



State Emergency Risk Management Guideline

RESPONSIBLE AGENCY

State Emergency Management
Committee Business Unit

APPROVED BY

State Emergency
Management Committee

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Amendment Table

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The SEMC acknowledges the Aboriginal peoples throughout the state of Western Australia as the Traditional Custodians of the lands where we live, work and volunteer. We recognise Aboriginal peoples' continued connection to land, waters and community, and pay our respects to Elders both past and present.

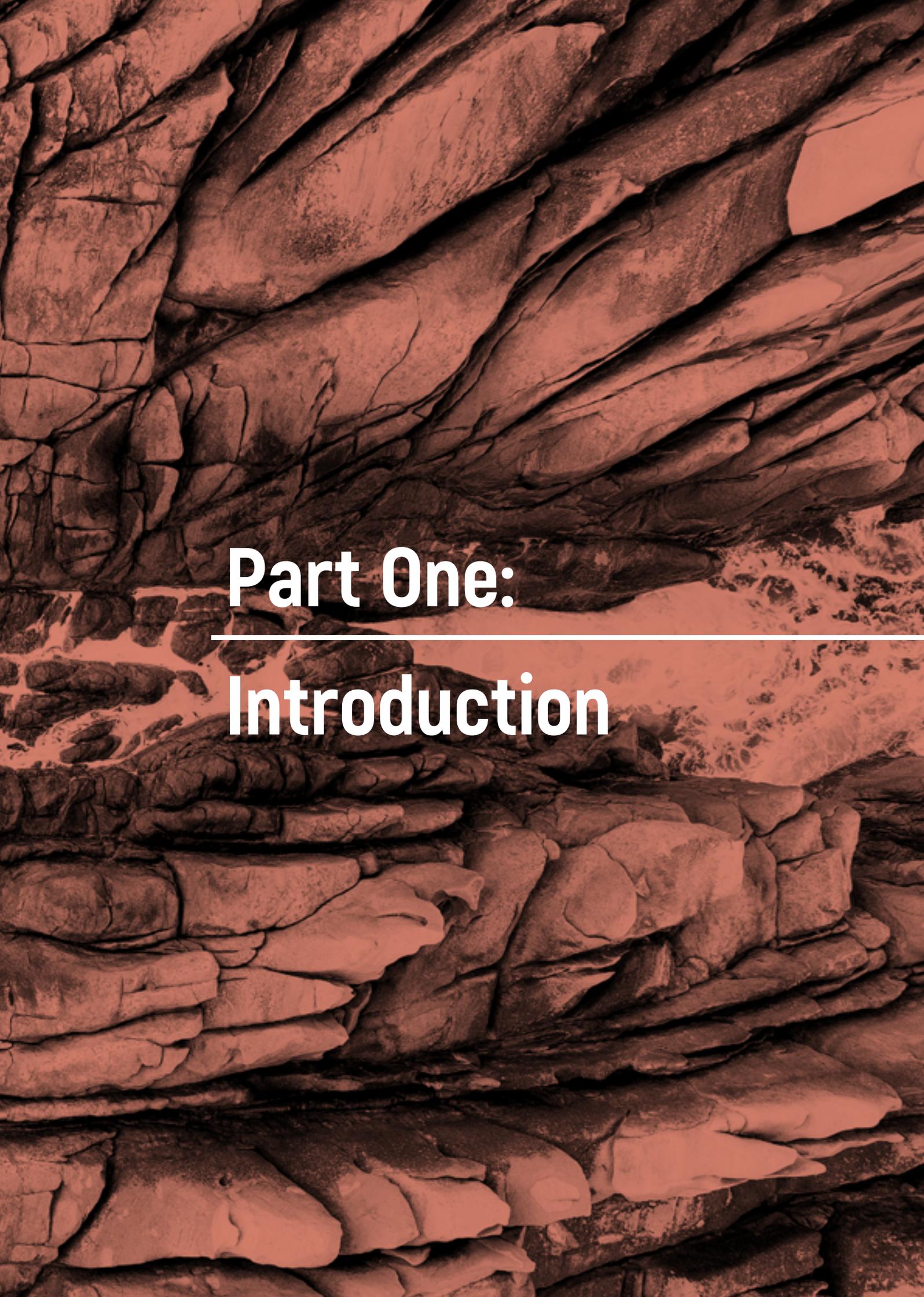
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All of the State emergency management legislation and documents can be accessed via the [State Emergency Management Framework](#) page of the [State Emergency Management Committee website](#).

Contents

PART ONE: INTRODUCTION	5
1.1 Emergency Risk Management	6
1.2 Risk Management Principles	7
1.3 Risk Management Framework	8
1.4 Risk Management Process	9
1.5 Emergency Risk Management in Practice	10
PART TWO: ESTABLISH THE SCOPE, CONTEXT AND CRITERIA	12
2.1 Identifying Important and Vulnerable Elements in the Community	13
2.2 Project Plan	15
PART THREE: RISK IDENTIFICATION	18
3.1 Hazards and Scenarios	19
3.2 Risk Statements	25
PART FOUR: RISK ANALYSIS	28
4.1 Assess Current Controls	30
4.2 Assign a Consequence Level	31
4.3 Assign a Likelihood Level	36
4.4 Assign a Confidence Level	37
4.5 Risk Level	38
4.6 Priority Level	39
4.7 Practical Aspects of a Risk Assessment Workshop	40
PART FIVE: RISK EVALUATION	41
5.1 Addressing Priority Risks	42
PART SIX: RISK TREATMENT	45
6.1 Identify Treatment Options	47
PART SEVEN: MONITORING AND REVIEW	49
7.1 The Scope	51
7.2 The Risks	52
7.3 The Risk Treatment Strategies	52
APPENDICES	53
Appendix A: Glossary	54
Appendix B: References	56
Appendix C Toolbox	57
Appendix D: Risk Priority Levels	59
Appendix E: Risk Assessment Workshop Recommendations	62
Appendix F: Treatment Compendium	65



Part One:

Introduction

The State Risk Project, undertaken by the Risk, Capability and Analysis Portfolio of the Department of Fire and Emergency Services" (DFES) on behalf of the State Emergency Management Committee (SEMC), is an initiative of the State Government of Western Australia and is jointly funded under the Commonwealth Government's National Partnership Agreement on Natural Disaster Resilience.

Western Australia stretches nearly 2,500 km from north to south, spanning 23 degrees of latitude. This spread encompasses several climatic zones from tropical in the far north, moving through grassland, desert, subtropical and on to temperate regions in the southwest. On a global scale, such broad climatic variation and diversity for a State is rare.

With WA covering nearly one-third of the Australian continent, the size, remoteness and diversity present a broad range of challenges for emergency management.

In addition to the infrequent threat from naturally occurring events such as earthquakes and tsunamis, destructive storms, floods, cyclones and bushfires are significant seasonal hazards the State faces each year to varying degrees.

WA is also exposed to various anthropogenic hazards such as chemical and oil spills (on-shore and off-shore), major rail, road and air crashes, and energy supply disruptions. The State's ongoing population expansion and developing natural resource-based economy, further increase exposure to these risks.

In recent years WA has experienced a range of emergencies that have resulted in the loss of life and damage to private and public property. Several of these emergency events, including floods, fire, cyclone, storm, human epidemic and marine transport emergencies have required a State-level response. There have also been many regional and local emergencies.

These events have resulted in significant social and economic costs. The State aims to reduce these costs through employment of Emergency Risk Management (ERM). This process seeks to identify, analyse, evaluate and treat sources of risk before, during and after an emergency.

This guide aims to support implementation of the risk management process and the creation of ERM plans. It is based on the 2020 National Emergency Risk Assessment Guidelines (NERAG) but has been tailored to Western Australia's context.

According to section 3.2.6 of the State Emergency Management Policy, ERM planning should comply with State Emergency Management Prevention and Mitigation Procedure 2.1. The SEMC recommend using the State Emergency Risk Management Guideline (this document) to assist with this planning process.

1.1 Emergency Risk Management

Emergency Risk Management (ERM) is described in the Australian Disaster Resilience Glossary as 'a systematic process that produces a range of measures which contribute to the well-being of communities and the environment'. This process considers the likely effects of hazardous events and the controls by which they can be minimised. ERM is composed of three distinct elements (Figure 1), the risk management principles, framework and process, as outlined in the 2020 National Emergency Risk Assessment Guidelines (NERAG).

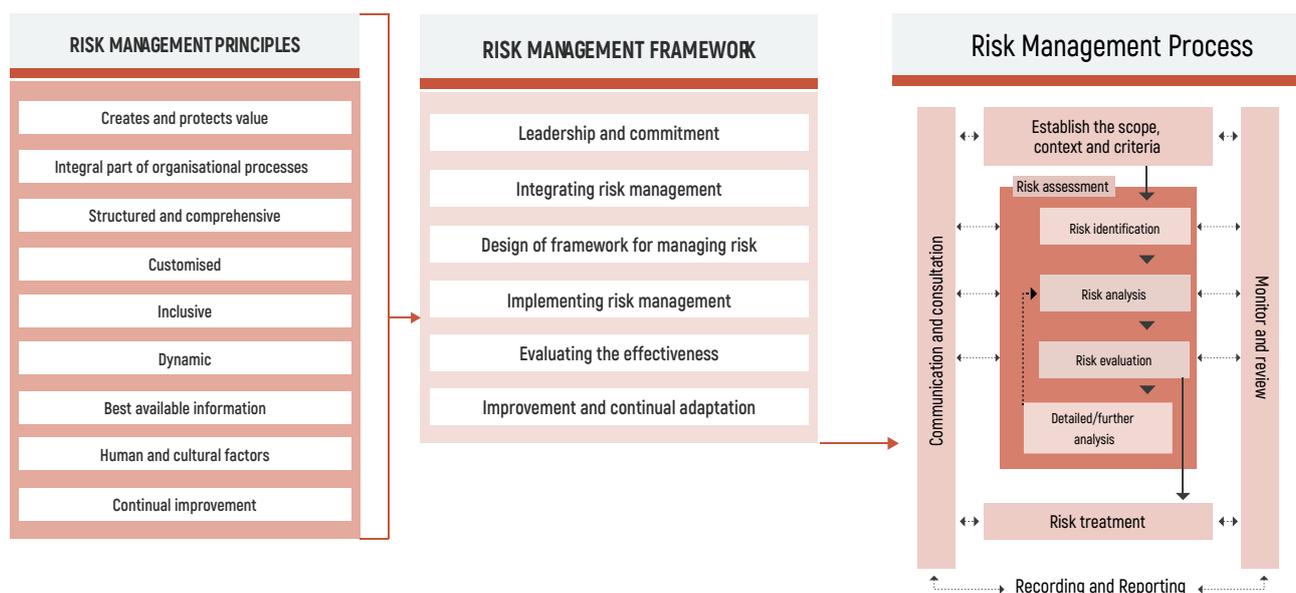


Figure 1: Principles, framework, and process for emergency risk management, as described by AS/NZS ISO 31000:2018.2 Adapted from National Emergency Risk Assessment Guidelines (2020).

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1.2 Risk Management Principles

Risk management principles underpin the mindset needed by organisations to conduct effective ERM and outlines the manner in which to undertake the process. In order to be effective, ERM should follow 9 key principles.

- 1. Creates and protects value:** Risk management contributes to the wellbeing, sustainability and resilience of human health, the environment, the economy, public administration and social setting.
- 2. Integrates into all organisational processes:** Risk management is a mainstream activity that is integrated into standard business practices of organisations, governments and communities.
- 3. Structured and comprehensive:** Results are consistent and comparable.
- 4. Customised:** The framework and processes are appropriate and timely involvement of stakeholders, enabling their knowledge, views and perceptions to be considered.
- 5. Inclusive:** Includes appropriate and timely involvement of stakeholders, enabling their knowledge, views and perceptions to be considered.
- 6. Dynamic:** Risk management anticipates, detects, acknowledges and responds to changes in context and risk profile in an appropriate and timely manner.
- 7. Best available information:** Inputs to risk management are based on the best available historic and current information. Risk management explicitly takes into account any limitations and uncertainties associated with such information and expectations. Information should be timely, clear and available to relevant stakeholders.
- 8. Human and cultural factors:** Human behaviour and culture significantly influence all aspects of risk management at each level and stage.
- 9. Continual improvement:** Risk management is continually improved through learning and experience.

1.3 Risk Management Framework

The risk management framework (Figure 2) is the overarching governance arrangement that ensures risk information is reported and used in decision-making. For this to be effective, all parties must be committed to its success from the beginning through established communication pathways and commitment by leadership.

The main components of the framework include:

- Leadership and commitment to implement risk management (e.g., executives, managers). This is essential for the process to be successful.
- Integrating risk management into the organisation and its context
- Designing an appropriate risk management framework
- Implement risk management according to the framework
- Evaluate the effectiveness of the risk management framework
- Improvement and continually adapting the framework to ensure it remains current to the needs of the organisation.

The ERM process may produce results, but it could be that the results are not taken up by decision makers because the appropriate resources and reporting structures were not put in place first.



Figure 2: Emergency Risk Management Framework

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1.4 Risk Management Process

The risk management process is the actions which are undertaken to look at the actual risks facing a community. It involves five main phases (Figure 3).

1. **Establish the context:** this allows stakeholders to agree on the overall objectives and the scope within which they will operate. It defines the community environment and any potential issues that may affect the ERM process.
2. **Risk identification:** this identifies and describes the nature of the hazards, the vulnerabilities of the community and identifies the potential risks.
3. **Risk analysis:** this examines the risk(s), considering their likelihood and consequence(s) and assigns levels of risk and priority.
4. **Risk evaluation:** this compares the risks with the set evaluation criteria and decides which risks require treatment.
5. **Risk treatment:** this selects and implements appropriate treatments to deal with risks.

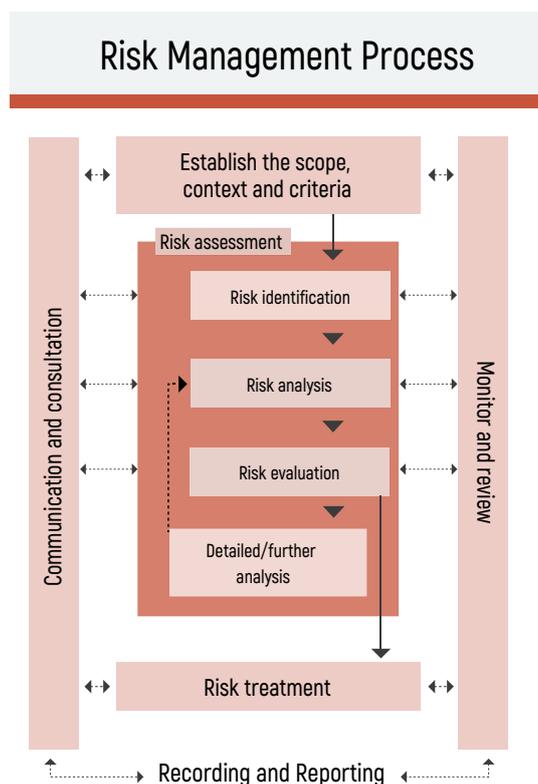


Figure 3: Emergency Risk Management Process

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Each phase is supported by two ongoing activities:

1. **Communication and consultation:** this aims to ensure two-way communication with internal and external stakeholders throughout the process
2. **Monitoring and review:** this allows for ongoing improvement of the process.

Recording and reporting arrangements are necessary to ensure that the outcomes of the risk assessments processes are communicated and available for the process of monitoring and review.

1.5 Emergency Risk Management in Practice

ERM can be undertaken in a number of ways depending on what suits your organisation. In WA, experience has shown that a workshop environment, with relevant stakeholders in attendance, is the most effective format to undertake risk assessments. It gives stakeholders the opportunity to openly exchange knowledge and information and to build a comprehensive understanding of the risks posed to a community.

Exchange of information is essential for the assessment as many things are linked to each other. For example, health professionals may require information about road access to assess the risks to the health of the residents in the area. This information about road access may need to be provided by other stakeholders such as Main Roads WA or local government.

The ERM process is therefore explained below in terms of what needs to be done before, during and after the risk assessment workshop.

Before the Workshop

Four key steps need be undertaken before a risk assessment workshop. Each step is described in further detail throughout this guideline. The four steps, and where you can find more information, are:

1. Create a project plan (Part 2)
2. Identify hazards for assessment (Part 3)
3. Develop the credible worst-case scenario, including AEP (Part 3)
4. Write risk statements (Part 4).

Additional practical 'Before the Workshop' aspects are available in section 4.7: Practical Aspects of a Risk Assessment Workshop.

During the Workshop

During the workshop, participants will be introduced to the ERM process, the chosen hazard and the scenario that the assessment will be based on. Following this, they will collectively analyse (see Part 5) the risks posed by the scenario to different aspects, such as the economy or health of people. The end result of each workshop is a completed risk register for that particular hazard event.

Throughout the workshop it is important to encourage discussion to reach fair and valuable conclusions. To do so, it is essential that all participants have a shared understanding of what is expected from the beginning. As your participants will come from a variety of backgrounds and have experience in different fields, presenting information about the hazard and its potential impacts will help everyone to be on the same page.

It is often beneficial if these presentations are given by either the facilitator or a stakeholder such as a Hazard Management Agency (HMA) representative for the hazard being assessed as they are likely to contribute specialist knowledge.

Additional 'During the Workshop' guidance is available in section 4.7: Practical Aspects of a Risk Assessment Workshop.

After the Workshop

Once the risk results are collected, three key steps should be completed. Each step is described in further detail throughout this guideline. The three steps, and where you can find more information, are:

1. Risk evaluation (Part 5)
2. Risk treatment (Part 6)
3. Monitoring and review (Part 7).

Toolbox

A series of tools are available to assist with the process and can be found on the [State Emergency Management Committee](#) (SEMC) website. The online Toolbox includes materials, presentations, templates, hazard videos, the Western Australian Risk Register Tool, criteria tables and more to help throughout the ERM process.



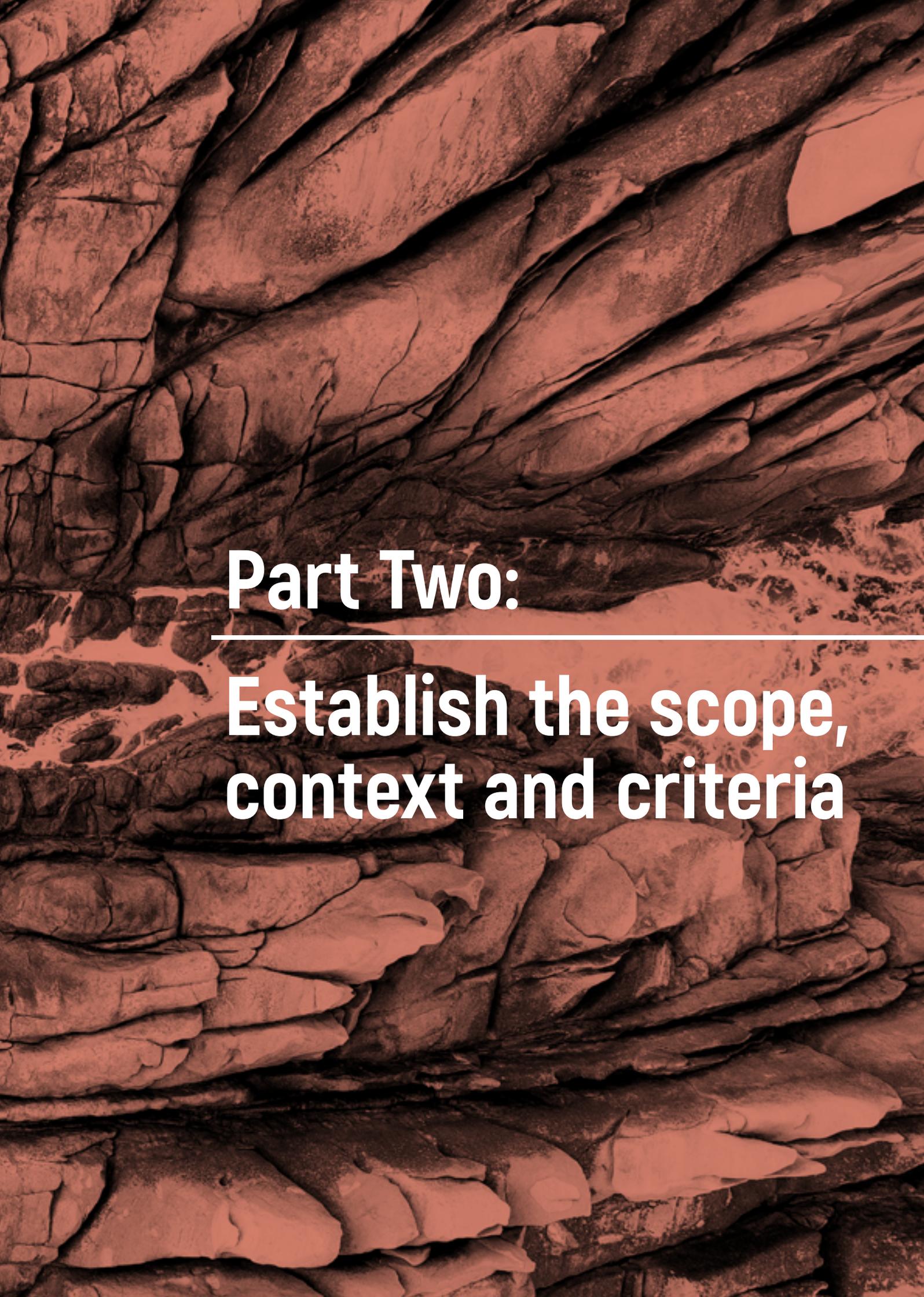
Where an item in the Toolbox is available to assist, you will see a toolbox symbol.

Appendix C provides a full list all of the tools and materials and describes what they might be used for.

Document Outputs

On completion of a risk assessment, a risk register compliant with this guideline should be produced. This can be completed using the WA Risk Register Tool available for download in the [online Toolbox](#).





Part Two:

**Establish the scope,
context and criteria**

Establishing the scope, context and criteria is the first phase of the ERM process (Figure 4) and is fundamental to allow stakeholders to agree on a common understanding of objectives and the scope within which they will operate. This includes identifying important and vulnerable elements that may influence the risk assessment and creating a project plan, which is explained below.

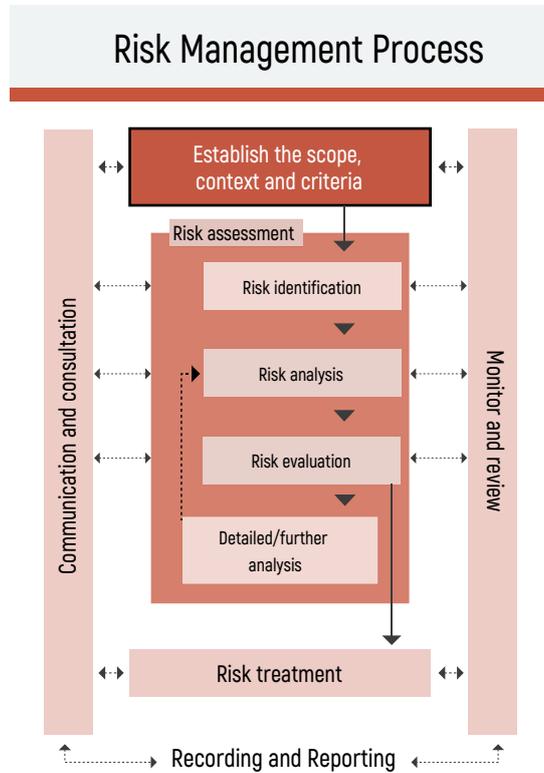


Figure 4: The first phase of the Emergency Risk Management Process is to establish the scope, context and criteria

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2.1 Identifying Important and Vulnerable Elements in the Community

To help set the context, it is essential to identify elements that could be vulnerable to impacts by hazards. These elements can be divided into five key areas: people, economy, public administration, social setting and environment. These same areas are also the focus of the risk assessment process and are included in the WA State Core Objectives. Table 1 includes some elements/aspects that you may want to consider when establishing the context.

You should also consider other aspects that may fall outside of these areas such as single points of failure or reliance on infrastructure and services outside of your control etc.

Table 1: Elements to Consider when Establishing the Context, Described Under the Five key Impact Areas

Impact Area	Elements to Consider
People	<ul style="list-style-type: none"> population (including seasonal populations) location of people demographics at risk populations (elderly, children, people with disabilities)
Economy	<ul style="list-style-type: none"> important industries local businesses transport networks utilities infrastructure shopping centres tourism
Public Administration	<ul style="list-style-type: none"> emergency services government services non-government services utility providers service providers
Social Setting	<ul style="list-style-type: none"> schools/educational facilities hospitals and health centres aged care facilities community centres heritage buildings
Environment	<ul style="list-style-type: none"> flora fauna conservation areas bodies of water areas highly valued by the community

2.2 Project Plan

A project plan is helpful to assist in structuring the project and ensuring everyone involved understands their roles and responsibilities.

The main features to be included in the project plan are as follows.

Project Objectives and Scope

The most important objective should be to improve community safety and wellbeing. Another objective of the ERM process could be to fulfil the requirements in State Emergency Management Policy section 3. An example objective could be 'to conduct a risk assessment for [the area of interest], following this guideline for [the chosen priority hazards] considering impacts to people, economy, public administration, environment and social setting'.

The scope of the project describes what will be included and excluded from the assessment. Using the example above, the scope would be limited to looking at:

- the risks in the area of interest
- five hazards
- how these hazards impact the five impact areas. You may also want to consider organisational parameters.

Working Team

Work that needs to be carried out is outlined in the following parts and includes:

- developing the hazard scenario(s) and risk statements (Part 3)
- conducting the risk analysis (Part 4)
- analysing the results (Part 5)
- reporting (Part 7).

You will need to determine who will undertake this – whether one person does all the work or if multiple people contribute. For instance, it is recommended that two people run a risk assessment workshop i.e. one facilitator and one data entry person, who will enter the data into the WA Risk Register Tool available for download in the [online Toolbox](#).



Timeframe and Communication Strategy

Develop a realistic timeframe to undertake all aspects of the ERM process and decide when the risk assessment workshops will take place. For example, workshops could be run in one block, once every month or once every quarter.

Communication is vital throughout the ERM process to ensure everyone involved is kept well informed and invited to contribute during each stage of the process. It can be extremely beneficial to leverage off existing communication pathways within your own organisation.

Within the communication strategy determine how it will take place and how frequently it will occur. You could also consider how you will distribute and communicate the findings of the risk assessment once complete.

Identify Key Stakeholders

Establish who your key stakeholders are and ensure they are involved and informed throughout the process. Key stakeholders can be those who:

1. may be affected by the impacts of an emergency event
2. may contribute specialist knowledge to the process
3. have jurisdictional authority for the specific hazards and/or elements at risk.

Stakeholders that you may consider inviting to the risk assessment workshop, depending on services located within the scope of your assessment, could include:

Government departments/Statutory authorities:

- Department of Communities
- Department of the Premier and Cabinet
- Department of Education
- Department of Fire and Emergency Services
- Department of Health (WA Country Health Services)
- Department of Biodiversity, Conservation and Attractions
- local government
- Regional Development Commissions
- St John Ambulance WA
- State Emergency Services
- Western Australia Police Force (WA Police Force).

Utility providers:

- communications (e.g. Telstra, Vodafone, Optus, etc)
- gas (e.g. ATCO, Alinta)
- Main Roads WA
- power (e.g. Western Power, Horizon Power)
- water (e.g. Water Corporation).

Social service providers/community:

- Aboriginal communities
- Culturally and Linguistically Diverse (CaLD) communities
- representation for at-risk persons (e.g. aged-care and disability services)
- social service providers (e.g. Silver Chain, Meals-on-Wheels)
- volunteer organisations.

Other entities:

- airports
- corrective services institutions
- industry (e.g. mining, oil, gas, tourism etc.)
- universities or colleges.

The importance of involving executive / senior management in the project cannot be underestimated. They will be the ones who commit resources on behalf of the organisation in relation to what to treat and when, so it is vital they understand where the information is coming from.



Part Three:

Risk Identification

3.1 Hazards and Scenarios

Risk occurs where a hazard (e.g. bushfire or cyclone) impacts vulnerable elements of the community, creating an emergency event. The aim of risk identification is to generate a comprehensive list of risks based on the sources of risk (hazard) and their potential consequences (Figure 5).

In the next two sections you will identify the risks relevant to your area by:

- describing in detail the hazards that could affect your area of assessment (hazard scenarios)
- considering elements that could be impacted by those hazards (risk statements).

It is important to consider both existing and new risks that may present in the future.

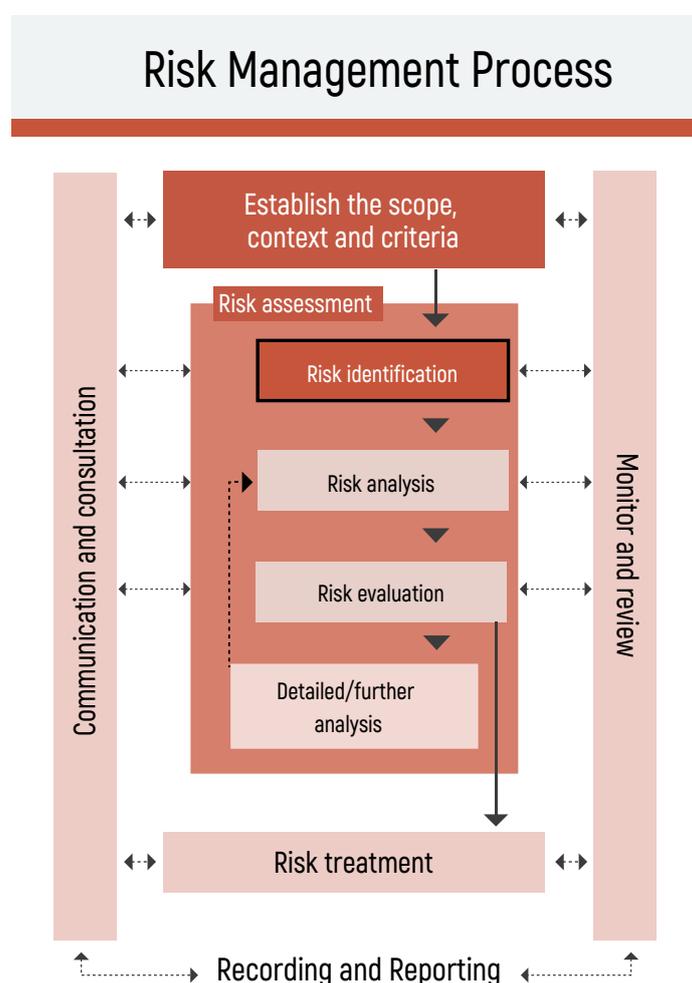


Figure 5: Risk identification phase of the Emergency Risk Management Process

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3.1.1 Hazard Identification

Identify all hazards that could impact elements within your area of interest using available sources of information. To assist in this, the list of 28 hazards with a designated Hazard Management Agency prescribed in Western Australian emergency management legislation can be found on the [SEMC website](#). While there may be other hazardous events that could occur in your area of interest, it is recommended that the risk assessment process should be confined to the following prescribed hazards:

Table 2: Prescribed Hazards and Hazard Management Agencies

Hazard	Hazard Management Agency
Air Crash	Commissioner of Police
Animal or plant, pests or diseases	Agriculture Director General
Injury or threat to life of persons trapped by the collapse of a structure or landform (collapse)	Fire and Emergency Services Commissioner
Cyclone	Fire and Emergency Services Commissioner
Earthquake	Fire and Emergency Services Commissioner
Loss of or interruption to the supply of electricity that is capable of causing or resulting in loss of life, prejudice to the safety, or harm to the health, of a person (electricity supply disruption)	Coordinator of Energy
Fire	Fire and Emergency Services Commissioner
Flood	Fire and Emergency Services Commissioner
Loss of or interruption to the supply of natural gas, that is capable of causing or resulting in loss of life, prejudice to the safety, or harm to the health, of a person (gas supply disruption)	Coordinator of Energy
Actual or impending spillage, release or escape of a biological, substance that is capable of causing loss of life, injury to a person or damage to the health of a person, property or the environment	Chief Executive Officer, Department of Health

Hazard	Hazard Management Agency
Actual or impending spillage, release or escape of a chemical, radiological or other substance that is capable of causing loss of life, injury to a person or damage to the health of a person, property or the environment	Fire and Emergency Services Commissioner
Heatwave	Chief Executive Office, Department of Health
Hostile Act	Commissioner of Police
Human Epidemic	Chief Executive Office, Department of Health
Land search – for persons lost or in distress, that requires a significant coordination of search operations	Commissioner of Police
Loss of or interruption to the supply of liquid fuel as defined in the Liquid Fuel Emergency Act 1984 (Commonwealth) section 3(1), that is capable of causing or resulting in loss of life, prejudice to the safety, or harm to the health, of a person (liquid fuel supply disruption)	Coordinator of Energy
Actual or impending spillage, release or escape of oil or an oily mixture that is capable of causing loss of life, injury to a person or damage to the health of a person, property or the environment (marine oil pollution)	Chief Executive Officer, Department of Transport
<p>Marine search - for persons lost or in distress in waters or on a vessel on waters.</p> <p>Waters are defined as:</p> <ul style="list-style-type: none"> • State waters • the area of a port that is defined in the <i>Shipping and Pilotage Act 1967</i> section 3 • the area described in relation to a port by order under the <i>Port Authorities Act 1999</i> section 24. 	Commissioner of Police

Hazard	Hazard Management Agency
<p>Actual or impending event involving a vessel (including a collision, a stranding or an incident of navigation that is capable of causing or resulting in:</p> <ul style="list-style-type: none"> · material damage to the vessel or another vessel · loss of life, injury to a person or damage to the health of a person, property or environment or · a hazard to the navigation of other vessels (marine transport emergency). 	<p>Chief Executive Officer, Department of Transport</p>
<p>Radiation escape from nuclear powered warship</p>	<p>Commissioner of Police</p>
<p>Rail crash - Public Transport Authority Network</p>	<p>Public Transport Authority</p>
<p>Rail crash - Arc Infrastructure Network</p>	<p>Arc Infrastructure Pty Ltd</p>
<p>Road crash</p>	<p>Commissioner of Police</p>
<p>Storm</p>	<p>Fire and Emergency Services Commissioner</p>
<p>Space Debris Re-entry</p>	<p>Commissioner of Police</p>
<p>Terrorist Act - as defined in the <i>Criminal Code</i> section 100.1 set out in the Schedule to the <i>Criminal Code Act 1995</i> (Commonwealth)</p>	<p>Commissioner of Police</p>
<p>Tsunami</p>	<p>Fire and Emergency Services Commissioner</p>

The agencies supporting the HMA should be the starting point for contacting subject matter experts for further information. The latest State Hazard Plans (formerly called Westplans) can be found online at Emergency management plans (www.wa.gov.au).

When choosing your hazards, consideration should be given to the overall risk of a hazard. This means the potential consequences of a hazard should be considered as well as its likelihood.

Risk = Consequence x Likelihood

It is important to consider the full range of potential impacts from a hazard. The risk assessment process divides these impacts into five impact areas (Table 2). Different hazards will impact each area to varying degrees. For example, a storm is likely to have a significant impact on the economy but may have little impact on the environment, while a HAZMAT incident may have a greater impact on the environment than the economy.

In addition, consider the amount of time required to undertake the risk assessment process. While it may be desirable to understand the risks posed by all hazards present in the area, it may be impractical to assess them all. For this reason, it is suggested that you consider priority hazards in your area which are likely to pose the maximum risk (consequence and likelihood).

Table 3: Five Impact Areas of Risk Assessment

Impact Area	Impact to Consider in Risk Assessment
People	Impacts on the physical health of individuals.
Economy	Impacts to the economy, the governing bodies and industry sectors.
Public Administration	Impacts of the emergency on the governing body's ability to govern.
Social Setting	Impacts on the whole community, its daily functioning and social aspects such as culture and community resilience.
Environment	Impacts on the ecosystem of the area, including flora and fauna.

3.1.2 Scenario Development

In WA, experience has shown that using hazard scenarios is most effective. Now that you have chosen the hazards you will assess, you will need to develop scenarios for each hazard. Hazard scenarios are used in the risk assessment process to ensure all workshop participants have a common understanding of the potential impacts. As there are a multitude of events that could occur, a scenario is very useful to keep the discussion and participants focused, and on the same page. A **credible worst-case scenario** should be used to keep your assessments consistent and, more importantly, because any planning and risk reduction activities undertaken for the largest event will more than likely address issues that arise from smaller, more frequent events.

The key aspects of a scenario are:

- an event large enough to require a multi-agency response
- a timeline of events
- specified time of day and year (which may affect those exposed and resource availability)

3.0 | RISK IDENTIFICATION

- location of event
- a credible Annual Exceedance Probability (AEP)
- anticipated high level impacts.

In addition to these key aspects, there are a few helpful strategies to consider when developing the scenario. These include:

- considering historical events that have occurred in the area of interest
- considering historical events that have occurred with the State and adapting them to your area of interest
- using the consequence table (Table 5) tailored to the population and gross area product of the area of interest and producing an event that may have catastrophic consequences across a few (or all) of the five consequence areas.

A consequence table that can be tailored to your area of interest can be found in the online Toolbox.

A hazard scenario template is available in the online toolbox to assist in developing scenarios. Scenarios should be developed in conjunction with experts and stakeholders who understand the hazard(s) whenever possible. Individuals representing the HMA, critical infrastructure providers, health services and local government can be helpful.

Examples of scenarios created for the State Risk Project district risk assessments are also available in the online toolbox. These can be used for reference to assist you in scenario development. An additional benefit of developing scenarios is that they can be used for future exercises and other activities.



A scenario presentation should be created to give workshop participants a timeline of events. You can include these slides in the main workshop presentation (template in the online toolbox)

3.1.3 Determining the Scenario Probability

A key aspect of developing a scenario and assessing risk is determining the probability of the scenario occurring. For example, bushfires occur every year, but how often does one of this scale occur? Also, to properly compare the risks of different hazards, the probability of each event needs to be known. For instance, an earthquake may be very damaging but is unlikely to occur very often (0.005% chance per year); while a serious bushfire may occur more often (2% chance per year).

What is AEP?

The probability is best described using the annual exceedance probability (AEP). The AEP is the probability of the scenario occurring in any given year. The AEP can be difficult to determine and is typically determined by comparison to other similar hazard occurrences, scientific research or by expert judgment based on scientific knowledge. It is written as a percentage, e.g. a 1% chance of occurrence in any given year.

You may be familiar with looking at the scenario probability as the Average Recurrence Interval (ARI) - the average period of time (in years) between the occurrence of events of the same size. The ARI can be converted to an AEP using the WA Risk Register Tool.

If looking at more than one scenario (e.g. flood and bushfire), you will need an AEP for each. Also remember to consider how often a scenario of that size happens (i.e. not just bushfires or floods in general).

3.1.4 Outputs

The outputs from this section should be a detailed description of the hazard scenario and determination of the AEP from the scenario.

3.2 Risk Statements

Risk statements are single sentences that detail the relationship between the hazard scenario and its potential consequences. They should be written for each of the five impact areas (economy, people, public administration, social setting and environment) for each scenario.

These risk statements will be assessed in the workshops and should be written so that they are able to be assessed by the risk criteria in the consequence table (Table 5). It would be useful to familiarise yourself with the consequence table before writing the statements.

3.2.1 Risk Statement Tree

A risk tree can be created to help identify different aspects that may be impacted by an emergency event and the impact area within which they sit. Figure 6 includes some examples. You may want to use the elements you identified in section 2.1 to assist with this.

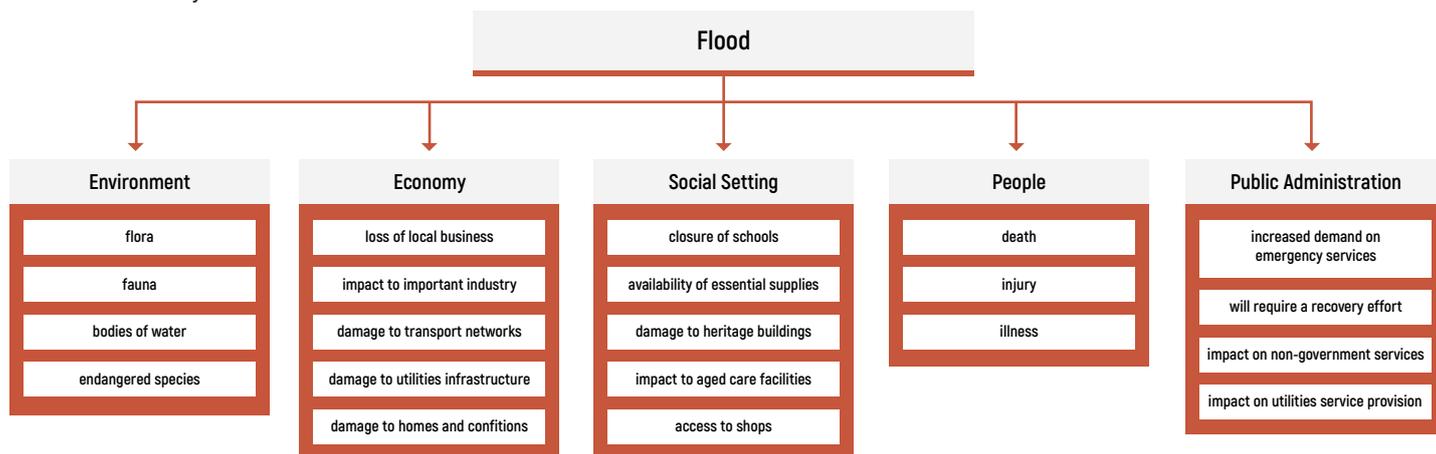


Figure 6: Fictional example of a risk statement tree used to identify vulnerable aspects that may be impacted by an emergency event.

Note: Print on A3 to pass print accessibility.

3.2.2 Risk Statement Structure

You will need to write a risk statement for each impact identified in your risk statement tree. Each risk statement should outline:

- the hazard
- the hazard's action (e.g. will disrupt, damage, impact etc.)
- an area of interest
- consequences which may result – ensure these can be assessed by the consequence table criteria.

The general structure for a risk statement, and examples of risk statements are illustrated below. In addition, a generic risk statement database is available in the online Toolbox which provides statements that can be adapted to your specific scenario and risk assessment.



Ensure the meaning of a risk statement is not ambiguous. More specific statements will also help when it comes to looking at potential treatments.

A template to put your risk statements in for your participants is available in the online Toolbox. These will need to be entered into the WA Risk Register Tool prior to your workshop.

General structure of a risk statement:

A [*hazard e.g. bushfire, flood, storm, outbreak of disease*] will [*area of interest and consequence/recommended ending*]

Examples:

- **Economy:** A storm will cause damage to bridges and approaches to bridges, resulting in repair costs.
- **Public Administration:** A bushfire will affect power infrastructure, impacting service delivery.
- **Social Setting:** A flood will impact the availability of essential commercial products.
- **People:** An outbreak of disease will result in deaths.
- **Environment:** A marine oil pollution event will cause pollutants to enter marine environments impacting marine ecology.

3.2.3 Review Current Controls

For each risk statement requiring treatment, list the controls already in place that are intended to mitigate the risk by reducing the likelihood and/or consequence. It will give you an understanding of what is already being done and provide a basis for generating control improvements.

A review will work best if you have knowledge and experience with the current controls. Input from representatives across your different business areas may also be valuable. Discussions with relevant government agencies may complete your understanding of current controls.

3.2.4 Frequently Asked Questions

How many risk statements should be assessed for each hazard?

There should be as many statements as necessary to cover the possible consequences; however, it is recommended that at least 20 statements and no more than 50 statements per hazard scenario is best.

Does there need to be an equal number of risk statements for each impact area?

Not necessarily, as long as you ensure that you have thought about potential consequences in all areas. It is likely that you will have more risk statements in some areas than others, depending on the hazard.

Where does mental health sit?

The effects on mental health are often hard to capture. It is recommended that a serious mental health issue requiring medical intervention that is a direct result of the emergency event is considered as an injury/illness. It can be assessed within the people impact area using the descriptors provided and should be based on the level of medical treatment required. For broader community psychosocial impacts, a statement in the social setting impact area is recommended. It can be assessed under community wellbeing, as to whether the community has current resources support itself, or if external services (e.g. counselling from outside of your area of interest) are required.

Can statements be added during the workshop?

Yes. If something comes up during the workshop that does not relate to a specific risk statement, a new risk statement can be added. This often happens, as those with the expertise at the workshop may identify things that you may not have thought about beforehand.

Can statements be split during the workshop?

Yes. If a risk statement is not specific enough, or you find it covers more than can be assessed, you can split the risk statement up and create new ones during the workshop.

Why do statements say 'will' impact?

The risk statement is written as if the scenario is taking place. You would assign a consequence as if the risk statement is happening (e.g. the school flooding will have a 'major' consequence). The likelihood is then used to assess whether it will flood or not in the scenario (e.g. the school being damaged by a flood will have a 'major' consequence, but the likelihood of the school being damaged to this consequence level in this scenario is 40%).

What do response and recovery risk statements cover?

These statements cover any activity that requires response or recovery and are as a direct result of the scenario. There is no timeline on this; all activities undertaken – whether they take one month or two years – should be included. These activities typically do not include repair cost (e.g. roads) as these are covered under a 'road' risk statement; but rather programs or additional work hours that result from the event.

What does public administration include?

Public administration can include any governing body, whether this is a government service, non government service, utility provider or health service etc. It refers to whoever would govern the activity/activities that you are describing.

Where does infrastructure fit in?

Infrastructure can fit into the economy and public administration areas. If you are looking at the dollar value of losing or damaging the infrastructure, you would write a risk statement in economy. If you are looking at the impact to the services provided, you would write a risk statement in public administration.

When looking at the impacts to power infrastructure you could write two separate risk statements:

- **Economy** – A storm will impact power infrastructure, incurring costs; e.g. how much will it cost to repair and how much money may be lost as a result of this impact?
- **Public administration** – A storm will impact power infrastructure, impacting the ability to maintain core services; e.g. if power infrastructure is impacted, how might this affect the power company's ability to supply its services to the community?

What are essential supplies?

Essential supplies cover physiological necessities, including water, basic food items (e.g. milk and bread), pharmaceutical medicines, toiletries and fuel.

What are basic commercial products?

Basic commercial products include non-essential items that can be found in supermarkets and retail outlets.

3.1.5 Outputs

The output from this section should be a list of risk statements for each hazard being assessed.



Part Four:

Risk Analysis

Risk analysis is the 'systematic process to understand the nature of and to deduce the level of risk (Figure 7). The risk statements identified in section 3.2 can now be analysed by determining their consequence and the likelihood of that consequence.

The chosen consequence and likelihood levels are used to assign a risk level using the risk matrix (Table 10).

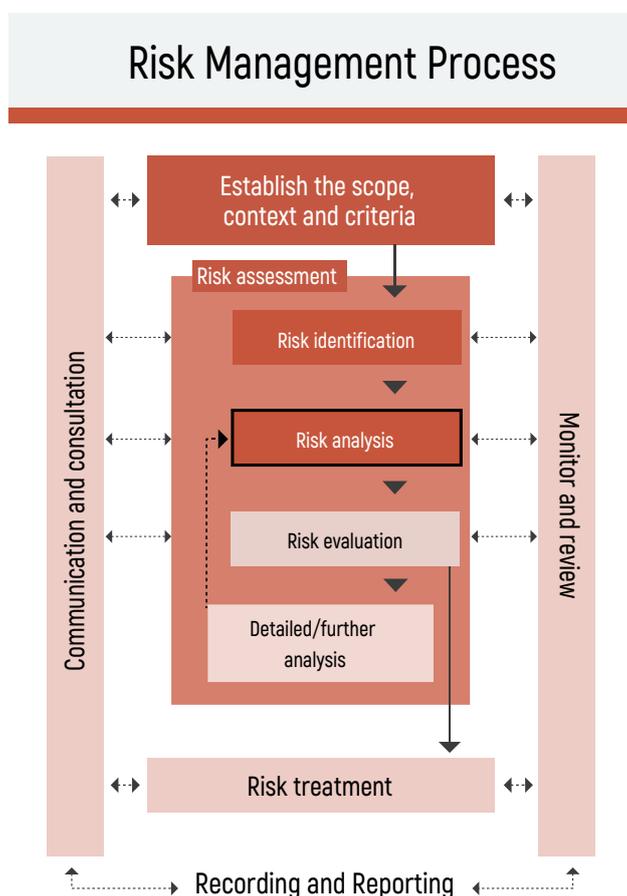


Figure 7: Risk analysis phase of the Emergency Risk Management Process

Note: Print on A3 to pass print accessibility.

The six steps to be completed for each hazard statement when assessing risk statements for a hazard scenario are:

1. assess current controls
2. assign a consequence level
3. assign a likelihood level
4. assign a confidence level
5. risk level calculation
6. priority level calculation.

Steps 1 to 4 should be completed in a risk assessment workshop. Once these steps are completed, steps 5 and 6 are automatically completed for you by the WA Risk Register Tool. The six steps are detailed below, followed by a description of the practical aspects of a risk assessment workshop.

4.1 Assess Current Controls

For each risk statement, conduct an assessment of current controls. Controls can include approaches that: avoid the risk (e.g. land-use planning to move vulnerable elements away from risks)

- remove the risk source (e.g. stabilise steep cliffs to remove landslide risk sources)
- modify the consequence (e.g. strengthen buildings to minimise hazard impacts)
- modify the likelihood of the risk (e.g. road safety improvements to minimise road crash likelihood)
- retain the risk by informed decision (e.g. public education about the risks)
- share the risk (e.g. insurance).

As shown in the below table, these controls can be considered with regard to their strength and/or expediency. Control strength refers to the ability of the control, or group of controls, to achieve its objective. Control expediency refers to the ability of the control to be used/deployed readily and the controls acceptability to stakeholders.

Table 4: Qualitative descriptors of control strength and expediency

Level	Control Strength	Control Expediency
High	Control is highly effective in reducing the level of risk	The control is frequently applied. A procedure to apply the control is well understood and resourced. The cost of applying the control is within current resources and budgets.
Medium	Control is effective in reducing the level of risk	The control is infrequently applied and is outside of the operators' everyday experience. The use of the control has been foreseen and plans for its application have been prepared and tested. Some extraordinary cost may be required to apply the control.
Low	Control has some effect in reducing the level of risk	The control is applied rarely and operators may not have experience using it. The use of the control may have been foreseen and plans for its application may have been considered, but it is not part of normal operational protocols and has not been tested. Extraordinary cost is required to apply the control, which may be difficult to obtain.
Very Low	Control has almost no effect in reducing the level of risk	Application of the control is outside of the experience and planning of operators, with no effective procedures or plans for its operation. It has not been foreseen that the control will ever need to be used. The application of the control requires significant cost over and above existing resources, and the cost will mostly likely be objected to by a number of stakeholders.

4.2 Assign a Consequence Level

Determine the consequence of each risk statement using the criteria in the consequence table (Table 5). This table shows how the impacts of an emergency event can be categorised from 'insignificant' to 'catastrophic' according to the five key consequence areas. When assessing the consequence level, it is assumed the scenario **is occurring**.

The consequence table uses scalable descriptions to assess the risk level appropriately. The values in the people and economy consequence area descriptions are based on the population and gross area product of your area of interest. In some cases, where there are small populations, different consequence levels may have the same criteria. For example, for a population of 15,000, the scaled people criteria for the 'minor', 'moderate' and 'major' consequence levels would be the same, 'at least 1 death', because the calculated values are rounded up to the nearest whole number.

In such cases, the highest consequence level should be applied, i.e., major in this example. There are additional notes about some of the terms used in the people (injury) and environment categories in Table 6 and Table 7.

A consequence table that can be adapted to your area of interest can be found in the online Toolbox.

When assigning a consequence level to a risk statement during a workshop, it is important that the maximum possible consequence is chosen. This is so any potential treatment strategies consider the highest consequence. For example, while there could be a small chance of a major consequence for a risk statement and a higher chance of a moderate consequence, the higher consequence needs to be chosen. A helpful approach is to begin on the right-hand side of the consequence table (catastrophic level) and work left (decreasing in consequence level) until you find the appropriate consequence.

Aspects to consider when assigning a consequence level are that:

- most impact areas on the consequence table have sub-categories/dot points. When assigning a consequence level only one of these sub-categories needs to be met for that level to be chosen.
- when deciding the consequence, it is important to consider how the existing controls (e.g., fire breaks) may alter the consequences. This is typically done informally during discussions in the workshop.
- the consequence level descriptors are words used to rank the level of consequence and do not necessarily reflect how a community might describe such an event.

Table 5: Consequence Table

Impact Area	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
People	Mortality	Not applicable	At least 1 death in 10,000,000 people	At least 1 death in 1,000,000 people	At least 1 death in 100,000 people	At least 1 death in 10,000 people
People	Injuries/ Illness	1 in 1,000,000 people seriously injured or any minor injuries	1 in 10,000,000 people critically injured with long-term or permanent incapacitation or 1 in 1,000,000 people seriously injured	1 in 1,000,000 people critically injured with long-term or permanent incapacitation or 1 in 100,000 people seriously injured	1 in 100,000 people critically injured with long-term or permanent incapacitation or 1 in 10,000 people seriously injured	1 in 10,000 people critically injured with long-term or permanent incapacitation or 1 in 1000 people seriously injured
Economy	Loss in economic activity and/or asset value	Decline of economic activity and/or loss of asset value less than 0.004% of gross area product	Decline of economic activity and/or loss of asset value greater than 0.004% of gross area product	Decline of economic activity and/or loss of asset value greater than 0.04% of gross area product	Decline of economic activity and/or loss of asset value greater than 0.4% of gross area product	Decline of economic activity and/or loss of asset value greater than 4% of gross area product
Economy	Consequence on important industry	Inconsequential business sector disruption	Significant industry or business sector is impacted by the emergency event, resulting in short-term (i.e., less than one year) profit reductions	Significant industry or business sector is significantly impacted by the emergency event, resulting in medium-term (i.e., more than one year) profit reductions	Significant structural adjustment required by identified industry to respond and recover from emergency event	Failure of a significant industry or sector

Impact Area	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Environment	Loss of species and/or landscapes	No damage to ecosystems at any level	<ul style="list-style-type: none"> Minor damage to ecosystem/species of state significance Significant damage to ecosystem/species of district/local significance 	<ul style="list-style-type: none"> Minor damage to ecosystem/ species of national significance Significant damage to ecosystem/species of state significance Severe damage to ecosystem/ species of district/local significance 	<ul style="list-style-type: none"> Significant damage to ecosystem/species of national significance Severe damage to ecosystem/species of state significance Permanent destruction to ecosystem/species of district/local significance 	Permanent destruction to ecosystem/species of national, State and district/local significance
Environment	Loss of community environmental value	Inconsequential damage to item of interest	Minor damage to item of interest	Significant damage to item of interest	Severe damage to item of interest	Permanent destruction to item of interest

Impact Area	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Public Administration	Governance Functions	Governing bodies' delivery of core functions is unaffected or within normal parameters	Governing bodies encounter limited reduction in delivery of core functions	<ul style="list-style-type: none"> Governing bodies encounter significant reduction in the delivery of core functions Governing bodies are required to divert some available resources to deliver core functions or seek external assistance to deliver some of their core functions 	<ul style="list-style-type: none"> Governing bodies encounter severe reduction in the delivery of core functions Governing bodies are required to divert a significant number of available resources to deliver core functions or seek external assistance to deliver the majority of their core functions 	Governing bodies are unable to deliver their core functions
Social Setting	Community well-being	<ul style="list-style-type: none"> Community social fabric is disrupted Existing resources sufficient to return the community to normal function No permanent dispersal 	<ul style="list-style-type: none"> Community social fabric is damaged Some external resources required to return the community to normal function No permanent dispersal 	<ul style="list-style-type: none"> Community social fabric is damaged Some external resources required to return the community to normal function No permanent dispersal 	<ul style="list-style-type: none"> Community social fabric is broken Significant external resources required to return the community to normal function Some permanent dispersal 	<ul style="list-style-type: none"> Community social fabric is irreparably broken Community ceases to function effectively, breaks down Community disperses in its entirety
Social Setting	Community services	Inconsequential / short term impacts	Isolated / temporary reductions	Ongoing reductions	Reduced quality of life	Community unable to support itself

Injury and illness are the non-lethal damage or harm done to a person's physical or mental capacity due to the emergency. The descriptors of injury and illness are based on the level of medical treatment required (Table 6).

Table 6: Injury and illness scale and definitions.

Injury severity	Description
Fatal	Mortally injured, certain to lead to death regardless of available treatments. Counted among deaths, not injuries.
Critical	Injuries that pose an immediate life-threatening condition if not treated adequately and quickly.
Serious	Injuries requiring a great degree of medical care and use of medical technology such as X-rays or surgery, but not expected to progress to life-threatening status.
Minor	Impacts on the whole community, its daily functioning and social aspects such as culture and community resilience.
Environment	Injuries requiring basic medical aid which would require bandages or observation.

Environmental consequences are measured in terms of the scale of damage and/or intervention required for recovery (Table 7).

Table 7: Environmental damage descriptors

Damage level	Description
Permanent destruction	The permanent loss of a species or ecosystem, or the potential for ongoing impacts leading to permanent loss.
Severe damage	The ecosystem or species requires a major program of interventions and recovery to restore it to health. The asset or species has been or is likely to be permanently altered from its original State by the emergency event.
Significant damage	The ecosystem or species requires a diversion of resources to manage their recovery.
Minor damage	The ecosystem or species is able to recover fully, with minimal or no intervention.

4.3 Assign a Likelihood Level

The likelihood has been divided into two parts to assist workshop participants. They do not need to know how often such a storm occurs, but rather the chance of the impacts. For example, a large storm may occur, but what is the chance that the school will be damaged or the electricity network will be impacted?

The overall likelihood for each risk statement is the combination of the scenario AEP (from section 3.1) and the likelihood of the consequence assigned within the workshop.

Overall likelihood level = probability of event (AEP) x likelihood of consequence (%)¹

For example, if the risk statement has been assessed to have major consequences, you will need to assign the likelihood of a major consequence using a percentage.

Given the assumption that the scenario **is happening**, the likelihood level assigned here (in the workshop) is for the assigned consequence level of the risk statement.

When deciding the likelihood as a percentage, choose along the scale from 0-100% (Table 8) the percentage that best represents the likelihood of that consequence occurring (given the event **is happening**).

For example: 100% would imply that the consequence is going to happen. 50% would imply that the consequence may or may not happen. 5% would imply that consequences could happen but the likelihood of it happening is very low.

Following the group discussion in the workshop, any percentage can be assigned along the scale (e.g., 76%) for the chosen consequence.

If the AEP for the scenario is entered into the WA Risk Register Tool, the overall likelihood calculation is done automatically when you enter the likelihood of the consequence as a percentage. The tool also auto-calculates the appropriate NERAG likelihood term (Table 8), as described in the NERAG 2020, for use in the risk matrix (Table 10).

Table 8: NERAG likelihood term

NERAG likelihood term	Overall likelihood level
Almost certain	63% per year or more
Likely	10 - < 63% per year
Unlikely	1 - < 10% per year
Rare	0.1 - < 1% per year
Very rare	0.01 - < 0.1% per year
Extremely rare	< 0.01% per year

Notes

¹ Adapted from National Emergency Risk Assessment Guidelines (NERAG) 2020.

4.4 Assign a Confidence Level

The confidence level is used to identify the robustness of the assessment. The confidence level table (Table 9) provides five confidence levels ('lowest' to 'highest') based on supporting evidence, expertise, and participant agreement during the workshop.

You should take the lowest level from one of the three categories when determining the confidence level. For instance, there could be strong agreement amongst participants (highest) but no relevant expertise available (low). So, the confidence level would be 'low'.

Table 9: Confidence level table

Category	Lowest	Low	Moderate	High	Highest
Supporting evidence	<ul style="list-style-type: none"> No historical events No scientific model 	<ul style="list-style-type: none"> Anecdotal information of historical events The scientific model which could be applied with significant modification 	<ul style="list-style-type: none"> Historical event of similar magnitude in a comparable community of interest Relevant scientific model available 	<ul style="list-style-type: none"> Recent historical event of similar magnitude in a directly comparable community of interest Good scientific model available 	<ul style="list-style-type: none"> Recent historical event of similar magnitude to that being assessed in the community of interest Highest quality scientific model
Expertise	No expertise is available	Expertise is available in 1,000,000 people seriously injured	Relevant expertise is used to make decision	Relevant expertise is highly influential in the decision	Relevant and demonstrated expertise available and highly influential in making the decision
Participant agreement	Fundamental disagreement of assessment	Disagreement of major aspects of assessment	Disagreement of minor aspects of assessment	Agreement of assessment	Strong agreement of assessment

4.5 Risk Level

The risk level for each statement is determined by combining the consequence level and the overall likelihood using Table 6. If you have entered the consequence, the likelihood of the consequence (%) and the scenario probability (AEP) into the WA Risk Register Tool, the risk level will be determined automatically

Table 10: Risk matrix

Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic
Almost	Medium	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	Extreme	Extreme
Unlikely	Low	Low	Medium	High	Extreme
Rare	Very low	Low	Medium	High	High
Very Rare	Very low	Very low	Low	Medium	High
Extremely	Very low	Very low	Low	Medium	High

Table Note: Source: Australian Government Attorney-General's Department, accessed under Creative Commons BY license

4.6 Priority Level

A priority level is used to determine the order in which risks should be addressed for treatment. For ease of use, the WA Risk Register Tool automatically determines the priority level (Table 11) for each risk statement once the consequence, likelihood and confidence have been entered. See Appendix B for more information on the calculation of the priority level.

Table 11: Priority levels with suggested actions for each

Priority	General descriptor: action pathway
1	Highest priority for further investigation and/or treatment, and the highest authority relevant to context of risk assessment must be formally informed of risks. Each risk must be examined, and any actions of further investigation and/or risk treatment are to be documented, reported to and approved by that highest authority.
2	High priority for further investigation and/or treatment, and the highest authority relevant to context of risk assessment should be formally informed of risks. Further investigations and treatment plans should be developed.
3	Medium priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.
4	Low priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.
5	Broadly acceptable risk. No action required beyond monitoring of risk level and priority during monitoring and review phase.

Table Note: Adapted from National Emergency Risk Assessment Guidelines (NERAG) 2020.

4.7 Practical Aspects of a Risk Assessment Workshop

How to apply the above information practically in a risk assessment workshop is described below. For further workshop recommendations, please see Appendix C.

Before the workshop

Before a workshop, it is recommended to complete the following:

- Arrange the **workshop logistics** (e.g., venue, catering, timings etc.).
- **Populate your WA Risk Register Tool** with the appropriate information, including the hazard, the AEP of your scenario, the risk statements, and the relevant consequence areas.
- **Populate your risk statements** into the template for all participants.
- Download and tailor your **workshop presentation**:
 - you will need to enter your specific criteria, such as population and gross area product of your area of interest, into the correct slides in the presentation
 - insert your scenario presentation slides where instructed.
- **Print** workshop materials. This could include consequence and confidence tables, risk statements for participants, the agenda and additional handouts (e.g., scenario maps, information etc.).



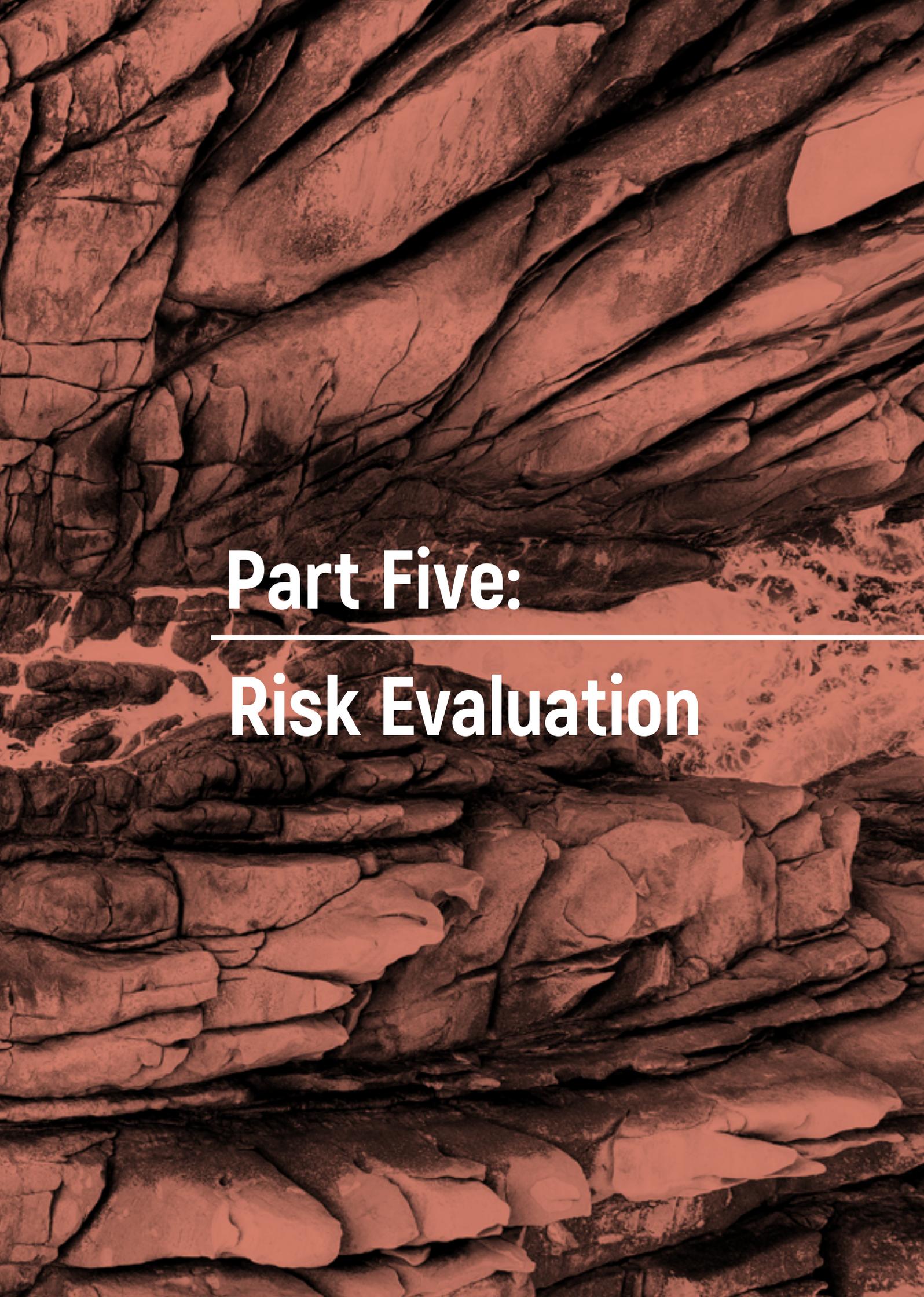
Templates, tools, and a checklist to assist with the above can be found in the [online toolbox](#).

During a workshop

1. **Present your information** about the hazard, vulnerabilities, consequences, and scenario. Appendix C describes this in further detail. Everyone must understand the scenario, as the assessment should be based only on the content of the scenario. This ensures that everyone will be considering the same size event.
2. The facilitator should then present the **risk assessment process** portion of the workshop presentation, which describes how the risk analysis will work. This should include how the consequence, likelihood and confidence levels are chosen.
3. Conduct the **risk analysis**. For each risk statement, facilitate the discussion to assign consequence, likelihood, and confidence levels collectively. Ensure someone is entering this information into the WA Risk Register Tool.

Risk Analysis Tips

- Three minutes per risk statement is recommended; however, the facilitator may find that the first few risk statements can take longer while participants begin to understand the process. The speed of the assessment is likely to pick up over time.
- When assessing the consequence level, ensure participants select a level based on the criteria and not because they feel it should be a particular level. For example, if a risk statement is to be assessed as 'moderate', it must meet at least one of the 'moderate' criteria.
- When assessing the consequence level, ensure participants select the maximum possible consequence and adjust the likelihood as required.
- If you are the facilitator, remember to remain impartial and rely on the expertise of your participants, but do 'challenge' them or ask for their reasoning if you think the assessment may be incorrect. Their final decision is what should be recorded.



Part Five:

Risk Evaluation

Risk evaluation is the process of determining whether a risk and/or its magnitude are acceptable or tolerable. The risk evaluation phase (Figure 8) helps to determine which risks may require further detailed assessment or treatment and prioritises measures to reduce risk levels. This phase will likely need to be undertaken with decision-makers and technical experts.

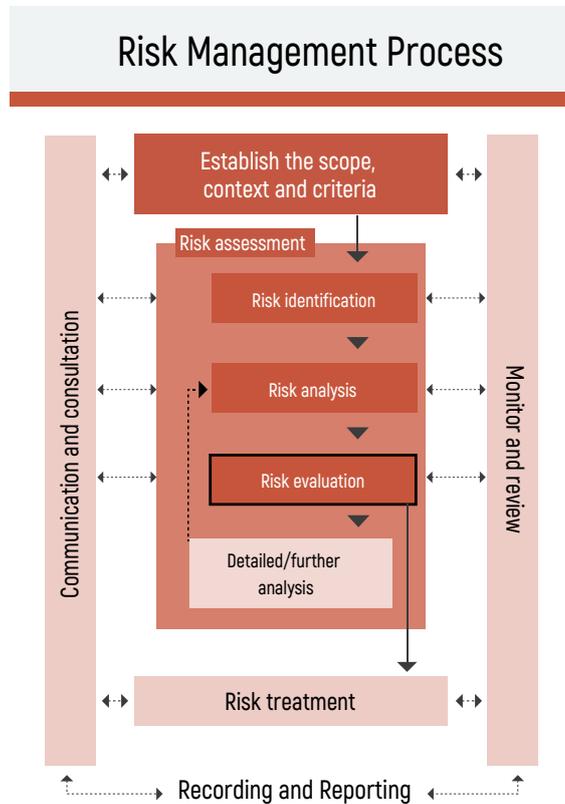


Figure 8: Risk evaluation phase of the Emergency Risk Management process

Note: Print on A3 to pass print accessibility.

5.1 Addressing Priority Risks

This step should be undertaken once all hazards have been assessed. This will allow treatment decisions based on priority level, regardless of the hazard. It also allows for the identification of common risks across multiple hazards. Addressing common risks will have a more significant return on investment than risks resulting from a single hazard.

Consider the following questions when reviewing the risk statements:

- Are there common risk themes across multiple hazards it could be addressed with a single treatment?
- Is the risk so urgent that it must be addressed, and there is no time for further, more detailed assessment?
- Can the confidence level be realistically increased through further research or investigation? (Increasing the confidence level may result in a lower priority level.)

Further analysis should be considered if:

- further analysis will increase the level of confidence
- a proposed treatment can potentially cause adverse consequences, resulting in new risks or exacerbating existing ones.

The points above can be addressed for each risk statement by following the diagram in Figure 9.

At the end of this stage, each evaluated risk is assigned one of the following actions:

- Treat: risk requires treatment (see Part 6)
- Further analysis: risk requires further analysis (see below)
- Monitor: risk requires ongoing monitoring and maintenance of existing controls (see Part 7).

Decisions made during this step should be recorded in the risk register.

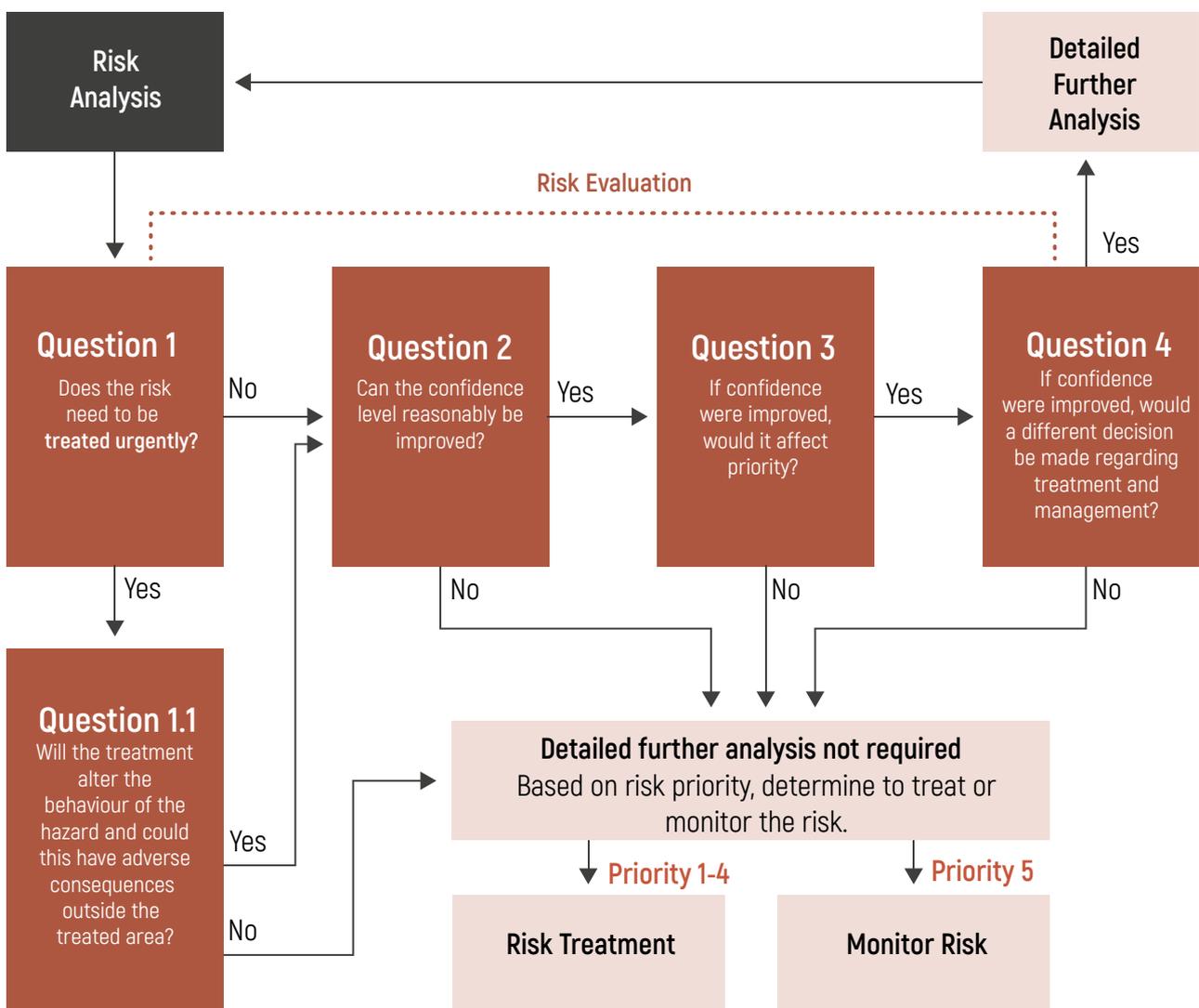


Figure 9: Risk evaluation classification

Note: Print on A3 to pass print accessibility.

The questions used to evaluate the risks are:

Question 1: Does the risk need to be treated urgently? If No, then go to Question Two; if Yes, go to Question 1.1.

Question 1.1 Will the treatment alter the behaviour of the hazard, and could this have adverse consequences outside the treated area? If Yes, go to Question Two. If No, then go to place in Treat or Monitor.

Question 2 Can the confidence level reasonably be improved? If Yes, go to Question Three; if No, place in Treat or Monitor.

Question 3 If confidence were improved, would it affect priority? If yes, go to Question 4; if No, place in Treat or Monitor.

Question 4 If confidence were improved, would a different decision be made regarding treatment and management? If yes, then refer to it for further analysis. If no, then place it in Treat or Monitor.

Detailed/Further Analysis

If it is decided that detailed or further analysis is required, this may involve the following:

- further investigation and research
- beginning a new risk assessment with a more focused context
- using semi-quantitative or quantitative methods (such as analysis of historical impacts or consequences of past emergency events).

The use of semi-quantitative and quantitative methods may be beneficial if potential treatments are either expensive or will have a widespread consequence on the community.

Update Risk Register

Risk statements that require further analysis should have their consequence, likelihood and confidence levels reassessed based on the updated information. Any change in these levels should be noted in the risk register, along with detailed reasons for the change. At this point, these risk statements should be assigned either the treat or monitor actions within the risk register.



Part Six:

Risk Treatment

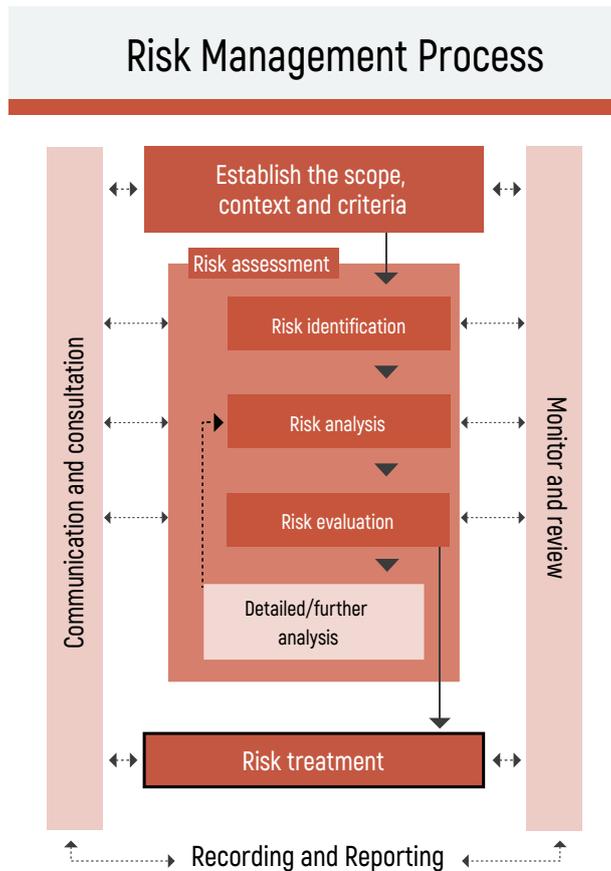


Figure 10 : Risk treatment phase of the Emergency Risk Management Process

Note: print on A3 to pass print accessibility

The risk treatment phase (Figure 10) aims ‘to determine and implement the most appropriate action(s) in response to the identified need to treat risks’.² A risk treatment can either remove the cause of the risk or implement/improve controls to reduce the level of risk.

Who Should Treat the Risk?

Depending on the type of risk identified, it is likely it will fall into one of the following categories:

- Those which are the responsibility of your organisation and are within its capacity to treat.
- Those which are the responsibility of your organisation but are beyond its current capacity to treat.
- Those which are the responsibility of external organisations.

Where your organisation can address the risk, treatment options should be considered. The steps for identifying and evaluating treatment options are set out in the following sections.

Where the responsibility for a risk belongs to another organisation or is beyond the capacity of your organisation to manage, the risk should be discussed with the appropriate personnel/organisations.

Notes

² Source: Australian Government Attorney-General's Department, accessed under Creative Commons BY licence.

6.1 Identify Treatment Options

The identification of treatment options may be undertaken in various ways and may depend on the type of risk and the organisations involved in its management. Treatment options can reduce the risk by preventing, preparing, or responding to the risk. A treatment may also involve taking steps to aid recovery.

Examples of treatments (not exhaustive) available under each approach include:

- **Prevention:** Prescribed burning, land-use planning, education.
- **Preparedness:** Warnings, exercising and training, community action.
- **Response:** Firefighting, community safety, rescue.
- **Recovery:** Restoration activities across social, economic and built environments.

Before deciding to undertake a treatment option, it is important to fully understand the benefits, costs and any potential adverse impacts. This can be done by considering each treatment option against the following factors:

- **Timing** – Will the benefits be quickly realised?
- **Leverage** – Will this option lead to further risk-reducing actions by others?
- **Administrative efficiency** – Can it be easily administered or will its application be neglected due to difficulty or lack of expertise?
- **Continuity** – Will the effects be continuous or short-term? If continuous, will it be sustainable over time?
- **Compatibility** – How compatible is this option with others that may be adopted?
- **Cost** – Is this option affordable? Is it the most cost-effective? Is it capital and/or recurrent?
- **Effects on society** – What will economic, social, people, public administration, and environmental impact be?
- **Risk creation** – Will this option introduce new risks?
- **Equity** – Who pays for the risk reduction? When the risk is not a result of people's decisions, is the cost fairly distributed?
- **Risk reduction potential** – What proportion of the losses from this risk will it prevent?
- **Public reaction** – Are there likely to be adverse reactions to its implementation?

A treatment plan should be developed for each treatment option considering the components below.

- **Benefits:** Anticipated benefits from treatment actions
- **Resources:** List all resources required for the effective implementation of the treatment options.
- **Performance:** Detail how performance will be measured.
- **Timeframe:** Provide a detailed timeline for implementation, including deadlines.
- **Review:** Document the required frequency of review.
- **Actions:** Describe in detail the treatment action.

- **Justification:** Describe why the selected treatment option was considered.
- **Responsibilities:** Define the responsibilities of all individuals and organisations involved in treatment.

Treatment(s) plans should be formulated following your standard organisational processes. This information should be entered into the WA Risk Register Tool detailing any further actions to be taken.

Government agencies undertaking risk analysis must be mindful of any state or national requirements which may impact treatment options such as regulation.



Part Seven:

**Monitoring and
review**

Continuous monitoring and review of the risk(s) is an essential component in the ERM process which feeds into each step along the way (Figure 11). It allows for any changes in circumstances to be updated, new risks to be identified, and the effectiveness of controls and treatments to be evaluated.

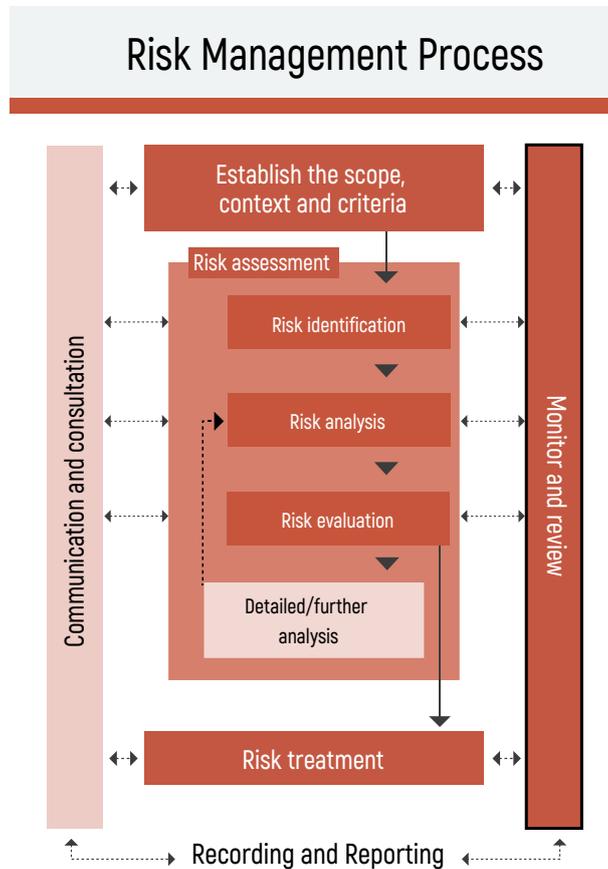


Figure 11: Monitor and Review Phase of the Emergency Risk Management Process

Note: Print on A3 to pass print accessibility.

Monitoring should be ongoing, with regular updates provided to appropriate personnel within your organisation. This ongoing monitoring should capture any changes in circumstance and track how treatment strategies (once identified) progress.

A full review of risks should be conducted if there are significant changes in the circumstances within the area of interest.

A full review of risks should be conducted if there are significant changes in the circumstances of the hazards.

It is recommended that risks are assessed every five years

Three areas that should be monitored and reviewed are the scope, the risk and the risk treatment strategies.

7.1 The Scope

Identify any changes in circumstance that may alter any part of the project scope (Part 2). Consider changes to any aspect of the five consequence areas (economy, people, public administration, social setting, and environment), regardless of how small these may be. Priorities and perceptions of risk can change over time.

Some examples of changes you may wish to consider are shown in Table 12. Please note this is not an exhaustive list.

Table 12: Examples of factors in each consequence area that may change over time

Consequence area	Factors that may change
Economy	<ul style="list-style-type: none"> Local economy Predominant industry Tourism Commercial/residential development Infrastructure development Changes to transport networks
People	<ul style="list-style-type: none"> Population Movement of population Demographics
Public administration	<ul style="list-style-type: none"> Capability of the governing bodies Location of government services/offices
Social setting	<ul style="list-style-type: none"> Resilience of the community Community health services (e.g., GP) Facilities for vulnerable people Community services
Environment	<ul style="list-style-type: none"> Conservation areas Ecologically sensitive areas Environmental value assigned National parks

7.2 The Risks

It is necessary to re-evaluate hazard(s) changes and their associated risk(s) and ensure that the most up-to-date information is used. It would be best if you considered changes in:

- the frequency of the hazard
- the scale of the hazard
- the likelihood of the hazard
- the exposure to the hazard
- the vulnerability of infrastructure and the population to the hazard
- climate change.

It is important to review hazards and risks after an emergency, as information from these events can improve your understanding of risks and improve treatment strategies.

7.3 The Risk Treatment Strategies

It is essential to continuously monitor and review the current agreed risk treatment strategies and their effectiveness. In addition, it is vital to ensure that identified controls are operating efficiently and identify any changes that may have occurred or are anticipated.

Any identified changes in circumstance may impact risk treatment decisions. Therefore, if risk identification, analysis and/or evaluation are re-visited, risk treatments may also need to be modified.

Record All Results and Modifications

All changes in circumstance and/or any modifications should be documented in the WA Risk Register Tool. This ensures that all stakeholders are aware of any changes, which can be accounted for in future reviews.



Appendices

Appendix A: Glossary

Table 9: Terms used throughout the suite of State emergency management documents have the meanings given in section 3 of the *Emergency Management Act 2005*, the State Emergency Management Glossary or the list of definitions in the State EM Policy or the State EM Plan, as applicable. Specific definitions relevant to this guideline are listed below.

Table 13: State Emergency Management Definitions

Term	Definition
Annual exceedance probability (AEP)	The probability of an emergency event of a given size or larger occurring each year, expressed as a percentage.
AS/NZS ISO 31000:2018	International standard for risk management which forms the basis of the ERM process.
Confidence	The trustworthiness or reliability of the evidence that supports risk assessments.
Control	A measure that modifies risk. This may be an existing process, policy, device, practice or other action that acts to minimise negative risk or enhance positive opportunities.
Elements at risk	Components of the five consequence areas which may be at risk from hazards.
Frequency	A measure of likelihood expressed as the number of occurrences of an event in a given time.
Loss	Any negative consequence or adverse effect, financial or otherwise.
Monitoring	To check, supervise, observe critically, or record the progress of an activity, action or system on a regular basis in order to identify change.
Organisation	Group of people and facilities with an arrangement of responsibilities, authorities, and relationships.

Term	Definition
Residual risk	Risk remaining after risk treatment. Following implementation of risk treatment, residual risk can also be referred to as retained risk.
Risk register	A document usually presented in a tabular form which lists the following information concisely for each risk: The risk statement, source, hazard, consequence area, prevention/preparedness controls, recovery/ response controls, level of existing controls, likelihood level, risk level, confidence level, treatment strategy.
Risk source	An element which, alone or in combination, has the intrinsic potential to give rise to risk.
Stakeholders	A person, group of people or organisation that can affect, be affected by, or perceive themselves to be affected by a decision or activity.
Susceptibility	The potential to be affected by loss.

Appendix B: References

1. [State Emergency Management Policy](#)
2. [State Emergency Management Procedures](#)
3. United Nations International Strategy for Disaster Reduction (UNISDR) (2009). Terminology on Disaster Risk Reduction, United Nations, Geneva, Switzerland. Available from: http://www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf
4. Australian/New Zealand Standard (2018). AS/NZS ISO 31000 Risk management – Principles and guidelines. Reproduced under the SAI Global copyright License 1411- c083.
5. Australian Government Attorney-General's Department (2020). National Emergency Risk Assessment Guidelines (NERAG) Handbook 10. Accessed under Creative Commons BY licence, licence conditions at www.creativecommons.org.au.

Appendix C Toolbox

Below is a full list of all the tools and templates available on the [SEMC website](#) which you can use to assist you with your risk assessment process.

Table 14: Tools available to assist with risk assessment process

Name	Description	More information
WA Risk Register Tool	An Excel spreadsheet where you can input your data throughout the ERM process. This is your Risk Register and will do all mathematical calculations for you, including the assignment of risk levels.	Visit the online toolbox
Tailored consequence table (includes confidence table)	After entering your population and gross area product for your area of interest, this Excel tool will generate a consequence table that is specifically tailored to your area of interest.	Section 4.2 Assign a Consequence Level
Workshop presentation	This workshop PowerPoint presentation can be used by facilitators during the workshop to introduce and explain the risk assessment process and ensure all steps are covered. All red coloured text should be changed to match your own context.	Section 4.7 Practical Aspects of a Risk Assessment Workshop
Generic risk statements database	This Excel spreadsheet contains generic risk statements for each consequence area which you can tailor to suit your community.	Section 3.2 Risk Statements
Workshop checklist	A checklist for the materials required before and during the workshop.	Section 4.7 Practical Aspects of a Risk Assessment Workshop
Full treatment scorecard	Used to rate each treatment option against 10 criteria.	Visit the online toolbox
Treatment scorecard tool	Microsoft tool to calculate the average score of treatment ideas	Visit the online toolbox

Table 15: Templates available to assist with risk assessment process

Name	Description	More information
Project plan template	A template for a project plan that should be completed before commencing the ERM process.	Section 2.2 Project Plan
Hazard scenario template	A template document that should be completed when developing a hazard scenario.	3.1.2 Scenario Development
Risk statement tree	You can use this template to brainstorm different aspects that may be impacted by the emergency event for each consequence area to help you with writing risk statements.	Section 3.2 Risk Statements
Risk statement template for workshop participants	A template document where all risk statements can be written and then used by participants in the risk assessment workshops.	Section 3.2 Risk Statements and Section 4.7 Practical Aspects of a Risk Assessment Workshop
Risk Treatment Plan Template	Use this template to create a treatment plan for identified risks.	Part 6: Risk Treatment

Table 16: Reporting tools to assist with risk assessment process

Name	Description
ERM consultant quarterly report	Template for the quarterly report required to be completed by consultants engaged in ERM for a local government.
Final report criteria	For local government use, a checklist of criteria for the final report produced by consultants engaged in ERM.

Appendix D: Risk Priority Levels

Priority is determined automatically by the WA Risk Register Tool and ranges from 1 (highest priority) to 5 (lowest priority) (Table 17). Priority is based on the consequence, likelihood, and confidence. The confidence level is used to select one of the five priority matrices below (Tables 18-22), and then the likelihood and consequence are used to select the priority level.

For example, a risk with a major consequence and a rare likelihood that has been assessed with the highest confidence level would lead to a risk priority of 3, using Table 18: Priority levels at highest confidence. If the same risk were assessed with a low confidence level, the risk priority would be a priority of 2, using Table 22: Priority levels at lowest confidence.

Table 17: Priority level descriptions

Priority	General descriptor: action pathway
1	Highest priority for further investigation and/or treatment, and the highest authority relevant to context of risk assessment must be formally informed of risks. Each risk must be examined, and any actions of further investigation and/or risk treatment are to be documented, reported to and approved by that highest authority.
2	High priority for further investigation and/or treatment, and the highest authority relevant to context of risk assessment should be formally informed of risks. Further investigations and treatment plans should be developed.
3	Medium priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.
4	Low priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.
5	Broadly acceptable risk. No action required beyond monitoring of risk level and priority during monitoring and review phase.

Assign a Confidence Level

The confidence level is used to identify the robustness of the assessment. The confidence level table (Table 9) provides five confidence levels ('lowest' to 'highest') based on supporting evidence, expertise, and participant agreement during the workshop.

You should take the lowest level from one of the three categories when determining the confidence level. For instance, if there is strong agreement amongst participants (highest) but no relevant expertise available (low), then the confidence level would be 'low'. The following confidence tables have been adapted from the National Emergency Risk Assessment Guidelines (NERAG) Handbook 10.

Table 18: Priority levels at highest confidence

Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	4	4	3	2	1
Likely	5	4	4	2	2
Unlikely	5	5	4	3	2
Rare	5	5	5	3	3
Very Rare	5	5	5	4	3
Extremely rare	5	5	5	4	4

Table 19: Priority levels at high confidence

Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	4	3	2	1	1
Likely	4	4	3	2	1
Unlikely	5	4	3	2	2
Rare	5	5	4	3	2
Very Rare	5	5	4	3	3
Extremely rare	5	5	5	4	3

Table 20: Priority levels at moderate confidence

Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	3	3	2	1	1
Likely	4	3	2	1	1
Unlikely	4	4	3	2	1
Rare	5	4	3	2	2
Very Rare	5	5	4	3	2
Extremely rare	5	5	4	3	3

Table 21: Priority levels at low confidence

Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	3	2	1	1	1
Likely	3	3	2	1	1
Unlikely	4	3	2	1	1
Rare	4	4	3	2	1
Very Rare	5	4	3	2	2
Extremely rare	5	5	4	3	2

Table 22: Priority levels at lowest confidence

Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	2	2	1	1	1
Likely	3	2	1	1	1
Unlikely	3	3	2	1	1
Rare	4	3	2	1	1
Very Rare	4	4	3	2	1
Extremely rare	5	4	3	2	2

Appendix E: Risk Assessment Workshop Recommendations

Workshop essentials

There are five key aspects to cover in a workshop, which are listed below. In addition to the risk assessment process, you will need to ensure that participants have all the knowledge they need to assess risks properly. As your workshop participants will come from various backgrounds and experiences, everyone must be on the same page regarding the hazard, potential consequences and the scenario. It is often beneficial to have a series of presentations to ensure this is the case. If possible, you could enlist the help of a fellow stakeholder, preferably an HMA representative, for the hazard you will be considering.

There is an overall workshop presentation PowerPoint template in the online toolbox with example slides for items 2, 3 and 4 below.

- 1. Establish the hazard context (approximately 15 minutes)** – this presentation establishes the context of the hazard. What is it, why does it happen, where can it occur, when can it occur, who has roles and responsibilities in the event of an emergency, etc.
- 2. Vulnerabilities and consequences (approximately 15 minutes)** – this presentation should highlight the different aspects within your area of interest and how they might be impacted. This activity can link to the vulnerable elements identified in Part 2 across the five key impact areas. For example:
 - **Economy:** predominant industries/sectors, monetary figures for contribution to gross area product, location of major hubs etc.
 - **People:** population (including distribution), interesting facts about population (e.g., transient nature etc.).
 - **Public Administration:** which services are likely to be disrupted (utilities), critical infrastructure (bridges, roads, ports, power stations) etc.
 - **Social Setting:** the social fabric of the area, socioeconomic indicators, remote communities, aboriginal communities, mining communities etc.
 - **Environment:** national parks, environmentally sensitive areas, bodies of water etc.
 - Other relevant information.
- 3. The scenario (approximately 10 minutes)** – a presentation of the scenario you have developed that will be used for the assessment (see Part 3 for more detail).
- 4. Risk assessment presentation (approximately 10 minutes)** – to be presented by the facilitator. This presentation describes the risk assessment process (detailed in Part 4) to the workshop participants, including an explanation of the consequence, likelihood and confidence.
- 5. Risk analysis process** – following the presentations, this is the main body of the workshop. It is the collective process where the facilitator leads the participants through the analysis process outlined in Part 4, assigning consequence, likelihood, and confidence levels to each risk statement.

Once you have decided on your hazard and scenario, identify, and liaise with those assisting you on the day. This includes:

- the facilitator you have chosen (whether this is you or someone else)
- presenters of the presentations listed above (if not being presented by the facilitator)
- a data entry person.

Ensure everyone understands their roles and what needs to be completed before and during the workshop.

Risk Analysis Frequently Asked Questions:

What do the facilitator and data entry roles entail?

The facilitator should manage the discussion to reach fair and valuable conclusions for each risk statement. It is recommended that they record the consequence, likelihood, and confidence levels on a risk statement sheet in front of them during the workshop. This not only acts as a backup to the data entry person but also allows the facilitator to initiate discussion or refer to statements if needed.

The data entry person should take notes regarding the discussion among participants in the 'comments' section of the WA Risk Register Tool throughout the workshop. Comments should add context to the assessments made. In addition, once the participants have chosen the consequence, likelihood and confidence levels, these should be entered into the WA Risk Register Tool using the drop-downs next to the appropriate risk statement.

Why is it best to move from right to left with the consequence table?

The risk assessment process identifies the maximum possible consequence and the likelihood of this consequence. To ensure the maximum consequence is chosen, it is best to start from the right-hand side (catastrophic) and move left until the criteria is met. For example, suppose participants are debating between a major consequence with a 50% chance of occurrence and a moderate consequence that is likely to happen (100% likelihood). In that case, 'major' should be chosen as it is the maximum possible consequence.

What duration of impacts should be considered?

There is no limit to the duration of consequences, and you should consider the whole event, whether this lasts for a few hours or many years. It would be best to consider all consequences directly attributed to the scenario you are assessing.

What if there is no relevant expert present at the workshop?

If there is no relevant expert at the workshop for a particular risk statement, you can estimate the consequence and likelihood and reduce the confidence level. After the workshop, you should also follow up on this particular risk statement with the relevant person.

Where do the numbers in the consequence table come from?

The values in the consequence criteria are based on population percentages and the gross area product of your area of interest. The generic consequence table shows the percentages for each level (Table 1).

Why is the number of deaths and/or injuries/illnesses the same for different consequence levels?

The numbers in the 'people' category are based on the population of the area of interest. The population is rounded up to the nearest whole number. Several consequence levels may be the same for small populations where the number of deaths and/or injuries/illnesses is rounded up to one. Where there are different consequence levels with the same criteria, the highest consequence should be chosen (i.e., 'major' not 'moderate').

Do all criteria in each impact category need to be met to reach a particular consequence level?

No. All impact areas have multiple sub-categories or dot points. Only one criterion in an impact area needs to be met for a particular consequence to be assigned. For example, in the 'social setting' consequence category, there are four sub-categories (community well-being, community services, culturally important object and culturally important activities). Further, within the community well-being sub-category, three dot points exist for each consequence level. Any criteria can be used to assess a social setting risk statement. Make sure you choose the highest possible consequence.

Appendix F: Treatment Compendium

Introduction

The purpose of this compendium is to provide a range of potential treatment ideas for reducing risks to hazards in WA. Treatment ideas in this compendium cover the whole spectrum of prevention, preparedness, response and recovery (PPRR):

- **Prevention** – mitigation or prevention of the probability of the occurrence of, and the potential adverse effects of, an emergency
- **Preparedness** – preparation for response to an emergency
- **Response** – combating the effects of an emergency, provision of emergency assistance for casualties, reduction of further damage, and help to speed recovery;
- **Recovery** – support of emergency affected communities in the reconstruction and restoration of physical infrastructure, the environment, the community and psychosocial and economic wellbeing.

However, many of the ideas relate to prevention and preparedness, as these are the most effective approaches to minimize risks before an event occurs. Treatment ideas for various hazards are categorized under (and listed in no particular order):

- planning and regulations
- risk understanding and awareness
- physical works and infrastructure
- natural environment protection.

This document is intended as a starting point for gathering and generating ideas and should not be the only source for identifying options.

When generating or selecting treatment ideas, the following questions should be considered:

- **Risk reduction potential:** Will the treatment reduce the risk? Cost: Is this option affordable? Is it the most cost-effective? Continuity: Will the effects be sustainable over time?
- **Risk creation:** Will new risks be avoided? Technical feasibility: Is it technically possible?
- **Ease of administration:** Can it be easily administered? Effects on society: Will the effects be fairly distributed?
- **Equity:** Will the costs of the risk reduction be fairly distributed?
- **Synergies:** Is it compatible with and will it advance community objectives (for example, economic development, environmental quality)?
- **Primacy of life:** Will it protect lives and prevent injuries?

Please note that not all ideas listed in the compendium are necessarily eligible for current and/or future State funding. State funding priorities and mechanisms are adjusted as required. Therefore, we recommend you keep up-to-date through the appropriate channels.

Biosecurity

Animal disease

Description:

- A known disease that does not occur in endemic form in Australia, and for which it is considered to be in the national interest to be free of the disease; or
- A variant form of an endemic disease which is itself not endemic, which if established in Australia, would have a national impact; or
- A serious infectious disease of unknown cause, which may be an entirely new disease; or
- Outbreak of a known endemic disease far beyond the severity expected, that an emergency response is required to ensure that there is not

Plant pest

Description: Any species, biotype or strain of invertebrate pest or pathogen injurious to plant health, unprocessed plant products, bees or fungi provided that it is discrete, identifiable and genetically stable, but excludes genetically modified organisms (GMOs).

Planning and regulations

- Exercise emergency management plans and consider significant worst- case scenarios.
- Exercise recovery of a large-scale pest or disease outbreak.
- Create a toolbox, including templates, to reduce the administrative burden in an animal or plant biosecurity threat event.
- Conduct targeted surveillance of foot-and-mouth disease.
- Implement disease management strategies.
- Keep an up-to-date resource register that includes equipment, such as earth-moving machinery (and operators), which may be required in the event of an outbreak.
- Identify suitable facilities for use as control centres.
- Pre-identify waste management disposal sites.
- Improve awareness and understanding.
- Conduct biosecurity awareness campaigns.
- Encourage on-farm biosecurity measures, including signage, farm hygiene and surveillance.
- Promote biosecurity practices to farmers and industry on potential threats, surveillance and diagnostic protocols.
- Encourage early notification to the Department of Primary Industries and Regional Development (DPIRD), if an animal is suspected to be affected by a reportable disease.
- Make information regarding biosecurity available at local government offices and on local government websites.

Bushfire

Description: Any actual or impending bushfire that impacts and/or causes or threatens to cause injury, loss of life and/or damage to property or the natural environment that may require a response. Local governments are encouraged to liaise with their Department of Fire and Emergency Services (DFES) regional office regarding contemporary approaches to the management of bushfire-related risk. Some potential considerations are:

Planning and regulations

- Consider bushfires in land-use planning, with particular focus on the peri-urban fringe and high population areas.
- Apply specific guidelines and procedures for new construction in bushfire-prone areas.
- Apply the Building Code of Australia (BCA).
- Encourage the use of fire-resistant construction in bushfire-prone areas.
- Implement additional green waste collection prior to bushfire season.
- Prepare a plan for rebuilding and recovery of specific high threat areas or buildings.
- Exercise emergency management plans and consider significant worst-case scenarios, including those that take into account the rural-urban interface and places of last refuge.
- Encourage comprehensive business continuity planning.
- Pre-identify multiple evacuation centres that are appropriately positioned away from fire hazards.
- Pre-identify multiple coordination centres.
- Conduct pre-evacuation planning (including coordination and communication with vulnerable groups—for example, evacuation of aged-care facilities, allowing sufficient time for transferring patients).
- Reduce existing single-entry access roads and eliminate future bottlenecks in any planning proposals.
- Work with residents living in communities with a single access road in and out to plan for bushfire escape and identify opportunities for developing secondary access points.
- Establish contingencies for essential services such as power, water, wastewater and communications (for example, backup power generators).
- Enforce burning permits and restrictions.
- Develop strategies to reduce bushfire risk through mitigation measures, such as a bushfire risk mitigation plan.

Awareness and understanding

- Identify areas prone to bushfire and identify high-risk areas through a process endorsed by the Office of Bushfire Risk Management (OBRM).
- Identify strategic community and economic assets in high-risk locations.
- Promote education directed at property owners on actions they can take to reduce risks to their property, such as removing dead vegetation, installing interior and exterior sprinkler systems, removing vegetation alongside structures and creating asset protection zones around the property.

- Encourage active participation in community education programs such as the DFES 'Are you bushfire ready?' and '5 minute fire chat' programs.
- Support education programs regarding bushfire (for example, school programs, information about evacuation procedures, how to create a bushfire plan workshop).
- Conduct 'How to create a Bushfire Plan' workshops for the local community.
- Encourage the creation and maintenance of individual household Bushfire Plans.
- Engage in pre-season and preparedness briefings for your area.
- Work with DFES, the Department of Biodiversity, Conservation and Attractions (DBCA), volunteers and the community to ensure bushfire risks are understood.

Physical works and infrastructure

- Protect propane tanks or other external fuel sources.
- Create and maintain asset protection and low fuel zones around residential property and critical infrastructure.
- Maintain vulnerable infrastructure such as powerlines, substations, telecommunication towers and water treatment plants.
- Implement strategic fuel management techniques, such as slashing, mulching, planned burning, clearing of dead vegetation, selecting fire-resistant vegetation, and creating mineral earth firebreaks.

Natural environment protection

- Promote the conservation of open areas to separate developed areas from high bushfire threats.

Coastal inundation/storm surge

Coastal inundation

Description: The temporary or permanent flooding of a portion of land within the coastal zone.

Storm surge

Description: An intense low-pressure system associated with a low or cyclone can create a 'bulge' in the sea surface. When combined with significant onshore winds, a storm surge (higher sea levels) can inundate land near the coast. If a storm surge occurs at the same time as a high astronomical tide, inundation can be extensive, particularly in low-lying areas. Coastal inundation and storm surge can stem from cyclones, storms, floods and tsunamis.

Planning and regulations

- Limit or prohibit development in vulnerable coastal areas.
- Consider coastal inundation in land-use planning.
- Consider climate change and sea level rise in all planning and development.
- Adapt shoreline setback regulations to limit storm surge impacts.
- Exercise emergency management plans and consider significant worst- case scenarios.
- Adopt building requirements for higher elevation in inundation zones.
- Develop and maintain beach management plans.
- Plan for future storm surge heights due to sea level rise.
- Improve awareness and understanding.
- Use geographical information systems (GIS) mapping to identify areas at risk of coastal inundation and storm surge.
- Work with industry and the community in high-risk areas to understand and mitigate the potential risks and impacts.

Physical works and infrastructure

- Relocate existing vulnerable critical facilities outside of high-risk areas.
- Construct groynes along the shoreline to trap and retain sand.
- Protect the natural environment.
- Maintain natural barriers to reduce the impact of coastal inundation (for example, mangroves).
- Prohibit removal of natural vegetation from dunes and slopes.
- Develop flood protection schemes, such as levees, flood gates, sea walls and/or stop banks.
- Consider 'living shorelines' –'soft' shore-protecting techniques involving natural materials that bolster the existing vegetation. This could include the protection/restoration of vegetation that once existed at the site or planting new mangroves or water-absorbing salt marshes.
- Combine hard and soft shoreline protection (for example, granite rock sills with vegetation).

Awareness and understanding

- Identify areas prone to cyclone, particularly high threat areas.
- Identify critical at-risk assets in threat areas, including those that support major industries.
- Promote public awareness on being self-reliant for at least 72 hours with no electricity or water.
- Encourage community preparedness and participation in the 'Cyclone Smart' campaign.
- Consider culturally and linguistically diverse (CaLD) groups, if relevant.
- Promote awareness through social media sites.
- Consider animal welfare during and post event.
- Improve community awareness of cyclone, including severe wind and wind-driven rain, through education (for example, where to shelter, how to evacuate).
- Work with industry and the community to ensure understanding of cyclone risks.
- Engage in pre-season and preparedness briefings for your area.
- Use GIS to map areas susceptible to inundation by storm surge.
- Use wind impact modelling that takes terrain into account.

Physical works and infrastructure

- Ensure construction is upgraded to the current National Standards if the purpose of a building/ facility changes.
- Maintain power lines and other utility structures.
- Consider asset hardening against severe wind loading.
- Consider flood mitigation, such as scheduled maintenance programs, to regularly clear drainage pits, culverts and channels for blockage, prior to the onset of the cyclone season.
- Roadside collection for rubbish/green waste prior to the event.
- Check and clear drainage systems prior to the event.
- Inspect assets post event.
- Explore alternate communication methods and/or backup methods.
- Increase maintenance of residential buildings.
- Anchor rooftop-mounted equipment (air conditioning units, satellite dishes).

Natural environment protection

- Encourage use of natural environmental features as wind buffers/ barriers in site design.
- Use appropriate natural barriers (for example, sand dunes) to minimise storm surge impacts and inundation.

Earthquake

Description: The sudden release of stress built up within the earth's crust. When the crust fails, energy waves are released causing ground shaking.

Planning and regulations

- Apply and enforce the Building Code of Australia (BCA) for all building applications.
- Design for earthquakes (Australian/New Zealand Standard AS/NZS 1170.4), which includes the seismic zone map.
- Support mandatory accreditation and competency for building industry professionals.
- Develop evacuation plans/procedures for schools.
- Develop evacuation plans/procedures for hospitals, medical centres and aged-care facilities.
- Establish a process to engage with structural engineers to assess structures, buildings and facilities after an earthquake.
- Develop emergency communication plans to inform the community about what to do during and after an earthquake.
- Create and maintain a local government earthquake response plan.
- Exercise emergency management plans and consider significant worst- case scenarios.

Awareness and understanding

- Enable a public education program about what to do during an earthquake (for example, 'drop, cover, hold').
- Support education on earthquakes for younger groups through school activities.
- Earthquake exercises involving community members.
- Learn earthquake knowledge and experience from experts in other earthquake-prone countries, such as New Zealand, Japan and the US.
- Develop an inventory of public buildings that may be particularly vulnerable to earthquake damage.
- Promote public education about how to secure homes to prevent damage to contents, such as securing bookshelves, televisions and storage cabinets.

Physical works and infrastructure

- Rebuild structures to a higher standard post incident.
- Undertake seismic retrofitting of public facilities and heritage buildings most at risk to earthquakes.
- Upgrade priority buildings to current standards (that is, improve building performance).
- Identify and harden critical infrastructure to withstand earthquake shaking.
- Anchor rooftop-mounted equipment (air-conditioning units, satellite dishes).

Energy supply disruption

Electricity supply disruption

Description: A loss of, or interruption to, the supply of electricity that is capable of causing or resulting in loss of life, prejudice to the safety, or harm to the health, of a person.

Gas supply disruption

Description: A loss of, or interruption to, the supply of natural gas that will have significant impact on the community, energy infrastructure, essential services and domestic gas supply systems.

Liquid fuel disruption

Description: A loss of, or interruption to, the supply of liquid fuels that will have significant societal and economic impact on WA and the ongoing provision of essential services.

Planning and regulations

- Ensure local government emergency management plans contain up-to-date contact information for the HMA and links to the State Hazard Plan –Energy Supply Disruption.
- Provide the HMA with the contact details of the local government liaison officer.
- Analyse the requirement for redundant energy sources across the local government.
- Develop a register of critical services to identify the number and location of emergency facilities (for example, hospitals, police, fire, ambulance and water supplies) throughout the local government.
- Ensure a comprehensive business continuity framework is in place³. These plans should include:
 - consideration of the loss of all energy types;
 - a risk assessment of critical processes reliant on energy (develop alternate strategies, particularly for communications and essential services like water and wastewater); and
 - a priority list of critical processes so a limited amount of energy can be used wisely.
- Establish contact with fuel/gas/electricity providers to:
 - understand where local government sit on the provider's priority list for resupply;
 - identify at-risk community members (for example, Western Power life support customers); and
 - identify key personnel from these providers for more effective communication during an emergency.
- Encourage energy efficiency measures throughout local government to:
 - reduce reliance on individual energy sources (electric or hybrid vehicles versus petrol vehicles);
 - reduce reliance on central energy distribution (uptake of solar and battery storage); and
 - reduce the overall energy footprint (more efficient households are less impacted by energy disruptions).
- Identify locations where the community can gather, and which the HMA can prioritise during a power outage.
- Exercise emergency management plans and consider significant worst-case scenarios.

Notes

³ This will ensure the local government continues to operate; it is different from establishing emergency arrangements to support the wider community. Local emergency management arrangements are unlikely to work without a functioning local government.

Awareness and understanding

- Hold community meetings, LEMC and DEMC sessions to increase awareness of:
 - the impacts of energy disruptions;
 - the need for individuals to consider their own risks and plan appropriately;
 - the local, district and State emergency management arrangements; and
 - the relationship between severe weather events and supply disruptions (for example, storms and cyclones as catalysts; and heatwaves as high- risk times for the electricity grid).
- Ensure at least one local government officer is fully briefed on energy supply, as it is the most critical service.
- Conduct exercises using energy supply disruption as a focus or a component

Physical works and infrastructure

- Have backup generators or priority contracts for generators in place for critical facilities/ buildings, including communication equipment.
- Ensure comprehensive testing and a maintenance schedule is in place for backup equipment.
- Increase use of solar panels and battery systems on critical public buildings, where possible.
- Establish strategic fuel reserves for use by essential local government vehicles and/or backup generators.
- Prioritise energy-efficient equipment in identified locations (for example, community centres).
- Establish emergency communication infrastructure (for example, battery-operated radios) for use in the event of an outage.

Natural environment protection

- Assess possible impacts of an energy shortage to the environment (for example, wastewater pumps that if unable to function may contaminate the environment).
- Establish clear procedures for refueling activities during an emergency. (Be aware that an unfamiliar method of supplying or accessing fuel, say, from a backup petrol source, will increase the risk of a fuel spill.)

Flood

Description: The partial or complete covering of usually dry land areas with water from the unusual and/or rapid accumulation of surface waters from any source.

Planning and regulations

- Implement a floodplain management strategy. The strategy should consider long-term climate change and will require frequent updating.
- Establish collective watershed/catchment-based planning to address flood hazards across neighbouring local governments.
- Invest in regional-scale flood models.
- Reduce the area of impermeable surfaces (roads, footpaths, parking lots) within local government areas. Consider a requirement for 'X%' of open spaces to be permeable.
- Encourage the use of permeable driveways and surfaces to reduce runoff.
- Implement land-use planning to avoid developments in high flood risk areas.
- Use vegetation in and around floodplains to help dissipate floodwater.
- Improve planning and design of drainage systems to increase drainage.
- Increase drainage absorption capacities with retention basins.
- Require all critical facilities (for example, local government offices, emergency operation centres, police stations, fire stations) to be located outside of flood-prone areas.
- Use flood mapping for pre-planning evacuation routes and evacuation centres in the lead-up to a flood event.
- Formalise mutual aid agreements/MOUs across local governments and government agencies.
- Enhance timely gathering and dissemination of incident information.
- Develop evacuation planning for high-risk areas.
- Exercise emergency management plans and consider significant worst- case scenarios.
- Avoid or limit the density of development in floodplains.
- Require drainage studies and flood mitigation for new developments.
- Schedule maintenance programs to regularly clear drainage pits, culverts and channels for blockage.

Awareness and understanding

- Educate residents on safety during flood events, including the danger of driving through flood water.
- Undertake routine cleaning of debris from drains, streams, rivers and under bridges.
- Encourage residents to help keep nearby storm drains clear of debris during storms and not to rely solely on local government crews for assistance.
- Increase awareness of flood hazards by sharing flood inundation maps with the community.
- Encourage homeowners to purchase flood insurance.

- Educate and communicate with farmers and related industries about flood hazards and planning.
- Conduct flood exercises with the community.
- Promote public education on how to prepare for a flood (for example, 'Flood Smart').
- Distribute safety information to people in flood-prone areas.
- Encourage businesses to understand and prepare for the expected impacts of flood inundation of their premises.

Physical works and infrastructure

- Increase the number of river gauge stations to improve data collection for use in flood models.
- Construct infrastructure using design standards that limit their vulnerability to flooding.
- Raise critical utilities above expected flood heights.
- Protect critical facilities in flood-prone areas with levees or other structures.
- Elevate roads and bridges above expected flood heights either pre-emptively or as part of betterment program after a flood event.
- Remove or relocate structures (such as public toilet blocks) from flood-prone areas to minimise future flood damage.
- Install automatic road closure barriers for flood ways.
- Construct flood detention basins in flood prone-areas.

Natural environment protection

- Protect and enhance landforms that serve as natural mitigation features (for example, river banks, wetlands, dunes).

HAZMAT

- Description: An acronym for hazardous materials. A hazardous materials incident means an actual or impending spillage or other escape of a hazardous material that causes or threatens to cause injury or death, or damage to property or the environment. This term encompasses biological, chemical, radiological and/or other substances.

Planning and regulations

- Ensure organised response teams are available on standby during the transport of potentially harmful chemicals.
- Identify locations of containers for disposal of spill clean-up materials.
- Ensure sufficient personal protection equipment is available in the event of a spill.
- Provide training in hazardous materials response to first responders.
- Conduct a commodity transport study to identify areas and times of high risk.
- Conduct an environmental impact analysis for known chemical transports through the area. The analysis should identify what may be required for recovery in the event of a spill.
- Exercise emergency management plans and consider significant worst-case scenarios.

For more information:

- Department of Fire and Emergency Services: dfes.wa.gov.au/hazard-information/hazmat
- Department of Mines and Industry Regulation and Safety: dmp.wa.gov.au/Dangerous-Goods/Dangerous-Goods-258.aspx
- Department of Health: ww2.health.wa.gov.au/Health-for/Environmental-Health-practitioners/Environmental-hazards
- Radiological Council: radiologicalcouncil.wa.gov.au
- Department of Water and Environmental Regulation: der.wa.gov.au/our-work/controlled-waste

Heatwave

Description: A period of abnormally hot weather that could impact on human health, infrastructure and services.

Planning and regulations

- Consider extreme heat in land-use planning, with a particular focus on increasing green/open space and providing shade through vegetation, where possible.
- Identify vulnerable people at high risk in a heatwave (for example, elderly, homeless). Consider creating a database to track the vulnerable individuals during an extreme heat event.
- Establish contingencies for essential services, particularly power and potable water.
- Provide early warnings to the public.
- Encourage passive-cooling in new development designs.
- Reduce urban heat islands (UHI). UHI occur where hard surfaces absorb and retain the sun's heat,

and this heat is not adequately reduced at night. Building orientation, design and materials can all heavily influence the impact of heat on the built environment.

- Make continuity plans which allow for rescheduling of non-essential events if a heatwave is imminent.
- Exercise emergency management plans and consider significant worst- case scenarios.
- Open up air-conditioned cooling centres to allow local residents respite from the heat.

Awareness and understanding

- Engage with key stakeholders and community members to raise awareness about the risks of extreme heat.
- Identify established and informal networks to connect and engage with vulnerable groups, including CaLD groups.
- Update your local government website to include additional services being provided during the heatwave.
- Increase community messaging through local media and standard communication channels.
- Provide key messaging to the community on what to do if a power outage occurs during a heatwave.

Physical works and infrastructure

- Encourage installation of 'green/cool roofs' that reflect sunlight and keep heat away from buildings.
- Provide community 'cool areas' such as swimming pools or amenities with cool air flow.
- Increase maintenance of essential services if a heatwave is expected.

Natural environment protection

- Increase canopy cover, such as trees, which can reduce the impact of direct sunlight.

Human epidemic

Description: The occurrence of more cases of an infectious or transmissible disease than would be expected in the State's population, or a subgroup of the State's population, during a given time period that requires immediate actions to limit the spread of disease from infected persons to the wider community.

Planning and regulations

- Support environmental health programs to minimise risk of disease transmission, such as those designed to ensure provision of safe food and water, and effective sewerage systems.
- Support immunisation strategies against vaccine-preventable diseases.
- Support targeted immunisation programs of vulnerable individuals.
- Assist with the identification of vulnerable populations, along with methods to provide advice and support in a timely fashion.
- Exercise emergency management plans and consider significant worst- case scenarios.
- Ensure business continuity planning is up-to-date and effective in the face of a human epidemic event.
- Assist with monitoring of food safety.
- Ensure safe disposal of contaminated waste.
- Ensure adequate control of vermin or insect infestations, including reservoir (carrier) elimination programs.

Awareness and understanding

- Support health promotion and education activities, targeting both health professionals and the public.
- Provide community education on communicable diseases.
- Campaign to inform public misconceptions around vaccines.
- Tailor community education to the specific disease/epidemic event. For example, preparedness for pandemic influenza may include community education on hygiene, infection control, use of antiviral medications and vaccination.

Landform collapse

Description: The collapse of a landform in which people are trapped, and the situation is beyond local emergency management arrangements.

Planning and regulations

- Carry out land-use planning that establishes cliff setbacks (which account for annual cliff recession) and that rezones vulnerable areas.
- Complete an inventory of locations of critical facilities (buildings, infrastructure) in high-risk areas (that is those prone to collapse).
- Relocate at-risk buildings and infrastructure out of high-risk areas.
- Exercise emergency management plans and consider significant worst- case scenarios.

Awareness and understanding

- Conduct education and awareness to increase public safety around areas of risk.
- Encourage residents to manage the risk to their property or business.
- Use GIS to identify and map landform collapse hazard areas.
- Use GIS to identify and map communities vulnerable to landform collapse hazards.
- Implement monitoring and inspections for transport routes passing through or near high-risk collapse areas.

Physical works and infrastructure

- Shift towards lightweight, temporary structures that can be moved readily to accommodate natural shoreline migration.
- Manage drainage systems at the top of cliffs to limit saturation and the erosion of the cliff.
- Locate utilities outside of high-risk collapse areas.
- Make appropriate use of danger signage in publicly assessable high- risk areas.
- Control access to high-risk collapse areas using fences, paths and signage
- Protect the natural environment.
- Monitor cliff profiles to document cliff erosion hazards.
- Research and analyse data of cliff erosion to increase understanding of cliff behaviours.
- Stabilise cliffs (for example, rock netting, rock bolts, revegetation, seawalls and drainage systems) to reduce collapse risk.

Marine emergencies

Marine oil pollution

Description: Actual or impending spillage, release or escape of oil or an oily mixture that is capable of causing loss of life, injury to a person or damage to the health of a person, property or the environment.

Marine transport emergency

Description: Actual or impending event involving a ship that is capable of causing loss of life, injury to a person or damage to the health of a person, property or the environment

Planning and regulations

- Identify potential evacuation centres for ship passengers' accommodation and emergency relief and support.
- Provide safety notices when a large vessel is coming into port (particularly passenger vessels).
- Pre-identify waste management disposal sites for spill clean-up or wreck salvage.
- Exercise emergency management plans and consider significant worst- case scenarios.
- Exercise recovery in a maritime emergency event.
- Maintain a Spontaneous Volunteers Management Plan.
- Establish strategically located caches for oil spill response equipment.

Awareness and understanding

- Increase awareness and understanding of shared maritime policies (for example, port, State and national policies).
- Promote boat safety and licensing laws.
- Promote awareness of the potential impacts of an oil spill on local beaches, environmentally sensitive areas, wildlife and businesses.
- Increase awareness of beach oil spill clean-up methods, the lengthened duration of oil spill recovery and human resource requirements, including how local governments can assist.
- Participate in oil spill exercises.
- Increase awareness of oil spill incident recovery requirements for local government.
- Conduct oil spill modelling

Natural environment protection

- Maintain natural buffers such as salt marshes and mangroves that may reduce the impact and spread of an oil spill or other contaminants.
- Identify and map critical environmentally sensitive marine areas that would be vulnerable to an oil spill.

Storm

Description: 'Storm' describes thunderstorms but also cold fronts and troughs that produce significant or severe weather. A thunderstorm is a sudden electrical discharge manifested by lightning and thunder. Thunderstorms are associated with convective clouds (cumulonimbus) and are, most often, accompanied by precipitation in the form of rain or hail.

Planning and regulations

- Inspect building roofs to ensure adequate wind and water resistance.
- Enforce design standards for buildings located in areas susceptible to storm surge.
- Adapt shoreline setback regulations to limit storm surge impacts.
- Locate future critical facilities outside of areas susceptible to storm surge.
- Encourage business continuity plans, particularly for small businesses.
- Pre-identify coordination centres.
- Pre-identify evacuation centres, with arrangements to maintain essential services such as backup power.
- Identify and develop a list of backup generators and prioritise their use in an event.
- Include strategies for debris and waste management in emergency management plans.
- Exercise emergency management plans and consider significant worst- case scenarios.
- Consider storm waste management strategies in emergency management plans.
- Establish contingencies for essential services such as power, water, wastewater and communications (for example, backup generators).

Awareness and understanding

- Increase public education on how to prepare for storms and increase awareness. Ensure CaLD representation where applicable.
- Increase education for homeowners regarding storm impacts and how their property could be impacted.
- Increase engagement with absentee landowners regarding cleaning of properties.
- Increase engagement and participation of utility providers in LEMCs.
- Hold pre-storm/storm preparation community meetings.
- Promote awareness through social media sites.
- Ensure school staff know where safe refuge areas are in school buildings.
- Use GIS to map areas susceptible to inundation by storm surge and high wind zones.
- Educate homeowners in high-risk areas about potential mitigation options.
- Provide early notification to the community of pending storm events, including hail storms.
- Consider animal welfare during and post event.

Physical works and infrastructure

- Anchor rooftop-mounted equipment (air-conditioning units, satellite dishes).
- Ensure maintenance of power lines and other utility structures.
- Identify low-lying areas prone to regular flash flooding and conduct works to mitigate flooding (see flood section for more options).
- Consider flood mitigation such as scheduled maintenance programs to regularly clear drainage pits, culverts and channels of blockage.
- Explore alternative communication methods and/or backup methods.
- Encourage the use of hail-resistant building materials (glass, shutters, roofing tiles).

Natural environment protection

- Encourage the use of natural environmental features as wind buffers/ barriers in site design.
- Use appropriate natural barriers (for example, sand dunes) to minimise storm s

Structural fire

Description: 'Fire' refers to any actual or impending property fire that impacts and/or causes or threatens to cause injury, loss of life and/or damage to property or the natural environment that may require a response.

Planning and regulations

- Carry out mandatory building inspections following construction to check the buildings follow approved plans and specified materials.
- Incorporate internal fire protection systems into local government buildings, aged-care facilities and multistorey apartment buildings.
- Require the use of registered and trained tradespeople and builders.
- Enforce the Building Code of Australia (BCA).
- Enhance onsite building inspections, auditing and enforcement.
- Encourage building owners to test fire evacuation plans for large commercial or residential buildings.
- Conduct audits to ensure maintenance of installed fire safety systems is occurring.
- Exercise emergency management plans and consider significant worst- case scenarios.

Awareness and understanding

- Encourage home and building owners to have house/building insurance.
- Encourage homeowners to create and practise fire evacuation plans.
- Increase industry awareness of the potential risks associated with non- compliance with the National Construction Code (NCC).
- Provide ratepayers with education sessions (with the assistance of DFES) on the importance of understanding the risks presented in their building. Provide details of where they can find more information (for example, from DFES and the Department of Mines, Industry Regulation and Safety [DMIRS]).

Physical works and infrastructure

Ensure regular maintenance is carried out on all installed passive and active fire safety systems.

Transport incidents (air crash, road crash, rail crash)

Description: Collision or imminent collision of a vehicle with a structure, terrain, water, vehicle or other thing, and is of such a nature or magnitude that a significant and coordinated response is required.

Planning and regulations

- Identify potential evacuation centre locations near airports in case of an emergency event.
- Ensure Aerodrome Emergency Plans (if applicable) are current and reviewed/exercised using significant credible scenarios.
- Exercise emergency management plans and consider significant worst- case scenarios.
- Identify potential road closures within the vicinity of railway level crossings in the local government's boundaries in the event of a rail crash.
- Identify potential areas of refuge (for example, community centres) close to level crossings where people (including passengers) affected by the rail crash could be relocated in the first instance, if deemed appropriate.

Awareness and understanding

- Increase community awareness about road safety campaigns (for example, 'Towards Zero Strategy').
- Reinforce via local media and other local government communication channels, public education campaigns around rail safety (for example, Public Transport Authority's safety campaigns and TrackSAFE Education resources).
- Engage and build relationships with rail network operators.

Physical works and infrastructure

- Maintain local roads to an appropriate standard to help prevent accidents.
- Improve the safety of roads (if applicable) during maintenance and/or reconstruction (for example, increase the road shoulder width, reduce curvature of sharp turns).
- Keep areas adjacent to level crossings that are not the responsibility of the Public Transport Authority (PTA) clear of obstructions (clear line of sight).
- Liaise with the PTA's maintenance branches—advising of any PTA property-related issues that become apparent to the local government maintenance staff before the PTA is aware of it.

