



Draft Resilience Assessment Guide v.1

October 2021 – version 1

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RESILIENT SYDNEY

A program for metropolitan Sydney to build the capacity of individuals, communities, institutions, businesses and systems to survive, adapt and thrive in the face of chronic stresses and acute shocks.

Resilient Sydney is aligned to the global Resilient Cities Network, previously 100 Resilient Cities, pioneered by the Rockefeller Foundation. The Resilient Sydney Office is funded by local government and hosted by the City of Sydney.

www.resilientsydney.com.au

RESILIENT CITIES NETWORK

Resilient Cities Network is a urban resilience network, bringing together global knowledge, practice, partnerships, and funding to empower members to build safe and equitable cities for all

www.resilientcitiesnetwork.org

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Acknowledgement of Country



We acknowledge Aboriginal and Torres Strait Islander peoples as the First People and traditional custodians of the land and waters of this place we now call Sydney.

Aboriginal peoples continue to show great resilience and generosity of spirit towards other peoples with whom they now share their land and waters. We recognise that by acknowledging our shared past, we are paving the way for a future where all Australians are embraced. To be resilient Sydney needs a future based on mutual respect and shared responsibility, where everyone and all living things can thrive

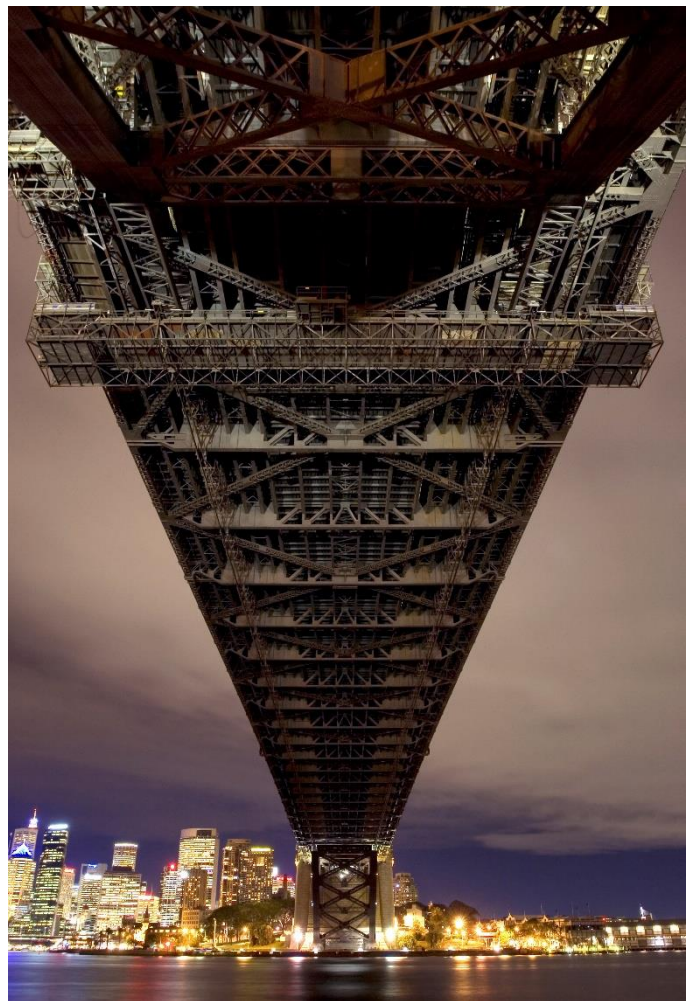
Foreword

Disruptive shock events magnify underlying community stresses. This Resilience Assessment Guide provides a framework to diagnose how these shocks and stresses interact within a local community and their relationship to the assets and services provided within a specific location.

Whether you are examining the services your council provides to the community, the critical infrastructure services your organisation provides, or your responsibilities for emergency management planning and response, taking a holistic perspective of shocks and stresses will support planning and preparedness.

Building on the results of the metropolitan scale Resilient Sydney resilience assessment, this Guide provides a framework to explore how shock and stresses may result in resilience hazards within a specific place and community. By applying this Guide within your local or regional context, it is possible to:

1. Identify the key community stresses, and likely or most disruptive shock events, in advance
2. Understand potential impacts in the context of longer trends
3. Identify the 'resilience hazards' for that place
4. Test resilience hazards and priorities with the community and stakeholders of that place
5. Develop key projects, investments, policies, processes and networks to collaboratively manage the hazards and reduce future impacts across NSW.



The Guide

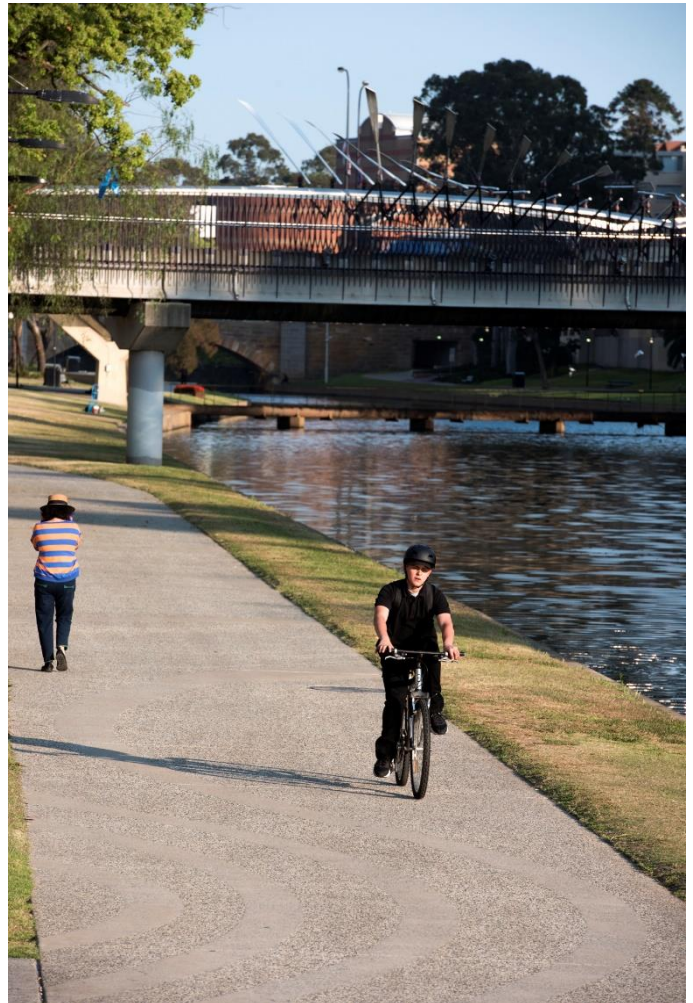
This Guide can be used to develop a place-based resilience assessment to identify a community level risk profile. The Guide identifies how this assessment process aligns to and can inform:

- The development of Local Emergency Risk Assessments (LERA) and/or Local Emergency Management Plans (LEMPs)
- Local government Integrated Planning and Reporting requirements including the development of Community Strategic Plans and in particular Resourcing Strategy documents such as the Assets Management Plan and Long-Term Financial Plan.
- Development of corporate risk registers.

This Guide has been published through a partnership between the City of Sydney, Resilient Sydney and the City of Sydney Local Emergency Management Committee.

This Guide aims to support the uptake of this resilience hazard assessment process by organisations and Local Government Authorities across Metropolitan Sydney and wider NSW.

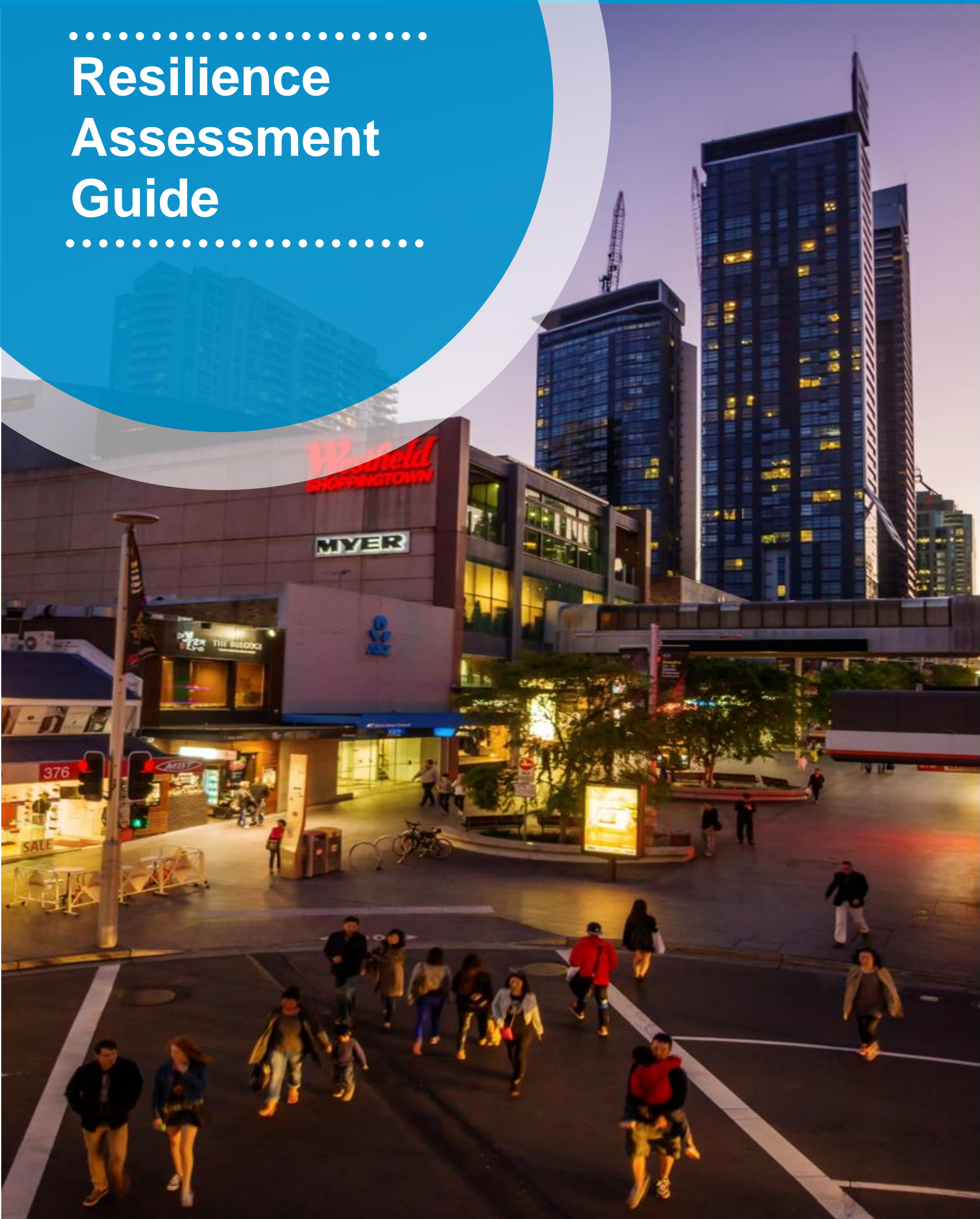
AECOM was engaged to develop the Guide. This Guide builds upon the resilience assessment process and Assets and Risks Tool used by 100 member cities of the 100 Resilient Cities initiative pioneered by the Rockefeller Foundation. Today, the Resilient Cities Network builds on the legacy of the 100 Resilient Cities initiative in partnership with this global community of cities and Chief Resilience Officers.



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Resilience Assessment Guide

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Understanding resilience hazards

Resilience hazards are defined as those hazards arising from a combination of social, economic or environmental shock and stress events.

Resilience hazards acknowledge that disruptions arise from a range of causes, and that harm can be minimised by taking a holistic approach.

Resilience is defined as the capacity of individuals, communities, institutions, business and systems to survive, adapt and grow no matter what kinds of chronic stresses and acute shocks they experience.

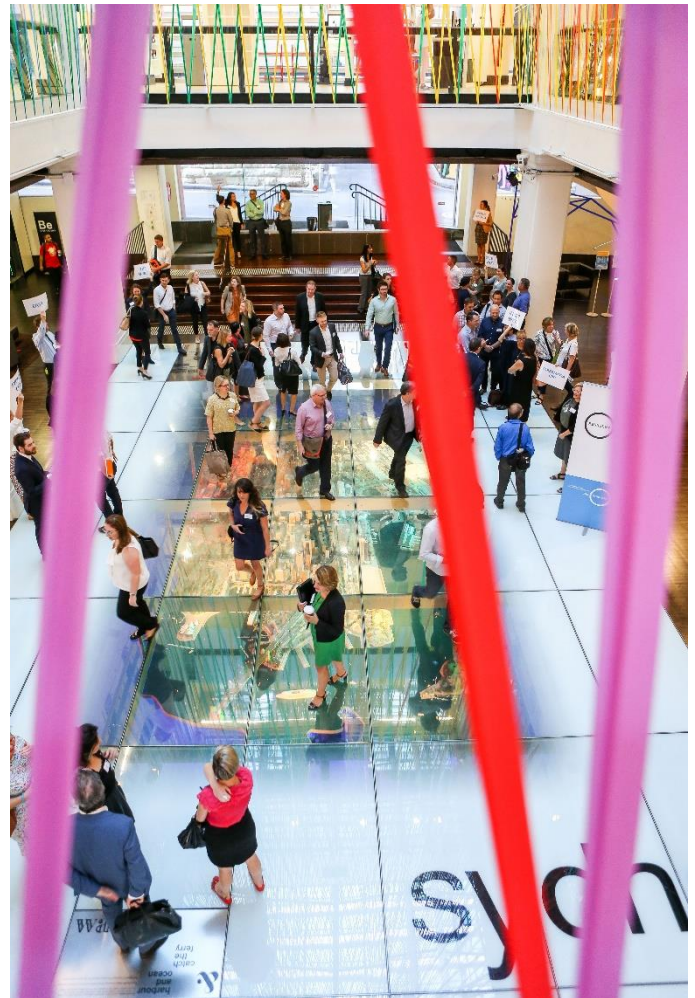
Acute shocks are sudden, short-term events that disrupt individuals, communities, institutions, business and systems. Examples include major storms, floods, bushfires, heatwaves, disease outbreaks, terrorism and cyber-attacks.

Chronic stresses weaken a systems and communities on a day-to-day or cyclical basis. Examples include homelessness and housing affordability, lack of access to public transportation systems, family violence, climate change, structural inequity, and chronic food or water shortages.

Systems include critical assets and infrastructure¹.

The resilience assessment undertaken recognises that there is a relationship between shocks and stresses, and that the consequences of shock events experienced by individuals, communities, institutions, business and systems can be influenced by the stresses experienced.

Causes of shocks and shocks themselves are interdependent, for example there is a strong relationship between critical infrastructure failure, and breakdown of critical information infrastructure, and either may be caused by terror or cyber-attacks.



¹ NSW Critical Infrastructure Resilience Strategy 2018

<https://www.emergency.nsw.gov.au/Documents/publications/policies/NSW%20Critical%20Infrastructure%20Resilience%20Strategy%202018.pdf>

The resilience assessment process

Disruptive Building on the Metropolitan Sydney Regional Resilience Assessment

The findings of the Resilient Sydney Metropolitan Sydney Resilience Assessment, as summarised in the Resilient Sydney Strategy (2018) can be used as a baseline for your resilience hazard assessment. By reviewing these baseline inputs in light of your local and organisational context this Guide helps organisations to understand their exposure to resilience hazards. The resilience hazard assessment tool provided in Appendix C steps through the resilience hazard assessment process.

The Metropolitan Sydney resilience assessment results can be used as a starting point to understand and identify which assets/infrastructure, shocks, stresses and/or megatrends you would like to include in your assessment. You should review these results and revise to be relevant to your local context, asset registers, community engagement outcomes and other relevant documents. You may wish to consider any key areas of interdependencies your organisation has with Metropolitan Sydney wide assets/infrastructure, shocks, stresses and/or megatrends. These dependencies should inform your development of the resilience hazards relevant to your local context.

Assessment and prioritisation of findings

A range of tools can be used to help inform the resilience hazard assessment process. You may wish to adopt internal existing risk management processes, consequence and likelihood criteria, and/or the findings of other existing risk assessments such as the Local Emergency Risk Assessment (LERA).

A recommended tool for use is the 100 Resilient Cities Assets and Risks Tool. The 100 Resilient Cities Assets and Risks Tool has been used globally to help cities (including the City of Sydney as part of the Resilient Sydney Strategy) and other organisations to assess resilience and determine the key shocks and stresses that may impact resilience. The Tool was developed by AECOM for use across the global 100 Resilient Cities initiative to help guide cities to prioritise shocks and stresses under a range of future scenarios and to identify vulnerable assets.

This Tool was developed for use across the 100 Resilient Cities program pioneered by the Rockefeller Foundation. This Tool represents a globally tested methodology that has been used to help cities and other organisations assess their resilience and determine the key shocks, stresses and critical assets that may impact their functionality.

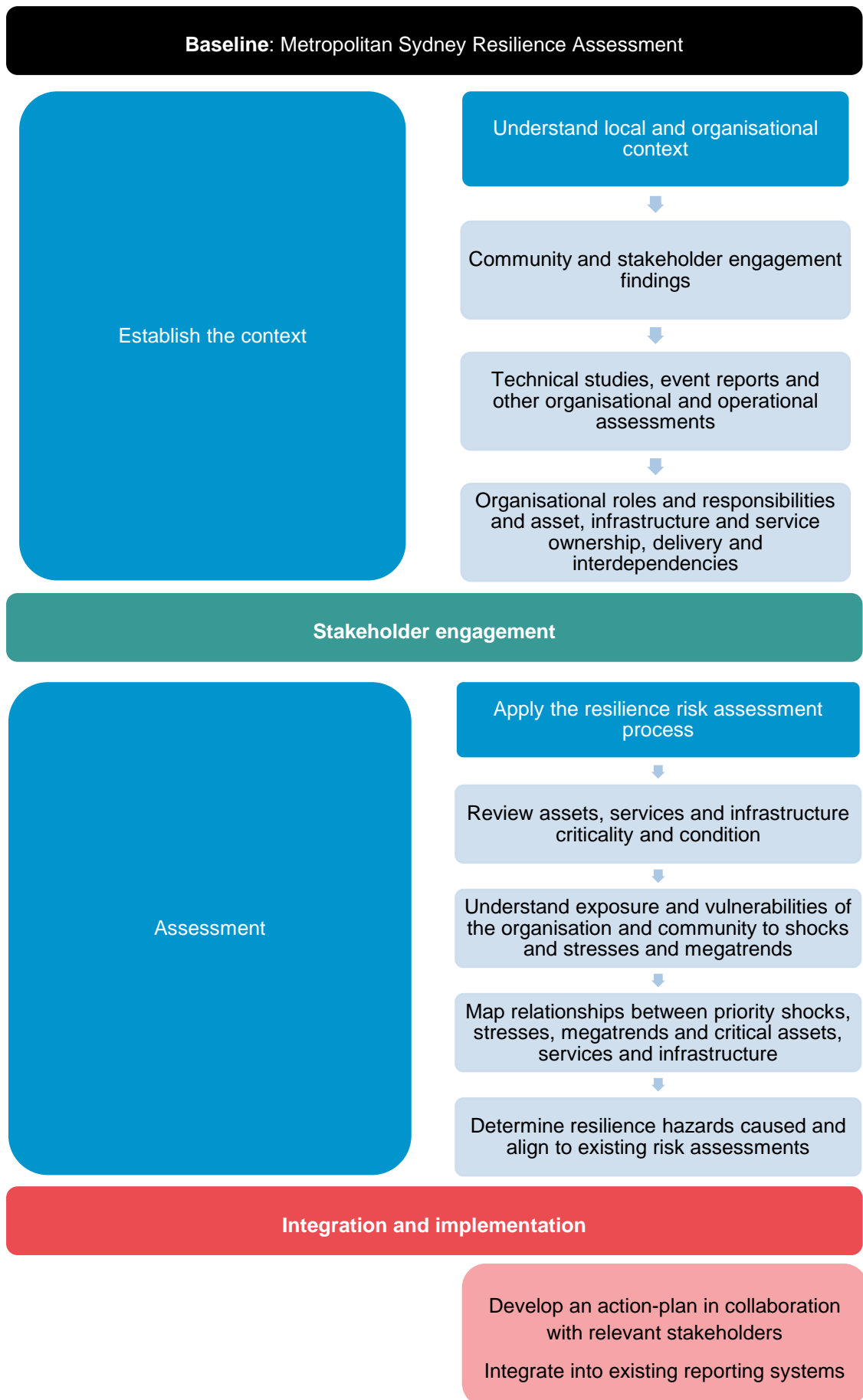
The 100 Resilient Cities Assets and Risks Tool is designed to:

- Produce robust, evidence-based risk assessments to inform decision making and prioritisation
- Draw on expertise and input from key stakeholders, and provides opportunity for engagement
- Consider both shocks and stresses and the relationships between them
- Be forward-looking and capture future risks
- Complement existing frameworks and draw in existing data
- Be customised for different time and location scales

Application of this Tool is not only limited to application in a city context and has been used by other organisations including local councils, Public Transport Victoria (PTV) and the Department of Defence to help understand their exposure to risks in a place-based context.

The Assets and Risks Tool was used by Resilient Sydney to support an audit of critical city assets and infrastructure, assess the risk of the shocks and stresses facing Sydney, and identify the megatrends with the greatest impact on Sydney's future. Throughout the three-year strategy development process, the results of the Tool and the process followed to complete the Tool provided a robust, evidence-based snapshot of Metropolitan Sydney's resilience which were tested with government, business and community stakeholders as well as Australian and global academics and experts researching resilience.

Summary of the Resilient Sydney resilience assessment process



Critical Assets, Services and Infrastructure

Depending on the nature of your organisation and/or scale of the assessment you are undertaking, you may wish to use the Metropolitan Sydney list of assets and infrastructure as a starting point, or you may wish to use your existing asset register or other criticality assessment.

The resilience assessment tool provides a long list of the findings of the Metropolitan Sydney Resilience Assessment. Critical assets and services, priority shocks, stresses and megatrends for Metropolitan Sydney have been provided below.

Metropolitan Sydney Critical Assets, Services and Infrastructure

The following list of critical assets and infrastructure for Metropolitan Sydney is based on the findings of the Resilient Sydney Strategy. These critical infrastructure assets and infrastructure are ranked in terms of exposure to shock events with consideration of their current condition (i.e. Current management, Level of service provided - functionality and capacity, Condition or state of repair, Criticality and business risk). These assets and services have a mix of ownership and management across Metropolitan Sydney and refer to those assets, infrastructure and services whose delivery / ownership and/or management external to the assessing organisation. These assets and infrastructure are ranked in accordance with the Resilient Sydney assessment.

Metropolitan Sydney

Critical Assets and Infrastructure

(Resilient Sydney ranking in terms of vulnerability)

Health infrastructure

Airports

Communication networks

Wastewater and stormwater

Energy network

Railways

Roadways

Commercial buildings and structures

Water supply

Power generation

Emergency service facilities

Residential buildings and structures

Agricultural and horticultural land

Foreshore infrastructure

Defence assets

Ports and maritime services

Waterways

Community and social service facilities

Education facilities

Oil and gas distribution and supply network

Cultural assets and icons

Ferries

Financial institutions

Public open space

National parks and reserves

Purpose: To develop a list of critical assets, services and infrastructures for your place

Your action: Revise the assets, services and infrastructure lists with reference to the Metropolitan Sydney ranking list, by considering the following questions:

- How does your local area and/or organisation relate to metropolitan wide critical assets and services? Which assets does the community rely on the most? If it was not available for a period of time would it have a significant impact on the lives of your community members? Who owns these assets? Which assets should be included in your assessment?

- How do these interdependencies influence the identification of the critical assets and services within your local area? Which regional and local assets does the delivery of your essential services rely on? How does this inform your management plans?
- Given your local area and/or organisation's experience of hazard events, would you change the criticality ranking of any of these assets / infrastructures?
- The most critical need to be protected the most or have the highest intervention levels of maintenance or investment so they do not fail outright?

Priority Shocks and Stresses

Shock events may cause a significant disruption to assets, services, infrastructure and the community. Stresses influence the consequence and/or likelihood of a shock event and the capacity of the community to cope with or recover from a shock event. Depending on the nature of your organisation, you may wish to use the Metropolitan Sydney list of shocks and stresses as a starting point, or you may wish to use other inputs to enhance and revise this list.

Inputs may include the risks identified in your Local Emergency Management Plan, priority issues identified in community engagement surveys, local demographics and/or local experiences of shock or stress events.

Metropolitan Sydney Priority Shocks

These shocks events were identified through the screening and prioritisation of over 50 potential global shocks against:

- Previous occurrence in Sydney
- Current trend, based on likelihood and intensity
- Future risk, based on likelihood and maximum consequence
- Consideration of key shocks against critical assets and infrastructure, including:
 - Worst case scenario consequences for each asset
 - Scenario analysis based on city trends, level of consensus of potential and maximum impact and likelihood of occurrence.

Metropolitan Sydney Priority Stresses

Shocks and stresses were prioritised through a relationship analysis of links between them, including considering whether a stress or shock will directly or indirectly exacerbate the maximum impact or effect of the others.

Metropolitan Sydney Priority Shocks (unranked)

Extreme weather events (heat wave, flood, severe :

Infrastructure failure

Financial institution failure

Water crisis

Digital network failure

Terror attack

Disease pandemic

Cyber attack

Health Services Demand

Housing Affordability

Social Cohesion

Employment Diversity

Inequity

Chronic Illness

Transport Diversity

Drug and Alcohol Abuse

Your action: Revise the priority shocks and stresses with reference to the results of the Metropolitan Sydney findings, considering:

- Given your organisation's or local community's experience of hazard events, are any of these shocks and stresses more important to your location than others?
- Consider your relationship to the shock or stress. Could the shock or stress eventuate from an external source outside of your local area or outside the jurisdiction of your organisation? Would this shock or stress still impact your organisation or local area.

- Would you see any of the shocks and stresses from the long list as being more important to your organisation / local area given your community demographics, community feedback, etc? Would you change the ranking of any of these shocks or stresses?

Priority Megatrends

Megatrends are global, sustained and macro-economic forces of development that impact business, economy, society, cultures and personal lives thereby defining our future world and its increasing pace of change.

Metropolitan Sydney Priority Megatrends

The following list of megatrends for Metropolitan Sydney is based on the findings of the Resilient Sydney Strategy. The assessment prioritised the city trends with the greatest impact on Sydney's future over a 30-year scenario horizon.

Metropolitan Sydney Priority Megatrends (unranked)

Increased rate and distribution of chronic illnesses

Pressure on society with an increase in domestic and drug-related crime

Limited access to multimodal transport options

Increased cultural diversity and distribution of population

Increased reliance on digital solutions

Increase in global temperatures and rising sea levels

Increased interdependencies with global supply chains

Decrease in affordable housing options

Increasing global focus on metropolitan scale solutions

Purpose: The purpose of this step is to

Your action: Depending on the nature of your organisation, you may wish to use this list of megatrends to start, or you may wish to use other inputs to revise this list. Inputs may include reports on global megatrends such as the World Economic Forum, priority issues

identified in community engagement surveys, local demographics such as industries and/or other areas of exposure your organisation may have to local, regional or global megatrends or external forces. Revise the megatrends with reference to the results of the Metropolitan Sydney findings, considering:

- Given your local areas demographics or your organisation's experience of hazard events, are any of these megatrends more important to your location than others?
- How do these global and/or national megatrends translate to your local context?

Developing resilience hazards

Resilience hazards can then be determined. Each resilience hazard should be described with reference to:

- Shocks, Stresses, and Megatrends: shock, stress and megatrend events that may cause or exacerbate the consequence and/or likelihood of the resilience hazard occurring.
- Assets and Services: Critical infrastructure, systems and services owned by the assessing organisation and other stakeholders impacted by the resilience hazard.

By directly describing the relationship between shocks, stresses, assets, services, global/ local megatrends and grounding these events in the lived experience of the people most affected, organisations can better determine which interventions can support emergency prevention, preparation, response and recovery.

Example resilience hazards

Energy network failure

Mass public transport failures

Community financial vulnerability

Health care services overwhelmed

Public unrest and disorder / riot

Community vulnerability to social isolation

Dispersion of waste / hazardous materials due to extreme events (storms, bushfire) causing pollution (air, water, soil)

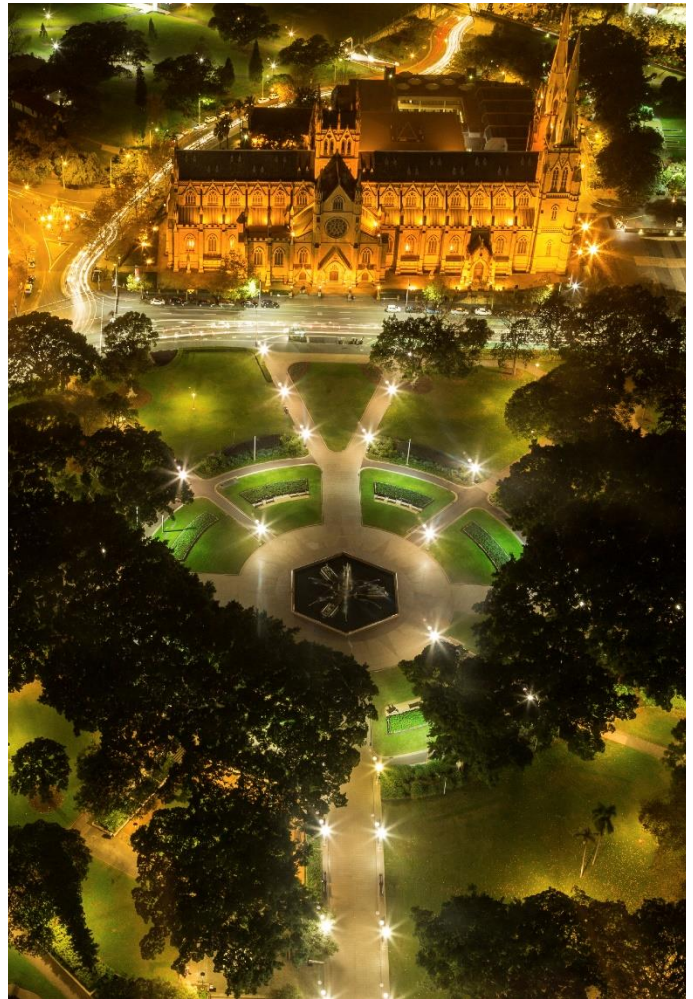
Stakeholder engagement

Integrating the lived experience of key stakeholders and the local community is essential for understanding resilience hazards, stakeholder engagement, insights and inputs should be sought throughout the resilience hazard assessment process. Community priorities for the future, current and future demographics, lived stresses and experience of past shock events will ground the resilience hazard assessment in a place-based context.

Communities understand the system best - they understand interconnectedness and which parts of a system fail first. Integrating place-based resilience and community experience means that the resilience hazard assessment process will help prioritise initiatives such as:

- Rebuilding in partnership with community organisation
- Creating meeting spaces to share experience and seek feedback
- Identifying essential “life-lines” and understanding interconnectedness
- Integrating into existing initiatives, investment and reporting systems.

Findings from existing community stakeholder engagement should be sought, analysed and used where available and timely. Actions arising from the resilience hazard assessment may include the need for further stakeholder and community engagement.



Implementation and action plans

Identify themes for action

The Action Plan outlines four themes to guide effective responses to the identified resilience hazards. Actions are outlined within each theme. The themes and actions should be developed with consideration of your council's and the LEMC's ability to control and influence action within each of the themes, as well as opportunities to collaborate with other stakeholders.

Emerging themes to guide action development

Example themes for developing actions

1)	2)	3)	4)
Collaboration and communication	Capacity and training	Community connectivity	Critical infrastructure interdependencies

Desired outcomes

Increase the resilience of communication systems and improve information sharing practices.	Improve planning for and capacity to respond to multi-hazard events.	Support local connections and help communities prepare for priority shocks.	Improve understanding of critical infrastructure inter-dependencies and adaptability.
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Identify outcomes for each theme

For each theme, the desired outcome should be developed that describes the intended state of the subsequent actions delivers.

Develop actions

Within each theme, actions should be developed that deliver on the outcomes. This could start with a single priority action, with several supporting actions. Descriptions of each of the adaptation actions have been developed in accordance with the following outline.

Example actions

Review established emergency communication channels and identify additional opportunities for new channels

Mutual aid between councils and other critical infrastructure and services

Develop scenario planning activities inclusive of multi-hazard events

Identify community leaders and include in scenario planning

Improve preparedness and planning communications with community

Identify opportunities for increased support for vulnerable communities especially heatwave planning

Review community opportunities to constructively engage with governance systems

Review adaptive capacity/flexibility/fit for purpose of assets under future scenarios

Work with insurers regarding reinvestment and critical infrastructure providers

When actions are developed please consider following the action hierarchy and components below.

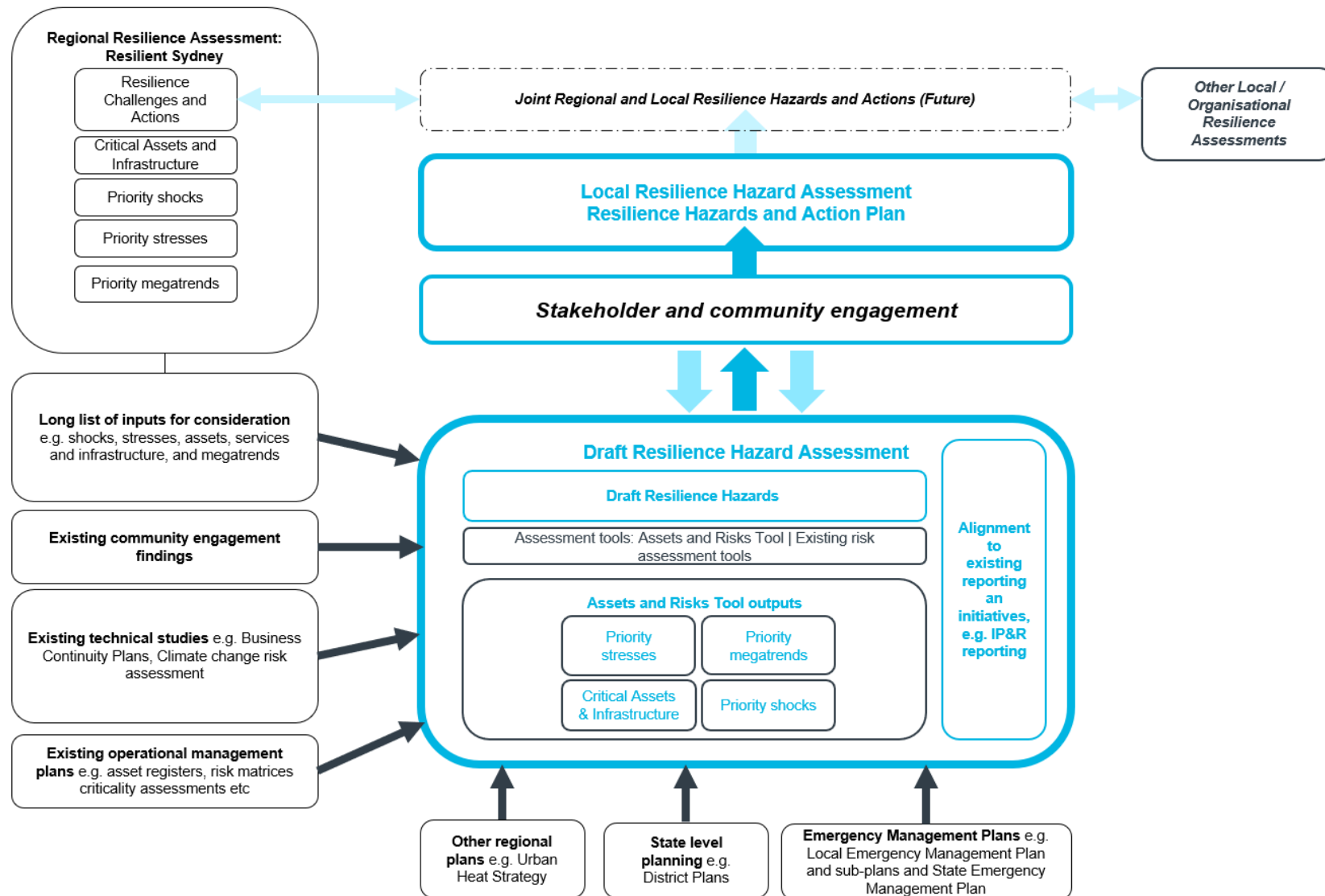
Action components

Action scope	Description
Theme	
Desired Outcome	Key outcomes from the action, and description of any alignment to existing actions.
Action	Identification number and brief description of the proposed action.
Owners	Key parties responsible for leading the implementation of the action.
Partners	Internal and external stakeholders for action implementation where identified

Integrating resilience into existing reporting

To support ongoing implementation of the actions developed in response to the resilience hazards, seek opportunity to align to existing investments, policies, reporting processes and networks to collaboratively manage the hazards and reduce future impacts across NSW.

Summary of inputs and outputs for the Resilience Assessment



Glossary

Term	Description
<i>Adaptation</i>	Anticipating adverse effects and taking appropriate action to prevent or minimise the damage they can cause, as well as to harness any beneficial opportunities ¹ .
<i>Asset</i>	An item or property owned by a government or company, regarded as having value and/or needed to service a city's needs, commitments, or other physical, social or economic function.
<i>Climate change</i>	Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity ² .
<i>Consequence</i>	The extent to which a system, environment, economy and society might be adversely affected under any given scenario ³
<i>Critical infrastructure</i>	The assets, systems and networks required to maintain security, health and safety, and social and economic prosperity. These are underpinned by the organisations and people that support them ⁴ . Water, wastewater, stormwater, electricity, gas, petroleum, telecommunications, and transportation systems including road, rail, airports and ports are all included ⁵ .
<i>Hazards</i>	The potential occurrence of a natural or human-induced situation or condition that could harm people or damage property or the environment ⁶ . Depending on the scale of this harm and the nature of the hazard, hazards may also be considered as shocks and/or stresses.
<i>Materiality</i>	Materiality is determined by considering both the impact of a natural hazard on delivery of services, and the level of dependency on those services. An impact or dependency is material if the value of disruption to those services has the potential to alter decision making ⁷ .
<i>Megatrends</i>	Global, sustained and macro-economic forces of development that impact business, economy, society, cultures and personal lives thereby defining our future world and its increasing pace of change.
<i>Metropolitan Sydney</i>	Also known as Greater Sydney, the area extending from Wyong and Gosford in the north, the Royal National Park in the south, and includes the Blue Mountains, Wollondilly and Hawkesbury to the west.

¹ After AdaptNSW <https://climatechange.environment.nsw.gov.au/Adapting-to-climate-change/Local-government/Adaptation-planning>

² Intergovernmental Panel on Climate Change (IPCC) <https://www.ipcc.ch/working-group/wg2/?idp=689>

³ NSW Critical Infrastructure Resilience Strategy 2018
<https://www.emergency.nsw.gov.au/Documents/publications/policies/NSW%20Critical%20Infrastructure%20Resilience%20Strategy%202018.pdf>

⁴ NSW Critical Infrastructure Resilience Strategy 2018
<https://www.emergency.nsw.gov.au/Documents/publications/policies/NSW%20Critical%20Infrastructure%20Resilience%20Strategy%202018.pdf>

⁵ This definition also aligns to the definition of lifelines as used by the New Civil Defence Emergency Management Act
http://www.nzlifelines.org.nz/site/assets/files/1019/nzlc_lifelines_brochure_171025.pdf

⁶ Office of Emergency Management <https://www.emergency.nsw.gov.au/Pages/for-the-community/community-service-workers/resources/definitions.aspx>

⁷ After Infrastructure NSW Guidelines for Resilience in Infrastructure Planning <https://www.treasury.nsw.gov.au/sites/default/files/2019-08/GUIDELINES%20FOR%20RESILIENCE%20IN%20INFRASTRUCTURE%20PLANNING%20-%20NATURAL%20HAZARDSV2.pdf>

<i>Term</i>	<i>Description</i>
<i>Resilience</i>	The capacity of individuals, communities, institutions, businesses and systems to survive, adapt, and grow, no matter what kinds of chronic stresses and acute shocks are experienced.
<i>Resilience hazard</i>	Resilience hazards are defined as those hazards arising from a combination of social, economic or environmental shock and stress events.
<i>Risk</i>	A risk is a function of the likelihood that any hazard/shock and/or stress will cause harm under a given scenario and consequence or the extent to which the system, environment, economy and society might be adversely affected under this scenario.
<i>Shocks</i>	An acute natural or man-made event or phenomenon threatening major loss of life, damage to assets and a city's ability to function and provide basic services, particularly for poor or vulnerable populations.
<i>Stresses</i>	A chronic (ongoing or cyclical) natural or man-made event or phenomenon that renders the city less able to function and provide basic services, particularly for poor or vulnerable populations. Stresses can amplify shock events or exacerbate hazards.
<i>Vulnerability</i>	The degree to which a system is susceptible to, and unable to cope with, adverse impacts of a hazard. Vulnerability is a function of exposure, sensitivity and adaptive capacity.

Appendices (to be added in next version)

Contact details

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