects on members of the public who wilfully trespass. If the development takes appropriate measures to provide a secure boundary to reduce likelihood of trespass, those ignoring these measures might not be considered valid receptors. It could be considered that a development will already have mitigated for trespass as far as reasonably practicable, so there would be no further mitigation available to mitigate further;

- also dependent on individual development decisions, but it may be appropriate to consider excluding effects on employees working on-site, as they are protected by existing health and safety legislation, although this should be agreed on a development-by-development basis to ensure this is the case; and
- hazards associated with other topics, for example, damage or contamination of aquifer or borehole which would typically fall under a water/flood risk/land quality assessment.

Agreeing how the assessment will be reported

There are several options for reporting the major accidents and/or disasters assessment. This should be agreed as part of the scoping process. Options include:

- within existing chapters, i.e. under an additional section heading, describing these as unplanned events, during construction and/or operation. This may involve a description of methodology in the upfront text describing this approach, and then for each EIA topic a section under construction and operation that deals with abnormal circumstances (major accidents and/or disasters);
- within a standalone major accidents and/or disasters chapter, which cross-references to other EIA topics where necessary; or
- as a risk assessment which is an appendix to the scoping report or the Environmental Statement and referred to as part of the 'Description of the development' or 'Scope of the Assessment' sections.

The decision should be made on a development-by-development basis and included in the scoping report for agreement with stakeholders.

Summary

To recap, the following factors should be agreed with stakeholders at the scoping stage:

- the reasons for either scoping the topic in or out;
- if scoped in:
    - the sources of information to be used for the baseline to inform the assessment;
    - the receptors that will be considered as part of the assessment;
    - the spatial scope of the assessment;
    - how significance will be defined;
    - the inclusions and exclusions within the assessment; and
    - any unknowns or uncertainties that are inherent in the data or the assessment.

Assessment

If major accidents and/or disasters has been scoped into the assessment, the methodology for undertaking the assessment might follow the example provided in this section. However, methodologies may vary between developments and is likely to evolve with practice.

A robust record of all steps should be kept. As with any EIA topic it is possible that during consultation, some major accidents and/or disasters hazards are queried, and it should be possible to refer to how or why these were screened out or assessed further.

- **Setting out the baseline – hazard identification and receptor tagging**

Using the baseline sources agreed through scoping, commence the analysis to identify hazards that will be assessed.

Risk registers are typically live documents and will need to be frozen at set times so they can be used to inform the assessment. This may align with particular design freeze points in the programme or happen at other times. For the avoidance of any doubt, the version of any data used should be clearly stated in the assessment assumptions.

The multiple sources of information you analyse should be collated and presented consistently in one hazard identification record, an example template for which is presented in Appendix D. This collated hazard identification record will provide the evidence base for the assessment.

Depending on the scale of the development, identified hazards may be grouped into high-level 'Risk Events' which have the same potential consequence. This can help to keep the assessment proportionate. For example, all hazards, sources and pathways that could lead to a major road traffic accident could be combined, since it is the traffic accident that has the potential to cause harm to an environmental receptor, regardless of the cause.

The grouped Risk Events should then be reviewed and assigned to relevant environmental receptors that may experience an impact (noting the scope you agreed during scoping). This may be specific, such as a river at a certain location, or more general, such as members of the public in the vicinity. This tagging can be added to the hazard identification record template. It is unlikely that your existing baseline data will have categorised hazards against receptors, and therefore this is an important step. This may require further consultation with EIA topic leads to inform an understanding of what receptors are present within the location that a grouped Risk Event could occur.

If you have a Risk Event with no valid receptor tagged against it then this Risk Event will not require further assessment as there is no valid source-pathway-receptor linkage. This can be reported in the hazard identification record template and discounted from any further reference in the assessment.

Assessment – identifying reasonable worst-case impact

As you move into assessing major accidents and/or disasters impacts, the reasonable worst-case environmental impact should be identified for each grouped Risk Event with a valid receptor.

This is likely to be done qualitatively, using professional judgement and consultation with other EIA topic specialists to understand what a reasonable worst-case impact might be for that receptor. If there is any uncertainty around what the reasonable worst-case impact might be, then a realistic level of caution is recommended. Generally, it will be possible to demonstrate later in the assessment that the reasonable worst-case impact has been mitigated despite the inherent uncertainty.

The following question may assist at this point in the process:

'Could the grouped Risk Event reasonably constitute a major accident and/or natural disaster in terms of the definitions provided?'

For example, if the grouped Risk Event has the potential to harm a member of the public, the important consideration is whether that harm could constitute a fatality, multiple fatalities or permanent injury – all of which are likely to classify it as a major accident and/or disaster (noting any exclusions your assessment may make, such as trespassers).

Similarly, the impact on the natural environment should be considered in terms of widespread or irreversible harm.

The hazard identification record template (Appendix D) provides further examples of reasonable worst-case impacts.

The hazard identification record template should set out the results of the review process undertaken, recording consultations with other EIA topics as an evidence trail, and providing any other comments that will assist in demonstrating how an outcome was reached.

Assessment – Selecting the grouped Risk Events that need further assessment

It is expected that the collated and grouped hazard identification record will hold some information that may not be relevant to the overall assessment. At this stage you can consolidate your hazard identification record by screening out any Risk Events that meet the following criteria:

- there is no source-pathway-receptor linkage;
- the receptor is not within scope, as defined through scoping;
- the consequence does not meet the criteria of a significant environmental effect, and therefore the grouped Risk Event is not a potential major accident and/or disaster; or
- the consequence and likelihood of the risk is high, to the extent that it is considered unacceptable to the development and has therefore been designed-out or otherwise managed.

The reasons for screening these out of further detailed assessment should be recorded in the hazard identification record.

Remaining grouped Risk Events should then be assessed further as described in the following sections. This will determine whether potential significant effects on receptors are already managed and/or mitigated to an acceptable level (i.e. perhaps using the term as low as reasonably practicable [ALARP]) or whether there are gaps in mitigation that need to be addressed through secondary mitigation.

○ Assessment – understanding the likelihood of a Risk Event occurring

The possibility of the reasonable worst-case environmental impact occurring should be evaluated considering:

- the likelihood of the grouped Risk Event occurring considering the measures already embedded into the design and best practice (primary and tertiary mitigation); and
- the likelihood that an environmental receptor is affected by the reasonable worst-case grouped Risk Event following primary and tertiary mitigation.

Likelihood assessments need not be quantitative but should evaluate and report as part of the hazard identification risk record whether the reasonable worst-case impact you have identified is a realistic outcome of the grouped Risk Event therefore requiring further mitigation, or whether this outcome has already been adequately addressed by embedded and best practice mitigation measures.

This evaluation can refer to existing risk assessments as well as consultation with relevant EIA topic and non-EIA (i.e. members of the design team) specialists, with reference to the definition of low likelihood.

Non-technical consultees, such as affected residents, will understand a description around the chance of fatality due to explosion, for example, better than a probability such as 'less than 1 in 1,000'. Therefore, careful consideration should be given to the communication of likelihood in simple terms. For instance, a development may use terms such as a development has 'x' chance of an event happening over the next 10 years.

○ Mitigation – identifying the requirements for secondary mitigation

The outcome of the above activity will highlight risks for which existing primary and tertiary (embedded and best practice) measures do not provide sufficient mitigation to reduce the risk to an acceptable level, and therefore significant effects could occur. Where this is the case, secondary (additional) measures will be required.

In consultation with relevant topic leads, secondary mitigation must be developed to manage the risk to an acceptable level, most likely below the significance criteria for a major accident and/or disaster.

Mitigation – risk management options

Risk management options for major accidents and/or disasters will fall into one of the following categories, consistent with the mitigation hierarchy used for EIA generally:

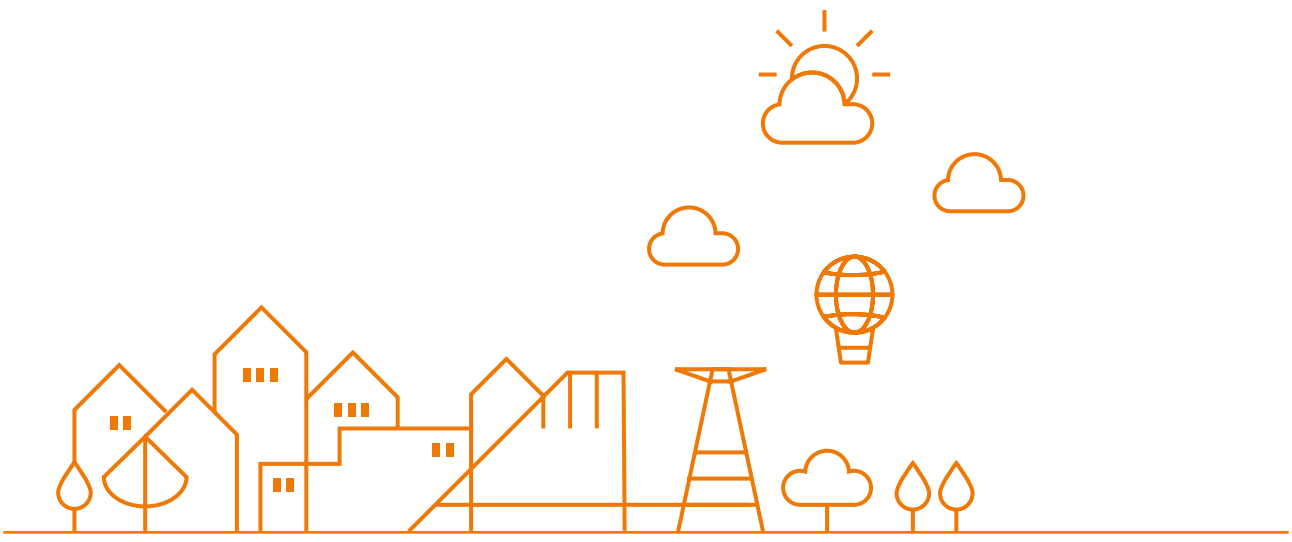
- eliminate (or 'avoid') the risk, by adopting alternative processes to eliminate the source of the hazard or remove the receptor.
- reduce the risk by adapting proposed processes such that either the likelihood or the impact of the Risk Event can be reduced.
- isolate the risk, by using physical measures 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 (e.g. emergency response) so that should a Risk Event occur, it can be controlled and managed appropriately. The EIA mitigation hierarchy of repair and compensate for any significant damage to environmental receptors may then apply following a control measure; and
- exploit the risk, if it presents potential benefits or new opportunities, for instance moving an existing asset to which a development relates further from a potential source of hazard, such as a hazardous site.

Residual assessment

As the impact of safety risks must be adequately addressed within the regulatory framework of a development it is not anticipated that significant residual effects will be identified following assessment, although further practice will inform this further.

Importantly, the above process should focus on demonstrating how secondary mitigation reduces the likelihood and/or significance of the reasonable worst-case impact occurring to an acceptable level. The hazard identification risk record can be used to report this process and demonstrate the following flow of assessment:

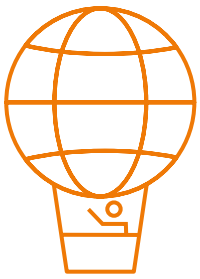
- Risk event leads to reasonable worst-case impact upon receptor.
- Reasonable worst-case impact identified as not adequately mitigated via primary and tertiary mitigation, and as such, significant adverse effect likely to occur.
- Secondary mitigation options explored.
- Reasonable worst-case impact adequately mitigated to acceptable limits, or reasons for not doing so clearly justified.



Final words

The major accidents and/or disasters topic requires consultation and collaboration over and above specialist EIA topic-specific skills. Where specialist risk assessments are required, it is expected that this expertise would generally already exist within the client or the development team, and the role of the major accidents and/or disasters topic team is to consult with these specialists and connect their work to the EIA.

The guidance presented in this primer will evolve as practice in the field emerges. The primer offers an example approach and does not stipulate that this method should be followed. Instead the content should be used as a basis to help build awareness and a platform from which to evolve the approach. As practice evolves, this primer will be updated and a move towards an agreed uniform approach – preferably in the form of a practical guidance note – may be issued.



Appendix A – Supplementary terminology

Definition	Source	Comment
Accident: 'Something that happens by chance or without expectation'. **Disaster:** 'A sudden accident or a natural catastrophe that causes great damage or loss of life'.	Oxford English Dictionary	
'Serious accident' means any train collision or derailment of trains, resulting in death of at least one person or serious injury to five or more persons, or extensive damage to rolling stock, the infrastructure, or the environment, and any other similar accident with an obvious impact on railway safety regulation or the management of safety. 'Extensive damage' means damage that can immediately be assessed by the investigating body to cost at least £2 million in total.	Railway Safety Directive (Directive 2004/49/EC)	The definition applies to a wider scope of impacts than required under the EIA Directive (refer to section 4 above)
To satisfy the definition of 'emergency' under the Act, the event or situation must threaten serious damage to human welfare in, or the environment of, a place in the United Kingdom. Additionally, to constitute an emergency, an incident or situation must also pose a considerable test for an organisation's ability to perform its functions. The common themes of an emergency are the scale of the impact of the event or situation; the demands it is likely to make of local responders; and the exceptional deployment of resources.	Civil Contingencies Act 2004 and Her Majesty's Government's accompanying non-statutory guidance[7]	This Act provides an overarching framework for preparing for and responding to civil emergencies within the United Kingdom
'An occurrence such as a major emission, fire, or explosion resulting from uncontrolled developments in the course of the operation of any establishment covered by this Directive and leading to serious danger to human health or the environment, immediate or delayed, inside or outside the establishment, and involving one or more dangerous substances.'	The Seveso III Directive (Directive 2012/18/EU)	Relates to the COMAH involving dangerous substances

7 HM Government (2013) Emergency Response and Recovery – Non-statutory guidance accompanying the Civil Contingencies Act 2004, Cabinet Office, 28 October 2013.

Definition	Source	Comment
Events with the potential to result in: • the death or adverse effects on local populations of species or organisms, with lower thresholds for high-value or protected species; • contamination of drinking water supplies, ground or groundwater; • damage to designated areas, habitats or populations of species within the areas; • damage to listed buildings; • damage to widespread habitats; and • damage to the marine or aquatic environment.	The Control of Major Accident Hazards (COMAH) regulations, 2015 and the HSE guidance on implementing them[8]	The requirements of the Seveso III Directive are transposed into UK legislation via the COMAH regulations
'Major accident' is defined as an occurrence on-site [...] leading to a loss of life or serious danger to human health and/or the environment, whether immediately or over time, on-site or off-site. 'Serious danger to human health' relates to people present permanently or for prolonged periods of time in the potentially affected area but excludes workers operating at the facility. Injuries leading to disability or prolonged states of ill health shall count as serious dangers to human health. 'Serious danger to the environment' relates to: • a contaminant source strength that does not decrease significantly within a short time; • permanent or long-lasting environmental damage; and • the affected environment not being restored through minor clean-up and restoration efforts.	Major Accident Off-Site Emergency Plan (Management of Waste from Extractive Industries) (England and Wales) Regulations 2009[9]	These regulations implement the provisions of the Mining Waste Directive (Directive 2006/21/EC)

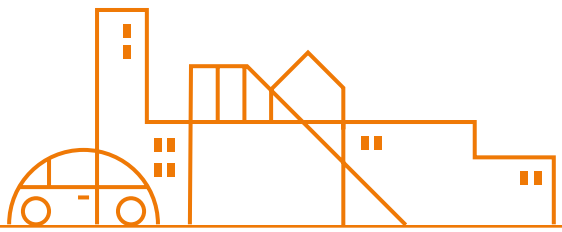
8 Health and Safety Executive (2015) The Control of Major Accident Hazards Regulations 2015: Guidance on Regulations, L111, Third Edition, June 2015

9 Department of Environment, Food and Rural Affairs (2011) Guidance: Major Accident Off-Site Emergency Plan (Management of Waste from Extractive Industries) (England and Wales) Regulations 2009 Mining Waste Directive: Article 6 Category 'A' Waste Facilities. Department of Environment, Food and Rural Affairs, August 2011.

Definition	Source	Comment
Refer to Section 3.2 of the CDOIF guidelines for thresholds to be used when determining the potential for a Major Accident to the Environment (MATTE) to a variety of defined environmental receptors. The thresholds outlined must be exceeded for the scenario to be considered a potential MATTE.	Chemical and Downstream Oil Industries Forum (CDOIF) – Guideline Environmental Risk Tolerability for COMAH Establishments	
Hazard – something with the potential to cause harm.	Institution of Occupational Safety and Health (IOSH)	IOSH is the Chartered body for health and safety professionals
Likelihood – chance of something happening. Note 1: In risk management terminology, the word 'likelihood' is used to refer to the chance of something happening, whether defined, measured or determined objectively or subjectively, qualitatively or quantitatively, and described using general terms or mathematically (such as a probability or a frequency over a given time period). Note 2: The English term 'likelihood' does not have a direct equivalent in some languages; instead, the equivalent of the term 'probability' is often used. However, in English, 'probability' is often narrowly interpreted as a mathematical term. Therefore, in risk management terminology, 'likelihood' is used with the intent that it should have the same broad interpretation as the term 'probability' has in many languages other than English. Risk – effect of uncertainty on objectives. Note 1 – An effect is a deviation from the expected. It can be positive, negative or both, and can address, create or result in opportunities and threats. Note 2 – Objectives can have different aspects and categories and can be applied at different levels. Note 3 – Risk is usually expressed in terms of risk sources, potential events, their consequences and their likelihood.	ISO 31000:2018	ISO 31000 is a family of standards relating to risk management codified by the International Organization for Standardization. The purpose of ISO 31000:2009 is to provide principles and generic guidelines on risk management

Definition	Source	Comment
Selected criteria for notification of a major accident to the European Commission under Article 18(1) of Directive 2012/18/EU and Regulation 26 of the COMAH Regulations 2015. A major accident meets the criteria for notifying the European Commission, if it has at least one of the consequences described in Paragraphs 1 to 4 below: Injury to persons and damage to property: a. a death; b. six persons injured within the establishment and hospitalised for at least 24 hours; c. one person outside the establishment hospitalised for at least 24 hours; d. a dwelling outside the establishment damaged and unusable as a result of the accident; e. the evacuation or confinement of persons for more than 2 hours where the value (persons × hours) is at least 500; or f. the interruption of drinking water, electricity, gas or telephone services for more than 2 hours where the value (persons × hours) is at least 1,000. Immediate damage to the environment: a. Permanent or long-term damage to terrestrial habitats: i. 0.5 hectares or more of a habitat of environmental or conservation importance protected by legislation; or ii. 10 or more hectares of more widespread habitat, including agricultural land; b. Significant or long-term damage to freshwater and marine habitats: i. 10 km or more of river or canal; ii. 1 hectare or more of a lake or pond; iii. 2 hectares or more of delta; or iv. 2 hectares or more of a coastline or open sea; or c. Significant damage to an aquifer or underground water: 1 hectare or more. Damage to property: a. damage to property in the establishment, to the value of at least EUR 2,000,000; or b. damage to property outside the establishment, to the value of at least EUR 500,000. Cross-border damage: any major accident directly involving a dangerous substance giving rise to consequences outside the territory of the Member State concerned.		

Definition	Source	Comment
Mitigation – means primary (inherent design), secondary (foreseeable) and tertiary (inexorable) measures. Primary – Modifications to the location or design of the development made during the pre-application phase that are an inherent part of the development, and do not require additional action to be taken. Secondary – Actions that will require further activity to achieve the anticipated outcome. These may be imposed as part of the planning consent, or through inclusion in the ES. Tertiary – Actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered standard practices used to manage commonly occurring environmental effects.	IEMA (2016), Environmental Impact Assessment Guide to Delivering Quality Development	Mitigation considered in the following order: Primary = Embedded mitigation Tertiary = Good practice Both above are considered when initially predicting environmental effects. If significant effects remain following this initial assessment, consideration of secondary mitigation is made. Secondary = Additional mitigation

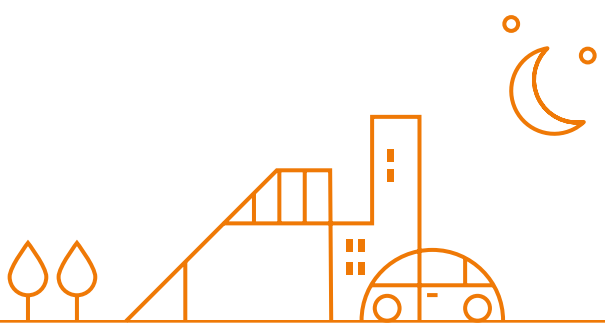


Appendix B – Useful legislation

The below is a selection of some of the legislative background surrounding developments but is not comprehensive. A full review of all relevant legislation should be undertaken for each individual development.

Legislation	Description
Health and Safety at Work etc. Act 1974 (HSWA)	This legislation places general duties on employers, people in control of premises, manufacturers and employees. Health and safety regulations made under this Act contain more detailed provisions. The Act provides the framework for the regulation of industrial health and safety in the UK. The overriding principle is that foreseeable risks to persons in workplaces shall be reduced so far as is reasonably practicable and that adequate evidence shall be produced to demonstrate that this has been done.
Construction (Design and Management) Regulations 2015 (CDM Regulations)	These regulations place specific duties on clients, designers and contractors so that health and safety is considered throughout the life of a construction development from its inception to its subsequent final demolition and removal. Under the CDM Regulations, designers are required to avoid foreseeable risks so far as reasonably practicable by eliminating hazards from the construction, cleaning, maintenance, and proposed use and demolition of a structure, reducing risks from any remaining hazard, and giving collective safety measures priority over individual measures.
The Management of Health and Safety at Work Regulations 1999	These regulations generally make more explicit what employers are required to do to manage health and safety under the HSWA.
Electricity at Work Regulations (1989 No. 635)	The purpose of the Regulations is to require precautions to be taken against the risk of death or personal injury from electricity in work activities.

Legislation	Description
EU Regulation 402/2013 on the Common Safety Method on Risk Evaluation and Assessment (CSM-RA) (as amended by Regulation EU 2015/1136)	An EU Regulation that describes the methods required to be used to assess compliance with safety levels and safety requirements.
The Planning (Hazardous Substances) Regulations 2015	The Planning (Hazardous Substances) Regulations 2015 implement land-use planning requirements under the Seveso III Directive (2012/18/EU) on the COMAH. Hazardous substances consent is required for the presence of certain hazardous substances at or above controlled quantities specified.
Control Of Major Accident Hazards (COMAH) Regulations 2015	The COMAH Regulations aim to prevent and mitigate the effects of major accidents involving dangerous substances which can cause serious damage/harm to people and/or the environment. COMAH treats risks to the environment as seriously as those to people.
Seveso III Directive	Main EU legislation dealing specifically with the control of onshore major accident hazards involving dangerous substances.



Appendix C – Case studies

Development	Scoped in or out?	Link	Comments/Planning Inspectorate (PINS) feedback
High Speed 2 (HS2) Phase 2a	In	www.gov.uk/government/collections/hs2-phase-2a-environmental-statement www.gov.uk/government/consultations/hs2-phase-2b-draft-environmental-impact-assessment-scope-and-methodology-report	For High Speed Two Phase 2a, a significant adverse effect was considered to mean the loss of life or permanent injury, and/or permanent or long-lasting damage to an environmental receptor. Note: this may be considered a low threshold within the health and safety discipline; however, given the sensitivity of the consultation, it was found to be difficult to support anything else.
Expansion of London Luton Airport	In	infrastructure.planninginspectorate.gov.uk/projects/eastern/expansion-of-london-luton-airport/?ipcsection=docs&stage=1&filter1=Environmental+Impact+Assessment+Scoping	At the scoping stage, PINS commented that insufficient information had been provided on measures already in place to scope out some risk items. The Environmental Statement (ES) should include a definition of these and the current systems in place to address impacts for these matters. On-site safety of Airport staff should be taken into consideration, in addition to the on-site safety of members of the public. The ES should establish a baseline in respect of natural disasters, for example setting out the current susceptibility of the site to seismic movement, extreme storms, tornadoes, snow and fog. Any risk registers relied upon must be made public. The ES should clearly demonstrate how significance factors are taken into consideration and combined to determine the overall significance of effects. The ES must clearly set out the risk tolerability criteria referred to and contain an explanation as to how it has been taken into consideration within the assessment in concluding on likely significant effects.

Development	Scoped in or out?	Link	Comments/Planning Inspectorate (PINS) feedback
A30 Chiverton to Carland Cross	Out	infrastructure.planninginspectorate.gov.uk/projects/south-west/a30-chiverton-to-carland-cross-scheme/?ipcsection=docs&stage=1&filter1=Environmental+Impact+Assessment	High-level screening undertaken as part of scoping. This showed that the volume and type of traffic using the development would not change significantly from that using the current road alignment, and therefore it was reasonable to conclude that there was no general increase in risk of a major accident and/or disaster.
Cuadrilla Shale Gas Exploration	Considered	cuadrillaresources.uk/wp-content/uploads/simple-file-list/PNR-Planning-/Environmental-Risk-Assessment.pdf	In the form of an Environmental Risk Assessment, prior to 2017 EIA Regulations. Mandated by Royal Society, and sensible given potential hazards associated with, and high-profile nature, of development. Document to provide assurance to the Department for Energy and Climate Change (DECC), that an appropriate risk management structure is in place, and that environmental risks to human health and the environment have been robustly identified and will be managed appropriately or controlled. The focus of the risk assessment was on identifying and assessing the unplanned outcomes from the proposed activities of construction, operation and restoration of the proposed shale gas exploration development. Risks identified were broken down into source; pathway; receptor; development phase; embedded mitigation measures; likelihood; consequence; risk score; justification for risk score; and comments for clarity. The document was provided ahead of the EIA for the development.

Development	Scoped in or out?	Link	Comments/Planning Inspectorate (PINS) feedback
Expansion of Heathrow Airport (Third Runway)	In	infrastructure.planninginspectorate.gov.uk/projects/london/expansion-of-heathrow-airport-third-runway/?ipcsection=docs&stage=1&filter1=Environmental+Impact+Assessment+Scoping	Although scoped in, the scoping report proposes to scope several matters out. However, the scoping opinion from PINS requests a number of these to be scoped back in or provide further justification and baseline for scoping out. The ES should establish a baseline in respect of natural disasters, for example setting out the current susceptibility of the site to seismic movement, extreme storms, tornadoes, snow and fog. Study area needs to be agreed with the Civil Aviation Authority (CAA), Heathrow Strategic Planning Group (HSPG) and other affected local authorities. ES should take account of the major accident hazard sites and major accident hazard pipelines identified by the Health and Safety Executive.
Gatwick Airport Northern Runway	In	infrastructure.planninginspectorate.gov.uk/projects/south-east/gatwick-airport-northern-runway/?ipcsection=docs&stage=1&filter1=Environmental+Impact+Assessment+Scoping	PINS commented: Public Safety Zones (PSZ) to be considered. Not enough detail presented to presently scope out risks that will not increase risk compared to existing situation, and those perceived to already be mitigated by existing protocols. Little justification for the study areas selected (10km for "wider events" related to airspace and 1km for ground based/on-site events) beyond the use of expert judgement. PINS do not consider arbitrary distances should be applied and instead be based on individual Risk Events. Approach to be agreed with relevant consultation bodies.

Development	Scoped in or out?	Link	Comments/Planning Inspectorate (PINS) feedback
Drax Re-power	In	infrastructure.planninginspectorate.gov.uk/projects/yorkshire-and-the-humber/drax-re-power/?ipcsection=docs&stage=app&filter1=Environmental+Statement	No topic chapter proposed in scoping. PINS considered that the description of the development should address the risk of major accidents and/or disasters relevant to the development concerned. If risks are identified that have the potential to result in a likely significant environmental effect, these should be assessed within the ES along with the likely measures that will be employed to prevent and control such matters.
Sizewell C New Nuclear Power Station	In (as part of other topics)	infrastructure.planninginspectorate.gov.uk/projects/eastern/the-sizewell-c-project/?ipcsection=docs&stage=app&filter1=Environmental+Statement	PINS commented that information presented within other technical assessments may not be enough to undertake the assessment of major accidents and disasters. ES should include criteria against which impacts will be assessed to establish the worst-case scenario for each risk. Significance criteria to be agreed with relevant consultation bodies. ZoI [zone of influence] may need to broaden beyond just surrounding land. ES should consider incidents and accidents at relevant similar facilities that have occurred both in the UK and abroad.

Development	Scoped in or out?	Link	Comments/Planning Inspectorate (PINS) feedback
Brent Field Decommissioning	Considered	assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/590278/Brent_Field_Environmental_Statement.pdf	Oil rig decommissioning in the North Sea. EIA carried out prior to 2017 EIA Regulations, therefore not a full assessment, but consideration for major accidents and disasters. Each decommissioning option was broken down into activities/end points, which were then evaluated against a range of environmental and socioeconomic categories including: onshore, resource use, hazardous substances, waste, physical, marine, environmental risk from accidents, employment, legacy, fisheries, shipping, energy and emissions) to identify the environmental impacts (spillages of oil/chemicals, broken vessels/pipelines, misplaced disposal. A system for emergency preparedness and response is maintained by Shell to ensure that the correct action is taken in the event of an incident or accident that could affect the environment. Arrangements covering the Brent Decommissioning development activities, and in particular oil spill or release contingency planning arrangements were made. E.g. the response strategy incorporates areas such as trans- boundary arrangements, the resources available (onshore and offshore) to deal with releases, dispersants available on the standby vessel, and membership of Oil Spill Response Limited (OSRL).

Appendix D – Hazard identification record template

Text					Are cross-disciplinary impacts likely?											Text			
Grouped Risk Event	**Source and/ or pathways**	**Receptor**	**Source document**	**Reasonable worst consequence if event did occur**	**Agriculture, forestry and soils**	**Air quality**	**Community**	**Cultural heritage**	**Ecology**	**Health**	**Land quality**	**Landscape and visual**	**Socioeconomics**	**Sound, noise and vibration**	**Traffic and transportation**	**Water resources and flood risk**	**Primary/tertiary mitigation**	**Could this lead to a major accident and/or natural disaster with existing mitigation in place?**	**Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?**	**If no, what secondary mitigation is required to reach an acceptable level?**
Ground Collapse	Tunnelling	Various	CDM Risk Register	Ground settlement reaches surface resulting in subsidence and structural damage to buildings immediately above.	Y		Y			Y		Y					Managed via CDM: tunnel design and construction methods include risk assessment for overlying structures and monitoring or mitigation if required.	No	Yes	
Major road traffic accident	Working over or adjacent to existing highways. Movement of construction vehicles along public roads and adjacent to public rights of way.	Various	CDM Risk Register	Death and/ or injury to a member of the public. Delays and congestion in surrounding area.			Y			Y			Y		Y		Risks identified and managed via CDM, construction planning, draft Code of Construction Practice (CoCP) and method statements etc. Risks to public road users assessed and managed in the ES and then as part of construction planning. Overarching controls addressed via draft CoCP and implemented through method statements, traffic management plan etc.	Yes	Yes	

Appendix E – FAQs

Below is a selection of frequently asked questions that arose in drafting this primer that may offer some further guidance.

How to consider malicious threats, wilful harm or terrorism?

The focus of the assessment is the impact of a major accident and/or disaster on the environment, regardless of the specific cause, for example, explosion rather than bombing, or obstacle in road rather than specifically a deer or a fly-tipped fridge.

The correct security measures specific to the nature and scale of the development should always be in place prior to operation to prevent such threats if they are relevant.

What about residual risks?

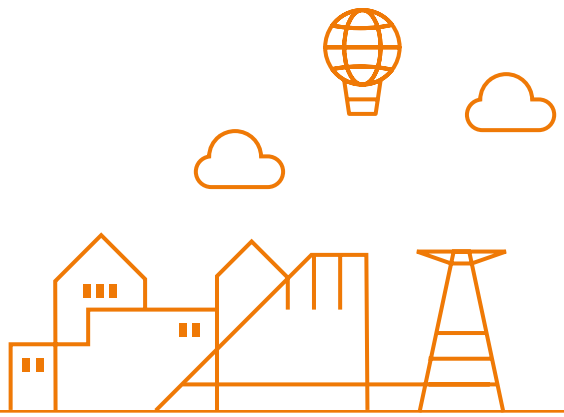
There needs to be a general acceptance when conducting a major accidents and/or disasters assessment that some risks, however unlikely, may still occur. Mitigation should be identified pre-event and post-event to reduce the effects to an acceptable level. For those risks that cannot be completely designed-out, emergency plans are available to deal with the response in order to minimise the significance of any impacts.

Are the EIA Regulations the correct vector for this topic?

We are all aware of the environmental consequences of events such as Deepwater Horizon, Fukushima, Seveso and Chernobyl. The process within the assessment offers a cross- disciplinary and alternative environmental lens of focus to development risk which may lead to previously unconsidered risks. The major accidents and/or disasters assessment is also an opportunity to provide the public and decision-makers with a clear and logical approach to hazard identification and mitigation. It does not seek to replace or duplicate health and safety regulations that are in place to manage risks, rather to add to the available information on the potential major accidents and/or disasters risks of a development from an environmental perspective.

Will this not just become a tick box exercise?

Every development is unique. Each client and legal team will have their own issues and concerns, and each local authority is likely to develop its own approach to this assessment. Therefore, the scope of and approach to major accidents and/or disasters assessment is likely to differ greatly between developments. With time, there may be standard approaches to certain common risks events.



Appendix F – References

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