

# A review of the National Emergency Risk Assessment Guidelines

Phase 1 – research and scoping report

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# Executive Summary

The *National Emergency Risk Assessment Guidelines* (NERAG) guide efforts to build capability, harmonise risk assessments and better understand the nature of hazards that have the potential to cause harm and loss to Australian communities and the economy.

This report addresses the question of whether NERAG requires review in order to better reflect the contemporary disaster risk landscape, including the transition towards systemic approaches to disaster risk and the conclusions of the Royal Commission into National Natural Disaster Arrangements 2020.

This report relies on three sources of information and evidence:

- A focused review of the literature including the 2015 United Nations *Sendai Framework for Disaster Risk Reduction*, the *National Disaster Risk Reduction Framework* and associated guidance materials, *Guidance for Strategic Decisions on Climate and Disaster Risk* and the *Systemic Disaster Risk Handbook*.
- An online survey of 145 NERAG stakeholders
- Focus group discussions with stakeholders from the six State jurisdictions.

The key findings of this research are:

- Climate change, complexity and systemic risk is challenging the current approaches to risk analysis and risk governance. Systemic risk and compounding and cascading events must be integrated into risk assessment. Long-term complexity, uncertainty, and turbulent change, especially arising out of climate change, must also be addressed. In the context of systemic risk the purpose and objectives of risk assessment, must include vulnerability, the avoidance of future risk and the enhancement of resilience
- A systems approach should be applied to risk assessment to enable deeper awareness and understanding by decision makers of the complex and dynamic interconnections and interdependencies between systems and the autochthonous processes driving unexpected and unpredictable outcomes.
- The effective application of a systems approach requires improved methods, knowledge, and data. Appropriate analytical methods and techniques are required including modelling and scenarios.
- Knowledge and data are central inputs to the risk assessment process. Quantitative data are needed to analyse and model complex system interactions and systemic risk. Stakeholder knowledge and perceptions are needed to provide unique insights into context, value, and priorities. Stakeholders require equitable access to disaster risk information if they are to fully understand, trust and engage in the process.
- Stakeholder collaboration is vital to fully revealing objectives, goals, priorities, decision criteria and resource constraints necessary for the systematic assessment of risk. Collaboration is required for access to unique perspectives and knowledge,



especially about what is valued. It is needed to enhance understanding, trust, and confidence that risk assessment accounts for all the key inputs.

- Community involvement, as a key source on what is of value, is central to a comprehensive assessment of risk and better decisions about treatment.
- The complexity, uncertainty, and turbulence of natural, social, and economic environments in which risk assessment and decision-making is and will be made in the future, requires a capacity for active learning. Practitioners need to be able to actively and continuously search for better alternatives and ways of transforming in the direction of those alternatives.
- Practitioners need access to learning opportunities to enhance their capacity to understand complex systems and sophisticated analytical tools and methods, and to assimilate a diversity of perspectives and values into their thinking.
- Setting directions and priorities for mitigation of risk is a central objective of the risk assessment process and yet it is only briefly addressed in the NERAG. Separation of risk assessment and risk treatment is unsustainable in a complex interrelated environment in which community values should play an integral role in mitigation and treatment priorities and in investment decisions.
- Governance and leadership must take account of the dynamics of systems, their boundaries, and their interactions, requiring a broader and wider framing of risk beyond conventional systems boundaries. Therefore, governance and leadership must be capable of enabling inter- and transdisciplinary cooperation and engagement. Anticipatory governance and leadership are required that facilitates connections, through communication and knowledge sharing, between all stakeholders including the community, throughout the risk management process. It must be capable of incorporating diverse stakeholder values and knowledge through open collaboration and communication; to facilitate innovative knowledge and data creation and analysis; and forward looking to be able to deal with unforeseen and non-conventional problems. Governance and leadership must be agile to be able to revisit, restart, or change the risk methodology to reflect decision needs, temporal demands or as circumstances change. It should produce good, low-regret decisions.
- Good governance and leadership must pull all these elements together. Leaders and decision-makers need to have clear insights into dynamic, complex relationships within a turbulent environment; see how values, vulnerability, social justice, and resilience intersect; and how values and priorities can indicate points of intervention

Consequently, this report concludes that a national emergency risk assessment framework, to be used as a guide in Australian jurisdictions at national, state, local government, and community levels, is required. It should provide both guidance and a tool chest to assist with the issues identified in this report to reduce risks. At a minimum guidance is required on incorporating the following into risk assessment: systemic risk; systems thinking; sophisticated quantitative and qualitative analysis; consultation and collaboration with

stakeholders including the community; active learning and capacity building; and mitigation/treatment of disaster risk.

# Chapter 1: Introduction to the research

## 1.1 Background

The [National Emergency Risk Assessment Guidelines](#) (NERAG) are part of the [Australian Disaster Resilience Handbook Collection](#), managed by the Australian Institute for Disaster Resilience (AIDR) on behalf of the Australian Government. NERAG was first published in 2010 to guide efforts to build capability, harmonise risk assessments and better understand the nature of hazards that have the potential to cause harm and loss to Australian communities and the economy. The Guidelines were republished in 2015 and updated in 2020 to reflect changes in *ISO 31000:2018 Risk Management Guidelines* in addition to further minor revisions. New risk approaches have also emerged, and strategic objectives have changed, to reflect the 2015 United Nations [Sendai Framework for Disaster Risk Reduction](#), [Australia's National Disaster Risk Reduction Framework](#) and associated [guidance materials](#), and the evolution of Australia's risk management capabilities. These developments are reflected in the policy directions and principles of the [National Disaster Risk Reduction Framework](#) and the [Systemic Disaster Risk Handbook](#).

This document reports on the findings of the first phase of review of NERAG based on scoping research with jurisdictional representatives from the States and Territories, along with other key stakeholders. Jurisdictional representatives from emergency management agencies indicated that they use and implement NERAG in various ways, tied to their jurisdictional and legislative arrangements. Considering these findings in the context of wider developments in risk approaches, creates an opportunity to review and align NERAG with current conditions and standards.

## 1.2 Purpose of scoping research

The purpose of the scoping research was to:

- Explore and understand how the NERAG are currently used and viewed by State and Territory emergency management agencies and other relevant organisations throughout Australia.
- Identify the limitations of the NERAG and opportunities to align the NERAG with the principles and guidance in the *National Disaster Risk Reduction Framework*; *Guidance for Strategic Decisions on Climate and Disaster Risk*; and the *Systemic Disaster Risk Handbook*.
- Provide the evidence and conceptual foundation to formally review the NERAG in 2022/23.

### 1.2.1 Research questions

Research questions were developed to investigate whether there is a need for the Commonwealth Government to update and renew the NERAG. The research questions focused on:

- Demonstrating the need for and opportunities to revise the NERAG and bring it in line with current thinking and best practice.
- Identifying how to make the NERAG more useful for its users and the most effective means of bringing it into line with best practice.

## 1.3 Methods

The methods comprised of:

- an environmental scan and literature review
- the development of a stakeholder map identifying agencies, individuals and organisations across the disaster risk reduction landscape that use the NERAG
- a recruitment program using information from the stakeholder map to promote participation in the online survey
- the development of survey questions through consultation
- an online survey to collect data addressing the research questions
- six online focus groups of 60 minutes duration comprising six to ten participants.

Collectively, these methods enable validation of qualitative findings and extension of quantitative data (triangulation of findings). Further detail is provided below.

### 1.3.1 Environmental scan and literature review

Materials and papers relevant to the research were reviewed including:

- National Emergency Risk Assessment Guidelines, AIDR 2020
- Systemic Disaster Risk, AIDR 2021
- National Disaster Risk Reduction Framework, Department of Home Affairs 2018
- National Strategy for Disaster Resilience, COAG 2011
- Profiling Australia's Vulnerability, National Resilience Taskforce 2018
- Sendai Framework for Disaster Risk Reduction 2015-2030, UNDRR 2015
- Guidance for Strategic Decisions on Climate and Disaster Risk
- A collection of articles based on disaster risk reduction in AJEM

The literature review established the strategic policy context and the key themes and trends against which to review the NERAG. The policy and principles of the National Disaster Risk

Reduction Framework (NDRRF), the Sendai Framework and Systematic Disaster Risk are central to bringing the NERAG up to best policy and practice. The focus of the literature review was therefore on these key documents, supplemented by relevant aspects of the material listed above. The literature review comprises the second chapter of this report. The key insights of the literature scan informed the development of survey questions and the direction of the focus groups.

### **1.3.2 Development of a stakeholder map**

A stakeholder map was constructed to identify the diverse target audiences for the scoping research. It included those responsible for developing disaster risk policies, capabilities and doctrine within Commonwealth, state, territory and local government agencies and government and non-government organizations. The map also included educators, researchers, planners and business. The stakeholder map was used to inform the recruitment process for the online survey and focus groups.

### **1.3.3 Online survey**

The survey was designed based on insights gained from the literature review and in consultation with the research partners. The survey was delivered online via Survey Monkey. Participants self-selected after being contacted via email.

Surveying of participants was rigorous and comprehensive:

- participants could respond only once
- potential participants were contacted three times to encourage completion.

The findings of the online survey are summarised in Chapter 3 and detailed at length in Appendix A.

### **1.3.4. Zoom focus groups**

While in-person focus groups are preferable<sup>i</sup> the uncertainties and constraints of Covid-19 resulted in six 60-minute focus groups being conducted online. Focus groups were designed to provide further detail and depth to the findings of the online survey. Participants reflected all Australian jurisdictions. Facilitator's notes (Appendix B) were prepared to reflect the research objectives and explore, and to provide a structure for discussions to clarify and extend insights from the online survey.

## **1.4 Structure of the report**

A review of the relevant literature follows in Chapter 2. The review summarises the National Emergency Risk Assessment Guidelines, the National Strategy for Disaster Resilience, the

Sendai Framework, the National Disaster Risk Reduction Framework, Profiling Australia's Vulnerability, the Guidance for Strategic Decisions on Climate and Disaster Risk and the Systemic Disaster Risk Handbook. The implications of this literature for NERAG are discussed. Chapter 3 expands on the findings of the literature review and discusses the results of the quantitative and qualitative methods of the research. Chapter 4 then provides short concluding comments.

Appendix A and B present the detailed results of the online survey of stakeholders and the results of the six focus groups with participants from the state and territory jurisdictions.

# Chapter 2: Literature review

## 2.1 Introduction

This chapter presents an overview of the main elements of the NERAG and discusses features of key documents in the disaster risk policy landscape that may support or confirm the NERAG approach, in addition to those that question or weaken the NERAG approach. The imperative to review the NERAG against these developments is also consistent with the evolution of Australia's risk management capabilities and the position taken by the Royal Commission into National Natural Disaster Arrangements 2020:

'National frameworks and strategies generally establish sensible principles. It has, however, been difficult for us to determine the extent to which these principles have been, or will be, translated into tangible outcomes.'<sup>ii</sup>

'Across the world, the growing complexity and interaction of human, economic and political systems mean the risks are becoming increasingly systemic and we have **routinely failed to correctly understand and portray their impacts.**'<sup>iii</sup>

This review considers the currency and relevance of the Guidelines against the current transition in thinking and strategic objectives towards systemic approaches to risk. The final section of this chapter summarises the implications of this analysis for a broad review of the NERAG.

The documents addressed in this literature review are:

- National Emergency Risk Assessment Guidelines, AIDR 2020
- Systemic Disaster Risk, AIDR 2021
- National Disaster Risk Reduction Framework, Department of Home Affairs 2018
- National Strategy for Disaster Resilience, COAG 2011
- Profiling Australia's Vulnerability, National Resilience Taskforce 2018
- Sendai Framework for Disaster Risk Reduction 2015-2030, UNDRR 2015
- Guidance for Strategic Decisions on Climate and Disaster Risk
- A collection of articles based on disaster risk reduction in AJEM

## 2.2 National Emergency Risk Assessment Guidelines

The [National Emergency Risk Assessment Guidelines](#) provide a nationally consistent 'all hazards' approach to risk assessment and prioritisation of investment in activities to address risk.

The NERAG provide a method for risk assessment, in an emergency context, that is consistent with the Australian Standard *AS/NZS ISO 31000:2018 Risk management – principles and guidelines*. It seeks to promote rigorous and consistent risk assessment that is of high quality and comparability, and to contribute to the evidence base of emergency related risks.

NERAG based risk assessments are intended to guide decision making regarding the prioritisation of the investment of scarce resources for risk mitigation (i.e., risk treatment, emergency prevention and preparedness measures). It applies a method that is scalable, utilises a likelihood and consequence analysis, draws evidence and data from a range of sources and assesses risk to varying levels of confidence.

The NERAG are structured as illustrated in Figure 1. Within the context of the *Risk Management – principles and guidelines (AS/NZS ISO 31000:2018)* it's focus is to minimise risk by establishing the context of the risk and identifying, analysing, and evaluating this risk while at all stages communicating and consulting with stakeholders, and monitoring and reviewing outputs:

- risk identification is the 'process of finding, recognising, and describing risks'
- analysis is the 'process to comprehend the nature of risk and to determine the level of risk'
- evaluation is the 'process of comparing the results of risk analysis with risk criteria to determine whether the risk and/or its magnitude are acceptable or tolerable'<sup>iv</sup>.

NERAG risk assessments comprise documentation of risk context that is widely understood and accepted; a risk register; analysis of the level of risk based on its likelihood, consequence, and confidence; risk evaluation assigning each risk a priority; and a prioritising of risks for further assessment, treatment, or monitoring. The guidelines provide for both initial and detailed assessments as illustrated in Figure 2.

The following sections will discuss the seven key elements of the NERAG, assessing it against recent developments in global and Australian principles, understandings and approaches to risk assessment and management.



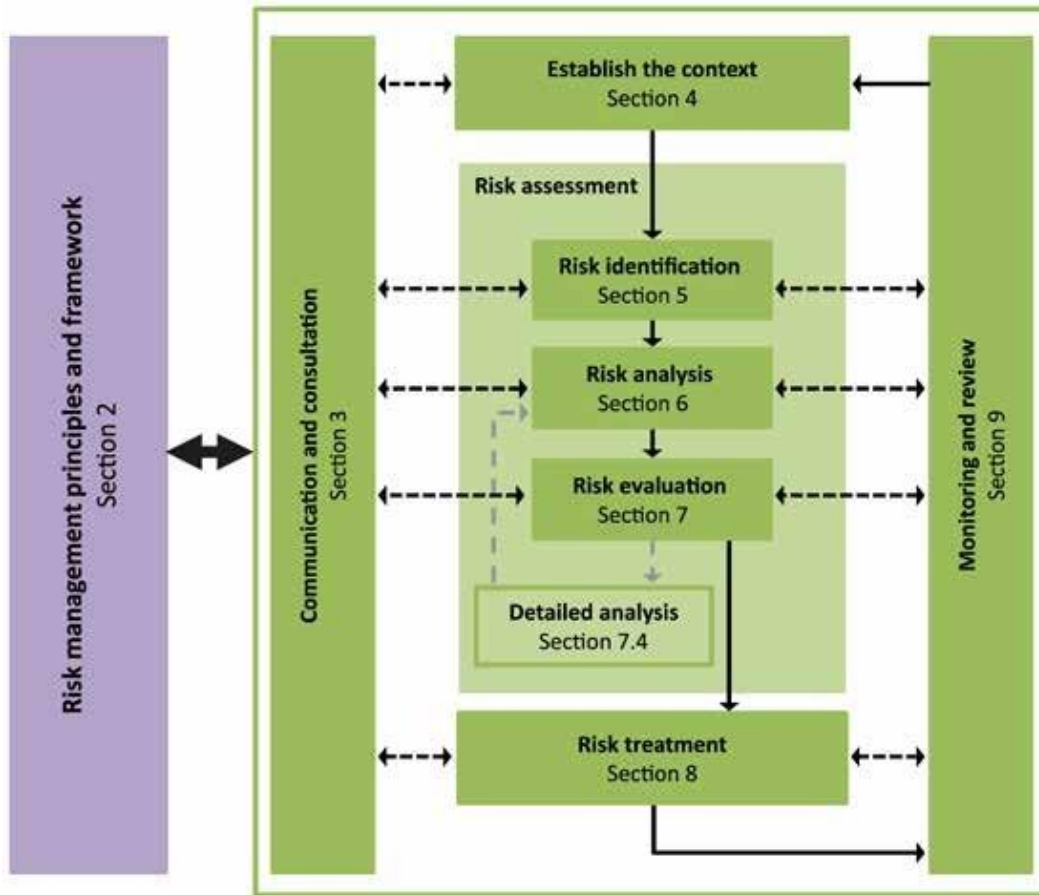


Figure 1: Risk management process for emergency-related risk

### 2.2.1 Communication and consultation

The NERAG advocate for communication and consultation at all stages of the risk assessment process to enable stakeholder understanding and support to commit resources to risk management. It argues that this communication and consultation should commence before the risk assessment process begins.

The NERAG draw on *AS/NZS HB 327:2010 Communicating and consulting about risk* and *HB 89-2012 Risk management – guidelines on risk assessment techniques* for methods of community engagement and communication. The guidelines emphasise the need to establish a clear purpose for consultation, clarity in the role of stakeholders, transparency to establish and maintain trust and openness to a wide range of stakeholder interests. The four key principles advocated are:

- consultation and communication throughout the risk management process
- openness to all views, attitudes and perceptions
- respectful, truthful, relevant, accurate and clear interaction
- planned and documented interactions enabling proper reporting.

In establishing possible approaches to consultation and engagement NERAG adapts the *National Strategy for Disaster Resilience Community Engagement Framework*. These approaches include information, participation, consultation, collaboration, and empowerment as detailed in Figure 3. This framework was superseded by the *Community Engagement for Disaster Resilience Handbook* (AIDR 2020) in 2020.

### 2.2.2 Establish the context

Contextualising the risk assessment involves setting the purpose, objectives and scope of the assessment; identifying the criteria such as death/injury, economic, environmental, community wellbeing and administrative impact; and establishing the methodology for the assessment.

The NERAG suggest that in establishing the context the following parameters are considered:

- The sponsor's governance, structure, and accountabilities; policies and objectives; resources and knowledge; organizational culture; standards; relationships with internal stakeholders; contractual relationships (i.e., internal parameters).
- Social, political, economic, regulatory, technological environment (global, national, state, regional, local); significant drivers impacting the organisation or jurisdictions; and relationships with external stakeholders (i.e., external parameters).

The scope of the risk assessment upon which risks are identified and risk models built includes features outlined in Figure 4:

- the source(s) of risk (hazard)
- the emergency event(s)
- the consequence categories that reflect community viewpoints and values (people, economy, environment, public administration and social setting).

The NERAG suggest an all-hazards assessment be undertaken at the scoping stage to identify the hazards generating the greatest risks and the risk connections between hazards (systemic risk), although a single hazard approach is also supported. It suggests that a range of scenarios, rather than a single hazard, and their associated impacts can be useful at the early phase to help identify significant risks.

The Guidelines emphasise the establishment of risk criteria at the context setting stage as a basis for assessing which risks need to be addressed. These criteria assign:

- consequence level (from insignificant to catastrophic)
- likelihood level (extremely rare to almost certain)
- risk level (very low to extreme)
- confidence level (lowest to highest).

### 2.2.3 Risk Identification

On the basis of *AS/NZS ISO 31000:2018 Risk management – principles and guidelines*, the NERAG define risk identification as ‘identification of risk sources, events, their causes, and their potential consequences.’ It emphasizes a comprehensive identification of ‘relevant’ risks and the broadest range of potential consequences including ‘cascade, cumulative, and “knock-on” effects’ (p.42). This contributes to complexities and secondary effects (power interruption disrupts communication and causes economic losses). [Note: these are not seen in systemic risk terms].

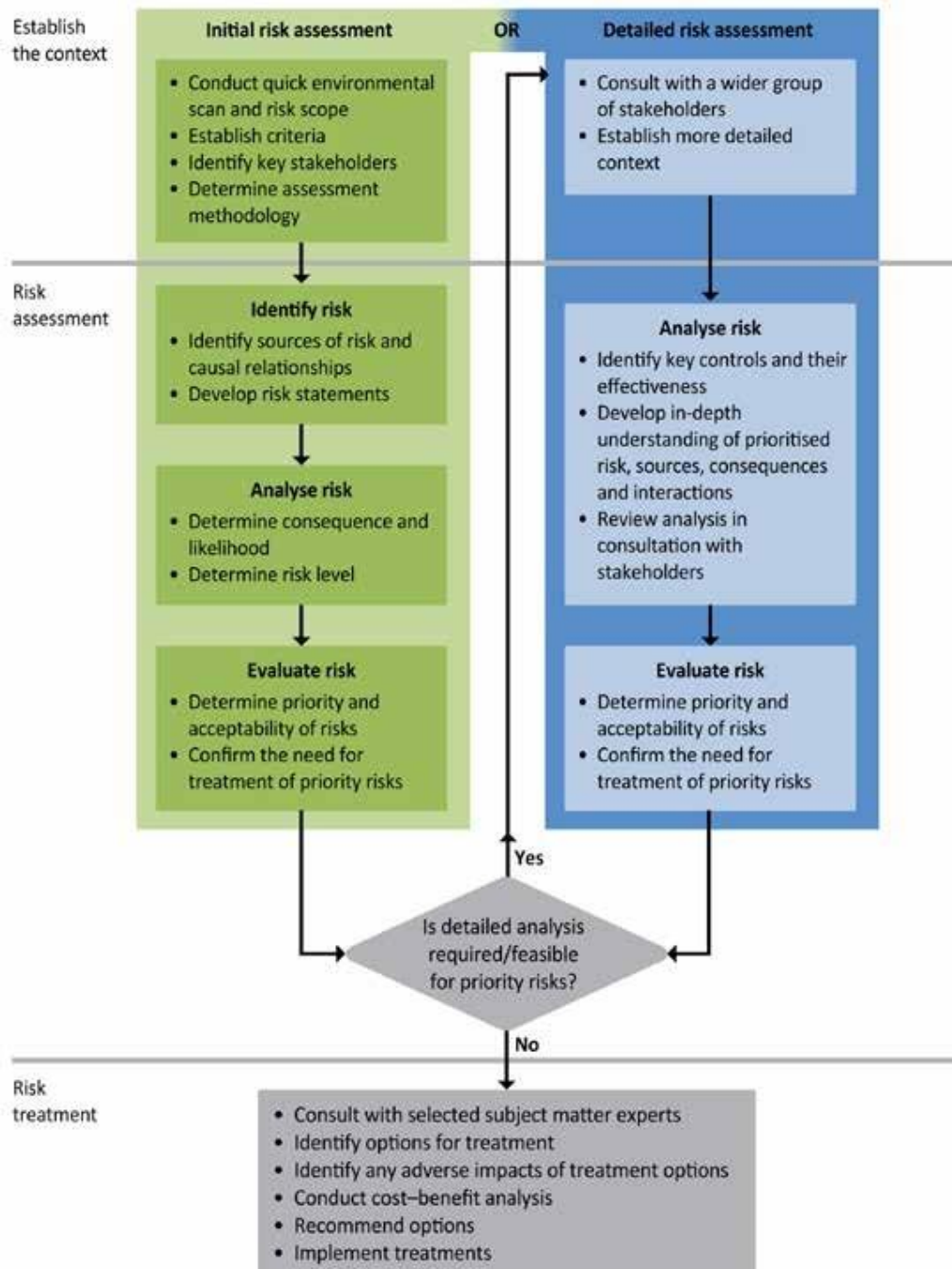


Figure 2: NERAG’s initial and detailed risk analysis

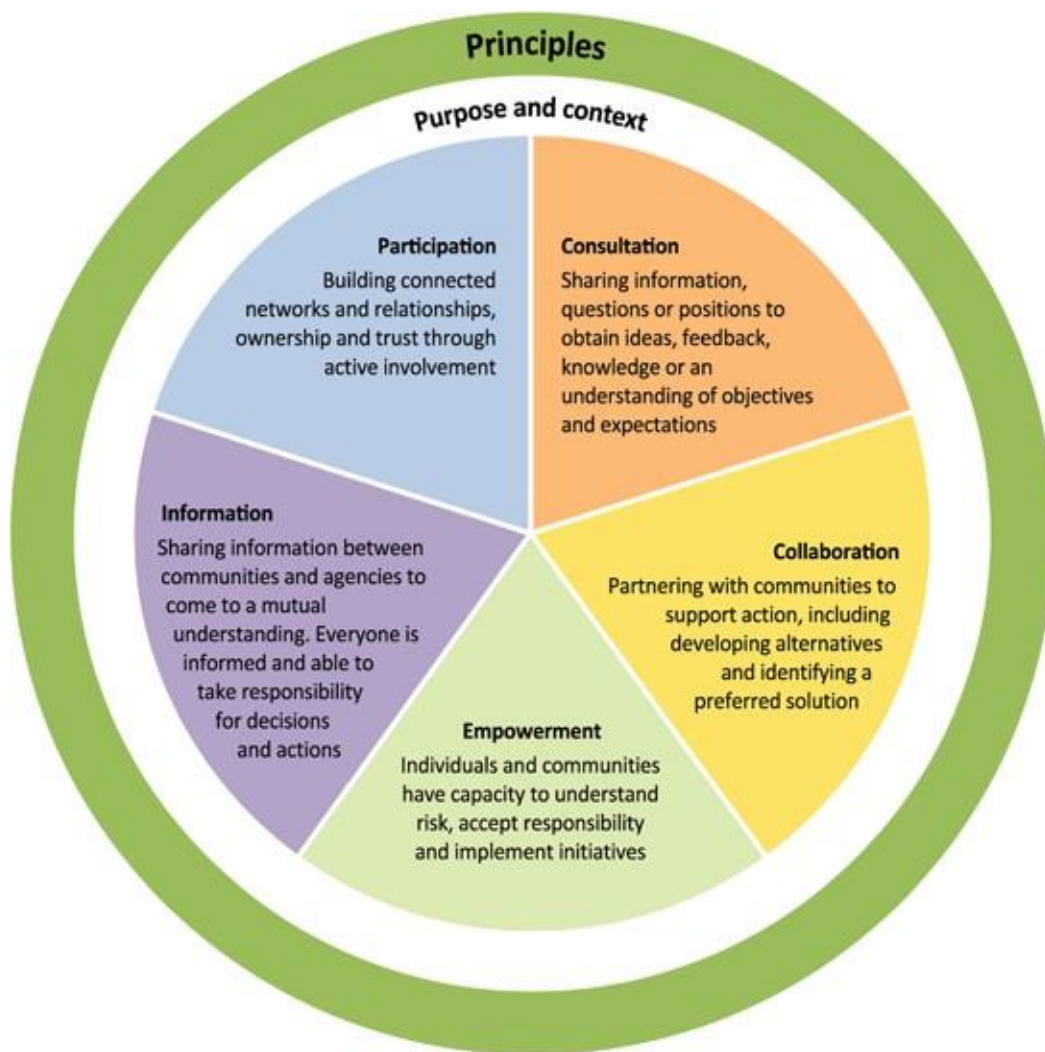


Figure 3: National Strategy for Disaster Resilience Framework

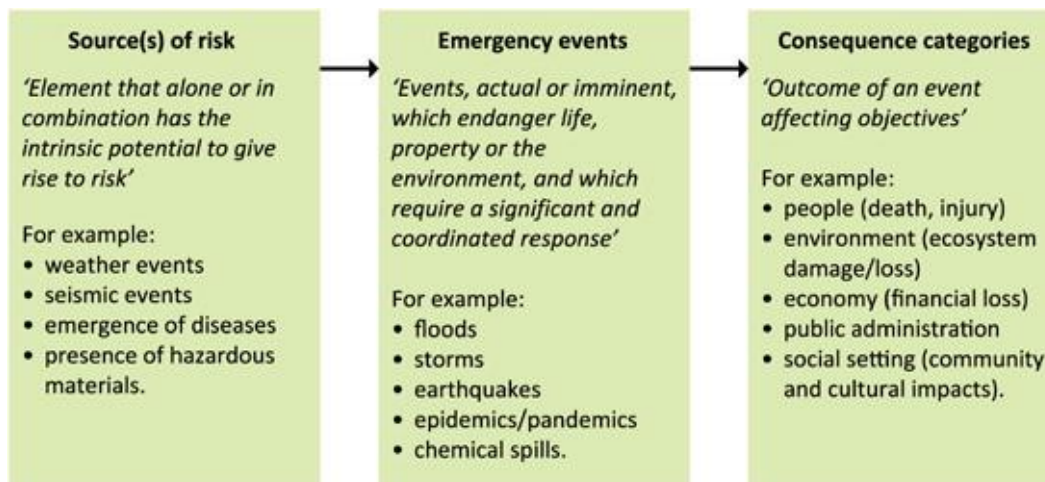


Figure 4: Summary scope of risk assessment

It advocates for communication and consultation with stakeholders to access different perspectives and experiences, as well as both a holistic view and hazard-specific studies (mapping and modeling) to identify risks. A risk description is required linking (one or more) sources of risk to a consequence, focusing on an (a single) emergency event and identifying controls (prevention, preparedness etc.) that reduce severity or likelihood of consequences. A risk register is required to record the risks identified and is to be reviewed to ensure all 'relevant' risks are identified, trivial issues excluded, duplicates combined, and controls identified.

### 2.2.4 Risk Analysis

Risk analysis is defined as 'the systematic process to understand the nature of and to deduce the level of risk' (Standards Australia, *AS/NZS ISO 31000:2018 Risk management – principles and guidelines*). Risk level is a function of consequence (to people, economy, environment, public administration and social setting) and likelihood of consequences from the event occurring.

The NERAG use a process of risk analysis involving:

- Gathering knowledge about the risk including historical data, modelling, consequence assessment and expert opinion.
- Assessing the extent of control which includes strength (effectiveness) and expediency (ease of activation and use). These are rated qualitatively, and an overall level of control determined using a matrix (see NERAG Table 2 p.53).

- Risk criteria that standardise and regularise the assessment of consequence and likelihood and assumptions about existence and effectiveness (existence) of controls.
- Establishing levels of consequence for each risk (e.g., to people, economy, environment) using qualitative criteria (e.g., 1 in 10,000 deaths and/or critical injury is judged as catastrophic consequence).
- Establishing the level of likelihood of that consequence based on the probability (using annual exceedance probability (AEP)) of the event and the consequence. Involves four steps considering: AEP and likelihood; controls; impact of temporal factors; changes to exposure.
- Risk level is assessed using a qualitative risk matrix (Table 11 p.73). NERAG requires that all identified and analysed risks be evaluated. This relies on judgements that may not fully recognise systemic risks and local processes.
- Confidence in the assessment to indicate uncertainty. It relies on judgements about quality of evidence, levels of expertise in assigning consequence and likelihood and extent of agreement between stakeholders. Use single measure or separate confidence or consequence and likelihood (Table 13 p.7).

### 2.2.5 Risk evaluation

Risk evaluation helps to decide which risks may require further detailed assessment or treatment and prioritises measures to reduce risk levels. Priority (Table 14 p.78) is determined by combination of risk level and confidence (Tables 15-19 p.78-79) resulting in appropriate further research, treatment, and monitoring/review.

The NERAG advise that a decision on whether further action is required at this stage and the risk assigned an action category (1- treatment, 2 - further analysis, 3- monitoring and controls). It suggests 'external factors' that could have affected the risk assessment and confidence level, should be 'taken into account.' Decision on action is then guided by questions in Figure 5 over the page. The risk register records the decisions resulting from the evaluation and risks requiring critical attention.

At this stage, the risk evaluation may make clear the need for further analysis if there is insufficient information to determine risk level or appropriate treatment. The NERAG suggest detailed analysis based on quantitative data that utilises historical records.

### 2.2.6 Risk treatment

The NERAG provide an indicative discussion of the process of modifying risk as part of the risk management process following risk assessment. Risk assessment provides information to address the cause of risk and identify most appropriate treatments. The Guidelines summarise risk treatment planning in Figure 6.

The NERAG advocate for consideration of cost-benefit and sensitivity analysis for a decision on treatment but leaves it to decision makers for treatment planning ‘using their own relevant decision-making framework.’<sup>v</sup>

### 2.2.7 Monitoring and review

The NERAG advise that as part of the risk management process a timetable to monitor and review outcomes is established and documented. Review is seen as necessary since ‘the nature of emergency related risk changes over time’ including priorities, perception and culture.

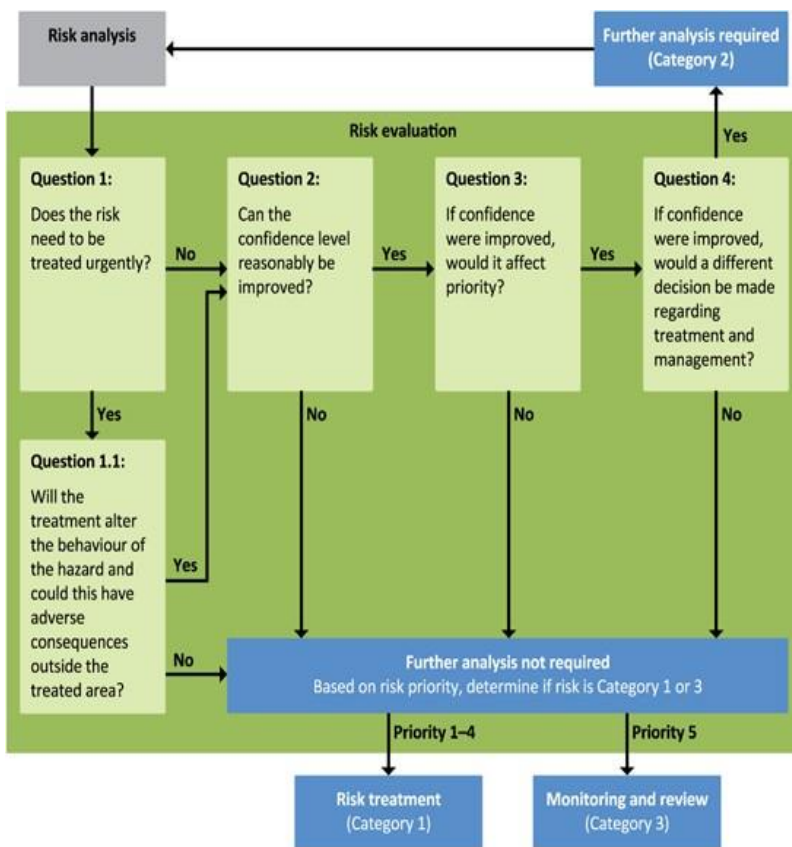


Figure 5: Decision point questions (p.83)

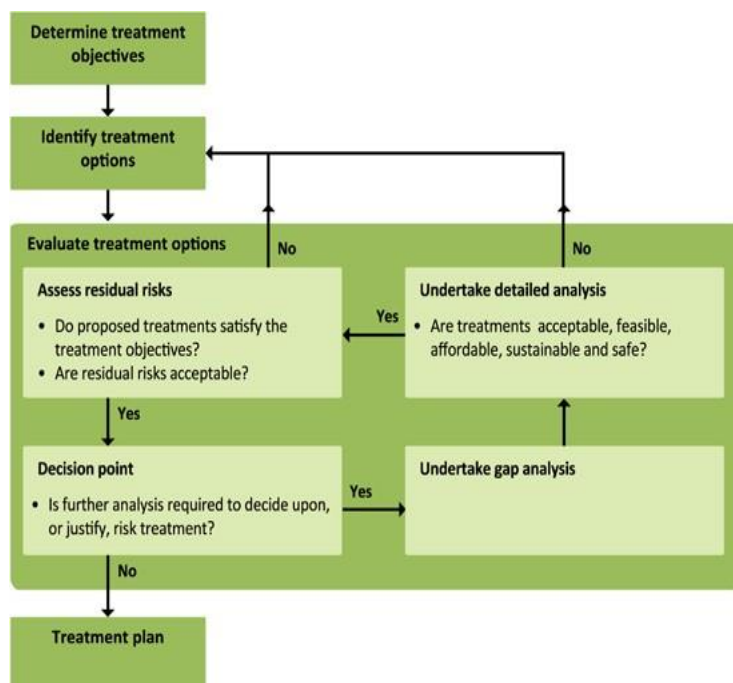


Figure 6: Risk Treatment Planning

## 2.3 National Strategy for Disaster Resilience

The *National Strategy for Disaster Resilience (NSDR)* is a national policy providing ‘high-level direction and guidance on how to achieve disaster resilient communities across Australia’<sup>vi</sup> and embodying strategic priorities to, among others, reduce risk and promote and communicate an awareness and understanding of risk within the community.

Published in 2011, the National Strategy for Disaster Resilience (NSDR) provides high-level guidance on disaster management to governments, business, community leaders and not for profit organisations. The NSDR recognises the changing risk context propelled by climate change; that societal impacts of disaster drive the need for improved resilience; and new methods and arrangements are necessary to do this.

It understands the sources of increasing vulnerability to disaster through work-life patterns, lifestyle expectations, demographic changes, and community fragmentation. It recognises the source of systemic risk and its impact on vulnerability through greater complexity and interdependencies of social, technical, and infrastructure systems.

NSDR argues that a disaster resilient community needs to better understand and respond to risk, including exposure and vulnerability and takes steps to protect itself. Its priorities are for risk assessments:

- to be undertaken and shared for priority hazards
- to consider risks and vulnerabilities and capabilities across the social, economic, built, and natural environments.
- to use consistent methodologies and data frameworks and cost-benefit analysis to inform risk reduction activities



- through partnerships, sharing and collaboration, make information accessible and available to governments, organisations and communities undertaking risk management planning and mitigation works.
- to provide datasets that enable communities to better understand and act on their risks.

## 2.4 Sendai Framework

### Chart of the Sendai Framework for Disaster Risk Reduction 2015-2030

#### Scope and purpose

The present framework will apply to the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters, caused by natural or manmade hazards as well as related environmental, technological and biological hazards and risks.

It aims to guide the multi-hazard management of disaster risk in development at all levels as well as within and across all sectors

#### Expected outcome

The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries

#### Goal

Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience

#### Targets

Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015	Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015	Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030	Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030	Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020	Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030	Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030
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#### Priorities for Action

There is a need for focused action within and across sectors by States at local, national, regional and global levels in the following four priority areas.

<p><b>Priority 1</b> Understanding disaster risk</p> <p>Disaster risk management needs to be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment</p>	<p><b>Priority 2</b> Strengthening disaster risk governance to manage disaster risk</p> <p>Disaster risk governance at the national, regional and global levels is vital to the management of disaster risk reduction in all sectors and ensuring the coherence of national and local frameworks of laws, regulations and public policies that, by defining roles and responsibilities, guide, encourage and incentivize the public and private sectors to take action and address disaster risk</p>	<p><b>Priority 3</b> Investing in disaster risk reduction for resilience</p> <p>Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment. These can be drivers of innovation, growth and job creation. Such measures are cost-effective and instrumental to save lives, prevent and reduce losses and ensure effective recovery and rehabilitation</p>	<p><b>Priority 4</b> Enhancing disaster preparedness for effective response, and to «Build Back Better» in recovery, rehabilitation and reconstruction</p> <p>Experience indicates that disaster preparedness needs to be strengthened for more effective response and ensure capacities are in place for effective recovery. Disasters have also demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of the disaster, is an opportunity to «Build Back Better» through integrating disaster risk reduction measures. Women and persons with disabilities should publicly lead and promote gender-equitable and universally accessible approaches during the response and reconstruction phases</p>
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#### Guiding Principles

Primary responsibility of States to prevent and reduce disaster risk, including through cooperation	Shared responsibility between central Government and national authorities, sectors and stakeholders as appropriate to national circumstances	Protection of persons and their assets while promoting and protecting all human rights including the right to development	Engagement from all of society	Full engagement of all State institutions of an executive and legislative nature at national and local levels	Empowerment of local authorities and communities through resources, incentives and decision-making responsibilities as appropriate	Decision-making to be inclusive and risk-informed while using a multi-hazard approach
Coherence of disaster risk reduction and sustainable development policies, plans, practices and mechanisms, across different sectors	Accounting of local and specific characteristics of disaster risks when determining measures to reduce risk	Addressing underlying risk factors cost-effectively through investment versus relying primarily on post-disaster response and recovery	«Build Back Better» for preventing the creation of, and reducing existing, disaster risk	The quality of global partnership and international cooperation to be effective, meaningful and strong	Support from developed countries and partners to developing countries to be tailored according to needs and priorities as identified by them	

Figure 7: Chart of Sendai Framework

The purpose, goal and expected outcomes of the Sendai Framework are to 'guide the multi-hazard management of disaster risk in development, at all levels...within and across

sectors... to substantially reduce disaster risk and societal losses by preventing new and reducing existing disaster risk, through integrated and inclusive cross-society measures preventing and reducing hazard exposure and vulnerability to disaster, increasing preparedness... and strengthening resilience.’ The priorities for action are to enhance understanding of disaster risk, strengthen disaster risk governance, promote investment in disaster risk prevention, and enhance disaster preparedness for response, recovery, rehabilitation and reconstruction.

The Sendai Framework advocates that key principles are applied to taking this action including cooperative, collaborative and inclusive approaches; empowerment of communities; reducing existing disaster risk and preventing the creation of new risk; prioritising investment in risk reduction and recognising the specific characteristics of communities in decisions about risk measures; and coordinating disaster risk reduction with sustainable development.

## 2.5 National Disaster Risk Reduction Framework

The National Disaster Risk Reduction Framework (NDRRF) guides national efforts to actively reduce disaster risk to minimise loss and suffering caused by disasters. It translates the first three Sendai Framework priorities into action.

Disaster risk is a product of hazard (a sudden event or shock), exposure (the people and things in the path of potential hazards), vulnerability (the potential for those people and things to be adversely impacted by a hazard) and capacity (the ability for those people and assets and systems to survive and adapt). Climate change is an underlying driver of disaster risk and increases disaster risk in a variety of ways, including by altering the frequency and intensity of natural hazards, affecting vulnerability to natural hazards, and changing exposure patterns.

The Sendai Framework 2030 Outcome is ‘the substantial reduction of disaster risk and losses in lives, livelihoods and health, and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.’

The NDRRF establishes a 2030 vision, goals and priorities broadly aligned to the Sendai Framework and the 2030 Sustainable Development Goals and outlines foundational strategies for action to meet these across the five years from 2019 – 2023. The 2030 vision is to be enabled and supported to actively reduce disaster risk and limit the impacts of disasters on communities and economies. Society understands and responds to social, environmental, technological, and demographic changes which have the potential to prevent, create or exacerbate disaster risks. All sectors of society:

- make disaster risk-informed decisions
- are accountable for reducing risks within their control, and
- invest in reducing disaster risk to limit the cost of disasters.

The 2030 goals are to:

- take action to reduce existing disaster risk
- minimise creation of future disaster risk through decisions taken across all sectors
- equip decision-makers with the capabilities and information needed to reduce disaster risk and manage residual risk

The priorities of the framework, the five-year outcomes sought for each and strategies for the period to 2023 aimed at taking action to reduce disaster risk in Australia are summarised in Table 1. Outcomes and strategies relevant to the focus and direction of the NERAG are *italicized*.

Framework priorities	Five-year outcomes	Strategies to 2023
Understand disaster risk	<ul style="list-style-type: none"> <li>• Legal liability of decision-makers relating to disaster risk information is further understood and acted upon.</li> <li>• Australia is supported with enduring and cohesive national capabilities that enable the creation, capture and sharing of useful disaster risk information,</li> <li>• <i>Meaningful disaster risk information is freely disclosed, shared and integrated into risk planning across sectors</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Improve public awareness of, and engagement on, disaster risks and impacts</i></li> <li>• Identify and address data, information and resource gaps</li> <li>• Address technical barriers to data and information sharing and availability</li> <li>• <i>Integrate plausible future scenarios into planning</i></li> <li>• Develop cohesive disaster risk information access and communication capabilities to deliver actionable disaster risk data and information</li> <li>• Support long-term and solution-driven research, innovation and knowledge practices, and disaster risk education</li> <li>• <i>Improve disclosure of disaster risk to all stakeholders</i></li> </ul>
Accountable decisions	<ul style="list-style-type: none"> <li>• Public, private and community sector decision-makers are working towards addressing disaster risk along with other risks</li> <li>• <i>Decision-making processes and models, including cost benefit analyses, adequately address current and future disaster risks</i></li> <li>• <i>Priority disaster risks are identified and actively mitigated</i></li> <li>• <i>Integrated and robust frameworks are used to assess and reduce disaster risk in all environments, but particularly infrastructure, land use and development planning</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Consider potential avoided loss (tangible and intangible) and broader benefits in all relevant decisions</i></li> <li>• <i>Identify highest priority disaster risks and mitigation opportunities</i></li> <li>• <i>Build the capability and capacity of decision-makers to actively address disaster risk in policy, program and investment decisions</i></li> <li>• Establish proactive incentives, and address disincentives and barriers, to reducing disaster risk</li> <li>• <i>Maintain planning and development practices that adapt to rapid social, economic, environmental and cultural change</i></li> <li>• <i>Promote compliance with, and embed resilience requirements into, relevant standards, codes and specifications</i></li> </ul>
Enhanced investment	<ul style="list-style-type: none"> <li>• Existing and future disaster risk reduction investments target high priority locally and nationally significant disaster risks</li> <li>• Where possible, investment in disaster risk reduction is designed to <i>maximize broader outcomes including increased productivity, improved connectivity, and social inclusion</i></li> </ul>	<ul style="list-style-type: none"> <li>• Pursue collaborative commercial financing options for disaster risk reduction initiatives</li> <li>• Develop disaster risk reduction investment tools to provide practical guidance on investment mechanisms</li> <li>• Leverage existing and future government programs to fund</li> </ul>

Framework priorities	Five-year outcomes	Strategies to 2023
	<ul style="list-style-type: none"> <li>Investments in disaster risk reduction and resilience limit future disaster recovery costs</li> </ul>	<p>priority risk reduction measures</p> <ul style="list-style-type: none"> <li>Identify additional current and future potential funding streams</li> <li>Improve the accessibility, variety and uptake of insurance</li> <li><i>Empower communities, individuals and small businesses to make informed and sustainable investments</i></li> </ul>
Governance, ownership and responsibility	<ul style="list-style-type: none"> <li>All sectors and communities understand the extent to which they have a responsibility to reduce disaster risk.</li> <li><i>Mechanisms are in place nationally to identify and reduce disaster risk arising from cross-sector interdependencies</i></li> <li>Transferred ownership of disaster risk through commercial exchanges is transparent and acknowledged</li> <li>All sectors and communities are engaged in a national mechanism to connect and guide efforts to reduce disaster risk</li> </ul>	<ul style="list-style-type: none"> <li>Establish a national mechanism to oversee and guide disaster risk reduction efforts and cross-sector dependencies</li> <li>Establish a national implementation plan for this framework</li> <li>Support and enable locally led and owned place-based disaster risk reduction efforts</li> <li>Incentivise improved transparency of disaster risk ownership through personal and business transactions</li> <li>Consistently report on disaster risk reduction efforts and outcomes</li> <li>Create clear governance pathways for pursuing disaster risk reduction projects</li> </ul>

Table 1: Framework priorities, planned five-year outcomes and strategies

## 2.6 Profiling Australia's Vulnerability

The Profile reminds Australia of its commitments to the United Nations 2030 Agenda for Sustainable Development (including the Sustainable Development Goals), the United Nations Sendai Framework for Disaster Risk Reduction 2015-2030 and the Paris Agreement on Climate Change.

The *Sendai Framework for Disaster Risk Reduction 2015-2030* calls on jurisdictions worldwide to:

- integrate disaster risk reduction into policy, investment, and sustainable development
- prevent one sector from increasing risk in others
- involve all members of society, including the most vulnerable, in crafting and implementing measures.

The Profile's contribution to understanding of disaster risk through the profiling of Australian vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment, is consistent with Australia's commitments to systematically analyse and reduce drivers of disaster risk. This includes reducing hazard exposure, reducing vulnerability of people and property, sustainably managing land and environment, and improving preparedness and early warning for natural hazard events.

The Profile argues that in Australia we do not have a foundational understanding of the root causes of disaster, how places and people become vulnerable, and how this leads to disaster. Australians are dependent on interconnected systems to deliver essential services such as energy, water, health and transport, and communications which have been established over decades, in different circumstances and with different priorities. Decisions taken over many generations around these essential services, and other societal systems have increased Australia's vulnerability to disaster risk, requiring a deeper understanding of this risk and systemic vulnerabilities, to better address them.

Societal values have driven these historical decisions so it is necessary to understand what Australians value and why, so that disaster risk reduction efforts can be prioritised. To reduce the likelihood or consequence of disasters the Profile focuses on the root causes and effects of vulnerability. It advocates for collaboration and coordination between diverse stakeholders, across jurisdictions and socio-economic sectors to better understand systemic causes and effects of vulnerability, and how to mitigate them.

Extreme events disrupt social, economic and natural systems and cascade to overwhelm society's capacity of to cope. Vulnerability to cascading disruption of these systems is because of:

- The placement of communities, infrastructure, and assets in hazardous areas or because of inadequate building standards.

- Values, such as: affordability; cultural connection; safety and security; or lifestyle influence choices which are sometimes made with inadequate understanding of risks. Conscious trade-offs between values, through collaborative decision-making, need to be made to reduce systemic vulnerability.
- Expectations that the supply of essential information and communications, food, water, electricity, fuel and healthcare which are affordable, safe, high-quality and reliable, drive decisions about where and how they are provided. In many cases cost minimisation requires low redundancy and creates vulnerability to disruption with the potential for cascading effects across interconnected systems, including infrastructure and supply chains.
- Risk assessment across multiple hazards and timescales, under complex, variable and uncertain conditions using traditional probability based (likelihood by consequence) approaches are inadequate and coming under increasing pressure to change. They cannot adequately deal with ambiguity, uncertainty, and ignorance. New broad-based, rigorous approaches to disaster risk assessment need to reduce the element of 'surprise' by recognising the increasing frequency of catastrophic events; innovatively frame complex problems; and include different perspectives. They also need to take account of implicit value-tradeoffs and transfer of risk, to minimise vulnerability and suffering, and avoid creating future risk.
- Lack of good governance and leadership including openness to transform decision-making, adjust management approaches and to be agile in dealing with uncertain, dynamic and demanding circumstances.

The Profile argues for a re-framing of Australia's approach to vulnerability and consequently, the approach to risk assessment, as reflected in Figure 8.



## Pathways to safety

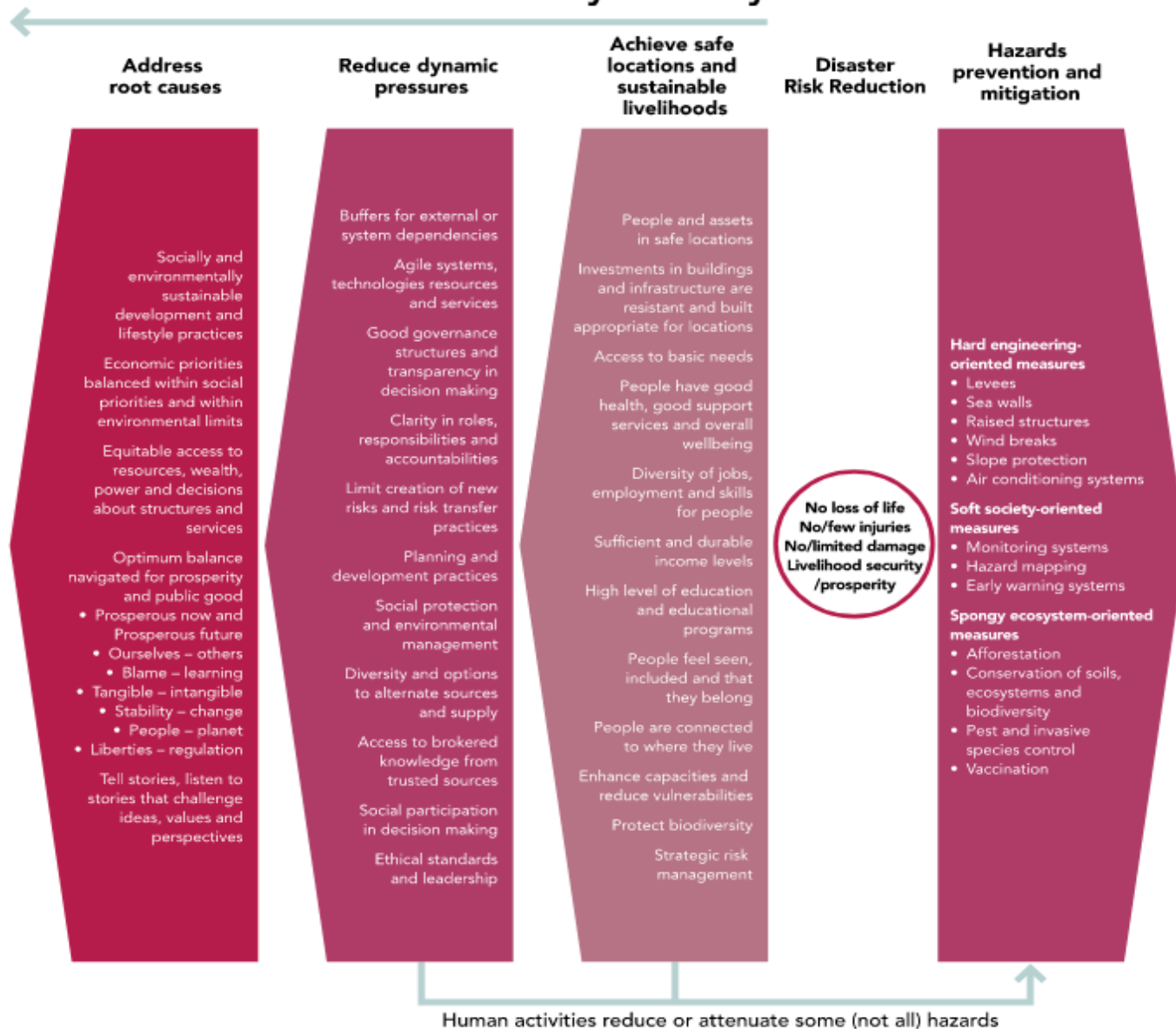


Figure 8: The pathway to safety, highlighting the things to enhance or the things to increase. (Source: adapted from Wisner et al, 2011).

## 2.7 Guidance for Strategic Decisions on Climate and Disaster Risk

The introductory Guidance maintains that hazards and disaster risks that incrementally compromise the capacity and stability of natural environments are influenced by climate change. Natural hazards such as heatwaves, floods, storms, bushfires, and drought are more frequent and intense, to the extent that some have been ‘unprecedented’. Individual and community livelihoods and wellbeing are negatively impacted and the capacity of individuals, communities and the emergency services to cope is overwhelmed. The Guidance documents define climate and disaster risk as the ‘potential damage that could occur to social, economic, natural or infrastructural assets, services, or communities from natural hazards, climate change, exposure, vulnerability and environmental health.’<sup>vii</sup>

One of the most pressing challenges posed by climate change and ‘unprecedented’ impacts of natural hazards is the ‘nation’s limited capabilities for assessing, managing and governing the systemic implications of climate and disaster risks.’<sup>viii</sup> ‘Current approaches to climate and disaster risk measurement and management are inadequate. Existing knowledge, models and tools are insufficient. This is limiting the development of legitimate, credible options for reducing climate and disaster risk.’<sup>ix</sup>

The Guidance argues for the urgent development of new strategic climate and disaster risk assessment practices to consider systemic risk early in the decision-making process, to properly consider disaster risk and avoid reinforcing existing risks and creating new ones. The guidance offers an innovative, unified approach to incorporating climate and disaster risk into decision-making by:

- using a systems-and values-based approach to assessment and collaboration
- reconsidering the appropriateness of stakeholders’ objectives, goals and decision criteria
- making strategic long-term decisions that account for relevant uncertainty
- identifying and learning how to apply appropriate methods to make robust decisions in uncertainty
- understanding the knowledge and information required for different stages of strategic plans or risk assessments.

The set of five guidance documents are designed to inform strategic climate and disaster risk assessment through continuous, iterative, adaptive learning about vulnerability, scenarios and prioritisation within a governance context (Figure 9). The complexity, turbulence and rate of change of natural, social and economic systems makes an adaptive learning approach imperative. Adaptive learning involves:

- mapping the climate and risk context
- developing a vision and goals for preferred climate and risks
- searching potential and emerging futures
- developing options and pathways

- adaptively implementing change.<sup>x</sup>

The Guidance documents propose approaches that are, in many cases, consistent with the methods used in NERAG but mostly represent a philosophical and methodological leap beyond it, reflecting the considerable progress in thinking that has occurred since the NERAG were first developed. The guidance documents also discuss the substantial shortcomings of decision matrices upon which much of the NERAG method is based.



Figure 9: The set of Guidance documents for enabling strategic climate and disaster risk assessment based on continuous, iterative and active learning

The following summarises the contents of the remaining guidance documents.

### 2.7.1 Guidance on governance

The Guidance discusses risk governance in the context of systemic climate and disaster risk and explores some of the limitations of current risk governance approaches including risk assessment. Emerging decision-making approaches to diagnose and strategically address governance barriers to acting on climate and disaster risks are introduced.

‘Systemic risk governance refers to the rules, norms, routines and practices that enable and constrain individuals and organisations from recognising, assessing and managing the causes and effects of systemic risks.’<sup>xi</sup> Current governance arrangements need reform to be able to

effectively address highly interconnected, increasingly complex, dynamic and unstable natural, economic and social systems. In this context, simple likelihood of consequence risk assessment and treatment methods are not effective.

Prevailing decision support tools and methods including risk assessments are not able to effectively assess risk. Risk is framed narrowly with only a subset of measures of value and success considered, focused on proximate causes of the problem. The Guidance encourages analysis by decision-makers of governance constraints on their understanding and management of causes and effects of risk by using the Values-Rules-Knowledge (VRK) approach or Collective Impact Initiative method.

The Guidance argues for the public sector to build national capabilities in climate and disaster risk assessment, data and information. Development of authoritative national, state and regional climate and disaster risk scenarios is required. Assessment and quantification of the investments and potential pathways/roadmaps is required for climate and disaster risk reduction.

The Guidance also highlights six key problems with risk matrices that create discrete categories of risk based on combinations of likelihood of an event occurring and the consequence.

1. Categories are subjective and may not line up with continuous relationships between variables.
2. The matrix approach fails to specify the decision-makers risk appetite.
3. Colour coding of categories can result in inconsistent risk assessments and the high prioritisation of relatively moderate risk.
4. Different risks may not be sufficiently differentiated because of the compression of the range within and between the discrete categories.
5. People avoid extreme values and fail to consider the full range of categories available to them reinforcing range compression. In cases where likelihood and consequence are negatively correlated, decisions based on conventional risk matrices are worse than random decisions.<sup>xii</sup>
6. People apply different numerical likelihoods or probabilities based on their differing subjective interpretations of their descriptions.

The risk matrices used in NERAG, therefore, are not a good basis to inform decision-making. Risk matrices must be able to reflect systemic risk co-dependencies, incorporate margins of error and be produced through an active adaptive learning process. Risks categories generated by this process are the ex-post product of quantitative analysis not an ex-ante categorisation imposed on the situation before it has been analysed properly.

### **2.7.2 Guidance on vulnerability**

The Guidance focuses on societal vulnerability to climate impacts, natural hazards, and disaster, to complement and strengthen existing risk-based approaches. It discusses ways to

collaboratively understand and assess the effects of the root causes of these vulnerabilities. It applies a model of societal VRK that incentivise and inform trade-offs and decisions that affect vulnerabilities in interconnected social, ecological and infrastructural systems. Assessment of vulnerability involves understanding 'why' and 'how' overwhelming loss and suffering are caused by natural events that impact on what people and society value. Vulnerability arises out of societal, community and individual decisions that determine how our systems (i.e., social, economic, environmental etc) work and how we collectively live our lives.

The Guidance presents a range of concepts and tools that are relevant to risk assessment and have implications for NERAG. The Deconstructing Disaster workshop has decision-makers embedded in a complex disaster scenario enabling a deeper understanding of the causes and effects of vulnerability through insights into the motivations of people involved, and the attributes and importance of things they value.

Values analysis and developing a values framework, possibly in the context of a disaster scenario, is advocated for in the Guidance to enable decision-makers to better understand what people value, why they are valued, and the value trade-offs people make in times of disaster risk. The Guidance advocates for systems thinking to identify the diverse variables involved in vulnerability and their interdependencies and interactions. In so doing, the Guidance broadens the possibilities and choices available in problem solving. It concludes that systems analysis enables:

- understanding of the bases of vulnerability
- identification of feedback loops
- diagnosis of vulnerabilities
- awareness of possible interventions.

The VRK approach (Figure 10) is presented as a tool to illustrate how the decision context is shaped by knowledge of options and consequences; values about the desirability of options and consequences; and the rules impacting options.

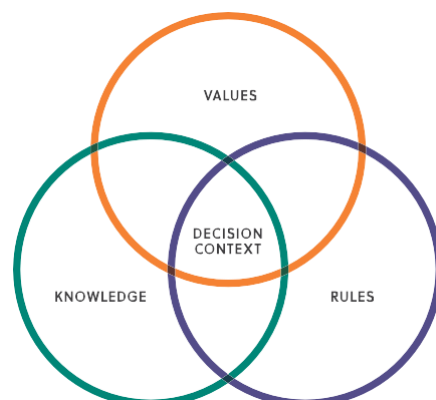


Figure 10: Decision context: societal systems of values, rules and knowledge (VRK)

The Guidance advocates VRK to be used to identify the parameters of disagreement or misunderstanding about options to address vulnerability through understanding:

- the bases of decision-making constraints
- how rules reflect (or not), knowledge and values.

The guidance proposes decision-makers engage in continuous anticipatory learning to support better decisions in the context of uncertainty, complexity and turbulence. It advocates social learning by which interaction, collaboration and sharing integrates insights and knowledge.

### 2.7.3 Guidance on scenarios

The Guidance proposes the development and application of scenarios to explore the implications of uncertainty to hazards, exposure, or vulnerability and to making high-stakes strategic and operational decisions. Scenarios can be used to visualise a range of potential aspirational futures or inform goals and decision criteria guiding collective, adaptive actions. Scenarios enable robust, low-regrets decisions in the context of uncertainty, and are specifically related to magnitude.

The Guidance asserts that the relevance of uncertainties (such as low probability, high consequence events), and the ambiguities these create, are understated by well-established risk assessment methods. 'They often assume the system is understood and controllable, and that optimal decisions can be made based on narrowly defined goals and a single prediction of a 'best estimate' future.'<sup>xiii</sup> It concludes that deep uncertainty about the nature and scale of climate and disaster risk challenges established risk assessment approaches because they do not adequately account for the dynamic and systemic implications of climate and disaster risks. Discrete risk matrices or static probability-based approaches cannot deal adequately with extreme events, uncertainty, ambiguity or ignorance.

The Guidance encourages the use of aspirational, exploratory, and normative types of scenarios to understand the nature of risk and how to deal with it. Exploratory scenarios that can explore probable, plausible, possible and preposterous hazard futures are seen as broadening the applicability of probability-based approaches by opening them to a wider range of possibilities including radical shifts in the environment.

Scenarios of societal vulnerability are identified in the Guidance as enabling consideration of 'deeper political, social, and economic forces contributing to systemic vulnerability that puts people at risk. Without this broader view, disaster risk reduction interventions may become fragmented and focus on a series of small-scale initiatives, artificially separate(ed) from the surrounding vulnerability context.'<sup>xiv</sup>

#### **2.7.4 Guidance on prioritisation**

The Guidance promotes a services and community (vulnerability) focus for timely program and project investment objectives rather than ‘assets’ (economics) focus. Interventions (‘options and pathways’) are evaluated based on vulnerability reduction (‘value at risk’) and creation of economic net benefits (‘value potential’) using scenarios to explore combinations of hazards, exposure, vulnerability and interventions.

At its core the Guidance argues for a shift in focus of climate and disaster risk management to a more active adaptive approach that reduces the causes and effects of societal vulnerability through timely investment in reducing vulnerability and clearly recognising deep uncertainty and the multi-scale and systemic nature of risks. It advocates for strategic, systems thinking and engagement with a wider set of stakeholders in framing objectives and identifying options for reducing the systemic causes and effects of risks. The Guidance presents new analytical and decision-making approaches and frameworks that are useful in an environment of uncertainty about facts, values and likely outcomes. It applies a ‘low regrets’ criteria where decisions keep future options open; do not reinforce or increase risks; and perform satisfactorily under most scenarios.

Little of the NERAG is devoted to the process of modifying risk following risk assessment so this Guidance is currently of limited relevance. However, the key elements of the Guidance may be applicable in a future review of the NERAG.

## 2.8 Systemic Disaster Risk Handbook

The AIDR *Systemic Disaster Risk Handbook* provides a suite of principles for disaster risk reduction, inclusive governance, and decision-making to build resilience and sustainability (Figure 11). It has been developed to promote and guide consideration of systemic risk and resilience analysis as part of any decision, review, update or development of contemporary practical instruction or risk assessment processes. The Handbook supports the implementation of the *National Disaster Risk Reduction Framework (NDRRF)*<sup>xv</sup>, and the *United Nations Sendai Framework for Disaster Risk Reduction (Sendai Framework)*<sup>xvi</sup>. ‘The era of hazard-by-hazard risk reduction is over.’<sup>xvii</sup> ‘We are now in an era of risk and resilience analysis that deals with systemic risk reduction, greater uncertainty, and more complexity.’<sup>xviii</sup>

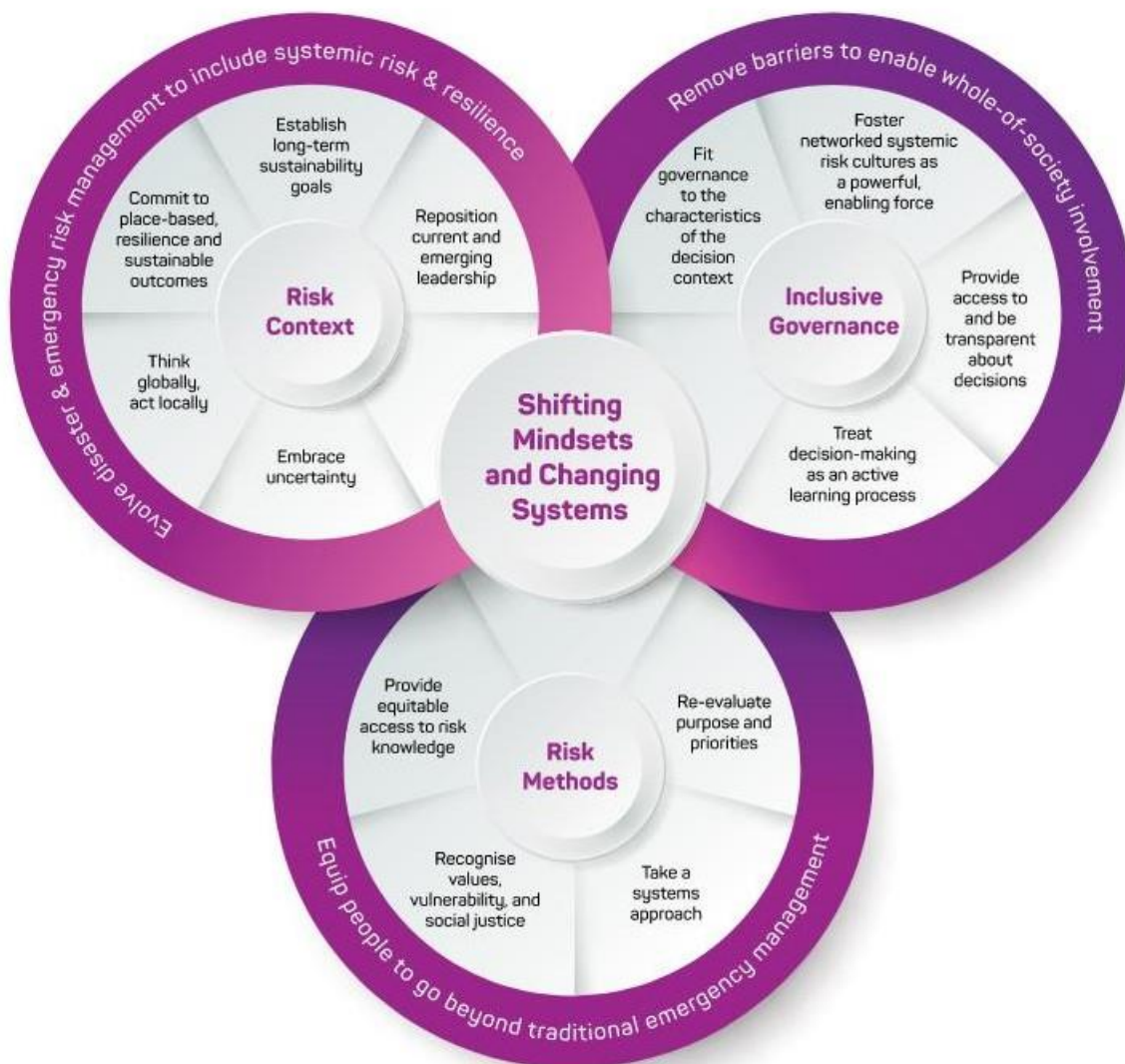


Figure 11: Systemic Disaster Risk Principles (p.2)



The NERAG's approach to disaster risk assessment is increasingly contested by the realities of the interactions of climate change, in addition to more frequent and compounding hazards with complex interdependencies between social, technical, environmental, and economic systems, creating systemic risk and vulnerabilities. Systemic risk challenges the NERAG's risk assessment approach and reduces the effectiveness of risk reduction activities. Its principle, framework and processes require modification so the type and magnitude of sudden or gradual systemic failures that exceed society's capacity to cope, are properly understood and addressed.

While to some extent the NERAG applies the principles outlined below, the degree to which these principles are addressed, and the currency of the techniques/approaches used, needs improving. The NERAG needs to accommodate more extensively:

- 'Whole-of-society involvement in managing risk to enhance resilience and reduce loss and harm from disasters.
- Inclusive governance and risk cultures framed around place-based, systemic resilience and sustainable outcomes.
- Access for people and communities to tools, ability, and knowledge beyond traditional emergency management to resist, absorb, accommodate, recover, transform, and thrive in response to the effects of shocks and stresses.<sup>'xix</sup>

The principles enunciated in the *Systemic Disaster Risk Handbook* are consistent with, apply, and extend those established in the *National Disaster Risk Reduction Framework (NDRRF)* and are developed under the headings of:

- change the risk context
- build inclusive governance
- rethink disaster risk methods.

### **2.8.1 Change the risk context**

Disasters are becoming more frequent, and their impacts are becoming more extensive and extreme, requiring better understanding of the risks. Risk tools and methods require adaptation and improvement to reflect increasing uncertainty and the need for collaboration. Consequently, risk assessment 'needs to evolve beyond current approaches and institutional structures... to build capacity and capability to integrate systemic risk and resilience assessments into existing risk management frameworks... Disasters are not natural and should no longer be considered only an emergency management issue.'<sup>xx</sup>

The key implications relating to risk context are:

- Greater uncertainty about the nature, extent and impact of disaster risks, and consequent potential reduction in trust in decision-makers within communities caught up in disaster cycles. While action is more difficult in such circumstances,

quality decisions based on inclusive governance and the use of sophisticated techniques can address some uncertainty.

- A systems approach to managing disaster risks, that recognises the complex relations between relevant factors and the autochthonous processes driving unexpected and unpredictable outcomes, should be applied.
- Community insight and expertise should be utilised through effective community engagement, to enhance analysis and decision-making around risks and treatments.
- Community involvement and collaborative risk governance, that accounts for values, rules and knowledge, expands the focus beyond risk assessment to local community resilience.
- Climate change, increasing the frequency and intensity of disasters, that has cascading effects on all aspects of society, requires analysis and action based on a long-term decision-making perspective.
- Leaders' decision-making approaches must reflect a context of complexity, uncertainty and turbulence and strengthen long-term resilience and sustainability through just, trustworthy and confident action.

## 2.8.2 Build inclusive governance

'Governance is equated with the structures, rules and arrangements that provide a mandate and accountability for the functioning of systems, assets, people, and economies – whether undertaken by governments, institutions, or other entities.'<sup>xxi</sup>

In the context of climate change, governance and leadership responsibilities around disaster risk management has extended beyond 'survival or recovery of a community or business...to longer-term resilience outcomes, minimising loss and harm, and nurturing and regenerating the natural environment.'<sup>xxii</sup> This is driven by market forces demanding that decision-makers are diligent and take due care in relation to mitigating risk, in the context of climate change, through transparent, effectively managed decisions that are inclusive, fair, just, well-informed and trustworthy.

Recognising the new demands on governance the handbook proposes that:

- Governance structures, rules, and arrangements should reflect the characteristics of the complex and changing decision context so diverse stakeholder values and knowledge are incorporated into decisions making through open collaboration and communication.
- A new complex, fast-moving and turbulent reality requires early and regular consideration of risk within flexible, ethical and value-driven governance culture and leadership, switched onto systemic risk, networked, inclusive and driven by action learning.
- Genuine, open collaboration and knowledge sharing with diverse internal and external stakeholders, rather than limited transactional interactions, should provide transparent access to decision-making processes.

- Decision-making become a process of active adaptation in which early decisions become a trial, experiment, or interim measure to be reviewed and continuously changed based on what is learned. Continually develop improved approaches to assessing and treating risks to address the novelty of events and uncertainties of disaster risk.

### 2.8.3 Re-think disaster risk methods

Disaster risk management is evolving to include systemic disaster risk reduction and resilience that takes a long-term perspective but can respond appropriately to short- and medium-term demands. Addressing the influence of complex systems on disaster risk assessment and decision-making requires the involvement of expertise from across scientific domains and placing people and their values at the centre of the process to discover values and vulnerabilities, avoid an imbalance of knowledge and help people use risk information to more effect.

Inclusive risk management governance must be agile to be able to revisit, restart, or change the risk methodology to reflect decisional needs, temporal demands or as circumstances change. It should produce good, low-regret decisions.

In this context the handbook proposes new approaches based on:

- Rethinking the purpose of disaster risk management, including assessment and treatment investments, around long-term systemic disaster risk reduction and resilience by incorporating people, place, and values into decision-making and priority setting.
- Taking a systems approach to the complex interconnections and relationships that create systemic vulnerability around assets; community; networks and place; and governance and coordination. Seeing the world from a systems perspective enables a clearer view of the available points for intervention and the implicit values and priorities.
- Making values, vulnerability, and social justice central to the purpose of disaster risk management, assessment and treatment, and building community trust by agreeing to objectives with stakeholders and making transparent judgements in setting priorities, allocating resources and making risk management decisions generally.
- Providing all stakeholders with open and ready access to risk knowledge including inputs, outputs and decisions, to enable equitable access and foster participation and trust. Discussing the progress of a disaster risk reduction and resilience activity is a key collaboration tool, enabling two-way feedback and building shared commitment to outcomes.

## 2.9 Implications for the NERAG

The National Emergency Risk Assessment Guidelines were consolidated out of work that commenced in the early to mid-1990s, first published in 2010 and republished in 2015. They were updated in 2020 to reflect changes in *ISO 31000:2018 Risk Management Guideline*.

Since the publication of the National Strategy for Disaster Resilience in 2011, the understanding of the global context and the range and sophistication of methods has further transformed. The wide-ranging effects of climate change on the frequency and intensity of natural hazards is accepted as a reality that must be addressed.

The Sendai Framework establishes clear objectives and principles for promoting disaster risk reduction and pursuing risk assessment. It advocates a coordination of efforts in reducing disaster risk and building resilience and sustainability. Since 2015 there has been extensive development of Australian frameworks and guidance for risk assessment consistent with the Sendai framework that specifically recognises systemic risk and advocate for new approaches that focus on vulnerability, stakeholder collaboration, and the use of more sophisticated analytical approaches.

Consequently, NERAG's objectives, structure and methods require a comprehensive review to take account of the transformational developments that have occurred since its original publication.

The following issues should be considered as part of the first stage of the review when key jurisdictional stakeholders are convened to deliberate on the rewriting of NERAG (phase 2 of the review):

### **Objectives**

- a. Consider minimising vulnerability and suffering and avoiding future risk creation as legitimate objectives of risk assessment (and implicit in value-trade-offs and risk transfer).
- b. Integrate risk assessment and resilience by embedding resilience requirements into frameworks and methods.

### **2. Governance and leadership**

- a. Establish governance culture and leadership that is responsive and agile, and ethical and values driven, in the context of long-term complexity, uncertainty, turbulence and systemic risk.

### **3. Active adaptive learning**

- a. Make decision-making an active, adaptive learning process to enable continuous improvement.
- b. Build capability and capacity of decision-makers to lead and make robust decisions around policy, programmes and investment, in a context of complexity, uncertainty and turbulence.

#### **4. Systems approach**

- a. Apply a systems approach to analysis and decision-making to better understand interconnections and interdependencies, clarify implicit values and priorities, and identify effective intervention points.

#### **5. Systemic risk**

- a. Recognise the existence of complex interconnectedness and interdependencies between social, technical, environmental, and economic systems creating systemic risk and vulnerabilities.

#### **6. Analytical methods and techniques**

- a. Apply decision-making process and models that can adequately address current and future disaster risk.
- b. Base decision-making on integrated and robust frameworks, methods, and techniques that are appropriate in a complex, uncertain and turbulent context.
- c. Address shortcomings of traditional probability-based risk matrices (failure with uncertainty, ambiguity, and ignorance) by transitioning to the use of quantitative and qualitative techniques including modelling and aspirational, exploratory, and normative scenarios.

#### **7. Values in decision-making**

- a. Transparently incorporate values, vulnerability, and social justice into risk assessment and risk management decision-making.

#### **8. Stakeholder collaboration**

- a. Open the process of risk assessment to enable community input of knowledge, values and priorities.
- b. Fully and transparently collaborate with communities to build trust.
- c. Establish open collaboration and communication with all stakeholders, across all domains including in relation to objectives, goals, priorities, decision criteria and resource allocation in risk assessment and decision-making.

#### **9. Disaster risk knowledge and information**

- a. Create, capture, and equitably share disaster risk knowledge and information with all stakeholders to support collaboration and trust.
- b. Identify data needs and resource gaps.
- c. Promote discussion and broader understanding of how responsibility for disaster risk is shared.
- d. Address risk transfer.

## **10. Mitigation and treatment**

- a.** Consider risk reduction/mitigation/investment as integral to informing the risk assessment process.
- b.** Identify priorities for and invest in mitigating/treating disaster risks.
- c.** Enable locally informed risk mitigation investment decisions that account for local characteristics.
- d.** Empower communities, individuals, and business to make informed risk reduction investments.

# Chapter 3: Findings

## 3.1 Introduction

The National Emergency Risk Assessment Guidelines (NERAG) guides efforts to build capability, harmonise risk assessments and better understand the nature of hazards that have the potential to cause harm and loss to Australian communities and the economy. The purpose of the NERAG is to provide a framework for the assessment of emergency risk that can be used within Australian jurisdictions at national, state, local government, and community levels. It is used to a limited extent in a range of other roles including planning and bushfire assessment.

The 2015 United Nations Sendai Framework for Disaster Risk Reduction, Australia's National Disaster Risk Reduction Framework and associated guidance materials, and the evolution of Australia's risk management capabilities have produced new approaches to risk and changes in strategic objectives. In the international sphere, a dynamic rather than a static framing of risk has recently been adopted in considering hazard, exposure, and vulnerability (Reisinger et al., 2020; IPCC, 2022), focusing on complex impacts and systemic risk from a multi-hazard perspective. **The National Disaster Risk Reduction Framework, the Systemic Disaster Risk Handbook and the Guidance for Strategic Decisions on Climate and Disaster Risk, in recognising and adopting these international developments, have established policy directions and principles that suggest the need for an examination of NERAG to consider whether and how it should be refashioned.**

The NERAG were originally designed to assess individual hazards within relatively stable natural, social and economic systems. Since its conception in the 1990's and its development over the following thirty years, profound global change has occurred across socio, technical, environmental, economic, and political systems (Cutter et al., 2015). Systemic risk arises from the complex ways in which systems interact with each other. System interactions reinforce or dampen the effect of the parts, generating cascading impacts and autochthonous processes capable of producing system error or failure.

In the context of systemic risk, NERAG must address the practical, political, and personal spheres of transformation<sup>xxiii</sup>. Drawing heavily on the work of Sillmann et al. (2022) the NERAG should firstly look to issues around knowledge and expertise, innovation, and organisational management. Secondly, it needs to consider systems, structures and processes bearing on societal organisation and management and systems function. This includes social and cultural norms, rules, regulations, incentives, and infrastructure. Thirdly, the NERAG needs to address individual and shared beliefs, values, worldviews, and paradigms. These factors influence attitudes and behaviours that shape individual and collective views of systems and systemic risks, and preferred strategies for practical transformations.<sup>xxiv</sup>

**The impacts of climate change and the emergence of complex, cascading and systemic risk were recognised by many of the participants in this research as requiring urgent development of new strategic climate and disaster risk assessment practices to consider systemic risk early in the decision-making process, to properly consider disaster risk and avoid reinforcing existing risks and creating new ones. A philosophical and methodological reshaping of NERAG’s approach to risk assessment is required.** In the context of discussing the findings of this research the following sections set out the reasons for and the areas in which NERAG requires review. Further detail pertaining to the results of each question of the survey can be found in Appendix A, while in depth discussion of the results of the focus groups can be found in Appendix B.

### 3.2 Use and usefulness of the NERAG

Almost two-thirds of participants in the online survey perceived the NERAG to be at best, moderately useful (See Appendix A.5). As a national framework designed to provide cross jurisdictional guidance in the assessment of risk, it could be expected to be of considerably greater use to stakeholders. However, the NERAG are perceived by many participants as; complex and time consuming in its application; as failing to address systemic risk and embrace new methods; and as inferior to available alternatives. The NERAG are used by 55% of participants in various ways. They are mainly used to provide a general guide or checklist, as an adjunct to other frameworks; and because their use is required by their processes in addressing key elements in the assessment of risk.

While the NERAG are used by approximately four in ten participants to establish the context, and identify and analyse risk, 36% use it to evaluate risk and 33% for guidance on communication and consultation or monitoring and review. One quarter use it for guidance on the treatment of risk. Online participants who reported that they did not use the NERAG in the various stages of the risk assessment process cited five main reasons:

- prefer other approaches or frameworks
- difficult to apply to local/small scale analysis
- qualitative rather than quantitative methods used by the NERAG
- fails to address systemic risk
- guidance is too limited.

Approximately 55% of online survey participants used risk assessment frameworks other than the NERAG. Primarily they indicated using the ISO 31000 and organisational and jurisdictional specific frameworks.

### 3.3 Changes to the NERAG

Principles guiding changes identified by research participants, are to make the NERAG:



- Simple and accessible, not overly complex; but quantitatively based; and adaptive, strategic and forward looking.
- Open to community input and broader collaboration to draw on community understanding and expertise and balance stakeholder voices.
- Take full account of the resources involved and the outcomes generated by risk treatments.
- More comprehensively support its application, including through technical advice and access to case studies, scenarios and examples.

The NERAG should reflect the current and emerging context by recognising the impact of climate change and addressing multiple hazards and systemic risk. Customised versions could meet different needs including decision-making at local or community levels.

The research has identified several opportunities to align the NERAG with the principles and guidance in the National Disaster Risk Reduction Framework; Guidance for Strategic Decisions on Climate and Disaster Risk; and the Systemic Disaster Risk Handbook and to establish a basis for transformative change toward reducing systemic risk. These opportunities are discussed under the following headings and their associated subheadings:

- Objectives
- Governance and leadership
- Adaptive learning
- Systems approach
- Systemic risk
- Analytical methods and techniques
- Values in decision-making
- Collaboration with stakeholders
- Disaster risk knowledge and information
- Mitigation and treatment

### 3.4 Objectives

In the context of climate change, greater systems complexity, increasing uncertainty and turbulence, and systemic risk, the objectives of disaster risk management are much more than ‘survival or recovery of a community or business... [and must account for] longer-term resilience outcomes, minimising loss and harm, and nurturing and regenerating the natural environment.’<sup>xxv</sup> The primary purpose of the NERAG in providing guidance on risk assessment should therefore be reconsidered to include minimising vulnerability and suffering; avoiding future risk creation; and enhancing resilience.

#### 3.4.1 Vulnerability

Both through the online survey (68.6% of participants) and in focus group discussions, many participants supported the reconsideration of the NERAG's purpose, objectives, and goals, including promoting the objectives of minimising vulnerability and suffering (62.3%). However, modifications to the NERAG's purpose to make values, vulnerability, and social justice central (41.8%) were less well supported. Consistent with emerging international practice, there is a dominant view that addressing vulnerability should become an integral and explicit part of the NERAG risk assessment objectives.

### 3.4.2 Resilience

Broadening the objectives of the NERAG to address and support resilience was supported by participants (60.6% of online survey participants), although some online and focus group participants believe resilience is out of the NERAG's scope (13.6%) or adequately addressed in the current guidance generally (3%). There is considerable support for considering how resilience can be addressed in the NERAG guidance. If this is to occur effectively, resilience needs to be clearly defined within a risk assessment context.

### 3.4.3 Risk ownership and transfer

It is recognised that the NERAG do not adequately address issues around the ownership of risk and risk transfer, but this research provided no clear directions for the review of the NERAG in this context.

## 3.5 Governance and leadership

'Governance involves the structures, rules and arrangements that provide a mandate and accountability for the functioning of systems, assets, people, and economies – whether undertaken by governments, institutions, or other entities.'<sup>xxvi</sup> Traditional governance of risk management, encapsulating the rules, norms, routines, and practices that enable individuals and organisations to recognise, assess and manage the causes and effects of risk, tends to be compartmentalised, sector-focused and response-oriented<sup>xxvii</sup>. Risk is framed narrowly with only a subset of measures of value and success considered, focused on proximate causes of the problem.

Governance and leadership in a complex and uncertain environment subject to systemic risk must differ markedly from that which has been pursued in the past. It must be responsive, agile, ethical and values driven. It must take account of the dynamics of systems, their boundaries, and their interactions, requiring a broader and wider framing of risk beyond conventional systems boundaries. Therefore, governance and leadership enabling inter- and transdisciplinary cooperation and engagement from scientists, regulators and stakeholders in the private and public spheres is required.<sup>xxviii xxix</sup>

With complex, systemic risk, only a broad range of stakeholders can map risk by providing unique insights into the risk context and identify the drivers of risk. Anticipatory governance and leadership are required that facilitates connections, through communication and knowledge sharing, between all stakeholders including the community, throughout the risk management process.<sup>xxx</sup> Governance structures, rules, and arrangements should enable decision-making to incorporate diverse stakeholder values and knowledge through open collaboration and communication. Leadership must display diligence and due care in risk mitigation decision-making through transparent, effectively managed decisions that are inclusive, fair, just, well-informed, and trustworthy.

Governance and leadership must facilitate innovative knowledge and data creation and analysis and be forward looking to be able to deal with unforeseen and non-conventional problems. Governance and leadership must be agile to be able to revisit, restart, or change the risk methodology to reflect decisional needs, temporal demands or as circumstances change. It should produce good, low-regret decisions.

### **3.5.1 Good governance of risk management**

Factors arising out of this research that should be considered in reviewing the NERAG approach to the governance of risk management are:

- ***Framework to support governance***

A national framework is required to support good governance of risk management based on transparent and consistent and rigorous methodology that enables comparison of risk across jurisdictions.

- ***Guidelines and tool chest***

While there is some dispute, a document that is to be used as a national framework will best address complexity, uncertainty, and systemic risk by providing comprehensive guidelines coupled with an extensive tool chest.

- ***Coordination across jurisdictions***

A national framework that effectively coordinates and prioritises risk management and facilitates preparation and response must address processes between levels of government and across jurisdictions and work consistently with the risk management methodologies of the corporate sector.

- ***Resource constraints***

Local government, particularly in Queensland because of its central role in risk management, may be subject to resource pressures because of any broadening of the NERAG into systemic risk and vulnerability and the need to greatly enhance methods, analysis and processes.

- ***Complexity of the NERAG***

Some audiences consider elements of the NERAG to be complex in interpretation and application, and consequently find it difficult to use. For these users a simplified approach is needed. In Queensland for example, where local government takes a central role in risk management, the NERAG are not used in risk assessment because they are difficult to operationalise. Other jurisdictions have similar difficulties applying the NERAG at a smaller scale including within communities and at the municipal level.

- ***Diversity of stakeholder needs***

State jurisdictions and businesses apply different risk management governance approaches in which they are invested and reluctant to change or adapt. Providing versions of the NERAG that meet varying user needs may be considered.

- ***Discontinuity of risk assessment and treatment***

Risk management governance is divided at the point where risk assessment is translated into treatments or mitigations and in some cases are politically constrained.

### 3.6 Active adaptive learning

The complexity, turbulence, rate of change and uncertainty of natural, social, and economic systems makes an adaptive learning approach to decision-making imperative. Adaptive learning involves 'active, continuous searching for alternatives that offer more promising future prospects and for ways of transforming... in the direction of these alternatives.'<sup>xxxi</sup> This process generates continuous improvement.

Active learning in the management of risk involves:

- mapping the climate and risk context
- developing a vision and goals for preferred climate and risks
- searching potential and emerging futures
- developing options and pathways
- adaptively implementing change.<sup>xxii</sup>

Decision-making that harnesses active learning makes early decisions a trial, experiment, or interim measure to be reviewed and continuously changed based on what is learned. It produces continually improved approaches to assessing and treating risks that address the novelty of events and uncertainty of disaster risk.

There was strong support (67% of online participants) for incorporating guidance on the application of active learning in the risk assessment process, tinged with some uncertainty (14.7%). This uncertainty is expressed in several concerns about the application of active learning to the NERAG that also emerged in the focus groups. First, existing processes within stakeholder organisations are not supportive of traditional learning based on closing the monitoring, evaluation, reporting and improvement loop. Support for traditional organisational learning is needed to make progress toward active learning. Second, the risk management approach currently applied through the NERAG is consistent with active

learning, which is understood to be regular review and updating of risk assessments and their outcomes. Change is therefore not required. Third, active learning may be resource intensive.

### 3.6.1 Building capability

In a context of complexity, uncertainty and systemic risk, practitioners and decision-makers need skills and capabilities that are radically different from those that may be adequate in more stable environments. These individuals need to make robust and agile decisions around policy, programs, and investment, requiring an understanding of complex systems, sophisticated analytical tools, and methods (including systems thinking) and a diversity of perspectives and values. Decisions appropriately guided by values, vulnerability, and social justice need to be made through the lens of ethical decision-making. Problem-solving competencies should be strengthened through training and education in systems thinking.

The NERAG guidance on appropriate skills and instruction for decision-makers on systemic risk is supported (63.2% online survey participants). In focus groups participants believe the NERAG should promote capacity building within the broad risk management community to enable adaptive learning and support the application of sophisticated methods and techniques within the risk assessment process.

## 3.7 Systems approach

A system is a group of interacting or interrelated elements that act according to a set of rules to form a unified whole. A system, surrounded and influenced by its environment, is described by its boundaries, structure and purpose and expressed in its functioning<sup>xxxiii</sup>. A systems approach recognises the complex and dynamic interactions between systems and the autochthonous processes driving unexpected and unpredictable outcomes that contribute to uncertainty. A systems approach enables a deeper understanding of complex interconnections and interdependencies, of implicit values and priorities, and effective intervention points to reduce risks.

Adopting a systems approach enables decision-makers to better see the dynamic, complex relationships between values, vulnerability, social justice, and a resilient society, including their points of intersection. The existence of systemic risk requires addressing through systems thinking. Applying a systems approach to risk assessments however poses a considerable challenge. This challenge is reflected in responses to the online survey in which 59.4% were supportive and 20.3% uncertain as to whether the NERAG should advise or provide guidance on a systems approach to risk assessment.

Focus group participants were divided about using a systems approach. Some recognised that a systems perspective is necessary to the understanding of systemic risk and that it is being adopted internationally and by large Australian corporations. Taking a systems

perspective is becoming an accepted norm and Australian governments need to keep abreast of it. At the same time there was considerable concern about the complexity of a systems approach and the resources required to apply it to risk assessment. Some believed that a systems approach should not be incorporated into the NERAG guidance but rather that it cites examples or identifies sources of information or tools.

### 3.8 Systemic risk

Systemic risk arises out of the complex interconnectedness and interdependencies between social, technical, environmental, and economic systems. The interaction of climate change and more frequent and compounding hazards with complex interdependencies between these systems, creates systemic risk and vulnerabilities.

Participants of both the online survey and focus groups highlighted the need for the NERAG to address the emergence of long-term complexity, uncertainty, and change, and of complex interconnections and interdependencies. The NERAG should provide guidance on how to take account of complex interconnections and interdependencies in risk assessment (69.6% of online survey participants) and long-term complexity, uncertainty, and change (71.0%).

The context in which risk assessments are undertaken is recognised as extensively influenced by climate change which increases the frequency, intensity and coincidence of hazards and amplifies risk. State and local government and the private sector are responding to the impacts of climate change and the NERAG likewise, needs to recognise and adapt to this reality.

The NERAG is not currently well designed to address systemic risk in a range of contexts because it is focused on assessing a single hazard. It should explicitly recognise and provide guidance to decision-makers on systemic risk as part of a process of extending and refining its advice on effectively reducing risk.

#### 3.8.1 Compounding, cascading risk

Australian jurisdictions have recently and will increasingly need to deal with multiple, and compounding and cascading disasters. These compounding and cascading events are not addressed by the NERAG. Guidance is required on new approaches to assess these compounding risks and access and analyse the more complex and extensive data that will be required.

### 3.9 Analytical methods and techniques

Risk assessment and decision-making within a complex, rapidly changing and uncertain environment requires robust, agile, and integrative methods, and techniques. Decision-making process and models that can adequately address current and future disaster risk

must be capable of identifying, generating, and crystallizing complex strands of quantitative and qualitative data. They must be able to reveal and clarify complex system interactions and allow stakeholder and community values and priorities to play a central role in analysis and decision-making.

Multiple lines of evidence and a diverse range of methods and models are required to address the complexity of systemic risk and identify multiple entry points for action on risks. A flexible and adaptive approach using quantitative and qualitative techniques including modelling and aspirational, exploratory, and normative scenarios should be pursued. A flexible approach discourages focus on a customary means of analysis and encourages the application of methods and models that can best address specific methodological needs and the complexity and multifaceted nature of systemic risk.

### 3.9.1 Scenarios and modelling

There is considerable support for the wider application of quantitatively based approaches to the risk assessment process. This support is partially based on experiences with, or positive perceptions of, modelling that is currently undertaken in emergency and disaster management. The application of modelling in scenario-based planning is also viewed positively.

The NERAG is an appropriate vehicle to advise on the use of modelling, plausible scenarios and scenario-based planning that encompasses complex and systemic risk (62.3% of online survey participants). Scenario planning workshops, in a serendipitous feedback loop, facilitate active learning. A tool chest of quantitative and qualitative methods should be appended to the NERAG.

### 3.9.2 Probability matrices

The shortcomings of probability-based risk matrices including their failure in accounting for uncertainty, ambiguity, and ignorance should be recognised and avoided. There is considerable support for greater use of better options such as modelling and scenarios to replace the use of probability matrices (62.3% of online survey participants) although 11.6% disagree and 13% are uncertain.

Probability-based matrices in the NERAG are built on expert judgements founded in pre-climate change assumptions and experience, and in an increasingly complex and uncertain context, are too prescriptive.

- ***Consequence***

The NERAG structured approach to consequence is viewed positively, although systemic risk, multiple and cascading events, and increasing uncertainty requires that consequence is considered more broadly.

- ***Likelihood***

The NERAG approach is unhelpful because likelihood is not appropriately calibrated within and between different hazards and is based on limited scenarios. This is problematic in the context of multiple, compounding, and systemic risk.

On the other hand, the approach provides a basic framework for an assessment of likelihood in a simple, stable, single hazard. The use of probability matrices provides a fundamental base for considering and comparing single hazard assessments.

## 3.10 Values in decision-making

### 3.10.1 Values

Values drive decisions regarding planning, physical infrastructure, transport and communications, and hazard mitigation priorities. It is necessary to understand what is valued and why, so risk can be comprehensively assessed, and disaster risk reduction efforts prioritised. Affordability, cultural connection, safety and security, and lifestyle values influence choices, and are often made without an adequate understanding of risks.

The community is a key source of information and perspectives on what is of value, especially in informing assessments of consequence, that may not be otherwise fully accessible or considered.

The NERAG should provide clear guidance on accessing and incorporating community values in the process of assessing risk. While community values may conflict with experts' values and priorities, they should be revealed, understood, and reflected in risk assessments and decision making. The NERAG should also provide guidance on how community stakeholders can readily communicate their values and priorities without becoming bogged down in more technical aspects of the risk assessment process.

However, in contrast to this suggestion a significant minority (41.2%) of online survey participants do not support values being a key guide in the NERAG, including those who don't want them included (19.1%), see values as out of scope (8.8%) and see values as not useful in assessing risk (7.4%).

The NERAG refer to community viewpoints and values in establishing consequence categories at the context stage but may not be considered in later stages. There is a view amongst some participants that this is adequate (5.9%). Some focus group participants expressed similar views i.e., that the NERAG adequately address the consideration of values in risk assessments; value search should not be a key element of the NERAG risk assessment framework; and that the identification of community values is most effectively pursued through the existing consultative processes of emergency agencies and local government.

### 3.10.2 Social justice

Risk assessment should take account of social justice in the decision-making process. Compelling examples in the community and local government support the need to consider social justice in assessing risk.



### 3.10.4 Vulnerability

The NERAG guidance should reflect international trends signalled in the Sendai Framework and the UN's most recent global assessment report. The failure of the NERAG to explicitly consider vulnerability is a major shortcoming and needs to be addressed. Vulnerability should be regarded broadly including the social, economic, and physical spheres. By including vulnerability, the NERAG can provide better risk assessment guidance and point to appropriate treatments.

## 3.11 Collaboration

Open and inclusive collaboration allows societal values and belief systems, and valued locations and objects, to be identified and properly placed in the assessment of risk by all stakeholders, including the community. Open collaboration enables objectives, goals, priorities, decision criteria and resource allocation to be revealed and integrated into risk assessment and decision-making.

Given the uncertainties and complexity of identifying and analysing systemic risks, exploring all contexts in an open and inclusive collaboration with a diversity of stakeholders widens understanding, increases trust, and enhances decision-maker confidence that vital perceptions and priorities are embodied in risk assessment.

Many participants recognised the importance of collaborating with stakeholders and see it as an integral part of their current risk assessment process. Several feel that detailed guidance is unnecessary. Almost one in five (19.1%) online survey participants believe the NERAG currently adequately addresses collaboration with stakeholders.

However, online survey participants support the NERAG guidance on open collaboration with stakeholders across all domains and about objectives, goals, priorities in risk assessment and decision-making (both 60.3%). Several participants cited examples of the NERAG guidance on collaboration failing or needing improvement. Shortcomings arise out of interactions between government and the private sector, between levels of government, due to legislative constraints and failure to account for systemic risk.

### 3.11.1 Community involvement

Community involvement should allow community knowledge, values, and priorities to inform and influence decision making (54.4% of online survey participants). Many focus group participants see the NERAG guidance on community involvement as needing to address the purpose of community consultation and broadening the ambit of consultation to consider vulnerability and impact.

The NERAG should advise on the standard for appropriate community consultation, including involving people in deliberations in which they can productively contribute without subjecting them to unnecessary technical language or discussion. Striking this balance in a way that doesn't exclude appropriate community involvement may be a challenge. Participants want the NERAG to provide guidance on striking that balance, and approaches

that could be considered. However, a few participants feel that the involvement of the community may need to be limited because the outcomes are not informative.

### **3.12 Disaster risk knowledge, information, and data**

Quantitative and qualitative knowledge and data are central inputs to the risk assessment process. Quantitative information is vital within the complex reality of systemic risk characterised by multiple dimensions of hazards, exposure, and vulnerabilities, and uncertain societal and environmental change. System knowledge and data including an understanding of system boundaries is critical to identifying feedback loops and cascading effects. Quantitative data enable forecasting and calibration of theoretical models; analysis of socio-economic vulnerability and structural inequality that bears on systemic risk; and modelling of the effectiveness of actions to develop and inform adaptation, risk reduction and resilience strategies.

Stakeholders, including community members are a key source of knowledge and information relevant to the risk assessment process. Their personal and shared ideals, values and beliefs and the dynamics of the political system influence attitudes and behaviours. Data on these factors must play a key part in the assessment of risk. Identifying, collecting, and analysing these data must be carefully considered to provide a complete picture of context, consequences, and priorities. If the unique understandings and insights of stakeholders are to be fully utilised, ready and equitable access to disaster risk information is essential. Equitable access is likely to nurture trust and participation and enhance a broader appreciation and understanding of the risk context and decision-making parameters.

#### **3.12.1 Importance of knowledge and data**

Access to current, reliable data is central to credible and replicable risk assessments. There is extensive support for greater guidance through the NERAG to promote a data driven approach and improve access to, and coordination of, knowledge and data used in the process. The NERAG do not facilitate the collection and assimilation of data reflecting climate change. These data are central to producing meaningful risk assessments so the NERAG guidance on this is fundamental. Guidance is needed on which data should be used, and how different types and levels of data can be appropriately harnessed at distinct points in the risk assessment process. Uncertainty about the role of NERAG in relation to knowledge and data revolves around concerns about the need for additional resources.

#### **3.12.2 Sharing**

Access to and comparability of data are central requirements of effective data sharing. Differences in data collection methods, datasets, and information sources based on varying methodologies, need to be identified and addressed.

The NERAG should address the creation, capture and equitable sharing of disaster risk knowledge and information (66.7% of online survey participants) notwithstanding 17.4% who believe it does that already. The NERAG should provide guidance to facilitate greater data sharing including ways to ensure accessibility, quality, and security. It should promote and support current and future cooperative information sharing projects between government jurisdictions, educational institutions, and corporations. The NERAG has a role in coordinating knowledge generated through agencies' consideration of lessons learned. It should also facilitate the establishment of a community of practice.

### 3.13 Mitigation and treatment

Risk reduction/mitigation/investment is integral to informing the risk assessment process (72.5% of online survey participants). The NERAG should provide guidance on how to identify high priorities for mitigating/treating disaster risks (63.2%). Many participants say that NERAG fails to provide adequate guidance for mitigation or treatment decisions. Some believe it is difficult or inappropriate for NERAG to provide guidance on treatments because decisions are made outside the agency assessing the risk and are very often highly context driven, or politically based. A few suggested that NERAG could advise on incorporation of risk assessments into risk registers used to guide treatment decision-making including prioritization and funding.

# Chapter 4: conclusions

A national emergency risk assessment framework to be used as a guide in Australian jurisdictions at national, state, local government, and community levels, is required to harmonise quality risk assessments and more fully comprehend the nature of potentially harmful hazards. The new realities of climate change, complexity and systemic risk are challenging the current approaches to risk analysis and risk governance that assume relatively stable environments and single, isolated hazards.

Systemic risk arises out of complex interconnections and interdependencies between social, technical, environmental, and economic systems, resulting in compounding and cascading disasters. Guidance is required on integrating systemic risk and compounding and cascading events into risk assessment, and addressing long-term complexity, uncertainty, and turbulent change especially arising out of climate change. The purpose and objectives of risk assessment, to include vulnerability, avoiding future risk and enhancing resilience, also needs to be reconsidered in the context of systemic risk.

There is disagreement about the use of a systems approach in risk assessment based on concern about the complexity of applying a systems approach and the resources required. However, if systemic risk is to be adequately understood and addressed a systems approach must be used. A systems approach enables a deeper understanding of the complex and dynamic interconnections and interdependencies between systems and the autochthonous processes driving unexpected and unpredictable outcomes. Decision-makers can better see the dynamic, complex relationships between values, vulnerability, social justice, and resilience, including effective intervention points to reduce risks. The NERAG should provide guidance on how a systems approach can be harnessed to account for complex interconnections and interdependencies in risk assessment and long-term complexity, uncertainty, and change.

The effective application of a systems approach requires much improved methods, knowledge, and data. Appropriate analytical methods and techniques are required. These include modelling and scenarios that can identify, generate, and crystallize complex strands of data, reveal and clarify complex system interactions, and allow stakeholder inputs to play a central role in analysis and decision-making. Guidance is required on the use of modelling, plausible scenarios and scenario-based planning that encompasses complex and systemic risk. Access to appropriate modelling and scenario planning tools through an extended tool chest should be provided.

Knowledge and data are central inputs to the risk assessment process. Quantitative data are needed to analyse and model complex system interactions and systemic risk. Stakeholder knowledge and perceptions provide unique insights into context, value, and priorities. Stakeholders need equitable access to disaster risk information if they are to fully understand, trust and engage in the process. Guidance is required to promote a data driven approach and improve access to and coordination of knowledge and data used in the risk

assessment process. Consideration should be given to the NERAG facilitation of data sharing and a community of practice.

Stakeholder collaboration, including with the community, is vital to fully revealing objectives, goals, priorities, decision criteria and resource constraints necessary for a systematic assessment of risk. It provides access to unique perspectives and knowledge especially in relation to what is valued. It enhances understanding, trust, and confidence that a risk assessment accounts for all the key inputs. Guidance should recognise the consultation and collaboration methods currently used by government and private organisations. It should establish best practice approaches and address shortcomings of government to government, and government to private sector interaction.

Community involvement, as a key source on what is valued, enables a comprehensive assessment of risk and better decisions about treatment. Guidance on community involvement should advise on best practice including accessing and incorporating community values; clarifying the purpose of community involvement; addressing vulnerability and impact; and facilitating the involvement of all community members.

The complexity, uncertainty, and turbulence of natural, social, and economic environments in which risk assessment and decision-making is and will be made in the future, requires a capacity for active learning. Practitioners will need to be able to actively and continuously search for better alternatives and ways of transforming in the direction of those alternatives. Guidance is required on the application of active learning in the risk assessment process. That guidance should take account of the failure of some organisations to learn within existing learning paradigms.

Practitioners will also need to enhance their capacity to understand complex systems and sophisticated analytical tools and methods and to assimilate a diversity of perspectives and values into their thinking. Guidance on building the capacity of practitioners, decision-makers and leaders is therefore required.

Setting directions and priorities for mitigation of risk is a central objective of the risk assessment process and yet it is only briefly addressed in the NERAG. Separation of risk assessment and risk treatment is unsustainable in a complexly interrelated environment in which community values should play an integral role in mitigation and treatment priorities and in investment decisions. Addressing risk is an end-to-end process that cannot be severed part way through the process. Comprehensive guidance on mitigating/treating disaster risks that recognises risk assessment as an end-to-end process in a complex and turbulent environment, is required.

Good governance and leadership must pull all this together. Leadership and decision-makers need to have clear insights into dynamic, complex relationships within a turbulent environment; see how values, vulnerability, social justice, and resilience intersect; and how values and priorities can indicate points of intervention to reduce risks.

Governance and leadership must take account of the dynamics of systems, their boundaries, and their interactions, requiring a broader and wider framing of risk beyond conventional

systems boundaries. Therefore, governance and leadership must be capable of enabling inter and transdisciplinary cooperation and engagement. Anticipatory governance and leadership are required that facilitates connections, through communication and knowledge sharing, between all stakeholders including the community, throughout the risk management process. It should be capable of incorporating diverse stakeholder values and knowledge through open collaboration and communication; to facilitate innovative knowledge and data creation and analysis; and forward looking to be able to deal with unforeseen and non-conventional problems. Governance and leadership must be agile to be able to revisit, restart, or change the risk methodology to reflect decisional needs, temporal demands or as circumstances change. It should produce good, low-regret decisions.

Risk assessment guidance must recognise and address a turbulent environment characterised by complexity, uncertainty and systemic risk in order that leadership can emerge to build the necessary systems of governance.

# Appendix A: Results of the online survey

## Online survey structure and questions

### Would you like to contribute to the review of the National Emergency Risk Assessment Guidelines (NERAG)?

Your participation in this survey will help the Australian Institute for Disaster Resilience (AIDR) understand how NERAG is currently used and perceived by stakeholders across Australia. The outcomes of this survey will contribute to a broad review of NERAG in 2022-23 to align the guidelines with up-to-date thinking, policy and practice for disaster risk reduction and resilience, including the National Disaster Risk Reduction Framework and Systemic Disaster Risk Handbook.

The survey is being conducted by the Australian Institute for Disaster Resilience. Taking part is anonymous and should take 10 minutes.

Thank you for your support.

### Background and context:

AIDR is contracted by the Australian Government National Recovery and Resilience Agency (NRRRA) to manage the [Australian Disaster Resilience Handbook Collection](#) ('Handbook Collection'). The Handbook Collection supports the implementation of the [National Disaster Risk Reduction Framework](#) by providing national principles and guidance to strengthen the resilience of Australian communities to disaster.

During the process of developing Australia's inaugural [Systemic Disaster Risk](#) Handbook (AIDR 2021) the need to review the [National Emergency Risk Assessment Guidelines](#) (NERAG) (AIDR 2020) was revealed to align the guidelines with the policy direction established by the [National Disaster Risk Reduction Framework](#) and the principles of Systemic Disaster Risk.

The work to review NERAG will be undertaken in two phases. Phase 1 will be completed by June 2022 and focus on scoping research with States and Territories to identify how NERAG is currently being used and identify opportunities for policy alignment and the principles of systemic disaster risk.

In this first instance we are reaching out to you for your views on NERAG, do you use it? Do you use parts of it? Are there limitations to using NERAG? Are there opportunities to update NERAG?

### 1. Which of the following sectors do you currently work in? Select all that apply.

- Academia
- Community sector
- Commonwealth government

- Critical infrastructure
- Defence
- Education
- Emergency management /services
- Environment
- Local government
- Non-government
- Not for profit
- Peak/Member body
- Policy
- Private sector i.e., Business, insurance and finance
- State government
- Volunteer
- Other (please specify)

**2. Which jurisdiction do you work in?**

- Australian Capital Territory
- New South Wales
- Northern Territory
- Queensland
- South Australia
- Tasmania
- Victoria
- Western Australia
- International

**3. How many years have you worked in the area of risk assessment?**

- Never
- < 12 months
- 1-4 years
- 5-10 years
- 10 years

**4. How many years have you used NERAG?**

- Never
- < 12 months
- 1-4 years
- 5-10 years
- 10 years

**5. How useful is NERAG for assessing disaster risk**

- Extremely useful



- Very useful
- Moderately useful
- Slightly useful
- Not at all useful

**5a. What are the reasons you feel this way? [Comment box]**

**6. Do you use the following sections of NERAG?**

- Section 3: Communication and consultation (open, respectful and planned communication so stakeholders understand and commit to risk management)
  - YES - What is the main reason you use this section? **[Add comment box]**
  - NO - What is the main reason don't use this section? **[Add comment box]**
- Section 4: Establish the context (includes assessment scope, risk criteria and assessment method)
  - YES - What is the main reason you use this section? **[Add comment box]**
  - NO - What is the main reason don't use this section? **[Add comment box]**
- Section 5: Risk identification (identify sources of risk, and potential events, event causes and consequences)
  - YES - What is the main reason you use this section? **[Add comment box]**
  - NO - What is the main reason don't use this section? **[Add comment box]**
- Section 6: Risk analysis (process to understand the nature of risk and the level of risk based on consequence on people, economy, environment etc, and the likelihood of consequences from the event, using risk matrices)
  - YES - What is the main reason you use this section? **[Add comment box]**
  - NO - What is the main reason don't use this section? **[Add comment box]**
- Section 7: Risk evaluation (establishes which risks require further assessment /treatment and sets priorities for action to reduce risk levels)
  - YES - What is the main reason you use this section? **[Add comment box]**
  - NO - What is the main reason don't use this section? **[Add comment box]**
- Section 8: Risk Treatment (process of modifying risk following risk assessment) – should it address this issue in greater detail given the prioritisation guidance?
  - YES - What is the main reason you use this section? **[Add comment box]**
  - NO - What is the main reason don't use this section? **[Add comment box]**

- Section 9: Monitoring and review (timetable to monitor and review outcomes since nature of risk may change)
  - YES - What is the main reason you use this section? **[Add comment box]**
  - NO - What is the main reason don't use this section? **[Add comment box]**

Since the publication of NERAG in 2010, the policy landscape has identified new elements and approaches to risk assessment. National guidance in the [National Disaster Risk Reduction Framework; Guidance for Strategic Decisions on Climate and Disaster Risk](#); and the [Systemic Disaster Risk Handbook](#) highlights:

- the systemic nature of climate and disaster risk
- taking a systems approach to addressing risk
- the need for open collaboration between all stakeholders
- the facilitation of community input of knowledge, values and priorities
- application of active adaptive learning to risk assessment.

**7. Do you think NERAG needs to be updated to incorporate these elements and approaches?**

- YES
- NO
- Not in NERAG's scope
- Already adequately addressed in NERAG
- Not useful for risk assessment
- UNSURE

**8. For the areas you see a need to be updated in NERAG (listed below) please comment briefly on the change required.**

- Reconsider the purpose, objectives and goals of risk assessment to reflect contemporary thinking and best practice. **[add comment box]**
- Make values, vulnerability, and social justice central to the purpose of disaster risk management **[add comment box]**
- Make the objectives of risk assessment to minimise vulnerability and suffering and avoid future risk creation **[add comment box]**
- Address and support resilience (individual/community) **[add comment box]**
- Take account of long-term complexity, uncertainty and change to the nature, extent and impact of disaster risks **[add comment box]**
- Take account of complex interconnections and interdependencies in social, technical, environmental, and economic systems that create systemic risk **[add comment box]**
- Account for complex interdependencies (social, technical, environmental, and economic systems) by taking a systems approach and/or using systems diagrams, to risk analysis and decision-making **[add comment box]**
- Apply adaptive learning in the risk assessment process by trialling decisions and continually improving **[add comment box]**

- Provide instruction for decision-makers on systemic risk and [guidance for strategic decisions on climate and disaster risk](#) [add comment box]
- Use credible but critical modelling and scenarios and reduce reliance on probability matrices for risk analysis. [add comment box]
- Use stakeholders' values as a key guide in decision-making. [add comment box]
- Enable community input, so decision-makers can draw on community knowledge, values, and priorities. [add comment box]
- Establish open collaboration with stakeholders across all domains. [add comment box]
- Collaborate about objectives, goals, priorities, decision criteria and resource allocation in risk assessment and decision-making. [add comment box]
- Create, capture, and equitably share disaster risk knowledge and information with all stakeholders to support collaboration and trust. [add comment box]
- Consider the risk reduction/mitigation/investment stage as integral to the risk assessment process. [add comment box]
- Identify high priorities for mitigating/treating disaster risks. [add comment box]
- Have different versions of NERAG for different purposes [add comment box]
- Any further considerations [add comment box]

**9. Are there other elements of NERAG that need to be updated to reflect more contemporary thinking and best practice in risk assessment? [Comment box]**

## A.1 Sectors

Participants were asked:

*Which of the following sectors do you currently work in? Select all that apply.*

Almost three in four survey participants work within emergency management services (31.7%), local government (26.2%) and state government (15.9%).

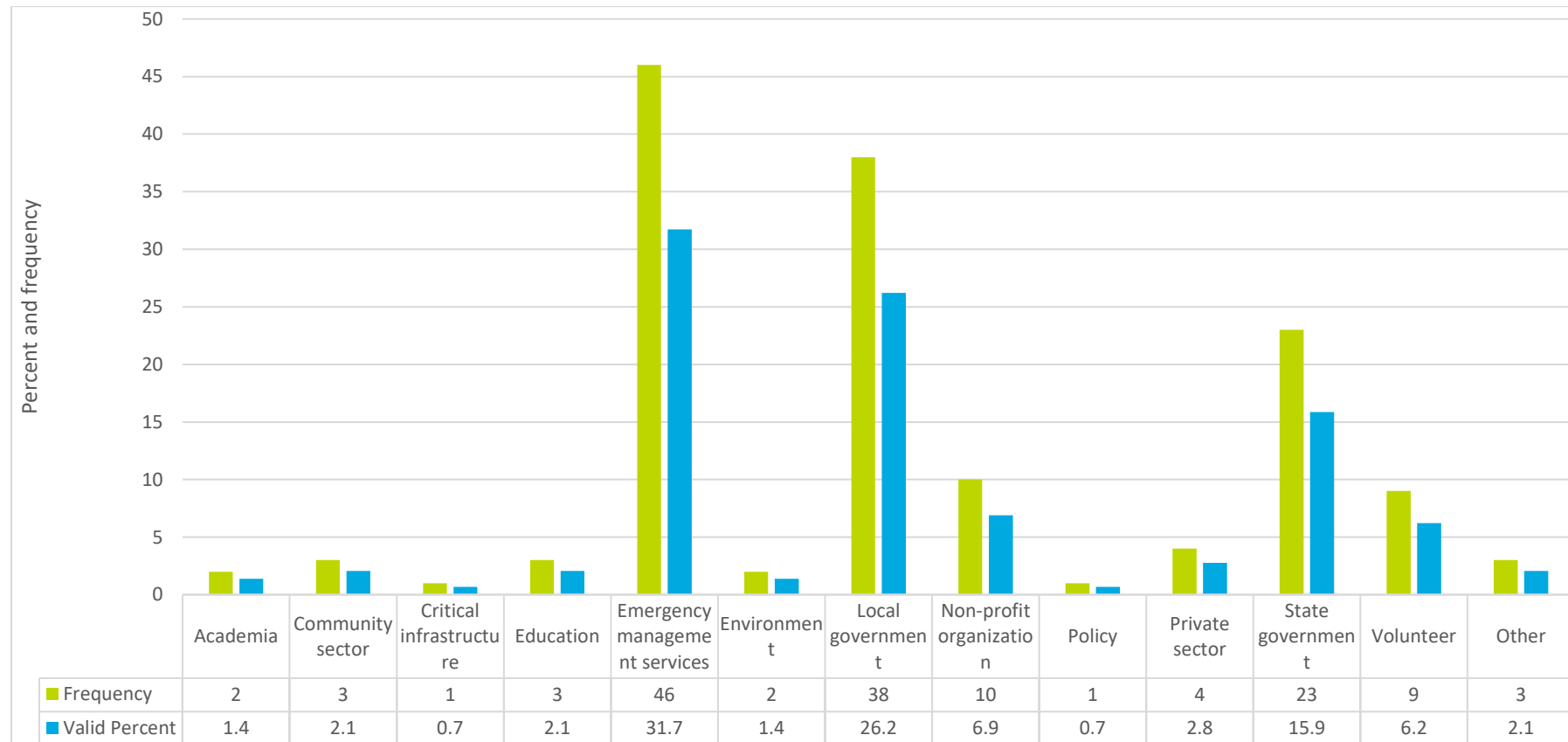


Figure 12: Sectors in which participant works

## A.2 Jurisdictions

Participants were asked:

*Which jurisdiction do you work in?*

In excess of one half of survey participants (51.7%) work in Victoria (27.6%) or South Australia (24.1%). Those from New South Wales (14.5%) and Western Australia (10.3%) represented a further one quarter of participants.

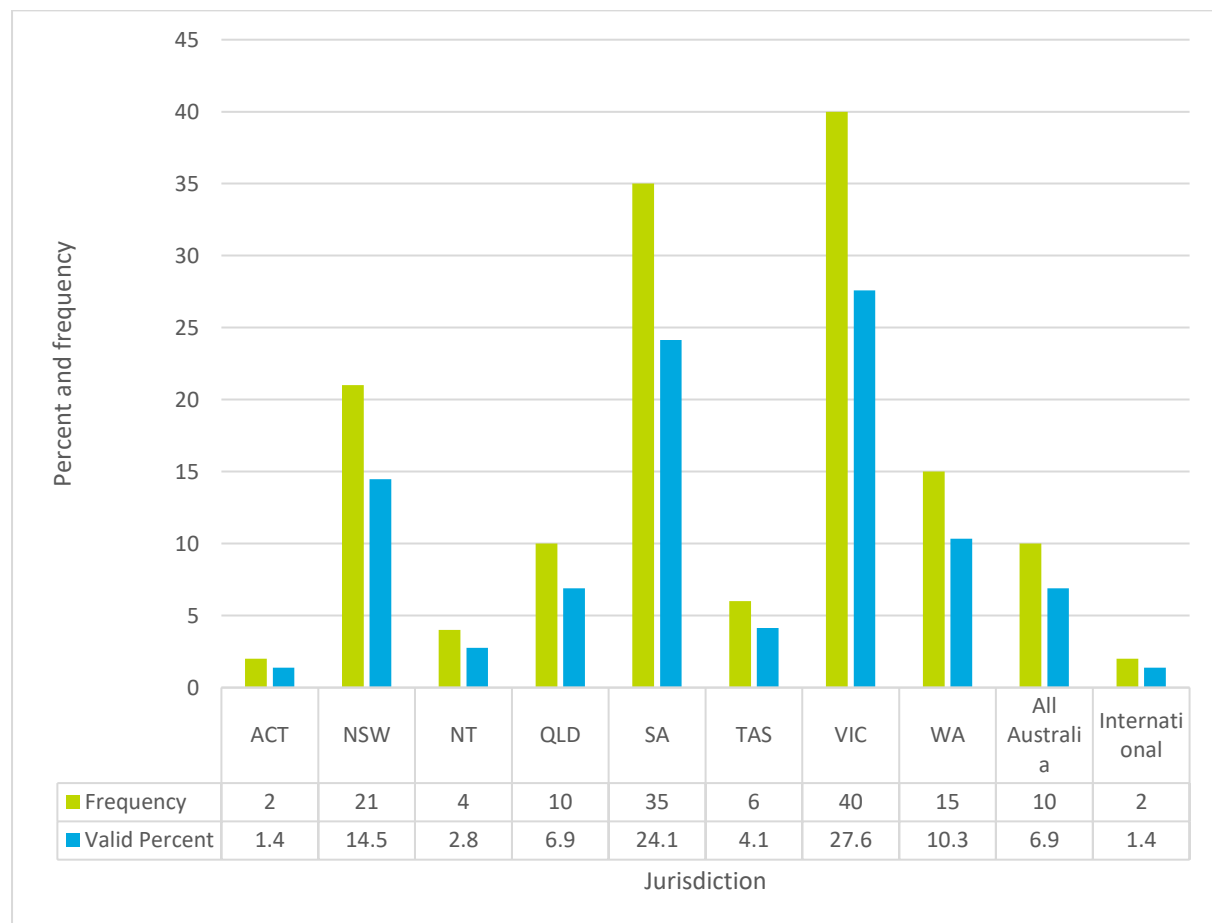


Figure 13: Jurisdiction in which participant works

### A.3 Time working in risk assessment

Participants were asked:

*How many years have you worked in the area of risk assessment?*

More than half of participants (54.5%) had worked within the risk assessment area for greater than ten years. A further one in six (17.2%) had worked in the area between five and ten years. A small number (3.4%) had never worked in risk assessment.

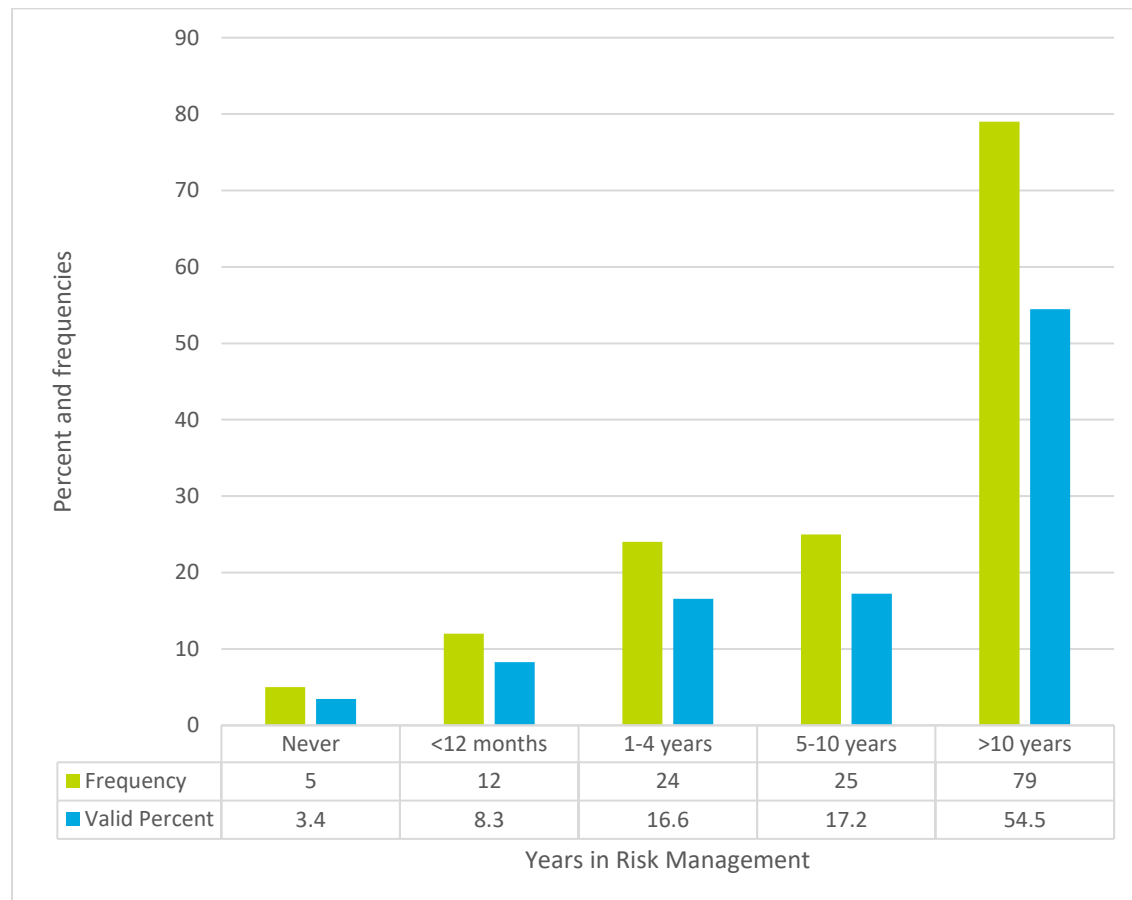


Figure 14: Time working in risk assessment

## A.4 Time using NERAG

Participants were asked:

*How many years have you used NERAG?*

Almost one third of participants (30.3%) had never used NERAG. One in eight (12.4%) had used NERAG for more than 10 years, a further one quarter (24.8%) for five to ten years and 17.2% for one to four years.

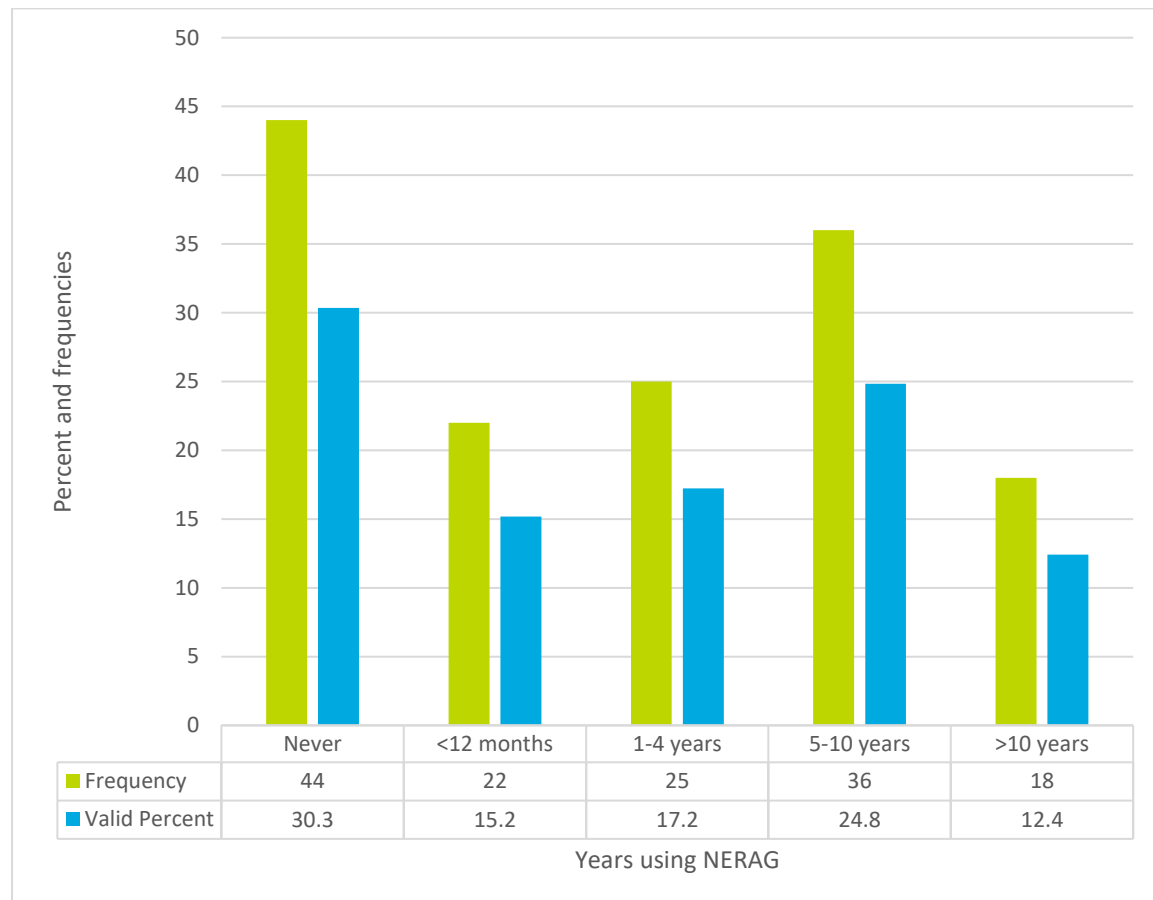


Figure 15: Time using NERAG

## A.5 Usefulness of NERAG

Participants were asked:

*How useful is NERAG for assessing disaster risk?*

More than one third of participants (34.5%) see NERAG as very (29.7%) or extremely (4.8%) useful for assessing disaster risk. Almost four in ten (38.6%) see it as moderately useful and over a quarter (26.9%) see NERAG as slightly useful (10.3%) or not useful at all (16.6%) for assessing disaster risk.

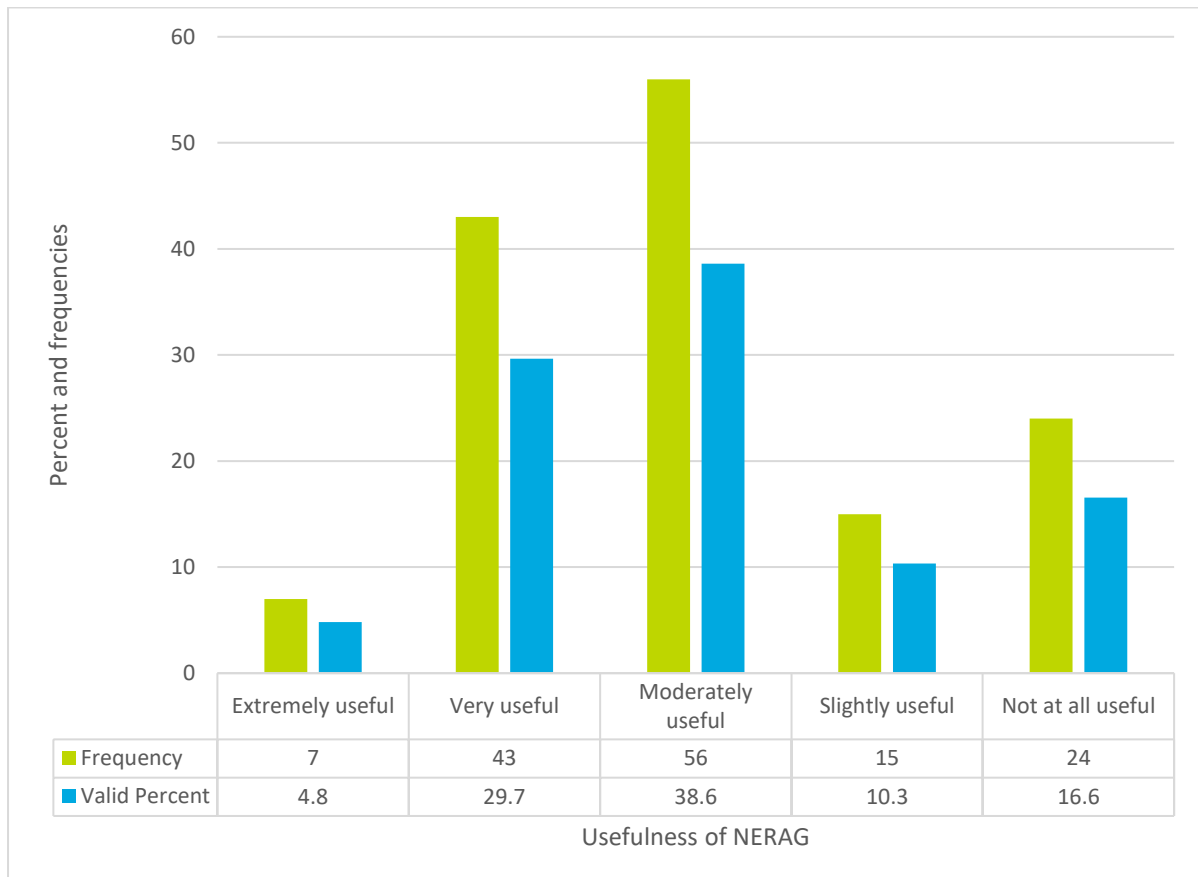


Figure 16: Usefulness of NERAG



## A.6 Reasons for usefulness of NERAG

Participants were asked:

*What are the reasons you feel this way? (NERAG is useful/not useful for assessing disaster risk?) Multiple responses were possible.*

### Reasons NERAG is useful

Those who believe that NERAG is useful for assessing disaster risk cite the following reasons:

Participants believe that NERAG is useful for risk assessment primarily because it provides standard framework or baseline for risk assessment (11.9%), can be applied across jurisdictions (7.6%), is detailed and comprehensive (4.2%) and is consistent with other standards (4.2%), namely AS 31000.

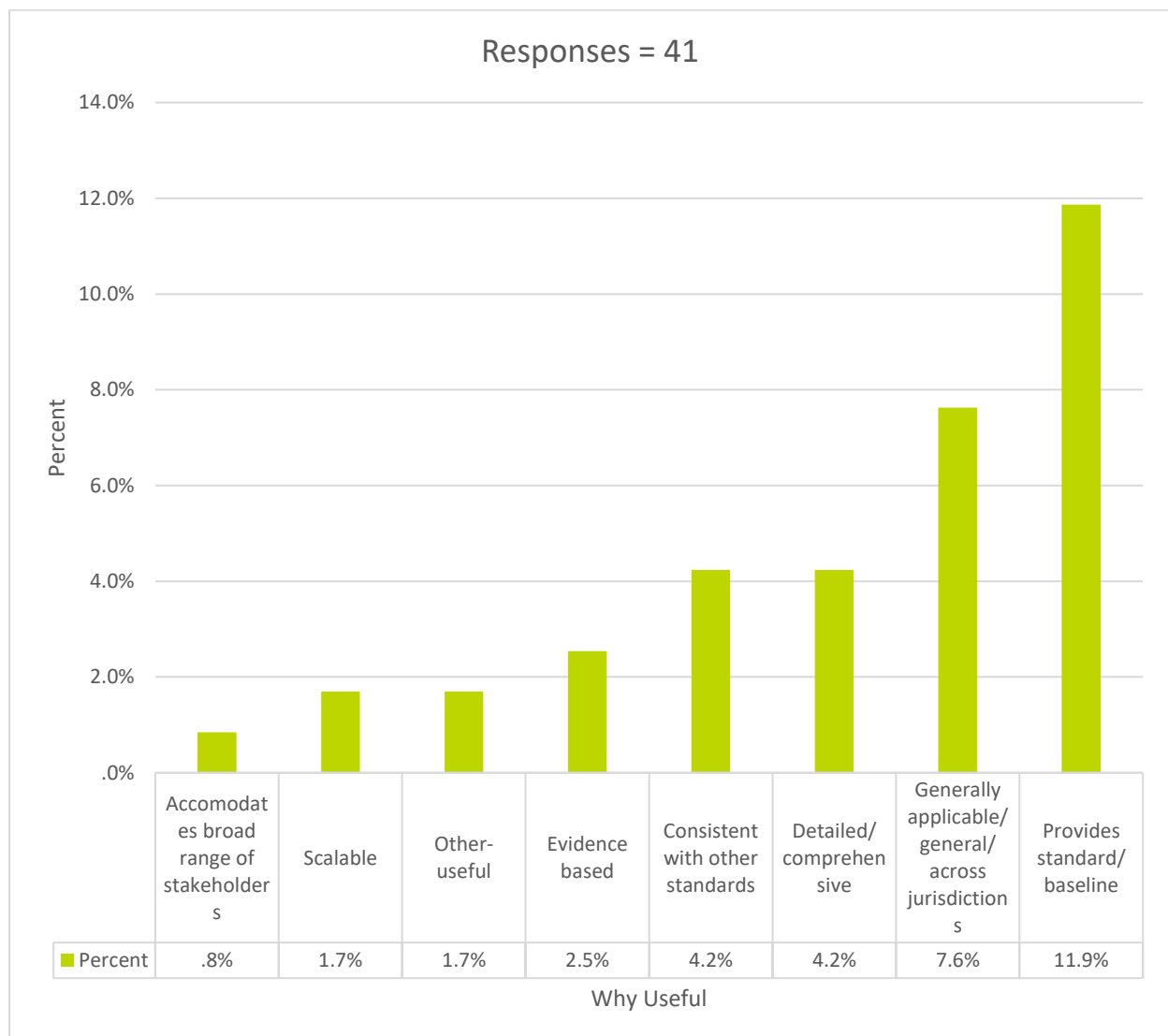


Figure 17: Reasons NERAG is useful

## A.7 Reasons NERAG is not useful

Those who believe that NERAG is not useful for assessing disaster risk cite the following reasons (multiple responses were possible):

More than one in ten responses (11%) suggest that participants see NERAG as not useful because they do not use it. More than one in six responses (17.8%) refer to the complexity of NERAG as influencing its usefulness, some participants saying that it is impractical and academic. Some felt it was not well suited to analysis of disaster risk (5.9%) Participants raised methodological issues including NERAGs use of likelihood and consequence while overlooking issues of vulnerability and capability (5.1%); difficulties applying it at a local/small scale (5.1%); and its qualitative basis (5.1%).

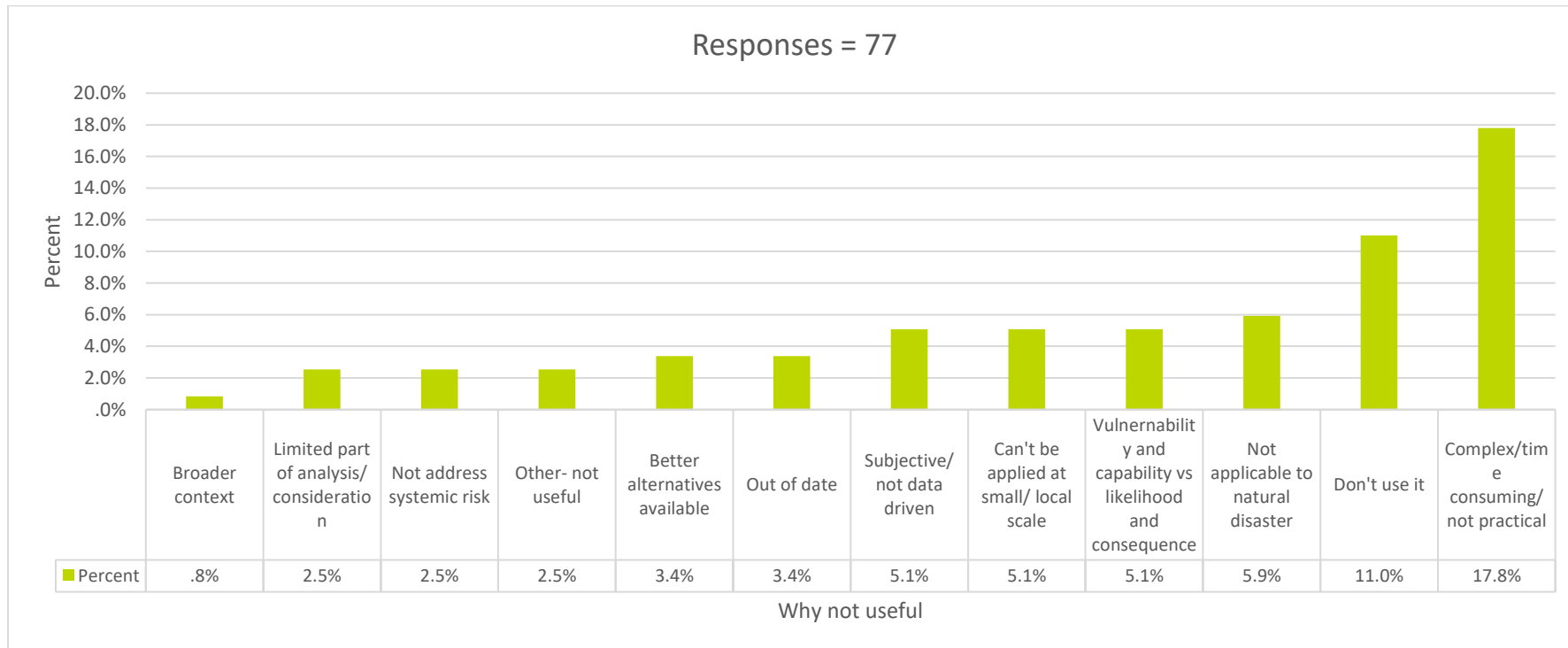


Figure 18: Reasons NERAG is not useful

## A.8 Sections of NERAG used by participants

Participants were asked:

*Do you use the following sections of NERAG?*

Of those participants who had used NERAG the most used sections, used by more than seven in ten, discussed; Risk identification (75.3%), Risk analysis (74.7%) and Establishing context (72.5%). The least used section (53.8%) discusses risk treatment. Participants' reasons for using, or not using, each section is discussed in the following section.

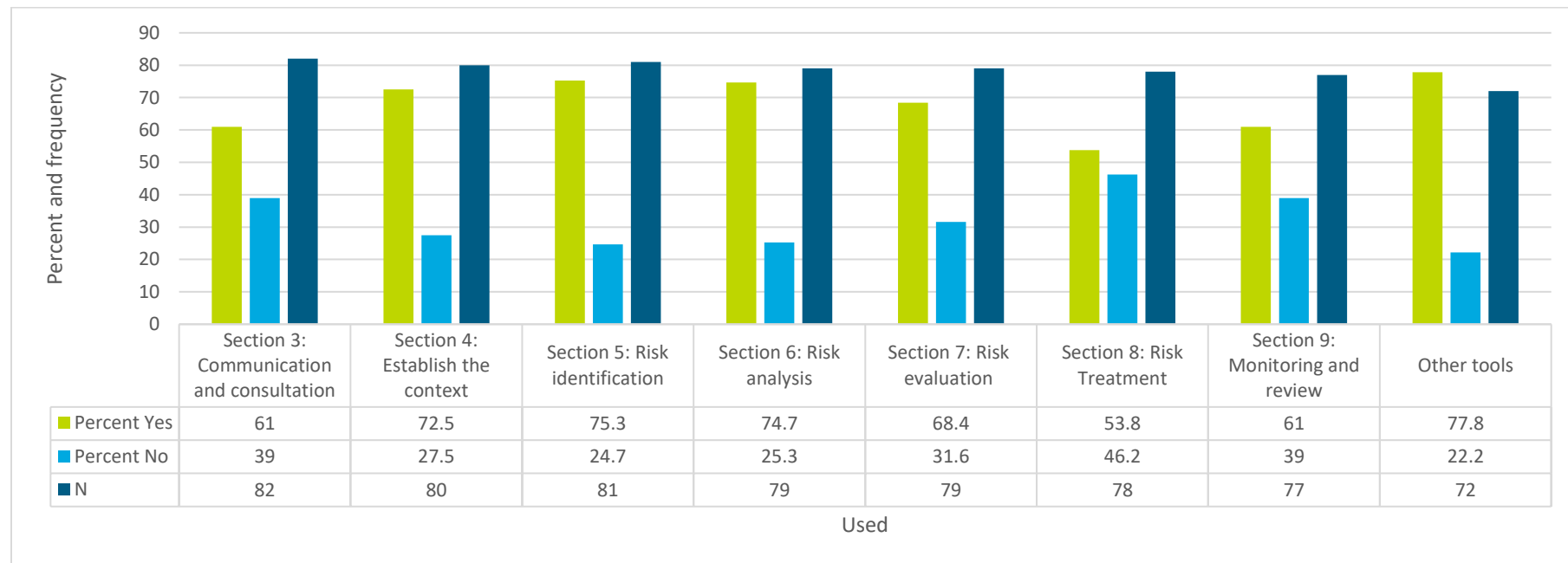


Figure 19: Sections of NERAG used by participants

## A.9 Reasons for using or not using section 3: communication and consultation

Participants who used Section 3 of NERAG were asked:

*What is the main reason you use this section (multiple responses possible)?*

Participants who use the communication and consultation section use it as a guide or a checklist (21.9%) for their activities in this area; because they see it as a basis for good communication and consultation practice (16.4%); and because they see communication and consultation as providing reliable and up to date information.

Responses were classified as follows:

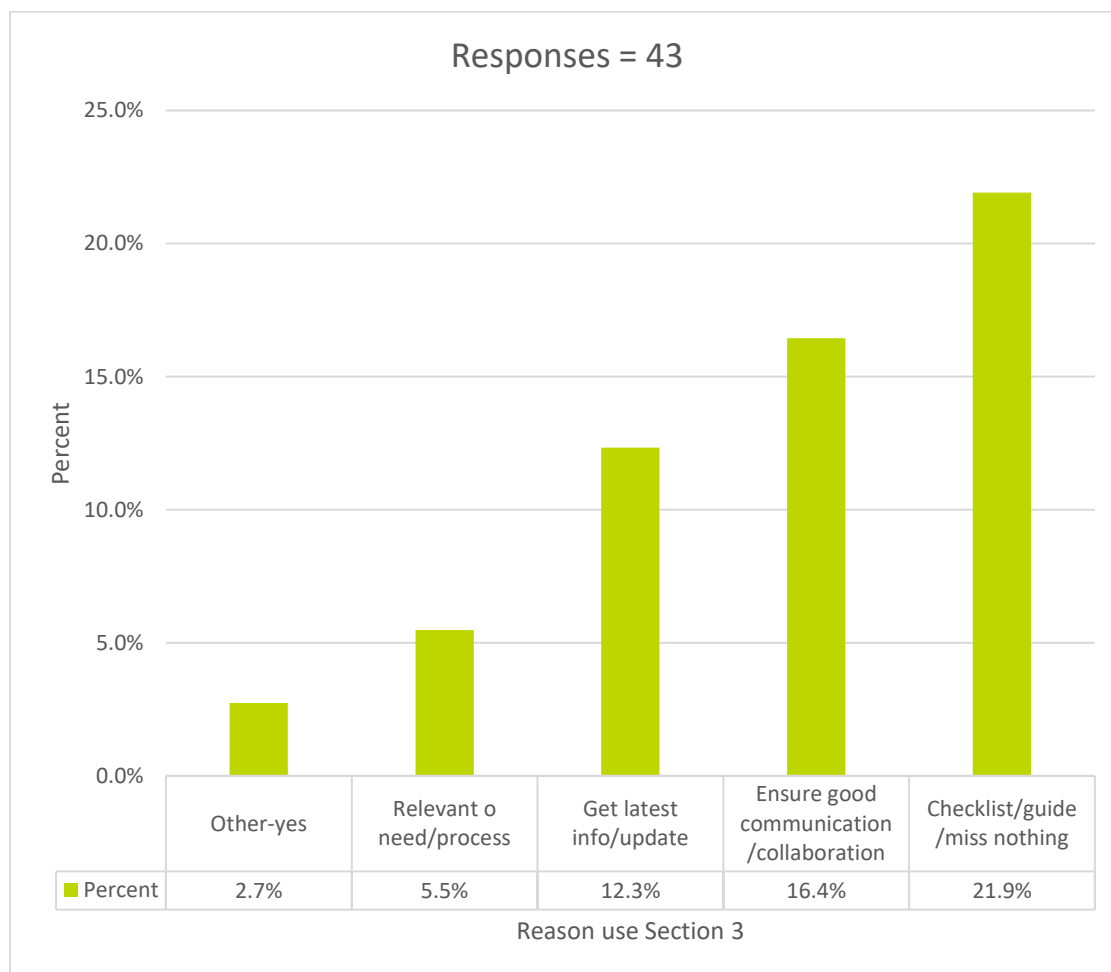


Figure 20: Reasons for using Section 3

Participants who did not use Section 3 of NERAG were asked:

*What is the main reason you do not use this section (multiple responses possible)?*

Almost one in five responses (19.2%) indicate participants who use NERAG do not use it in relation to communication and collaboration. Participant responses also indicate that they use other approaches to, and frameworks for, consultation and communication (6.8%); believe that their circumstances do not require efforts in this area (6.8%), sometimes because stakeholders are already engaged; and because the approach to communication and collaboration outlined in NERAG is insufficiently nuanced to suit their needs.

Responses were classified as follows:

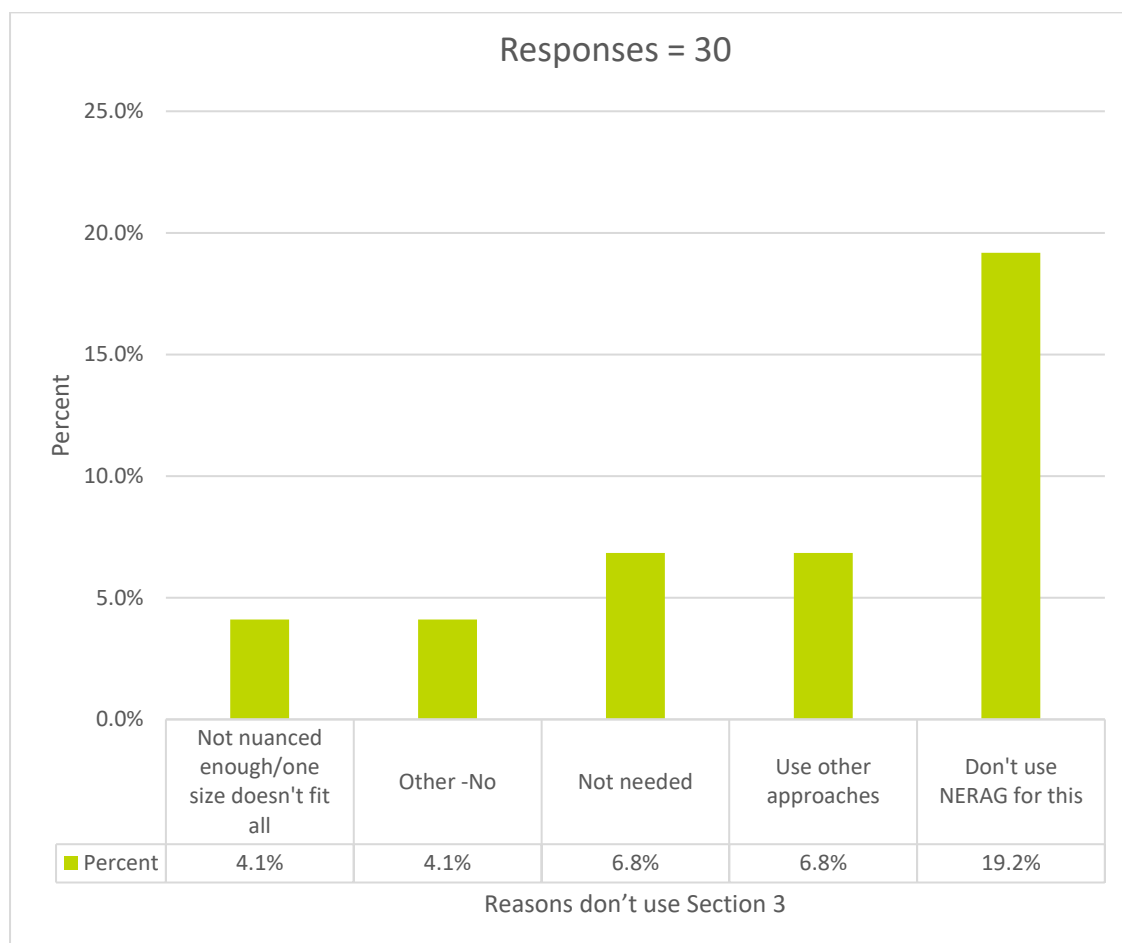


Figure 21: Reasons for not using Section 3

## A.10 Reasons for using/not using section 4: establish the context

Participants who used Section 4 of NERAG were asked:

*What is the main reason you use this section (multiple responses possible)?*

Almost one quarter of responses (23.6%) indicate participants use the section because they believe that establishing the context is central to the risk assessment process; over one in eight (13.9%) believe that context setting helps to provide a clear focus to the process, putting stakeholders on the same page; and clearly describing the nature and extent of risk (11.1%). More than one in ten responses (11.1%) indicate that participants use the section as a guide or checklist for performing the risk context setting stage.

Responses were classified as follows:

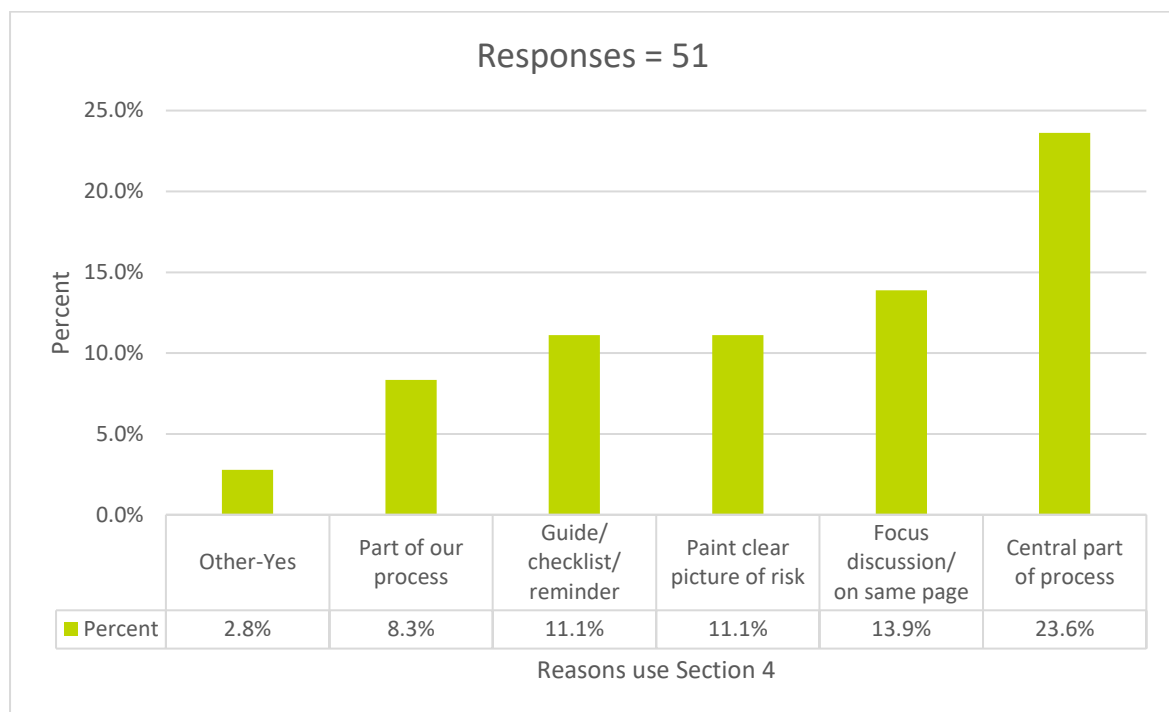


Figure 22: Reasons for using Section 4

Participants who did not use Section 4 of NERAG were asked:

*What is the main reason you do not use this section (multiple responses possible)?*

Responses of those who do not use the context section of NERAG indicate a preference for other frameworks (6.9%).

Responses were classified as follows:

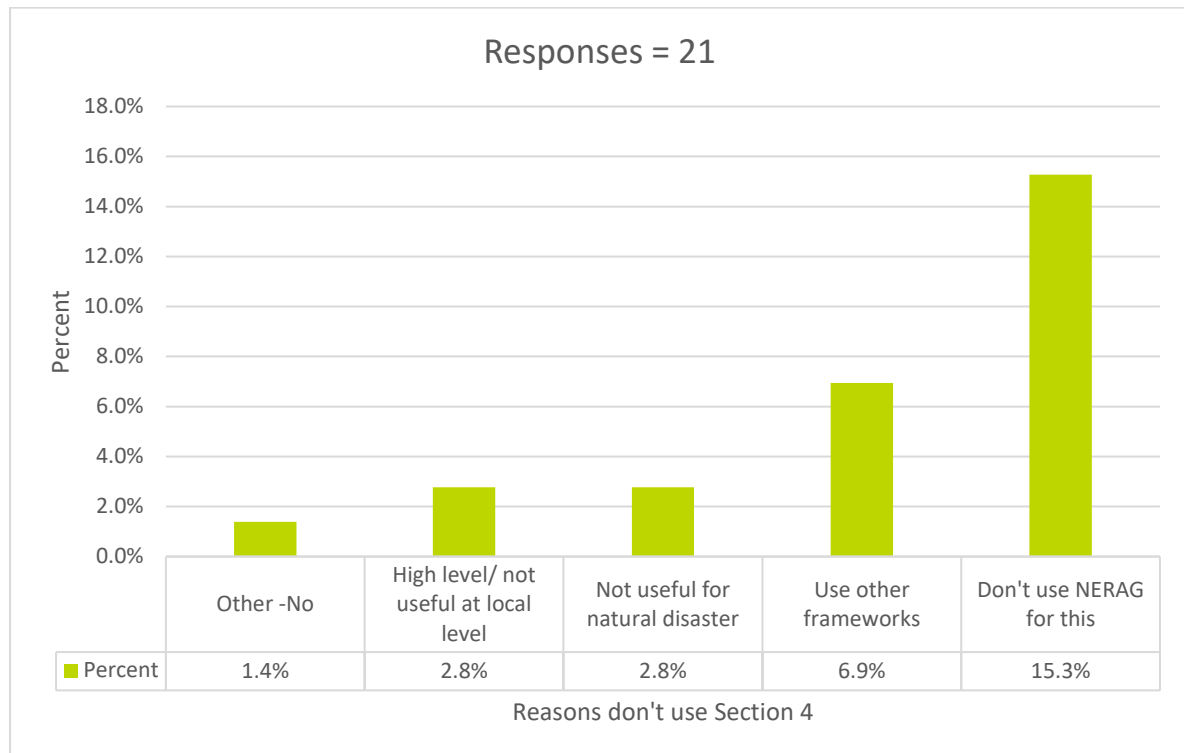


Figure 23: Reasons for not using Section 4

## A.11 Reasons for using or not using section 5: risk identification

Participants who used Section 5 of NERAG were asked:

*What is the main reason you use this section (multiple responses possible)?*

Almost a quarter of responses (23.2%) indicate that participants use the risk identification section as a resource to guide their approach. Almost one in five responses (19.5%) suggest the section allows participants to identify the nature of risk and scope their considerations with a further 7.3% suggesting that they use the section to clarify risk as a basis for developing an agreed view between stakeholders.

Almost one in five responses (19.5%) reveal participants as using the section because they see identification as foundational generally to the risk assessment process (11%) or as a key part of their organizations' risk assessment process (8.5%).

Responses were classified as follows:

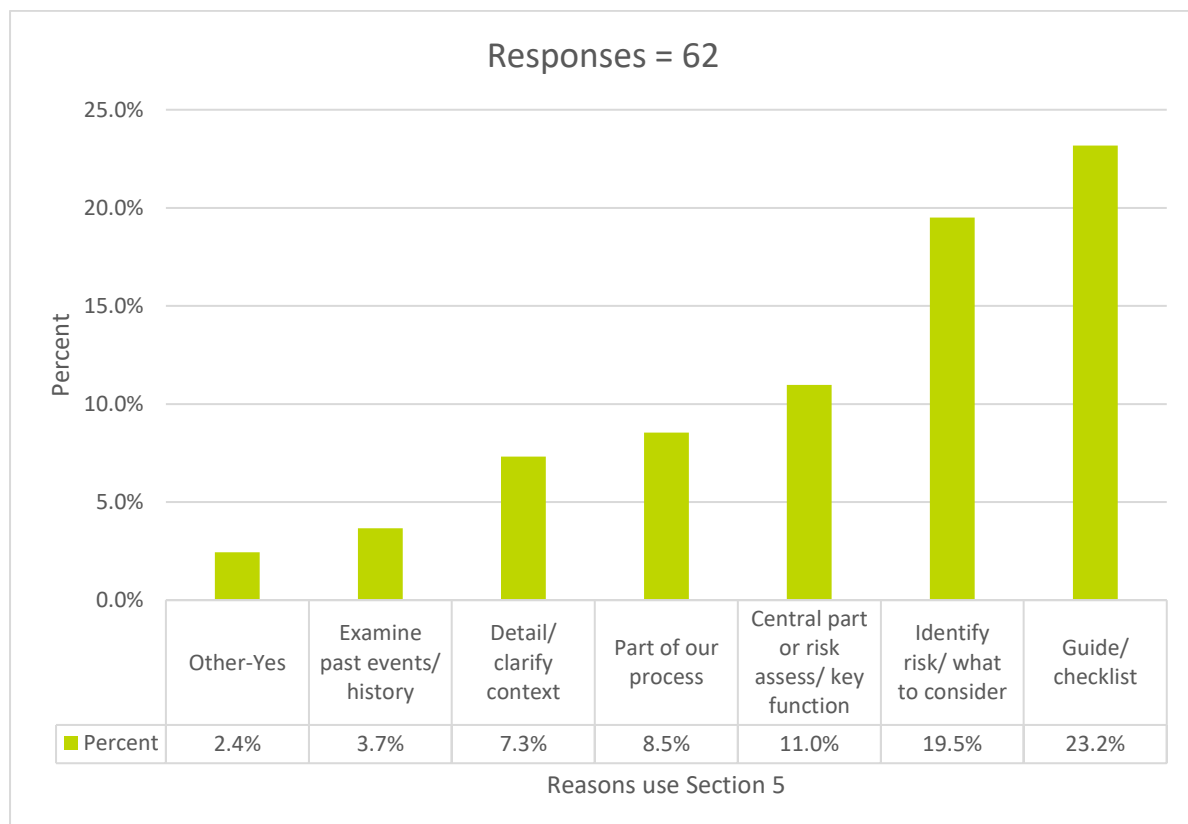


Figure 24: Reasons for using Section 5



Participants who did not use Section 5 of NERAG were asked:

*What is the main reason you do not use this section (multiple responses possible)?*

Responses of those who do not use the risk identification section of NERAG indicate a preference for other frameworks (6.1%).

Responses were classified as follows:

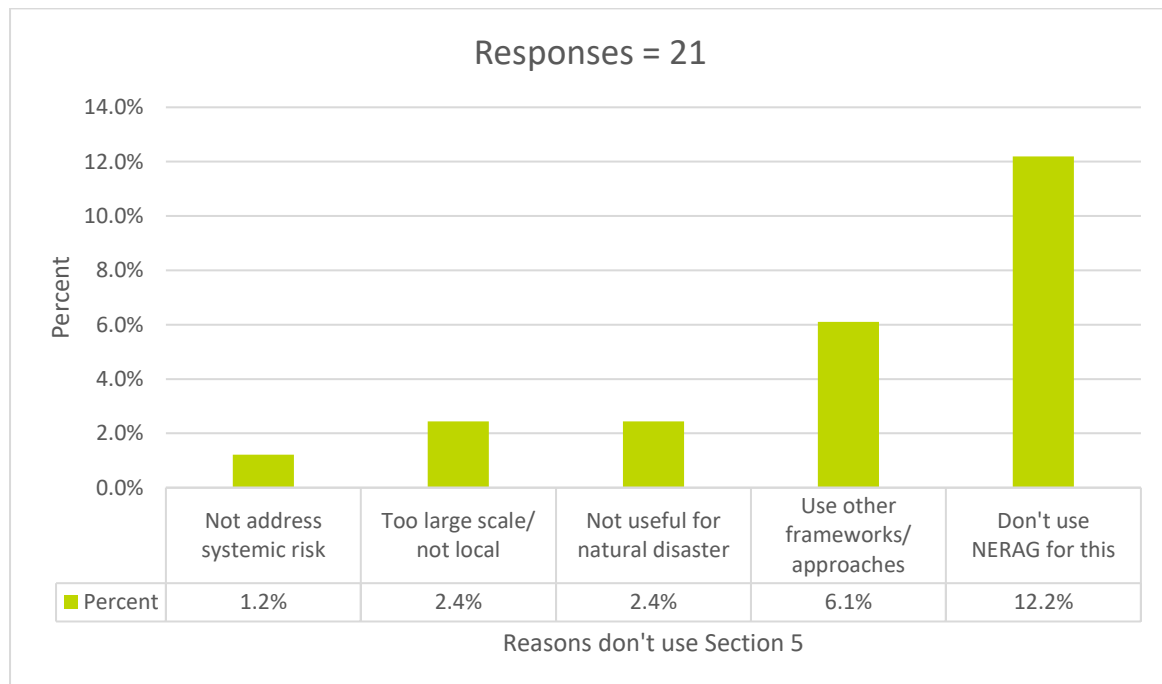


Figure 25: Reasons for not using Section 5

## A.12 Reasons for using or not using section 6: risk analysis

Participants who used Section 6 of NERAG were asked:

*What is the main reason you use this section (multiple responses possible)?*

More than one in five responses (21.7%) point to participants using the risk analysis section as a checklist or a guide to their approach. Approximately one in seven responses (14.5%) suggested that participants use the risk analysis section to help structure their evidence to focus on the risks to be addressed and inform action.

Over one quarter of responses (25.3%) show participants using the risk analysis section because they see it as central to the risk assessment process (12%) or as a key part of their organizations' processes (13.3%).

Responses were classified as follows:

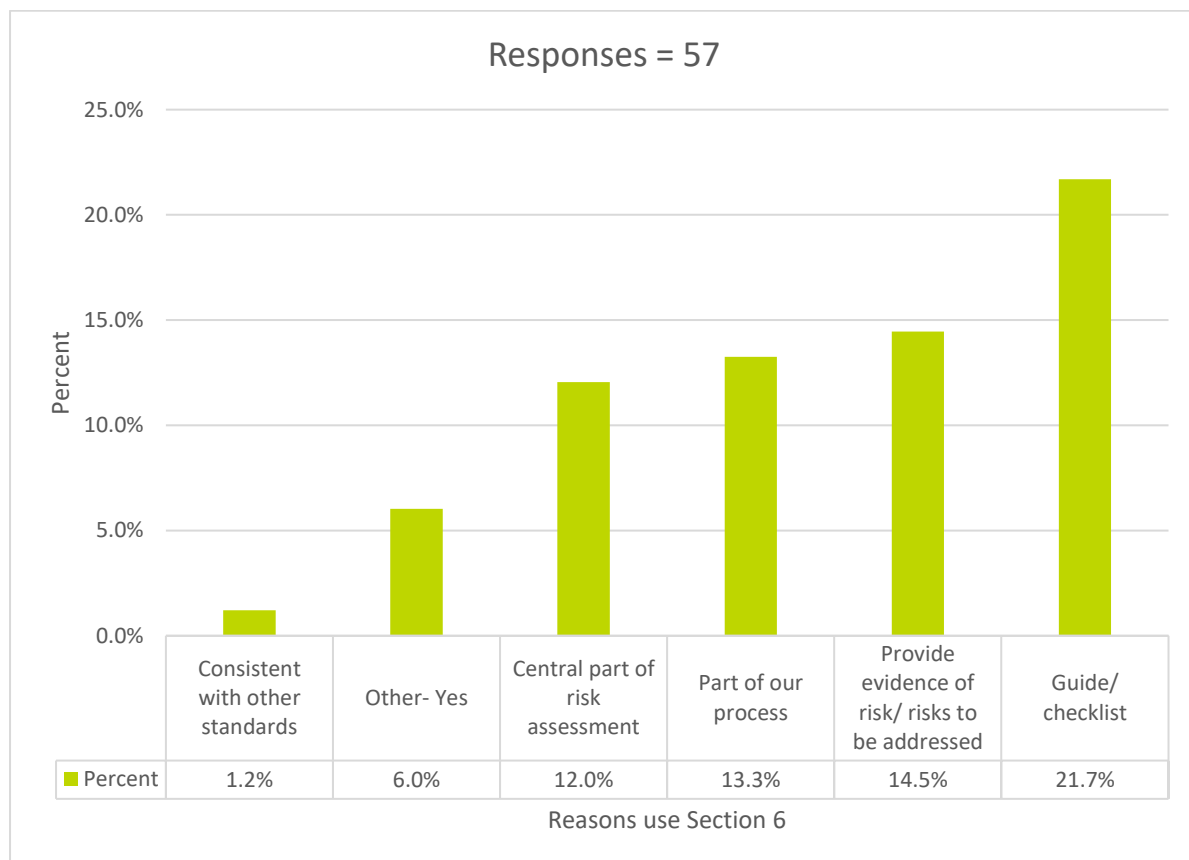


Figure 26: Reasons for using Section 6

Participants who did not use Section 6 of NERAG were asked:

*What is the main reason you do not use this section (multiple responses possible)?*

Participants' responses suggest those who do not use the risk analysis section of NERAG prefer to use other frameworks (6%); and see the section as subjectively based, preferring quantitative models (3.6%).

Responses were classified as follows:

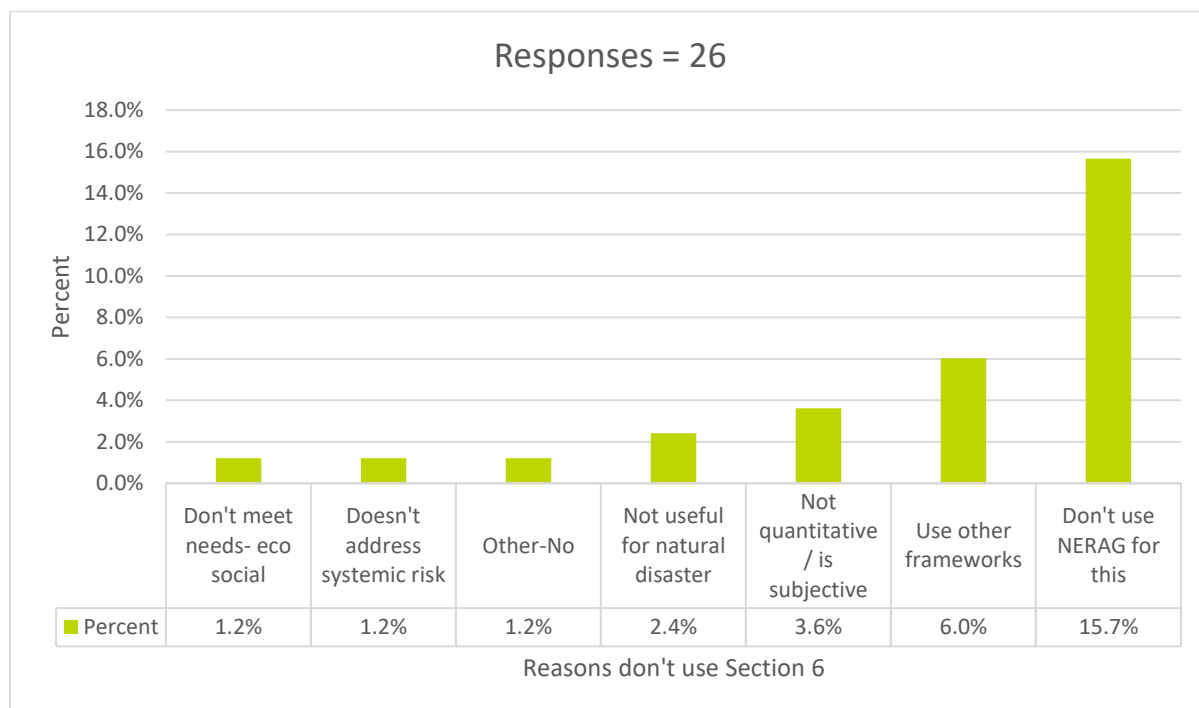


Figure 27: Reasons for not using Section 6

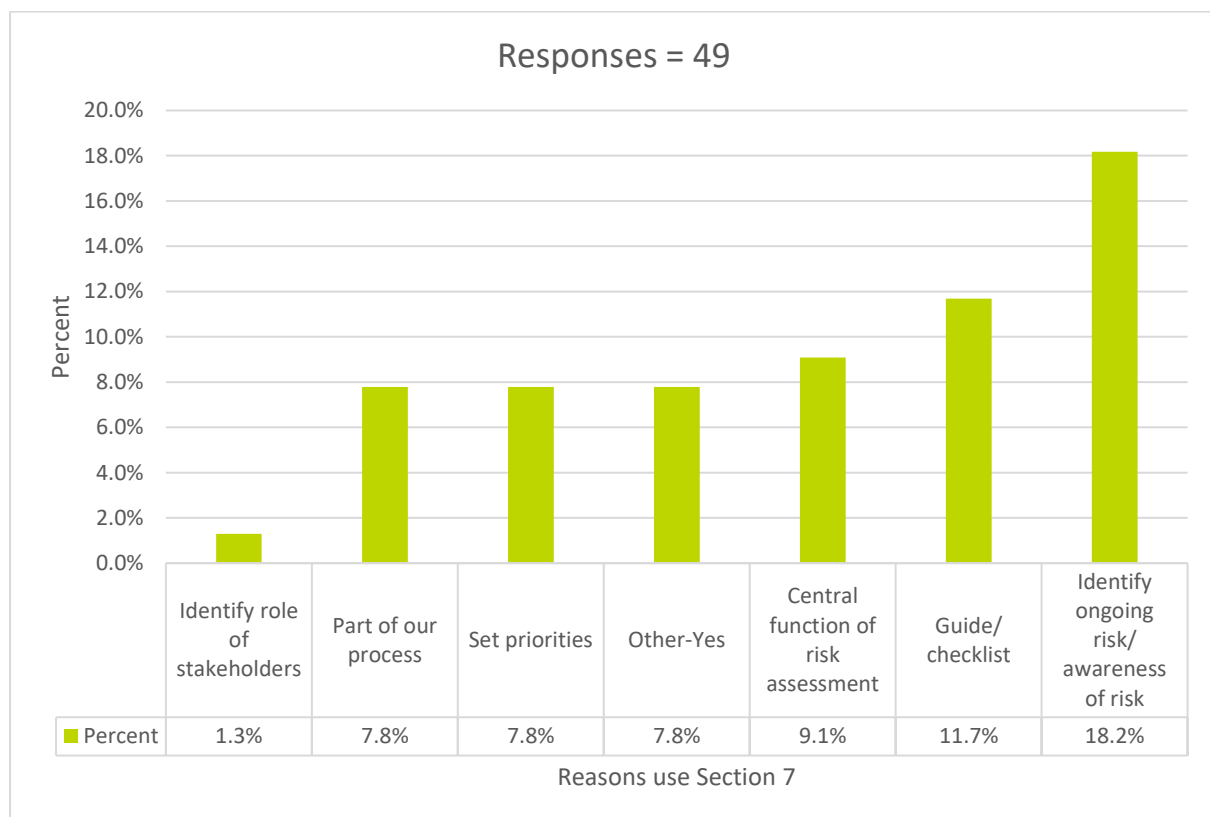
## A.13 Reasons for using or not using section 7: risk evaluation

Participants who used Section 7 of NERAG were asked:

*What is the main reason you use this section?*

Responses indicate participants use this risk evaluation section of NERAG because it assists in identifying on-going risks (18.2%) and prioritize or prescribe treatments (7.8%). One in eleven responses (9.1%) refer to risk evaluation as a key element of risk assessment generally, with a further 7.8% seeing it as central to their organizations' risk assessment processes. One in nine responses (11.7%) indicate the risk evaluation section is used as a checklist or guide.

Responses were classified as follows:



Multi-responses possible

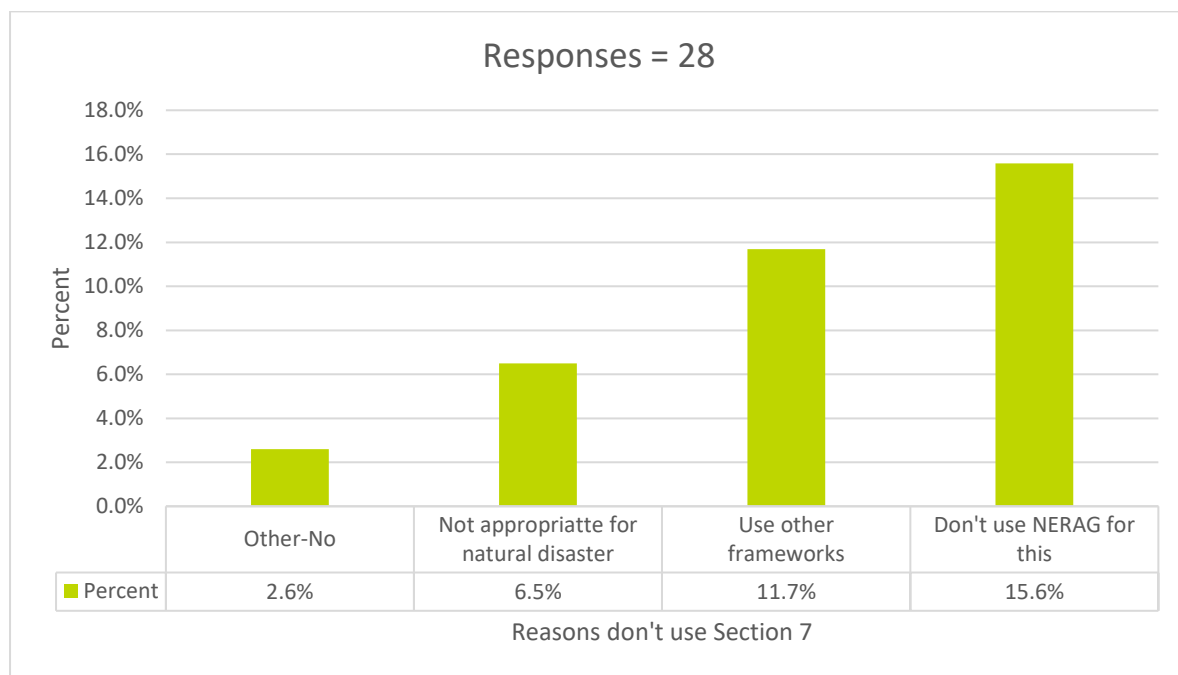
Figure 28: Reasons for using Section 7

Participants who did not use Section 7 of NERAG were asked:

*What is the main reason you do not use this section?*

Participants who do not use the risk evaluation section of NERAG said that they prefer to use other frameworks (11.7%) and believe it is difficult to use for natural disasters (6.5%) some specifically referencing the decision point analysis. [Legacy risk but not strategic planning and avoiding risk]

Responses were classified as follows:



Multi-responses possible

Figure 29: Reasons for not using Section 7

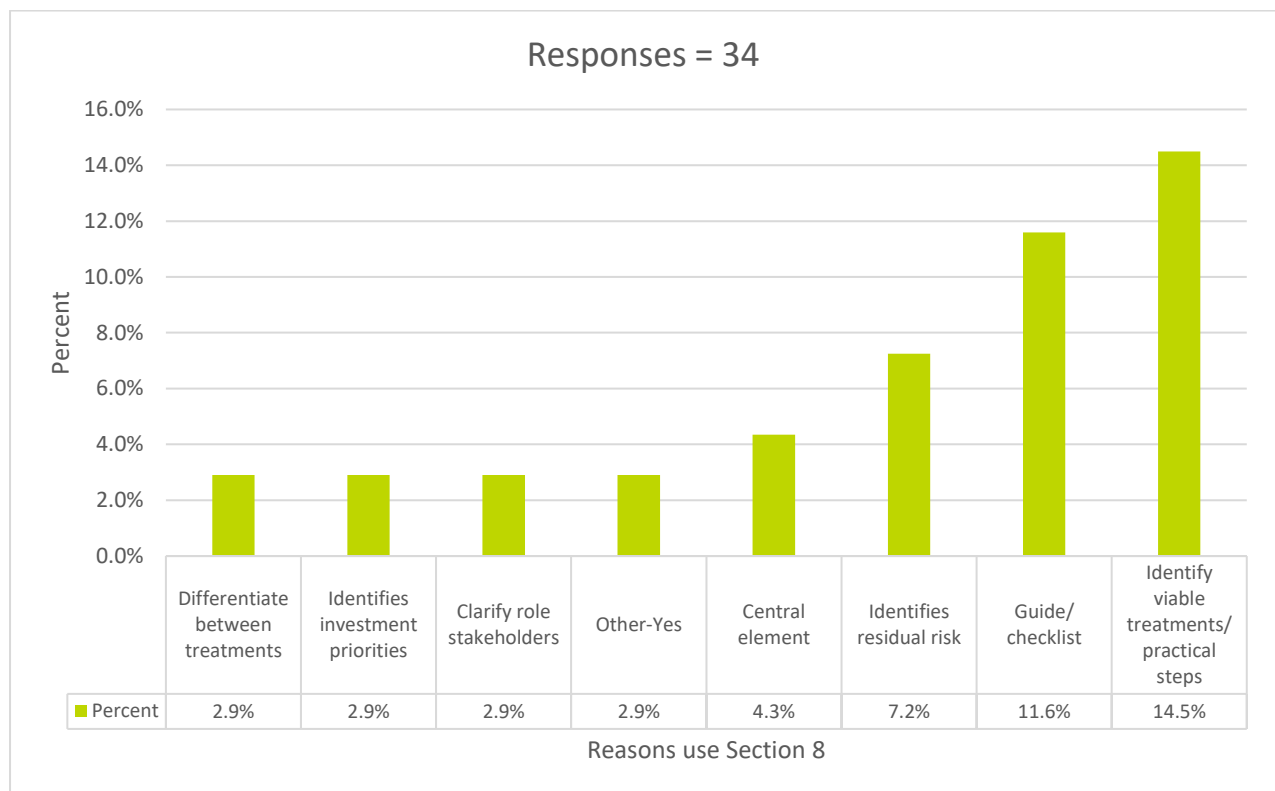
## A.14 Reasons for using or not using section 8: risk treatment

Participants who used Section 8 of NERAG were asked:

*What is the main reason you use this section?*

Many participants use the risk treatment section of NERAG because it assists in identifying feasible treatment measures to reduce risk (14.5% of responses), to differentiate between treatments (2.9%) and to prioritize them (2.9%). Many also use the section as a guide or checklist (11.6% or responses).

Responses were classified as follows:



Multi-responses possible

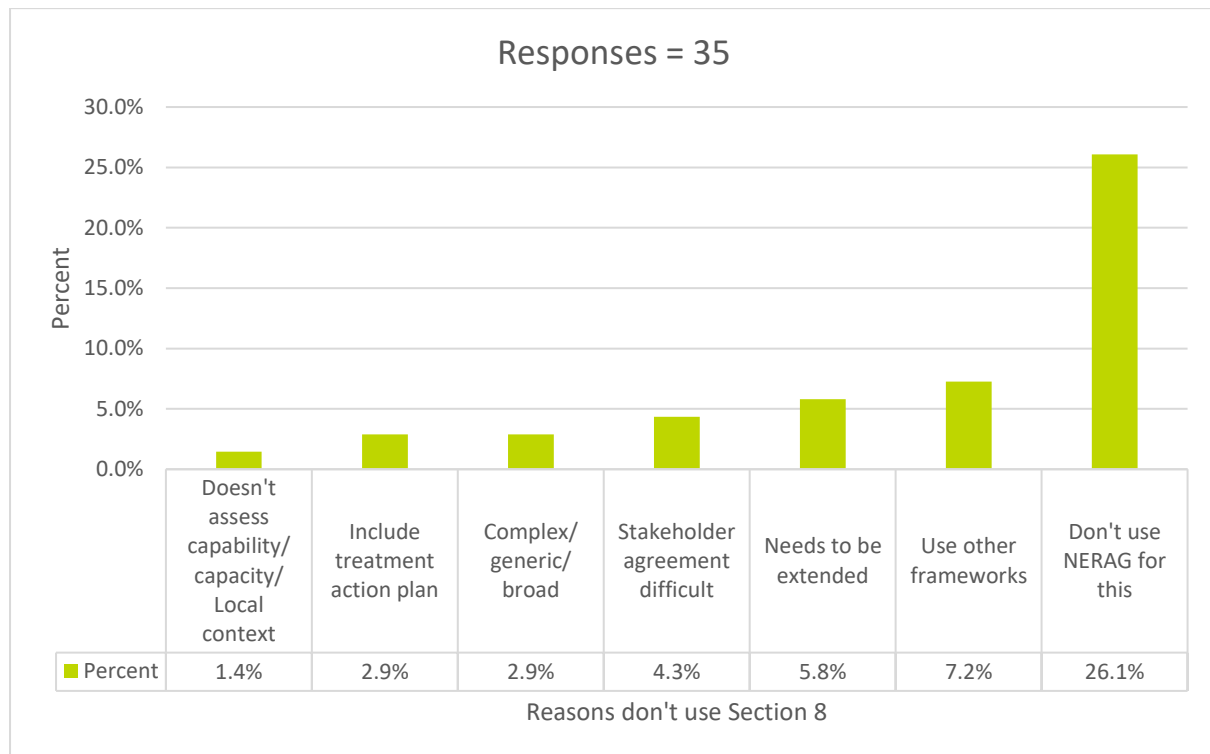
Figure 30: Reasons for using Section 8

Participants who did not use Section 8 of NERAG were asked:

*What is the main reason you do not use this section?*

Participants who do not use the risk treatment section of NERAG prefer to use other frameworks (7.2% of responses%) or believe the section is too generic (2.9%) and its content needs extending (5.8%) including guidance on developing a treatment action plan (2.9%).

Responses were classified as follows:



Multi-responses possible

Figure 31: Reasons for not using Section 8

## A.15 Reasons for using or not using section 9: monitoring and review

- Participants who used Section 9 of NERAG were asked:

*What is the main reason you use this section (Multi-responses possible)?*

Participants responses indicate that the monitoring and review section of NERAG is used because it is seen as a key element in the risk assessment (10.4%) reflecting the ongoing nature of the process, is integral to good governance (9%), and part of organizational risk assessment (3%). Participants also use the monitoring and review section as a guide to their processes (10.4%) and to track implementation (9%).

Responses were classified as follows:

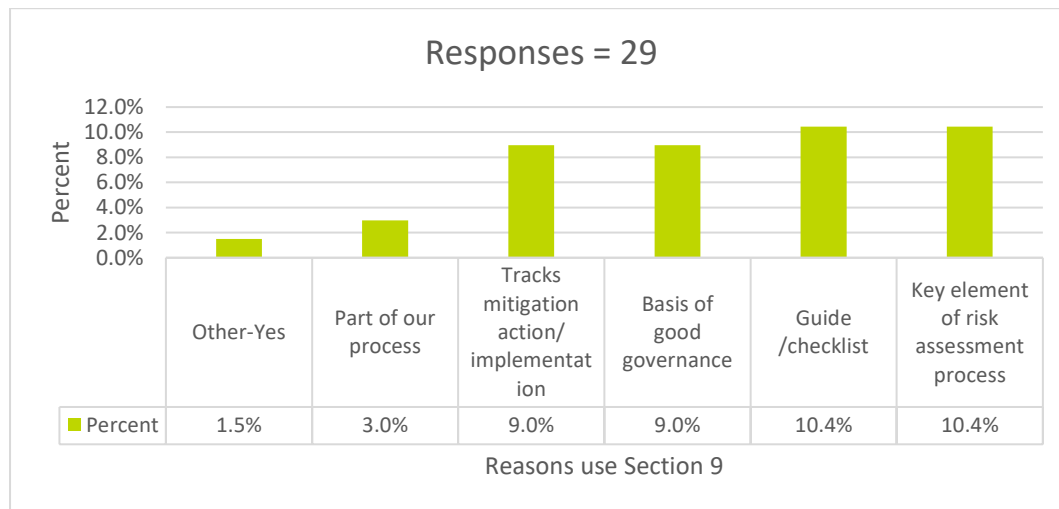


Figure 32: Reasons for using Section 9

- Participants who did not use Section 9 of NERAG were asked:

*What is the main reason you do not use this section (Multi-responses possible)?*

Participants who do not use the monitoring and review section of NERAG favour other frameworks (16.4% of responses) or believe its content needs improving (10.4%).

Responses were classified as follows:

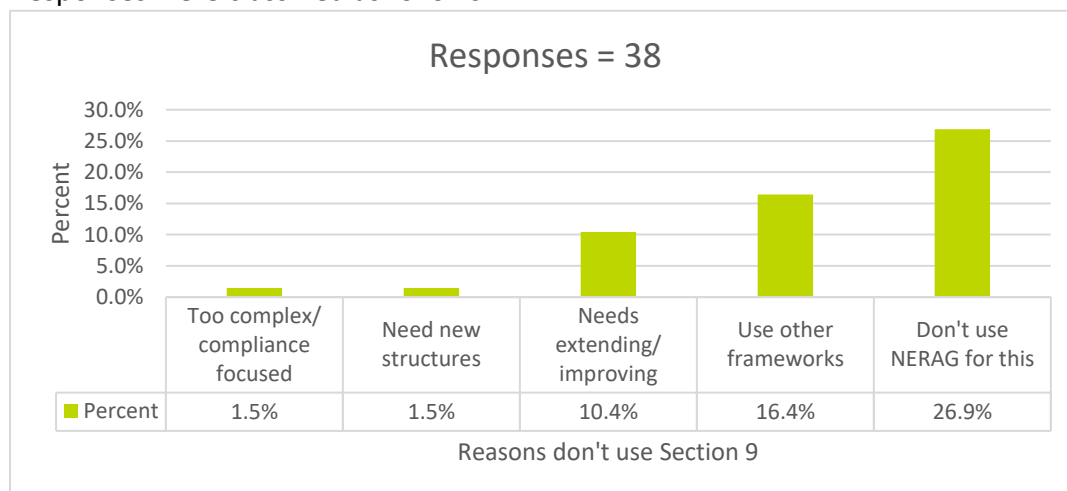


Figure 33: Reasons for not using Section 9



## A.16 Use of other risk assessment tools

Participants were asked:

*Do you use other risk assessment guidelines, models, frameworks etc. to supplement or instead of NERAG?*

More than three quarters of participants (77.8%) use risk assessment guidelines, models, or frameworks to supplement, or instead of NERAG.

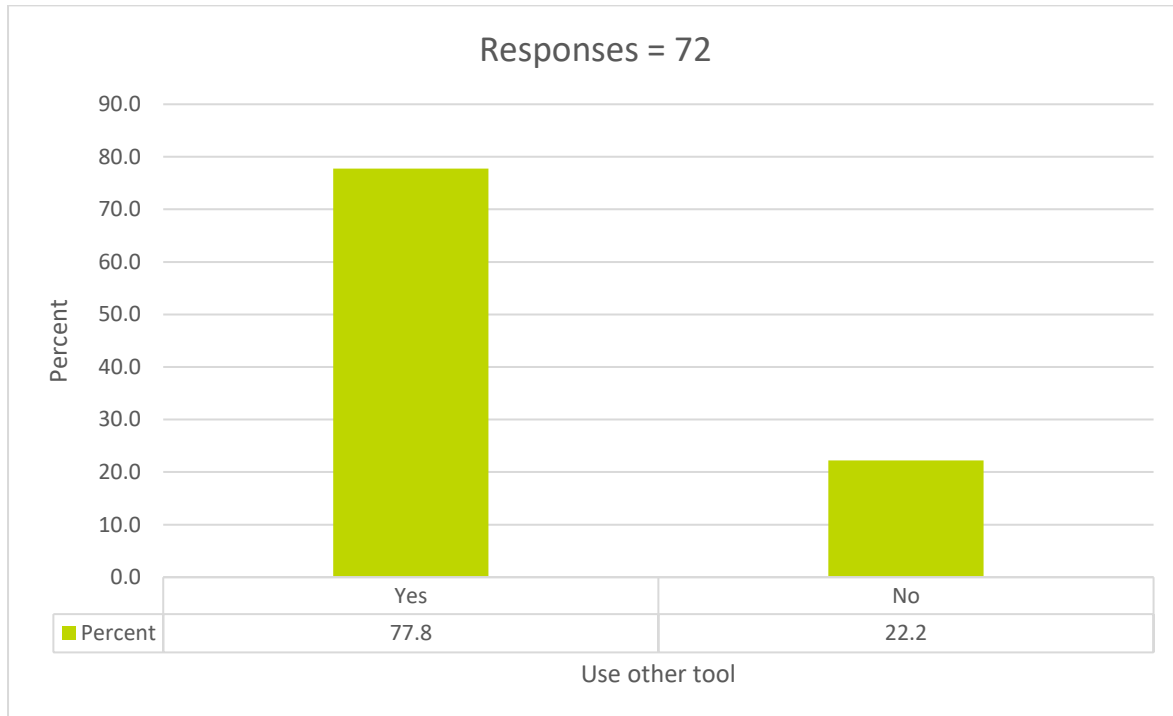


Figure 34: Use other tools

## A.17 Other risk assessment tools used

Participants who said they used risk assessment tool instead of or supplemental to NERAG were asked:

*Which other risk assessment guidelines, models or frameworks do you use (Multi-responses possible)?*

Almost one quarter (23.8%) of responses from participants who use other risk assessment frameworks refer to using ISO 31000. Many participants also use organization specific frameworks (15.5% of responses) in addition to QFES risk assessment process (7.1%), VicSES' CERA (6%) and local governments' Emergency Management Framework (2.4%). Jurisdiction specific frameworks were also cited including SA Emergency and Strategic Risk Management Framework (2.4%), SEMC WA Emergency Risk Management Local Government Handbook (1.2%) and Victorian Bushfire Risk Register (1.2%). Many other alternative frameworks (21.4%) were cited by participants.

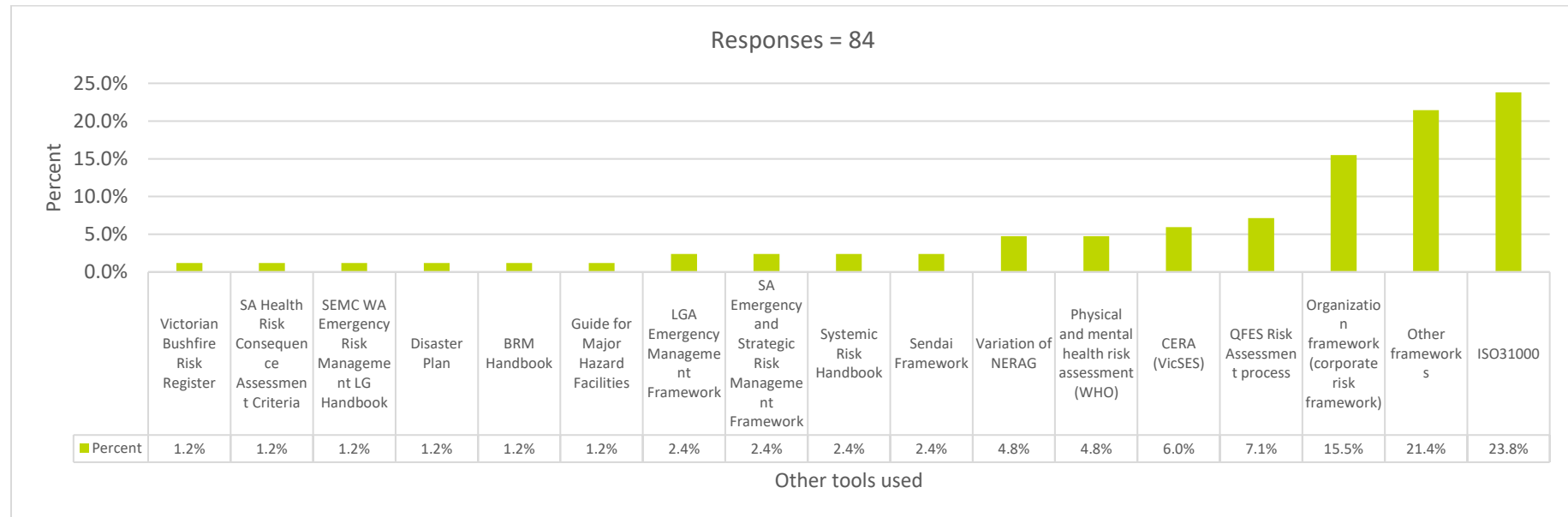


Figure 35: Other tools used

## A.18 Need to update NERAG

Participants were asked:

*Do you think NERAG needs to be updated to incorporate the following elements and approaches?*

**Table 2: Need to update NERAG**

	<b>Yes</b>	<b>No</b>	<b>Not in NERAG scope</b>	<b>Already addressed in NERAG</b>	<b>Not useful for risk assess</b>	<b>Unsure</b>	<b>N</b>
<i>Use stakeholder values as a key guide in decision-making</i>	35.3	19.1	8.8	5.9	7.4	23.5	68
<i>Make values, vulnerability and social justice central to purpose</i>	41.8	11.9	11.9	4.5	10.4	19.4	67
<i>Have different versions of NERAG for different purposes</i>	46	27	0	3.2	0	23.8	68
<i>Enable community input to include their knowledge, values and priorities in decision making</i>	54.4	10.3	1.5	10.3	5.9	17.6	68
<i>Account for complex interdependencies by taking a systems approach</i>	59.4	4.3	1.4	8.7	5.8	20.3	69
<i>Establish open collaboration with stakeholders across all domains</i>	60.3	0	4.4	19.1	4.4	11.8	68
<i>Collaborate about objectives, goals, priorities etc in risk assessment and decision-making</i>	60.3	1.5	4.4	17.6	2.9	13.2	68
<i>Address and support resilience</i>	60.6	3	13.6	3	3	16.7	66
<i>Make objectives of risk assessment to minimize vulnerability and suffering</i>	62.3	4.3	4.3	5.8	8.7	14.5	69
<i>Use modelling and plausible scenarios to reduce use of probability matrices</i>	62.3	11.6	4.3	5.8	2.9	13	69
<i>Provide instruction to decision makers on systemic risk</i>	63.2	2.9	11.8	4.4	2.9	14.7	68
<i>Identify high priorities for mitigating/treating disaster risks</i>	63.2	2.9	7.4	11.8	2.9	11.8	68
<i>Create, capture and equitably share disaster risk knowledge and information</i>	66.7	0	2.9	17.4	2.9	10.1	69
<i>Apply adaptive learning in the risk assessment process</i>	67.6	1.5	4.4	8.8	2.9	14.7	68

	Yes	No	Not in NERAG scope	Already addressed in NERAG	Not useful for risk assess	Unsure	N
<i>Reconsider purpose, objectives and goals</i>	68.6	0	0	17.1	4.3	10	70

**Table 2: Need to update NERAG (cont.)**

	Yes	No	Not in NERAG scope	Already addressed in NERAG	Not useful for risk assess	Unsure	N
<i>Take account of complex interconnections and interdependencies</i>	69.6	1.4	4.3	8.7	4.3	11.6	69
<i>Take account of long-term complexity, uncertainty and change</i>	71	1.4	2.9	10.1	1.4	13	69
<i>Consider the risk mitigation/investment stage as integral to risk assessment process</i>	72.5	0	4.3	10.1	1.4	11.6	69

The largest number of participants (around seven in ten) who responded to the question, think that NERAG needs to be updated to:

- Consider the risk mitigation/investment stage as integral to the risk assessment process (72.5%)
- Take account of long-term complexity, uncertainty, and change (71%) and of complex interconnections and interdependencies (69.6%), although taking a systems approach to address this is less well supported (59.4%; 20.3% uncertain).

The elements and approaches which were perceived by the fewest participants as requiring updating or including in NERAG are:

- Using stakeholder values as a key guide in decision-making (35.3%)
- Making values, vulnerability, and social justice central to purpose (41.8%)
- Enabling community input to include their knowledge, values and priorities in decision making (54.4%)
- Having different versions of NERAG for different purposes (46%)

Approximately one in five participants were uncertain about their attitude to the inclusion of these elements.

Incorporating community values into risk assessment decision making appears to have limited support among participants.

The support for some elements was diminished by the perception that NERAG currently adequately accounts for it including:

- Reconsidering purpose, objectives and goals (68.6%; 17.1% believe NERAG adequately addresses it)
- Establishing open collaboration with stakeholders across all domains (60.3%; 19.1%)
- Collaborating about objectives, goals, priorities etc in risk assessment and decision-making (60.3%; 17.6%)

The responses to the latter two elements suggest some stakeholders believe that NERAG adequately addresses collaboration between stakeholders.

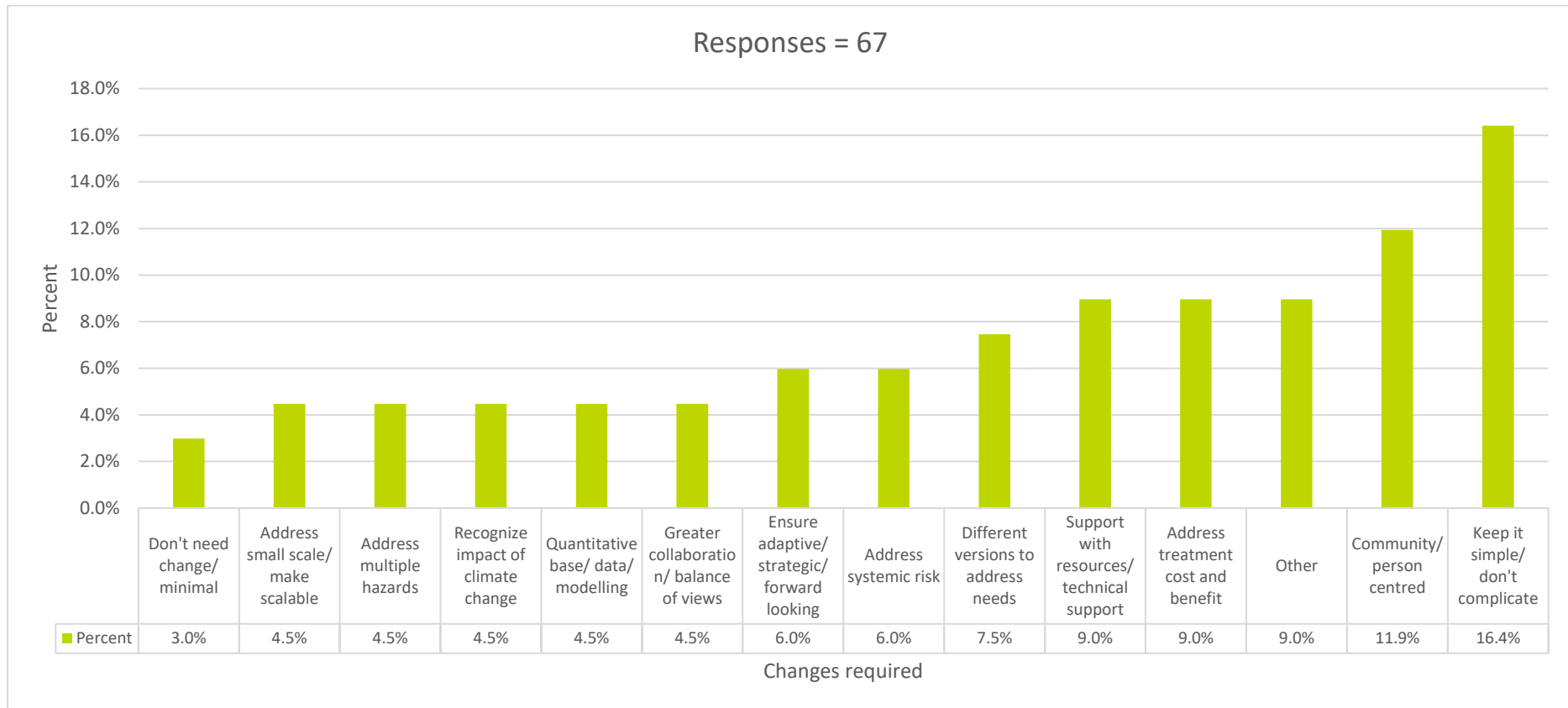
Support for the following elements is more limited because some participants see it as outside NERAG's scope including:

- Make values, vulnerability and social justice central to purpose
- Provide instruction to decision makers on systemic risk
- Address and support resilience

## A.19 Comments on needed updates to NERAG

Participants were asked:

*In regard to the elements and approaches above, please comment briefly on the changes required.*



Multi-responses possible

Figure 36: Changes required

Participants identified a number of guiding principles for the changes that they believed were required for NERAG. These are:

- Simple and accessible, not overly complex (16.4% of responses); but quantitatively based (4.5%); and adaptive, strategic and forward looking (6%).
- Open to community input (11.9%) and broader collaboration (4.5%) to draw on community understanding and expertise and balance stakeholder voice
- Take full account of the resources involved and the outcomes generated by risk treatments (9%)
- More comprehensively support the application of NERAG (9%) including with technical advice and access to case studies and examples.

Participants believe that an updated NERAG should reflect the current and emerging context by recognizing the impact of climate change (4.5%) and addressing multiple hazards (4.5%) and systemic risk (6%).

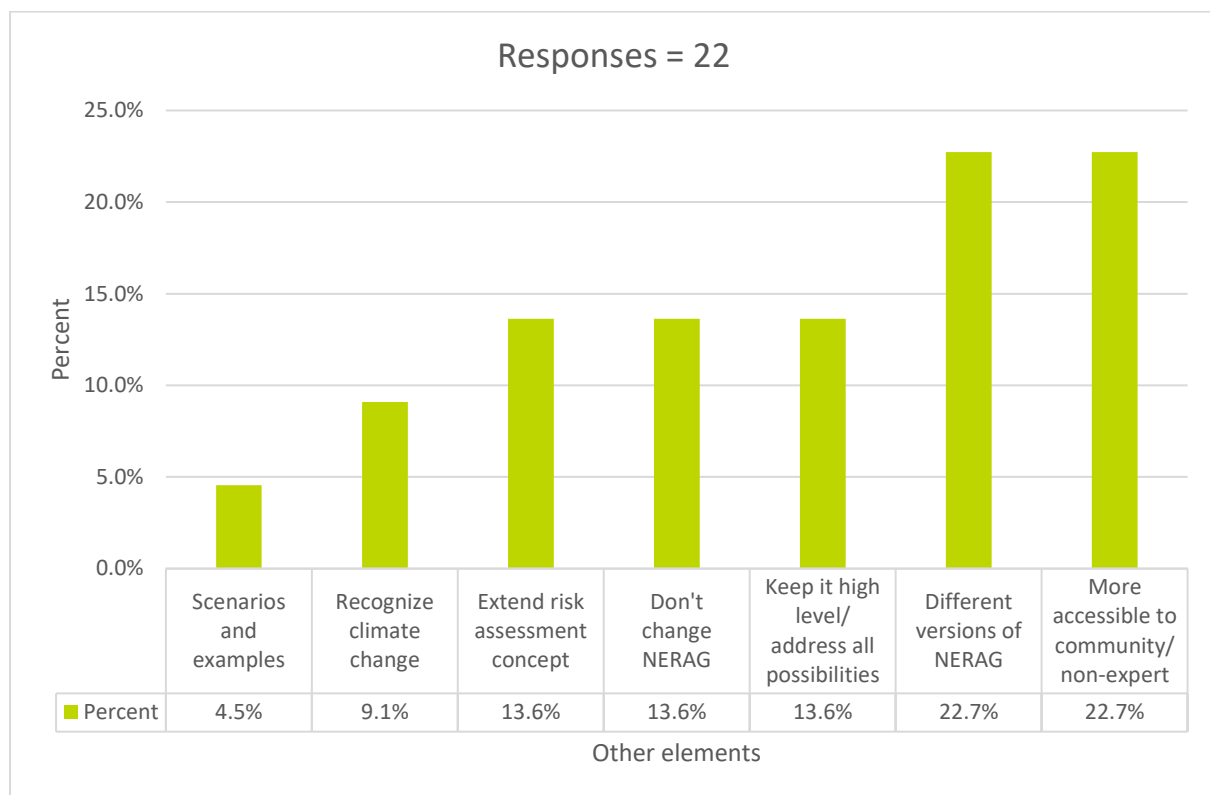
Some participants want versions of NERAG to be customized to different needs (7.5%) including addressing the needs of local scale (4.5%) decision-making.

## A.20 Other elements of NERAG requiring updating

Participants were asked:

*Are there other elements of NERAG that need to be updated to reflect more contemporary thinking and best practice in risk assessment?*

A few participants took the opportunity to reinforce their views with largely diverging views. Some feel NERAG should not change (13.6% of responses) and assess broadly rather than at local or small scale (13.6%). But others feel the concept of risk assessment should be broadened (13.6%) to recognise climate change (9.1%) and make the process more understandable and accessible to the broader community (22.7%).



Multi-responses possible

Figure 37: Other elements of NERAG requiring update



# Appendix B: Results of the focus group discussions

## B.1 Focus group facilitation notes

### INTRODUCTIONS

You are all located in [Jurisdiction] and have been involved in risk assessment in some way.

I would like to hear all your views on NERAG. Tell me what you think and respond to the views of other people in the discussion. There are no right or wrong answers here. If you agree or disagree with me or anyone else tell me why.

Your comments will remain totally anonymous so feel free to be frank. You will remain unidentifiable, and all data will be wiped after I have finished with it.

Let's start

### **Impression**

1. Overall, what do you think of NERAG?

### **Use**

2. My impression is that in some jurisdictions NERAG is used in a limited way, while in others it is used as a major resource. To what extent do you use NERAG? Why?
3. The online survey suggested that people tend to use NERAG more for establishing the context, risk identification and risk analysis? Why.
4. The survey also suggested that the sections on risk treatment, communication and consultation, and monitoring and review are less used. Why?
5. Is there anything in the process of review that you would not want to lose from NERAG?
6. Why are other risk assessment tools used?

### **Usefulness**

7. To what extent is NERAG complex and consequently less useful? How can this be addressed?
8. Is it useful/applicable in natural disaster? Why/not
9. How useful/applicable is NERAG at small scale/local level?
10. Is there an issue in it not addressing vulnerability and capability? [Inadequacy of likelihood and consequence]
11. Are there issues for you in NERAG's use of probability matrices?

### **Issues to be addressed for NERAG improvement**

12. What do you think are the key issues that should be considered in improving NERAG?

- a. Address the impact of climate change, multiple hazards, systemic risk, uncertainty and complexity.
- b. Active adaptive learning. Test approach and adapt to learnings. Can this work? How?
- c. Need better access to disaster risk knowledge, information, and data. Identify resource gaps. Is this so within your jurisdiction? How can it be achieved?
- d. Use of a systems perspective for risk assessment?
- e. Integrate consideration of risk treatment to inform risk assessment.

**Issues already adequately addressed in NERAG?**

13. Some people feel that NERAG adequately addresses:
- a. Purpose, objective, and goals of risk assessment. What do you think?
  - b. Collaboration across all domains. What do you think?
  - c. Community input of knowledge, values, and priorities into decision-making. What do you think?

**Issues that are out of NERAG's scope**

14. Some people feel that some issues are out of scope:
- a. Values, vulnerability and social justice as the central purpose of risk assessment and to guide decision-making. What do you think?
  - b. Addressing and supporting resilience. What do you think?
  - c. Guidance for decision-makers on systemic risk. What do you think?
  - d. How do you think the issue of systemic risk so should be incorporated into NERAG?

**Stage 2 of Review**

15. How do you think Stage II of the NERAG review should proceed?
- a. What sort of process would you prefer? [Views from jurisdictions]
  - b. Structure of review [Steering committee]?
  - c. Stakeholder participation?

**Other issues**

16. Is there anything you'd like to say about NERAG that we haven't discussed?

That's the end of our discussion today. Thank you for your involvement and have a good evening.

## B.2 Detailed Findings

*I guess there is a potential risk I see that we want to align to that national guideline on NERAG as best practice but if the review doesn't happen and there isn't an improvement or change to NERAG to reflect those other approaches that are out there, I guess there's the risk that we may not be able to be consistent with NERAG because we've, I guess, developed models and tools that we think are a lot more robust and transparent in understanding or articulating the dynamic risk (SA).*

*I think the issue is that risk assessment is just so rapidly changing at the moment and NERAG isn't quite reflecting some of the thinking that's happening internationally and nationally about issues. So, I think there is scope to again, review NERAG to reflect those kinds of current thinking that's happening (TAS).*

*We have been trying over the last couple of years to utilise the methodology from the NERAG to apply to our decision making for planning applications that are within bushfire prone areas. We've been fairly unsuccessful in using the methodology. We found it overly complicated but also, it doesn't quite do what we wanted it to do. For planning purposes to determine whether it was essentially, is it too risky is the location that it's in and the bushfire risk, is that unacceptable or is it acceptable to a decision maker? We were hoping that it could be a quantitative, yes or no in simple terms, but whatever way we've tried to manipulate it and use it with unable to serve that purpose (WA).*

## B.3 Introduction

Six focus groups, each of ninety minutes duration, were held between June 20 and July 6, 2022, with State jurisdictions. An average of eight participants were involved in each group with a maximum of ten and a minimum of seven.

Dr Ken Strahan mediated all groups using a semi-structured discussion format (attached in the appendices at B.1). Katelyn Samson and Ella Wilkinson of the Australian Institute for Disaster Resilience explained the context of the research and provided information where required. All groups were recorded.

The presentation of the results that follows reflects the main themes that emerged from the discussions. An extensive use of participants' quotes seeks to represent the directions and feel of the discussions and support its interpretation.

## B.4 Objectives

- i. Consider minimizing vulnerability and suffering and avoiding future risk creation as legitimate objectives of risk assessment (and implicit in value-tradeoffs and risk transfer).
- ii. Integrate risk assessment and resilience by embedding resilience requirements into frameworks and methods.

Disaster risk is a product of hazard (a sudden event or shock), exposure (the people and things in the path of potential hazards), vulnerability (the potential for those people and things to be adversely impacted by a hazard) and capacity (the ability for those people and assets and systems to survive and adapt).

#### **B.4.1. Vulnerability**

Most participants in all jurisdictions believe that vulnerability, consistent with increasing international practice, should become an integral and explicit part of the NERAG risk assessment process, although one participant thinks it is adequately addressed in likelihood and consequence considerations. They want NERAG to provide guidance about how vulnerability should be used in risk assessment and to identify and use available vulnerability data.

*...it's one of the primary variables we have to ameliorate in my view and ... it aligns...across social, economic, physical vulnerability (QLD).*

*...it's obviously integral to the process, vulnerability (NSW).*

*...the lack of emphasis on vulnerability (in NERAG) ... makes it seem like a very physical systems emphasis and of course vulnerability in urban systems has a lot to do with people (VIC).*

*...the international space is very much shifting to vulnerability and working within the Sendai framework ... to consider exposure and vulnerability... for impacts and risks (rather) than solely focusing on consequence statements which is where NERAG tends to take us (WA).*

*...one of the issues that isn't captured in NERAG particularly well is the inclusion of vulnerability. It's reasonably standard and common within the disaster risk reduction world to consider that risk is a function of your hazard, your exposure and your vulnerability and the only way really to reduce risk is to reduce those three aspects (QLD).*

*Your biggest bang for buck is on controlling your vulnerability. So, without having vulnerability part of your core concept in terms of understanding risk, ... That's the way you can reduce your risk in our view...(QLD).*

*...how we can give better guidance about how people use ... vulnerability. I'm not sure if we're clear on what that means or how someone at a local risk planning committee meeting is really going to understand (NSW).*

Vulnerability of a range of different systems, including people, is seen as important.

*...the vulnerabilities of infrastructure and network systems and transport infrastructure and communities moving in and around during emergencies and natural hazards is really important (NSW)*

*...in a dynamic when you've got, hundreds of thousands, if not millions of people moving in and around the state and what the vulnerabilities of our systems are (NSW)*

*...look across exposed element types, let's say, which means that we can look at buildings, we can look at housing stock, we can look at whether housing stock is up to code, or we can look at whether this community has an economy that's vulnerable to a particular kind of hazard. (QLD)*

Many participants believe that including vulnerability would allow NERAG to more comprehensively assess risk and point to appropriate treatments.

*The framework and the risk statement ties to the consequence, which are too high level ... and consequences quite often pushes us into response and recovery treatments versus vulnerabilities which can push us into prevention and preparedness treatments (TAS).*

*If we can ... talk about the risk being a consequence of the threat from the hazard and determine different levels of threat and protection measures...and you can pinpoint the exposed element ...and look at their exposure and vulnerability and specific protection measures that can apply. It just gives you a lot more flexibility to drive both an assessment result and the outcomes that you need in terms of treatments. So, ... NERAG for us has its problems (WA).*

*...it's the standard that's put out there through the Sendai Framework and the Disaster Risk Reduction Framework which has been adopted. You look at understanding disaster risk and that'll be talking about hazard exposure and vulnerability, not likelihood and consequence (WA).*

#### **B.4.2 Resilience**

Many participants see resilience as a valuable concept requiring careful definition and a nuanced application to risk assessment.

*If we are going to include resilience, then we really need to have a strong criteria and a really strong way to actually understand what resilience means, because resilience can mean a number of things, at different levels. It comes down to individual perceptions ... experiences. So, if it is going to be included ... it needs to be really tightly defined (WA).*

*It's being driven by...'we've advanced beyond risk, we've got to do something special, we're calling it resilience'... but they can't explain to you what that is. ... risk is a thing and resilience is a thing, where is the overlap, where is the difference, how can I use*

*them together? If you're using that adapt, thrive, survive... it's different to 'we are just going to be really strong and try to withstand the attack'. So, resilience is another word that's still trying to land exactly where it is (VIC).*

*... my problem with the term is ...it can be very woolly. Language around Disaster Risk Reduction tends to be a lot clearer and a lot more able to be implemented. Resilience, ... can sort of mean so many different things and I think it can often be captured by slogans (QLD).*

*I'm not saying that it's not a valuable idea or it's not a valuable goal. ... It's just, there needs to be a bit more care around the definition and ... in particular, what needs to be thought of... is how do people, on the ground, achieve this thing? (QLD).*

*I think a nuanced approach to resilience needs to be part of the consideration. ... it's not uniform to all people in one community or all pieces of infrastructure. So, I think it's a much more intangible thing to try and grapple with when you're using it in a risk assessment environment. Not to be discounted, but it is more difficult (SA).*

*(People advocating resilience) seek to embrace the wider complexity of systems and make a real attempt at improvement rather than what they see as a negative in the risk system approach which is a sort of a one-shot examination of a part of a system. Now that is an exaggeration, but I think there's some truth in it, in between those two camps. And I think there's some value in trying to not just use the word because it's popular but to embrace the concept that perhaps takes us to a wider view of improvement of our systems (VIC).*

Some participants see resilience as an existing part of the risk assessment process or currently implicit in identifying treatment options.

*I think it's a little bit like risk. It's an abstract concept and it's hard to get your way around sometimes but, I guess, simply put from my way thinking, is if we get our controls right, we are building resilience (VIC).*

*...it may be that resilience is good because it captures a whole bunch of ...individual action, such as ... retrofitting buildings... road betterment... all these sorts of things can be captured in resilience. In my mind, they can be captured in disaster risk reduction just as well and they align better with the discussion (QLD).*

*...resilience is a part of...a factor in your mitigation measures or your treatment plan ... because it will affect likelihood or consequences. So, you cannot rule it out. Building resilience needs to be a part of the whole concept, but whether it's specifically in the emergency risk assessment process or it is actually some of the factors that guide either the assessment process or the treatment options that come out the other end (TAS).*

*In an absolutely ideal world, it would lovely to be able to see ... for every risk reduction measure that you ... treat your risk and you're reducing that risk, that you see an increase in that community's resilience, but I think ... that's a tricky thing to do (QLD).*

*So, my point would be because it's still philosophical and it's not always done well and understood ... try and keep them separately with the link with the statement saying managing the risks in emergency helps enhance resilience ... (VIC).*

Some say that guidance on how resilience can be considered in NERAG would be valuable.

*...at least, some guidance so people can have an understanding and apply it to their assessment of risk even if it's a more of a context statement rather than saying these are things that we're going to put it into it (WA).*

### **B.4.3 Risk ownership and transfer**

Some participants feel that NERAG does not adequately address issues around the ownership of risk and risk transfer.

*...if there's a local risk assessment undertaken and mitigation measures ... but there's still outstanding risks, how's that escalated to State ... just how they're talking to each other about risk transfer (NSW).*

*...reallocating risk ownership to different stakeholders throughout the process is something that could be expanded on in the NERAG (NSW).*

*There are issues around risk ... individual and collective ... people are happy to build their house in a bushfire prone area ... deal with the risk, but are the rest of us able as a community willing to tolerate the risk that we have to pay for in recovery afterwards? So, there's all those complex issues around who owns a risk (TAS).*

*I think it's a really good document but... there's a bit missing. How does a third party who's not a risk owner apply NERAG to inform a client or a decision maker? (WA).*

## B.5 Governance and leadership

- i. Establish governance culture and leadership that is responsive and agile, and ethical and values driven, in the context of long-term complexity, uncertainty turbulence and systemic risk.

### B.5.1 Governance

#### **Guideline or toolkit?**

There is disagreement over whether NERAG should be a guideline/framework or a toolkit. Many participants think that NERAG should be developed as a detailed framework/guideline with an extensive box of tools appended.

*NERAG talks about it being a framework and I'm not sure whether it is although parts of it might be... but I think we could start off with a high-level document which is a risk framework and have some addendums, including suggested processes (VIC).*

*I'm hoping this iteration of NERAG will come with some tools as well and not just the guide. That (lack of tools) is one of the reasons a lot of agencies don't use NERAG. Where do we start, how do we proceed was the question for many people (SA).*

*...it is a question of whether we are using this as a guideline that's very helpful for those that are developing or relatively developed, and we'll leave those that have got very sophisticated risk management tools to do their own thing (VIC).*

#### **Supportive of governance**

NERAG is seen by many participants as supportive of the good governance of risk management based on transparency and consistent and rigorous methodology that enables comparison of risk across jurisdictions.

*I think it's a guideline for trying to make sense and put structure on what is an incredibly complex situation so we can work through it. As long as people treat it like that and not as instructions to cook a cake or something like that, then it can be really useful (TAS).*

*... one of the strengths of NERAG ... is that you're making a really transparent (risk assessment) document that outlines exactly how you came up with the result ... so that other people can scrutinize it (WA).*

*...the whole concept around a standardized, comprehensive, consistent, and importantly, defensible process is really important, something that we can use to prioritize actions (NSW).*

*...some of that general guidance is really good ...and allows you to give defensible reasons for why you've taken the positions. Generally, you are doing things fairly*



*consistently with other jurisdictions, so that there is some ability to have some comparison (TAS).*

*what we've got with NERAG is a nationally consistent method for undertaking community or public safety risk assessments (VIC).*

*I think the actual framework, the guidelines, although they may need updating are still really good (SA).*

*...by using the evidence and the structured process, we can start to compare risks and hazards across the full spectrum (NSW).*

*...the NERAG framework provide some general principles and gives a lot of flexibility on how you do it (TAS).*

One jurisdiction has incorporated NERAG into its governance processes.

*We embed in the ministerial guidelines that NERAG applies at the municipal level when each Council does their emergency management risk assessments and then at the regional level, and then obviously, at the state level (VIC).*

### **Coordination across jurisdictions**

Some participants feel that NERAG needs to address processes between the different levels of government and across jurisdictions to improve coordination and prioritization of preparation and response.

*...how do you escalate ...if there's a local risk assessment undertaken, mitigation measures that are put in but there's still outstanding risks, how's that escalated to state and so forth ... just how we're talking to each other (NSW).*

*We can have emergencies in several states ...in multiple communities, and we don't have a way of looking at that and deciding who do we give priority to. ... we've had floods in Queensland and New South Wales, and we've also had issues on the South Australian and West Australian Border. For some of the national companies we're dealing with, they're trying to deal with all those people simultaneously. ...NERAG doesn't really help us do that (VIC).*

### **Resource constraints**

A few local government participants, particularly in Queensland, are concerned about the impact of resource constraints on using NERAG for risk assessments and on broadening into systemic risk and vulnerability and conducting sophisticated analysis.

*... most local governments, ...we're just looking at resourcing ...and it's challenging even for a larger council ... and then completing with other priorities. I think there's*

*real value and ...a real desire to have all those elements included but when it comes down to those working on the actual assessments and the implementation. It's a challenge (QLD).*

*...bearing in mind that local disaster management groups and districts are very resource constrained... very time poor and so, anything that isn't immediately clear what the utility is. It gets brushed aside (QLD).*

## **B.5.2 Complexity of NERAG**

Many participants say NERAG is complex and consequently some audiences experience difficulties using it. Some participants feel a simplified version is needed.

*We tried to apply it and it was too complex a process. So, we tried to simplify it for the consultants who were going to use the methodology to prepare the risk assessment and then ... for the decision maker ... who had to read ... and understand the document. By simplifying it there was a criticism that it had been dumbed down. It's very difficult to find that midpoint where it's still readable and contains the right amount of information and... it still is a logical document. When you're putting together these documents that comes out with 40 or 50 pages of diagrams and explanations ... At the end of the document, you're still scratching your head going well, hang on. What's the answer? (WA)*

*...it is a very, very dense document. It takes a lot to work through ... very, very text heavy. It had to be adapted... there wasn't a clear way to present the process for our purposes and that took some real working through. So, it was a very, very onerous process (NSW).*

*...using NERAG to develop a contextual emergency risk assessment process...it was a very heavy process. And to do it justice takes a lot of input, a lot of data, a lot of time and energy to go through the process... a simplified version would be more useful (NSW).*

*NERAG needs to be a simple process, shouldn't be any more complex than what it is already. If it can be simplified, great (SA).*

*...risk assessment, it can run the risk of being quite onerous. And ... I kind of lost the will to live through the process (TAS).*

*...that's the sort of feedback I've heard along the way that it takes a bit of work to go through the process in NERAG (VIC).*

*...as a framework that guides you through thinking about risk and the identification stage, it can be quite useful but when you start to try to quantify risk ... it becomes difficult to use (WA).*

*... that document is way too high level. I've got some experience and have worked in risk management previously with some emergency management portfolios, but essentially, in the job I've got now is too high-level document for me to implement (NSW).*

Participants from Queensland say that local government takes a central role in risk management and that NERAG is not used in risk assessment because it is difficult to operationalise.

*...in the Queensland context ...risk management is so specific and it's highly local (QLD).*

*for the Local Disaster Management Groups and in terms of the state's approach, it's definitely not the preferred approach. The main reason is that it's very difficult to operationalize... for the implementation of disaster risk assessments and disaster risk management and mitigation and communication of risk up from local to the state. (QLD).*

Some participants from other jurisdictions also have difficulties applying NERAG at a smaller scale including within communities and at the municipal level.

*...it needs to be scalable and adaptable more easily than it currently is (WA).*

*The NERAG is supposed to be used for all scales of events or ... regions but we find it is hard for small local Councils. It works fine on a state basis or a regional basis but as you go smaller, it is a bit harder (SA).*

*I would say it is better suited to ...large systems rather than local systems where you're more interested in consequences manifesting within the owner operator rather than more broadly. That goes to the heart of the objectives of NERAG but from an infrastructure's owner's perspective, there has been a limitation of applying it in my experience (VIC).*

*It does a reasonable job at a high level but if you try to look at a local, smaller community level, it's not really applicable. It's really a high level...probably state or regional risk assessment. It's useful but when you want to look at a specific risk assessment for a smaller community, it's not transferable (WA).*

### **B.5.3 Diversity of stakeholders' needs**

State jurisdictions and businesses are seen by many participants as running different risk management governance approaches in which they are invested and reluctant to change or adapt.

*... different ... control agencies ... all have different systems... their own systems and they feel like this (broader risk assessment approach) is another burden. So, they tend to use what they know or what they prefer or what they are invested in and working in ... for the last 10 years. ... if it works for them, why do we need to change it? (SA).*

*I think the challenge is if (NERAG) becomes too prescriptive and it doesn't allow you to do (risk assessment) in a way that works for the entity. But again, you want something that allows consistent understanding of risks that are transferable (TAS).*

*...the corporates have their own risk management matrices that they use across their entire business. So, you are going to have to give them a good reason to use something different. But if this is a guideline, it doesn't really matter if they use something different, it only matters when you say this is the guideline you will use (VIC).*

*...there was not a massive uptake of NERAG to meet the regulatory requirements under the Emergency Management Act and the reason for that is because it wasn't directly compatible with existing corporate risk frameworks. So, you have one assessment giving you risk ratings that didn't necessarily easily integrate with the existing risk framework. So, it made comparing apples and apples very difficult (VIC).*

*It comes down to the scope and who the guidelines are aimed at, because we've talked a lot about things that affect corporations ... systemic risk, climate change, etc. So, if we're hoping to use NERAG in corporations, then you need to consider that they may not be clear on their community. They're working with AS 31000 and they've got the risk process fairly well mature, and probably at an optimal stage and taking into account a lot of uncertainty, including the unknown unknowns, because that's what they need to do as part of business (VIC).*

#### **B.5.4 Risk assessment and treatment**

Many participants note that risk management governance is divided at the point where risk assessment is translated into treatments or mitigations.

*Once the risk assessment is completed... the treatments then go into a delivery side of things which is generally the business of an agency or council or body of some sort and then they tend to use their own operational processes. So, NERAG sort of falls off then. So, delivering it, you're no longer assessing the risk. You'll just get this thing done, report back, there's that, that's been done, or it hasn't, and it's no longer considered a risk context... no longer part of the risk processes (SA).*

This is discussed further in the last section of this discussion of focus group results under 'treatments'

Some participants note that risk assessments may be politically constrained.

*Governments have gone through major planning reform, and we've still got a system that's allowing... the development of infrastructure and people building on flood plains (SA).*

*... we're doing all this work, but decisions are made by other people or politically influenced decisions are made that are just continuing to build risk rather than reducing it (SA).*

*...when you're doing the assessment process, just capturing some of the evidence out there on things like how biases can come into risk assessments and perceptions. Probably looking at being mindful of not skewing your assessment for political imperatives (TAS).*

*...being able to do the risk assessment process in a transparent way which doesn't try to downplay or avoid negative things and identify the risk but still come out with an outcome where the risk might be accepted (WA).*

## **B.6 Active adaptive learning**

- i. Make decision-making an active, adaptive learning process to enable continuous improvement.
- ii. Build capability and capacity of decision-makers to lead and make robust decisions around policy, program and investment, in a context of complexity, uncertainty and turbulence

### **B.6.1 Building capability**

Participants believe that NERAG should promote capacity building within the broad risk management community to enable adaptive learning and support the application of sophisticated methods and techniques within the risk assessment process.

*I think any opportunity to educate and bring people together to work through this process would be great (NSW).*

*There's an underlying question here about how we train people in this range of tools (VIC).*

*What we found in the 2017 state-level emergency risk assessment ... people with different levels of risk assessment knowledge, experience, and training... that level of experience might have changed the whole qualitative approach of NERAG. So ...building the capacity of the people involved to engage with the risk assessment (NSW).*

*... there are models out there that work and provide guidance, but they require certain expertise. So, if you put them in NERAG, that's great, but you've got to have the expertise (VIC).*

*There used to be vocational level training in emergency management which gives you the skills to understand these documents better and interpret them. I don't think people*

*should have to go into university ... and I don't think there's a lot of value in some of these short private sector courses but maybe some online training self-paced ... because there's a real gap (WA).*

*Having people who are trained in connection to do it is important and then having end users who are educated on how they should be using it is important (VIC).*

## **B.6.2 Active learning**

There are a range of concerns about the application of active learning to NERAG. First, some participants feel that existing processes do not adequately address learning and need to happen before further steps toward active learning can be taken.

*...at the moment we're still trying to, ... have a proper cycle where we're actually closing the loop in terms of... observations, insights, evaluation, analysis, and then recommendations, going through capability, embedding the practice, and then learning the lesson. We haven't even gotten to that point yet, let alone to the point where we could test lessons learned (QLD).*

Second, many participants believe that their current risk management approach is consistent with active learning. They interpret the process of active learning within NERAG as regular review and updating of risk assessments and their outcomes.

*...if you had a really robust risk assessment of, let's say, three to five years ... and then annually, you sort of revisit events and things that have changed in the meantime and update it. So, it seems like a really sensible way to do the NERAG (NSW).*

*... when you think about that loop and the feedback... that's very similar to the risk assessment process. When you want to make a change, you include all your stakeholders and then you make sure you get that feedback going backwards and forwards. And then when you implement something, you then keep reviewing and evaluating what you've done. That's the way it should work (TAS).*

*If you're keeping your plans alive, that by extension means that you need to keep your risk assessment alive because your treatment for that risk assessment has to be kept alive. So, to me, it seems like it should be just an integral part of any really good robust risk assessment (NSW).*

*I think any risk management needs to be framed in a cycle of reassessments, doing mitigation activities, risk reduction activities and assessment whether they worked or not (SA).*

*we are getting better at this ... all the time ...our assessments ...are growing in confidence as we test things and go back and review and adjust our controls ... and hopefully a few risks come off as we do controls and mitigations that are working (VIC).*

*If you're going through consistently doing monitoring and evaluation for each phase, ... that should be feeding into adaptive learning, going forward and sort of feeding back and forth (VIC).*

*It's just the feedback mechanisms of how (reviewing whether risk is acceptable) is triggered. But having a rigorous framework really helps to facilitate that conversation (SA).*

Third, a few see financial constraints to active learning.

*...if money was no object, and if we lived in an ideal world, we'd have a risk assessment that would be constantly receiving inputs and constantly being adjusted (NSW).*

There is support for considering an active learning approach within NERAG.

*...the current document ...gives monitoring and review one paragraph. If there's a way of representing it more as an ongoing dynamic process ...it might send a better message because it looks like its... handball that off, it's over ... that to me seems like it could be improved (VIC).*

*There's a bigger loop of saying have we achieved the outcomes? ... because the treatments are just actions ...and quite often we're not very outcome focused. Have we actually reduced the risk as opposed to have we built a levy or some hazard reduction? That's... probably the bigger element that NERAG could reinforce (SA).*

## B.7 Systems approach

- i. Apply a systems approach to analysis and decision-making to better understand interconnection and interdependencies, clarify implicit values and priorities, and identify effective intervention points.

Participants are divided in their view on incorporating a systems approach into the NERAG. Some think a careful application of a systems perspective to NERAG would be helpful in dealing with systemic risk.

*I think that part of NERAG's role is to ... put systems and put structure around a really, really complex situation. And I think there are ways to incorporate systems thinking into that (TAS).*

*when we're trying to...integrate with things like climate risk assessments and they are generally predominantly systems-based ... to have a framework to get from something like that to the more hazards specific, would be helpful for us (NSW).*

*...systems thinking needs to be applied to dealing with ... systematic risks (SA).*

*And when we look at cascading effects, if we don't have communication systems or electricity and so forth, what does that mean? ...There's lots of compounding stuff. But the system's approach, doesn't have to replace everything in there but it provides a different perspective (NSW).*

*For me, systems are becoming more and more important. Understanding how this system connects to a wider range of systems and all things that are applied is becoming more and more important (VIC).*

*I think that systems approach would illuminate ... and find those common consequences in system dependencies that need to be looked at and maybe ranked independent of the cause (NSW).*

There is some recognition that a systems perspective is becoming the norm and government needed to keep up.

*...if we as government...don't get on that boat, we're going to find ourselves with a group of people doing things one way and we're going to be trying to do it another. (VIC).*

*In some of the corporates that I work with, they've got long supply chains and they're starting to realize they're not just chains they are networks, because the chain is being pulled in multiple different directions at any point in time. And they're reliant on systems over which they have no visibility because they're operating in Europe or Southeast Asia (VIC).*

Some participants are cautious, suggesting that a systems approach should not be incorporated into NERAG guidance but should cite examples or identify sources of information or tools.

*...a systems approach. It depends on the scale of the risk assessment in my view (QLD).*

*...having a systems approach is good when we are looking at the bigger picture. So, you know, it may not work for local councils. It may work at the State level or even a regional level. So, if the newer NERAG version can give examples, and ... tools to do that, that would be good (SA).*

*It's a challenging environment to take a systems approach because in some cases, we don't know the full extent of the system or all the ... cascading and linked events. There's probably systems analysis needed to quantify them but I'm not sure that the risk assessment itself has to be in a systems approach, but the systems approach certainly would shed light on data and connections. So, it would be useful but not essential (SA).*



*I think it can be drawn out as one of the tools that you could use to complement the work that you're doing but it's not essential to the core process (SA).*

*I feel like some of that new thinking around systemic vulnerability ...is good but I think NERAG has to be a practical tool that we can use. It is hard to get that balance, but I think NERAG should probably be at that more workable tool...(SA).*

Some participants are concerned about the complexity of a systems approach and the considerable demand on resources that it would impose.

*Well, I think it's incredibly labour intensive to take a systems thinking approach (QLD).*

*So, how you then apply that systems process ... you really do need to draw some boundaries otherwise it will just end up reams and reams and reams of paper (WA).*

*... part of me says let's not overcomplicate this so much that the person that's trying to do it off the side of their desk in local government looks at it and goes, 'I don't even know where to start' (SA).*

*They can get very, very, very complicated and CSIRO have done some great work in this area, but it tends to just blow your mind and gets too complicated (TAS).*

Systemic risk

- i. Recognise the existence of complex interconnectedness and interdependencies between social, technical, environmental, and economic systems creating systemic risk and vulnerabilities.

## B.8 Systemic risk

All participants recognise the context in which risk assessments are undertaken is extensively influenced by climate change and its impact on the frequency, intensity and coincidence of hazards and amplifying risk. They refer to State and local government and private sector responses to climate change and believe NERAG also needs to recognise and adapt to the reality of climate change.

*We're going to have to deal with the effects of climate risk more effectively in the hazard risk assessment space (SA).*

*...climate change needs to be included when we review. So, if there's some way of aligning that strategically into NERAG to look ... from a broader perspective that would be good (SA).*

*...there are national and state strategies that say we have to include climate change ... it has to be done and it's being done. (NSW).*

Participants overwhelmingly say that NERAG should explicitly recognise and provide guidance to decision-makers, on systemic risk as part of a process of extending and refining the advice it provides.

*I think it is important for systemic risks to be addressed in the guideline (QLD).*

*...it would be useful to provide guidance on how to think about and do a systemic risk assessment (VIC).*

*From my perspective, I don't see how NERAG can be useful without incorporating systemic risk (VIC).*

*Ten or 12 years into the process that's part of what we should now be considering ...to further our understanding. We developed the methodology to fit the emergency services and as we mature that, there are these other things that we know are key factors but are not yet on the table but they're very influential...should be influential in our decision making (SA).*

*At minimum... (NERAG needs to be) a flag for (local government) so that they are not missing it... get an understanding of what a systemic risk is, and that the important thing is they start to communicate that issue further (QLD).*

*I definitely agree that there is a need to address these systemic risks, and there's an expectation that NERAG will address those issues (SA).*

*...we apply risk assessments to natural hazards individually, but it would be useful to be able to have a combined assessment of natural hazards at a high level of strategic planning (WA).*

A few participants feel that considerable guidance on systemic risk is needed.

*if you just said, 'you need to have consideration for systemic risk in your risk assessments', their eyes will glaze over and they'll just (ask) what does that mean? So, we've got to provide some guidance on what that is (VIC).*

Many participants say that NERAG is not currently well designed to address systemic risk in a range of contexts because it is focused on assessing a single hazard.

*It doesn't cope well with the systemic nature of risk. Its very hazard focused. So, you're sort of looking at hazard, hazard, hazard, hazard, separately whereas in fact, they tend to be all interlinked. It really doesn't cope well with that (TAS).*

*When we apply NERAG to a state risk context, a number of those scenarios we looked at you would see the consequence statements push us into capability measures. So, for example, how effective is our health service? How effective is our ambulance service? How many fatalities would we have? But it considers each of those*

*consequence statements independent of other parts of the system which they're comprised of. For example, is our ambulance system going to cope with this emergency? Sure, it may, in the context of how many ambulances we have but in the context of our road network, our hospital network, and everything else, when you apply systems methodology to looking at it risks would perhaps escalate significantly (WA).*

*We talk about all emergencies and yet we deal with them in stovepipes. We don't look at how they're all interacting and that's becoming a bigger issue with climate change. I don't think NERAG in its current form really encourages people to explore that space (VIC)*

*... the benefit of looking at it from a systemic perspective is you can put events (into) a temporal scale and have a greater appreciation of not just the immediate but some of the long term and indirect consequences of a particular event (WA).*

*We took the view that the traditional NERAG approach is a bit one dimensional, and we need to think about those systemic vulnerabilities that kind of go across all different or many different hazards (TAS).*

*...we now think around systemic risk ... around disasters and NERAG doesn't necessarily address that or account for that (WA).*

*...the systemic nature of risk ... it's not specifically hazard focused. So, the focus turns more to the ability to cope with disruption rather than hazard, hazard, hazard, hazard (TAS).*

*when I reflect on NERAG from a built environment perspective, I struggle so much to think about how it can be applied to a whole of system viewpoint. How it could be integrated with an urban planning management system, not just the town planning controls but the wider set of provisions we try use (VIC).*

*I think it's also important to consider acute and latent systemic risks and how they manifest differently. For example, a power outage that impacts on general well-being in the community versus... lack of planning in water infrastructure ... and therefore shortages of water in a particular catchment (VIC).*

### **B.8.1 Compounding, cascading risk**

Many participants are concerned that their jurisdictions will increasingly have to deal with multiple and compounding and cascading disasters.

*... when it comes to compound hazards ... if you look at all these floods, ...they had multiple big events within weeks and ... how storms then relate to floods down the line. So that's also something we're grappling with ...it is changing your consequence equation (NSW).*

*...the cascading effects on systems ...we really don't understand. We now have systems on systems on systems and you press one you're on top of another one and you're going to knock over a house at the other end because we just don't see those long interconnections (VIC).*

*...one thing that comes up is to identify risks, you end up maybe having five to 10 risks...then a compound flood... state level flooding in two different areas simultaneously. So, you start getting a lot of risks and then that makes it quite time-consuming to then run that analysis against each other (NSW).*

Many participants feel that this reality of compounding and cascading events is not well dealt with by NERAG and requires the development of new approaches.

*... it's very simplistic in the way that it's considering risk... it doesn't account for cascading events at all. It doesn't try to explore or guide the user into appreciating the complexity of those incidents once there's been an impact in terms of what some of the knock-on effects might be as a result of what's occurred (WA).*

*...compounding (and) cascading events need to be considered through scenario planning. But I just don't know how it would be considered as part of the risk assessment process (NSW).*

*The challenge is when you're developing a state risk assessment, you're considering all the hazards in isolation and that to us, as we've learned particularly over the last five years stemming from COVID into the 19/20 bushfires and onwards, we have concurrent and cascading events now and climate changing is only going to exaggerate those events. So, the ability to consider those risks independently is irrelevant anymore but they need to be scaled and measurable based upon credible scenarios (WA).*

*...in terms of cascading and concurrent events or catastrophic events, there's no guideline (SA).*

*A pandemic... then a storm ...becoming a flood and then a week later, we've got another east coast low, that smashes us again. So that consideration, operationally, we have to contend with. I don't know if the NERAG risk assessment actually captures that (NSW).*

*...when we apply NERAG ... statewide assessments may only be done every handful of years and so, you're trying to wave in compounding and cascading events. I think that means you need a much more agile risk assessment process (QLD).*

*...cascading hesitance is something that's occurring. But we have to do it. We've had sequential events or events that impact then get worse because of another event. So, we have to start thinking. We have to start doing those assessments but at the moment, the methodologies are unclear (SA).*

Many participants want guidance on assessing these compounding risks and expect the risk assessments to be more complex and require more extensive data.

*It's something that we're aware of and ... a lot of local governments want guidance around (QLD).*

*We've had some concurrent things going on. So, to get more work done in that cascading, concurrent space would be really useful (SA).*

*...If there was some Commonwealth level leadership on (compounding risk), that would be a real value-add from our perspective ...getting these conversations happening at a more theoretical, elevated level ... to get some guidance and leadership...(QLD).*

*trying to do it, technically, is quite difficult. You need a lot of data to support that if you want to do it well (SA).*

*We looked at cascading, compounding storms and what impact that would have on coastal erosion... that's complex and ... how do you try and forecast that so that you can position yourself for ... another series of floods next year. There's a whole lot of preconditions that are now in place from this current event (QLD).*

*I think the framework is there. It's just how do we interpret the risk assessments and how do you make them additive... you've got to get the different risks on a similar scale which NERAG provides... and then you can compare different hazards. So, there's a bit of methodology ... and I suspect there might actually be a piece of either research or knowledge gathering ... (SA).*

*...when you're doing risk assessment workshops using NERAG with a bunch of stakeholders, people are saying why aren't we considering multiple things happening at the same time because that's what's happening in real life? So, it's not just that we're saying it. The people that we're working with are saying it (SA).*

## B.9 Analytical methods and techniques

- i. Apply decision-making process and models that can adequately address current and future disaster risk.
- ii. Base decision-making on integrated and robust frameworks, methods, and techniques that are appropriate in a complex, uncertain and turbulent context.
- iii. Address shortcomings of traditional probability-based risk matrices (failure with uncertainty, ambiguity, and ignorance) by transitioning to the use of quantitative and

qualitative techniques including modelling and aspirational, exploratory, and normative scenarios.

### B.9.1 Probability matrices

Many participants are critical of the use of probability matrices as part of the NERAG risk assessment process. Some believe that better quantitatively based options are available in some cases.

*...a lot of convoluted logic, which does a reality distortion on the matrices and how they're coloured. If it says one in 5,000 regardless of the consequences, it's red (NSW).*

*...even though people use risk matrices, I think they focus pretty much on probability in assessing a hazard and it's almost like a double or triple weighting against the consequence (NSW).*

*From an infrastructure perspective, they're very limiting. They don't allow you to do a deep dive into the failure pathways and the conditional probabilities. So, it's a bit too high level and ...there's more quantitative methods that I lean towards, particularly in the dam safety space (VIC).*

Many participants are concerned that the matrices are based on expert judgements founded on pre-climate change assumptions and experience and are too prescriptive in an increasingly complex and uncertain context.

*I think they're useful, but... they're a bit like playing the piano with a hand of bananas. ... There's only a few of them that you can say what the likelihood is from objective data. .... things like bushfire and flood, it's changing now because of climate change (TAS).*

*But I think high impact, low probability events, and we've seen a few of them, ...we've got no data but that's the way the world - that's what uncertainties are about, the lack of data. How do we make decisions for the future with data from the past? (VIC).*

*one of the key principles for systemic disaster risk is the notion of uncertainty and I think NERAG is more prescriptive even though we would like it not to be, with those probability tables, ... it doesn't really factor in for decision making in uncertain times and that whole concept of uncertainty (VIC).*

*So, we need a probability scale that allows us to map ... and that's an important part of the criteria and without it you don't have a method, do you? (VIC).*

Some feel that the NERAG's use of probability matrices provides a fundamental base for considering and comparing assessments.

*...the matrix provides consistency. Without them, there would have been wildly different responses ... having a group that come from quite different backgrounds, really having that in black and white in front of us did guide us greatly (QLD).*

*I think having some consistency, whether it be the probability tables, and ... the likelihood tables, having some consistent way of how you cut or stratify those things so that you can take findings that are at a higher level, or in a like setting (TAS).*

*...it means when we start saying something's an extreme risk or ... you start talking about the final outcome, it means that we've all actually been using a similar form of calculation to get to that (TAS).*

*When you have a conversation ... going through a risk assessment process with a community group or a committee ...which in emergency management sometimes that's how it works. It is really useful to have these types of tools to bring them to an agreement, an understanding ultimately that way the risk is and then ...how to manage it (VIC).*

## **B.9.2 Consequence**

Some participants reflect positively on NERAG's structured approach to consequence.

*The categories of consequence ...actually worked pretty well for structuring discussions in workshops and also the reports ... (TAS).*

*So, to use it as a way of bringing a sort of evidence-based approach to what might otherwise be some really subjective conversation around consequence has been really helpful for us (NSW).*

Some participants noted that systemic risk, multiple and cascading events, and increasing uncertainty required that consequence is considered in new ways.

*This is something we're grappling with ... is how to deal with the severity question for different hazards. And, when it comes to compounding hazards ... if you look at all these floods, ...they had multiple big events within weeks and ... something we're grappling with in terms of ...changing your consequence equation (NSW).*

*it creates a new need to not only do that calculation of a single consequence but consequence across social...infrastructure, ...financial separately because they're relevant to different people ... (If they get) compressed into one consequence level, ...you don't see quite how critical that specific economic impact was, or that specific social impact was and so on. Just being a bit higher resolution on consequences if we are talking about social risk (NSW).*

*...the key thing is, looking at ... the consequences more so than the triggering event ... because they are the true societal impacts. If we actually move that focus, looking more at consequences... we remove a whole lot of individual risks and actually start putting it into ... what are the things that really disrupt society, and truly move to an*

*all-hazards approach, which is looking at more of the consequences than what caused it (TAS).*

*...everyone comes in initially thinking of bushfire, tsunami...the hazards, that's what brings people in, but what it really is about is how do you cope with disruption (TAS).*

### **B.9.3 Likelihood**

A few participants say that NERAG's likelihood assessments do not work well.

*... the likelihood assessments...we felt that we were using tools that didn't quite meet the purpose... we felt that we were shoehorning things in a little bit, in an incredibly complex area (TAS).*

*... likelihood of a one in 100,000-year event... it's hard enough to get people to think a week ahead (let alone) 100,000 years into the future. It's just completely inconceivable (WA).*

Many participants say NERAG's approach to likelihood is not helpful because likelihood is not appropriately calibrated within and between different hazards and is based on limited scenarios.

*With hazards like floods, which can occur over the full range of probabilities, depending on how big the flood gets... it can be anything...across a range. ...The way NERAG is positioned ...it very much favours those hazards where there's a point probability that can be quantified reasonably precisely. And it doesn't deal with things like floods, which can occur in a whole range (NSW).*

*It might be a bit easy to apply NERAG and consequence for some hazards but for us because fire is so dynamic, it can be a really subjective process (SA).*

*I think it's because natural hazards are a lot easier to predict whereas non-natural hazards are a bit harder to predict and that's the part which the likelihood is difficult (SA).*

*...it can't just be across all hazards because the significance of different hazards varies. I think ... something like an oil spill. A one in 20-year oil spill is going to be enormous versus, you know, one in 20-year cyclone (QLD).*

*...guidance tables (don't provide) consistent ways of looking at things like fires and floods, which these days have fairly high frequency return, and at the other end, ... tsunamis and larger earthquakes where you're talking thousands to tens of thousands of years and being able to put them all on a timeline in your likelihood table. (TAS).*



*...a major tsunami from the south of New Zealand is assessed by the geologists as happening once every 13,000 years. ... we don't have to worry about that because that's never going to happen in our lifetime. (But) we're talking about any kind of scenario where there's a really quick onset kind of disaster that hits whether it's a dam failure or this or that, we were talking about the same kind of consequences (TAS).*

NERAG's approach to likelihood is seen by a few as providing a useful framework for developing an overall assessment of likelihood.

*...insights from a dozen or so people saying, this is what we think the likelihood is. I think it is useful for having as consistent approach across jurisdictions as we can. Just recognizing that it's not a hard and fast science... and the levels are broad enough that you don't have to be too specific about it generally (TAS).*

### **B.9.4 Scenarios and modelling**

Many participants support the wider use of quantitatively based approaches in the risk assessment process. This support is partially based on experiences with or perceptions of modelling that is currently been done and the need to incorporate modelling into scenario-based planning.

*I think for us, it's essentially been superseded by some of the modelling that's being used or it's starting to be used more widely across the states to model fire (SA).*

*...the new modelling approach that a lot of States are taking, Victoria and New South Wales is particularly strong (SA).*

*...looking at the existing version of NERAG, there's only two mentions of the word forecast and no mentions of projections. So, I think that needs a stronger focus, the use of forecasts or simulated outcomes under different scenarios (VIC).*

Some participants express strong support for NERAG to provide advice on the use of scenarios to address complex and systemic risk.

*... centring NERAG around scenarios. You can have scenarios (with) multiple interlinking hazards, or you could even have concurrent hazards and how you deal with that. It stimulates adaptive learning through discussion and ...workshops ... (TAS).*

*... scenario planning is missing from NERAG currently. And I think that is needed particularly for more complex risks or, large scale risks and that goes to systemic risk (VIC).*

*It puts ... too much weight on historical reference points which aren't necessarily useful, knowing what we know (VIC).*

Scenario planning workshops are cited as effectively facilitating active learning

*There were quite a few times where people were thinking through problems, and through the discussions around workshop tables, resolved issues or brought up completely new issues. And sometimes where the risk treatment didn't make it to the report because it was resolved through those discussions (TAS).*

Some participants suggest an appendix to NERAG could incorporate or support a more quantitative approach.

*There will be cases where a simple qualitative assessment is adequate but where possible, we certainly would like to have more quantitative assessments. It would be good as part of perhaps, a companion document (to NERAG), to say, 'here are some alternate ways other than a qualitative risk matrix to assess risk' and then some examples of that perhaps (SA).*

## B.10 Values in decision-making

- i. Transparently incorporate values, vulnerability, and social justice into risk assessment and risk management decision-making.
- ii. Open the process of risk assessment to enable community input of knowledge, values and priorities.

### B.10.1 Values

Many participants support a strong focus on community values in the process of assessing risk and believe that NERAG needs improving to facilitate this.

*...a comprehensive risk assessment should include (values) in developing your risk evaluation criteria. What are the values of the community? What's important to that community that you need that risk treatment for? (NSW).*

*...risk assessment, it really focuses on what is your value and want to protect? And communities often have very different views on what those priorities might be ... (TAS).*

*it's a no-brainer that you need to include what the community values... but maybe the application might need some work. (NSW)*

*I think a lot more guidance on that value piece is going to be more important to facilitate conversations with communities (VIC).*

*... giving that sort of guidance is really invaluable because ultimately, risk assessment should be about what people are worried about (QLD).*

*What is the community value? ... what are risks to those values. ... the more data you put in those values, the more you drag out, the better your risk assessment would be, the more dependencies you'll identify and the consequences (VIC).*

*NERAG is quite rigid in its definition of consequence. So, you're not able to really account for the full range of things that an affected community might be concerned about or might think are important (WA).*

A few participants are uncertain whether NERAG should or can provide detailed guidance on community values.

*I think ... the finer detail of how you do that is probably out of scope, but highlighting the importance is, especially as we're facing, ... not just emergency risk, but we're also trying to encourage the building of resilience (TAS).*

*...there's a lot of complex issues that I don't know how NERAG can help with, but it might be useful to have some guidelines or just some general concepts around (values) (TAS).*

*NERAG's approach is saying communities should be consulted, but it's limited and ... not including necessarily knowledge and values, and the priorities of the community (NSW).*

*At a minimum, (NERAG) needs to address the values ... broad statements about how we are treating them... the context needs to be stated upfront and quite clear (SA).*

Many participants recognise that community values may conflict with experts' values and priorities, but that community values need to be revealed, understood, and reflected in risk assessments and decision making.

*...we can always look at our (expert) values ... and whether they're reflecting community values, or whether they're ... the views of people who work in this space ... interpreting community values. I think it's worthwhile to check in, especially in a local context. There could be more about that in NERAG (VIC).*

*...there are some great on-paper mitigations that communities outright reject because it affects things like their amenities. ... if the community loses something they value ... to put a levy that's eight-foot high and they lose their sea views ... these are where values come in and I think we can't make those decisions without those inputs (SA).*

*...some people are happy to live in a beautiful area that's heavily treed and accept that it's a fire risk. As long as we're communicating that, well, I think we need to be accepting of (their priorities) but that needs to be part of the discussion and the evaluation around the table (SA).*

*I think it's challenging that NERAG ... doesn't really account for communities that wish to accept some risk (WA).*

Many participants see the community as a key source of information and perspectives, especially in informing assessments of consequence, that are not otherwise fully considered or accessible.

*There's certainly a lot of intelligence in the community that may not filter its way to government (NSW).*

*Values are essential, because how are you going to stratify some of the consequences when you start looking at some of those other domains such as the cultural side or the social value or the environment. ... how you cut those things, without having the broader owners ... or those impacted ...having some input into the consequences (TAS).*

*...community consultation on the bushfire recovery...really did inform how we understood the risks on the ground. ... just the learning, it really, challenged what were (our) standard responses (QLD).*

*... some of this is for technical specialists to work out probability and likelihood. Consequence requires a lot more input from the people who are going to be affected (VIC).*

*If NERAG is going to contain a schema that encourages (experts)...to determine the level of consequence or of how bad a particular scenario might play out, you can't separate that from the values of the community ... because they determine ... what's important and what's not (WA).*

A few participants feel that NERAG adequately addresses the consideration of values in risk assessments.

*I think the framework is broad enough. So, if you're developing valuation criteria or risk criteria framework or identifying your stakeholders ... it enables that (NSW).*

*... the consequences described in NERAG are really all about what we value. ... life, human health, prosperous economies, heritage culture ... it's really underpinning the context of a community assessment ... it's really, that's what underpins NERAG (VIC).*

*as we went into the pandemic, we suddenly realized that we quite value having social connections .... we had to make some assumptions, but we built those around, ... those five NERAG categories (that) pretty much cover off on things that we actually value (TAS).*

A few participants feel that value search should not be a key element of NERAG's risk assessment framework.

*...but you wouldn't use NERAG risk assessment as the tool to talk about (community) priorities (SA).*

A few think that the identification of community values is most effectively pursued through the existing consultative processes of emergency agencies and local government.

*I think local governments are really well placed to do a lot of this work. We've drawn on (them) and the respective agency engagement activities. We ... draw on the extensive internal engagement that we do with our communities at the local level (and on) agency-specific engagement activities. We saw that as the opportunity without having to go out and do our own specific engagement ... (NSW)*

*At a certain level, we do consider (values) but it's up to risk people in local governments ... to tell us what the valuable community assets are. So, there is a sort of conduit. It's not us going straight to the communities but (values are) something that we do consider (QLD).*

Some participants want NERAG to provide guidance on how community stakeholders can readily communicate their values and priorities without becoming bogged down in more technical aspects of the risk assessment process.

*I think there's a piece there about helping guide people through the ... process and making sure that people you're inviting actually have valuable information and data to provide, as well as (views on) how this is going to affect people (VIC).*

*It's important to know what community values are, what their priorities are ...for their voice to be heard, the values to be represented in the risk assessment but not by them sitting there for four hours with the rest of us (SA).*

*...because we say disaster resilience is everybody's business, and everyone needs to be aware ... and reduce their risk where they can and incorporate it in their everyday plans and actions, ...engaging people ... making it a process they can relate to...is important.... that hopefully NERAG can facilitate (TAS).*

### **B.10.2 Social justice**

There is considerable support amongst participants for risk assessment to take account of social justice in the decision-making process. They cited compelling examples in the community and local government that supported the need to consider social justice in assessing risk.

*...social justice and vulnerability, I'd say are interconnected...so all should be considered as part of your risk assessment (NSW).*

*I think that everyone's aware that disasters can reinforce social inequalities. So, I think the NERAG .... should consider...Community and Culture, how people sort of fit together (TAS).*

*...a lot of low socio-economic communities live in caravan parks because ... they can't afford housing. Those caravan parks are built on the low parts of the floodplain, that ... are more vulnerable to flood, for example, than other communities. (NSW).*

*...given Queensland's got a lot of indigenous councils. I think that... it's absolutely vital for us to include the social justice and equity aspect in there. ... we're really trying to inject ... equity into our approach in terms of support (QLD).*

### **B.10.3 Vulnerability**

Many participants identify NERAG's lack of explicit consideration of vulnerability as a major shortcoming and a clear need to be addressed in improving its guidance.

*...if you look at the vulnerability statement ...and the various national frameworks ... have all identified vulnerability. I think ... all of us in the industry have known for years and years that we need to do that... NERAG must be consistent with that (NSW).*

*one of the issues that isn't captured in NERAG particularly well is ... vulnerability. It's reasonably standard and common within the disaster risk reduction world to consider that risk is a function of your hazard, your exposure and your vulnerability and the only way really to reduce risk is to reduce those three aspects... Your biggest bang for buck is on controlling your vulnerability. ...having vulnerability part of your core concept in terms of understanding risk (QLD).*

*the lack of emphasis on vulnerability, in my opinion makes it ... a very physical systems emphasis and of course vulnerability in urban systems has a lot to do with people and, in my opinion, we tend to forget them as the owner at risk... (VIC).*

Many participants refer to the international context and want to see the NERAG guidance reflect international directions including the Sendai Framework and the UN's most recent global assessment report.

*We've tended to adopt the approach from the United Nations Disaster Risk Reduction Framework where we're looking at hazard exposure and vulnerability and the function of those establishing risk (WA).*

*The international space is very much shifting to vulnerability and working within the Sendai framework. To consider exposure and vulnerability... much more towards impacts and risks than solely focusing on consequence statements which is where NERAG tends to take us (VIC).*

*...the standard ... through the Sendai Framework and the Disaster Risk Reduction Framework has been adopted. ... understanding disaster risk and that'll be talking about hazard exposure and vulnerability, not likelihood and consequence (WA).*

Some participants suggest that NERAG needs to take a broad view of vulnerability that includes social, economic and physical spheres.

*...the vulnerabilities of infrastructure and network systems and transport infrastructure and communities moving in and around during emergencies and natural hazards is important. ... not just in a static way that this community has got this sort of demographic, so they've got a vulnerability, but also in a dynamic way... (NSW).*

*...it's one of the primary variables we have, to ameliorate risk. It aligns across social, economic, physical vulnerability. It can be used to describe a whole bunch of things and a common language (QLD).*

*From a systemic risk perspective when considering the provision of essential services, I think the vulnerability aspect will force owner operators of infrastructure to reconsider just applying a likelihood in isolation to order of magnitude...(VIC).*

*NERAG's risk statement ties to the consequence, which are too high level and ...quite often push us into response and recovery treatments versus vulnerabilities which can push us into prevention and preparedness treatments (WA).*

However, a few participants are unsure whether NERAG should provide guidance on vulnerability beyond its current approach.

*I'm not sure if we're clear on what vulnerability means or how ... (people) are going to understand...So, some better guidance about how we transition some of the information available to us into the system would be useful (NSW).*

*Some people, as part of their likelihood, will consider vulnerability because it impacts on what the likelihood is. Others will call it out as two separate issues, so really depends on where you sit in that (VIC).*

## **B.11 Collaboration**

- i. Fully and transparently collaborate with communities to build trust.
- ii. Establish open collaboration and communication with all stakeholders, across all domains including in relation to objectives, goals, priorities, decision criteria and resource allocation in risk assessment and decision-making.

### **B.11.1 Collaboration**

Many participants recognise the importance of collaborating with stakeholders and see it as an integral part of their in the risk assessment process and feel that detailed guidance from NERAG is unnecessary.

*...it's ingrained that we consult with the stakeholders ...their opinions, their perceptions of risk, their strategies in place, because they'll be responding with us. So, we've got that already (QLD).*

*...we wouldn't refer to NERAG for collaboration. There are different ways we do that... MOUs with other councils, with SES, other agencies. It's a given that we collaborate with all of them... (TAS)*

*...give us some tips and guidance, but not let's get too prescriptive...let's not get too much into a recipe on the ingredient level (TAS).*

Many participants believe that NERAG provides appropriate guidance on collaboration with stakeholders.

*I think NERAG covers it... to do the risk assessment in the first place (NSW).*

*NERAG's guidance works really well... bringing the right expertise into the room (NSW).*

*I think highlighting collaboration the way that NERAG does at the moment is appropriate. I think it's an adequate level (QLD).*

*NERAG... does have a big focus on collaboration and not making decisions in isolation or doing assessments or analysis in isolation (VIC).*

*...it is extremely useful ... makes sure you consider who are the relevant stakeholders to get around the table...promoting the conversation between stakeholders, making people aware of the risks, and really thinking through the broader impacts (QLD).*

However, a few participants cited examples where NERAG guidance on collaboration does not work well or needs to be improved. Shortcomings arise out of interactions between government and the private sector, between levels of government, due to legislative constraints and failure to account for systemic risk.

*I think an important part NERAG ... which has quite a strong section on ...who your stakeholders are, consult with them, all that kind of stuff. And I think that section needs to be really, really strong for risk assessment. And it's certainly an area that should be scoped for improvement (TAS).*

*I've seen NERAG fail in an infrastructure setting where you've got a government business enterprise interfaced with private entities. Collaboration doesn't necessarily happen because of the pace at which these entities are operating. Assessments are done largely internally and there's no case study information or formal structure to support that collaborative effort more broadly (VIC).*

*I think NERAG is limited by the way the planning process must consider collaboration (WA).*

*NERAG provides a good framework for encouraging us to collaborate for an individual risk assessment. However, it doesn't encourage us to collaborate across the levels of risks. So, there's no need for us to collaborate up from a local level to a district level to a state level to a federal level. The challenge with the framework*



*means that we don't always have the whole picture by the time risk assessment is done at the state or national level (WA).*

*...if we recognise the systemic nature of the risk then your collaboration network should be broader, wider, and possibly, vertically integrated (WA).*

### **B.11.2 Community involvement**

Many participants see NERAG's guidance on consultation with the community as needing improvement by reconsidering the purpose of community consultation and by broadening NERAG's guidance on consultation to consider vulnerability and impact.

*...if we need to engage community in this process then there are questions ... is this the right process? For what ends would we be doing that? Are we asking them to come in as a subject matter expert? (TAS).*

*...the collaboration principle says to partner with communities to support action including developing alternatives and identify preferred solutions ... but shouldn't collaboration be also around hazards and vulnerabilities? (NSW)*

*it is extremely useful and is about facilitating the conversation and making people aware of the risks and really thinking through the broader impacts (SA).*

Many participants want NERAG to ensure that community is consulted appropriately, including involving them in deliberations in which they can productively contribute and not subjecting them to unnecessary technical language or discussion.

*I think it would be ... beyond cruel to put community members through four hours of dry risk assessments (SA).*

*...we shouldn't be communicating one in a hundred events to community. We shouldn't be using the words 'it's a rare event'. Rare events are frequent. ...it's a practitioner language, not a community tool for engaging with community (SA).*

*We shouldn't be asking them to take all of this technical information in a workshop and go away and work out what they're going to do with it? That's not engaging with community and is not useful for community. Please, let's not go down that path (TAS).*

Striking this balance in a way that doesn't exclude appropriate community involvement may be a challenge. Participants want NERAG to provide guidance on striking that balance, and approaches that could be considered.

*...identifying which risks need to be referred to expert panels for consideration around consequences and impacts and so on, and then being transparent in the process and*

*taking that information back to the communities that are likely to be affected. I think NERAG could give guidance on how to do that (VIC).*

*...if we are going to the community trying to get simple ideas across so that they can make an informed decision ... having a pretty simple framework, and lots of case studies at different levels ... seems to really make a lot of sense (VIC).*

However, some participants feel that the involvement of the community may need to be limited because the outcomes are not informative.

*There's an acknowledgement (in NERAG) that it needs to happen, but engagement is a full-time job. So, I guess it's only as good as the user applying resources to that process (NSW).*

*... we invite them to everything, which is nice. Good morning teas. And what you get is, the loudest voice in the room that then gets heard (VIC).*

*...(you'll) not necessary want to follow NERAG all the time where one of the principles is inclusiveness. For example, how do you include everyone in the community knowing that somebody's not going to like (the decision) (VIC).*

## B.12 Disaster risk knowledge and information

- i. Create, capture, and equitably share disaster risk knowledge and information with all stakeholders to support collaboration and trust.
- ii. Identify data needs and resource gaps.
- iii. Promote discussion and broader understanding of how responsibility for disaster risk is shared.
- iv. Address risk transfer.

### B.12.1 Importance of knowledge and data

Many participants see access to current, reliable data as central to credible and replicable risk assessments. They strongly support greater guidance through NERAG to promote a data driven approach; and improve access to, and coordination of knowledge and data used in the process.

*...we should be able to use best available knowledge to underpin our decision making to build our level of confidence... in the rigor of the risk assessment and ... prioritization of that risk, rather than all just being lumped in priority one because we don't have great confidence in the data (SA).*

*...it's about having data and the methodology in support, so it is repeatable next time and it's not ... having (to rely on) the same stakeholders being in the room to get the results (VIC).*

*...the strength of the consequence category for us was dependent on access to data sets. We had access to some data, but it was very challenging to get an acceptable amount of data to strengthen that particular part of the process. So, if we could have ... better access to data through a common avenue that would be of great benefit (NSW).*

*the framework of consequence and likelihood... is always very hard to assess because if you haven't got lots of good data ... So, that's about data collection but how do we aggregate, compare, and look at the time sequences of risk? It's a gap ...in NERAG (SA).*

*...mentioning that you need to have that data driven or, you know, science backed decision making is really important (QLD).*

NERAG is not seen as facilitating the collection and assimilation of current data that reflects climate change, seen as central to producing meaningful risk assessments

*...in the evolving situation with natural hazards in the current environment... in terms of that data set...how often do you have the opportunity to update it (NSW).*

*I guess from a climate change risk assessment perspective, some considerations would be around having the most up to date downscale climate projections for the region that you are conducting the assessment in (SA).*

*It puts too much weight on historical reference points which aren't necessarily useful... if you're looking historically, it's not going to be a defensible approach under the climate change scenarios we're dealing with now (VIC).*

*... the changing situation ... climate and natural hazards. Environment ... is on the move. Is that going to change your probability outcomes? Is that going to change a whole bunch of things in that space? The answer is yes, probably. Then how quickly can we get that new information into that data set (NSW).*

Some participants want NERAG to provide guidance on what data should be used, and how different types and levels of data can be appropriately harnessed at different points in the risk assessment process.

*...as we're driving towards being more data-driven ...in a long transition process to get there ... having some frameworks around how we deal with hybrid methods... where there are data gaps ... quantitative/qualitative ... there's definitely room for guidance around that (NSW).*

*...we often don't know what data we're seeking because we're not quite sure what question we're asking at the time. It's a big ask, but it would be good to have some guidance (from) NERAG that helps to understand what data can be used at what points along the process (NSW).*

A few participants are unsure whether NERAG should have a role in relation to knowledge and data.

*I don't know whether you need to put a stronger emphasis on having better data or that's a separate process to the actual NERAG methodology (SA).*

*There are lots of areas (where) there is a lack of data, and you just have to accept that. I don't think NERAG should... put people off starting the risk assessment process just because you don't have appropriate data... (SA).*

*It's really about how you collect and store that data ... I think it would take some focus from what NERAG is. Some general statements around those things but it shouldn't be a data dictionary ... it would take away from the focus of NERAG (WA).*

*It's important to determine exactly whether (NERAG) is a tool or ... a framework. If it's a tool, organizations can develop their own way to share knowledge and to create and store data outside of the tool. If it's in a framework approach or guideline, then maybe it does need to be considered (WA).*

A few participants worry that changes to NERAG's approach would require changes to existing risk assessments demanding additional resources and data.

*...we've got a dedicated position in the emergency planning role, and it took a significant amount of work to produce a revised local emergency risk assessment based on the revised guidelines (NSW).*

*... if there's a wholesale change to NERAG we have to adapt to a new framework, and then we've got to transition the data or figure out where data goes, where it doesn't go, what can contribute and what can't. That will become a problem for us and particularly at the State level (WA).*

### **B.12.2 Sharing**

Many participants want NERAG to provide guidance on knowledge and data sharing and to facilitate greater sharing including ways to ensure data accessibility, quality, and security.

*The sharing of information is really what it's all about because no one group, or certainly not one individual has all the knowledge or even anywhere close to it. It is about bringing those areas of expertise together (TAS).*

*My concern is, where is all that information going to end up and how will it be shared because we all need that knowledge to help us. ...I guess it's something that really needs to be looked at, where is this information going to be available? (SA).*

*NERAG ...needs to be able to address how we share data. ... that's part of what the NERAG framework actually needs to consider setting at a Commonwealth level (WA).*

*I would see the NERAG guideline itself actually try to talk specifically about data. You know, like, for instance, pointing to specific agencies with specific data sets (QLD).*

*We're working on an online platform that captures all those data and ... from our point of view, there's a coordination role (for NERAG) which is of real value ... (QLD).*

*...having ...a database or knowledge hub where you can find information from reputable national or international sources might be a good supporting tool as opposed to having to go trolling ...to try to find ... the latest research findings coming out of CSIRO or the various other think tanks ... the U.S. weather bodies and geological societies... (TAS).*

*There's an opportunity to coordinate information and data providers, creators, users across Australia and try and get these capabilities more widely known and used. Having a standard way of capturing risk information would be really useful across the country (QLD).*

*I'd like to think that NERAG can really emphasize that we do need to share as much as possible. That should be the default position. And then we just take out whatever specific security issues there are rather than go the other way (TAS).*

*...how do we come up with this sort of data standard so we can interoperate? (QLD).*

*...have some kind of minimum data standards, that will be shared so that we can potentially apply consistent risk assessments across the state (SA).*

Participants from several jurisdictions mention current cooperative information sharing.

*WA is partnering with Queensland, Victoria, and Tasmania ...looking at how we align our frameworks towards building a shared risk information portal to address the Royal Commission's recommendations into a shared perspective of risk information ... having a tool so we can build risk information from a local level up to a state and national level and have a mechanism to easily share that information across government agencies and support agencies (WA).*

*...the AIDR Knowledge Hub ...is a way of guiding people ... through the process. Even just having examples that agencies have applied and downloading that to the Knowledge Hub... It's nice to have some credible work examples that can guide your thinking a little bit (WA).*

NERAG is seen as having a role in coordinating knowledge generated through agency's consideration of lessons learned.

*Having a standard for lessons management but then having a way of capturing that from across the Commonwealth would be useful (QLD)*

*I think convening groups to discuss this sort of stuff because it may be that there is a desire to access our lessons management (QLD).*

Some participants think NERAG should facilitate a community of practice.

*what I think would be really good is ... a community of practice around risk assessment. Not necessarily having it ... centralized in one place but recognizing that it is an ecosystem ... driven by multiple different parties (QLD).*

*...create a network of practitioners who can think... 'I'll give her a call, or she did a project that's actually quite relevant. ...NERAG building that might be another way of imagining knowledge sharing (WA).*

*...there's a lot of providers out there. It would be good to convene them together to have discussions around, you know, what capabilities are actually out there? (QLD).*

*It's a lot more value for us to have ... discussions rather than having stuff written down that just sits there and doesn't get implemented (QLD).*

## B.13 Mitigation and treatment

- i. Consider risk reduction/mitigation/investment as integral to informing the risk assessment process.
- ii. Identify priorities for and invest in mitigating/treating disaster risks.
- iii. Enable locally informed risk mitigation investment decisions that account for local characteristics.
- iv. Empower communities, individuals, and business to make informed risk reduction investments.

Many participants say that NERAG does not provide adequate guidance for mitigation or treatment decisions.

*I think it gives a very broad, qualitative picture, but it actually doesn't provide a pathway to investment decisions (NSW).*

*Effectively, what that gives you is a ranking of the risks. It gives you a risk prioritization... the risk assessment sits by itself (QLD).*

*...the risk treatment section (of NERAG) is quite short ...and the actual integration into the process of risk assessment is limited... and there's no further guidance (NSW).*

*...the NERAG is written for risk assessment and the mitigation has just been tacked on to it afterwards. There is not a lot of detail... (SA).*

One participant says that NERAG fails to address the treatment of multiple and complex risks.

*... it works fine if it's just one hazard. When you do the control assessment and the risk assessment based on the controls for that hazard risk you rate it accordingly. But when you add those complexities with the confidence or the control rating ... when you need to assess that, that's where the complexities arise ... assessing the control ratings one on one and then in association with the risk, then you add another layer which is another hazard, or another event and they have their own controls. ...how they interact with each other. So, there's more complexities as we go (SA).*

Some participants believe that NERAG should address risk treatment in greater depth.

*... what's the point of assessing risk if you don't know how you're going to be able to reduce it in the end? (NSW).*

*...you do a risk assessment and then what's the treatment or the mitigation and how do you evaluate that? It's quite light on in those areas and I think that there's opportunity for improvement (SA).*

*I think it's good (for NERAG) to provide guidance on treatments...it should be part of it (QLD).*

*... we should be focusing on where mitigation options are and how we reduce these risks. It would be helpful to the sector to provide guidance on that. ... highlighting a part of NERAG that I think could be improved (VIC).*

*...treatment is an integral part of vulnerability and vulnerability affects risk. So how ... existing treatments ...impact vulnerability is important (NSW).*

*NERAG should consider at least case studies or some examples of best practice in treatments. Like you've got some companion documents there now. It sets the context and the implementation that will be useful. You don't have to be prescriptive but certainly some guidance around what's been used elsewhere or how you could tackle certain issues (SA).*

*...what you want to avoid is arbitrariness ... and if you provide really good guidance on how to prioritize treatments... the effectiveness of treatments ... estimate how much a treatment reduces disaster risk. I think that's powerful. Guidance...should be in there. (QLD).*

*... the guidelines about determining the confidence in treatments is good but I think if it can be expanded ... to assess whether the risk has been treated or not, whether the treatments are effective and ... what's the residual risk. A bit more direction in that space (WA).*

*...risk treatment... there's like one or two pages. ... it's not quite enough. It'd be really good to have some focus on ... we identified the risks, and we've evaluated them. How do we act on that? What does the risk management plan look like? Who do we need to talk to? (SA).*

Some participants suggest that it is difficult or inappropriate for NERAG to provide guidance on treatments because decisions are made outside the agency assessing the risk and are very often highly context, or politically based decisions. A few participants suggest that NERAG could address risk assessments being incorporated into risk registers which are used to guide treatment decision-making including prioritization and funding.

*...when you're talking about the treatments ... who's holding the money, what are the priorities in the organization? So, it fits into those kinds of processes (TAS).*

*There is...hope ... that once you've uncovered a risk, that there will be a political appetite to treat it. Many practitioners have tripped over that point and are quite disappointed at the lack of appetite, after you do the risk assessment, to actually address it (SA).*

*I would have thought that was highly context dependent. So, it'd be hard to provide generalized advice (WA).*

*NERAG complements our own risk assessment process ...and review what is currently in our risk register. ... and looking at our risk treatment plans...(TAS).*

*... the whole point of doing the risk assessment is to fix problems. Knowing the problems but not doing anything is the biggest problem we are having after a decade of having these risk assessments. It's because the ownership of the risk is different to ownership of the mitigation work and there might be multiple people involved with mitigation which is quite complex. With shrinking funding and resourcing, it's challenging as it is. So, if NERAG could help in any way to assist in the mitigation question (SA).*



# Endnotes

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- <sup>i</sup> <https://www.ecmcfoundation.org/news/2020/lessons-learned-on-pivoting-to-online-focus-groups-amid-the-covid-19-pandemic>
- <sup>ii</sup> Royal Commission into National Natural Disaster Arrangements 2020
- <sup>iii</sup> UNDRR 2019, Global Assessment of Risk, GAR Distilled
- <sup>iv</sup> Standards Australia, AS/NZS ISO 31000:2009 Risk management – principles and guidelines
- <sup>v</sup> Australian Disaster Resilience Handbook 10: National Emergency Risk Assessment Guidelines, 2015, Australian Institute for Disaster Resilience CC BY-NC, p. 86
- <sup>vi</sup> National Emergency Management Committee 2011, National Strategy for Disaster Resilience, Canberra
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- <sup>viii</sup> Australian Government, Department of Home Affairs. 2019. Climate and Disaster Risk: what they are, why they matter and how to consider them in decision making. 1 Introduction p.6
- <sup>ix</sup> Australian Government, Department of Home Affairs. 2019. Climate and Disaster Risk: what they are, why they matter and how to consider them in decision making. 1 Introduction p.6
- <sup>x</sup> Adapted from Figure 2: Schematic of the iterative and adaptive decision-making and learning steps involved in assessing and managing climate and disaster risks. p. 10
- <sup>xi</sup> Australian Government, Department of Home Affairs. 2019. Climate and Disaster Risk: What they are, why they matter and how to consider them in decision making. 2 Guidance on Governance
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- <sup>xvi</sup> UNDRR 2015
- <sup>xvii</sup> United Nations Office for Disaster Risk Reduction (UNDRR).
- <sup>xviii</sup> Systemic Disaster Risk (AIDR, 2021) p. 8
- <sup>xix</sup> Adapted from Systemic Disaster Risk (AIDR, 2021)
- <sup>xx</sup> Systemic Disaster Risk (AIDR, 2021) p. 8
- <sup>xxi</sup> Systemic Disaster Risk (AIDR, 2021) p. 18
- <sup>xxii</sup> Systemic Disaster Risk (AIDR, 2021) p. 18
- <sup>xxiii</sup> O'Brien, K., & Sygna, L. (2013). Responding to climate change: the three spheres of transformation. Proceedings of transformation in a changing climate, 16, 23.
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- <sup>xxxii</sup> Adapted from Figure 2: Schematic of the iterative and adaptive decision-making and learning steps involved in assessing and managing climate and disaster risks. p. 10
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