Toolkit for Assessing Disaster Resilience for Aged Care Facilities

Version 1.0
June 2020

Flinders University | Torrens Resilience Institute

Government of South Australia

DISASTER RESILIENT AUSTRALIA

Acknowledgments

This project was funded under the Natural Disaster Resilience Program (NDRP) by the South Australian State Government and the Commonwealth Department of Home Affairs (NDRP-1517-27).

The Community Disaster Resilience Scorecard Toolkit **https://www.flinders.edu.au/torrens-resilience-institute/resources** is acknowledged as the foundation for this document. The Community Scorecard was produced by the Torrens Resilience Institute with funding provided by the Attorney-General's Department through the National Emergency Management Program (NP1112-0015 and NP1314-018).

Hazard-specific scenarios are included in the document. These were obtained from the Australian Red Cross in South Australia at the time of writing. The scenarios were developed as part of a NDRP-funded project undertaken by the Australian Red Cross to build the resilience of Community Service Organisations in South Australia.

The project team would like to acknowledge everyone who participated for their time, expertise and feedback involved in the development of the Aged Care Disaster Resilience Scorecard.

In the spirit of reconciliation, this document acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples today.

Disclaimer

The Aged Care Disaster Resilience Scorecard is intended as a general guide only. Use of this tool does not constitute external assurance of the organisation's resilience capability, nor does it constitute compliance with any benchmark. The reliability of any assessment or evaluation based on this Toolkit's content is a matter for independent judgment of users. Users should seek professional advice as to their specific risks and needs.

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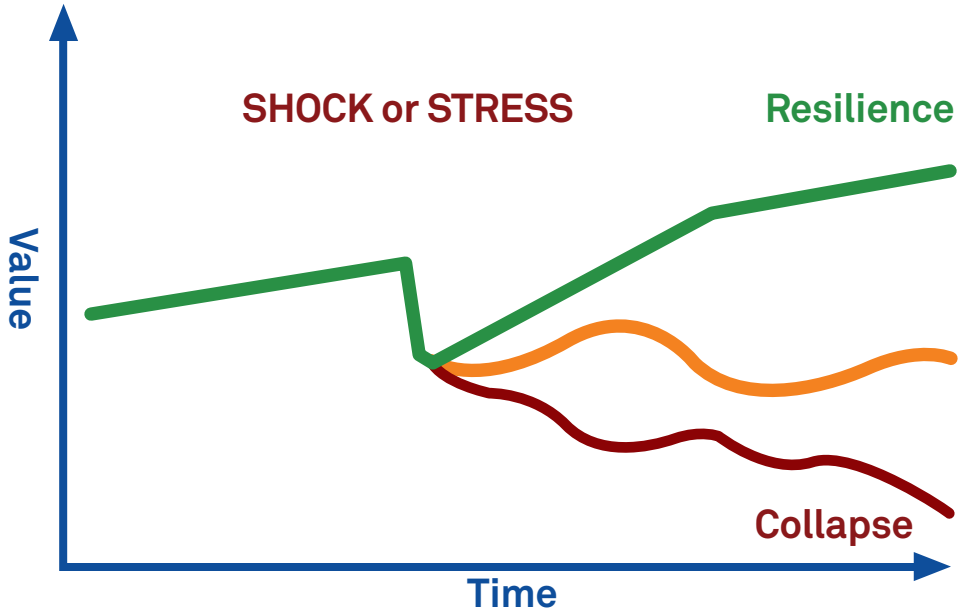
Contents

Defining Disaster Resilience

Disruptive events such as bushfires, floods, earthquakes and severe weather events are inevitable, unpredictable to a large extent and can significantly impact organisations, communities, and the economy.

Governments, businesses, not-for-profit organisations, aged care providers, communities, households and individuals all have a role to play to be prepared and to improve their resilience.

Disaster resilience is about reducing the impact of disruptive events or emergencies, learning and improving. Disaster resilient organisations are those that can continue to provide services to people despite the crisis while protecting the well-being of staff, clients and volunteers.



Source: "Community Disaster Resilience Scorecard Toolkit" – Torrens Resilience Institute, 2012.

Disaster resilience can be defined in many ways, but four important components to consider are shown below. Improving these components will enhance your organisation or facility's overall resilience.

Source: "Community Disaster Resilience Scorecard Toolkit" – Torrens Resilience Institute, 2012.

In simple terms resilience is the ability to recover readily from adversity.

In an organisation this can mean working together to:

- Function and sustain critical systems, even under stress;
- Adapt to changes in the physical, social or economic environment;
- Be self-reliant if external resources are limited or cut off; and,
- Learn from experience to improve over time.

Assessing Disaster Resilience using a Scorecard

If you have picked up this document, you are interested in improving the resilience of your workplace. You can be a manager overseeing many aged care facilities, or you may be responsible for one or two.

It is not possible to plan and make improvements to your preparedness without knowing your starting point. A practical and easy way to assess where you are at can be instrumental in identifying how you can go about improving your resilience.

This Toolkit comprises a Scorecard, guidelines on how to use it, as well as other resources. The Toolkit provides a set of tools that will assist you in assessing the resilience of your aged care facility to disruptive events.

Use of these tools will promote discussion about the key aspects of resilience for your organisation. This will help you to understand your own and your colleagues' understanding and knowledge of the four resilience components outlined.

An assessment using the Scorecard in the Toolkit will provide you with a point-in-time snapshot of how resilient your facility is to disruptive events. This will help you recognise areas for improvement. Taking action in these areas will help to enhance resilience.

You can repeat the scoring exercise at regular intervals to track your progress over time and identify new areas needing attention.

If you have more than one facility you are taking care of, a useful approach is to apply the Toolkit individually for each facility and then combine the learnings you have come to at a corporate level. This will mean that you are able to address resilience components at all levels in your organisation.

This Toolkit provides a pragmatic approach to assess resilience **at the individual facility level.**

Please note:

This Toolkit is not designed for assessing resilience of clients residing in independent living units or who receive home care, although aspects found in the Toolkit can be applied to these settings.

There are other tools or scorecards that can be used on an individual level.

One example is the Torrens Resilience Institute's Household Resilience Toolkit which provides any community-based organisation (e.g., community service organisation or community clubs) with the materials necessary to stimulate conversation about disaster resilience and provide useful information to members of potentially vulnerable households. **https://www.flinders.edu.au/torrens-resilience-institute/resources**

The Australian Red Cross RediPlan is also a valuable resource for individuals preparing for emergencies and may be useful to organisations in assisting those coordinating an emergency response to better prepare on a personal level. This guide offers advice for people in how to prepare for an emergency at home and within the broader community, how to manage stressful thoughts and feelings during and after an emergency, as well as encouraging planning and action before an event to ensure that people are as prepared as they can be.

https://www.redcross.org.au/getmedia/eb80a653-73ff-4d87-9034-ea1d874c54c5/2017-03-06-RediPlan-Comprehensive-Guide.pdf.aspx

The Toolkit

1. Using the Scorecard

The Toolkit for Assessing Disaster Resilience in Aged Care Facilities consists of the following:

1. **Guidelines** and **advice** on how to use the Scorecard, i.e.,
   - Who should be included and the timing of the assessment
   - The scoring process and sources of information that can be used
   - What to do after the scoring exercise
2. **The Scorecard** which assesses four components of resilience:
   - Risk and vulnerability
   - Planning and procedures
   - Available resources
   - Community connectedness
3. **A Facility Vulnerability Assessment** document, which can be used by the buildings manager before the scoring exercise.
4. **Scenarios** that can be used in exercises to prepare for disruptive events, thereby building organisational resilience.

In this document you will also find the following Appendices:

- **Hazard specific information** to improve understanding of the potential impact of Earthquakes, Floods, and Bushfires.
- **Useful information** about the history of the Scorecard and where to find additional information to better assess risks and to improve resilience.
- **A Glossary** with terms often used in the disaster field.

Overview of the Scoring exercise

1. Decide to assess your facility's resilience.
2. Choose who will take part in the assessment.
3. Organise a meeting at a time and place that is convenient.
4. Work through the Scorecard to identify areas to be addressed.
5. Determine a way forward with specific actions.
6. Carry out assigned tasks.
7. Re-assess resilience after 12-18 months.

Remember!

The process of completing the scoring exercise is more important than the actual score that is reached. Bringing people together to build understanding and connection and agreeing about priorities are key first steps towards building resilience!

Who should participate in the scoring exercise?

The first step is to identify the staff who could provide practical insights into the resilience of your facility. You could include any relevant staff members with experience in administration, operations, maintenance, and development of the facility, as well as staff involved in the care of residents.

People to consider include: the chief executive officer, the executive service manager, the procurement and maintenance officer, the nursing manager, the occupational health and safety officer, the buildings manager, etc.

1. Using the Scorecard

How do we go about doing the scoring exercise?

Once you have identified the people involved, you can organise a meeting to work through the Scorecard to assess the resilience of your facility. It works best if the meeting takes the form of a group discussion with negotiation to reach consensus where views differ. It usually takes at least an hour to work through the scorecard, but this depends on the nature and extent of discussions.

It is important to recognise that the scoring exercise is an opportunity to learn from each other, especially regarding different roles, expectations and knowledge. Everyone around the table should be given the opportunity to share their experience and insights. Having an assertive chairperson is a must.

How are individual items scored?

As outlined above, the Scorecard identifies four key areas or components of resilience. For each of these, there are a series of questions to be rated on a scale from 1 to 5 for each item. The areas of resilience are:

- **Risk and vulnerability**
  – What is the level of risk and vulnerability at your site?
- **Planning and procedures**
  – What procedures support your disaster planning, response and recovery?
- **Available resources**
  – What emergency planning, response and recovery resources are available in your facility?
- **Community connectedness**
  – How connected are you with your community?

When scoring, each question is scored from 1 to 5, with 5 being the highest level of resilience. It is suggested that you as a group discuss evidence, share opinions, knowledge and experiences and work to reach a consensus for each item. If there is a substantial disagreement or lack of confidence in assigning a score, then setting the score at a lower level (the less resilient level) rather than the higher one will be a more effective way of continuing to engage your organisation in strengthening resilience.

Using the summary page at the back of the Scorecard, the item scores are recorded and then added together to get a component score for each area, and these are combined for an overall total resilience score.

The scores are used to calculate percentages. If scores result in percentages of 75% or lower, the scores point to areas that need to be addressed to improve resilience.

It is suggested that careful attention be paid to each component score. If the score in one area tend to be much lower than in the other three, that aspect of resilience should probably be the highest priority for action and mitigation.

During the process of working through the Scorecard, any comments, suggestions, concerns and resulting actions can be documented for later reference. There are specific boxes to record actions that were identified.

Please note: the Scorecard results are not for anyone outside of your organisation, they are yours to use as a quality improvement and communication tool.

Where do we find the evidence to help with the scoring?

Where possible, it is suggested that evidence be used to support the scoring of questions. Group members can be tasked with collecting this information before scoring is undertaken.

For example, the buildings manager can use the Facility Vulnerability Assessment to gain information on the building stock for the facility ahead of the meeting, while another member can obtain flood maps, and yet another member can check the locations of shut-off points for gas, electricity, etc.

1. Using the Scorecard

Types of information which could be considered are listed for each question and should be supplemented with group discussion. Documents which could be useful include:

- Business Continuity Plans;
- Insurance policies;
- Building plans and building inspection reports;
- Emergency management plans or emergency protocols for your site;
- Patient records or statistical data about patients and residents (subject to confidentiality);
- Maps of your site and surrounds;
- Flood maps where available.

Comparing Scorecard assessments

If your organisation includes more than one facility, it is useful to combine the results so that you can have an overview of where the strengths and gaps are for the different sites.

It is, however, important to not compare the scores numerically.

Each scorecard exercise is an individual undertaking for a specific site and the scores will be derived at through a discussion based on subjective opinions in many instances.

It is advisable and more useful to look at which areas are in the red or amber zones for individual facilities and to look for commonalities and differences, rather than comparing specific numerical scores.

Moving forward after the Scorecard exercise

Once the Scorecard is completed, you will better understand the likely resilience of your facility (or facilities) and be able to determine which of the four components of resilience are most in need of attention.

Based on that, you can move forward by undertaking one or more of the following steps:

Combine the assessments of all relevant facilities for your organisation to get an overview (if relevant);

- Present the findings to the relevant Board or your organisation, executive team, staff, and other groups as you see fit;
- Develop a Resilience Action Plan to address the areas falling in the red or amber zones;
- Pay particular attention to any items where there was substantial disagreement on scoring levels during the Scorecard exercise;
- Decide when to repeat the Scorecard process (probably after 12-18 months).

Things to think about when moving forward

- Identify and protect what really matters;
- Focus on management culture and expectations;
- Improve situational awareness, notice small signals;
- Prepare for what you are not able to predict;
- Protect capacity and capability – don't only strengthen systems;
- Encourage trusted accountability and constructive disobedience;
- Stop seeking certainty in planning/don't over plan;
- Focus on capability to adapt and to be flexible;
- Practise moving from slow time to quick time;
- Promote autonomous self-organising systems/teams; and
- Think about worse case scenarios.

Disaster Resilience Scorecard for Aged Care Facilities

Version 1.0
June 2019

Site: _____ **Date:** _____

Present: _____

_____

2. Disaster Resilience Scorecard for Aged Care Facilities

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How are individual items scored?

The Scorecard identifies four key areas or components of resilience. For each of these, there are a series of questions to be rated on a scale from 1 to 5 for each item. The areas of resilience are:

1. **Risk and vulnerability**
   – What is the level of risk and vulnerability at your site?
2. **Planning and procedures**
   – What procedures support your disaster planning, response and recovery?
3. **Available resources**
   – What emergency planning, response and recovery resources are available in your facility?
4. **Community connectedness**
   – How connected are you with your community?

- When scoring, each question is scored from 1 to 5, with 5 being the highest level of resilience.
- Discuss each question - share opinions, knowledge and experiences and work to reach a consensus score for each item.
- If there is a substantial disagreement or lack of confidence in assigning a score, then setting the score at a lower level (the less resilient level) rather than the higher one will be a more effective way of continuing to engage your organisation in strengthening resilience.

How do I make sense of the scores?

- Record each item score in the summary page at the end of the Scorecard.
- Add the relevant scores together to get a subtotal for each area of resilience.
- Combine the subtotals for an overall total resilience score.
- Calculate the percentage for each subtotal and the total score.
- Compare your percentages with the Resilience Action Table.

If scores result in percentages of 75% or lower, the scores point to areas that need to be addressed to improve resilience.

2. Disaster Resilience Scorecard for Aged Care Facilities

1. What is the level of risk and vulnerability at your site?

Question	Score					Information Resource
Is your facility at risk for a flood? Yes / No / Unknown				*If NO – mark items as Not Applicable (5)*		
1. Are you aware of any potential sources of flood risk (riverine, flash, coastal, infrastructure failure) for your site? *If available, refer to your area's Flood Impact Assessment*	**1** Not aware. Haven't checked possible sources of information	**2** Have checked possible information sources and limited information available	**3** Yes – at risk of flooding and/or isolation by more than one source, including local/historical knowledge	**4** Yes - at risk of limited flooding and/or isolation by one source of information	**5** Low flood risk confirmed by professional advice/ Not Applicable	Flood maps, local knowledge, Local council, DEWNR, SES
2. Is your facility shown as inundated or isolated on a flood map? *If available, refer to your area's Flood Impact Assessment*	**1** Not aware or no flood maps available. Inundated or isolated in a 5% AEP (one in 20-year) flood	**2** Inundated or isolated in a 2% AEP (one-in-50-year) flood	**3** Inundated or isolated in a 1% AEP (one-in-100-year) flood	**4** Inundated or isolated in a Probable Maximum Flood scenario	**5** Not inundated/not isolated on any available maps, no recorded history of flooding/Not Applicable	Flood maps, local knowledge, Local council, DEWNR, SES
3. Does the flood map for your building(s) show inundation above the ground floor level? *If available, refer to your area's Flood Impact Assessment*	**1** Not aware or no flood maps available	**2** The majority of site is shown as vulnerable to above ground floor flooding	**3** Some of site is shown as having ground floor and/ or above flooding	**4** Available flood maps show only below floor flooding	**5** No flooding shown for site/Not applicable	Flood maps
4. Is your property built with design features to minimise flooding (e.g., raised floor levels, landscape design features, including adequate drains, resilient building materials, temporary dry storage for essential items)	**1** Unknown / Property has no design features, property situated in a low lying area or close to a watercourse	**2** Property has no specific design features but is built on highest ground of the site	**3** Property is elevated from ground level	**4** Property is above 1% AEP with adequate freeboard, includes some minimising design features	**5** Property above 1% AEP with adequate freeboard; includes design features such as dry storage/Not Applicable	Facilities Manager, Building inspection
5. Does your property have any structural flood defence (e.g. levee banks, floodwalls, or access to equipment for temporary structural defence such as sandbags and filling equipment, temporary levee banks)?	**1** None of these or unknown	**2** Some defences but poorly maintained or in poor condition	**3** Can access sandbagging equipment and site has minimal defence features	**4** Flood wall and other defence features, including easy access to sand-bagging equipment	**5** Well maintained flood wall or flood barrier built to 1% AEP with freeboard, sand-bagging equipment stored on premises/ Not Applicable	Facilities Manager, Building inspection
Comments:						

2. Disaster Resilience Scorecard for Aged Care Facilities

Question	Score					Information Resource
Is your facility at risk of a bushfire? Yes / No / Unknown				*If NO – mark items as Not Applicable (5)*		
6. Are you aware of any potential bushfire risk for your property?	**1** Not aware. Haven't checked possible sources of information	**2** Have checked possible information sources and limited information available	**3** Yes – at risk of bushfire by more than one source	**4** Yes – at some risk of bushfire by one source of information	**5** Low bushfire risk confirmed by professional advice/Not applicable	Facilities Manager, Building inspection, online bushfire risk assessment tools
7. Does your organisation have a documented bushfire plan for pro-actively planning and responding to any identified bushfire threat?	**1** No plan exists	**2** A basic plan exists which has not been updated/exercised/ tested since being written	**3** A plan is in place which is occasionally updated	**4** A thorough plan is in place which is updated regularly with the system being tested through exercises/ events from time to time	**5** A thorough plan is in place which is updated at least bi-annually to reflect learnings from regular exercises/ tests/ events/Not applicable	Facilities Manager, Building inspection
8. Was this plan developed in consultation with the relevant fire fighting organisation, local council, staff, clients, family members and volunteers?	**1** No plan exists	**2** Current plan was developed by site manager with limited consultation	**3** Plan was developed in consultation with fire fighting organisation and staff	**4** Plan developed in consultation with the relevant fire fighting organisation, local council, staff, clients and family members and updated occasionally	**5** Plan developed in consultation with the relevant fire fighting organisation, local council, staff, clients, family members and volunteers and updated each season/Not applicable	Facilities Manager, Building inspection
9. Does the plan consider the roles and responsibilities in regard to monitoring fire alerts, local conditions, outsider triggers and making decisions about relocating residents or remaining on site?	**1** No plan exists	**2** Basic plan exists with responsibilities broadly outlined	**3** Plan exists and roles and responsibilities are outlined in more detail but not reviewed regularly and decision making and monitoring unclear	**4** Roles and responsibilities are outlined in detail in plan, reviewed regularly but decision making and monitoring unclear	**5** Roles and responsibilities are outlined in great detail, reviewed regularly and decision making and monitoring clearly defined/Not applicable	Facilities Manager, Building inspection
10. Do you have bushfire mitigation measures, fire control, and response equipment installed and to you regularly carry out relevant mitigation strategies?	**1** No plan exists	**2** Basic measures and equipment in place and measures carried out	**3** Some mitigation measures and procedures are in place and updated/ checked/ carried out occasionally	**4** A large number of mitigation measures and procedures are in place and updated/checked/ carried out regularly	**5** Extensive mitigation measures and procedures are in place and updated/checked/ carried out each season /Not applicable	Facilities Manager, Building inspection
Comments:						

For a detailed approach to be bushfire ready, please see "Residential Aged Care Services – Bushfire Ready Resource" which can be found at: **health.vic.gov.au/bushfire/downloads/racs_bushfire_resource.pdf**

2. Disaster Resilience Scorecard for Aged Care Facilities

Question	Score					Information Resource
Is your facility at risk of an earthquake? Yes / No / Unknown				***If NO – mark items as Not Applicable (5)***		
11. Are you aware of any potential earthquake risk (e.g. fault-line) for your site?	**1** Not aware. Haven't checked possible sources of information	**2** Have checked possible information sources and limited information available	**3** Yes – at risk of earthquake by more than one source	**4** Yes - At risk of earthquake by one source of information	**5** Low earthquake risk confirmed by professional advice/Not applicable	Facilities Manager, Building inspection
12. When was your building(s) constructed? (Relates to compliance with the current Earthquake Standard)	**1** Pre-1984 and no assessment against current code	**2** 1984-96 or assessed as 35-50% compliant to current code	**3** 1997-1998 or assessed as 50-65% compliant to current code	**4** 1999-2009 or assessed as >65% compliant to current code	**5** Built 2010 or later/Not applicable	Facilities Manager, Building inspection, Building codes/ Appendix C
Comments:						
Other risks:						
13. Do you store hazardous materials on site that might create additional risks? (medical gases, fuel, solvents etc.)	**1** Unknown / Materials on site but not identified, not secured and no actions plans	**2** Hazardous materials identified only, not secured and no action plans	**3** Hazardous materials identified and stored normally, no action plans	**4** None / Identified and well secured, no action plans	**5** None / Identified and well secured with action plans for any spills	Facilities Manager, Hazardous Material Register
Comments:						
Actions:						

2. Disaster Resilience Scorecard for Aged Care Facilities

2. What procedures support your disaster planning, response and recovery in a disaster?

Question	Score					Information Resource
14. Do you have access to information about warnings about hazards, e.g., flood or bushfire warnings via mobile apps, etc.?	**1** Don't know what warnings are relevant	**2** Some understanding of what warnings are relevant but not well understood	**3** Warnings are checked on an irregular basis and understood by a few staff	**4** Warnings are regularly checked and understood by key staff	**5** Warnings are received in advance via a number of sources including radio and internet, are followed and are understood by most staff	Bureau of Meteorology, SES, Fire authorities
Comments:						
15. Is an emergency plan and/or a Business Continuity Plan in place for your site? (e.g., to deal with loss of power, water, gas, communications, cooking or laundry facilities)?	**1** No plan(s) in place	**2** Basic plan(s) in place but not been updated/ exercised/ tested since being written	**3** Plan(s) in place and updated occasionally	**4** Thorough plan(s) in place and updated regularly with the system being tested through exercises/ events from time to time	**5** Comprehensive plans in place and updated at least bi-annually to reflect learnings from regular exercises/tests/ events	Relevant Manager
Comments:						
16. Have you had an incident, e.g., flood, storm damage, black out, fire recently?	**1** No incident / A minor incident occurred but back to normal within hours	**2** An incident occurred but no changes to processes and practices were made	**3** An incident occurred and some changes to processes and practices were made	**4** An incident occurred, staff discussed and implemented change to processes and practices	**5** An incident occurred, staff debriefed, changes to processes and practices incorporated in revised planning and exercises	Relevant Manager
Comments:						
17. Have you recorded the locations of key services and their connection and shut-off points?	**1** No	**2** Some information is provided but it needs updating	**3** Basic information on service connections is included in plans	**4** Basic information on service connections is included in plans	**5** Drawings of all services are included in plans, staff have been trained	Relevant Manager
Comments:						

2. Disaster Resilience Scorecard for Aged Care Facilities

Question	Score					Information Resource
18. What planning is in place for an evacuation/ invacuation from your site, including transport and alternative accommodation?	**1** Not currently considered in planning and reliant upon emergency assistance for evacuation, no alternative accommodation/No space for invacuation	**2** Basic Evacuation Plan in place; Informal understanding with other aged care provider(s) to give assistance with accommodation where possible/Space for invacuation	**3** Well developed Evacuation Plan in place; formal agreement exists with other aged care provider(s) to give assistance with accommodation/Safe space for invacuation	**4** Evacuation Plan in place and exercised, includes suitable transport for non-ambulatory residents; formal agreement exists with other provider(s) to give assistance with accommodation/Safe spaces for invacuation	**5** Evacuation Plan in place and exercised, includes suitable transport for non-ambulatory residents and transfer of residents' clinical information; formal agreement exists with other provider(s) to give assistance with accommodation. Arrangements have been exercised and sites in regular contact/Safe spaces for invacuation	Relevant Manager
19. Do you have a system in place to determine what proportion of residents has the capacity to independently evacuate their accommodation without physical/emergency assistance?	**1** No system in place	**2** Work underway to put a system in place	**3** An informal system is in place	**4** A formal process is in place, but is not updated regularly	**5** A formal process is in place and information is regularly reviewed and updated	Patient assessments
Comments:						
20. What communication protocols/systems are in place with relatives of residents in the event of a disaster?	**1** No system in place	**2** Staff have a basic understanding of what communication is needed	**3** Communication protocols established with some systems in place	**4** Communication systems established, multiple methods identified/ available	**5** Communication protocols established with relatives, multiple communication methods identified and exercised	Relevant Manager
Comments:						
21. How is security maintained while allowing access and egress in the event of power loss?	**1** Not currently considered in planning	**2** Key staff know what to do	**3** Basic arrangements for maintaining security are included in plans	**4** Detailed arrangements for maintaining security are included in plans	**5** Detailed arrangements for maintaining security are included in plans and have been tested	Relevant Manager
Comments:						

2. Disaster Resilience Scorecard for Aged Care Facilities

Question	Score					Information Resource
22. Are computer systems regularly backed up off site with key emergency information also kept in hard copy? (e.g., contact lists and medical details)	**1** No system in place	**2** Monthly backup onto drives on site	**3** Weekly off-site backup, hard copy contact lists updated at least every six months	**4** Half weekly off-site backup, hard copy contact lists updated monthly	**5** Daily automatic off-site backup, hard copy contact lists updated at least monthly or sooner	Relevant Manager
Comments:						
Actions:						

2. Disaster Resilience Scorecard for Aged Care Facilities

3. What emergency response and recovery resources are available to you during a disaster?

Question	Score					Information Resource
23. Do staff have access to a range of communication options (internal and external) that will allow information to flow during an emergency?	**1** No system in place	**2** Limited access to a range of communication options (e.g., mobile and landline phones)	**3** Good access to a range of communications but likelihood to work during an event is not known	**4** Has good access to a range of communication options (i.e., phones, walkie-talkies, etc) likely to work during an event	**5** Has wide range of access to communication options that are highly likely to work during an event	Self assessment, systems refer to mobile phones, walkie talkies, social media, etc
Comments:						
24. What is the level of food, water and necessary basic living goods available at your site in an emergency?	**1** Unknown / Limited supply	**2** Dependant upon external delivery of supplies	**3** Up to 2 days supply most of the time	**4** Up to 4 days supply	**5** Five days or more supply	Self assessment
25. What is the level of medical and related supplies available at your site in an emergency? (e.g., medication, oxygen, emergency medication, incontinence pads, wipes)	**1** Unknown / Limited supply	**2** Dependant upon external delivery of supplies	**3** Up to 2 days supply most of the time	**4** Up to 4 days supply	**5** Five days or more supply	Self assessment
Comments:						
26. What proportion of staff are trained in emergency response/recovery arrangements at your site?	**1** < 20%	**2** 21 - 40%	**3** 41 - 60%	**4** 61 - 80%	**5** > 80%	Self assessment, these refer to evacuation procedures, etc. and not first aid or disaster response
Comments:						

2. Disaster Resilience Scorecard for Aged Care Facilities

Question	Score					Information Resource
	1 Unknown	**2** A basic policy is in place, there has been no review of the policy for some years	**3** Insurance for damage/ loss to property, equipment and contents is in place and reviewed annually before renewal	**4** A range of insurances are in place to cover damage/loss to property, equipment and contents as well as loss of income due to business interruption, natural hazards, etc.	**5** Comprehensive insurance in place (replacing infrastructure, lost income, alternative accommodation, natural hazard coverage) have been professionally assessed and are adequately covered	
27. Do you have adequate insurance in place?						Facility Manager
Comments:						
Actions:						

2. Disaster Resilience Scorecard for Aged Care Facilities

4. How well connected are you with your community?

Question	Score					Information Resource
28. What is the level of interaction/engagement/ communication with family members of residents in general?	**1** Family members receive no information outside of official administration issues	**2** Family members receive occasional communication	**3** Family members are regularly communicated with and there is minor engagement with family members	**4** Family members are regularly communicated with in a variety of ways, while some participate/ engage in various activities	**5** Family members are regularly communicated with in a variety of ways, many participate or engage in various activities/events	Self assessment
29. What is the level of engagement with the community around your site and/or community organisations in your region?	**1** Little or no engagement with surrounding community/ community groups	**2** Some engagement with the community/ community groups	**3** Engaged with community, community groups some participation in community activities	**4** Regular participation/ engagement with community activities/ community groups	**5** Support for and active involvement with community activities/ community groups	Self assessment, this refers to local schools, churches, groups, Rotary/ Lions club, etc.
30. What is the degree of engagement with other similar facilities in your region?	**1** No networks with other similar facilities	**2** Informal networks with other similar facilities	**3** Formal networks with other similar facilities, limited interaction	**4** Formal network with irregular planning and activities with other similar facilities	**5** Formal network with regular planning and activities with other similar facilities	Flood maps
31. What is your degree of engagement with your aged care industry association?	**1** Not involved with the industry association and do not attend its events	**2** Staff occasionally participate in industry association events	**3** Staff and management often participate in industry association events	**4** Staff and management always participate in industry association events	**5** Staff and management directly participate in management of the industry association and its events	Self assessment
32. What is the nature of your engagement with emergency management organisations and/or arrangements?	**1** Passive	**2** Consultation	**3** Engagement	**4** Collaboration	**5** Active participation	Facilities Manager, Building inspection
Comments:						
Actions:						

2. Disaster Resilience Scorecard for Aged Care Facilities

Component	Question	Score (1-5)
Risk / Vulnerability	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
Subtotal A (out of 65)		
Procedures	14	
	15	
	16	
	17	
	18	
	19	
	20	
	21	
	22	
Subtotal B (out of 45)		
Resources	23	
	24	
	25	
	26	
	27	
Subtotal C (out of 25)		

Component	Question	Score (1-5)
Connectedness	28	
	29	
	30	
	31	
	32	
Subtotal D (out of 25)		

Component	Scores	Percentages
Risk / Vulnerability	/ 65	%
Procedures	/ 45	%
Resources	/ 25	%
Connectedness	/ 25	%
Grand Total (out of 25)	**/ 160**	

The Combined Resilience Scorecard is intended as an awareness tool to prompt thinking about your hazard risk and behaviour in preparation for and during events.

Pay attention to the scores of each component. If one component is much lower than the others then that aspect of resilience should probably be the highest priority for action.

At appropriate time intervals you might choose to repeat the Scorecard process to track improvements in your resilience to a disaster. *

* Disclaimer: The Scorecard is not intended as a detailed engineering assessment. If you have any concerns regarding your flood resilience or require further details please consult a relevant qualified engineer.

2. Disaster Resilience Scorecard for Aged Care Facilities

Resilience Action Table

	Red Zone	Caution Zone	Going Well
Overall Score	0 - 25%	26 - 74%	74 - 100%
Risk / Vulnerability	0 - 25%	26 - 74%	74 - 100%
Procedures	0 - 25%	26 - 74%	74 - 100%
Resources	0 - 25%	26 - 74%	74 - 100%
Connectedness	0 - 25%	26 - 74%	74 - 100%

Notes:

Scorecard summary for more than one facility

If your organisation includes more than one facility, it is useful to combine the results so that you can have an overview of where the strengths and gaps are for the different sites.

It is, however, important to not compare the scores numerically.

Each score is derived at through a discussion and is based on subjective opinions in many instances.

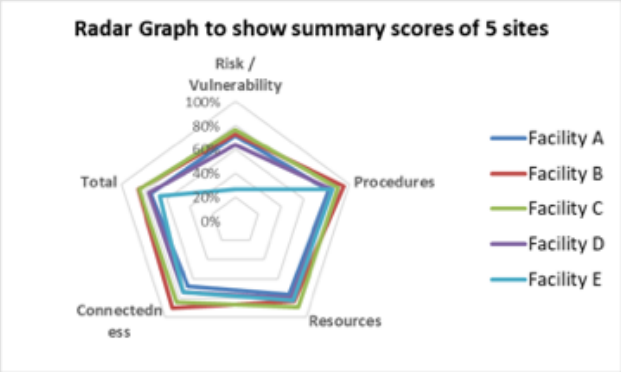
It is advisable and more useful to look at which areas are in the **red** or **caution zone**.

Two useful ways of comparing the results is to combine them in a spreadsheet and to construct a spider/radar graph.

These can easily be done in Excel or equivalent software. Below are some examples:

Table: Summary of results for 5 sites

	Facility A	Facility B	Facility C	Facility D	Facility E
Risk / Vulnerability	71%	73%	76%	64%	26%
Procedures	82%	95%	90%	85%	85%
Resources	76%	83%	89%	80%	82%
Connectedness	68%	90%	84%	74%	74%
Total	74%	85%	85%	76%	67%



Facility Vulnerability Assessment

Version 1.0
June 2019

Site: _____ **Date:** _____

Present: _____

_____

3. Facility Vulnerability Assessment

Disclaimer

The Facility Vulnerability Assessment is intended as a general guide only. Use of this tool does not constitute external assurance of the organisation's resilience capability, nor does it constitute compliance with any benchmark. The reliability of any assessment or evaluation based on this tool's content is a matter for independent judgment of users. Users should seek professional advice as to their specific risks and needs.

This tool has been produced in good faith, exercising all due care and attention. We do not accept responsibility for any inaccurate or incomplete information supplied by third parties. No representation is made about the accuracy, completeness or suitability of the information in this assessment for any particular purpose. We shall not be liable for any damage which may occur to any person or organisation taking action or not on the basis of this publication. Readers should seek appropriate advice when applying the information to their specific needs.

3. Facility Vulnerability Assessment

What design features of your buildings may be relevant to the resilience of your site?

Question	Building/Area A	Building/Area B	Building/Area C	Building/Area D	Building/Area E	Information Resource
1. When was the building/area constructed?						Original Architectural and/or Engineering drawings or inspection
• Pre-1984						
• Between 1984 and 1998						
• Between 1999 and 2009						
• After 2010						
2. What are the walls and support structures of your building made of?						Original Architectural and/or Engineering drawings or inspection
• Brick with large windows close to the ground						
• Cavity brick, lightweight autoclaved aerated concrete (AAC) blocks inaccessible openings						
• Full brick/block masonry cavity brick						
• Brick/block veneer with venting, AAC blocks with impervious sealant						
• Reinforced concrete						
3. What is the floor of your building(s) made of?						Original Architectural and/or Engineering drawings or inspection
• Particle board						
• Timber floor close to the ground						
• Standard grade plywood						
• Timber T & G						
• Concrete suspended or on-ground slab						

3. Facility Vulnerability Assessment

What planning or reports that may be relevant to resilience does your organisation/facility have?

Question	No	Under Development	Yes	Comments	Information Resource
4. Which of these documents does your organisation have?					Facility manager, OHS manager, buildings manager
• Quality and Safety Plan					
• Business Continuity Plan					
• Fire Plan and last Fire Inspection Report					
• Asbestos register					
• Staff Education Report					
• Last Accreditation Report and Recommendations					
• Recent documents related to any changes or redevelopment of the facility if applicable and appropriate					

4. Scenarios

The Toolkit includes a practice scenario, as well as additional hazard-specific scenarios.

Scenarios A and B were obtained from the Australian Red Cross in South Australia at the time of writing (June 2019). The Red Cross scenarios were developed as part of a NDRP-funded project to build the resilience of Community Service Organisations.

Feel free to use these to inform or guide discussions during the Scorecard exercise or as part of wider staff considerations around action plans. For each of the scenarios, you can consider the following points:

- Do you and your staff know what to do?
- What plans and arrangements do you have in place?
- How do you get more information?
- Who do you need to contact and what actions do you need to take?

Practice Scenario

You are the manager of an organisation with four residential aged care facilities. You are experiencing a state-wide power blackout due to a major storm. The outage in the areas where 3 of your facilities are located is estimated to last for 4 days. One of your sites are also experiencing flooding due to the storm that resulted in the power outage. You have a generator installed in one of your facilities, but it has been a while since this has been checked. For three of the four sites, food delivery is due in 2 days, while medicine and other medical supplies are due for delivery in 1 day. At the other site, food delivery happened 2 days ago, and medicine and other supplies were delivered earlier that morning. All of this is happening during winter and many of your staff are affected by the flu, with many key management staff being on sick leave. You are not currently on site at the facility where your office is. You are in a meeting and a fairly new person is in charge at the moment.

A. Area-wide Black out

Wednesday, early December. Forecast 32oC, North Westerly winds 15km p/h.

10:15am: Wednesday: Normal day at your organisation until suddenly the power goes out.

10:20am: After checking the fuses and surrounding organisations, it becomes clear that the power outage has impacted everyone and is not just localised to your building(s).

10:35am: A staff member has seen on social media that the local substation is on fire.

10:50am: Still no power. You have tuned into ABC local radio from your car/ battery operated radio and have heard that a small fire is being attended to at the substation and all on your grid are in blackout.

11:30am: Update on local radio, the fire has been contained but has caused significant damage to the substation. Power is not expected to be restored for the next 12 hours whilst repairs are completed.

2:00pm: Update on local radio, the damages more extensive than first thought. The power is now not expected back on for 24-36 hours.

Thursday, early December. Forecast 34oC, North Westerly winds 0-5km p/h

8:00am Thursday: There is still no power. Some of your staff have contacted you asking whether to come to work. Other staff have not been able to be contacted due to flat mobile phones and no landlines. What is your business continuity plan? What services can you deliver?

3:45pm: Power has come back on. Clients/ community members are frustrated, and it is suspected that many will have lost the majority of their perishable food items.

In the case of a power outage, remember that:

- The police will be directing traffic on top of their regular duties.
- Many petrol stations will be unable to pump petrol - do you have enough fuel in your car/ for your generator?

4. Scenarios

- Many of us don't carry cash anymore - how will you cope without Eftpos when there's no power?
- Generators need to be serviced regularly to ensure that they work when needed.
- Automatic doors often cannot be opened or closed without power.
- Many assisted lifts, adjustable beds and chairs are powered by electricity, be mindful of staff moving clients safely.
- Also consider in home medical equipment and transport such as motorised wheelchairs, oxygen or dialysis machines. All need access to a power source.

B. Extreme Heat

The Bureau of Meteorology are predicting maximum temperatures exceeding 38.7oC with overnight minimum temperatures of 25.4oC for at least the next 5 days. There have been warnings issued of an increased likelihood of rolling blackouts and interruptions to public transport. Local councils will be limiting some services such as outdoor work and community transport, with essential works to be conducted in the early morning to avoid the higher temperatures. Certain public venues will extend their opening hours to provide respite from the heat for those without sufficient cooling in their homes.

The fire danger rating is listed as 'severe'.

In the case of a heat wave, remember that:

- Extreme heat causes more deaths and hospitalisations in Australia than all other natural hazards combined.
- Heatwaves are a particular risk for those with health issues, the elderly, children, outdoor workers and those with disabilities. But anyone can be at risk if they don't take precautions to keep hydrated and cool, even if they are fit and healthy.
- Infrastructure such as electricity, transport networks and communications can be at a heightened risk of breakdown during heat waves.
- Increased demands on ambulances and hospitals can be expected.
- Outdoor work will cease, and agriculture will be impacted reducing productivity and potentially leading to food shortages.
- Climate change will lead to more frequent and more extreme heat waves in the future.

C. Bushfire

7:55am - You are driving to work and notice smoke coming from the North West. When you arrive at your desk, you check your country fire services' website and see that there is a fire in the area with a WATCH AND ACT warning for this area and an ADVICE warning for the surrounding areas. There are currently no road closures. Your outreach staff will shortly be commencing work helping clients in their homes. Many of whom live in the local area with WATCH AND ACT and ADVICE warnings. You are concerned both for your staff and your clients.

10:20am - One of your outreach workers calls you to let you know that they have been stopped by police at a road closure and told there is a fire in the area. You check the relevant website and find there is an EMERGENCY WARNING for the area that could affect both your staff and clients. Your worker wants to continue visiting clients and tells you they know a back road to get through.

11:45am - The bushfire is moving quickly and is likely to affect several staff and clients. All your staff have been contacted and advised to leave the area immediately. Your team have been able to contact all but 2 clients to advise them of the fire. One of your staff thinks that one of the clients is on holiday but isn't sure. Another outreach worker who has been advised that the situation is worsening believes that they are not in any danger and wants to continue to check on clients.

D. Dust storm

8:00am - It's been very dry in your local area for the past few months with minimal rain and higher than average temperatures. The temperature today is predicted to reach 340 oC with a cold front expected in the afternoon with 35km-45km per hour winds and heavy rain expected.

2:00pm - The temperature has started to drop, and the wind begins to pick up. You notice rubbish and lighter unsecured objects being caught in the gusts and blowing down the street.

4. Scenarios

2:45pm - The sky has become dark and visibility is reduced as a dust storm blows through your area. The wind is blowing at 35km per hour with gusts of up to 50km and the dust is abrasive on the skin of those caught outdoors. It is difficult to see, especially while driving.

3:00pm - The ambulance service and the emergency department at the hospital close to you have had an increase in the number of calls for assistance from those with respiratory issues such as asthma, emphysema or cardiovascular disease. Your state's emergency services are responding to several calls of fallen tree branches and a car accident that has occurred due to poor visibility on the roads.

4:15pm - Heavy rain begins to fall. Due to the high winds many roof gutters and drains are clogged with leaves and other debris resulting in running water on roads and spilling out of gutters. The ground is so dry that it isn't absorbing the rain resulting in large puddles of collected water.

4:35pm - The rain has passed, and the air is humid. You're faced with the mess left by the dust storm and the rain to clean up.

In the case of a dust storm, remember that:

- Research shows that during a dust storm, visits to the emergency department for respiratory problems increase.
- Those with existing health concerns such as respiratory or heart-related problems may find their existing symptoms are aggravated during a dust storm.
- Dust storms can reduce visibility. Extra caution should be used when driving. If the visibility is very low, park in a safe place to avoid collisions and wait for the dust to clear.

E. Burst water main

10:30am: After a long dry summer period, there has finally been the first few days of decent rain in months. Unfortunately, this results in the soil swelling and putting upward pressure on pipes. A weak point in the pipe just happens to be in front of your workplace and it has resulted in a burst water pipe sending water and debris to shoot skyward over 10 metres into the air.

10:35am - You have called the police to help direct the chaotic traffic on the road outside, and SA Water to switch off the water and repair the damaged pipe. Water from the pipe is crashing down on your roof and overflowing your gutters resulting in water flowing into your premise under the door. A piece of asphalt has cracked your window.

10:50am - SA Water have arrived and have switched off the water, the carpet in your entrance way is soaked through and water is dripping down the wall near your computer. Clearly there must have been a weak point in the roof and the pressure of so much water has resulted in a leak. You turn off all electrical equipment in the vicinity to be safe.

11:00am - SA Water have advised that it is likely to take them a few hours to repair the damaged pipe and so you will have no water until 2:30pm. Traffic has slowed to a crawl past your workplace as SA water contractors get to work with the repairs. Your staff have attempted to towel dry the entrance way, but chances are that the carpet will need to be replaced.

In the case of a burst water main, remember that:

- Burst water mains are three times more likely to occur in summer and autumn after long periods of dry weather followed by significant rain.
- Your water provider is likely to be able to assist with assistance with temporary drinking water, coordinating clean ups and contacting insurance providers.

F. Flash flood

Late in the afternoon the Bureau of Meteorology begin to issue warnings that thunderstorms producing damaging winds and heavy rainfall is expected the following day in the late morning. It has already been a wet start to winter and so local dams are close to capacity and the ground is soft underfoot. Your organisation is in a flood prone area and so begin to take precautions such as acquiring sandbags and placing items off the ground. By 10am, rain has begun belting down and run-off begins to flood low lying areas. Strong winds knock down trees and power lines, causing blackouts and local dams and creeks begin to overflow their banks, creating more flooding. In total, 60ml of rain falls within a 30-hour period.

4. Scenarios

There are reports that in some areas, people are trapped in their homes or businesses due to the rising water, main roads have been closed as sections of the asphalt have been washed away and local schools have made the decision to keep students on-site because of safety concerns about bus transport.

Your organisation has sandbagged your entrance ways, and so have avoided the worst of the water damage to your workplace. However, access from one end of the street has been cut off due to the flood waters damaging the roads and you have no power or clean water on-site.

The next day, the flood water has begun to subside, leaving in its wake mud and debris. Power is expected to be restored by the evening as crews work to repair power lines and SES remove the fallen trees. A number of your clients have been badly impacted by the floods with damages to their homes, with many feeling very emotional from the experience. Local and State Governments have advised the community to boil water until otherwise advised due to the risk of contamination to the drinking water from the flood waters.

For your workplace, consider the following:

In the case of a flood, remember:

- Stack possessions, records, stock or equipment on benches and tables. Place electrical items on top, move waste containers, chemicals and poisons above floor level.
- Secure items that are likely to float and cause damage.
- Never drive, ride or walk through floodwater.
- Be prepared to evacuate if advised by emergency services.
- When returning after a flood, ensure electricity and gas are turned off before entering the property. Any electrical systems or equipment that has been exposed to flood water should be checked by an electrician before being used.
- Drink only bottled or boiled water until normal water supply has been declared safe.

Appendix A: Floods and Flood Damage

In simple terms, a flood is water where it is not wanted. Flooding can occur from a number of sources including natural and man-made waterways, dams, coastal or marine waters, infrastructure including pipes, dams and levees or extreme rainfall events.

Types of Flooding

Riverine Flooding – Flooding that occurs as a result of rainfall within the catchment of a watercourse such as a river or creek. Riverine flooding is defined as flooding that takes six hours or more from the time of rainfall to when inundation occurs. This type of flooding often results in the most severe impacts because riverine flooding generally persists for longer and can affect a larger area than other types of floods.

Flash Flooding – Flash flooding occurs within six hours of the causative rainfall event. This type of flooding is caused by high rainfall storm events and can occur very quickly at almost any location. As there is little opportunity to warn people and prepare, flash flooding can be very destructive.

Coastal Flooding – Coastal flooding is due to tidal or storm-driven coastal events, including storm surges. This can be exacerbated by wind-wave generation from storm events and king tides. Future sea level rise as a result of climate change may also impact upon coastal flooding in the future.

Infrastructure failure – Infrastructure failure occurs when infrastructure including levees, dams and pipes fail due to lack of maintenance, age, poor operation, malfunction, accidents, climate impacts or extreme circumstances including other natural hazards such as earthquakes. Sewer backup flood on the street, reverse valve failed, main street valve failure causing flood of site, burst water main, sewer backflows, backflow prevention devices.

Flooding Impacts

The impact a flood has varies depending on the type of flooding, location, timing, magnitude and the length of time floodwaters persist. Floods in densely populated towns or cities, especially those which occur with little warning are most likely to cause the most severe impacts.

Impacts can include injuries and fatalities, damage and destruction of private property, economic losses to businesses and damage to essential infrastructure and services including roads, telecommunications, sewage and water infrastructure, hospitals and schools. Floods often lead to long-term emotional and financial consequences within affected communities as they seek to repair and rebuild following an event.

Evacuation of Numurkah Hospital due to flooding, Victoria, 2012

Source: Numurkah District Health Services

Appendix A: Floods and Flood Damage

Damage to Buildings

Floods can cause structural damage to buildings in the following ways:

- **Hydrostatic Actions** – These are actions which result from differences from standing water pressure inside and outside of a building. If there is a large volume of water on the external wall of a building and this pressure is not matched inside the building, there is a potential for structural failure. This can be prevented by wet-proofing a property, that is to allow water to enter and leave freely.
- **Hydrodynamic Actions** – Hydrodynamic action is the flow of water through and around buildings, damage by this type of action is greatest when water velocities are extreme. Hydrodynamic action can cause buildings to be washed away in intense flows.
- **Debris Actions** – This damage is caused by debris carried by floodwaters impacting buildings, for instance large objects such as tree branches being forced into buildings.
- **Erosion and Scour** – Erosion and scour around buildings can affect stability of building foundations and increase flood damage to property.

Damage to buildings in Grantham, Queensland, from 2011 floods

Source: Herald Sun

Water Damage

A major source of flood damage is immersion and the effect of contact with water on the buildings' contents, fixtures and fittings. The extent of damage is dependent on several factors including the depth of water, types of materials, period of immersion and whether there are contaminants in the water such as silt and sewage.

Building fixtures which are vulnerable to water damage include floor coverings (particularly carpet), wall linings, cabinetry and doors. A large range of building contents, such as bedding, food, office and medical supplies, electrical equipment and personal memorabilia can be irretrievably damaged by contact with flood water.

Consideration of a property's resilience to flood must consider how the property will respond to immersion and the drying process. Key considerations for building materials are:

- the structural integrity of materials to water,
- the drying times of materials,
- whether there are any hollows or spaces where water can be trapped and prevent drying, and
- the potential for deposition of materials such as silt in cavities.

In addition to this, floodwater can affect the provision of utilities to buildings including electricity, water and telecommunications, cause sewage backflow and create unsafe environments. To minimise this, it is recommended that utilities including electrical powerpoints and wiring, plumbing, heating, cooling and ventilation be above the flood hazard level (FHL), cabling below the FHL be waterproofed, any underground wiring be at a sufficient depth to avoid erosion and sewage backflow prevention devices be installed.

Appendix A: Floods and Flood Damage

Aged Care Facilities

The impacts of flooding can be greatest in vulnerable communities, including aged populations. Isolation or inundation of aged care facilities makes discharge and admission of patients, staff roster change overs and provision of goods including medical supplies, linen, food and hygiene products difficult or impossible.

The evacuation and relocation of elderly, especially those confined to bed or who are very frail, is one of the more serious impacts of flooding.

Evacuation and relocation of residents presents substantial challenges associated with moving vulnerable patients, transferring medical records and essential personal belongings and identifying suitable housing and care for residents. This is a difficult process and can be a very emotional and stressful time for residents who may feel anxious and dislocated.

Evacuation of patients from Koo Wee Rup Hospital, Victoria, in 2011 floods

Source: Sunday Herald Sun

Recently, a number of aged care facilities have been evacuated due to flooding or flood risk. In January 2011, five nursing homes in South East Queensland were evacuated. Flooding has also caused evacuation in a St George Nursing Home in 2010 and in New Farm Regis Corinya Aged Care Home in Brisbane in 2013.

Substantial flooding in January 2013 of RSL Care Fairways, Bundaberg, led to the evacuation of over 108 residents at short notice to a number of locations. Much of the site was flooded to a depth of 200mm, with the worst affected areas being to 1.5 m. Damage to the aged care facility led to long-term impacts including limited and sporadic access to potable water and electricity, with many residents only able to return home eight months after flooding.

Flooding in RSL Care Fairways in Bundaberg, Queensland, January 2013

Source: RSL Care

Appendix A: Floods and Flood Damage

The Karinya Nursing Home adjoining Numurkah Hospital, Victoria, was affected by floods in March 2012. Floodwaters peaked earlier than forecast, leaving volunteers and staff little time to sandbag the hospital or protect the aged care facility. This led to a rapid evacuation of residents and patients. Residents of Karinya were evacuated by 4WD, ambulance and helicopter to a number of alternate facilities. While elderly residents were able to move in again in the month following the evacuation, the hospital was submerged to a depth of 30cm which caused plaster walls to crumble and the floor to lift when floodwaters subsided. Due to the extent of this damage, the hospital operated out of temporary tents and transportables and has to be demolished and rebuilt.

Flooding of the Karinya Nursing Home, Victoria, March 2012

Source: Numurkah District Health Service

Key Points

Key points to consider are that:

- Knowledge about the flood risk of your property, access to and understanding about flood warnings and a tested flood plan is crucial to prepare for a flood event;
- Local knowledge and good communication can greatly assist during a flood event;
- Damage to buildings can be caused by small amounts of flooding. Impacts can be both direct, from the forces associated with flood water coming into contact with a building, and indirect including interrupted access to amenities such as electricity, lack of access and reduced housing availability;
- Evacuating and relocating residents can be very stressful for them. Many feel a strong sense of dislocation and anxiety when evacuated and continuity of care and familiar faces can help;
- Preparations for flooding including sandbagging, packing necessary items and evacuation is best done early, while the site is still dry rather than later when flooding has started;
- Repair and clean-up following a flood is a lengthy process and needs to be started as soon as safely possible to minimise further impacts. Residents may be required to be in alternate accommodation for long periods during this time.
- Your local council will be able to provide advice on flood risk.

Appendix B: Fires and Fire damage

Understanding fire behaviour

The Australian climate is generally hot, dry and prone to drought. At any time of the year, some parts of Australia are prone to bushfires and grassfires.

- **Grassfires** are fast moving, passing in five to ten seconds and smouldering for minutes. They have a low to medium intensity and primarily damage crops, livestock and farming infrastructure, such as fences.
- **Bushfires** are generally slower moving, but have a higher heat output. This means they pass in two to five minutes, but they can smoulder for days. Fire in the crown of the tree canopy can move rapidly.

Source: Stockphoto purchased by Torrens Resilience Institute

Bushfires are an intrinsic part of Australia's environment. Natural ecosystems have evolved with fire, and the landscape, along with its biological diversity, has been shaped by both historic and recent fires. Many of Australia's native plants are fire prone and very combustible, while numerous species depend on fire to regenerate. Indigenous Australians have long used fire as a land management tool and it continues to be used to clear land for agricultural purposes and to protect properties from intense, uncontrolled fires.

Fire has three essential requirements: fuel, heat and oxygen and cannot burn without one of these. Different types of bushfire fuel (vegetation, etc.) burn differently: finer fuels like grasses burn more quickly, while more substantial, woodier fuels burn with greater intensity. A bushfire will occur when there is sufficient dry fuel to burn, weather conditions are hot, dry and windy, and there is a source of ignition, such as lightning.

Humidity, geography, wind and temperature affect how fires behave and spread:

- The hotter the air temperature, the closer any fuel is to its ignition point, and dry fuel will burn more easily. The lower the humidity, the drier the air is, again helping fuels burn as they release their moisture into the air more readily.
- The slope of the landscape is also important. Fires burn much faster uphill than down. This is because the radiation and convection a fire creates preheat the fuel source, and this is much more readily done upslope than down. A 10-degree increase in slope usually results in a doubling of the speed of the fire. Fire will spread up a 20-degree slope four times as fast as it will along flat ground.
- If wind speeds are below 12–15 km/h, a fire will burn slowly. However, if wind speeds are even slightly higher than this, they will have a significant impact on the fire movement. A change in wind, often from a cold front, can activate the side of a fire, making it broader. In general, a wider fire will burn faster than a very narrow one.
- Fires also create their own weather; the heat of a fire can result in whirlwinds and turbulent air currents. These can drive the fire sideways, broadening the fire front. Wind can also cause spotting—carrying pieces of burning fuel, like twigs, leaves or small embers, ahead of the fire, igniting more small fires.

Appendix B: Fires and Fire damage

Fire spreads by direct contact, spotting (i.e., the wind carries small pieces of burning material ahead of the fire which can ignite new fires), and air currents (i.e., the fire heats passing wind, which is carried to new locations and then ignite heat fuel sources under certain conditions).

The impact of bushfires

Historically, bushfires have caused loss of life and significant damage to property. From 1967 to 2013, major Australian bushfires have resulted in over 8,000 injuries and 433 fatalities, close to 50% of all deaths from major Australian natural hazards in the period (excluding heatwaves). Over this same period, bushfires cost approximately A$4.7 billion (2013 Australian dollars, including deaths and injuries but excluding most indirect losses). The most impactful event in recent times was the Black Saturday fires in 2009 that resulted in 173 direct deaths - the highest ever loss of life from a bushfire in Australia. A total of 414 people were injured. Of these people, seven eventually died because of their injuries, taking the total number of deaths to 180. More than 3,500 buildings, of which 2,029 were houses, were destroyed and more than 450,000 hectares were burned.

Preparing for a bushfire

It is necessary to be aware of bushfires and for people in high bushfire risk areas to be prepared. The common advice from the various authorities is to be prepared, and to either leave early, or stay and defend. Prepare, Act, Survive is the nationally accepted approach.

An understanding of the risks of staying to defend a home during a bushfire, or evacuating to a safe place, is essential. All agencies agree that if the choice is to leave, this should be done early, usually the day before, or before 10 am on the day of risk. If the choice is to stay, everyone involved must be both physically and mentally prepared.

In terms of protecting oneself, one of the most dangerous aspects of a bushfire is the radiant heat it releases. At times, this heat can be so intense it can kill people who are quite far from the fire. The most effective protection from radiant heat is distance, or a solid barrier, like a wall or an embankment. Next best is covering up—putting on protective clothing like long pants and a shirt, or overalls made from natural fibres, not synthetics. Even a blanket is better than no protection.

Being fire ready means:

- developing, training and testing against a bushfire plan
- undertaking a risk assessment of your facility and location
- preparing your facility and carrying out maintenance and improvements
- understanding the fire danger ratings
- being aware of daily conditions and any bushfire warnings
- activating your bushfire plan when necessary.

For a detailed approach to be bushfire ready, please see **“Residential Aged Care Services – Bushfire Ready Resource”** which can be found at: **www2.health.vic.gov.au/about/publications/policiesandguidelines/resi-aged-care-bushire-ready-resource**

Appendix C: Earthquakes and Earthquake Damage

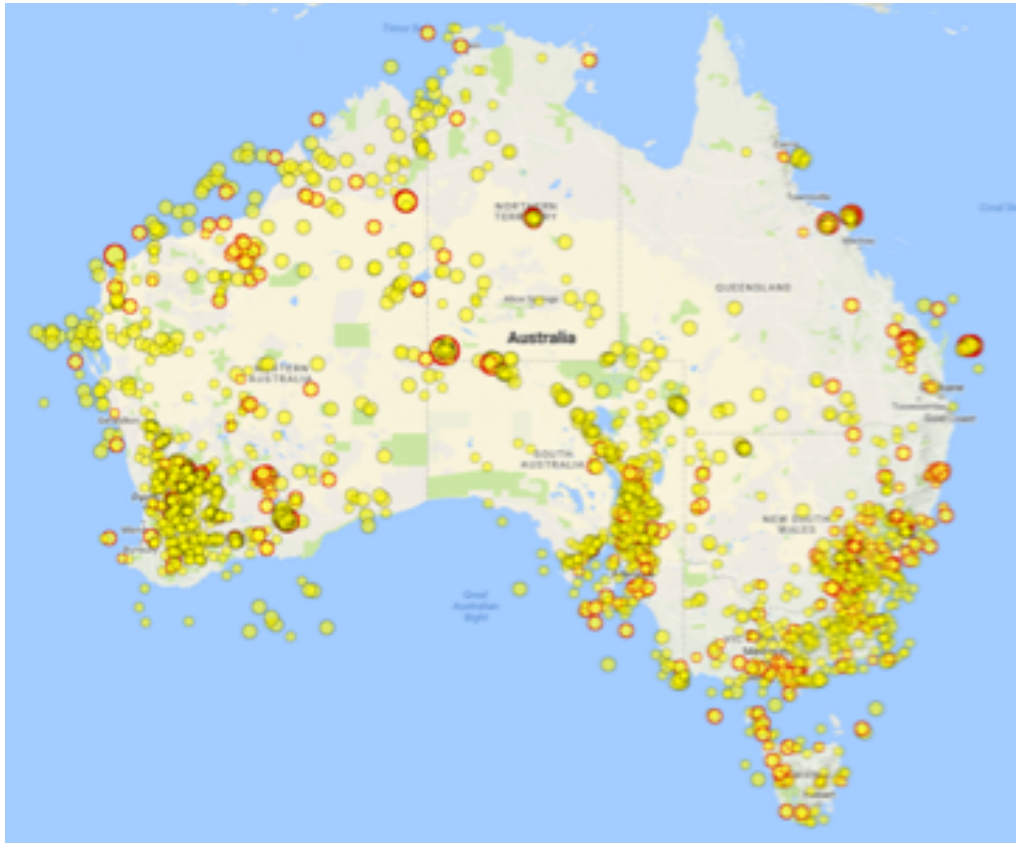
By world standards, the earthquake risk in Australia is low, with Adelaide being considered the most at risk compared to other capital cities. Australia has experienced several damaging earthquakes in the past 120 years.

The worst earthquake in terms of impact occurred on the 28 of December 1989 in Newcastle, NSW and measured magnitude 5.6 on the Richter Scale. This quake killed 13 people and hospitalised 160. It caused an estimated $4 billion worth of damage to 35,000 homes, 147 schools and 3,000 buildings. Damage was reported over an area of 9,000 km2, with movement up to 800 km away. The devastation was unusual for a relatively low magnitude quake. Experts say soft sediments may have intensified the shaking, the strength of which older buildings could not withstand.

The largest earthquake recorded to date in Australia measured Richter magnitude 6.5 at Beachport in 1897. Fifty people were injured in this quake, which was centred off the coast between Beachport and Robe but was felt throughout southern South Australia and south-western Victoria. Most of Beachport and Robe were destroyed, and Kingston and Mount Gambier also suffered damage. The earth heaved in waves and ruptured to a depth of 4m. In Adelaide, crowds panicked and suffered injuries as they rushed to the exits of swaying buildings.

Earthquakes in Australia are scattered widely and do not cluster along known faults as shown in the adjacent map. It is therefore considered that although the next major event may occur on a known fault line, there is also a very good probability that it will not. Due to the shallow depth of most Australian earthquakes, even small magnitude earthquakes are often felt and heard, and moderate magnitude earthquakes can cause damage.

Earthquakes are a natural process and it is inevitable that occasional earthquakes will continue to occur in Australia. There is no way yet of predicting when, where or how big an earthquake might be.



Source: Geoscience Australia – All located earthquakes 1990 to 2018.

Appendix C: Earthquakes and Earthquake Damage

Earthquake Damage to Buildings

While earthquakes are inevitable, damage to buildings because of an earthquake is not. There are a few factors known to make buildings particularly vulnerable to earthquake damage.

- **Poor construction:** Very old buildings are often constructed of poor quality materials, with low strength mortar being the main problem. Damage is occasionally caused by poor workmanship, for example, through brick ties being left out of masonry walls. Sometimes poor design is involved, particularly in the case of multistorey buildings with irregular structural layouts that have not been properly engineered.
- **Poor condition:** Walls are weakened when mortar is lost between bricks due to erosion by salt spray or heavy industrial pollution. This can also lead to corrosion of brick ties which bond walls together. Cracking of brick walls and rotting of timbers produce weak points which may lead to increased earthquake damage.
- **Chimneys, parapets and gable end walls:** Chimneys, parapets and gable end walls constructed of masonry are typically the first elements to fail in an earthquake. This can be dangerous as brickwork may then fall from a considerable height and can go right through a roof, particularly brittle tile roofs. The thinner a chimney the more vulnerable it is to ground shaking in an earthquake. Parapets and gable end walls that are not well-fixed back to the main structure are also prone to fall outwards from a building during earthquake ground shaking. The taller and less well fixed these elements the more likely they will fail.

  Flexible structures withstand earthquakes best. Timber-framed and clad buildings have performed very well in earthquakes in Australia and New Zealand. Brick veneer buildings with timber or steel loadbearing frame are quite flexible. Solid masonry (double brick/cavity brick or stone) is not flexible and more prone to damage in an earthquake.

Chimney failure, Christchurch New Zealand 2010
Source: BeckerFraserPhotos, CEISMIC, Canterbury Earthquake Digital Archive

Parapet and wall failure, Source: Earthquake Engineering Research Centre, 2016

Appendix C: Earthquakes and Earthquake Damage

Australian Earthquake Design Standards

The first Australian Standard on the design of earthquake resistant buildings was AS 2121-1979, it was known as the **"SAA Earthquake Code".**

The second Australian Standard on design for earthquake loads, AS 1170.4-1993, was referenced in the Building Code of Australia in January 1995. The standard was amended in 2002, however, the design formulas and methodology remained very similar.

The latest version, AS 1170.4: 2007 **"Structural design actions - Earthquake actions in Australia"** was referenced in the Building Code of Australia Amendment of 1 May 2008. A transition phase existed between 1 May 2008 and 1 May 2009 when both the 1993 and 2007 editions of the standard could be used. From 1 May 2009 only the 2007 standard could be used for design.

With each new standard there has been some increase in the loads and detailing required as knowledge of earthquake risk and how buildings fail under earthquake loads evolve. The 2007 standard increased earthquake loads to be applied in the design of Importance level 3 (high occupancy) and Importance level 4 (post disaster) buildings over the 1993 standard.

Generally speaking, all buildings need to be designed and constructed in accordance with AS1170.4 unless they are not captured under its scope such as buildings that are:

- domestic structures of class 1a or 1b that are 8.5m or less in height
  - Class 1 buildings are houses – typically standalone single dwellings of a domestic or residential nature

  - 1a: A single dwelling being a detached house, or one or more attached dwellings, each being a building, separated by a fire-resisting wall, including a row house, terrace house, town house or villa unit.

  - 1b: A boarding house, guest house, hostel or the like with a total area of all floors not exceeding 300m2, and where not more than 12 reside, and is not located above or below another dwelling or another Class of building other than a private garage.
- Importance Level 1 structures (e.g. farm buildings and sheds, isolated minor storage facilities, minor temporary facilities).

AS1170.4 Clause 8.1.4 provides a comprehensive list of architectural (non-structural) components that require consideration for earthquake loads being:

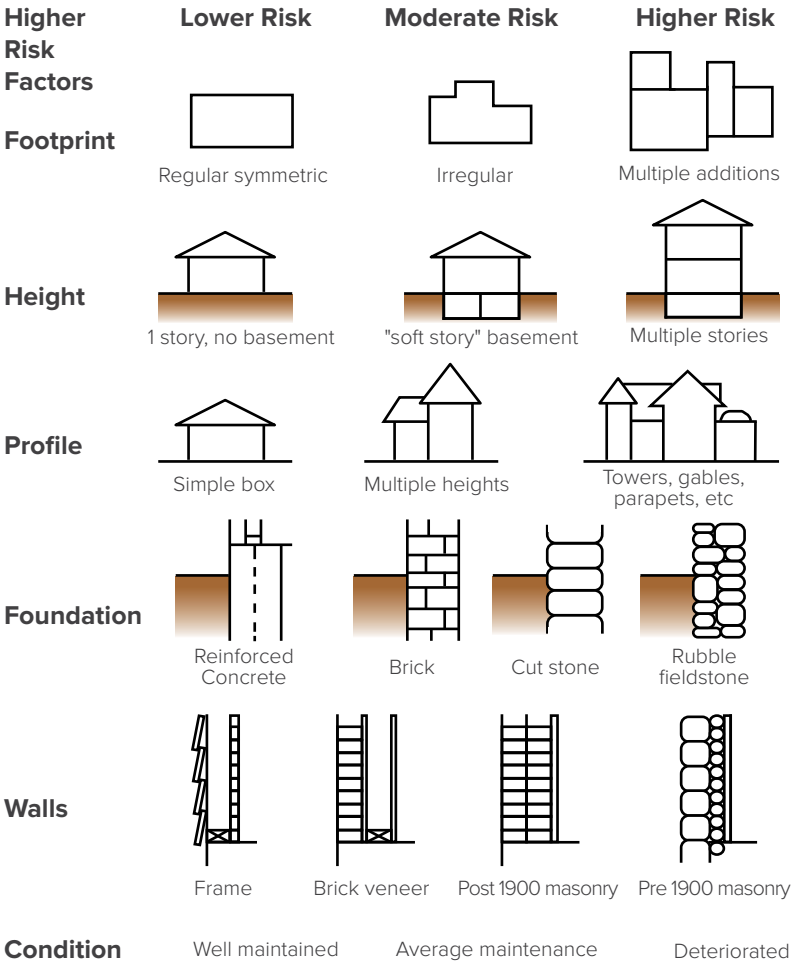
- Walls that are not part of the seismic-force-resisting system;
- Appendages, including parapets, gables, verandas, awnings, canopies, chimneys, roofing components (tiles, metal panels) containers and miscellaneous components;
- Connections (fasteners) for wall attachments, curtain walls, exterior non-loadbearing walls;
- Partitions;
- Floors (including access floor systems, where the weight of the floor system shall be determined in accordance with clause 6.2.2;
- Ceilings;
- Architectural equipment including storage racks and library shelves with a height over 2.0m.

Parapet strengthening, Source: Cintec Canada, Thomas Network, 2011

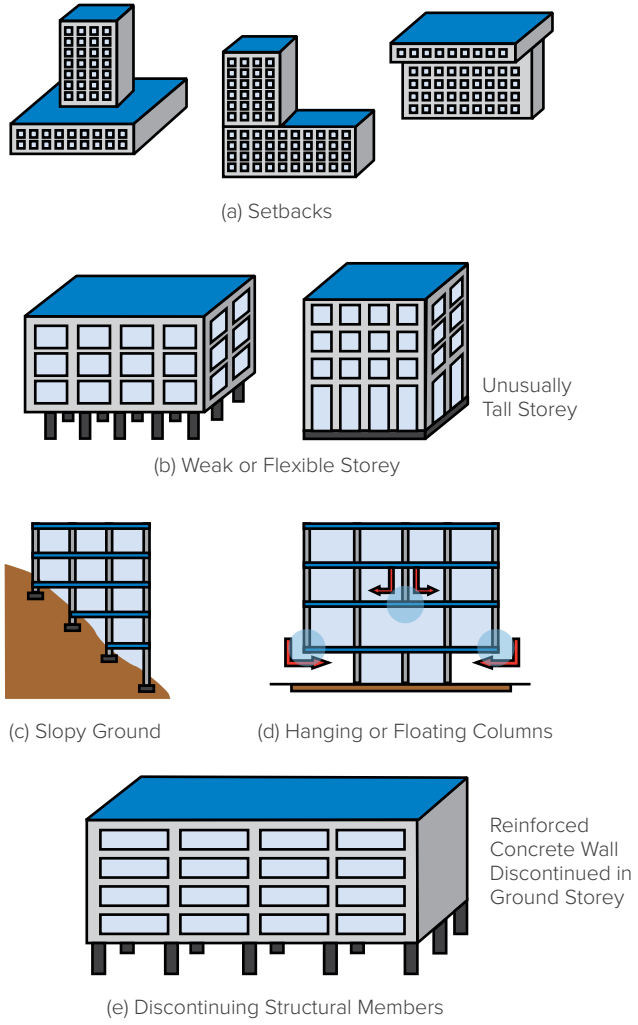
For more information about the early history of seismic design and codes in Australia, please see: **https://aees.org.au/wp-content/uploads/2017/02/History-of-Seismic-Codes-in-Australia-Rev.pdf**

Appendix C: Earthquakes and Earthquake Damage

Australian Earthquake Design Standards



Understanding Earthquakes and Historic Houses, Utah Department of Heritage and Arts, Utah, U.S.A.



Examples of Buildings with Irregular Structural Layouts

Appendix D: Useful references and links

Aged & Community Services Australia (ACSA) – Emergency Planning

Aged & Community Services Australia (ACSA) is a peak body supporting over 700 church, charitable and community-based not-for-profit organisations that provide accommodation and care services to older Australians. On their website they host a number of pages designed to assist aged care facilities' providers and country hospitals in planning, preparing for and responding to emergency events. It is a central repository of resources to assist in the development of local tools and processes. The topics on the website cover:

- Emergency Planning Concepts
- Rationales for developing policies and procedures
- First response
- Emergency Management Planning Templates
- Are you prepared?
- Phone Apps
- Workshop presentations
- Fact sheets and resources
- Useful contacts and links

https://acsa.asn.au/Home/Residential-Care-Home-Care-Housing/Residential-Care-Home-Care-Housing

Aged Care Insite – Evacuating residents due to a disaster: is it the right move?

Eight residents of an aged care facility in Florida died after the facility lost air-conditioning following Hurricane Irma, prompting an investigation into why the home was not evacuated. Aged Care Insite offers a look at the research surrounding evacuation, led by researchers at Monash University. They provide a podcast, talking to one of the authors Joseph Ibrahim, who provides some interesting thoughts around evacuation.

https://www.agedcareinsite.com.au/2017/09/evacuating-residents-due-to-a-disaster-is-it-the-right-move/

Australian Council of Social Service (ACOSS) – Resilient Community Organisations

ACOSS is a national advocate for action to reduce poverty and inequality, and the peak body for the community services sector in Australia. To this end, the Resilient Community Organisations is a toolkit developed for the community sector to help organisations measure and improve their resilience to disasters and emergencies. Working through the six steps (Leading Preparedness, Building Networks, Knowing Your Risks, Managing Your Risks, Preparing Others and Learning and Improving), aged care facilities can assess their resilience to disasters. The Toolkit includes:

- **A benchmarking system** so organisations can assess their current state of preparedness for disasters and emergencies and identify areas of improvement; and
- **Six Steps to Disaster Resilience,** which provide information and resources organisations need to take action.

http://resilience.acoss.org.au/

Australian Government – Emergency Alert

Emergency alert is the national telephone warning system used by emergency services to send voice messages to landlines and texts to mobile phones within a defined area about likely or actual emergencies. It is a useful tool, but in the event of an emergency please remember that mobile phone towers may not be able to get messages to your phone, and landline services may be disrupted. From this page you can access the emergency service sites in your state to find emergency information.

http://www.emergencyalert.gov.au/

Appendix D: Useful references and links

Australian Government – Organisational Resilience

This initiative by the Australian Government enables organisations to discover their resilience potential through a tool called a 'HealthCheck'. It uses a set of 13 resilience indicators, grouped into three overarching resilience attributes to determine organisational response and recovery ability. These three attributes are related to leadership and culture, networks and partnerships, and change readiness. After taking the HealthCheck, there are a number of 'treatments' provided, to enable organisations to continue to improve upon their resilience score in the areas most needed for them and view potential barriers to improvement.

https://www.organisationalresilience.gov.au/HealthCheck/overview

Brisbane City Council – Prepare Your Business

Most useful for Brisbane aged care facilities, the Brisbane City Council offers tools for organisations to be better prepared for disasters. They have a number of useful tools for organisations, such as:

- Flood tools to understand your facilities risk of flooding, with resources available on how to minimise flood impact
- Early warning alert system, an app to alert organisations to approaching severe weather
- Interactive business tool to allow organisations to quickly see how to prepare for severe weather
- Business continuity plan template to build resilience to disaster and ensure that the organisation is well prepared

However, all organisations can benefit from taking a look at their interactive business tool and business continuity plan template for tips towards building resilience.

https://www.brisbane.qld.gov.au/community-safety/community-safety/disasters-emergencies/prepare-your-business-severe-weather

Bushfire and Natural Hazards CRC (BNHCRC) – Hazard Note: Flood Management in a Changing Climate

This Hazard Note draws on PhD research by Caroline Wegner, regarding what is currently being done to mitigate flood damage in Australia, and what could still be done.

https://www.bnhcrc.com.au/hazardnotes/47

Department of Communities, Child Safety and Disability Service – Toolkit: Strategies and resources organisations in application of: People with vulnerabilities in disasters – A framework for an effective local response

This resource seeks to reduce the impact of disasters on people with vulnerabilities or people who may become vulnerable, and contribute to building resilient communities. It provides a number of measures for identifying who is at risk in a disaster and how to keep them safe. This would be a valuable tool for those who engage with or provide services for at risk people who do not live in an aged care facility, as well as encouraging aged care providers to consider the important relationships in the community that can contribute to disaster resilience.

https://www.qld.gov.au/community/documents/disasters-emergencies/supporting-people-with-vulnerabilities-toolkit.pdf

Appendix D: Useful references and links

Facility Management – Maximum precaution: fire safety in aged care facilities

While the toolkit deals with natural hazards, it is important that resilience towards deliberate events is also cultivated, as evidenced by the tragic Quakers Hill fire, where a nurse deliberately lit two fires, killing 11 people. Following this, Facility Management released an article addressing what aged care facilities can do to ensure that their residents are safe in the event of fire, including prevention, evacuation and response procedures.

https://www.fmmedia.com.au/sectors/maximum-precaution-fire-safety-in-aged-care-facilities/

Fire and Rescue NSW – Lessons from the Quakers Hill Nursing Home Fire

This article by Fire and Rescue NSW, released after the Quakers Hill fire, offers a section on 'Lessons for care facilities' and one on 'Challenges for firefighters', which can be useful in getting a different perspective on what is required by owners, managers, and staff during an event.

https://www.fire.nsw.gov.au/page.php?id=9134

Foundation of Rural and Regional Renewal (FRRR) – Contemporary Research and Practice in the field of Community-based Disaster Resilience

This research project, undertaken by FRRR in conjunction with the Torrens Resilience Institute, examines the multiple ways to measure and assess disaster resilience. It provides a broad-overview about the decision making process that went into creating this current toolkit, as well as giving examples of other useful disaster resilience tools.

https://www.frrr.org.au/resources/Formatted%20DR%20FR%20Lit%20Review2017_Final.pdf

HelpAge International – Disaster resilience in an ageing world

This booklet by HelpAge International offers a number of methods to involve older people in building organisational and individual resilience, and encourages engaging with them to draw on their capabilities to remain safe. While the information is geared towards those living or engaging with the broader community, and thus may not be relevant for homes with very frail or disabled patients, the idea of engaging with aged care residents and allowing them some input into disaster planning can allow for a more engaged, ready group. Chapters 2 and 3 are a useful starting point.

https://www.unisdr.org/2014/iddr/documents/DisasterResilienceAgeingWorld.pdf

National Climate Change Adaptation Research Facility (NCCARF) – Heat Ready: Heatwave awareness, preparedness and adaptive capacity in aged care facilities in three Australian states: New South Wales, Queensland and South Australia

This study by NCCARF is full of information about the effects of extreme heat on the elderly, and how it exacerbates existing conditions. It highlights the importance of having formal plans in place during heatwaves or hot weather to ensure that residents are kept healthy and hydrated. It offers some ideas of how facilities can improve the care of aged care residents during hot weather, and is an important to read for all Australian facilities.

https://www.nccarf.edu.au/publications/heat-ready-climate-aged-care

Appendix D: Useful references and links

New South Wales (NSW) Government – Evacuation Decision Guidelines

This resource by the NSW Government provides information to aged care facilities regarding what to do in the case of an emergency. It is not just specific to NSW, and offers a number of highly useful appendices with guides to decision making regarding evacuations for aged care facilities, and the multiple decisions and steps needed to ensure that evacuation is the right option, that the evacuation is undertaken safely and with the least amount of stress to residents as possible, and that the return to the facility is similarly stress-free.

https://www.emergency.nsw.gov.au/Documents/publications/guidelines/Guideline-Evacuation-Decision-Making-Guidelines-for-Health-and-Aged-Care-Facilities.pdf

Red Cross – Climate-Ready Communities

This general guide by the Red Cross is for anyone wanting to support their community to prepare for and adapt to the impacts of climate change. It offers a variety of tools for individuals to assess their communities' vulnerability to disasters, and encourages discussion and thought about how these events might become more common in future, and what can be done to mitigate the effects. This can assist aged care providers in assessing how to future-proof their facilities, and how to ensure residents are kept healthy and safe. The guide also encourages engagement with a number of tools such as the Regional Climate Change Adaptation Plans, to ensure users of the manual are well-informed and up-to-date with relevant climate change information.

https://www.redcross.org.au/get-help/emergencies/resources-about-disasters/resources-for-communities/climate-ready-communities

Red Cross – Emergencies Happen

Another general guide by the Red Cross is a valuable resource for individuals preparing for emergencies and may be useful to organisations in assisting those coordinating an emergency response to better prepare on a personal level. Any emergency that affects your facility may be widespread and thus impact employees, as well as resident's families and broader support networks. This guide offers advice for people in how to prepare for an emergency at home and within the broader community, how to manage stressful thoughts and feelings during and after an emergency, as well as encouraging thought exercises before an event to ensure that people are as prepared as they can be.

https://www.redcross.org.au/getmedia/eb80a653-73ff-4d87-9034-ea1d874c54c5/2017-03-06-RediPlan-Comprehensive-Guide.pdf.aspx

Residential Aged Care Services – Bushfire Ready Resource

A publication by the State Government of Victoria, this handbook is a valuable resource pertaining specifically to residential aged care services and their resilience to bushfires. Drawing on lessons learned during the 2009 bushfires, it provides insights into how to prepare for a bushfire, and the steps needed to ensure that residents are kept safe, including the creation of a business continuity plan and an emergency response plan. Being bushfire-specific allows this handbook to provide a wealth of specific information that should enable aged care providers to build their organisational resilience.

http://www.health.vic.gov.au/bushfire/downloads/racs_bushfire_resource.pdf

Appendix D: Useful references and links

Risk Management for Emergency Events in Aged Care

The Department of Health has created a general Risk Management page for Aged Care facilities. It provides the contact number to the Department of Health in each state, and provides further information about preparing for emergency events, and caring for older people in warmer weather, with information for both residential aged care providers, and home care providers. Additionally, it provides information about compliance with current legislation in the emergency arena.

https://agedcare.health.gov.au/publications-and-articles/guides-advice-and-policies/risk-management-for-emergency-events-in-aged-care

RMIT University – Disaster in Relation to Attachment, Loss, Grief and Recover: The Marysville Experience

This thesis by David Brandon Barton looks at the ways in which people respond to disaster, and how post-disaster actions by individuals and emergency managers is critical in ensuring that trauma is not prolonged. It looks at attachment to people, pets, place, possessions and participation. Useful for those seeking to understand more about reactions post-disaster and how to alleviate some of the stressors.

http://researchbank.rmit.edu.au/view/rmit:162288

United Nations Office for Disaster Risk Reduction (UNDRR) – Sendai Framework for Disaster Risk Reduction

The Sendai Framework is a United Nations (UN) initiative that aims to reduce disaster risk and losses in lives, livelihoods and health. This page allows toolkit users to see where the toolkit and their disaster resilience efforts sit within a global network.

https://www.unisdr.org/we/coordinate/sendai-framework

On the Frontline in Emergencies: A Practical Guide for Communities and Community Service Organisations'

The document was prepared for Berry Street in the wake of the 2009 Victorian Bushfires and the subsequent years of recovery efforts. Taking the learnings from these bushfires and other recent Australian disasters the guide is broken into key stages from 'Emergency response: the early days', 'The longer haul: case management, funding, resources' through to 'After the rush: longer-term recovery'. This guide sets out what to expect and challenges that may be faced, such as a flood of donated goods, staff shortages and burnout through to ways that community services may need to support whole communities, not just those who have been directly impacted by a disaster.

https://vcoss.org.au/analysis/on-the-frontline-in-emergencies-a-practical-guide-for-communities-and-community-services-organisations/

Water Management

WaterConnect is a portal to the latest information about South Australia's water resources, providing access to water-related publications and data. Their Hazard Management page provides information about flood awareness, with an interactive map designed for organisations and individuals to assess their current floodplain risk in the Adelaide metro area, and plan accordingly.

https://www.waterconnect.sa.gov.au/Pages/Home.aspx

Appendix E: Brief history of the development of the Scorecard

The Torrens Resilience Institute had previously developed a balanced scorecard for communities to assess their disaster resilience to all hazards.
More information can be found at:

https://www.flinders.edu.au/torrens-resilience-institute/resources

In 2013, the South Australian Department of Health, in collaboration with the SA Department of Planning, Transport and Infrastructure (DPTI) and the SA Department of Environment, Water and Natural Resources (DEWNR) used the Institute's Scorecard as a basis to develop the **Earthquake** and **Flood** Hazard Resilience Scorecards for Aged Care Facilities.

The aim of the two Scorecards was to assist aged care facilities in the process of becoming more resilient to potential earthquakes and floods. Each scorecard could provide a 'snapshot' of several key measures that are important to resilience.

Following a project completed in collaboration with Resthaven Inc. it was established that an assessment using both Scorecards took about two hours and was found to be repetitive and tedious for participants, as most questions were repeated (i.e., those not related to earthquakes and floods).

The decision was made to combine the scorecards to make the process more efficient and to add Fire as an additional focus for the Scorecard. Version 1.0 of the combined scorecard was developed.

Many of the terms included in the Glossary (in Appendix F) were part of the original **Earthquake** and **Flood** Hazard Resilience Scorecards for Aged Care Facilities.

Appendix F: Glossary

Term	Definition
Aftershock	Earthquakes that follow the largest shock of an earthquake sequence. They are smaller than the "mainshock" and can occur over a period of weeks, months, or years. In general, the larger the mainshock, the larger and more numerous the aftershocks and the longer they will continue.
Annual Exceedance Probability (AEP)	The likelihood of the occurrence of a flood of a given size or larger in any one year; usually expressed as a percentage. For example, if a peak flood flow of 500 m3/s has an AEP of 5%, it means there is a 5% chance (that is, one-in-20 chance) of a flow of 500 m3/s or larger occurring in any one year.
Area ignition	The ignition of several fires in an area, either simultaneously or in rapid succession, spaced so that they add to the main body of the fire to produce a hot, fast-spreading fire.
Arson	The criminal act of deliberately setting fire to property.
Astronomical tide	The variation in sea level caused by the gravitational effects of (principally) the moon and sun. Highest and lowest astronomical tides (HAT and LAT) occur when relative alignment and distance of the sun and moon from the earth are 'optimal'. Water levels approach to within 20 cm of HAT and LAT twice per year around mid-summer and mid-winter 'king tides'.
Attenuate	Weaken or become weak, reduce in magnitude.
Australian height datum (AHD)	A common national survey height datum 0.0 m AHD corresponds approximately to sea level.
Available fuel	The portion of the total fuel that would actually burn under various environmental conditions.
Average Recurrence Interval (ARI)	A statistical estimate of the average number of years between the occurrence of a flood of a given size or larger than the selected event. For example, floods with a flow as great or greater than the 20-year ARI (5% AEP) flood event will occur, on average, once every 20 years. Similar to AEP, ARI is another way of expressing the likelihood of a flood event; however, AEP is now the preferred term.
Backburn	In Australia, a backburn is a deliberately lit fire used by fire fighters to remove fuel in front of an advancing bushfire so that it will have reduced levels of fuel and be easier to control.
Bushfire	An unplanned fire outside the built-up urban environment in Australia. Known by different terms in other countries.
Bushfire hazard	An area where there is fuel available for a bushfire. Fuel includes any material which can be ignited and sustain a fire (e.g. vegetation, leaf litter, timber and brush fencing).
Bushfire risk	The chance of a bushfire occurring that will have harmful consequences to human communities and the environment.

Term	Definition
Bushfire threat	A term used to describe and analyse the danger that a bushfire poses in a particular area. There are four main aspects: 1. The likelihood of a fire starting and it is becoming uncontrollable; 2. The infrastructure/values that will be lost or damaged if a bushfire starts and gets out of control; 3. The extent of the damage that could be caused; 4. The resources that can be brought to bear on a fire and their effectiveness.
Business Continuity Planning	The strategies, plans and procedures for how an organisation will recover and restore partially or completely interrupted critical functions within a predetermined time after a disaster or extended disruption.
Catchment	The area of land draining to a particular site. It is related to a specific location and includes the catchment of the main waterway as well as any tributary streams.
Catchment flooding	Flooding due to prolonged or intense rainfall (e.g. severe thunderstorms, monsoonal rains in the tropics, tropical cyclones). Types of catchment flooding include riverine, local overland and groundwater flooding.
Coastal flooding	Flooding due to tidal or storm-driven coastal events, including storm surges in lower coastal waterways. This can be exacerbated by wind-wave generation from storm events.
Community	A group of people with a commonality of association and generally defined by location, shared experience or function.
Consequence	The outcome of an event or situation affecting objectives, expressed qualitatively or quantitatively. Consequences can be adverse (e.g. death or injury to people, damage to property and disruption of the community) or beneficial.
Critical infrastructure	Those physical facilities, supply chains, information technology and communications networks which, if destroyed, degraded or rendered unavailable for an extended period would significantly impact on the social or economic wellbeing of the state or affect the State's contribution to national social or economic well-being.
Defined Flood Extent (DFE)	The flood event selected for the management of flood hazard, as determined in floodplain management studies and incorporated in floodplain management plans. Selection of DFEs should be based on an understanding of flood behaviour and the associated risk and consequences of flooding. The DFE should also consider the social, economic and environmental consequences associated with floods of different severities. Different DFEs may be appropriate for structural measures (e.g. levees), different categories of land use and for emergency services planning. The concept of a range of DFEs supersedes sole focus on the 1% AEP flood event, as in earlier practice. DFEs do not define the extent of flood-prone land, which is determined by the PMF.

Appendix F: Glossary

Term	Definition
Earthquake	Ground shaking caused by a sudden movement on a fault or by volcanic disturbance.
Earthquake Hazard Leader	The Earthquake Hazard Leader is the agency which, because of legislative responsibility or specialised knowledge, expertise and resources undertakes a leadership role for planning emergency management activities pertaining to the prevention of, preparedness for, response to and recovery from the hazard of earthquake. (State Emergency Management Plan 2013).
Effective warning time	The effective warning time available to a flood-prone community is equal to the time between the delivery of an official warning to prepare for imminent flooding and the loss of evacuation routes due to flooding. The effective warning time is typically used for people to self-evacuate, to move farm equipment, move stock, raise furniture, and transport their possessions.
Epicentre	The location on the earth's surface that lies directly above the focus of an earthquake.
Evacuation (directed)	The controlled and managed movement of people from a threatened area to a place of safety in accordance with the provisions of the Emergency Management Act and other relevant legislation.
Evacuation (self)	The self-initiated movement of people from a threatened area to a place of safety.
Extreme bushfire weather	Extreme bushfire weather occurs when the temperature, wind strength, drought index is high, while relative humidity and fuel moisture is low. These conditions can occur every summer in Southern Australia. A bushfire occurring under extreme conditions moves rapidly, generates intense heat and is very difficult to suppress.
Fault	A fracture in the crust of the earth along which the separated sections have moved or been displaced in relation to each other. This displacement can be in a horizontal and/or vertical direction. The precise location and total lengths of faults are generally not known because they erode and become covered by alluvial (river) deposits.
Fire attack	Direct attack: fire fighters work on the edge of the fire, putting out flames with water, hand tools or earth moving machinery. Indirect attack: fire fighters work from a prepared fire line some distance for the fire edge and light a back burn.
Fire break	A strip of land where bushfire fuel is removed before a fire has occurred. Firebreaks rarely stop a fire from advancing, particularly in windy conditions, but they provide access and a prepared line from which to conduct a backburn or fight against an approaching fire.
Fire Danger Scale	An index which combines all factors that determine the likelihood of a bushfire starting, spreading and causing damage to identified values, and the difficulty of control. Used for daily preparedness planning in Australia by land managers and on signs warning the public of the daily fire danger on a six-level scale of low, moderate, high, very high, extreme and catastrophic.

Term	Definition
Fire front	The fastest moving part of the fire. It is also the hottest and most intense part of the fire and is the area from which most embers will come.
Fire hazard	Term used to describe a fuel which, if ignited, may be difficult to extinguish. There is also a scale of fire hazard from 'nil' to 'dangerous' which expresses the dryness of a fuel, and thus the likelihood of it catching alight. This is rarely used as it has been replaced by the Fire Danger Scale.
Fire perimeter	The entire outer edge or boundary of a fire.
Fire season	Times of the year during which bushfires are likely to occur and spread e.g. summer.
Flash Flood	Flash flooding occurs within six hours of the causative rainfall event. This type of flooding is caused by high rainfall storm events and can occur very quickly at almost any location. As there is little opportunity to warn people and prepare, flash flooding can be very destructive.
Flood	The covering of normally dry land by water that has escaped or been released from the normal confines of: • Any lake, or any river, creek or other natural water course, whether or not altered or modified; or • Any reservoir, canal or dam; • coastal or marine waters; or • pipes, dams, levees or other infrastructure due to structural failure, operations, malfunction, accident or other reasonsor as a result of rainfall-generated overland flow.
Flood awareness	An appreciation of the likely effects of flooding, and a knowledge of the relevant flood warning, response and evacuation procedures. In communities with a high degree of flood awareness, the response to flood warnings is prompt and effective. In communities with a low degree of flood awareness, flood warnings are liable to be ignored or misunderstood, and residents are often confused about what they should do, when to evacuate, what to take with them and where it should be taken.
Flood damage	The tangible (direct) and intangible (indirect) costs (financial, opportunity costs, clean-up) of flooding. Tangible costs are quantified in monetary terms (e.g. damage to goods and possessions, loss of income or services in the flood aftermath). Intangible damages are difficult to quantify in monetary terms and include the increased levels of physical, emotional, psychological health problems suffered by flood-affected people that are attributed to a flooding episode.
Flood frequency analysis	A statistical analysis to determine the relationship between peak discharge and the likelihood of the occurrence of the peak discharge. This is undertaken based on recorded historical data.
Flood hazard	The potential for flood to occur that causes harm to people, isolation of people, damage to property, damage to the environment, and/or other human, economic or environmental loss.

Appendix F: Glossary

Term	Definition
Flood Hazard Leader	The Flood Hazard Leader is the agency which, because of legislative responsibility or specialised knowledge, expertise and resources undertakes a leadership role for planning emergency management activities pertaining to the prevention of, preparedness for, response to and recovery from flood.
Flood intelligence	Information received from historical events and technical results from modelling to interpret a predicted flood level into a local context. It will translate a flood level at a key point (water level in a river upstream) to a local impact, such as flooding of low-lying areas, caravan parks, cutting of roads and railway lines, and inundation of homes and vulnerable communities (e.g. nursing homes that may require evacuation). Such intelligence is an important resource for response agencies in deploying their resources more efficiently. In addition, records of inundation levels are ideally collected during responses to improve such intelligence for future flood events.
Flood proofing of buildings	A combination of measures incorporated in the design, construction and alteration of individual buildings or structures that are subject to flooding, to reduce structural damage and potentially, in some cases, reduce contents' damage.
Floodplain	An area of land that is subject to inundation by floods up to and including the probable maximum flood (PMF) event – that is, flood-prone land.
Flow	The rate of flow of water measured in volume per unit time – for example, cubic metres per second (m3/s). Flow is different from the speed or velocity of flow, which is a measure of how fast the water is moving for example, metres per second (m/s).
Focus	The area of a fault where sudden rupture takes place causing an earthquake.
Foreshock	An earthquake that precedes the largest quake ("mainshock") of an earthquake sequence. Foreshocks may occur seconds to weeks before the main shock.
Fuel	Any material such as grass, leaf litter, twigs, bark, logs and live vegetation that can be ignited and sustain a fire. Measured in tonnes per hectare.
Fuel load	The dry weight of fuel per unit area that a fire would consume should it start.
Functional Services	A group of agencies that perform functional roles that support response and recovery activities during an emergency.
Governance	Management or leadership processes that define expectations, grants power, or verifies performance. Good governance is characterised by: • accountability, where the roles and responsibilities of parties are clearly understood, • participation, the involvement and agreement among affected parties of the governance arrangements, • predictability, the occurrence governance processes can be anticipated, and • transparency, the underlying logic of decisions that are made is subject to outside scrutiny.

Term	Definition
Ground Motion	Vibration and shaking of the ground during an earthquake.
Hazard	A potential or existing condition that may cause harm to people or damage to property or the environment.
Hazardous substances	These are substances with the potential, through being used at work, to harm the health or safety of persons in the workplace. They are mainly industrial chemicals and can harm people though on-going exposure rather than as a result of a specific accident or disastrous event. They range from toxic to sensitising substances, the latter causing 'only' allergic reactions.
Infrastructure failure	Infrastructure failure occurs when infrastructure including levees, dams and pipes fail due to lack of maintenance, age, poor operation, malfunction, accidents, climate impacts or extreme circumstances including other natural disasters such as earthquakes.
Intensity	A measure of ground shaking describing the local severity of an earthquake in terms of its effects on the Earth's surface and on humans and their structures. The Modified Mercalli Intensity (MMI) scale, which uses Roman numerals, is one way scientists measure intensity.
Landslide	A mass movement of soil, mud, and/or rock down a slope.
Likelihood	Used as a general description of the probability or frequency.
Liquefaction	The process that occurs when an earthquake shakes wet sandy soil until it behaves like a liquid, allowing sand to "boil up" to the surface, buildings to sink, or sloping ground to move.
Magnitude	A number that represents the size of an earthquake source, as determined from seismographic observations. The original earthquake magnitude scale was the Richter or "local" scale (ML), defined by Charles Richter in 1935, but it has limited range and applicability. Modern magnitude scales are based on the area of fault rupture times the amount of slip (seismic moment). The moment magnitude (MW) is the preferred magnitude scale, as it provides the most reliable estimate of the size of the largest quakes. For smaller quakes, ML and MW values are nearly the same. An increase of one unit of moment magnitude (for example, from 4.6 to 5.6) corresponds approximately to a 31.6 fold increase in energy released (by definition, a two-unit increase in magnitude, for example, from 4.7 to 6.7, represents an increase in energy released of 31.6 × 31.6 = 1000 times greater). Earthquakes below magnitude 2.5 are not generally felt by humans.

Appendix F: Glossary

Term	Definition
Minor, moderate and major flooding	These terms are often used in flood warnings to give a general indication of the types of problems expected with a flood: • Minor flooding causes inconvenience such as minor roads closures and the submergence of low-level bridges, the lower limit of this class of flooding on the reference gauge may be the initial flood level of which landholders and townspeople begin to be flooded. • Moderate flooding refers to the inundation of low-lying areas, which requires stock to be removed and/or some houses to be evacuated. Main traffic routes may be covered. • Major flooding refers to when appreciable urban areas and/or extensive rural areas are flooded. Properties, villages and towns can be isolated.
Mitigation	Measures taken in advance of a disaster aimed at decreasing or eliminating its impact on society and environment.
Modified Mercalli Scale	A number written in Roman numerals describing the severity of an earthquake in terms of its effects on the earth's surface, the population and structures.
Plate tectonics	The scientific theory that the Earth's outer shell is composed of several large, thin, relatively strong "plates" that move relative to one another. Movements on the faults that define plate boundaries produce most earthquakes.
Preparedness	The identification of hazards, assessment of threats and taking of measures to reduce or eliminate the adverse impact of potential natural hazard events.
Prescribed burn	The planned setting of a fire to achieve specific land management objectives e.g. reduce the fuel load.
Probable Maximum Flood (PMF)	The largest flood that could conceivably occur at a particular location, resulting from the probable maximum precipitation (PMP). The PMF defines the extent of flood-prone land. Generally, it is not physically or financially possible to provide general protection against this event. It is difficult to define a meaningful annual exceedance probability for the PMF event. It is commonly assumed to be in the order of 10-4 to 10-7 (i.e. a flood risk of 1 in 10,000 to 1 in 10,000,000).
Rate of spread	The rate at which a fire advances and enlarges. In forests, it is generally expressed as metres per hour. In grassland fuels, it is generally measured in kilometres per hour.
Recovery	The conduct of human, economic and environmental measures necessary to re-establish the normal pattern of life of individuals, families and communities affected by an emergency, including: (a) the restoration of essential facilities and services; (b) the restoration of other facilities, services and social networks; necessary for the normal functioning of a community (c) the provision of information, material and personal needs; (d) the provision of means of emotional support; (e) the recovery of the natural environment; and (f) support to assist the recovery of business

Term	Definition
Residual Risk	The risk remaining after implementation of risk treatment.
Resilience	A measure of how quickly a system recovers from failures.
Response	Activities that combat the adverse effects of a hazard event, provide emergency assistance for casualties, and help reduce further injury or damage and facilitate effective recovery operations for and in the local community.
Retrofit	Strengthening an existing structure to improve its resistance to the effects of earthquake.
Risk	A measure of the likelihood and consequence of something happening that will have an impact upon defined objectives.
Risk analysis	Process to comprehend the nature of risk and to determine the level of risk.
Risk assessment	Overall process of risk identification, risk analysis and risk evaluation.
Risk register	A listing of risk statements describing sources of risk and elements at risk with assigned consequences, likelihoods and levels of risk.
Risk treatment	The process of selection and implementation of measures to modify risk.
Riverine flooding	Inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam. Riverine flooding generally excludes watercourses constructed with pipes or artificial channels considered as stormwater channels.
Runoff	The amount of rainfall that drains into the surface drainage network to become stream flow. Also known as rainfall excess.
Rupture zone	The area of the Earth through which fault movement occurred during an earthquake. For large quakes, the section of the fault that ruptured may be several hundred miles in length. Ruptures may or may not extend to the ground surface.
Seismic waves	The waves of energy caused by the sudden breaking of rock within the earth or an explosion. They are the energy that travels through the earth and is recorded on seismographs. The two main types of waves are **body waves** and **surface waves.** Body waves can travel through the earth's inner layers, but surface waves can only move along the surface of the planet like ripples on water. Earthquakes radiate seismic energy as both body and surface waves.
Seismic Waves Continued - P Waves, Horizontal particle motion.	The first kind of body wave is the P wave or primary wave. This is the fastest kind of seismic wave, and, consequently, the first to 'arrive' at a seismic station. The P wave can move through solid rock and fluids, like water or the liquid layers of the earth. It pushes and pulls the rock it moves through just like sound waves push and pull the air. Sometimes animals can hear the P waves of an earthquake. Dogs, for instance, commonly begin barking hysterically just before an earthquake 'hits' (or more specifically, before the surface waves arrive). Usually people can only feel the bump and rattle of these waves. P waves are also known as compressional waves, because of the pushing and pulling they do. Subjected to a P wave, particles move in the same direction that the wave is moving in, which is the direction that the energy is traveling in and is sometimes called the 'direction of wave propagation'.

Appendix F: Glossary

Term	Definition
Seismic Waves Continued - S Waves, Vertical particle motion.	The second type of body wave is the S wave or secondary wave which is the second wave you feel in an earthquake. An S wave is slower than a P wave and can only move through solid rock, not through any liquid medium. It is this property of S waves that led seismologists to conclude that the Earth's outer core is a liquid. S waves move rock particles up and down, or side-to-side, perpendicular to the direction that the wave is traveling in (the direction of wave propagation).
Seismic Waves Continued – Surface Waves	Travelling only through the crust, surface waves are of a lower frequency than body waves and are easily distinguished on a seismogram as a result. Though they arrive after body waves, it is surface waves that are almost entirely responsible for the damage and destruction associated with earthquakes. This damage and the strength of the surface waves are reduced in deeper earthquakes.
Seismic zone	A geographic area sharing similar seismic risk.
Seismicity	The geographic and historical distribution of earthquakes.
Seismogram	A record written by a seismograph in response to ground motions produced by an earthquake.
Seismograph	A term that refers to the seismometer and its recording device as a single unit.
Seismologist	A scientist who studies earthquakes and seismic waves.
Seismology	The study of earthquakes and seismic waves that move through and around the earth.
Seismometer	An instrument that detects and records the motion of the earth's surface.
Shoring	The installation of temporary propping and bracing to stabilize a structure.
Significant asset	An asset that, if it is not functioning normally, leads to significant detrimental impact on the owner of the asset.
Soft storey	A building storey that has significantly less stiffness than the storey above. Some buildings with parking at ground level (and thus fewer walls or columns) or an otherwise open ground story have this condition. The term is sometimes also applied to a storey that has less strength than the one above, a condition that is more precisely termed a "weak story."
Source of risk	A source of potential harm.
Spot fire	A fire ignited outside the perimeter of the main fire by flying sparks or embers.
Stakeholder	A party who affects or can be affected by the development of any plans.
Storm surge	The increases in coastal water levels above predicted astronomical tide level (i.e. tidal anomaly) resulting from a range of location dependent factors including the inverted barometer effect, wind and wave set-up and astronomical tidal waves, together with any other factors that increase tidal water level.
Storm water	The runoff of water as a direct consequence of rainfall, typically in urban areas serviced by drainage infrastructure.
Strike-slip fault	A generally vertical fault along which the two sides move horizontally past each other. The most famous example is California's San Andreas Fault.
Subduction zone	A boundary along which one plate of the Earth's outer shell descends (subducts) at an angle beneath another. A subduction zone is usually marked by a deep trench on the sea floor. An example is the Cascadia Subduction Zone offshore of Washington, Oregon, and northern California. Most tsunamis are generated by subduction-zone earthquakes.
Tsunami	A sea wave of local or distant origin that results from large sea-floor displacements associated with powerful earthquakes, major submarine landslides, or exploding volcanic islands.
Uncertainty	The state, even partial, of deficiency of information related to, understanding or knowledge of, an event, its consequence, or likelihood.
Uncontrolled fire	Any fire which threatens to destroy life, property or natural resources.
Urban rural interface (URI)	The line, area, or zone where structures and other human development adjoin or overlap with undeveloped bushland.
Vulnerability	The susceptibility and resilience of the community and environment to hazards. Resilience is related to 'existing controls' and the capacity to reduce or sustain harm or loss. Susceptibility is related to the degree of exposure.

References

- Australian Building Codes Board 2012.
  Construction of Buildings in Flood Hazard Areas Information Handbook Version 2012.3, Canberra, Australia, Australian Building Codes Board.

- Australian Institute for Disaster Resilience 2017.
  Managing the floodplain: a guide to best practice in flood management risk in Australia,
  Victoria, Australian Institute for Disaster Resilience.

- Carswell, S. 2011.
  What we have learnt: Aged care provider learnings on responding to the February earthquake in Canterbury. (Report 1).
  New Zealand: Eldernet Ltd and Canterbury District Health Board.

- Department of Housing and Public Works 2013.
  Rebuilding after a flood: Water resilient products and building techniques.
  Queensland.

- Department of State Development 2013.
  Earthquakes, faults and house damage.
  Adelaide, SA: Resources and Energy Group.

- Geoscience Australia. 2019.
  Bushfire [Online]. Geoscience Australia. Available: http://www.ga.gov.au/scientific-topics/hazards/bushfire [Accessed].

- Hawkesbury-Nepean Floodplain Management Steering Committee 2006.
  Reducing vulnerability of buildings to flood damage: Guidance on building in flood prone areas.
  Parramatta, New South Wales: Hawkesbury-Nepean Floodplain Management Steering Committee.

- Maqsood, T., Wehner, M., Dale, K. & Edwards, M. 2016.
  Cost-Effective Mitigation Strategy Development for Flood Prone Buildings.
  Canberra, ACT: Geoscience Australia.

- Mason, M. P., E. Okada, T. and O'Brien, J. 2013.
  Analysis of damage to buildings following the 2010-2011 Eastern Australia floods.
  Gold Coast, QLD.

- Nolan, R. & Thornton, R. 2019.
  Bushfires 1: Understanding bushfires [Online].
  Australian Academy of Science.
  Available: https://www.science.org.au/curious/bushfires [Accessed].

- Resilient Organistations 2012.
  Shut Happens!
  New Zealand: Resilient Organisations Business Resource.

- Standing Committee of Agriculture and Resource Management 2000.
  Floodplain Management in Australia: Best Practice Principles and Guidelines.
  CSIRO Publishing.

- The Concrete Centre. 2015.
  Flood resilience [Online].
  Available: https://www.concretecentre.com/Performance-Sustainability-(1)/Flood-Resilience.aspx [Accessed].

- Torrens Resilience Institute 2012.
  Community Disaster Resilience Scorecard Toolkit.
  Torrens Resilience Institute, Adelaide

- Wilkie, L. 2013.
  'Numurkah Hospital and Karinya Nursing Home: The 2012 flood evacuation'.