



Australian Government

Infrastructure
Australia

Resilience principles

Infrastructure Australia's
approach to resilience



Section 1

Executive Summary

Summary

Infrastructure Australia is the nation's independent infrastructure advisor. We have a statutory role to share knowledge, promote good practice and facilitate collaboration and leadership. We undertake research and provide advice to governments, industry and the community on the infrastructure investments and reforms that will benefit Australians.

Since the summer of 2019, Australia has faced the COVID-19 pandemic, a record-breaking bushfire season, extensive flooding and drought, geopolitical risks and cyber-attacks on critical infrastructure networks. These events showed just how critical infrastructure is for safeguarding communities, ecosystems and the economy.

The high levels of exposure and vulnerability of our infrastructure and communities, along with the compounding impact of the disasters that Australia has experienced over the last two years, is a warning sign for the uncertainty and risk to our safety, livelihoods and economy that lies ahead.

In response to this, we are committed to ensuring that infrastructure assets and networks are designed, delivered and maintained to help improve Australian communities' resilience. We have a mandate (under the *Infrastructure Australia Act 2008*) to provide advice on matters relating to infrastructure, including:

- Australia's current and future needs and priorities relating to nationally significant infrastructure
- policy, pricing and regulatory issues that may impact on the utilisation of infrastructure
- policy issues arising from climate change
- the needs of users of infrastructure, and
- the delivery of infrastructure projects.

With this in mind, we have developed the following *Resilience Principles* to guide our work and promote resilient communities:

- Resist: Robust, fail safe and safe-to-fail
- Absorb: Prepared and ready to respond
- Accommodate: Spare capacity, variety and sufficient reserves
- Recover: Restoration and response
- Transform: Future focused, foresight and reflective
- Thrive: Integrated, flexible, innovative and inclusive
- Effective: Production of desired or intended result, place-based planning and engagement
- Timely: Accountability, transparency and promptness.

These principles enable us to adopt a consistent approach to inform our policy reform agenda and our infrastructure advisory and evaluation functions. We have also identified how we will promote, support, reflect and communicate resilience across our work.

Section 2

Defining resilience

Purpose of this document

This document defines Infrastructure Australia's approach to resilience in the infrastructure sector. It also outlines our view of the role of infrastructure in promoting resilient communities and ensuring infrastructure supports resilient outcomes.

Infrastructure Australia's resilience definition

We support an outcomes-focused understanding of resilience:

Resilient communities have the ability to resist, absorb, accommodate, recover, transform and thrive in a timely, effective manner in response to the effects of shocks and stresses to enable positive economic, social, environmental and governance outcomes.

Putting communities first

Infrastructure Australia's definition of resilience acknowledges the role of communities, not infrastructure assets, as the desired focus.

This approach moves away from the historical focus on building resilient infrastructure. Namely, the ability of infrastructure assets to withstand, adapt to changing conditions, and recover positively from shocks and stresses (see **Box 1** for definition of shocks and stresses). Infrastructure resilience relates to the structural integrity of physical infrastructure assets and service continuity. It involves allocating responsibility for action to one organisation or stakeholder to avoid, accept, reduce, or transfer a risk.

A community-centric, outcomes-focused definition of resilient infrastructure provides a touchstone for infrastructure asset owners and operators, all levels of government, policy-makers, regulators and communities to ensure each infrastructure decision appropriately reflects the long-term interests of infrastructure users and communities.

The importance of clear, actionable definitions that focus on resilient communities will be heightened over coming decades as the effects of shocks and stresses become more pronounced.

Enhancing risk management by rethinking resilience

The increasing challenges, complexity and interdependences of our infrastructure systems mean prevailing risk management approaches need to evolve to account for the interaction between multiple systems and the risks of multiple points of failure.

Increasing uncertainty and complexity partnered with increasing rate, frequency and magnitude of disruptive events means that the likelihood and impact of an event is harder to predict, quantify and manage. Therefore, the responsibility for action is more likely to be shared, or inappropriately simplified.

Traditional risk management approaches can overlook systemic risks that emerge from compounding shocks or stresses. The compounding impacts across entire systems of physical assets, organisations and communities can also fail to be understood.

Box 1: Defining shocks and stresses

Shocks: Disaster events with an immediate damaging impact, such as cyber-attacks, extreme storms or flooding.

Stresses: Chronic long-term or cyclical trends that undermine systems over time, such as rising inequity, ageing infrastructure or rising sea levels.

Examples of various shocks and stresses include:

- Disease pandemic
- Cyber attack
- Bushfires
- Extreme weather (including extreme heat, storm events, flooding)
- Water crisis
- Financial institution failure

Shocks



- Aged infrastructure
- Social cohesion and inclusion
- Climate change
- Drought
- Housing affordability
- Species extinction

Stresses



Aligning a definition with infrastructure for resilience

Our resilience definition focuses on the functionality or capacity of a system, rather than solely on one component. It also focuses on shared (rather than individual) responsibility at all levels of government, industry and the community.

This approach requires a shift in focus from 'resilient infrastructure' – that is, a sole focus on the resilience of assets themselves – to 'infrastructure for resilience', meaning, the contribution of assets and networks to the resilience of the system. It requires strengthening the asset, network, and sector, as well as strengthening places, precincts, cities, and regions.

In some instances, it may necessitate a transition away from a location or removing an asset entirely. This is a step-change from traditional approaches of attempting to prevent or mitigate the loss of individual assets due to specific events. This concept is discussed in more detail in Infrastructure Australia's papers *A Pathway to Infrastructure Resilience: Opportunities for systemic change* and the *2021 Australian Infrastructure Plan*.ⁱ

To achieve infrastructure for resilience, the owners and operators of infrastructure assets must collaborate. This involves both developing robust independent internal systems and processes, as well as ensuring integration or alignment with the community, emergency responders, local, state and territory governments, as well as the Australian Government around places and communities.

Taking a system view requires defining the outcomes and actions needed across all levels, which are:

- **Governance and Coordination:** These mechanisms play a foundational role in enabling infrastructure for resilience.
- **Place:** Enables consideration of local priorities and multiple issues at once. It is a basis for considering the uncertain cumulative impacts of decisions, the competing demands of

stakeholders, and negotiating outcomes. Taking a place-based approach creates a link between:

- assets and networks of assets,
 - local, context specific characteristics, and
 - the ultimate beneficiaries of infrastructure services: the community.
- **Assets:** No infrastructure asset exists in isolation. A single asset's failure can amplify impacts for people, economies and the natural environment and increase the risk of cascading, systemic failures.
 - **Community:** To ensure effective systems thinking and decision-making communities must be engaged early and throughout the project lifecycle. This can lead to better prepared communities and an improved social licence for infrastructure. It also ensures that all stakeholders learn from the community's knowledge of their 'place', understand how things work 'on the ground' and contribute to improving infrastructure design outcomes.

Our approach aligns with government

Consistency and a collective understanding of the system's focus are critical. We have ensured our systems focus aligns with established practice.

The *National Critical Infrastructure Resilience Strategy 2015*, the *National Disaster Risk Reduction Framework* and the *NSW Critical Infrastructure Resilience Strategy 2018*, identify three types of resilience:

1. **Infrastructure resilience:** the resilience planned for, designed, and built into assets, networks and systems (including natural assets)
2. **Organisational resilience:** the resilience of the organisations, personnel and processes supporting infrastructure to supply a service
3. **Community resilience:** the community's role in building and maintaining its own resilience while contributing to infrastructure resilience.

Infrastructure for resilience relates to the coordinated actions needed to increase the ability of assets, organisations and communities to prepare, cope and adapt to multiple shocks and stresses, and how to minimise their adverse economic, social and environmental impacts. This coordinated approach allows governments and the private sector to invest in the most cost-effective mix of infrastructure and non-infrastructure responses to increase resilience.

Section 3

Principles of resilience

Infrastructure Australia's principles of resilience

Resilient outcomes are dependent on the communities' ability across eight components of resilience, being to **resist, absorb, accommodate, recover, transform** and **thrive** in a **timely** and **effective** manner (see **Table 1**).

Our principles are designed to articulate the range of responses required for consideration in resilience planning. Tensions and trade-offs between the principles should be informed by a broader understanding of the nature of change, risk or threat, as well as place-based and community objectives. For example, resistance may be a helpful strategy in the short term to buy time and prepare for larger changes.

In other instances, the best option may be to exercise another principle such as transforming through the relocation of an asset, network or community. This could occur where a community cannot meet its needs due to inappropriate inter-dependencies or vulnerabilities or a changing climate.

Principles may often be contested and in conflict with each other. Resilience is a strategic focus area for Infrastructure Australia and we intend to provide additional advice and insights about handling these trade-offs, prioritising principles and practically achieving infrastructure for resilience.

No government acting in isolation has the capacity to ensure resilient communities. Traditional resilience methods place most of the responsibility for action on asset owners and operators. In a systemic conception of resilience, it is imperative that all actors in the system – from land-use planners, to individuals in the community, to governments – must understand who is accountable for ensuring resilience principles are satisfied. To do this, resilience needs to be embedded in all decision-making across systems, sectors, activities and risks.

Table 1: Resilience Principlesⁱⁱ

Component of resilience	Principle
Resist: Robust, fail safe and safe-to-fail	Systems that withstand or endure shocks and stresses to prevent an impact on infrastructure services, assets, networks, injury and loss of life. Failure should not be disproportionate to the cause. Systems should be safe-to-fail, anticipate failures and designed strategically to ensure failure is contained and minimised.
Absorb: Prepared and ready to respond	Well-constructed and well-managed systems that lessen the impact of all hazards on communities and infrastructure services. Systems should: <ul style="list-style-type: none"> - anticipate and proactively plan for future shocks and stresses, and provide services and infrastructure tailored to community needs and preferences, at reasonable cost. - identify low regrets pathways that consider long-term planning horizons and multiple scenarios.
Accommodate: Spare capacity, variety and sufficient reserves	Systems with the capacity to deal with disruption, pressure and surges in demand. A core trait is the redundancy of a system, which is the ability to maintain operations without significant deterioration in quality or value through additional capacity or substitution.
Recover: Restoration and response	Systems with the ability to respond and mitigate the consequences of shocks or stresses. Infrastructure and policies that help systems restore expected levels of service levels following an event, to the entire system without jeopardising services in other sectors, assets, networks or communities.
Transform: Future focused, foresight and reflective	Systems that change, evolve, adapt and learn in response to current and future trends and uncertainty. The ability to continually assess, build knowledge, learn and improve to inform future decisions. Returning to normal does not strengthen resilience but consolidates it. Transformation involves community behavioural change and an understanding of how to act before, during and after a disaster.
Thrive: Integrated, flexible, innovative and inclusive	Where possible, systems that allow communities to meet their needs and maintain their livelihoods before, during and after a shock or stress by safeguarding and minimising impact to economic, social, environmental and governance outcomes.
Effective: Production of desired or intended result, place-based planning and engagement	Systems are managed and perform as intended. Systems that achieve productivity, in line with community expectations and willingness to pay. Effective engagement promotes transparency, inclusivity and place-based approaches.
Timely: Accountability, transparency and promptness	Decisions about the system are prompt, transparent and made in a reasonable timeframe, using various communication channels, data platforms and engagement techniques.

Changes to the resilience principles

Our resilience definition and principles are slightly different to those set out in the 2021 *Infrastructure Australia Assessment Framework*.ⁱⁱⁱ These changes reflect Infrastructure Australia’s commitment to mature our understanding of community resilience and ensure it aligns with our goal of systemic resilience, and broader government definitions.

Additionally, the word ‘efficient’ has been removed from our original definition of infrastructure resilience and replaced with ‘effective’.^{iv} Stakeholder engagement has suggested that efficiency can be at odds with resilience. Redundancy and spare capacity are essential qualities of resilience. Efficiency often contradicts this because it aims to minimise costs, which can limit the system’s critical functionality.

Our sustainability principles

Infrastructure Australia's approach to sustainability can be found in the *Sustainability Principles: Infrastructure Australia's approach to sustainability*.^v It states that sustainable outcomes are contingent on balancing social, economic, environmental and governance components. Balancing outcomes across these four areas will help communities to thrive and be fair, while not adversely impacting future generations and the planet.

Resilience's relationship to sustainability

Resilient communities are critical to sustainability. While resilience assumes things will go wrong, sustainability focuses on maintaining our planet and future generation's quality of life.

Meeting the outcomes definition of resilience will help meet sustainability outcomes. This is because resilience decisions will have a bearing on sustainability outcomes. For example, a failure to protect communities will diminish public trust in institutions, resulting in a trust deficit that could hinder the approval of beneficial sustainability policies.

Failure to foster resilient communities results in a short-term, reactive policy focus to mitigate damage and loss of life, and livelihood. This effect is more pronounced in a fiscally constrained environment.

A lack of resilience also magnifies poor sustainability outcomes in vulnerable groups. In the absence of adaptation, even minor shocks or stresses can result in prolonged recovery. If resilience is not addressed, this can make communities more vulnerable, exposed and unable to action, plan or prioritise sustainability reform.

Conversely, sustainability practices also have the potential to prevent or mitigate shocks and stresses. For example, preserving blue and green space can reduce urban heat. In addition, reducing greenhouse gases and restricting climate change will likely lessen the severity and frequency of climate related shocks and stresses.

How we promote resilience

How Infrastructure Australia promotes resilience

We are committed to resilient communities and have identified how we promote, support, reflect and communicate resilience across our work. We support resilient outcomes, accountability and a systemic approach to resilience through a commitment to working collaboratively, sharing knowledge, promoting good practice and researching the challenges and opportunities that inform success. We plan to continuously refine our resilience definition and our understanding of the factors required to achieve resilient outcomes as defined through our principles.

Leading and informing debate

We lead and inform debate about policies and reforms that support resilience across all infrastructure sectors. By supporting knowledge sharing, we build capability at all levels of government and within industry. We work collaboratively with proponents and stakeholders to continuously improve the resilience of infrastructure investment decisions. We also advocate for and facilitate collaboration across all levels of government to ensure accountability and understanding of resilience.

Providing transparency, clarity and evidence

We are committed to recognising best practice in resilience planning through the *Infrastructure Australia Assessment Framework*. We are committed to continuously improving our assessment guidelines and working collaboratively with governments and proponents to help them consider resilient outcomes at every stage of infrastructure development. We also provide government, the private sector and communities with relevant, up-to-date evidence to enable good decision-making.

Recognising domestic and global leadership

We support domestic and international leadership to progress resilient communities and help deliver improved economic, environmental, social and governance outcomes. We advocate for a think global and act local approach. We support the Australian Government's endorsement of the United Nation's 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals.^{vi} We recognise the leadership provided by the United Nations' *Sendai Framework on Disaster Risk Reduction (2015-2030)*.^{vii}

Domestically, the following initiatives and work have been valuable inputs to Infrastructure Australia's approach to resilience:

- The Australian Institute for Disaster Resilience's *Disaster Risk Handbook*^{viii}
- The Commonwealth Scientific and Industrial Research Organisation report on *Climate and Disaster Resilience*^{ix}
- The Australian Business Roundtable for Disaster Resilience and Safer Communities' *Resilience Valuation Initiative*^x
- National Resilience Taskforce and the Department of Home Affairs' *National Disaster Risk Framework*^{xi}
- New South Wales Treasury and Infrastructure NSWs' *Guidelines for Resilience in Infrastructure Planning: Natural Hazards*.^{xii}
- *The Royal Commission into National Natural Disaster Arrangements Report*.^{xiii}

Ongoing efforts for reconciliation with Aboriginal and Torres Strait Islander peoples

Aboriginal and Torres Strait Islander communities often bear a disproportionate and generational impact from shocks and stresses. We are committed to contributing to quality-of-life and safety improvements for Aboriginal and Torres Strait Islander communities through better infrastructure decision-making.

Our Reflect Reconciliation Action Plan aims to acknowledge the need to empower communities, through improved and culturally appropriate education and health services or opportunities for employment and development.^{xiv} In 2023 we intend to release our Innovate RAP, which will develop and pilot strategies for reconciliation initiatives, set aspirational deliverables and publicly report on these initiatives.

Section 4

Resilience in our work program

How we include resilience in our work

The following sections outline how we are embedding our understanding of resilience and promoting resilient outcomes in our work program.

The 2021 Australian Infrastructure Plan

The *2021 Australian Infrastructure Plan* (the Plan) sets out the infrastructure solutions required to drive productivity growth, maintain and enhance our standard of living, and ensure our cities and regions remain world class. The 2021 Plan outlines practical and implementable resilience reforms, which have been informed through consultation, collaboration and partnerships with industry, peak bodies, governments, and the community. The 2021 Plan includes a Sustainability and Resilience chapter, and is also a cross-cutting theme considered throughout all other chapters.

The chapter's three core recommendations are:

- Build community resilience to all hazards by considering systemic risks, interdependencies and vulnerabilities in infrastructure planning and decision-making.
- Meet Australia's present and future needs by establishing the quadruple bottom line as a goal for all infrastructure policy and investment.
- Build community trust in infrastructure decision-making and institutions by ensuring infrastructure decisions are transparent and reflect place-based community needs and preferences.

The 2019 Australian Infrastructure Audit

The *2019 Australian Infrastructure Audit* (the Audit) strategically defined Australia's nationally significant infrastructure needs over the next 15 years. The 2019 Audit formed the evidence base for the 2021 Plan, while assessing equity, productivity, and value for money considerations in identifying the challenges and opportunities Australia is likely to face.

The 2019 Audit found trends impacting infrastructure planning were creating growing uncertainty. Since publication, Australia has experienced bushfires, drought, storms, floods, coastal erosion, cyber-attacks and the COVID-19 pandemic. These events have highlighted increasing uncertainty and a growing interconnection of Australia's infrastructure, environment, people and places. They have also demonstrated the importance of building infrastructure resilience to safeguard communities, ecosystems and the economy.

The 2019 Audit identified significant challenges hindering these outcomes. It concluded that Australia needs comprehensive resilience strategies and reform that reduce the personal, social, and financial costs of shocks and stresses by improving the resilience of assets and services.^{xv}

A Pathway to Infrastructure Resilience

Infrastructure Australia consistently advocates for reform on essential issues including the planning, funding, delivery and use of our nation's infrastructure. Leveraging the recommendations in the 2021 Plan, we make the case for change.

In June 2021, in partnership with Infrastructure New South Wales, we produced *A Pathway to Infrastructure Resilience*. It recommends a whole-of-system, all-hazards approach to resilience planning that focuses on strengthening an infrastructure asset, network and sector, as well as the place, precinct, city, and region that the infrastructure operates within.^{xvi} Two papers were produced:

- *A Pathway to Infrastructure Resilience: Opportunities for systemic change*: 10 directions for transformational and systemic change in infrastructure planning to achieve infrastructure for resilience.
- *Guidance for asset owners and operators in the short term*: A series of short-term actions for asset owners and operators as the first steps towards this change.^{xvii}

We collaborated with 600 experts across Australia from government, industry, peak bodies, academia and civil society organisations to inform the findings and directions defined in this work.

Infrastructure Market Capacity Report and policy papers

The Infrastructure Market Capacity report responds to a request from the Council of Australian Governments in March 2020 for Infrastructure Australia to regularly report on the market's capacity to deliver on the record investment pipeline, which looked at the record investment in the sector and the necessary demand for skills and materials to meet these levels.^{xviii}

As part of the report, we also published *National study of infrastructure risk*.^{xix} This study provides a new analysis of systemic, sectoral and project risks for infrastructure delivery with detailed consideration of 12 critical risks to upcoming infrastructure projects. The report was accompanied by an *Infrastructure Risk Dashboard*, which is designed to help users focus on the right project risks. It presents a library of common risks classified by project type and infrastructure sector, and maps these risks against climate information and geographical regions across Australia.

The *Delivering Outcomes* report, released in March 2020, states that transformational change is needed in how we plan and deliver infrastructure in Australia. This change must focus on delivering better outcomes for the community and for business through a more productive, resilient, innovative and sustainable infrastructure sector. The reforms identified by this report will have long-term consequences for the resilience of communities and services received by infrastructure service users and the community.

2022 Regional Strengths and Infrastructure Gaps report, released in March 2022, aims to provide a national view of the diverse strengths and infrastructure gaps (including resilience) facing Australia's regions in order to enable the identification of priority areas for future planning and analysis. By identifying infrastructure challenges and opportunities, Infrastructure Australia hopes to encourage governments, industry and the community to come forward with solutions to address these challenges.

Infrastructure Australia's Assessment Framework

Our Assessment Framework sets out the process Infrastructure Australia uses to consider proposals for inclusion on the *Infrastructure Priority List*.^{xx} It also provides information about what Infrastructure Australia does and how proposals are assessed, to enable proponents to develop their submissions.

The 2021 edition of the Assessment Framework provides advice on how we assess resilience and how proponents can consider it in their proposal development. Importantly, we encourage proponents to consider resilience at the earliest stages of proposal development, during the problem or opportunity identification stage. We then recommend that resilience is further considered and analysed during option development and as part of the final business case. This supports

consideration of resilient outcomes throughout the infrastructure planning process and not as an afterthought once a preferred solution has been selected.

Infrastructure Priority List

The *Infrastructure Priority List* (Priority List) is a prioritised list of nationally significant investment opportunities. It provides decision makers with advice and guidance on specific infrastructure investments that will underpin Australia's continued prosperity.^{xxi} As a national investment pipeline, the Priority List can promote resilient outcomes by identifying and then endorsing proposals with resilience benefits. Relevant examples include:

- Town and City water security outlines a mix of infrastructure and non-infrastructure responses, such as demand management, to efficiently meet agreed service standards for water security in Australia's towns and cities.
- Hawkesbury-Nepean Valley flood management presents a series of proposals and investments to reduce flood risk in the valley.
- Perth and south-western coast water security is a program of water sourcing and water demand management interventions to improve water security. This could include a mix of more conventional water sources and, more innovative reuse and recovery options, to provide additional climate-independent potable and non-potable water sources.
- Enabling Infrastructure for Remote Northern Territory communities' identifies the need for infrastructure upgrades to support resident's sustainable economic and social development.
- Northern Territory remote community power generation program sets out an opportunity to improve the resilience, flexibility, reliability, amenity and sustainability of power infrastructure in remote Aboriginal communities of the Northern Territory.

Resilience focused advocacy and engagement

We lead the **Resilience and climate risk workshop**. The workshop is an annual online workshop to ensure resilience and climate risk project visibility, identify opportunities for collaboration and promote coherency and consistency in resilience and climate risk assessment and appraisal.

We also take part in several industry and government initiatives to progress best practice:

- **Resilience Valuation Initiative:** A coalition of stakeholders seeking to value resilience and advance an accepted process with enabling methodologies for understanding the value of a resilience-building asset, network, feature or activity.^{xxii}
- **The Department of Agriculture Water and Environment's (DAWE) National Climate Resilience and Adaptation Strategy, and National Climate Scenarios:** Improving climate information and services, supporting partnerships and collaboration and driving practical resilience and adaptation outcomes through national coordination and cooperation.
- **Climate KIC and DAWE's Use of Climate Scenarios paper:** Consolidated efforts at a national and sectoral level to produce a set of standard or reference climate scenarios for Australia with accompanying guidance and information on their application.^{xxiii}
- **CSIRO's Enabling Resilient Investment approach:** An approach to value resilience by preparing for funding and financing, building resilience investment cases and creating adaptive space, options and pathways.^{xxiv}
- **Australian Institute of Disaster Resilience's Disaster Risk Reduction Handbook:** Guidance on national principles and practices for disaster resilience.^{xxv}
- **The Organisation for Economic Co-operation and Development (OECD) Blue Dot Network:** Multi-stakeholder initiative to provide assessment and certification of infrastructure development projects.

In addition, Infrastructure Australia provide detailed research and advice to help chart a pathway to resilient reform. These include *Planning Liveable Cities: A place-based approach to sequencing infrastructure and growth*^{xxvi} and *Future Cities: Planning for our growing population*.^{xxvii}

References

- ⁱ Infrastructure Australia and Infrastructure New South Wales 2021, *A Pathway to Infrastructure Resilience: Opportunities for systemic change*, Infrastructure Australia, Sydney, p 1, available via: <https://www.infrastructureaustralia.gov.au/publications/pathway-infrastructure-resilience-0>
- ⁱⁱ Melbourne Sustainable Society Institute 2021, *Urban resilience for local government: Concepts, definitions and qualities*, Melbourne, p 12, available via: https://sustainable.unimelb.edu.au/_data/assets/pdf_file/0012/3960399/MSSI_Issues_Paper_Urban-resilience-for-local-government_Concepts-definitions-and-qualities.pdf; The Department of Home Affairs 2018, *National Disaster Risk Reduction Framework*, The Australian Government, Canberra p 5, available via: <https://www.homeaffairs.gov.au/emergency/files/national-disaster-risk-reduction-framework.pdf>; United Nations Office for Disaster Risk Reduction 2015, *Sendai Framework for Disaster Risk Reduction 2015-2030*, The United Nations, New York, p 10, available via: <https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030>; Arup and the Rockefeller Foundation 2020, *The City Resilience Index*, the Rockefeller Foundation, London, p 1, available via: <https://www.arup.com/projects/city-resilience-index>
- ⁱⁱⁱ Infrastructure Australia 2022, *Infrastructure Australia Assessment Framework*, Sydney, p 1, available via: <https://www.infrastructureaustralia.gov.au/publications/assessment-framework>
- ^{iv} Infrastructure Australia and Infrastructure New South Wales 2021, *A Pathway to Infrastructure Resilience: Opportunities for systemic change*, Infrastructure Australia, Sydney, p 1, available via: <https://www.infrastructureaustralia.gov.au/publications/pathway-infrastructure-resilience-0>
- ^v Infrastructure Australia 2020, *Sustainability Principles: Infrastructure Australia's approach to sustainability*, Sydney, p 1, available via: https://www.infrastructureaustralia.gov.au/publications/sustainability_principles
- ^{vi} The United Nations 2020, *Sustainable Development Goals*, The United Nations, viewed on 30 November 2020, available at: <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>
- ^{vii} World Economic Forum 2020, *The Six Qualities of Sustainable Infrastructure*, viewed 7 December 2020, World Economic Forum, available at: <https://www.weforum.org/reports/six-qualities-of-sustainable-infrastructure-in-action>
- ^{viii} Australian Institute of Disaster Resilience 2020, *Australian Disaster Resilience Handbook Collection*, Australian Institute of Disaster Resilience, viewed 19 May 2020, <https://knowledge.aidr.org.au/collections/handbook-collection/>
- ^{ix} Commonwealth Scientific and Industrial Research Organisation 2020, *Climate and Disaster Resilience: Technical Report*, CSIRO, Canberra, p 2, available via: <https://www.csiro.au/en/research/natural-disasters/bushfires/report-climate-disaster-resilience>
- ^x The Australian Business Roundtable for Disaster Resilience and Safer Communities 2021, *Resilience Valuation Initiative*, The Australian Business Roundtable for Disaster Resilience and Safer Communities, Sydney, p 1, available via: <http://australianbusinessroundtable.com.au/our-initiatives>
- ^{xi} National Resilience Taskforce and the Department of Home Affairs 2018, *National Disaster Risk Reduction Framework*, the Department of Home Affairs, Canberra, p 1, available via: <https://www.homeaffairs.gov.au/emergency/files/national-disaster-risk-reduction-framework.pdf>
- ^{xii} New South Wales treasury and Infrastructure NSW 2019, *Guidelines for Resilience in Infrastructure Planning: Natural Hazards*, New South Wales treasury, Sydney, p 1, available via: <https://www.treasury.nsw.gov.au/sites/default/files/2019-08/GUIDELINES%20FOR%20RESILIENCE%20IN%20INFRASTRUCTURE%20PLANNING%20-%20NATURAL%20HAZARDSV2.pdf>
- ^{xiii} The Royal Commission into National Natural Disaster Arrangements 2020, *Royal Commission into National Disaster Arrangements Report*, The Royal Commission, Canberra, p 1, available via: <https://naturaldisaster.royalcommission.gov.au/system/files/2020-11/Royal%20Commission%20into%20National%20Natural%20Disaster%20Arrangements%20-%20Report%20%20%5Baccessible%5D.pdf>
- ^{xiv} Infrastructure Australia 2020, *Reflect Reconciliation Action Plan May 2020-May 2021*, Sydney, p 3, available via: <https://www.infrastructureaustralia.gov.au/reconciliation-action-plan>
- ^{xv} Infrastructure Australia 2019, *Australian Infrastructure Audit 2019*, Infrastructure Australia, Sydney, p. 46, available via: https://www.infrastructureaustralia.gov.au/sites/default/files/2020-10/Audit%202019_Full%20pdf_Updates%20September%202020.pdf
- ^{xvi} Infrastructure Australia and Infrastructure New South Wales 2021, *A Pathway to Infrastructure Resilience: Opportunities for systemic change*, Infrastructure Australia, Sydney, p 1, available via: <https://www.infrastructureaustralia.gov.au/publications/pathway-infrastructure-resilience-0>

-
- ^{xvii} Infrastructure Australia and Infrastructure New South Wales 2021, *A Pathway to Infrastructure Resilience: Opportunities for systemic change*, Infrastructure Australia, Sydney, p 1, available via: <https://www.infrastructureaustralia.gov.au/publications/pathway-infrastructure-resilience-0>
- ^{xviii} Infrastructure Australia 2021, *Infrastructure Market Capacity Report*, Sydney, p 3, available via: <https://www.infrastructureaustralia.gov.au/sites/default/files/202202/Infrastructure%20Market%20Capacity%20report%2020220201.pdf>
- ^{xix} Infrastructure Australia 2021, *A National Study of Infrastructure Risk*, Sydney, p 3, available via: <https://www.infrastructureaustralia.gov.au/sites/default/files/2021-10/A%20National%20Study%20of%20Infrastructure%20Risk%20211013a.pdf>
- ^{xx} Infrastructure Australia 2022, *Infrastructure Priority List*, Sydney, p 1, available via: <https://www.infrastructureaustralia.gov.au/infrastructure-priority-list>
- ^{xxi} Infrastructure Australia 2022, *Infrastructure Priority List*, Sydney, p 1, available via: <https://www.infrastructureaustralia.gov.au/infrastructure-priority-list>
- ^{xxii} Resilience Valuation Initiative 2022, *Resilience Valuation Initiative*, Sydney, available via: <https://resiliencevaluation.com.au/>
- ^{xxiii} Climate KIC 2020, *The use of climate scenarios in Australia*, Sydney, p 1, available via: <https://climate-kic.org.au/2021/08/16/the-use-of-climate-scenarios-in-australia/>
- ^{xxiv} CSIRO 2022, *Enabling Resilient Investment Approach*, Canberra, p 5, available via: <https://research.csiro.au/enabling-resilience-investment/>
- ^{xxv} AIDR 2021, *Systemic Disaster Risk Handbook*, Sydney, p 3, available via: <https://knowledge.aidr.org.au/resources/handbook-disaster-risk/>

