



Australian
Centre for
Disease
Control

Guidance on climate risk assessment and adaptation planning for Australian health system organisations

Manual



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Version Control

We are committed to regularly reviewing and updated this guidance to ensure it remains relevant, practical, and easy to use. Future updates will be recorded in the version history table below.

Version	Date published	Summary of changes
1.0	October 2026	Initial release of the guidance

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Introduction

This document, termed the manual, provides step-by-step guidance for Australian health system organisations to identify, assessment and manage risks to service delivery, infrastructure and population health. It forms part of a wider [Guidance on climate risk assessment and adaptation planning](#) package that delivers Action 3.3 of the National Health and Climate Strategy.¹

The manual outlines how to conduct a climate risk assessment and design adaptation actions relevant to an organisation's context. The manual can be used in conjunction with the Climate and Health Hazard Data, which is a compendium of information to inform the risk assessment and adaptation planning process. Templates have also been provided for organisations to complete as they follow the process outlined in this document.

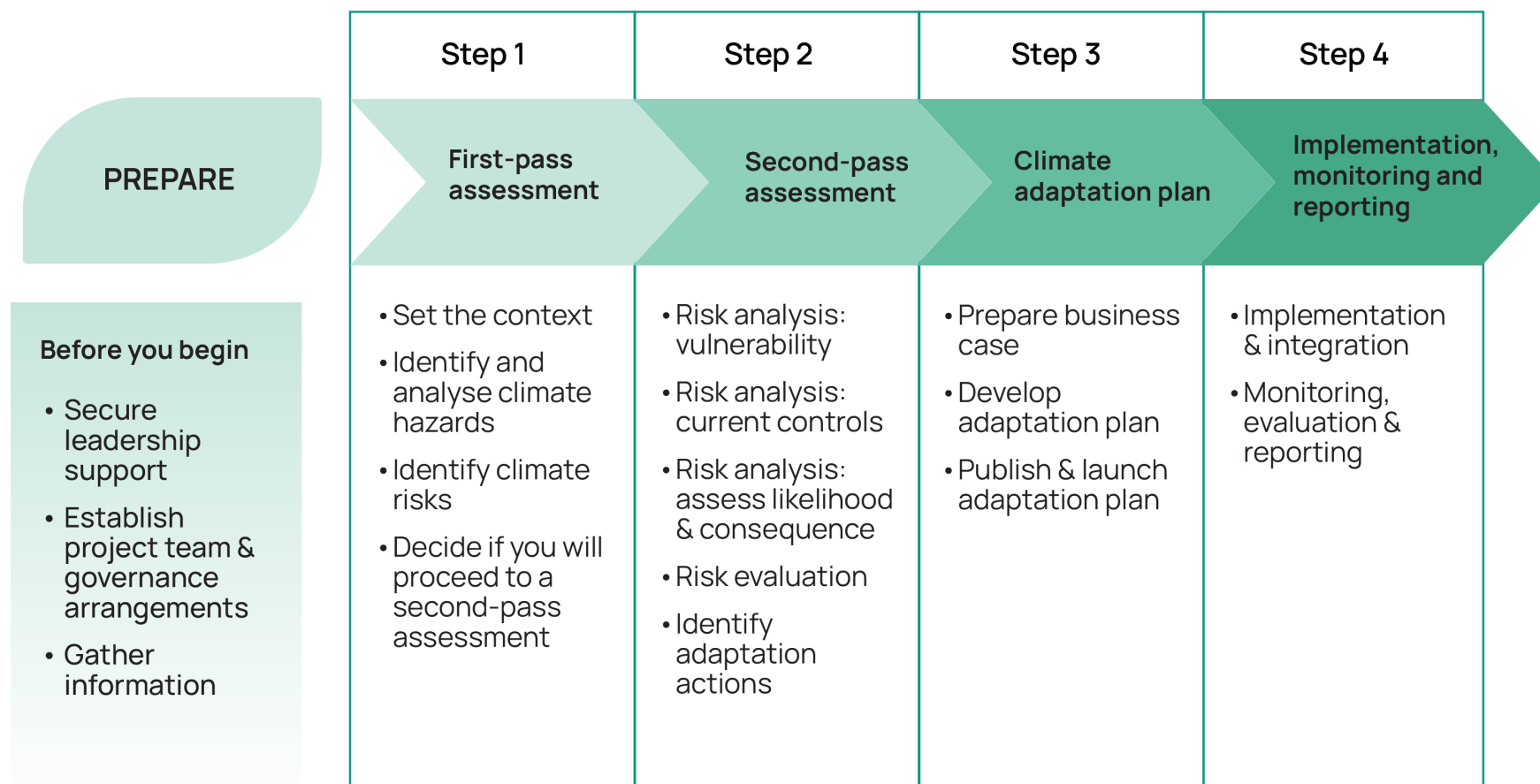
The risk assessment process can be divided into two stages: a first-pass assessment and a second-pass assessment (see Figure 1). The first-pass assessment is a high-level process to identify relevant climate hazards for your organisation, as well as associated risks to population health, service delivery and infrastructure.

Organisations can choose to stop after conducting a first-pass assessment, or preferably, the first-pass assessment can inform a second-pass assessment involving risk analysis, which culminates in assessing the likelihood and consequence of these risks and prioritising them for adaptation action.

The remaining sections of the manual explain how to develop an adaptation plan (including an associated business case) and then how to implement the plan (including monitoring and evaluation of progress). Appendices provide a review of evidence on climate risks to population health and additional resources on running consultation workshops and identifying climate risks and adaptation options, as well as summarising how the guidance package relates to other approaches to assessing climate risks.

To complete your climate risk assessment and adaptation plan, work sequentially through the steps in this manual. Refer to the Climate and Health Hazard Data, appendices, and any relevant external resources as needed. As you progress through each step, document your findings and decisions using the templates provided, adapting them to suit your organisation's specific context.

Figure 1. Overview of the climate risk assessment and adaptation planning process



Background

This section outlines key concepts that you will need to understand to follow the instructions on climate risk assessment and adaptation planning outlined in this manual.

This manual takes as its starting point the Intergovernmental Panel on Climate Change's (IPCC) definition of physical climate risk as a function of hazard, exposure, vulnerability and in some cases response (see below for further detail), and combines this definition with a standard approach to risk assessment based on evaluation of likelihood and consequence, in line with ISO 31000:2018 – Risk Management.^{2,3} This approach enables the resulting risks and mitigating actions to be integrated into an organisation's enterprise risk management framework or corporate risk register.

This guidance draws significantly on Queensland Health's 2019 Climate Change Adaptation Planning Guidelines, which were identified by stakeholders as a best practice model for Australian health system organisations, offering a robust climate risk framework accompanied by practical implementation support tools.⁴ In developing this national guidance, the Australian Centre for Disease Control (CDC) endeavoured to build on the Queensland Health framework while also incorporating a stronger focus on climate risks to population health, in part by drawing on World Health Organization guidance on Climate Change and Health Vulnerability and Adaptation Assessment.⁵

This final product represents a synthesis of best practice approaches. It is designed to help organisations assess and manage climate risks in a way that is locally relevant, methodologically robust, and aligned with broader national and international efforts. See *Appendix 5 – How this guidance relates to other approaches to assessing climate risks* for further information on the way this guidance draws on other risk assessment methodologies.

Importantly, the guidance does not prescribe how reporting entities should meet climate scenario requirements under the *Corporations Act 2001* or AASB S2. The Australian Accounting Standards Board (AASB) issued [AASB S2 Climate-related Disclosures](#) to mandate climate-related financial disclosures for certain entities via the *Corporations Act 2001*.⁶ AASB S2 sets out the requirements for an entity to disclose information about its climate-related risks and opportunities, including climate-related scenario analysis requirements. This guidance for health system organisations is not part of the AASB S2 and does not add or change the requirements in AASB S2 or the *Corporations Act*. The Australian Securities and Investments Commission (ASIC), as the regulator responsible for administering the sustainability reporting requirements, provides general guidance on these requirements and

their intent in [ASIC Regulatory Guide RG 280: Sustainability reporting \(RG 280\)](#), particularly sections RG 280.98 to RG 280.101. ASIC may issue further guidance as needed.⁷

[Commonwealth Climate Disclosure](#) is the Australian Government's policy for Commonwealth entities and Commonwealth companies to publicly report on their exposure to climate risks and opportunities, as well as their actions to manage them.⁸ To view the full Requirements, [visit the Commonwealth Climate Disclosure Requirements](#) home page. This guidance does not add or change the requirements for Commonwealth entities and Commonwealth companies meet requirements under the Commonwealth Climate Disclosure policy.

What is climate risk?

Climate risk refers to the potential for harm or disruption caused by climate change and/or efforts to limit it.⁹ Climate risks can be grouped in the following categories:

1. **Physical risks:** these risks arise directly from the physical impacts of climate change, such as damage to infrastructure from extreme weather, increased illness during heatwaves, or disruptions to services caused by flooding. Physical climate risks arise when people, natural systems, services, infrastructure, resources, or other assets are exposed to climate-related hazards (such as heatwaves, bushfires, floods, or storms).
2. **Transition risks:** these risks are associated with the shift to a low-emissions economy. Transition risks are typically thought of in the following categories:
 - **Policy, legal & regulatory:** risks from laws, regulations, or policies aimed at reducing emissions or improving sustainability. For example, health system organisations could face regulatory action if they failed to comply with (hypothetical) new sustainability requirements.
 - **Reputational:** risks of negative public perceptions and/or reactions if an organisation is perceived to have failed to take appropriate climate action. For example, health system organisations may face negative patient perceptions if they are seen as failing to take meaningful action on climate change compared to peer organisations, particularly in the aftermath of extreme events.
 - **Technology:** risks associated with shifts to new, lower-emissions technologies. For example, legacy health technology and infrastructure may become obsolete if it does not comply with new sustainability requirements.
 - **Market:** risks from shifts in market conditions, such as changes in demand, supply chains, or costs due to the transition to a low-carbon economy. For example, health system organisations may experience increased procurement costs due to climate-related market shifts.

- **Liability risks:** these risks are associated with people or businesses seeking compensation for losses they may have suffered due to climate change, including losses relating to physical and transition risks.

This guidance focuses on physical climate risks to minimise complexity for health system organisations still developing capacity and capability in climate risk assessment. However, it is generally considered best practice for climate risk assessment to encompass consideration of transition and liability risks where possible.

How is physical climate risk determined?

Physical climate risk is determined by the interaction of the following components (see □).

- **Hazard:** A natural or human-induced physical event, trend or impact that could cause harm, damage, or loss. Examples include extreme heat, heavy rainfall, rising sea levels, storms, floods, and droughts.
- **Exposure:** The presence of people, natural systems, services, infrastructure, resources, or other assets in areas where they could be affected by a hazard. For example, a hospital located in a flood-prone area is exposed to flooding, or people in an area prone to heatwaves are exposed to extreme heat.
- **Vulnerability:** The propensity or predisposition of exposed people, natural systems, services, infrastructure, resources, or other assets to be adversely affected. Vulnerability is underpinned by the characteristics of the person or asset, and is determined by **sensitivity** and **adaptive capacity**.
 - **Sensitivity:** The degree to which something would be affected by climate hazards in the absence of any adjustment or response. Sensitivity reflects how strongly something reacts to changes in climate conditions, independent of its ability to adapt. Something is highly sensitive if small changes in climate conditions lead to significant impacts. For example, a population group with pre-existing respiratory conditions may be highly sensitive to poor air quality during bushfire events. Similarly, a facility that relies on a single access road may be highly sensitive to flooding if that road is frequently cut off.
 - **Adaptive capacity:** The ability of something to adjust to climate hazards to reduce potential damage, recover from impacts, maintain essential functions, and strengthen resilience over the long term. It includes both the capacity to respond to and recover from acute climate impacts, and the ability to adapt, learn, and transform in anticipation of future risks. For instance, a hospital with robust emergency protocols, backup power, and surge staffing capacity might have high adaptive capacity in the face of extreme heat or storm events. Meanwhile, communities with strong social

connections and community infrastructure might have greater adaptive capacity than those without these assets.

A fourth component, '**response**' – which refers to actions taken to reduce climate risks – is sometimes also recognised as an additional determinant of climate risk.¹⁰ Response emphasises how actions to address climate risks might not work as planned or create other problems, and therefore themselves be drivers of climate risk. Unintentionally increasing existing risks or creating new risks by failing to consider unintended consequences or broader system impacts of adaptation actions is known as **maladaptation**.

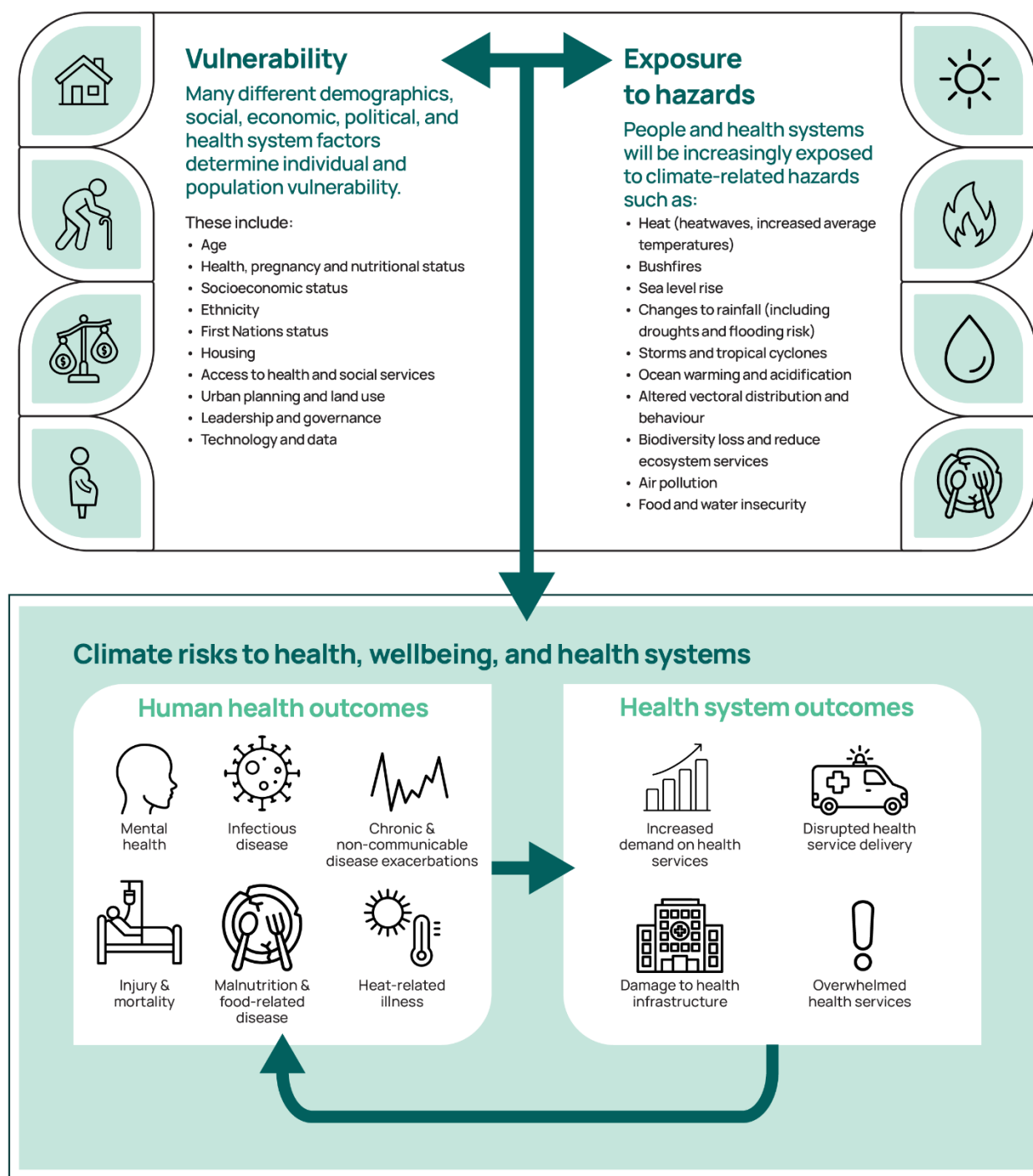
Figure 2. The dynamic interaction between hazard, exposure, vulnerability and response as determinants of physical climate risk



What are the population health outcomes associated with exposure to different climate hazards?

Physical climate risks to health, wellbeing and health systems eventuate when climate hazards (both extreme weather events and gradual environmental changes) interact with exposed and vulnerable people, natural systems, services, infrastructure, resources, or other assets. These risks can be thought of in two interconnected domains: risks to population health and risks to the health system, as seen in 0.

Figure 3. Climate risks to health, wellbeing and health systems



Climate risks to population health include a wide range of climate-sensitive health outcomes. For instance, rising temperatures and more frequent heatwaves increase the incidence of heat-related illness, including by worsening cardiovascular and respiratory conditions; bushfire smoke and poor air quality can also aggravate chronic disease; while floods and storms can cause physical injuries and mental health impacts. Meanwhile, changes to temperature and precipitation patterns are shifting disease vectors which influences the

spread of infectious diseases. 0 provides an overview of different climate-sensitive health outcomes.

Table 1. Non-exhaustive list of population health outcomes associated with exposure to different climate hazards

Hazard	Health outcomes
Heat and humidity	Heat exhaustion and heatstroke Dehydration Cardiovascular, respiratory, metabolic, neurological and gastrointestinal illnesses Foodborne diseases Pregnancy complications Kidney injuries Mental health impacts Injuries
Fire	Cardiovascular, metabolic and respiratory illness Pregnancy complications Burns and injuries Eye irritation Mental health impacts
Drought	Mental health impacts Potential food insecurity Respiratory illness Infectious diseases
Rainfall and flood	Infectious diseases Injuries Poisoning and contamination Mould-related respiratory conditions Mental health impacts
Storms	Injuries Mental health impacts Infectious diseases Respiratory illness
Coastal inundation	Injuries Mental health impacts Infectious diseases

Priority populations, such as First Nations people, older adults, children, people with disabilities or chronic illnesses, and those facing social or economic disadvantage, are

disproportionately affected due to limited capacity to avoid, respond to, or recover from the impacts of climate hazards.

Risks to health systems eventuate when health infrastructure, workforce, supply chains and other assets are affected by climate hazards, and as population health impacts place increasing pressure on health services. Health services may face disruptions to critical infrastructure, supply chains, and utilities like electricity and water. Facilities located in hazard-prone areas may be physically damaged or rendered inaccessible. Staff availability and wellbeing can also be compromised, particularly during emergencies when healthcare workers may be personally affected or experience burnout.

Risks to population health and risks to health systems are deeply interconnected and mutually reinforcing. When climate hazards affect vulnerable populations, the resulting health impacts drive up demand for care, often when health systems are already under strain. For example, a heatwave may lead to increased hospital presentations while also challenging the hospital's cooling systems and staff wellbeing and capacity. Similarly, a flood may displace communities and contaminate water supplies, while also disrupting transport routes and access to healthcare facilities.

By understanding how hazard, exposure, and vulnerability interact across both domains, health system organisations undertaking climate risk assessments and adaptation planning processes can develop strategies that protect communities, strengthen system resilience, and ensure continuity of care in a changing climate.

Climate risk assessment

What is a climate risk assessment?

A climate risk assessment is the process of identifying and evaluating how climate change could affect people, natural systems, services, infrastructure, resources, or other assets. The goal is to support decisions and actions that reduce harm and improve preparedness for a changing climate. Importantly, climate risk assessments should be treated as an ongoing and dynamic process, which should be revisited and updated as climate and other conditions change over time.

What about climate-related opportunities?

The impacts of climate change for health, wellbeing and health systems are overwhelmingly negative.¹¹ As such, the guidance focus on supporting health system organisations to prevent and/or manage potential adverse consequences of climate change. However, climate change mitigation and adaptation measures present significant opportunities to improve health

outcomes, enhance system resilience, and generate operational efficiencies. For example, improving building insulation can help to maintain safe indoor temperatures during extreme heat, reducing risks to patients and staff while lowering demand on cooling systems. This increases operational resilience, and also reduces energy use, emissions, and ongoing operating costs.

Many recent climate risk assessment frameworks prompt the identification of climate-related opportunities alongside risks.^{9,12,13} Although not the focus of this guidance, routinely considering and pursuing the opportunities and co-benefits of climate mitigation and adaptation measures is extremely worthwhile. Users should review any specific requirements (legislative, regulatory, or policy-based) that may apply to their organisation in relation to the assessment of climate-related opportunities to ensure compliance with context-specific obligations.

What are climate scenarios, and why do they matter in climate risk assessment?

Climate scenarios show how climate conditions might change under different levels of global greenhouse gas emissions and resulting atmospheric concentrations. They are not predictions or forecasts, but plausible descriptions of how the future may develop, which can be used to provide a view of the implications of developments and actions.

This guidance uses the globally recognised Shared Socioeconomic Pathways (SSPs) as the basis for different climate scenarios. SSPs were developed by the IPCC describe how socioeconomic factors (such as population, economic growth, education, urbanisation and technology development) could change over the next century and affect future greenhouse gas emissions and global temperatures (see 0).¹⁴

By considering multiple scenarios, health system organisations can better understand the range of risks they may face, identify which risks are most urgent under different conditions, and develop flexible adaptation plans that remain effective even as the climate continues to change.⁴ This approach supports more resilient decision-making in the face of the inherent uncertainty in climate risk assessment and adaptation planning and helps organisations in understanding how climate change could affect their operations, infrastructure, and the communities they serve. This manual and the accompanying Climate and Health Hazard Data provide the information you will need to consider for your climate risk assessment (see *Climate scenarios* section in this manual). The [National Climate Scenario Guidance](#) from the Department of Climate Change, Energy, the Environment and Water (DCCEEW) provides further detail on selecting and using climate scenarios to assess physical climate risk.¹⁵

Table 2. Summary of four Shared Socio-economic Pathways. Adapted from the National Environmental Science Program 'Understanding SSPs'

	SSP1-2.6 "Sustainability"	SSP2-4.5 "Middle of the road"	SSP3-7.0 "Reasonable worst-case"	SSP5-8.5 "Fossil-fuelled development"
The way the world might change in the future				
Emissions reduction	High and immediate	Moderate from 2040s	None (minor slowing)	None (accelerating)
Energy sources	Renewables and biofuels	Renewables and fossil fuels	Fossil fuels	Increased fossil fuels
Carbon dioxide removal	New technology	None	None	None
Global socio-economic trends	Gradual move towards sustainability and environmental respect; increased action towards the SDGs	Similar to the past; slow progress towards SDGs	Slow and increasingly unequal	Rapid growth at the expense of the environment; resource intensive lifestyles and industries; high investment in health and education; dependence on technological solutions
What the future climate may look like under each SSP				
Global warming by 2100	1.3-2.4°C	2.1-3.5°C	2.8-4.6°C	3.3-5.7°C
Resulting global warming levels ^(a)	Reaches 2°C around 2050s then stabilises	Reaches 2°C around 2050s, then 2.7°C by 2100	Reaches 2°C around 2050s, 3°C around 2070s, 4°C by 2100s	Reaches 2°C around 2050s, 3°C around 2060s, 4°C around 2080s
RCP equivalents				
RCP equivalent	RCP2.6	RCP4.5	No equivalent RCP	RCP8.5

(a) Due to past emissions all SSPs reach 1.5°C in the 2030s, and then diverge

How should uncertainty be managed in a climate risk assessment?

Many decisions in health systems rely on assumptions about future conditions, and climate risk assessments are no different. Uncertainty in climate risk assessments arises because

future climate conditions, their timing, and their local impacts are not fully predictable.¹⁶ This is due to factors like evolving climate models, incomplete data, and complex interactions between environmental, social, and health systems. It's important to factor this uncertainty into decision-making to avoid overconfidence in specific outcomes and to ensure plans remain flexible and robust under a range of possible futures. It's also important to remember that the climate scenarios you work with as part of the risk assessment process are not predictions of the future: they are descriptions of how the future *might* develop, depending on the decisions we collectively make as a society now and in the future. Health system organisations can manage uncertainty by clearly stating assumptions, using scenarios to explore different futures, and designing actions that can be adjusted over time. Plans should be regularly reviewed as new information becomes available.

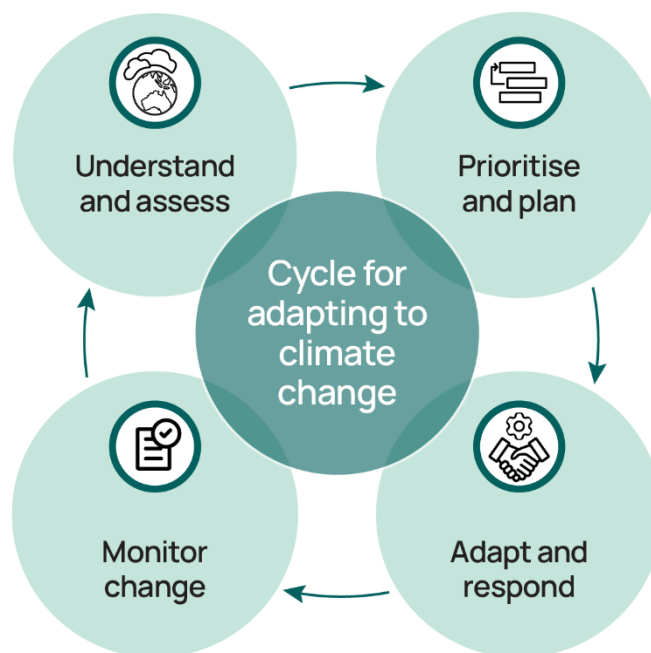
Adaptation planning

What is climate adaptation?

Climate adaptation is a process of preparing for and/or adjusting to the impacts of climate change. It involves taking practical steps to reduce harm and protect people, natural systems, services, infrastructure, resources, or other assets. It is a complex and ongoing process, consisting of an ongoing cycle of four activities: understand and assess; prioritise and plan; adapt and respond; and monitor change (see Figure 4). For health system organisations, climate adaptation could, for instance, involve planning to ensure facilities remain operational during extreme weather, or providing advice and support to priority populations to help them prevent and/or manage the health impacts of bushfire smoke. Effective adaptation can build climate resilience – the capacity to prepare for, respond to, and recover from climate impacts.¹⁷

Adaptation is different to, but closely connected to, mitigation, which focuses on reducing the greenhouse gas emissions that cause climate change. While emissions mitigation aims to slow or prevent future climate change, adaptation aims to reduce the likelihood of climate impacts eventuating and/or the severity of impacts when they do occur. Both adaptation and mitigation are essential, and both can have significant benefits for health and wellbeing; indeed, effective adaptation requires credible mitigation strategies to address the root causes of climate risks and impacts. The Australian Government is working to reduce emissions to help limit the worst impacts of climate change, with a target to reduce emissions to 62-70% below 2005 levels by 2035 and achieve net zero by 2050.¹⁸

Figure 4. The cycle for adapting to climate change (adapted from the [National Adaptation Plan](#))



What is an adaptation plan?

A climate adaptation plan outlines the actions an organisation will take to prevent, prepare for, and respond to the impacts of climate change. It is based on an understanding of climate risks (typically obtained via a preceding risk assessment), and focuses on reducing vulnerability (and, where possible, exposure) to climate-related hazards to minimise the likelihood or consequence of a climate risk being realised. Its aim is to prevent or minimise harm, protect people, assets and services, and strengthen resilience. For health system organisations, this includes planning for events like heatwaves, bushfires, floods, and climate-sensitive disease outbreaks, and ensuring infrastructure, workforce, and communities are ready to respond to changing conditions.

Where can I find more information?

Refer to the Glossary for definitions of key concepts.

Before you begin

Before you begin your risk assessment and adaptation planning process, there are some important things to consider.

Secure leadership support

At the outset, it is important to ensure your organisation's leaders support undertaking a climate risk assessment and developing an adaptation plan. Clear leadership support helps to secure resources, mandate, and cross-organisational participation. In addition, given that risk management and oversight are fundamental responsibilities of boards and executives, leadership should be actively involved to guide strategic choices and support the integration of climate risks into broader organisational planning. This level of involvement reflects the growing governance expectation that boards and executives identify, assess, and respond to climate risks as part of their core oversight duties.¹⁹

In some cases, the decision to undertake a climate risk and adaptation planning will come "top-down" (for example, because of a legal or regulatory requirement). In other cases, a "bottom-up" approach (in which staff members persuade their leadership of the need to undertake this process) is necessary. In such cases, a briefing paper may be needed to secure leadership support (you can refer to the Overview document for ideas to support this paper if required).

Climate risk assessment and adaptation planning should be understood as an ongoing, iterative process rather than a one-off exercise. Ideally, organisational leadership will commit to a continuous cycle of assessing climate risks and updating adaptation measures over time. This includes revisiting the risk assessment periodically to incorporate new climate data, emerging risks, and changes in organisational priorities, as well as refreshing adaptation actions as circumstances evolve. However, it may not always be feasible to secure this long-term commitment at the outset. In such cases, the need for an ongoing cycle of assessment and planning should be revisited with your organisation's leadership at a later stage (such as when finalising the adaptation plan or preparing the business case at *Step 3: Climate adaptation plan* so that long-term governance and resourcing needs can be embedded once the value of the process is clearer.

Establish project team and governance arrangements

Once leadership support is secured, your organisation should establish a project team to lead the assessment and planning, and clear governance arrangements to oversee the process in a way that builds ownership and buy-in amongst your organisation's leadership group. Climate risk assessment and adaptation planning are collaborative activities. Wherever the manual refers to "you," it should be understood to mean the team, the broader group of contributors, and the organisation, rather than individuals. The strongest outcomes will come from drawing on diverse expertise, perspectives, and responsibilities across any organisation.

Depending on your organisation's size and structure, you may wish to establish a dedicated executive steering committee; nominate an executive sponsor; and/or establish reporting lines into existing governance structures. Whatever arrangements you establish, it is critical that they facilitate collaboration and buy-in across your organisation, including by keeping senior executives or board members engaged with the process and its outcomes.

As you establish your project team and governance structure, think about:

- **Who might have further information or expertise** that will be useful and relevant in your risk assessment – for example, those with expertise or experience in climate change, risk management, disaster and emergency management, etc?
- **Who might be responsible for or affected by** identified risk management actions, e.g. frontline staff, suppliers, utility operators?
- **Who might need to endorse** the adaptation plan, or who can facilitate further action?
- **How** will you document, disseminate and socialise your findings and ensure that corporate memory is created?

It is helpful to consider these questions using a RACI matrix. RACI stands for:

- **Responsible:** who will carry out the work?
- **Accountable:** who owns the decision or outcome?
- **Consulted:** who needs to provide input or expertise?
- **Informed:** who needs to be kept updated on progress and decisions?

Your project team and/or governance structure may include representatives from procurement, finance, human resources, clinical, public health, infrastructure, planning/commissioning, disaster/emergency management, risk management, and legal. Consider engaging representatives from patient groups, the local community, and parts of the local community whose distinct perspectives are needed. This may include, for example,

First Nations people, people with disabilities, and culturally and linguistically diverse communities. Some organisations will choose to engage external consultants to support their project team; in these circumstances, a dedicated project team with appropriate representation from across the organisation will still be important to ensure that this project results in meaningful change.²⁰

Broad stakeholder engagement is important. Just as climate change does not recognise organisational boundaries, external stakeholders may help you respond to and manage any climate risks identified. For example, representatives from other local health system organisations could help you understand interdependencies and common vulnerabilities between your organisation and theirs. Meanwhile, local councils often manage utilities (e.g. water supply, roads, waste management) which are critical for care delivery and are vulnerable to climate risks. Stakeholders such as these should ideally be involved at an early stage in the risk assessment process.

In addition to establishing a project team and governance arrangements, a proactive stakeholder engagement strategy will help you to ensure your stakeholder engagement is comprehensive, effectively targeted and streamlined. To develop your stakeholder engagement plan, consider the following:

- **What** is the purpose of the engagement (e.g. inform stakeholders, seek input)?
- **Which** stakeholders need to be engaged?
- **How** do you intend to involve stakeholders (e.g. 1-1 meetings, workshop, survey, fact sheets)? What role will your stakeholders play and how will you facilitate that?
- **When** do you plan to involve them (i.e. at what stage of the risk assessment process)?

Gather information and plan

Consider your information needs: what kind of information will you need to complete the risk assessment and adaptation plan, and where will you find it? Apart from this manual and the accompanying Climate and Health Hazard Data, you may also need:

- **Organisational context:** documents that outline your organisation's objectives, operations, and risk management frameworks – for example, your current strategic plan.
- **Existing risk and resilience measures:** plans, policies, and procedures that address continuity, safety, and sustainability – for example, your current business continuity plan.
- **Evidence and research:** external sources that provide insights into health impacts, vulnerabilities, and management approaches – for example, climate change and health reports and fact sheets from the World Health Organization or other authoritative sources.

- **Community and stakeholder perspectives:** reports or data that highlight local needs and social factors – for example, the most recent Primary Health Network Needs Assessment Report for your area.
- **Other climate risk assessments and adaptation plans:** climate risk assessments and adaptation plans that have been developed by relevant local, state and federal agencies, as well as nearby primary, secondary and tertiary health system organisations. For example, you may wish to review the [National Climate Risk Assessment](#) (NCRA), published in 2025, which outlines key hazards, exposures, vulnerabilities, risks and impacts in relation to the Australian [health and social support system](#) (which refers to population health and wellbeing, as well as the provision, availability, and access to health and social support services).²¹

Bringing these resources together at the start of your risk assessment will strengthen it and help ensure alignment with your organisation's priorities and existing processes.

Finally, plan the approach that you will take to your risk assessment and adaptation planning, and consider the techniques you will use to elicit the information and consensus you need. Throughout the risk assessment and adaptation planning process, you may need to draw on a combination of techniques. These could include:

- Desktop research and document reviews
- Individual interviews with staff, stakeholders, or subject matter experts
- Questionnaires or surveys to gather input from a broader group
- Workshops or group brainstorming sessions to facilitate structured discussion and consensus-building.

Step 1: First-pass assessment

It is time to start your climate risk assessment. Begin with a first-pass assessment, which is a high-level scan to identify the climate-related risks to health and health systems relevant to your organisation. In your first-pass assessment, you will:

- **Set the context** (*Step 1.1 Set the context*): establish your objectives, and decide what time horizons, climate scenarios and scope you will use.
- **Analyse climate hazards** (*Step 1.2 Identify and analyse hazards*): understand how climate hazards have affected your organisation and/or community in the past, and how these hazards are projected to change in the future
- **Identify and analyse climate risks** (*Step 1.3 Identify climate risks*): identify a set of climate risks to your organisation and/or community

Which template should I use at this step?

Use the risk assessment template.

Where can I find more information?

Refer to the Climate and Health Hazard Data and the appendices (*Appendix 1 – Population health risks, Appendix 2 – Climate risk workshop guide, Appendix 3 – Sample risk statements*) for assistance in completing this step.

Step 1.1 Set the context

This step establishes the foundations of your climate risk assessment by clarifying why the work is being done and what it will cover.

Objectives

Work with your leadership and stakeholders to establish the objective/s of the risk assessment and adaptation planning exercise for your organisation. These objectives will vary significantly between organisations depending on the type of organisation, its operational setting, available resources, and strategic priorities. For example:

- **A Primary Health Network** could be undertaking a climate risk assessment as part of its Needs Assessment. It may focus on understanding and addressing climate-related risks to population health and delivery of primary health services, to inform future strategic planning and commissioning decisions.

- **An ambulance service** could be mainly concerned with identifying climate risks that could disrupt service continuity. Such risks may include extreme weather events affecting response times or access to patients.
- **A health infrastructure agency** may initiate a climate risk assessment to evaluate the resilience of built assets to hazards such as flooding, bushfires, and extreme heat. Their objective might be to inform capital works planning, ensure compliance with building codes and climate adaptation standards, and prioritise investments in retrofitting or relocating vulnerable facilities.

There is no single “correct” objective for a climate risk assessment and adaptation plan, and this guidance has been designed to support a wide variety of organisations achieve a wide variety of objectives – including, but not limited to, those outlined in the examples above.

When setting your objective/s, it may be helpful to reflect on the following questions:

1. **Why are you undertaking this climate risk assessment?** What are you hoping to achieve?
For instance:
 - *Improving organisational resilience*: to strengthen business continuity planning, emergency preparedness, and workforce capacity in the face of climate-related disruptions.
 - *Supporting population health*: to address climate impacts on the health of populations in vulnerable circumstances (e.g. First Nations communities, older adults, people with chronic illnesses) and ensure equitable access to care.
 - *Compliance with policy or funding requirements*: to meet regulatory or funding obligations.
 - *Responding to stakeholder expectations*: to demonstrate leadership and accountability to staff, patients, communities, and partners who are increasingly concerned about climate change.
2. **Do you need to make decisions with long-term (i.e. 10 years or more) implications** (for example, to support planning of new infrastructure or to help with framing new service needs)?
3. **To what extent is climate change already having impacts on your organisation and/or the community it serves** (for example, increased service disruptions and pressure on emergency services due to bushfire smoke and heat waves)?
4. **Do you have any regulatory obligations or compliance requirements** that are relevant to this process (for example, what organisational policies and risk management frameworks will your assessment need to align with)? Are there any emerging trends that suggest you may have future obligations or requirements related to climate risk?
5. **What local, regional, or national policies, plans, and/or legislation are relevant to this process?** Do you need any more contextual information (such as applicable policies,

strategic plans, and any location-specific details about the facilities, services, or communities your organisation operates within) about your site and operating region?

Scope

You now need to decide on the scope of your climate risk assessment and adaptation plan in collaboration with your leadership and stakeholders. This means deciding what elements of your organisation or community to address. Your scope will depend on your organisation's roles, responsibilities, available resources, and the objectives you have set. Remember, there is no single correct scope, and this guidance is designed to support a wide range of use cases. Each organisation must make a judgement call about what to formally assess, based on what they want to achieve and what is feasible given available resources.

In defining the scope of your assessment, you may wish to think with reference to the following 'elements at risk' – things of value to your organisation that may be affected by climate change:

- **Population health:** the health and wellbeing of the community you serve.
- **Infrastructure, facilities and equipment:** buildings, facilities, medical equipment, and other physical resources.
- **Workforce:** staff health, availability, and capacity to deliver services.
- **Supply chains and resources:** access to essential supplies such as medicines, food, water, fuel, and medical consumables.
- **Finances:** operating budgets, insurance coverage, and funding streams.
- **Ability to deliver services and maintain business continuity:** systems and processes that support ongoing healthcare provision and emergency response.
- **Ability to achieve strategic goals, objectives and outcomes:** long-term goals, objectives, and performance targets.

All the elements listed above are likely to be affected by climate change in some way. This step is about making a judgement call on which to include in your assessment. This decision should be guided by your objectives, as well as practical and logistical considerations such as:

- **Time and resources:** how much time do you have available, and what level of support and resourcing do you have to deliver the project? A wider scope typically requires more time and resources, while limited resources may necessitate a narrower focus. If your resources are limited, it may be necessary to initially deliver a first-pass risk assessment to build support within your organisation, before proceeding to a more in-depth process.

- **Geographic scope:** are you assessing a single facility, a local community, or a large organisation/network across a broader region? Are you working in partnership with other health system organisations across a region?
- **Expertise and capability:** what is the current level of climate change expertise and climate risk assessment capability within your organisation? What, if anything, has already been done to address climate risks?
- **Regulatory obligations or compliance requirements:** does your organisation have any specific regulatory or compliance requirements that you need to consider in determining the scope of your assessment?

Different types of organisations will have different scopes for their assessment. For example:

- A Primary Health Network may focus on population health, service delivery, and workforce capacity, aiming to inform future planning and commissioning.
- An ambulance service may prioritise service continuity, infrastructure, and supply chains, with a focus on maintaining reliable emergency response during extreme weather events.
- A health infrastructure agency may concentrate on the resilience of physical assets and financial planning, using the assessment to guide capital works, compliance, and investment decisions.

As outlined in the Overview document, risks to population health and risks to health systems are deeply interconnected and mutually reinforcing. Therefore, if resources permit, adopting a scope that considers both population health risks and health system risks is often the preferable option. However, depending on your organisation's context, objective/s, and climate risk maturity, you may wish to consider only risks to population health, or only risks to health service delivery, particularly if this is your first climate risk assessment. This manual has been designed to support you to undertake a climate risk assessment, irrespective of whether you consider all risks to population health and service delivery or only a subset.

At this stage, you should also decide whether your risk assessment and adaptation plan will consider only physical climate risks, or if you will also consider transition risks. Your decision should be guided by your objectives, capacity, and context. While it is best practice to consider transition risks as part of your assessment (and it is a regulatory requirement in some contexts), if your organisation has limited capacity or technical expertise, it may be more practical to focus your scope on physical risks, with a plan to consider transition risks in future iterations. Users should review any context-specific requirements (legislative and/or regulatory) in relation to climate risk assessment and disclosure to ensure compliance with any obligations about the types of risks and/or opportunities that should be assessed. Physical risk is the primary focus of this guidance. You may wish to refer to Treasury's forthcoming voluntary guidance on Climate-related Transition Planning for sector-neutral

guidance on setting strategic ambitions and developing actions to address both physical and transition risks and opportunities.²² If you do wish to consider transition risks, you may also wish to refer to the Australian Securities and Investments Commission's [module](#) on climate-related transition risks for further information.²³

Timeframes

You also need to decide which timeframes to use in your assessment. In general, you should consider climate risks in the present day, plus risks that may emerge over other timeframes. This is because climate impacts will change over time, and looking at multiple time horizons will help you understand how your risk profile might evolve, allowing you to plan accordingly.⁴ In the Climate and Health Hazard Data, we provide projections for three distinct time horizons: a baseline period (observed data from 1985 – 2014), mid-century (2050), and late century (2085). You can use these time horizons in your risk assessment, or, if you wish to use other sources of climate information, you can select other timeframes appropriate to your organisation's objectives and planning horizon.

Climate scenarios

Finally, decide which climate scenarios to use. Remember, a climate scenario is a plausible representation of what the future climate might look like. These scenarios are based on different assumptions about greenhouse gas emissions and other factors that influence the future climate. Considering a range of scenarios ensures you are planning for multiple possible futures, helping you to manage the uncertainty inherent in the climate risk assessment process.

The two main scenarios used in the Climate and Health Hazard Data are:

- **A 'middle of the road' scenario (SSP2-4.5):** this scenario assumes emissions remain at current levels until the middle of the 21st century, and that net zero emissions are not reached by 2100. It sees temperatures rising by about 2.7°C by the end of the century. NB: fire hazard projections are not available for SSP2-4.5, so for this hazard SSP1-2.6 is instead used as the lower emissions scenario.
- **A 'reasonable worst-case' scenario (SSP3-7.0):** this scenario assumes both emissions and temperatures continue to rise to the end of the century due to delayed climate action. It sees temperatures rise by about 3.6°C by 2100. This is the higher emissions scenario across all climate hazards.

These two scenarios have been selected as SSP2-4.5 is aligned with current global policy pledges, while SSP 3-7.0 is a plausible high-emissions pathway recommended for stress-testing.²⁴

You can use these climate scenarios in your risk assessment, or, if you wish to use other sources of climate information, you can select other scenarios appropriate to your organisation's objectives, any context-specific requirements, and your planning horizon.

The [National Climate Scenario Guidance](#) published by DCCEEW provides detailed guidance on the selection and use of climate scenarios.¹⁵

Action:

Document your objective/s, scope, timeframe/s and climate change scenario/s (and justification for these choices) in the risk assessment template.

At the end of Step 1.1, you should be able to answer the following:

- What are you **trying to achieve** (i.e., clear objectives and scope)?
- What are your **timescales and climate scenarios**?

Revisit *Step 1.1 Set the context* if you are unable to answer these questions.

Step 1.2 Identify and analyse hazards

To get a clear idea of the risks posed by climate change, it is necessary to start with an understanding of climate hazards that your organisation and/or community may have experienced in the past; understanding how these hazards may change in the future as the climate changes; and whether any new climate hazards might arise.

In this step, you will identify:

- **What** climate hazards have affected your organisation and/or community in the past.
- **How** climate hazards are projected to change in your organisation and/or community in the future.

Past climate hazards

Start developing your understanding of the baseline impacts of the present-day climate on the elements of your organisation and/or community within the scope of your assessment. To do this, you should:

- **Find out what climate-related hazards** have affected your organisation and community in the past.
- **Identify how and when** your organisation and community have been affected by these hazards in the past.

You may wish to start by referring to the climate information provided for your health district in the Climate and Health Hazard Data, which provides baseline information about six hazard types for each health district (see Box 2). This information will help you get a sense of the extent to which these hazards are relevant in your area at present. Some state governments have also published regional climate projections and information (including the NSW Government's [NARClIM](#) project and Victoria's [Future Climate Tool](#)), which can be used in addition to or instead of the Climate and Health Hazard Data for this guidance.^{25,26}

To get a richer sense of how these hazards have affected your organisation and/or community in the past, you should do some of your own research. You can use the following sources to obtain further information on past hazards and their impacts on your organisation and/or community:

- **Internal and external stakeholders:** stakeholders from your organisation and local community, including community elders, can provide insights into past events and their impacts.
- **Your organisation's documentation:** internal resources such as risk registers, incident documentation and asset management plans may have useful information.
- **External sources:** resources from organisations such as the Bureau of Meteorology, CSIRO, state governments and the Australian Institute of Disaster Resilience can include helpful information.

Future climate hazards

Now you need to consider your future timeframes, and how climate change is projected to drive changes in the frequency, intensity and severity of different types of climate hazard in the medium- and long-term. Remember, absence of a previous record of a hazard in your area does not mean it will not happen in the future.

Explore climate change scenarios for your area, seeking to understand how the frequency, intensity, duration, timing and distribution of different hazards are projected to change under different timeframes and climate scenarios. For example, consider whether heatwaves are becoming longer and/or hotter, whether drought conditions are becoming more common or prolonged, or whether larger areas of your health district will be at higher risk of flooding or bushfire in the future. Overall, you are looking to get a sense of whether the hazards are becoming more or less significant over time and under different climate scenarios.

Box 2: Using the hazard information in the Climate and Health Hazard Data

The Climate and Health Hazard Data provides climate hazard information summarised at the health district level. For each of 53 health districts across Australia, data is presented on six key climate hazards:

1. Heat and humidity
2. Fire
3. Drought
4. Rainfall and floods
5. Storms
6. Coastal inundation.

This information is provided across three different time horizons (baseline, medium-term, and long-term) and two climate scenarios (representing different emissions pathways), allowing users to explore how risks may evolve over time and under varying plausible future conditions.

Each hazard is described through a combination of narrative summaries and quantitative tables, which include one or more indicators (specific, observable, and measurable data points) chosen to reflect the frequency, intensity, or duration of each hazard. These indicators vary between hazard types, depending on the nature of the hazard and the availability of reliable data. For example, heat is represented by indicators including number of heatwaves per year, while coastal inundation is indicated by the area (in hectares) inundated.

You do not need to be a climate expert or conduct a detailed quantitative analysis to benefit from this information. The indicators are designed to help you answer two key questions:

- What is the **current significance** of each hazard in your area? For example, is heat already a major concern? Is coastal inundation currently rare?
- How are these hazards projected to **change over time**? Are they expected to become more frequent or intense in the medium or long term? How do projections differ between moderate and high emissions scenarios?

If your organisation has access to climate expertise or resources to commission a detailed risk assessment, the Climate and Health Hazard Data provides a robust foundation for a quantitative, data-driven analysis. However, even without specialist support, the Climate and

Box 2: Using the hazard information in the Climate and Health Hazard Data

Health Hazard Data enables you to develop a qualitative understanding of climate trends and identify which hazards may require closer attention in your planning.

Table 3. Sample heat hazard indicators from the Climate and Health Hazard Data for a given health district

Baseline		2050 Scenarios		2085 Scenarios	
		Middle of the road	Reasonable worst-case	Middle of the road	Reasonable worst-case
Average temperature (°C)	13.4	14.8 [14.3, 15.4]	15.1 [14.3, 15.8]	15.7 [14.6, 16.7]	16.8 [15.5, 18]
Maximum temperature on hot days (°C)	30.9	32.7 [32.2, 34]	33.3 [31.9, 35.1]	33.7 [32.7, 35.6]	34.8 [33.8, 37]
Minimum temperature on hot nights (°C)	16.7	18.2 [17.4, 18.9]	18.5 [17.5, 19.1]	19.1 [17.5, 20.2]	20.2 [18.7, 21.5]
Average apparent temperature on hot days (°C) (NOAA Heat Index)	32.4	33.9 [33.2, 34.4]	34.1 [33, 34.9]	34.6 [33.7, 35.7]	35.5 [34.4, 37]
Average heatwave duration in days	5	6 [5, 7]	6 [5, 7]	6 [5, 8]	8 [6, 11]
Number of heatwaves per year	2	4 [4, 6]	5 [3, 7]	6 [4, 8]	7 [6, 9]
Number of days per year > 35°C	4	8 [6, 13]	10 [5, 19]	12 [7, 22]	17 [12, 31]
Number of days per year > 40°C	0	0 [0, 1]	1 [0, 3]	1 [0, 3]	2 [1, 6]

Even without in-depth technical analysis, you can observe clear trends for the district in Table 3 (noting this data represents scenario-based projections with associated uncertainty):

- **Temperatures are rising:** Average, maximum, minimum, and apparent temperatures all increase over time, with sharper rises under the reasonable worst-case scenario.
- **Heatwaves are becoming more frequent and longer:** The number of heatwaves per year and their average duration both increase over time.
- **Extreme heat days are increasing:** Days over 35°C and 40°C become more common.

Box 2: Using the hazard information in the Climate and Health Hazard Data

Ultimately, the goal is not to get bogged down in every data point, but to use the indicators to build a picture of emerging climate risks under different climate scenarios. Remember that scenario-based projections carry inherent uncertainties, arising from differences in models, assumptions about future emissions, and natural variability. Rather than treating projections as precise predictions, use them to explore a range of plausible futures. Consider multiple scenarios and timeframes and focus on identifying plausible changes relevant to your organisation's context – even if their exact timing or magnitude is uncertain.

Action:

Document how climate hazards have previously affected your organisation and/or community, and how these hazards might change in future, in the risk assessment template.

At the end of Step 1.2, you should be able to answer the following:

- How has exposure to different **climate hazards** affected your organisation and/or community **in the past**?
- How may exposure to different **climate hazards** affect your organisation and/or community **in the future**?

Revisit *Step 1.2 Identify and analyse hazards* if you are unable to answer these questions.

Step 1.3 Identify climate risks

The next step is to identify how these hazards could create risks to the elements that you have included within the scope of your assessment, and to ask:

- **Exposure:** which elements are physically or functionally in harm's way if/when each hazard occurs?
- **Vulnerability:** if exposed to each hazard, how badly would each element be affected, and how quickly could it recover?

At this stage, these questions are just to help support your brainstorming – you will undertake more detailed analysis of the risks that you identify at later stages in the process.

Once you have considered these questions, you can begin to develop a series of risk statements describing how different climate hazards could interact with the exposure and vulnerability of elements at risk to give rise to impacts and consequences. In this context, an **impact** is the effect of a climate hazard on the element at risk, and a **consequence** is the

subsequent, broader implication for your organisation and/or community. You will then summarise this risk using a structured statement such as:

"[Hazard] could lead to [impact] on [exposed thing], resulting in [consequence]".

For example, you might identify that heatwaves (a hazard) could cause significant heat stress (an impact on population health), resulting in increased morbidity and mortality and increased demand for health services (consequences). A potential risk statement in this case is "Heatwaves could lead to heat stress, resulting in increased morbidity and/or mortality and increased demand for health services." See Table 4 for more worked examples. Remember that any one hazard may have multiple impacts and multiple consequences.

Systematically work through the list of climate hazards you identified in *Step 1.2 Identify and analyse hazards*. For each hazard, consider the impacts it might have on the elements at risk in scope of your assessment. Draw on your analysis of how each hazard has manifested in the past, what consequences it had, and which parts of your organisation or community were most affected. While past events are not definitive predictors of future impacts, they offer valuable insights into how climate hazards have interacted with your specific context and can help reveal patterns of exposure and vulnerability across different elements of your organisation.

Table 4. Worked examples of elements at risk, impact, consequence, and risk statement brainstorming

Hazard	Element at risk	Impact	Consequence	Risk statement
Heatwave	Population health	Heat stress	Increased morbidity and/or mortality; increased health service demand.	Heatwaves could lead to heat-related illness, resulting in increased morbidity and/or mortality and increased demand for health services.
Bushfires	Workforce	Harm to staff's physical and mental health	Reduced workforce availability and productivity; compromised service continuity.	Bushfires could adversely affect staff's physical and/or mental health, leading to reduced workforce availability and productivity and compromised service continuity.

Hazard	Element at risk	Impact	Consequence	Risk statement
Coastal inundation	Infrastructure	Damage to buildings, facilities and equipment	Service disruption, increased repair and maintenance costs; potential non-viability of maintaining current location.	Flooding and saltwater intrusion from coastal inundation could damage infrastructure, leading to costly repairs, service disruptions, and the need to relocate facilities if sites become unviable.

You should also consider whether future climate changes could give rise to new risks which have not been realised in the past. For example, you may have identified that high temperatures are not currently causing harm or disruption in your organisation and/or community, but then have identified that temperatures are projected to be much higher in the medium- or long-term, or that heatwaves may be much longer and more intense – therefore posing new risks to your organisation and/or community. Alternatively, if you are in a coastal area, your organisation and/or community may not currently experience coastal inundation, but future sea level rise may create new risks related to inundation in the future.

If you need some help getting started with developing your risk statements, you can refer to *Appendix 3 – Sample risk statements*, which provides a list of potential risks associated with different climate hazards. However, the list in the appendix should be used as a starting point only. Be sure to tailor and expand on your list of risks by considering factors specific to your organisation and local context.

As you develop your risk statements, it is important to look beyond the immediate, direct effects of each hazard and consider indirect impacts, interdependencies and the potential for cascading and compounding risks. Cascading risks occur when one climate-related event triggers a chain of subsequent impacts. For example, a bushfire may damage power infrastructure, leading to outages that disrupt hospital operations and compromise cold-chain storage for medications and vaccines. This can then affect patient care, emergency response, and continuity of service delivery. Compounding risks arise when multiple hazards occur simultaneously or sequentially, increasing overall harm. For instance, a heatwave coinciding with poor air quality from bushfire smoke can significantly increase respiratory-related hospital admissions over and above what would be caused by a heatwave on its own or poor air quality on its own, placing additional strain on health services.

In practice, when developing your risk statements, it may be helpful to ask:

- What systems or services rely on or are relied on by the element at risk?

- What other elements at risk could be affected if this element at risk fails or is disrupted?
- Could this hazard interact with other hazards or stressors to amplify impacts?

Where possible, it is also important to consider how climate impacts beyond your local area may flow through and affect your organisation and/or community. For example, national or international supply chain failures could have significant local impacts; while changes in climate conditions in other areas may have local population health impacts such as the spread of zoonoses or vector-borne diseases. See Box 3 for further information on identifying risks to population health.

Box 3: Identifying risks to population health

Risks to population health are often more complex to identify than risks to physical assets. For example, it is straightforward to document how a cyclone damaged a healthcare facility, but much harder to quantify its indirect and longer-term effects on health outcomes for the local population.

This complexity arises because:

- Health impacts often occur through multiple pathways (e.g. heat stress, air quality deterioration, water contamination).
- Effects may be delayed or cumulative, rather than immediate.
- Outcomes are influenced by the social determinants of health (e.g. socio-economic status, housing quality), which vary across communities.
- Data on health outcomes is often less accessible and less timely than, for example, infrastructure data.

While precise quantification of climate-related population health outcomes is beyond the scope of this guidance, a qualitative or semi-quantitative analysis of climate risks to population health can still provide valuable insights for planning and prioritisation.

To effectively identify climate risks to population health for your organisation or community, you should have at least a broad understanding of:

- Climate-sensitive health outcomes, and how different climate hazards influence these (*Appendix 1 – Population health risks* provides additional information).
- Baseline burden of relevant climate-sensitive health outcomes in your community (e.g., prevalence of asthma, cardiovascular disease) (see Climate and Health Hazard Data for this information for your health district).
- Current and projected exposure to climate hazards in your region or service area (see Climate and Health Hazard Data for this information for your health district).

Box 3: Identifying risks to population health

You can then combine these components to identify risks to population health. For example:

- If you know respiratory conditions such as asthma and chronic obstructive pulmonary disease (COPD) are highly climate-sensitive, and can be exacerbated by hazards such as bushfires and heatwaves, and
- Your community has a high prevalence of COPD and asthma, and
- Bushfires and heatwaves are projected to become more frequent and intense in your area under future climate scenarios,

Then you may identify increased respiratory morbidity and mortality due to bushfire smoke and heatwaves as a key population health risk.

While this guidance does not provide a detailed methodology for attributing and projecting current and future climate-related disease burden, comprehensive guidance on this topic is available from the [U.S. Centers for Disease Control and Prevention](#).²⁷ You may wish to use this resource to supplement your risk assessment.

You may find it helpful to use systems thinking approaches, such as drawing simple diagrams or flowcharts that map out how different elements of your organisation are connected.²⁸ This can help reveal hidden dependencies, such as how a disruption to transport infrastructure might affect supply chains, staff availability, or patient access.

You should work through these questions in collaboration with colleagues from different parts of your organisation, and potentially external stakeholders as well. Group brainstorming sessions, workshops, or stakeholder interviews can be particularly useful for identifying interdependencies that may not be obvious from a single perspective.

Document these insights as part of your risk statements, either by noting the potential for cascading or compounding effects, or by linking related risks together. This will help ensure your assessment captures the full scope of potential impacts and supports more integrated and resilient adaptation planning.

Finally, look for opportunities to consolidate risk statements where there is significant overlap or duplication. Grouping similar risks can make your assessment clearer, reduce redundancy, and help decision-makers focus on the most critical areas of vulnerability.

Action:

Document your risk statements, using either the risk assessment template or any appropriate alternatives provided by your organisation.

At the end of Step 1.3, you should be able to answer the following:

- **Which risks** are currently relevant to your organisation, and which may emerge in the future?

Revisit *Step 1.3 Identify climate risks* if you are unable to answer these questions.

Step 1.4 Decide if you will proceed to a second-pass assessment

At this point in your risk assessment, you should have:

- Clear objective/s, scope, and understanding of your policy context (*Step 1.1 Set the context*)
- An analysis of how different climate hazards have affected your organisation and/or community in the past, and an understanding of how these hazards are projected to change in the future (*Step 1.2 Identify and analyse hazards*)
- A list of climate risks (*Step 1.3 Identify climate risks*).

If you have not already done so, brief your leadership about your findings and seek their agreement to any recommendations arising from them. This supports appropriate oversight of identified risks and enables informed decision-making. Seek agreement to any recommendations and confirm that decisions about next steps are taken at a sufficiently senior level.

A key decision for your leadership at this stage is whether to continue with a more in-depth analysis of climate risks, known as a second-pass assessment. The second-pass assessment builds directly on the findings of the first-pass assessment and guides you to analyse risks in greater detail and to identify and evaluate adaptation options. In general, it is recommended to undertake a second-pass assessment if possible, but it is particularly important to do this if any of following apply to your organisation:

- Historic climate hazards have affected your organisation's ability to perform its essential functions, or projected climate hazards may do so in the future.
- Historic climate hazards have affected the community you serve in ways that changed demand for your services, or projected climate hazards may alter the level or nature of demand in the future.
- Identified climate risks have the potential to materially influence long-term strategic planning, investment decisions, or service delivery models.

- There is uncertainty about the implications of identified climate risks that would benefit from more detailed analysis.

However, if your organisation decides not to proceed to a second-pass assessment, you must nonetheless ensure that the risks that you have identified in your first-pass assessment are captured in your organisation's broader risk management framework. Add relevant risks that you have identified to your enterprise risk register, and undertake associated monitoring and reporting activities. You could also consider publishing some outputs from your first-pass assessment. Remember that climate risk assessment is an ongoing and iterative process to which you should return at later stages – there should be an opportunity to consider risks in greater depth at that time.

Action:

If you are proceeding to a second-pass assessment, go to the next section. If you are not proceeding to a second-pass assessment at this stage, ensure the risks that you have identified are captured in your organisation's risk management framework, and go to *Step 4: Implementation, monitoring, evaluation and reporting*.

At the end of Step 1: First-pass assessment, you should be able to answer the following:

- **Which risks** climate hazards have historically affected your organisation and community?
- **How** might these hazards change in the future?
- What are your **key climate-related risks** based on past and future impacts?

Revisit the relevant steps in the first-pass assessment if you are unable to answer these questions.

Step 2: Second-pass assessment

The second-pass assessment builds directly on the insights from the first-pass assessment. By the end of the second-pass assessment, you will have analysed each of your risks in depth, and assigned a clear rating for each risk, enabling you to prioritise which risks to address in your adaptation plan. In the second-pass assessment, you will:

- Analyse **vulnerability** of elements at risk (Step 2.1 Risk analysis: vulnerability)
- Assess **current controls** for each risk (*As part of this process, it is again important to consider interdependencies between elements at risk. To explore these interdependencies, consider mapping out how different elements rely on one another, and ask:*
 - What other systems or services does this element depend on?
 - Could disruption to another element increase this element's vulnerability?
 - Are there shared vulnerabilities across multiple elements?

At the end of this step, consider you may wish to assigning a qualitative vulnerability rating to each element at risk using the matrix above, or you may prefer to simply describe any factors that underpin the element's vulnerability in the relevant section of the templates.

Action:

Document your vulnerability evaluation in the risk assessment template.

At the end of Step 2.1, you should be able to answer the following question:

- What is the **vulnerability** of the **element at risk** for each of the risks that you have identified?

Revisit *Step 2.1 Risk analysis: vulnerability* if you are unable to answer this question.

- Step 2.2 Risk analysis: current controls)
- Assess **likelihood and consequences** of each risk (Step 2.3 Risk analysis: assess likelihood and consequence)
- Consider your organisation's **risk tolerance and appetite**, and decided whether to **treat, tolerate or transfer** each risk (Step 2.4 Risk evaluation)
- Identify and evaluate **potential adaptation actions** (Step 2.5 Identify adaptation actions)

You should undertake the second-pass assessment in close consultation with stakeholders across your organisation (and, where relevant, community) to validate and refine your assessment.

Which template should I use at this step?

Use the risk assessment template.

Where can I find more information?

Refer to the Climate and Health Hazard Data and the *Appendix 1 – Population health risks for assistance*, *Appendix 2 – Climate risk workshop guide*, and *Appendix 3 – Sample risk statements* in completing this step.

Step 2.1 Risk analysis: vulnerability

Begin working through each risk to better understand the vulnerability of each element at risk. Doing this will help you to identify which elements are most susceptible to harm and why.

Remember, vulnerability is a measure of how susceptible an element is to harm from a climate hazard. It is determined by two key factors: sensitivity and adaptive capacity (see Key Concepts for more information). An element with high sensitivity and low adaptive capacity is considered highly vulnerable. Conversely, if sensitivity is low and adaptive capacity is high, vulnerability is likely to be low (see Table 5).

Table 5. Vulnerability assessment matrix based on sensitivity and adaptive capacity

		Sensitivity		
		Low	Medium	High
Adaptive capacity	High	Very low vulnerability	Low vulnerability	Moderate vulnerability
	Medium	Low vulnerability	Moderate vulnerability	High vulnerability
	Low	Moderate vulnerability	High vulnerability	Extreme vulnerability

Work through the risk statements you have developed and assess the vulnerability of the relevant element at risk in each case. A risk statement will often only include one element at risk – but if more than one element is included, you should separately consider vulnerability for each one. For example, consider the risk statement:

“Heatwaves could lead to heat stress, resulting in increased morbidity and/or mortality and increased demand on health services”.

The relevant element at risk for your organisation is population health. You can assess vulnerability as follows:

- **Sensitivity:** Consider how susceptible the local population is to heat-related illness. Consider factors such as age, demographics and prevalence of chronic illness. Are there particular groups, areas, or even individuals that are particularly susceptible? Review past events to understand how heatwaves have affected health outcomes in the past.
- **Adaptive capacity:** Consider whether the population has characteristics that enable effective adaptation to heat-related health risks. This might include factors such as access to healthcare, socio-economic status, housing quality (e.g. insulation or air conditioning), mobility, social connectedness, and education levels. Populations and individuals with higher levels of these attributes are generally better equipped to respond to and recover from heatwave impacts. Reviewing how different groups have coped during past heatwaves can provide valuable insights into their adaptive capacity.

Alternatively, consider the risk statement:

“Bushfires could damage and/or disrupt key supply chain routes and infrastructure, leading to shortages of essential supplies and compromised service continuity”.

In this case, you might assess the vulnerability of supply chains (the relevant element at risk) by examining whether key routes and infrastructure are prone to damage and/or disruption, and by asking whether there are strong contingency plans, alternative routes, and emergency stockpiles in place. Box 4 provides information on how the Climate and Health Hazard Data provided as part of this guidance package can be used to assess vulnerability.

Box 4: Using the vulnerability information in the Climate and Health Hazard Data

To support you to consider vulnerability as part of your climate risk assessment, the Climate and Health Hazard Data provides indicators for a series of population health, demographic and household factors for each health district. *Appendix 1 – Population health risks* also contains information about associations between exposure to different climate hazards and various population health outcomes. This information will help you build a more detailed picture of some of the current and future vulnerabilities in your community.

For example, communities with high rates of chronic conditions such as asthma or heart disease may be highly sensitive to heatwaves or poor air quality, while communities with

Box 4: Using the vulnerability information in the Climate and Health Hazard Data

many households without motor vehicles or single-parent families with young children may face greater challenges evacuating or accessing services during a disaster.

By combining insights from local population health and demographic data with insights about known or projected climate hazards and relevant population health outcomes, you can better articulate specific risks within the scope of your risk assessment.

The information in the Climate and Health Hazard Data and in the manual does not offer a complete picture of all the elements at risk within your organisation. To more comprehensively understand vulnerability across the scope of your risk assessment, you will need to supplement the data in the Climate and Health Hazard Data with additional knowledge and analysis. This may include engaging local stakeholders and reviewing internal documentation and data sources to assess the specific vulnerabilities of:

1. Critical infrastructure (e.g. reliance on single access routes, flood-prone facilities)
2. Supply chains (e.g. dependencies on external providers or transport networks)
3. Workforce (e.g. staff health, mobility, surge capacity)
4. Service delivery models (e.g. reliance on digital systems or outreach services).

By combining population indicators from the Climate and Health Hazard Data with internal organisational knowledge, you can develop a more comprehensive and tailored risk assessment that reflects both community and operational vulnerabilities. You may also wish to supplement your risk assessment by referring to the comprehensive World Health Organization [guidance](#) on assessing climate-change-related vulnerabilities in health care facilities.²⁹

As part of this process, it is again important to consider interdependencies between elements at risk. To explore these interdependencies, consider mapping out how different elements rely on one another, and ask:

- What other systems or services does this element depend on?
- Could disruption to another element increase this element's vulnerability?
- Are there shared vulnerabilities across multiple elements?

At the end of this step, consider you may wish to assigning a qualitative vulnerability rating to each element at risk using the matrix above, or you may prefer to simply describe any factors that underpin the element's vulnerability in the relevant section of the templates.

Action:

Document your vulnerability evaluation in the risk assessment template.

At the end of Step 2.1, you should be able to answer the following question:

- What is the **vulnerability** of the **element at risk** for each of the risks that you have identified?

Revisit *Step 2.1 Risk analysis: vulnerability* if you are unable to answer this question.

Step 2.2 Risk analysis: current controls

Next, you will work systematically through each risk to identify what controls (measures to regulate the likelihood or consequence of a risk eventuating) are already in place for each risk. Your organisation may already have measures, plans, or procedures in place that to some extent mitigate many of the risks you have identified. These measures may be formal (such as policies, infrastructure, emergency protocols, and standard operating procedures) as well as informal culture or practices, such as staff behaviours, community networks, or unwritten norms. Even if these formal or informal controls weren't originally intended to address climate risks, they may still play a role in managing such risks.

Work through each risk one by one, identifying any existing mechanisms that may already be helping to manage the risk, even if they weren't originally designed with climate change in mind. For example:

- If you identified risks from increasing extreme heat, you may find a heatwave response policy, which outlines protocols for staff hydration, patient cooling strategies, and public health communication during heat alerts.
- If you identified risks from increased flooding, you may discover asset maintenance guidelines which include flood protection measures such as regular inspection of drainage systems and installation of flood barriers.

While measures such as these may have been originally designed for historical weather patterns, they may still provide partial (or in some cases complete) protection under future climate scenarios. To identify these existing measures, consider reviewing a range of internal documents and sources. These sources might include strategic and operational plans, risk registers, business continuity or emergency management plans, asset management strategies, health and safety procedures, and sustainability or environmental policies. You may also find relevant information in audit reports, program evaluations, or previous climate-related

assessments. In addition, speaking to different teams – such as facilities, operations, risk, planning, or community engagement – can help uncover informal practices or undocumented knowledge that may be relevant.

At this stage, you can also begin thinking about whether the current controls that you have identified are sufficient to manage the risks to an acceptable level, or whether further controls are likely to be needed. You will consider these questions in greater detail at *Step 2.4 Risk evaluation* and *Step 2.5 Identify adaptation actions*.

Action:

Document your current controls in the risk assessment template.

At the end of Step 2.2, you should be able to answer the following question:

- What **controls** are currently in place for each of the risks that you have identified?
- Revisit *As part of this process*, it is again important to consider interdependencies between elements at risk. To explore these interdependencies, consider mapping out how different elements rely on one another, and ask:

- What other systems or services does this element depend on?
- Could disruption to another element increase this element's vulnerability?
- Are there shared vulnerabilities across multiple elements?

At the end of this step, consider you may wish to assigning a qualitative vulnerability rating to each element at risk using the matrix above, or you may prefer to simply describe any factors that underpin the element's vulnerability in the relevant section of the templates.

Action:

Document your vulnerability evaluation in the risk assessment template.

At the end of Step 2.1, you should be able to answer the following question:

- What is the **vulnerability** of the **element at risk** for each of the risks that you have identified?

Revisit *Step 2.1 Risk analysis: vulnerability* if you are unable to answer this question.

Step 2.2 Risk analysis: current controls if you are unable to answer this question.

Step 2.3 Risk analysis: assess likelihood and consequence

In this step, you will assess the likelihood and consequence of each risk eventuating to assign an overall rating for each risk, which can be used to help prioritise which risks need addressing in your adaptation plan.

Likelihood and consequence scales

Start by identifying or defining both a likelihood scale and a consequence scale, which you will use to rate the climate risks you have identified. These scales provide a consistent way to describe and rate the probability of a risk occurring and the severity of its impacts.

A **likelihood scale** assigns scores and descriptors to different levels of probability that a risk will eventuate. For example, 'almost certain' might mean "could occur several times per year," while 'rare' might mean "only expected in exceptional circumstances" (see Table 6).

Table 6. Sample likelihood scale

Score	Descriptor	Definition
5	Almost certain	Could occur several times per year
4	Likely	Likely to occur in most circumstances
3	Possible	Might occur in most circumstances
2	Unlikely	Not expected to occur in most circumstances
1	Rare	Will only occur in exceptional circumstances and has not occurred in most cases

A **consequence scale** describes the magnitude of impact, typically ranging from insignificant to catastrophic, of a risk eventuating. For example, 'catastrophic' could mean severe, widespread harm or failure of critical systems, while 'minor' might mean temporary disruption that is easily managed (see Table 7).

Table 7. Sample consequence scale

Score	Descriptor	Definition
5	Catastrophic	Severe, widespread harm or failure of critical systems
4	Major	Significant disruption or harm, with long-term implications
3	Moderate	Noticeable impact on operations or health outcomes, requiring intervention
2	Minor	Temporary disruption, easily managed
1	Insignificant	Minor inconvenience, no lasting impact.

If your organisation has an existing risk management framework or corporate risk register (you should have identified any such framework at the beginning of your first-pass assessment), it will be important to align the definitions in your likelihood and consequence scales with those used by your wider organisation. Aligning your likelihood and consequence scales ensures that climate risks can be considered alongside other enterprise risks and integrated into broader planning and governance processes.

If your organisation does not already have defined likelihood and consequence scales, you may use or modify the definitions in the examples provided in Table 6 and Table 7. It is good practice to consult with relevant stakeholders, and particularly with your organisation's risk and emergency management teams, to agree on definitions and ensure shared understanding and buy-in.

Risk ratings

Now you will use these likelihood and consequence scales to assign ratings for each identified risk. These ratings will be used to help identify which risks are most significant and in need of urgent attention. You will start by assessing the **current** likelihood and consequence of each risk, then you will assess the **future** likelihood and consequence of each risk to gain an insight into how risks might evolve under changing climate conditions.

Start by reviewing your analysis of hazards and risks from *Step 1.2 Identify and analyse hazards* and *Step 1.3 Identify climate risks*. This analysis will help you to assess the likelihood and consequence of each risk eventuating. Then, move on to assigning your current likelihood and consequence ratings for each risk. Broadly speaking, a risk is more **likely** to eventuate if:

- It is driven by a **hazard** that occurs frequently.
- The element at risk is highly **exposed**.
- The element at risk is highly **vulnerable**.

For example, the risk "Bushfires could lead to service disruptions affecting hospital operations and patient care, resulting in delayed treatment and increased health complications" might be rated as "Likely" if bushfires occur frequently in your area, the hospital is in a bushfire-prone location, and if the hospital has limited capacity to manage prolonged disruptions (e.g., inadequate backup power or evacuation plans). Conversely, the same risk might be rated as unlikely if bushfires are rare in your region, the hospital is located in a low-risk area, and strong mitigation measures are in place (such as robust emergency protocols, backup power systems, and clear evacuation procedures).

Meanwhile, a risk would typically be given a severe consequence rating if the consequences of the risk eventuating would be significant and far-reaching. For example, the risk "Floods

could lead to contamination of drinking water affecting local communities, resulting in increased cases of waterborne diseases and strain on public health services” might be rated as “Severe” if contamination would have significant impacts on population health, overwhelm healthcare systems, and cause long-term harm to community wellbeing (e.g. widespread illness, hospital capacity exceeded, and costly recovery efforts).

The consequence of a risk is generally more likely to be severe if:

- The risk itself is driven by a hazard that typically has severe impacts.
- The element at risk is highly exposed.
- The element at risk is highly vulnerable.

For example, a community relying on a single untreated water source in a floodplain, with minimal health infrastructure and no contingency plans, would face severe consequences if flooding occurs, resulting in contamination of the water source. Conversely, consequences may be minor if water infrastructure is well-protected, multiple safe water sources exist, and strong mitigation measures are in place (such as advanced treatment systems, emergency supply plans, and a robust public health response).

Once you have evaluated the current likelihood and consequence of each risk, move on to considering the future likelihood and consequence of each risk. To do this, select a future timeframe that is relevant to your organisation (such as the 2050 ‘medium-term’ timeframe used in the Climate and Health Hazard Data) and revisit the future hazard analysis conducted in *Step 1.2 Identify and analyse hazards* to understand projected changes in relevant hazards for this timeframe. You may also wish to consider other expected changes (such as projected demographic, infrastructure, or social changes) in the exposure and/or vulnerability of different elements at risk over time, drawing on local sources and expert advice where available.

Once you have this information, use the same likelihood and consequence scales defined earlier to assign a future rating for each risk. For example, you may have rated the current likelihood of the risk “Floods could lead to contamination of drinking water affecting local communities, resulting in increased cases of waterborne diseases and strain on public health services” as “Possible.” If future hazard projections for your area indicate that much more of your area is likely to experience severe flooding in the future, you might then rate the future likelihood of this risk eventuating as “Likely,” reflecting the increasing probability of the risk eventuating under a changing climate.

Box 5 provides information on how to consider uncertainty when analysing future risks.

Action:

Document your current and future likelihood and consequence ratings for each risk in the risk assessment template.

Box 5: Managing uncertainty with future risks

Assessing future risks involves inherent uncertainty, particularly when projecting how hazards, exposure, and vulnerability may evolve. Assumptions made during this process should be clearly documented to ensure transparency and support future review and refinement. This could involve noting the basis for each assumption, the level of confidence, and any sources used, in your risk assessment report. When communicating future risk ratings to decision-makers, you should include appropriate caveats and make clear where uncertainty exists. This helps ensure decisions are made with an understanding of the limitations of the analysis and the potential for future conditions to differ from current projections.

Now bring your risk ratings for consequence and likelihood together to calculate overall current and future risk ratings. This is done using a risk matrix, which combines likelihood and consequence scores into a composite score between 1 and 25, which is then used to classify the risk into one of five categories: Very low, Low, Medium, High or Extreme (see Table 8).

For example, if the risk “Floods could lead to contamination of drinking water affecting local communities, resulting in increased cases of waterborne diseases and strain on public health services” has a current likelihood rating of “Possible (3)” and a consequences rating of “Moderate (3)”, meaning its overall current risk rating is “Medium (9).” If the future likelihood rating for this risk was “Likely (4)”, with a future consequence rating of “Moderate (3)”, its overall future risk rating would be “High (12).”

Table 8. Sample risk matrix

	Insignificant (1)	Minor (2)	Moderate (3)	Major (4)	Catastrophic (5)
Almost certain (5)	Medium	High	High	Extreme	Extreme
Likely (4)	Medium	Medium	High	High	Extreme
Possible (3)	Low	Medium	Medium	High	High
Unlikely (2)	Very low	Low	Medium	Medium	High
Rare (1)	Very low	Very low	Low	Medium	Medium

Action:

Document your current and future overall risk ratings for each risk in the risk assessment template.

At the end of Step 2.3, you should be able to answer the following question:

- What is the **likelihood and consequence rating** for each risk, both currently and in the future?
- What is the **overall risk rating** for each risk, both currently and in the future?

Revisit *Step 2.3 Risk analysis: assess likelihood and consequence* if you are unable to answer this question.

Step 2.4 Risk evaluation

Now you have calculated the overall risk rating for each risk, the next step is to evaluate each risk in the context of your organisation's broader priorities, capacity, and risk management approach. The aim of this step is to determine the appropriate level of response for each risk, based not only on its rating but also on your organisation's risk tolerance and appetite.

In this step you will:

- Consider your **risk tolerance** (the level of risk your organisation is willing to accept in practice) and **risk appetite** (the overall amount and type of risk your organisation is prepared to pursue or retain to achieve its objectives).
- Review your risk ratings, and use these ratings to decide whether to **treat, tolerate, or transfer** each risk – or apply a combination of these approaches.

This evaluation helps ensure your adaptation planning is proportionate, targeted, and aligned with your organisation's strategic objectives and resources.

Before deciding how to respond to each climate risk you have identified, it's important to understand your organisation's general approach to risk: specifically, its **risk tolerance** and **risk appetite**.

- **Risk tolerance** refers to the level of risk your organisation is willing to accept in practice.
- **Risk appetite** describes the overall amount and type of risk your organisation is prepared to pursue or retain to achieve its objectives.

These concepts can help guide decisions about which risks require action and which may be acceptable to monitor over time. For example, your organisation might have determined in its

enterprise risk management framework that all risks rated “High” or “Extreme” must be treated (i.e., actions should be taken to reduce the likelihood or consequence of the risk eventuating), while “Medium” or lower risks may be tolerated depending on context. This would help you to establish that further action will be required by your organisation in relation to any risks that have been rated as “High” or “Extreme” in your climate risk assessment. Note that your organisation’s risk appetite and tolerance may differ across risk types. For example, your organisation might have a very low tolerance for risks to patient safety (even if their rating is moderate) but be more comfortable accepting higher-rated risks to their finances.

To understand your organisation’s position on risk tolerance and appetite, consult your organisation’s risk management framework or policy documents, and the enterprise risk team or risk manager. Many organisations will have a formal position statement outlining their risk tolerance and appetite, which you can draw on in consultation with relevant stakeholders. If your organisation does not have clearly defined risk tolerance or appetite, you should consult with relevant stakeholders (such as executive leadership, risk managers, and operational teams) to agree on and document a practical threshold for action (for example, deciding that all risks rated “high” or above must be actively addressed). Doing this helps ensure your climate risk assessment aligns with your broader enterprise risk management framework and supports consistent decision-making.

Table 9 summarises some potential responses that you may take for risks rated at different levels. However, as discussed above, it’s important to note that risk appetite and tolerance may not be uniform across all risk types. This nuance helps ensure that decisions about which risks to treat are based not only on the score but also on the nature of the risk and its alignment with organisational priorities.

It’s important to remember that your enterprise risk framework may only identify a very small number of risks that warrant a whole-of-organisation response, and that there will often be other risks that fall below this high threshold but still merit targeted action at a sub-organisational level (for example, by an individual hospital department). Recognising this distinction ensures climate risks are managed proportionately and effectively, rather than assuming that only enterprise-level risks deserve attention.

Now, determine the type of response that may be required for each climate risk and prepare recommendations for consideration by your organisation’s executives or board. Close engagement with your leadership at this point is critical to ensure there is informed decision-making on the broad approach to each risk at the appropriate governance level. Remember that boards and/or executives are ultimately accountable for your organisation’s risk management and oversight.

Table 9. Risk levels and sample responses

Score	Risk level	Response required
20-25	Extreme risk	Urgent attention is required at a senior, whole-of-organisation level. This risk should be addressed promptly, with action plans and management responses required.
10-20	High risk	Prompt attention and adaptation action is likely required. This risk should be addressed in your adaptation plan, with action plans and management responses likely to be required.
5-9	Medium risk	Some attention and action is likely required. This risk should be addressed in your adaptation plan, with action taken where feasible and proportionate.
3-4	Low risk	Keep a watching brief, and ensure this risk is documented in your adaptation plan to revisit next year.
1-2	Very low risk	Keep a watching brief, and ensure this risk is documented to revisit in the next 2-3 years.

For each risk, consider:

- The **risk rating** assigned during your assessment
- Any **additional factors** relevant to your organisation (e.g. strategic priorities, regulatory obligations, available resources)
- Your organisation's **risk tolerance and appetite**, and whether a risk exceeds what your organisation can accept.

Based on these factors, develop recommendations and present them for your leadership to consider. At this stage, you are not determining precisely which actions to take – you are seeking a decision on which of the following broad approaches you should take for each risk:

- **Treat:** take steps to reduce the likelihood or impact of the risk. This is appropriate when the risk exceeds your organisation's tolerance and cannot be accepted as-is.
- **Tolerate:** accept the risk without immediate action. These risks should still be monitored and revisited periodically.
- **Transfer:** shift responsibility for managing the drivers and/or consequences of the risk to another party because they fall beyond your organisation's scope or control. This may involve flagging the issue to another organisation or stakeholder so they can adapt and reduce the consequence to your organisation and/or community. You may also transfer risk through arrangements such as insurance, which can help to reduce the financial consequences of risks to your organisation and/or community.

Your recommendations should be presented clearly and transparently so that your leadership can make informed decisions aligned with their governance responsibilities for risk oversight and management.

A combination of the above responses may be necessary to address many risks. For example, if a health system organisation identifies risks to its assets from increased flooding, it may install flood barriers and improve drainage on site (‘treatment’). Because local stormwater systems are managed by the local council, it may also flag the risk to the council and advocates for infrastructure upgrades (‘transfer’).

Action:

Document your organisation’s decision to treat, tolerate, and/or transfer each risk in the risk assessment template.

At the end of Step 2.4, you should be able to answer the following question:

- What is your organisation’s **risk tolerance** and **risk appetite**?
- Have you decided whether you should **treat, tolerate, and/or transfer** each risk?

Revisit Step 2.4 Risk evaluation if you are unable to answer this question.

Step 2.5 Identify adaptation actions

Now that you have developed a list of climate risks, rated them by likelihood and consequence, and have a decision from your leadership on whether to treat, tolerate and/or transfer each risk, it’s time to identify potential adaptation options – actions that may reduce the likelihood or consequence of a given climate risk eventuating. These actions can be included in your business case and, ultimately, your adaptation plan.

In Step 2.5 you will:

- Identify potential adaptation options for each climate risk, including both new initiatives and improvements to existing controls.
- Evaluate different options against a set of criteria to help you identify which best meet your organisation’s needs.

Where can I find more information?

Refer to the *Appendix 4 – Sample adaptation options* for information to support you completing this step. You may also wish to explore the [Australian Adaptation Database](#) for examples of adaptation actions occurring across different scales, sectors and geographic locations.³⁰

Begin working through your list of risks and consider what adaptation actions might be appropriate in relation to each risk. You should explore adaptation options with colleagues and other stakeholders, perhaps via a workshop (see *Appendix 2 – Climate risk workshop guide*). Adaptation actions can take many forms, including:

- **Social, community and education actions** – e.g. staff training to manage heat-related illness, patient education on preventive health measures, or community outreach during extreme weather events.
- **Governance and planning actions** – e.g. developing long-term service delivery plans that account for projected climate impacts, integrating climate risks into emergency preparedness protocols, embedding climate risk assessment and management into strategic/investment/operational decisions, or updating asset management strategies.
- **Engineering and infrastructure actions** – e.g. installing solar power with battery backup to reduce reliance on grid electricity, upgrading heating, ventilation and cooling systems to manage heat stress, consideration of climate risks in future infrastructure planning, or flood-proofing critical infrastructure.

Actions may include improvements to existing controls such as strengthening infrastructure, updating policies, or refining operational procedures. They may also involve entirely new activities – such as introducing new technologies, redesigning services, or building new partnerships – that are better suited to anticipated climate conditions. Box 6 provides more information on the different types of adaptation actions you could consider.

Remember, climate risk is determined by a combination of hazard, exposure, and vulnerability. Adaptation measures typically focus on reducing the exposure of an element at risk to climate hazards, and/or a reduction in that element's vulnerability to the hazards. For example, a hypothetical adaptation option for risks to population health from extreme heat might include establishing an early warning system and outreach program to check on vulnerable residents during heatwaves. This measure would help reduce both **exposure** to extreme heat (by providing people an opportunity to ensure they are in a cool place before conditions become dangerous) and **vulnerability** (by enhancing the adaptive capacity of populations at greatest risk through the provision of targeted support).

To support your brainstorming of adaptation options, you may wish to refer to

Appendix 4 – Sample adaptation options, which provides examples of adaptation actions relevant to different climate risks. However, it's important to tailor these generic examples to your organisation's specific context. Consider factors such as your organisational mandate, geographic location, population served, available resources, and existing systems and processes, as well as local climate projections, population health profiles, infrastructure conditions, and service delivery models when developing your actions.

Box 6: Types of adaptation actions

When planning how to respond to climate risks, it helps to think about the different types of actions you can take. Not all risks require the same level of response – some may only need monitoring, while others may require major changes. The four categories below provide a simple way to frame your options:³¹

1. **Keep a watching brief:** no immediate action is needed, but keep an eye on the risk and review it regularly as conditions change. For example, if climate projections suggest changes in mosquito-borne disease patterns but current cases are rare, you might monitor public health data and climate trends so you're ready if things shift.
2. **Improved management:** make small improvements to what you already do without changing the overall structure. This is about fine-tuning existing processes. For example, updating heatwave response protocols to include clearer staff communication and hydration checks, while keeping the same service model.
3. **Incremental adaptation:** introduce gradual changes to strengthen resilience, while keeping the core system intact. For example, launching vaccination outreach programs in remote communities as climate change affects disease patterns.
4. **Transformational adaptation:** make major changes to systems or structures when smaller adjustments won't work. This involves a significant shift in how risks are managed. For example, permanently relocating a health facility out of a high flood-risk zone.

These approaches aren't mutually exclusive, nor are they steps that must be taken sequentially – they can overlap. Often, you'll need a mix of actions from different categories at the same time to manage a single risk effectively.

As you identify potential adaptation actions, begin to think about how they might be implemented. This includes considering practical aspects such as:

- **Feasibility:** are the actions realistic given your organisation's capacity and resources?
- **Barriers:** what challenges might you face? Examples include limited leadership support, funding constraints, gaps in expertise, or stakeholder resistance.

- **Dependencies:** are there other initiatives, approvals, or partnerships that would need to be in place?
- **Opportunities:** are there existing programs, funding streams, or collaborations that could support implementation?
- **Sequencing:** are there foundational measures that could or should be put in place now that will help to lay the groundwork for further adaptation at a later stage?

It is also important to consider potential unintended consequences of different adaptation options, to minimise the risk of inadvertent maladaptation.

Then, for each risk, begin to flesh out your adaptation actions by estimating:

- **A rough cost range** (e.g. low, medium, high)
- **An indicative timeframe for implementation** (e.g. 1-5 years, 5-10 years, >10 years)
- **Key enablers of, or barriers to, implementation** (e.g. funding availability, regulatory requirements, leadership support, workforce capacity, stakeholder engagement).

These estimates do not need to be precise but will help inform prioritisation and planning.

To help you refine your options, consider:

- **Effectiveness:** Does the action fully or substantially address the identified risk? Does the action reduce exposure and/or sensitivity to climate hazards, or strengthen adaptive capacity for affected populations or systems?
- **Timeframe of benefits:** Will the action deliver short-term, medium-term, and/or long-term benefits? Are there foundational actions that could or should be put in place now to enable further adaptation at a later stage if required?
- **Co-benefits:** Does the action support other organisational goals (e.g. sustainability, health equity, operational efficiency)?
- **Minimisation of negative impacts:** Could the action have unintended consequences or disrupt other activities (i.e., maladaptation)?
- **Emissions impact:** Will the action reduce, maintain, or increase greenhouse gas emissions?
- **Capability:** Does our organisation have the capacity and capability to deliver this action, or would additional expertise and/or staffing be required?
- **Implementation time:** How long will it take to implement the action?
- **Lead-up time:** What planning, approvals, or preparatory work is required?
- **Estimated cost:** What is the approximate financial cost of the action?
- **Stakeholder engagement needs:** What stakeholder engagement and consultation will be required to ensure you have support and buy-in?

- **Implementation risks:** Are there risks associated with delivering the action (e.g. technical, financial, reputational)? What might be potential unintended consequences that could give rise to maladaptation?

To help answer these questions, you may wish to consult experts or review relevant research to have a grasp of the evidence regarding specific adaptation actions, and to understand what has worked in other countries/settings. Your goal is to identify the actions that best address the risk, are feasible within your organisational context, and offer the greatest overall benefit. Relevant stakeholders should be consulted to ensure the selected actions are practical, supported, and aligned with organisational priorities. Transparent engagement also helps build buy-in and reduces the likelihood of resistance during implementation. This step is about making informed, strategic choices that balance ambition with practicality, helping to ensure your eventual climate adaptation plan is both impactful and achievable.

Finally, don't forget about risks you've decided to tolerate or transfer.

- For **tolerated** risks, consider what monitoring or review mechanisms should be in place to track changes over time. Could a watching brief be established to ensure the risk is revisited periodically?
- For **transferred** risks, think about what actions are needed to ensure the appropriate party is aware of the risk and agrees to manage it. This might involve formal communication, partnership development, or advocacy to ensure the issue is flagged and addressed.

Even if your organisation isn't directly responsible for managing Tolerated or Transferred risks, you may still have a role in supporting coordination, information sharing, or contingency planning.

Action:

Document your preferred adaptation actions (And possibly one or two alternative options) for each prioritised risk in the risk assessment template.

At the end of Step 2.5, you should be able to answer the following question:

- What **adaptation actions** could you take for each of the risks you have decided to treat?
- How might each of these actions be implemented?

Revisit *Step 2.5 Identify adaptation actions* if you are unable to answer this question.

Step 3: Climate adaptation plan

After completing your climate risk assessment and identifying potential adaptation actions, the next step is to develop an adaptation plan. This plan will clearly link priority risks to practical responses, outline how and when actions will be implemented and by whom, communicate your strategy to internal and external stakeholders, and help to ensure action and accountability. It should focus on urgent risks while placing lower-priority risks on a watching brief for future review.

In Step 3 you will:

- **Develop a business case** identifying the costs, benefits, risks and feasibility of different adaptation options.
- **Draft an adaptation plan** outlining the actions you will take to manage climate risks to your organisations and/or community.

In an ideal scenario, you would first develop and secure approval of a full business case so that only actions with clear costings and approved expenditure flow through into the final adaptation plan. However, in practice, aligning this process with organisational budget cycles and business planning timelines can be challenging. In some cases, you may need to develop the adaptation plan first and then seek funding or business case approval for specific measures iteratively as you progress. This guidance is designed to support either pathway, allowing flexibility depending on your organisation's context.

Step 3.1 Prepare your business case

In *Step 2.5 Identify adaptation actions* you identified a range of potential adaptation actions to address your climate-related risks. Step 3.1 is about selecting the most important and feasible actions and packaging them into a business case that can be presented to decision-makers for support and funding.

The business case provides the evidence and rationale needed to secure support and resources from your leadership for your proposed actions – particularly those addressing high-priority or extreme risks, or which lay the foundations for further effective action in the future. It should outline the costs, benefits, risks and feasibility of different adaptation options for your organisation, helping decision-makers make decisions and allocate funding for addressing climate risks.

Which template should I use at this step?

Use the business case template.

Start by grouping your shortlisted actions into a few options packages. Each package should represent a different level of investment and ambition. For example:

- A **comprehensive package** – this will likely be the highest cost, highest benefit option.
- One or more **intermediate packages** that balance cost, impact, and feasibility, reflecting organisational priorities and staged implementation.
- A **targeted package** that focuses only on essential actions addressing the most urgent risks.

Indicate to your decision-makers which is your preferred package – the one that best balances impact, feasibility, and organisational fit. For each package, consider:

- **Estimated costs:** Use rough cost ranges (e.g. low, medium, high) if detailed figures aren't available.
- **Timing:** When could each action be implemented? Are some urgent, while others can be staged over time?
- **Risks:** What are the risks associated with implementation of each package, and what mitigations will you put in place?
- **Acceptability:** How will the package be received by stakeholders (e.g. patients, staff, partner organisations, regulators)?
- **Effectiveness:** How well does the package address the priority risks? Is there evidence from other context on the effectiveness of the measures you are proposing?
- **Alignment:** Does the package support your organisation's strategic goals, existing programs, or planning cycles?
- **Other benefits:** What other co-benefits could be achieved as a result of the measures you are proposing (e.g. improved health outcomes, operational efficiency, or reputational gains)?

To help decision-makers compare options, you may wish to include a basic cost-benefit analysis of different options. If so, you should aim to show:

- The **estimated cost** of each package. Also include a 'no-action' scenario as a baseline. This should outline the likely costs of not implementing further adaptation measures. You can draw on your risk assessment and your analysis of past hazard impacts (conducted at *Step 1.2 Identify and analyse hazards*) to estimate these costs.

- The **expected benefits**, such as avoided service disruptions, reduced health impacts, or long-term savings. Include non-financial benefits, like improved staff wellbeing or community resilience.

It is recommended you work closely with your organisation's finance/budget team to prepare any cost-benefit analysis, ensuring that assumptions, costing approaches, and valuation methods are aligned with internal expectations. Helpful resources are available online to support your team undertake the analysis.^{32,33} Try to obtain the best available evidence for likely costs and engage relevant stakeholders to help validate your assumptions and estimates so the final analysis is as robust and defensible as possible.

You may also wish to include as part of your business case a proposal for the risk assessment and adaptation planning process to be reviewed and/or repeated at a future stage aligned with your organisation's planning cycles, to ensure that this is not just a one-off process.

A business case template is provided to help you structure your case clearly and concisely. It includes sections for summarising your risks, describing proposed actions, outlining costs and benefits, and presenting your recommended option. Box 7 provides suggestions on presenting your business case effectively.

Action:

Develop and submit your business plan using the business case template.

At the end of Step 3.1, you should be able to answer the following question:

- Do you understand how to prepare a **suite of options packages**?
- Are you able to structure your **business case**?

Revisit *Step 3.1 Prepare your business case* if you are unable to answer these questions.

Box 7: Presenting your business case effectively

Here are some additional tips for submitting and selling your business case to decision-makers:

1. Lead with a compelling executive summary

Produce a clear, one-page summary outlining the problem, proposed solution and expected benefits. This helps decision-makers quickly grasp the value of your proposal.

2. Use plain language and avoid jargon

Make your case accessible to non-technical readers. Focus on clarity and brevity, especially when describing risks, actions, and benefits.

3. Highlight alignment with organisational objectives and external mandates

Refer to relevant organisational strategies, objectives and priorities, and any relevant national or state-level frameworks (e.g. the National Health and Climate Strategy) to show how your proposal supports broader goals. Highlight alignment with other priorities to demonstrate the authorising environment for this work.

4. Include stakeholder endorsements or letters of support

If possible, include brief statements or endorsements from internal or external stakeholders to demonstrate broad support and credibility.

5. Frame adaptation as risk management and resilience building

Position your proposal as a proactive investment in service continuity, population health protection, and organisational resilience – not just as a climate initiative.

6. Be transparent about uncertainties, assumptions and risks

Acknowledge where estimates are approximate and explain any assumptions. This builds trust and shows you've considered limitations. Outline any risks associated with your proposals, and discuss any proposed strategies to mitigate these risks.

7. Offer a clear implementation pathway

Outline how the preferred option will be delivered, including governance, timelines, monitoring and evaluation. Showing you have thought in detail about how to deliver this option will provide assurance to decision-makers that the proposal is actionable. If possible, include case studies of successful implementation in other contexts.

8. Be ready to present and discuss your case

Prepare a short slide deck and accompanying verbal presentation alongside your written business case. Be ready to answer questions and adapt your proposal based on feedback.

Step 3.2 Develop your adaptation plan

The adaptation plan brings together your risk assessment findings, selected adaptation actions, and implementation strategy into a clear and practical framework. This plan will serve as a strategic roadmap and communication tool across your organisation and with external stakeholders, guiding action, monitoring, evaluation, and accountability. You may wish to use the adaptation plan template provided to organise your content.

Your plan should be concise, focused, and accessible. Aim to:

- **Reinforce the urgency** of action. Highlight historical impacts to create urgency and relevance.
- **Demonstrate alignment** with organisational goals, and existing emergency, infrastructure, and health plans.
- **Frame options positively**, emphasising health, business, and financial benefits, not just risk reduction. Sequence actions logically and consider short- vs. long-term priorities.
- **Highlight stakeholder engagement**, demonstrating alignment with stakeholder priorities and referencing their support.
- **Provide** a clear roadmap for implementation and monitoring, including timelines, responsibilities, and monitoring and evaluation mechanisms.

Which template should I use at this step?

Use the adaptation plan template.

Provide background and context

Begin your adaptation plan by:

- Highlighting the implications of climate change for service delivery, infrastructure resilience, and population health. You may also need to include a brief explanation of key terms and concepts used in the adaptation plan.
- Outlining any policy, regulatory, legislative or strategic frameworks that underpin your risk assessment and adaptation planning process.
- Explaining how climate adaptation aligns with your organisation's broader strategic priorities.

This material will help to situate your adaptation actions within broader organisational and policy contexts.

Next, summarise the process undertaken to complete the risk assessment and develop the adaptation plan, including the methodology used. Document how stakeholders were involved in the risk assessment and business case development. Highlight:

- who was consulted and how
- key contributions or feedback
- any endorsements or commitments to support implementation
- where stakeholders were not previously involved, explain how the plan aligns with their interests and responsibilities.

Summarise your risk assessment findings

Provide a concise overview of the climate risks facing your organisation and/or community. This section provides the foundation for your adaptation plan by clearly presenting the climate risks your organisation faces and why these require action. The summary should be concise, accessible, and tailored to your audience, ensuring decision-makers and stakeholders understand the urgency and relevance. Aim to keep this section short and impactful, use headings and tables to organise information, and highlight why these risks matter now, not just in the future, to underline urgency.

You should include:

- **Overview of climate hazards:** summarise relevant climate scenarios and projected changes for your region (e.g., temperature extremes, rainfall patterns, sea-level rise). Highlight trends that are driving increased risk (e.g., frequency of heatwaves, intensity of storms).
- **Overview of risks:** list the key risks identified in your risk assessment (high and extreme risks should be highlighted; you may also wish to include lower-priority risks on a “watching brief” basis)
- **Historical impacts and case studies:** use local examples of past climate events and their consequences for health services, infrastructure, and population health. Where possible, include cost estimates of past impacts to reinforce the financial case for adaptation.
- **Visual aids:** if possible, incorporate maps, graphs, and timelines to illustrate projected changes and historical events.

Present your adaptation actions

List the adaptation actions selected through your business case process. For each action, include:

- a brief description of the action

- the risk it addresses
- expected outcomes
- implementation timeframe
- any dependencies or sequencing considerations
- links to existing business processes or strategic plans.

Ensure the actions are clearly prioritised, with responses to high risks and extreme risks given prominence. Lower-priority risks should be included on a watching brief, with review timelines specified.

Summarise roles, responsibilities, monitoring, evaluation and reporting

Finally, clarify who does what and how progress will be tracked (see *Step 4: Implementation, monitoring, evaluation and reporting* for further information on monitoring, evaluation and reporting):

- **Roles and responsibilities:** Identify the lead for plan oversight and assign owners for each action. Include governance arrangements and reporting lines.
- **Monitoring:** Outline performance indicators (to track progress) and trigger indicators (to activate staged actions). Specify data sources and frequency.
- **Evaluation:** Define how success will be measured and when formal reviews will occur.
- **Reporting:** State reporting frequency, audiences, and format.

Given that climate adaptation is not a one-off exercise, but an iterative and cyclical process, your adaptation plan should ideally commit to repeating the risk assessment and adaptation planning process on a set timeline (for example, in five years' time) that aligns with your own organisation's planning cycles.

Action:

Develop your adaptation plan using the adaptation plan.

Step 3.3 Publish and launch your adaptation plan

Now it is time to secure your leadership's agreement to publish and launch your adaptation plan. If possible, ensure that senior leaders are visibly involved in the publication and launch of the plan, such as by writing a foreword, providing key messages, or hosting/speaking at the launch event. Their endorsement helps signal organisational commitment, encourages buy-in across all levels, and positions the plan as a strategic priority.

Once this agreement is secured, depending on your local context, available resourcing, and organisational culture, here are some options you could consider to raise awareness and maximise stakeholder engagement moving forward:

- **Plan a launch event:** Host a formal launch to introduce the plan. This could include presentations, Q&A sessions, and interactive workshops. Consider inviting your board and executive, internal staff, external partners, community representatives, and media.
- **Create a communications toolkit:** Develop materials such as infographics, summaries, FAQs, and videos to make the plan accessible and engaging.
- **Distribute via internal channels:** Share the plan widely via newsletters, intranet, team meetings, and digital signage. Ensure all staff understand the relevance of the plan to their roles.

A well-coordinated launch supported by senior leadership helps build a shared understanding of the plan's importance and creates early momentum for implementation. Ensuring staff and stakeholders are informed and engaged from the outset will support smoother adoption and more consistent integration into day-to-day decision-making.

At the end of Step 3.2 and 3.3, you should be able to answer the following question:

- Do you understand how to construct an **adaptation plan**?

Revisit *Step 3.2 Develop your adaptation plan* and *Step 3.3 Publish and launch your adaptation plan* if you are unable to answer this question.

Step 4: Implementation, monitoring, evaluation and reporting

Finalising your climate risk assessment and adaptation plan is a significant milestone – but it is not the end of the process. Implementation, monitoring, evaluation and reporting are essential to ensure your plan remains relevant, effective, and responsive to changing conditions. Climate adaptation is not a one-off exercise; it is an iterative and cyclical process that should be revisited at regular intervals to take account of new information, emerging risks, and evolving organisational priorities.

This chapter outlines key considerations for putting your plan into action, tracking progress, and reporting outcomes in a way that supports transparency, stakeholder engagement, and continuous improvement.

Step 4.1 Implementation and integration

Successful implementation begins with embedding your adaptation plan into the core functions of your organisation. This includes:

- **Embedding in business planning:** Ensure your adaptation actions are referenced in strategic plans, operational documents, and risk assessments.
- **Integrating with enterprise risk management:** Work with governance and risk teams to incorporate climate-related risks into your organisation's enterprise risk management framework and processes.
- **Updating risk registers and controls:** Include climate risks in corporate risk registers, with appropriate mitigation strategies and monitoring mechanisms.
- **Aligning with reporting and compliance obligations:** Link your adaptation efforts to existing frameworks such as Environmental, Social and Governance, sustainability, or regulatory disclosures to reinforce accountability.

To support ownership and momentum, consider the following:

- **Appoint climate adaptation champions,** including from your board and/or executive, to lead implementation and foster engagement.
- **Offer training and capacity-building** opportunities to build understanding and capability around climate risks and adaptation strategies. Consider establishing a community of practice.

- Establish a stakeholder advisory group to provide ongoing input and champion the plan across sectors (this may already have been established as part of your risk assessment and adaptation planning process).
- Celebrate contributions through internal communications and recognition events to maintain enthusiasm and commitment.

Step 4.2 Monitoring, evaluation and reporting

Monitoring, evaluation and reporting are complementary components of climate risk assessment and adaptation planning processes, supporting decision-making, transparency and accountability. They help ensure your actions are achieving their intended outcomes, assist with identification of unintended consequences, and indicate when adjustments are needed.

Monitoring

Monitoring is the regular collection and analysis of information to provide indicators of progress and/or status. It includes monitoring inputs, activities, outputs and progress towards outcomes. Monitoring answers the question: 'What is going on?'³⁴

Two complementary types of monitoring are essential in this process: performance monitoring and trigger monitoring. Each serves a distinct purpose and will contribute to the overall effectiveness and responsiveness of your adaptation strategy.

Performance monitoring: tracking progress over time

Performance monitoring focuses on assessing how well your adaptation actions are progressing against the objectives set out in your plan. It involves the use of performance indicators – measurable metrics that reflect the effectiveness, efficiency, and impact of your actions.

Indicators can be grouped into three types:³⁵

- **Structure indicators:** measure the resources or capacities in place (e.g., the existence of a policy or decision-making structure).
- **Process indicators:** track whether actions are being implemented as intended (e.g. frequency of maintenance activities).
- **Outcome indicators:** assess the results or impacts of those actions (e.g., reduction in service disruptions, improved resilience of critical infrastructure).

You will want process indicators to monitor implementation progress, in addition to outcome indicators to understand whether these actions are achieving their intended effect.

These indicators should be:

- **easily understood** by internal and external audiences
- **directly relevant** to the attributes being measured (e.g. resilience, service continuity)
- **sensitive to change**, so they reflect progress or setbacks
- **measurable** using available data sources
- **limited in number**, to ensure the monitoring process remains manageable.

Performance indicators are typically tracked over time and reported at regular intervals (e.g. annually, biannually). They help you answer questions like:

- **Are our adaptation actions** being implemented as planned?
- **Are they improving resilience** or reducing vulnerability?
- **Are we seeing measurable improvements** in population health, service delivery or infrastructure performance?

Examples of **process indicators** (tracking implementation progress) include:

- **number of staff trained** in climate-related emergency protocols
- **proportion of infrastructure upgraded** to improve climate resilience.

Examples of **outcome indicators** (measuring impact or results) include:

- frequency and/or duration of service disruptions during climate events
- incidence and/or prevalence of climate-sensitive health outcomes.

Your indicators should ideally be developed in consultation with stakeholders to ensure they are meaningful, accepted, and aligned with broader organisational goals.

Trigger monitoring: responding to changing climate conditions

While performance monitoring tracks progress over time, trigger monitoring is focused on identifying specific climate-related changes that act as prompts for pre-defined actions to be implemented. This helps ensure that when certain thresholds or tipping points are reached, the corresponding adaptation measures are activated, adjusted, or reassessed. Trigger indicators are linked to thresholds or tipping points – for example, a certain number of consecutive days above a temperature threshold, or a rainfall event exceeding a defined volume.

Trigger indicators are especially useful for:

- **time-sensitive actions** that need to be implemented when certain conditions are met
- **threshold-based planning**, where actions are contingent on climate variables reaching critical levels

- **adaptive management**, allowing for flexible responses to emerging risks.

Trigger indicators should be:

- clearly related to specific climate changes (e.g. temperature, rainfall, sea level)
- measurable over the long-term using reliable data sources
- designed to allow sufficient time for planning and response
- linked to pre-defined actions in your adaptation plan.

Examples of ways in which trigger indicators might be used include:

- **activation** of heatwave response protocols when temperatures exceed 40°C for three consecutive days
- **initiation** of flood mitigation measures when rainfall exceeds 100mm in 24 hours
- **reassessment** of coastal infrastructure plans when sea level rise projections exceed a certain threshold.

Unlike performance indicators, trigger indicators are not used for ongoing monitoring. They are event-based and have a defined lifespan, tied to specific actions or decision points. These indicators should be developed in consultation with stakeholders to ensure they are meaningful, accepted, and aligned with broader organisational goals and processes. In many cases, emergency management teams will have an existing set of trigger monitors as part of their emergency management procedures – you should aim to align with any existing indicators wherever possible.

Evaluation

Evaluation is assessment of an activity to assess the achievement of objectives as well as testing underlying assumptions. While monitoring gives information on the status of a policy, program, or project at any given time relative to respective targets and outcomes. Evaluation gives evidence of why targets and outcomes have (or have not) been achieved.³⁴ Evaluation answers the question: 'What happened?'

Key dimensions typically considered in an evaluation include:

- **effectiveness**: the extent to which objectives have been achieved. It focuses on outcomes and impacts, examining whether the changes that were expected actually occurred
- **efficiency**: the degree to which resources (including time, funding, personnel, and materials) have been used optimally to achieve the desired results
- **equity**: the fairness or inclusiveness in terms of who benefits and who bears costs or risks
- **acceptability**: the extent to which the policy, program, or intervention is perceived as appropriate, satisfactory, or suitable by stakeholders.

At defined points in the implementation of your adaptation plan, it is advisable to undertake a formal evaluation that considers the dimensions above. This evaluation can draw and build on the ongoing monitoring activities outlined above, and can be used to inform adjustments to the implementation of adaptation actions, resourcing decisions, and to feed into future iterations of your climate risk assessment adaptation plan.

Reporting

Effective reporting is essential for tracking progress, maintaining transparency, and informing decision-making. Your reports should clearly present:

- **What is being monitored and/or evaluated:** Summarise the key indicators (structure, process, outcome, and any trigger indicators) and explain why they matter. If an evaluation has occurred, outline what has been evaluated.
- **Current status and trends:** Show how these indicators have changed over time, highlighting progress, setbacks, or emerging risks.
- **Implications for action:** Interpret what the data means – are actions on track, do they need adjustment, or are new measures required?

Reporting frequency should reflect the pace of change and the nature of the indicators being tracked. In early stages, biannual or triannual reporting may be more appropriate, allowing time for progress and reducing administrative burden. As adaptation efforts mature, reporting can be streamlined and aligned with broader organisational cycles.

Your reporting might be presented in the following:

- **Annual reports:** Incorporate adaptation progress into your organisation's standard reporting cycle, providing a high-level summary of key indicators and outcomes.
- **Special reports:** Prepare dedicated reports focused on climate adaptation, which can include detailed analysis, lessons learned, and recommendations for next steps.
- **Brief updates for governance meetings:** Provide concise summaries of indicator trends and any trigger events to inform decision-making.

At the end of Step 4.1 and 4.2, you should be able to answer the following question:

- Where and how do you intend to embed climate adaptation actions within your organisation's existing **planning and risk frameworks** to ensure they are implemented effectively?
- Are you able to distinguish between performance and trigger indicators, and select appropriate examples of each to monitor progress and respond to changing climate conditions in your organisation?
- How do you intend to **evaluate and report on progress** in relation to your climate risk assessment and adaptation plan?

Revisit *Step 4.1 Implementation and integration* and *Step 4.2 Monitoring, evaluation and reporting* if you are unable to answer these questions.

Glossary

Adaptation (climate adaptation)

Actions taken to prepare for and reduce the impacts of climate change.

Adaptation plan

A strategic document outlining how an organisation will respond to identified climate risks, including specific actions, timelines, and monitoring approach.

Adaptive capacity

The ability of a system, organisation, or community to adjust to climate change, reduce potential damage, and recover from impacts.

Cascading and compounding risks

Interconnected climate risks that amplify each other's impacts.

- **Cascading** risks occur when one climate-related event triggers a chain of subsequent impacts across systems.
- **Compounding** risks arise when multiple hazards or stressors occur simultaneously or sequentially, increasing overall harm.

Climate hazard

A climate-related event or trend that could cause harm, such as heatwaves, bushfires, floods, droughts, or sea level rise.

Climate resilience

The capacity to adjust to climate-related changes, development of uncertainties. Climate resilience involves the capacity to manage climate-related risks and benefit from climate-related opportunities.

Climate risk

The potential for harm or disruption caused by climate change and/or efforts to limit it.

Climate scenario

A plausible description of future climate conditions based on different levels of global greenhouse gas emissions. Scenarios help organisations plan for a range of possible futures.

Consequence (in risk assessment)

The implications for an organisation or community should a risk eventuate.

Control

Measures taken to regulate the likelihood or consequence of a risk. May also be referred to as 'risk treatment'.

Element at risk

A specific person, natural system, service, piece of infrastructure, resource, or other assets that may be adversely affected by climate-related hazards.

Exposure

The presence of people, natural systems, services, infrastructure, resources, or other assets in areas that could be affected by climate hazards.

Greenhouse gas

Gases that trap heat in the atmosphere and contribute to global warming. Common examples include carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O).

Impact

The effect of a climate hazard on an exposed element at risk.

Likelihood (in risk assessment)

The probability that a climate risk will occur, based on historical data and future projections.

Maladaptation

An adaptation action that unintentionally increases vulnerability or creates new risks, often by failing to consider long-term consequences or broader system impacts.

Mitigation (emissions mitigation)

Efforts to reduce or prevent greenhouse gas emissions, such as using renewable energy or improving energy efficiency. Mitigation addresses the causes of climate change.

Physical risk

Risks that arise from the direct impacts of climate change. They can be characterised as:

- **Acute** risks from changes in the frequency and severity of extreme events, such as increased incidence of heat stress during heatwaves
- **Chronic** risks from longer-term, more gradual changes in climate, such as changes in average rainfall contributing to water scarcity.

Resilience

The ability of a system, organisation, or community to withstand, recover from, and adapt to climate-related disruptions.

Risk appetite

The overarching amount and types of risk an organisation is willing to accept or retain to achieve its objectives.

Risk rating

A score assigned to a climate risk based on its likelihood and consequence. A risk rating helps prioritise which risks need action.

Risk tolerance

The levels of risk taking that are acceptable to achieve a specific strategic objective.

Sensitivity

The degree to which a system or population would be affected by climate hazards in the absence of any adjustment or response. High sensitivity means greater potential for harm.

Transition risk

Risks arising from the shift to a low-emissions economy, including changes in policy, regulation, technology, or market conditions that may affect operations or finances.

Vulnerability

The propensity or predisposition of exposed people, natural systems, services, infrastructure, resources, or other assets to be adversely affected by climate hazards. Vulnerability is underpinned by the characteristics of the person or asset, and is determined by sensitivity and adaptive capacity.

Appendices

Appendix 1 – Population health risks

As discussed at *Step 1.3 Identify climate risks*, effectively identifying climate risks to population health requires understanding how different climate hazards affect population health outcomes. This knowledge can be combined with data on the baseline burden of climate-sensitive health conditions in your community, along with information on current and projected exposure to climate hazards in your region or service area to help you identify the most significant population health risks.

This appendix aims to help users better understand how exposure to various climate hazards might influence population health outcomes. It presents findings from a rapid review of local and international epidemiological estimates of associations between exposure to different climate hazards and relevant population health outcomes undertaken by the World Health Organization Collaborating Centre for Climate Change and Health Impact Assessment at Curtin University in 2024. While these results are indicative rather than definitive and/or exhaustive, they offer a starting point for identifying and analysing potential population health risks when combined with local data, expert judgement, and other context-specific evidence.

The rapid literature review was conducted using structured keyword searches of Scopus, a large, multi-disciplinary database of peer-reviewed research. Following screening and assessment, 103 relevant studies were identified. Time and resource constraints meant additional steps (such as searches of additional databases or formal quality assessments of individual studies) could not be undertaken, as would typically occur in a systematic review. Consequently, while the review provides useful insights, it should not be considered comprehensive or definitive.

Interpreting the results in this appendix

The results from the literature review are generally reported in statements like this (fictional example): “One study found that the relative risk of respiratory illness increased by 5% [2.5%, 7.5%] following exposure to bushfire smoke.” Statements such as this mean that, in the population studied, people exposed to bushfire smoke had a greater chance of experiencing respiratory illness compared to those not exposed to bushfire smoke. Ranges in square brackets refer to the 95% confidence interval – which means that, in this example, the best estimate of the increase in risk is 5%, but based on the data, the true increase could reasonably be as low as 2.5% or as high as 7.5%.

Estimates of this kind indicate the direction and strength of an association. They do not necessarily imply a causal relationship, nor that the risk factor has a direct effect. Risk factors may be linked to health outcome through a chain of subsequent cause-and-effect links. Findings are often shaped by the extent to which the study controls for other factors (e.g. individual demographic or socio-economic characteristics). Although controlling for these factors can result in significant changes to results, controlling in this way is not always possible or even helpful (as in some cases, over-adjusting for too many additional variables can mask the true association). The estimates provided here are not intended to be applied directly as predictive values for your population and do not mean, for example, that:

- The number of people experiencing respiratory illness increased by 5% following bushfire smoke exposure (the 5% increase refers to relative risk, not an absolute increase in cases); or
- The severity of respiratory illness increased by 5% following bushfire smoke exposure (the 5% estimate is of risk of occurrence, not severity); or
- The increase in risk necessarily applies to your local population (the estimate is context-specific to the study population, which may differ in demographics, health status, exposure levels, and adaptive capacity).

Most estimates reported in this appendix are taken from individual studies, undertaken in specific settings. As such, there are limits to their external validity, or generalisability (i.e. the extent to which findings can be applied beyond the study settings). The actual impact in your area might be greater than or less than the findings reported here.

Finally, this appendix does not include every possible health impact associated with exposure to climate hazards. If a particular health outcome is not listed here, this does not mean it is irrelevant or does not occur – it simply means an estimate was not reported in the studies identified in this literature review. Further, because the review focused on identifying quantitative estimates of association between specific hazards and specific health outcomes, more distal, cascading, compounding, or complex pathways by which climate change can affect health will not be fully accounted for. For example, health and wellbeing impacts mediated by social, economic, or ecological systems – such as those arising through climate-driven disruptions to food security – are outside the scope of this review. You should therefore use local knowledge, expert input, and community data to identify additional health outcomes that may be important for your area. If possible, seek advice from local public health experts to assist you with interpreting the evidence outlined below for your local context.

Heat and humidity

The review found evidence of associations between exposure to heat and humidity and a range of adverse health outcomes. Adverse health outcomes were associated with both exposure to heatwaves (periods of multiple days with unusually high temperatures for the location), as well as with exposure to temperatures higher than normal but not reaching heatwave extremes. A study in Melbourne, Sydney and Brisbane found that at the 99th percentile of temperature (i.e, when temperatures reach the top 1% of the hottest days), the relative risk of mortality increased by 34% [22%, 46%] in Brisbane, 12% [4%, 19%] in Melbourne, and 33% [14%, 56%] in Sydney.³⁶ International studies also found associations between heatwaves and mortality, including mortality from cardiovascular and respiratory conditions.^{37,38}

A study in Brisbane found that, for people with Alzheimer's disease, middle-intensity heatwaves were associated with a 51% [2%, 126%] increase in relative risk of hospitalisation, and a 269% [76%, 665%] increase in relative risk of post-discharge death.³⁹

A second study from Queensland found high temperatures were associated with a 7% [5%, 9%] increase in the relative risk of hospitalisation for cardiovascular disease.⁴⁰ Another Brisbane-based study found a 259.0% [35.0%, 850.0%] increase in the odds of hospitalisation for renal (kidney) conditions amongst children within one day of a heatwave.⁴¹

A global meta-analysis found exposure to high temperatures was associated with a 32% [24%, 40%] increase in the relative risk of renal colic (kidney stones) and a 27% [12%, 43%] increase in the relative risk of other kidney diseases.⁴²

A global systematic review and meta-analysis found the relative risk of suicide deaths/attempts increased by 1.6% [1.3%, 1.9%] for every 1°C increase in ambient temperature.⁴³ A second systematic review and meta-analysis showed that heatwaves and extreme high temperatures (99th percentile) were associated, respectively, with a 5% [2%, 8%] and 18% [8%, 29%] increase in relative risk of mental and behavioural disorders.⁴⁴

International studies demonstrated associations between exposure to heatwaves and adverse pregnancy and birth outcomes. For example, a study from Southern California found that exposure to extreme heat days during pregnancy, and during the third trimester specifically, was associated respectively with a 27% [17%, 37%] and 28% [17%, 41%] increase in relative risk of severe maternal morbidity.⁴⁵ Some international studies demonstrated associations between high temperatures and infectious conditions, but the generalisability of these findings to an Australian context is unclear.

While the focus of this section is on high temperatures and heatwaves, it is important to note that exposure to cold temperatures is also associated with adverse health outcomes.

Bushfire smoke

The review found evidence of associations between exposure to bushfire smoke and several adverse health outcomes, including mortality. For example, one study in Sydney found that a 10 $\mu\text{g}/\text{m}^3$ increase in exposure to bushfire-related air pollution was associated with a 3.2% [0.3%, 6.2%] increase in relative risk of death from any cause over the 3 days following exposure amongst people aged 65 and older.⁴⁶ A study in Darwin found that hospital admissions of Indigenous people for respiratory infections increased by 15.02% [3.73%, 27.54%] in the 3 days following bushfire smoke exposure.⁴⁷ A study from California found that a 10 $\mu\text{g}/\text{m}^3$ increase in exposure to bushfire-related air pollution was associated with an 8% [4%, 13%] increase in the odds of an emergency department presentation for asthma.⁴⁸ While this summary has focused on the relatively small number of studies investigating health outcomes associated with bushfire smoke specifically, there is a larger body of evidence demonstrating an association between a wide range of adverse health outcomes and air pollution more broadly, which is not captured here.

Drought

The review found evidence of associations between exposure to drought and several adverse health outcomes, in particular mental health outcomes. For example, a study in New South Wales found an increase in the drought index from the first quartile to the third quartile was associated with a 15% [8%, 22%] increase in the relative risk of suicide amongst rural men aged 30-49.⁴⁹ Other Australian studies in rural settings found associations between exposure to drought and psychological distress.^{50,51} Evidence from international contexts indicated potential associations between drought exposure and other negative health outcomes, including mortality, infectious diseases, and respiratory outcomes. For example, a study in the Northern Rockies and Plains region of the USA found severe drought was associated with a 4.1% increase in relative risk of all-cause mortality at six months and a 0.9% increase at 12 months.⁵² However, the evidence from these international studies was mixed, and the generalisability of these findings to an Australian context is unclear.

Flooding and rainfall

The review found evidence of associations between exposure to flooding and adverse health outcomes, notably including mortality. A global study of 761 communities worldwide found that, in the 60 days after exposure to flood, there was a 2.1% [0.6%, 3.6%] increase in the relative risk of all-cause mortality, and a 4.9% [0.8%, 9.2%] increase in the relative risk of respiratory mortality.⁵³ An Australian study of communities in Northern NSW affected by severe flooding found significant psychological morbidity six months later.⁵⁴ For people whose homes had been flooded, the odds of symptoms of anxiety increased by 442% [129%,

1179%], the odds of symptoms of depression increased by 337% [93%, 889%], and the odds of symptoms of post-traumatic stress disorder increased by 1272% [353%, 4056%], as compared with those not exposed. A study from the Netherlands found exposure to floodwater increased the odds of gastrointestinal complaints by 344% [25%, 1483%], the odds of dermatological complaints by 567% [306%, 994%], and the odds of influenza-like illnesses by 175% [77%, 326%], as compared with those not exposed.⁵⁵

A cohort study of surfers in California, found that, compared with no exposure, exposure to seawater after wet weather conditions was associated with a 228% [95%, 451%] increase in incidence rates of ear infection, and a 396% [118%, 1029%] increase in incidence rates of wound infection.⁵⁶

Storms and cyclones

The review found evidence of associations between exposure to storms or cyclones and multiple adverse health outcomes. A global systematic review and meta-analysis found exposure to cyclones was associated with a 9% [4%, 13%] increase in the relative risk of all-cause mortality, an 18% [12%, 25%] increase in the relative risk of all-cause hospitalisation, and a 15% [13%, 18%] increase in relative risk of hospitalisation for respiratory disease.⁵⁷

There was also evidence from international studies demonstrating associations between storms and cyclones and infectious diseases. For example, a study from Texas found a 48% [10%, 100%] increase in the incidence rate of invasive mould infections in the year following a major tropical cyclone, as compared with before the cyclone.⁵⁸

There was also evidence of associations between storms and respiratory morbidity – specifically, thunderstorm asthma. A study of the 2016 thunderstorm asthma event in Victoria found a 41.7% [39.6%, 43.9%] increase in overall caseload for the emergency medical service on the day of the event, and a cumulative (3-day) increase in caseload of 96.6% [86.3%, 107.4%].⁵⁹ A study from Sweden also found co-exposure to heavy thunderstorms and high concentrations of birch pollen was associated with a 27% [15.0%, 40.0%] increase in respiratory presentations.⁶⁰

Appendix 2 – Climate risk workshop guide

A climate risk workshop is a collaborative session that brings together key stakeholders to support different stages of the climate risk assessment and adaptation planning process. It can be adapted to suit your organisation's needs and available resources, and may be used to:

- Identify and analyse relevant hazards, exposures and vulnerabilities for your organisation and/or community
- Identify climate risks
- Evaluate the likelihood and consequences of those risks
- Inform the development of adaptation actions and planning.

This guide is designed to be adapted flexibly depending on the stage of the risk assessment process at which the workshop is held. For example:

- **Early-stage workshops** may focus on hazard, exposure and vulnerability identification and initial risk brainstorming.
- **Mid-stage workshops** may support structured risk evaluation and prioritisation.
- **Later-stage workshops** may help refine adaptation actions and implementation strategies.

Before the workshop

1. Identify participants

Include a diverse mix of internal and external stakeholders:

- clinical and non-clinical staff
- facility and operations managers
- emergency planners
- local government, infrastructure, and utility representatives
- patients and service users
- community representatives, especially from priority populations.

2. Prepare materials

- climate projections and hazard, exposure and vulnerability data for your region
- a preliminary list of known or suspected climate-related hazards and risks
- risk evaluation templates or worksheets
- visual aids (e.g. maps, diagrams, case studies).

3. Set objectives

Clarify whether the workshop will focus on:

- identifying hazards and risks
- evaluating and prioritising risks
- informing adaptation planning.

During the workshop

1. Introduce the process

- Explain the climate risk assessment framework and where the workshop fits in.
- Review key concepts: hazard, exposure, vulnerability, consequence, likelihood, sensitivity and adaptive capacity.

2. Present context and data

- Share climate data, hazard maps, exposure and vulnerability information, and any relevant case studies.
- Highlight known or emerging climate-related hazards for your region or sector, and any information about key exposures and vulnerabilities.
- Highlight potential adaptation options and any evidence available to support these.

3. Facilitate discussion and activities

- Hazard, exposure and vulnerability identification: Brainstorm potential climate hazards, exposures and vulnerabilities, and confirm those most relevant to your organisation or community.
- Risk analysis: Explore how identified hazards interact with the exposures and vulnerabilities of key elements at risk, and what the likelihood and consequence of different risks might be.
- Risk evaluation: Use agreed criteria (likelihood, consequence) to rate and prioritise risks, considering how vulnerability affects both likelihood and consequence.
- Adaptation brainstorming: Identify possible actions to reduce risk or build resilience, noting feasibility and resource needs.

4. Capture outputs and decisions

- Document hazards, risks, ratings, and rationale.
- Record key interdependencies, assumptions, concerns and uncertainties raised during discussion.
- Agree on next steps and responsibilities for follow-up.

After the workshop

1. **Summarise and document the outcomes, including:**
 - hazards, vulnerabilities, exposures and risks identified
 - risk ratings and rationale
 - key vulnerabilities and interdependencies
 - participant feedback (support and/or concerns)
 - agreed priorities for further analysis or action.
2. **Share findings with leadership and stakeholders.**
3. **Use the results to inform the next steps in your climate risk assessment or adaptation plan.**

Appendix 3 – Sample risk statements

This section provides sample risk statements to support health system organisations in identifying climate risks, in line with *Step 1.2 Identify and analyse hazards*. The sample risks are organised into five categories:

1. **Population health:** Risks to population health and wellbeing, including direct and indirect health impacts of exposure to climate hazards, shifts in disease patterns, and exacerbation of existing health inequities.
2. **Infrastructure, facilities and equipment:** Risks to physical and digital assets that support health service delivery. This includes the built environment (e.g. buildings, utilities, transport access), as well as digital infrastructure such as IT systems, electronic health records, and communications networks.
3. **Workforce:** Risks to the health, availability, and capacity of the health workforce. These include occupational health and safety risks, workforce shortages, skill gaps, and psychosocial impacts of climate-related disasters and extreme weather events.
4. **Supply chain and resources:** Risks to the availability, reliability, and affordability of essential inputs required for health service delivery, including medical supplies, pharmaceuticals, food, water, and logistics systems.
5. **Service delivery and continuity:** Risks to the ability of health services to maintain continuous provision of safe, effective, and equitable care during and after climate-related disasters and extreme weather events.

A set of example risks in each of these categories is provided for six key climate hazards: heat and humidity, fire, drought, rainfall, storms, and coastal inundation. These examples are intended to serve as a starting point for brainstorming, not a comprehensive or definitive list. Health system organisations should tailor risk statements to reflect their own services, populations, and local context, and should always consider whether the examples provided here are relevant to their context. As ever, it is also important to consider interdependencies and cascading/compounding risks.

Heat and humidity: sample risk statements

Population health	Extreme heat and humidity could lead to increased heat stress, resulting in morbidity and mortality in the local population.
Infrastructure, facilities and equipment	Extreme heat and humidity could lead to reduced efficiency of heating, ventilation, and cooling systems, affecting indoor air quality and thermal comfort, resulting in patient and staff safety risks. Heatwaves could lead to power outages affecting access to critical equipment and medical records, resulting in disrupted service delivery. Prolonged high temperatures could lead to accelerated deterioration of critical infrastructure, affecting asset integrity and resulting in increased maintenance costs and service disruptions.
Workforce	High temperatures could lead to heat-related illness, fatigue, and reduced productivity affecting workers, resulting in increased absenteeism, higher staffing costs, and potential delays in service delivery. Heatwaves may increase demand for health services, placing strain on staff and increasing risk of burnout and other mental health impacts.
Supply chain and resources	High temperatures could lead to compromised storage and transport affecting heat-sensitive medications and vaccines, resulting in financial losses from spoilage and potential disruption of treatment schedules.
Service delivery and continuity	Heatwaves may increase hospital presentations with heat-related illness, straining service capacity. High temperatures could lead to compromised indoor conditions (including as a result of power outages), affecting patient safety, resulting in service disruptions.

Fire: sample risk statements

Population health	Bushfires could lead to increased population exposure to hazardous air pollution, resulting in morbidity and mortality in the local population.
Infrastructure, facilities and equipment	Bushfires could lead to damage to health facilities or equipment, resulting in costly repairs and disruption to service continuity and patient care through temporary closures. Bushfires could damage local critical infrastructure or utilities, interrupting essential services such as power, water and communications, resulting in service disruption and risks to patient safety. Bushfire smoke infiltration could lead to reduced indoor air quality affecting patient safety, resulting in service disruptions and increased operational expenditure.
Workforce	Bushfire smoke exposure could lead to increased respiratory illness among staff affecting workforce capacity, resulting in absenteeism and reduced ability to maintain service delivery. Bushfires could lead to restricted staff access to facilities due to evacuation orders or road closures, affecting workforce availability and resulting in potential service disruptions or patient safety risks. Bushfires could lead to psychological distress amongst health workers, resulting in burnout and other mental health impacts.
Supply chain and resources	Bushfires could disrupt transport routes for critical medical supplies, pharmaceuticals, and food, resulting in stock shortages, compromised patient care, and emergency procurement costs. Bushfires could damage and disrupt supplier infrastructure and logistics, resulting in shortages of essential equipment or consumables, delayed procedures, and increased procurement costs.
Service delivery and continuity	Bushfires could disrupt patient access to healthcare facilities, resulting in missed appointments, delayed treatment, and increased demand for telehealth alternatives.

Drought: sample risk statements

Population health	Drought could lead to psychological distress in the local population, resulting in morbidity and mortality.
Infrastructure, facilities and equipment	Prolonged drought could lead to water scarcity, limiting sanitation and cooling systems affecting infection control and patient comfort, resulting in increased infection risk, reduced patient satisfaction, and higher operational costs for alternative cooling and hygiene measures. Prolonged drought could lead to degradation of landscaping and external infrastructure affecting facility surrounds, resulting in increased heat exposure, elevated fire risk, and higher maintenance costs. Reduced soil moisture could lead to building cracking and subsidence, resulting in infrastructure damage and higher maintenance costs.
Workforce	Prolonged drought could lead to reduced staff morale and retention affecting rural and remote health services, resulting in workforce shortages, increased recruitment costs, and compromised continuity of care.
Supply chain and resources	Drought could lead to reduced economic viability of local suppliers, affecting procurement processes and resulting in increased costs and potential service disruptions. Prolonged drought could lead to impacts on local agriculture, resulting in increased costs or days with food supplies.
Service delivery and continuity	Drought could lead to increased stress in communities and demand for mental health and social support services, resulting in longer wait times, staff fatigue, and increased operational expenditure.

Storm: sample risk statements

Population health	Storms could lead to increased exposure to hazardous conditions, resulting in morbidity and mortality in the local population.
Infrastructure, facilities and equipment	Storms could cause power outages, disrupting service delivery and compromising patient care. Storms may damage buildings and critical equipment, resulting in costly repairs, operational downtime, and disruption of patient care.
Workforce	Storms may disrupt commuting and shift coverage, leading to staffing shortages and affecting service delivery.
Supply chain and resources	Storm damage to logistics infrastructure (e.g. roads, warehouses, ports) may interrupt supply chains for essential medical goods, leading to increased costs and potential shortages. Power outages during storms may disrupt cold chain storage, compromising the integrity of temperature-sensitive pharmaceuticals and other supplies.
Service delivery and continuity	Severe storms may cause temporary service closures, affecting continuity of care.

Rainfall and flooding: sample risk statements

Population health	Flooding could cause psychological distress, resulting in morbidity and mortality in the local population. Flooding could lead to exposure to contaminated floodwater, resulting in illness and injury.
Infrastructure, facilities and equipment	Flooding could lead to damage to electrical systems and medical equipment affecting facility operations, resulting in service outages and safety risks. Flooding could damage local utilities and critical infrastructure, leading to power outages and contamination of water supplies. Heavy rainfall could lead to overwhelmed drainage systems, water ingress, sewage overflow, and mould growth, resulting in service disruption and patient and staff safety risks. Recurrent flooding in vulnerable facilities could lead to structural compromise affecting long-term viability, necessitating costly retrofitting or relocation.
Workforce	Flooding could restrict staff access and availability, resulting in unplanned absences and reduced service capacity. Exposure to contaminated floodwaters could lead to health hazards affecting staff in emergency or outreach roles, resulting in increased illness risk and workforce disruption. Flooding could cause distress and harm to staff, resulting in psychosocial harms and mental ill health.
Supply chain and resources	Flooded transport routes could lead to delivery delays affecting medical supplies, food, and fuel, resulting in service interruptions. Flooding of supplier facilities or distribution centres could lead to supply chain breakdown affecting essential health resources, resulting in widespread shortages.
Service delivery and continuity	Flooding could lead to facility closure or evacuation affecting scheduled care and emergency response, resulting in disrupted service delivery. Flooding could lead to community isolation affecting access to health services, resulting in delayed treatment and increased health risks.

Coastal inundation: sample risk statements

Infrastructure, facilities and equipment	Coastal inundation could lead to loss of facility viability affecting health services, resulting in the need for strategic relocation or protective infrastructure. Saltwater intrusion could lead to damage to underground utilities and building foundations affecting operational integrity, resulting in increased maintenance costs and service risks.
Workforce	Uncertainty around long-term facility viability in coastal zones may affect recruitment and strategic workforce planning. Gradual inundation of coastal communities could lead to staff relocation affecting workforce planning and retention, resulting in operational disruption.
Supply chain and resources	Inundation of coastal transport routes and infrastructure may disrupt long-term supply chain reliability for coastal health services. Inundation of coastal communities could lead to a relocation of suppliers or distribution hubs, affecting procurement processes and resulting in increased lead times and costs.
Service delivery and continuity	Gradual inundation of coastal facilities may require long-term service relocation, affecting access and continuity for local populations.

Appendix 4 – Sample adaptation options

This section provides sample adaptation options to support health system organisations in identifying actions to address relevant climate risks. These examples are intended to serve as a starting point for brainstorming, not a comprehensive or definitive list. Health system organisations should tailor and build on the options to reflect their own services, populations, and local context, and should always consider whether the examples provided here are relevant to their context.

Leadership and governance

- Integrate climate risk and resilience into board agendas and organisational strategies and plans.
- Embed climate risk management into corporate risk management processes, so that it becomes part of business-as-usual decision-making.
- Designate executive accountability for climate risk and resilience.
- Develop and publish a climate risk policy or position statement.
- Monitor and report on climate risks and resilience, including climate impacts on the health system organisation.
- Establish dedicated roles and functions to lead climate risk and resilience initiatives.
- Ensure emergency response and resilience plans consider cascading and compounding risks.
- Develop networks and communication channels on climate risk and resilience with other health services and local organisations.

Population health

- Identify and map vulnerable populations and develop plans in collaboration with these groups to provide targeted support during climate-related emergencies.
- Develop culturally appropriate climate change and health resources in collaboration with priority populations.
- Integrate climate risk and resilience considerations into existing population health plans and strategies.
- Raise community awareness of the health impacts of climate change and steps people can take to protect themselves and their communities (e.g. heatwave safety, bushfire smoke precautions).
- Strengthen community mental health programs to manage climate-related mental ill-health.

- Develop or enhance extreme heat response plans.
- Enhance monitoring and surveillance of key climate-sensitive health outcomes and improve early warning systems.
- Strengthen partnerships with local councils and NGOs to promote community resilience to protect population health, for instance through improved social community connectedness and networks.
- Embed climate considerations into immunisation and infectious disease programs to prepare for shifts in disease patterns.
- Integrate climate risk into chronic disease management programs, ensuring care plans account for the impacts of climate hazards (e.g. heatwaves, bushfire smoke) and provide appropriate advice about what action to take.

Infrastructure and facilities

- Embed consideration of climate risk into future infrastructure planning.
- Enhance heating, ventilation and cooling (HVAC) systems to improve heat resilience and smoke filtration.
- Review and enhance backup power systems (e.g. generators, battery storage).
- Where possible and in close collaboration with relevant stakeholders, relocate critical assets and patient services away from hazard-prone areas.
- Develop coastal protection measures or strategic relocation plans for facilities at risk of inundation.
- Retrofit buildings for hazard resistance (e.g. raised floors, waterproofing, passive cooling).
- Consider climate resilience in all building renovations and new building developments, including in siting decisions.
- Install shade structures and increase tree canopy for cooling outdoor spaces.
- Ensure regular maintenance of vegetation, including clearing branches and removing leaf debris.
- Enhance stormwater management systems.
- Implement routine drainage inspections and upgrades to prevent stormwater ingress.
- Ensure rooftop equipment can withstand wind and lightning damage.
- Enhance regular maintenance/repair/renewal processes for infrastructure and facilities.
- Review and enhance insurance options to ensure they cover climate-related risks.
- Ensure that water storage is available above predicted flood levels to provide safe supply following flood events.
- Investigate water saving and storage options.

- Ensure waste storage areas are above predicted flood levels.

Workforce and operational

- Establish onsite staff accommodation for continuity of service provision during extreme events, taking into account childcare, transport and other essential needs for staff.
- Develop flexible rostering and remote work protocols for climate disruptions.
- Provide mental health support programs for staff affected by climate-related trauma.
- Embed consideration of climate risks into future workforce planning.
- Conduct regular extreme weather scenario training exercises for emergency preparedness.
- Ensure staff are appropriately trained to manage climate impacts, including upskilling staff to support surges in demand associated with extreme weather events.
- Establish contingency plans for staff transport in the event of extreme weather events.
- Review and enhance workforce surge capacity during disasters, for example by developing a roster of retired staff who may be willing to return to work during surge events.
- Review occupational health exposure standards to promote safe work practices in health service delivery and remote working during extreme weather events including heatwaves.
- Review and enhance insurance options to ensure they cover climate-related risks.

Supply chains and resources

- Assess supply chains for potential vulnerabilities to climate-related risks, locally, national and internally.
- Diversify suppliers and establish local procurement and backup options for critical goods.
- Develop contingency plans for food supply disruptions, including partnerships with local providers.
- Increase stockpiles of essential medications, personal protective equipment and emergency supplies.
- Implement measures to improve the resilience of cold-chain storage (e.g. backup refrigeration, temperature monitoring and alerts).
- Assess potential to provide additional storage space at vulnerable facilities to enable stockpiling if required.

Service delivery and continuity

- Consider options for expanding telehealth capacity and other flexible service delivery models (e.g. mobile health services) for extreme weather events where appropriate.

- Consider options for increasing ambulance availability during heatwaves, such as via temporary fleet relocation or ensuring maintenance schedules deliver full availability during summer.
- Consider planned redundancy in available beds in preparation for expected extreme weather events and other climate-related disasters.
- Develop protocols for rapid relocation or evacuation of patients during extreme weather events.
- Annually review emergency management plans to ensure they remain fit for purpose in a changing climate.
- Strengthen partnerships with local emergency services and councils for coordinated response during climate-related emergencies.
- Ensure remote health services can be activated to support vulnerable and/or isolated populations.
- Implement backup communications protocols and systems (e.g. satellite phones, radio networks).

Appendix 5 – How this guidance relates to other approaches to assessing climate risks

How is a climate risk assessment different from a vulnerability and adaptation assessment?

Climate risk assessments and vulnerability and adaptation assessments are closely related, but slightly different frameworks. The steps in the frameworks differ: risk assessments take as their starting point hazard-based risk identification and analysis, whereas vulnerability and adaptation assessments focus on profiling the climate vulnerability of populations, health systems and communities.³ However, the underlying goal of each process, when applied to health and health systems, is the same: to understand how climate change will affect health and health systems and to guide decisions that strengthen resilience. Each process produces actionable insights about which populations, systems, or assets are most at risk, the drivers of that risk, and the measures needed to reduce harm and build resilience. In practice, the findings often overlap: both frameworks highlight exposure to hazards, sensitivity of systems, and adaptive capacity, and both generate recommendations for interventions that strengthen preparedness and protect health.

Relationship between this guidance and source documents

This guidance is significantly informed by Queensland Health's 2019 Climate Change Adaptation Planning Guidelines, World Health Organization guidance on Climate Change and Health Vulnerability and Adaptation Assessment, Australian Government's Climate Risk and Opportunity Management Program (CROMP), and Australia's first National Climate Risk Assessment and National Adaptation Plan.^{4,5,9,61,62}

While each of these source documents differ in certain ways depending on their audience and objectives, they share common fundamentals. Firstly, all these frameworks take as their starting point the IPCC's definition of climate risk as a function of hazard, exposure, vulnerability and in some cases response.

Secondly, with the exception of the World Health Organization Climate Change and Health Vulnerability and Adaptation Assessment guidance, each of these frameworks then combines the IPCC definition of climate risk with a standard, generic approach to risk assessment based on evaluation of likelihood and consequence, in line with ISO 31000:2018 – Risk Management.¹² This international standard provides a systematic approach to risk management involving five key steps:

1. Establishing the scope, context and criteria

2. Risk identification
3. Risk analysis
4. Risk evaluation
5. Risk treatment.

These steps are underpinned by ongoing monitoring and review, communication and consultation, and recording and reporting. Each framework also recognises the need for repeated, iterative risk assessment and adaptation planning as capability and understanding grow, beginning with broad identification of key risks at a high level and moving toward more detailed and in-depth analysis as required. They emphasise the importance of embedding climate risk into existing governance and planning systems at organisational, regional, and national levels.

Thirdly, three of these frameworks (CROMP, the Queensland Health 2019 Guidelines, and the present guidance) draw on the IPCC definition of climate risk and on ISO 31000:2018 to provide guidance on how to assess and manage climate risks in a manner that enables the resulting risks and mitigating actions to be integrated into an organisation's enterprise risk management framework or corporate risk register. They do this, in various ways, by providing a methodology for translating the IPCC concepts of hazard, exposure and vulnerability into the standard risk management concepts of likelihood and consequence.

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