RESILIENT SYDNEY | City Context Report 2016

Resilient Sydney

Resilient Sydney is a 100 Resilient Cities initiative in collaboration with the City of Sydney, the metropolitan councils of Sydney and the New South Wales state government. Resilient Sydney is hosted by the City of Sydney.

In 2014 Sydney was selected to join the 100 Resilient Cities network, pioneered by the Rockefeller Foundation. Sydney receives funding and support from 100 Resilient Cities to catalyse metropolitan scale activities for the development of a resilience strategy.

The first milestone for Resilient Sydney was an Agenda Setting Workshop on 15 June 2015. 150 people attended including representatives from the New South Wales Minister for Planning, state government agencies and 40 of Sydney's 41 councils. Participants from business, social services and the community sectors also attended, including banking and insurance, social services and the Aboriginal and Torres Strait Islander community.

In September 2015 the New South Wales Minister for Planning and the Lord Mayors of Sydney and Parramatta launched the program, agreeing to work together to develop a resilience strategy for our city.

The *Resilient Sydney City Context Report* was prepared by the Resilient Sydney Strategy Partner in early 2016. Over 600 representatives from government, business and the community of metropolitan Sydney were consulted. Advice was sought from an independent panel of experts.

This document reports on Phase 1 of the Resilient Sydney program in line with the requirements of the 100 Resilient Cities initiative pioneered by the Rockefeller Foundation.

Acknowledgement of country

Sydney acknowledges Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of this place we now call Sydney. We pay our respect to Elders past, present and future of the Eora, Dharawal (Tharawal), Gundungurra, Dharug (Darug) and Guringai (Kuring-gai) peoples.

Purpose of report

1. Review Sydney's current resilience status via research, engagement, analytical tools and evaluation of existing plans and actions.

2. Provide an audit of key city challenges, strengths and weaknesses and opportunities to build resilience, including:

- an overview of the city context,
- a risk assessment of city assets and infrastructure, and shocks and stresses facing Sydney,
- an outline of external forces, or megatrends, shaping Sydney,
- a summary of existing resilience actions, and
- a summary of stakeholder perceptions of Sydney's resilience.

3. Provide an evidence base for the Preliminary Resilience Assessment, and the Discovery Areas to be explored in the next phase.

The Resilient Sydney City Context Report was developed by the Resilient Sydney project team which includes the City of Sydney and their Strategy Partner. Resilient Sydney is supported by: 100 Resilient Cities, Resilient Sydney Steering Committee, NSW Department of Planning and Environment, the City of Sydney and the City of Parramatta City Council.

Executive summary

In 2015, Sydney was chosen to join the 100 Resilient Cities (100RC) initiative pioneered by the Rockefeller Foundation. 100RC partners with cities around the world to help them become more resilient to the social, economic and physical challenges that are a growing part of the 21st century. 100RC was created to help cities respond to the impacts of three worldwide trends: urbanisation, globalisation, and climate change.

The Sydney initiative sees collaboration between the metropolitan councils of Sydney, the New South Wales State Government, businesses and communities. The program is hosted by the City of Sydney. 100RC provides Sydney with four types of support, including funding to hire a Chief Resilience Officer (CRO), support to develop a Sydney Resilience Strategy, a platform of services to support strategy implementation, and membership in the 100RC Network. Through the CRO and strategy process, 100RC aims to help Sydney to organise and integrate around resilience, and to scale solutions efficiently with the services platform and 100RC Network.

The strategy is developed in three phases:

- Phase I – development of the Preliminary Resilience Assessment

- Phase II – development of the Resilient Sydney Strategy

- Phase III – implementation of the Resilient Sydney Strategy

The first step is a comprehensive analysis of the Sydney metropolitan context to develop the Preliminary Resilience Assessment. This paper documents the research undertaken to support the assessment.

100 Resilient Cities has developed a suite of tools to help cities identify their resilience challenges. This City Context Report documents the outcomes from these tools to complete a diagnosis of the City's resilience context in accordance with the 100 Resilient Cities Strategy Guidance Manual, using tools developed by 100 Resilient Cities.

Completion of these tools provided a robust basis for identifying priority shocks and stresses, Sydney's most vulnerable infrastructure, stakeholder perceptions of resilience within metropolitan Sydney, and an overview of actions already improving resilience within Sydney. These outputs have been detailed in the body of this report, and have informed the Preliminary Resilience Assessment for metropolitan Sydney. The Discovery Areas identified for further investigation in Phase II encompass and address the issues identified through the use of these 100RC tools.

Research included reviewing data on Sydney supported by the tools, frameworks and global benchmarks of the 100 Resilient Cities program and other leading global, national and local frameworks, reports and studies. An understanding of stakeholder perceptions of Sydney's strengths and weaknesses in terms of resilience, and the actions currently undertaken to enhance Sydney's resilience also helped identify the key themes for our city, with over 600 stakeholders consulted from business, government and the community during 2015-16.

The City Context Report provides:

- An overview of the city context

- An assessment of critical assets and infrastructure

- Outcomes from a risk assessment of key shocks and stresses

- An outline of external forces, or megatrends, shaping the city

- A summary of current resilience actions

- A summary of perceptions of the city's resilience

These elements were assessed together to provide a preliminary evaluation of Sydney's resilience. The risk assessment for shocks, stresses and assets considered the context of Sydney's past and present state, as well as future trends, and the influence of global megatrends.

Shocks and Stresses

Sydney's top shocks and stresses were prioritised using a traditional risk assessment process. This helped clarify where Sydney could fail and where effort should be applied to reduce impacts.

Extreme weather was ranked the shock with the highest risk to Sydney. This finding was based on the number of past events, the level of disruption caused and projected future trends.

Extreme weather includes heatwaves, bushfires, storms and localised flooding. Of these, heatwaves were found to have the greatest impacts in terms of mortality and the number of people hospitalised. The projected trend is for an increase in the intensity and frequency of heatwaves over the next 30 years due to climate change.

The failure of core financial mechanisms or institutions (such as a big four bank or major insurer) has the potential to seriously degrade the functionality of Sydney's economy, due to the large finance, media and telecommunications market sectors. Sydney has demonstrated resilience to global financial crises such as the 2007 Global Financial Crises, but the likelihood and consequence of another crisis remains high, as reflected by the key megatrend of Sydney's increased interdependencies with global supply chains and economies.

The pressure of increasing demand for health services is the stress most likely to impact Sydney. Wider health and wellbeing stresses underlie this finding, including the increasing demand for health services for chronic illnesses, drug and alcohol abuse and an ageing population.

Diminishing social cohesion is also high in likelihood, due to the contributing nature of global trends and all of the other local stresses identified.

Top shocks (highest to lowest risk)	Top stresses (most likely to least likely)
Extreme weather(heat, bushfire, storms, flooding)	Increasing health services demand
Financial institution failure	Diminishing social cohesion
Infrastructure failure	Loss of housing affordability
Disease pandemic	Increasing chronic illnesses
Water crisis	Lack of transport diversity
Digital network failure	Insufficient employment diversity
Cyber attack	Increasing geographic inequity
Terror attack	Rise in drug and alcohol abuse

External forces shaping Sydney - Megatrends

Megatrends anticipated to have the most impact in shaping Sydney's resilience over the next 30 years include:

· Decrease in housing affordability and diversity of housing supply

· Increased rate and distribution of chronic illnesses.

· Increased interdependencies with global supply chains

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

· Increased cultural diversity and distribution of population

· Unequal access to multimodal transport options

· Increased reliance on digital solutions

· Increase in global temperatures and rising sea levels

· Increased focus on metropolitan scale governance

· Short-term political cycles and fragmented governance of the metropolitan city.

Sydney's critical infrastructure

Sydney's infrastructure underpins the city's economic strength and supports our standard of living.[1] The current condition of Sydney's critical infrastructure in relation to the top shocks was assessed, and the most vulnerable asset types to shocks within Sydney were identified, ranked from most to least vulnerable.

Most vulnerable assets (from most to least vulnerable)
Health infrastructure
Airports
Railways
Wastewater and stormwater
Commercial buildings and structures
Communication networks
Energy network
Water supply

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[1] NSW Office of Environment & Heritage, 2014,Towards a Resilient Sydney Urban Adaptation Research Synthesis

The city context, risk assessment, and stakeholder consultation have shown Sydney faces a range of challenges to resilience. The Discovery Areas have been developed to address these key challenges in order to maximise the resilience dividend for Sydney. The Discovery Areas are formed as research questions for deeper analysis in Phase II, and are summarised below.

Discovery Area	Diagnostic Question
How Sydney works	How can we understand the connections between critical systems to manage uncertainty and productivity in our city?
Adaptive Sydney	How can we adapt city planning, the built environment and financing to cool our city and care for our water resources?
Identity in Diversity	How can we value diversity in our community to improve social cohesion, inclusion and economic productivity?
City of Opportunity	How can our plans for Sydney's growth ensure everyone has equal opportunities to grow and thrive?

This report joins the Preliminary Resilience Assessment to conclude Phase I development of Resilient Sydney and provide a robust basis to proceed with Phase II.

Contents

Acknowledgement of country

Resilient Sydney acknowledges Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of this place we now call Sydney. We pay our respect to Elders past, present and future of the Eora, Dharawal (Tharawal), Gundungurra, Dharug (Darug) and Guringai (Kuring-gai) peoples.

The traditional custodians of this place we now call metropolitan Sydney have inhabited the area for at least 60, 000 years. They have an unbroken and continuing connection to Sydney. Metropolitan Sydney belonged to several major language and clan groups. The people of the 29 clan groups of the central and coastal area of Sydney are referred to collectively as the Eora Nation. The land of the Dharug (Darug) people is inland including Parramatta to the Blue Mountains. The land of the Dharawal (Tharawal) people extends south of Botany Bay and to the Georges River in the west, and the land of the Guringai (Kuring-gai) people is north of the harbour.

In 1788 the British established a convict outpost on the shores of Sydney Harbour. This had far reaching and devastating effects on the Aboriginal clans in the Sydney area, including the occupation and appropriation of their traditional lands.

Despite the destructive impact of this invasion, Aboriginal and Torres Strait Islander culture endured and is now globally recognised as one of the oldest living cultures.

Aboriginal peoples have shown, and continue to show, great resilience and generosity of spirit towards other peoples with whom they now share their land.

Resilient Sydney recognises that by acknowledging our shared past, we are paving the way for a future where all Australians are embraced. A future based on mutual respect and shared responsibility for our land.

1   Introduction

This City Context Report provides an overview of background studies and analysis to support the Resilient Sydney Preliminary Resilience Assessment.

The paper includes

- An overview of the city context
- An assessment of critical city assets and infrastructure
- The outcomes of a risk assessment of shocks and stresses facing Sydney
- An outline of external forces, or megatrends, shaping Sydney
- A summary of existing resilience actions
- A summary of stakeholder perceptions of Sydney's resilience

These studies provide an evidence base for the challenges identified in the Preliminary Resilience Assessment, and Discovery Areas to be explored in the next phase of Resilient Sydney.

1.1   Strategy development process

Sydney receives technical support and resources from 100 Resilience Cities to develop and implement a resilience strategy for the metropolitan area. Figure 1 shows an overall view of the 100RC Resilience Strategy process.

Figure 1 100 Resilient Cities Resilience Strategy process, showing Phase I, Phase II, and Phase III
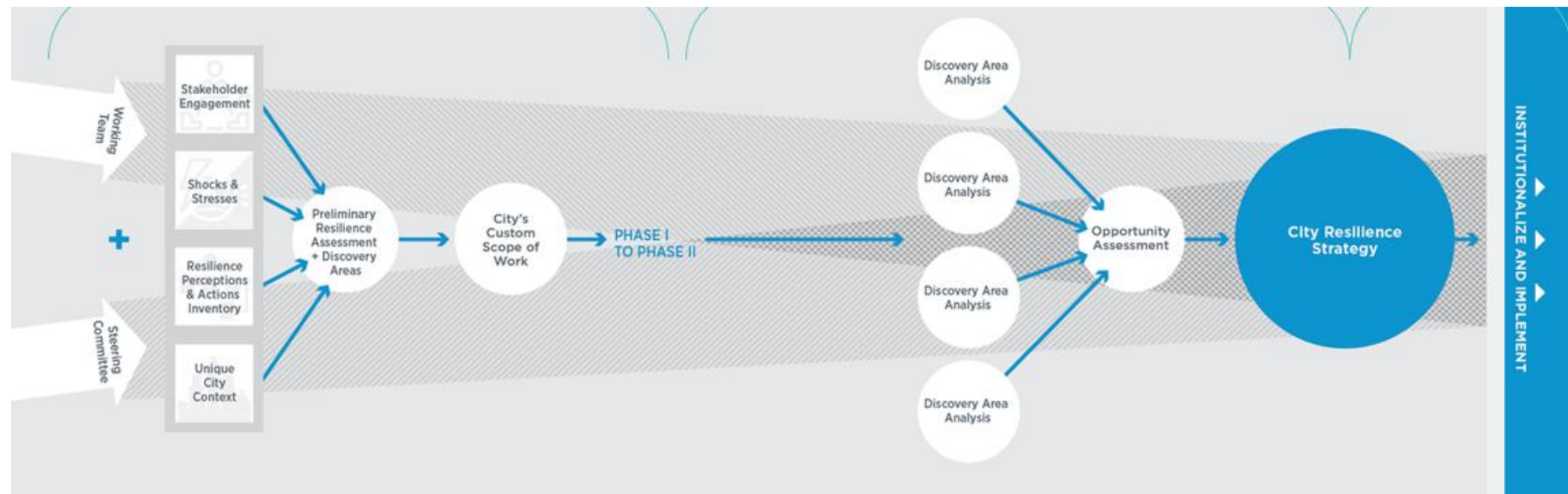
The Resilient Sydney strategy process includes three phases:

Phase I

- Build a working team and engage key stakeholders with influence and leadership throughout Sydney
- Review Sydney's current resilience status via research, engagement, analytical tools and evaluation of existing plans and actions. This review includes an audit of threats, strengths and weaknesses and opportunities to build resilience
- Identify Discovery Areas for further exploration
- Devise a framework for decision making
- Develop a scope of work and engagement strategy for Phase II.

Phase II

- Develop working groups to explore the Discovery Areas
- Use the findings of the working groups to identify resilience-building initiatives
- Use Phase I research findings and resilience-building initiatives to develop the Resilient Sydney Strategy. The strategy will outline Sydney's key challenges, opportunities and initiatives for action for the Resilient Sydney team and partner organisations.

Phase III

- Implementation of the Resilient Sydney Strategy.

1.2 Why resilience?

In 2015 the Australian Business Roundtable for Disaster Resilience and Safer Communities calculated the cost of natural disasters to Australia at $9 billion per year. The Roundtable estimate this cost will rise to $33 billion per year by 2050 without including the impacts of climate change.

Reducing these costs and unlocking the value of turning disruptions into opportunities is a priority for global cities.

Resilience building in cities worldwide has shown specific benefits such as:

- New market and entrepreneurial opportunities
- Financial savings, resource efficiencies

- Greater opportunities for partnerships
- Thought leadership and reputational gains with peers and customers
- Self-reliance and crisis management enabled and encouraged for communities, businesses and governments

These benefits are described as the resilience dividend.

The Resilience Dividend

Investing in actions that reduce impacts to individuals, the physical environment and the economy. Integrated decisions that result in cost-savings, cost-avoidance and create multiple benefits across multiple city systems.

Taking action to strengthen and manage interdependencies offers access to a resilience dividend for residents, communities, businesses and government. When disruptions are expected, planned for and turned into opportunities, they offer a financial, social and environmental return, or dividend. This provides wider benefits in the form of:

- Preventing or mitigating stresses and shocks;
- Adapting to unexpected shocks and stresses;
- Rapidly returning to normal and revitalising post disruptions;
- Accessing benefits when disruptions are not occurring; and
- Productive, peaceful prosperity and multiple benefits in times of stability.

These opportunities can be understood through the City Resilience Framework. 100 Resilient Cities uses the City Resilience Framework, shown in Figure 2, to assess the strengths and weaknesses of cities within four 'dimensions' and twelve 'drivers'.

The four dimensions are:

- Health and Wellbeing: the health and wellbeing of everyone living and working in the city
- Economy and Society: the social and financial systems that enable urban populations to live peacefully, and act collectively
- Infrastructure and Environment: effective leadership, empowered stakeholders, and integrated planning
- Leadership and Strategy: the way in which human-made and natural infrastructure provide critical services and protects citizens

Figure 2 City Resilience Framework showing four dimensions of city resilience[2]

Resilient Sydney will use the 100RC 'Resilience Lens' to identify our response to the key resilience challenges of our city. The seven guiding principles of The Lens will be applied to determine the Discovery Areas and research questions, proposed for Phase II of the Resilient Sydney program.

The Resilience Lens – 7 Guiding Principles

Resilience thinking can contribute to all city actions:
1. Approach the challenge in an integrated and holistic way that crosses silos, using the 100RC City Resilience Framework
2. Consider impacts of multiple shocks and stresses identified through a broad risk and hazard assessment
3. Aim for short, medium and long term benefits
4. Consider performance across the qualities and characteristics of resilience
5. Strive for equitable outcomes
6. Leverage actions across a broad group of stakeholders
7. Consider cross-jurisdictional implications (i.e. intercity/ regional/ national/ global)

Discovery Areas in Sydney, must:

· Make use of the 100RC Resilience Lens and Resilience Qualities
· Address key city scenarios
· Ensure relevance for metropolitan Sydney
· Replicate great ideas at scale
· Prioritise equity and develop investment frameworks
· Integrate future governance

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[2] Arup, City Resilience Framework

Improving resilience will mean adopting new behaviours and approaches to governance and leadership in Sydney. Resilient Sydney has reviewed global resilience practices, and have adopted the five behaviours proposed by Judith Rodin in The Resilience Dividend (2014) for the Sydney context. The Discovery Areas will align with these five behaviours shown in Figure 3. Resilient Sydney will use these five behaviours to drive resilience decision making and communicate how governance can respond to help deliver the resilience dividend.

Resilience Behaviours
Five key behaviours drive resilience decision making:
1. Aware - Do you have all the information about how critical city systems work and cascade, and the key city challenges?
2. Integrated – Are you connected and working with others to understand multiple opportunities when solving challenges?
3. Adaptive – Are your programs, products, policies and funding mechanisms flexible to respond to rapid changes and disruptions?
4. Diverse – Are you maximising potential value and benefits by engaging widely to support your decision making?
5. Self-regulating – Are you making decisions and creating governance structures that you can replicate and iterate?

Figure 3 Behaviours that support resilience decision making and governance[3]

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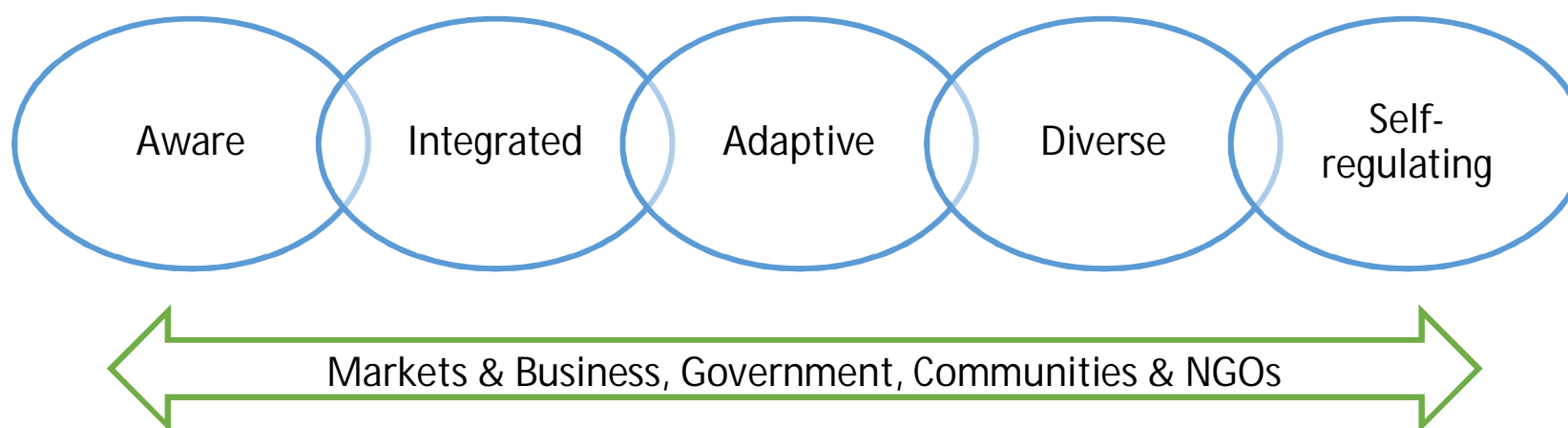
[3] Judith Rodin, 2014 The Resilience Dividend

1.3   Governance matters

In most cities realising a resilience dividend is an issue of governance. Sydney's governance context is complex. There are three layers of government with overlapping jurisdictions. This means decision making does not always align with the right level of impact. Understanding and managing interconnected networks for major infrastructure and land use planning within a growth paradigm is especially difficult.

Strategic urban planning is the number one resilience solution identified by cities in the 100 Resilient Cities program. Evidence shows that proactive, collaborative planning in cities leads to:

- Increase in jobs
- Reduction in family and community suffering and displacement
- Improved sense of wellbeing, belonging and health
- Boost to the international reputation of a city
- Enhanced sense of place— a city attractive to business and people

A resilience approach supports actors across a city to identify collaborative solutions to wicked problems that cross business, community and city boundaries.

2   Methodology

Phase I of the Resilient Sydney strategy process followed the 100 Resilient Cities methodology for establishing a Preliminary Resilience Assessment for metropolitan Sydney. 100 Resilient Cities has developed a suite of tools to help cities identify their resilience challenges. This City Context Report documents the outcomes from these tools to complete a diagnosis of the City's resilience context in accordance with the 100 Resilient Cities Strategy Guidance Manual (v2 2015). This methodology has been developed by 100 Resilient Cities and tested globally.

The following 100RC tools support the city context and outcomes documented in this City Context Report:

- Compilation of major shocks, stresses, and megatrends

- 100RC Assets and Risk Assessment Tool

- 100RC Perceptions Assessment

- 100RC City Actions Inventory.

Completion of these tools provided a robust basis for identifying priority shocks and stresses, Sydney's most vulnerable infrastructure, stakeholder perceptions of resilience within metropolitan Sydney, and an overview of actions already improving resilience within Sydney.

These outputs have been detailed in the body of this report, and have informed the Preliminary Resilience Assessment for metropolitan Sydney. The Discovery Areas identified for further investigation in Phase II encompass and address the issues identified through the use of these 100RC tools.

Extensive stakeholder engagement has also been undertaken which informs this report, described in Section 2.2.

2.1   City Context

A desktop study of Sydney's strengths and weaknesses has been undertaken and summarised to provide a resilience context of metropolitan Sydney. This study has been undertaken in alignment with the City Resilience Framework, summarising metropolitan Sydney context, strengths, and weaknesses within the dimensions of Health and Wellbeing, Economy and Society, Infrastructure and Environment, and Leadership and Strategy. This report synthesises the results from the 100RC tools into this study, alongside a wide range of current research.

2.1.1   Major Shocks, Stresses and Megatrends

A full list of shocks, stresses and megatrends (external forces) relevant to cities was compiled. This list was informed by the shocks, stresses, megatrends and issues identified in the following documents:

- 100 Resilient Cities framework, including the Assets and Risks Tool

- Top shocks, stresses, and megatrends identified for cities within Australia and New Zealand, including Melbourne, Christchurch, and Wellington

- Top shocks, stresses, and megatrends identified for cities globally across the 100RC network

- Global frameworks include: World Economic Forum's Global Risks Report (2016), United Nations Sendai Framework for Disaster Risk Reduction, KPMG Future State 2030: the global megatrends shaping governments (2014), and United Nations Sustainable Development Goals (2015)

- Key issues identified in local strategic plans and assessments such as NSW Office of Environment and Heritage (OEH) Towards a Resilient Sydney

- Key issues identified by industry bodies such as the Committee for Sydney, Green Cross Australia's Business Adaptation Network, and Australian Business Roundtable for Disaster Resilience and Safer Communities

- Desktop study of shocks and stresses which are current or have occurred in the past across Sydney.

By filtering the megatrends based on the shocks and stresses relevant to the Sydney context, a long list of the key megatrends which will shape Sydney over the next 30 years was identified. A full list of the shocks, stresses and megatrends which were considered is provided in Appendix A.

2.1.2   Assets and Risk Assessment Tool

The 100RC Assets and Risk Assessment Tool was used to undertake 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.

Figure 4 Summary of Asset and Risk Assessment Tool process
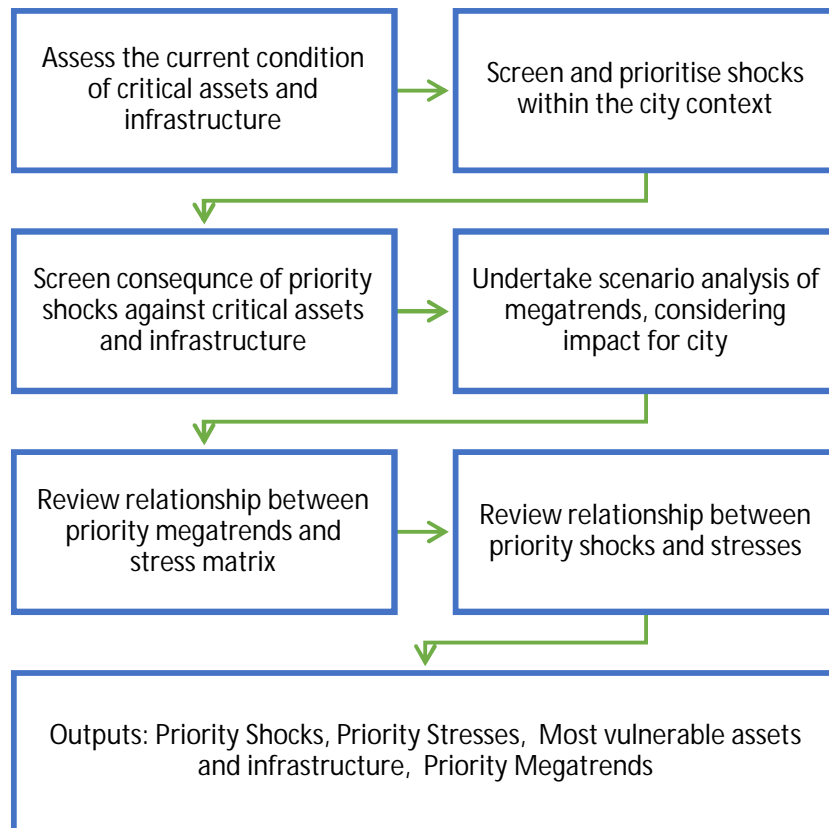
As part of completing the Assets and Risk Assessment Tool, the following steps were taken:

1. Assessment of the current condition of critical assets and infrastructure
   a) An audit of assets and infrastructure critical to the city
   b) Current overall condition assessment, including assessing:
      § Current management
      § Level of service provided i.e. functionality and capacity
      § Condition/state of repair
      § Criticality and business risk
2. Screening of shocks to identify priority shocks, reviewing all global shocks against:
   a) Whether the shock has occurred previously in Sydney
   b) Current trend, based on likelihood and intensity
   c) Future risk, based on likelihood of shock occurring in the future, and the maximum consequence of a future shock
3. Screening of priority shocks against critical assets and infrastructure, considering:
   a) What consequence each shock event would have for each asset, considering the worst case scenario.
4. Scenario analysis, considering what impact each relevant megatrend would have on the city using example scenarios, taking into account:
   a) Current state and trend within the city
   b) Level of consensus on the impact the megatrend will have
   c) Maximum consequence of the impact scenario
   d) Likelihood of occurrence
   e) Prioritisation of each of the megatrends
5. Stress matrix, considering the relationship between each stress and prioritised megatrend, identifying:

a) Whether each stress will occur as a primary or secondary result of each megatrend, or whether the megatrend will have no consequence

b) Priority stresses which are most likely to result from the priority megatrends

6. Relationship between shocks and stresses, assessing the likelihood of the linkage between every shock and stress, to rank the shocks and stresses, considering:

a) The strength of the relationship between each shock and stress, whether a stress will directly or indirectly exacerbate the maximum impact of a shocks or whether a shock could make the effects of a stress worse.

Completing the Assets and Risks Tool provides a robust basis for the identification of priority shocks and stresses and Sydney's most critical infrastructure. A full list of the critical assets and infrastructure assessed is provided in Appendix A. Detailed summaries of the priority shocks, stresses, and most critical infrastructure have been provided in the body of this report.

2.1.3   Perceptions Assessment

The 100RC Perceptions Assessment tool aligns stakeholder feedback on city resilience strengths and weaknesses against the elements of the City Resilience Framework. The Perceptions Assessment incorporates over 600 responses from stakeholders. The results of the Perceptions Assessment are summarised in Section 0.

2.1.4   City Actions Inventory:

A summary of approximately 100 existing actions which are already building resilience within metropolitan Sydney where identified and mapped against the City Resilience Framework. This list includes actions which contribute to resilience within the Sydney context, and includes national, regional and local actions. This list is not intended to be exhaustive, but primarily to acknowledge the amount of a level of work already happening within the resilience space in Sydney. Actions include strategies, frameworks, programs, networking and support groups, and funding grants. A number of innovative tools and initiatives (such as interactive heat maps and 'Cool Parramatta', an initiative for coping with extreme heat conditions) were also documented.

These city actions are currently being undertaken by;

- The Australian government, NSW state government and government agencies and local councils
- Business
- Community groups and not for profit organisations
- University and research organisations and
- The community.

Examples of city actions have been referenced throughout the body of this report as relevant. The outputs of the City Actions Inventory are provided in Appendix A.

2.2 Resilient Sydney project team

The Resilient Sydney project team comprises the Chief Resilience Officer and Deputy, hosted by the City of Sydney, and supported by the Strategy Partner.

The project team is supported by the Technical Advisory Group and guided by the Resilient Sydney Steering Committee. Members of the technical advisory group includes leaders from across Australia and New Zealand, within environment, economy, commercial advisory, transport planning, infrastructure, water infrastructure, sustainability, and governance

2.2.1 Steering committee

The Resilient Sydney Steering Committee has been established to provide leadership and vision to guide Sydney's transformation to a global exemplar of urban resilience.

Members provide diverse expert perspectives across government, business and academia to ensure Resilient Sydney is robust in considering all relevant information and perspectives.

The Resilient Sydney Steering Committee supports the Chief Resilience Officer in reviewing, validating and delivering the Strategy. Members include:

- Delegates of the Minister for Planning and State Government
- City of Sydney and Parramatta CEOs or delegates
- Metropolitan Local Government CEOs or delegates
- Chief Resilience Officer for Metropolitan Sydney
- Strategy Partner representative
- Independent Advisors from sectors:
  - o Business and Markets

- o Community and Social
- o Environmental and Physical
- o Resilience Governance Academic
- o Critical and Emergency Management
- o Youth and Culture

2.3 Stakeholder engagement

The City Context Report draws on interviews, workshop results and submissions from over 600 people from business, government, academia, the social services and non-profit sector and the community.

Stakeholder engagement for the Resilient Sydney strategy process began with an Agenda Setting Workshop in June 2015 attended by 150 stakeholders from the private and public sectors across metropolitan Sydney, and including 40 of the 41 local councils. It was the first time the 40 local councils attending had come together on such an issue.

The workshop set the scene for Sydney's critical resilience challenges and provided a baseline for understanding stakeholder perceptions of the city's current resilience.

A stakeholder engagement plan has been created to deliver a transparent, participatory and representative engagement process for the development of the Preliminary Resilience Assessment. A number of activities have been undertaken:

- Stakeholder mapping and analysis (stakeholder database)
- Identification and formation of the Resilient Sydney Steering Committee
- Key stakeholder interviews and workshops by the CRO, Deputy CRO and Strategy Partner
- Stakeholder and community feedback via an online survey

Another engagement plan will be created as part of Phase II development of the Resilient Sydney Strategy.

2.3.1 Stakeholder analysis

A stakeholder mapping and analysis process was undertaken to ensure Resilient Sydney is robust in considering the views of all individuals and organisations with content expertise for Sydney.

These included stakeholders from five sectors: policy and regulation, market, community, individuals and research. The level of involvement was determined by the control, influence, importance and representativeness of the stakeholder.

2.3.2 Interviews and workshops

The CRO and Strategy Partner undertook face to face interviews with key stakeholders, including business, and key government and private agencies.

The aim of interviews was to:

- Seek feedback on the strengths, vulnerabilities and factors that influence resilience in Sydney
- Secure interest and commitment to ongoing involvement in the project
- Access wider stakeholder networks
- Begin to embed resilience thinking across Sydney.

The outcomes of interviews and workshops were documented in the Stakeholder Perceptions Tool and informed the city context.

2.3.3 Surveys

Feedback on perceptions of Sydney's current resilience in terms of strengths and key challenges were gathered from:

- 150 stakeholders attending the Agenda setting workshop
- 380 community members selected to provide a mix of age, gender, socio-economic status, cultural and ability groups, with a slight weighting towards residents of Sydney's key growth areas in the west
- Over 200 people from government and business

Survey outcomes are reflected in the stakeholder perceptions tool and city context.

3 The Sydney Challenge

Sydney is Australia's largest city. It is home to more than 4 million people over 12,000 square kilometres. Sydney is a key driver of the Australian economy and contributes 23.3% of national gross domestic product. Extensive natural assets and a stable social and political environment make Sydney one of the most liveable cities in the world.

Like other global cities Sydney is growing and changing. Urbanisation, globalisation and climate change are amplifying underlying problems and challenging our city's ability to deal with disruption.

Despite strengths in the professional and financial sectors, economic opportunities are unevenly distributed across the metropolitan area. Western and southwestern Sydney are experiencing the highest levels of population growth. However the city's economic value is locked in the central business district in the east.

Inequity exists across the city. Access to education, public transport, health services and infrastructure is unequal and particularly difficult in the west and southwest.

Ongoing challenges include increases in chronic illnesses, domestic violence and drug related crime. Sydney is also experiencing issues around cultural tolerance and social cohesion.

Our city is increasingly affected by extreme weather, especially heatwaves, providing challenges for infrastructure, critical services, communities and natural systems.

The absence of a mechanism for collaboration across different levels of government, business and the community keeps information and networks siloed. This factor constrains Sydney's capacity to innovate, form partnerships, share knowledge and understand the impact pathways of critical decisions.

Complexity within Sydney's governance poses challenges for integrated decision making. The context is currently in flux as the state government attempts to rationalise local government and introduce a new metropolitan planning authority.

The current circumstances provide Sydney with significant opportunities. We must leverage our natural assets and economic and social strengths to ensure our ability to survive and thrive during disruptions, whilst remaining a globally competitive city.

Completion of the 100RC tools provided a basis for identifying priority shocks and stresses, Sydney's most vulnerable infrastructure, stakeholder perceptions of resilience within metropolitan Sydney, and an overview of actions already improving resilience within Sydney. These outputs have been detailed in the body of this report, and have informed the Preliminary Resilience Assessment for metropolitan Sydney.

The interdependencies between the shocks, stresses, assets and infrastructure and megatrends identified is acknowledged, and determining better determining the relationships between them is an ongoing challenge for Resilient Sydney.

Figure 5 Summary of outcomes: Sydney's most vulnerable assets, key megatrends, and priority shocks and stresses, circle size shows hierarchy of issues

3.1   Sydney's top shocks and stresses

Sydney's top shocks and stresses are displayed in Table 3. A traditional risk assessment highlighted the most important disruptions for Sydney now and in the future [4]. This assessment assisted our understanding of where Sydney could fail, and where effort should be applied in reducing the consequences of disruptions.

Extreme weather was ranked the shock with the highest risk to Sydney. This finding was based on the number of past events, the level of disruption caused and projected future trends.

Extreme weather includes heatwaves, bushfires, storms and localised flooding. Of these, heatwaves were found to have the greatest impacts in terms of mortality and numbers of people hospitalised. The projected trend is for an increase in the intensity and frequency of heat waves over the next 30 years due to climate change.

The failure of core financial mechanisms or institutions (such as a big four bank or major insurer) has the potential to seriously degrade the functionality of Sydney's economy. Sydney has demonstrated resilience to global financial crises such as the 2007 Global Financial Crises, but the likelihood and consequence of another crisis remains high, as reflected by the key megatrend of Sydney's increased interdependencies with global supply chains and economies.

The pressure of increasing demand for health services is the stress most likely to impact Sydney. Wider health and wellbeing stresses underlie this finding, including the increasing demand for health services for chronic lifestyle illnesses, drug and alcohol abuse and an ageing population.

Social cohesion is being impacted by rising inequity across Sydney. Other stresses, such as housing unaffordability, drug and alcohol abuse and inequitable access to transport contribute to social cohesion. Globally, social cohesion has also been identified as a key stress leading to social unrest.

Table 1 Summary of top shocks and stresses for Metropolitan Sydney

Top shocks (Highest to lowest risk)	Top stresses (Most likely to least likely)
Extreme weather (heat, bushfire, storms, flooding)	Increasing health services demand
Financial institution failure	Diminishing social cohesion
Infrastructure failure	Loss of housing affordability
Disease pandemic	Increasing chronic illnesses
Water crisis	Lack of transport diversity
Digital network failure	Insufficient employment diversity
Cyber attack	Increasing geographic inequity
Terror attack	Rise in drug and alcohol abuse

Further detail on Sydney's past experience to each of these shocks and stresses is provided in Sections 3.2 and 3.3.

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[4] Extreme weather events were combined into one single cluster in to order to avoid bias towards climate related shocks dominating the list and to avoid duplication of work already completed by local and state government. A further analysis of this extreme weather cluster was undertaken to unpack each of the key events that make up this cluster which identified that extreme heat is the biggest impact.

The list of shocks, stresses and megatrends considered was informed by the:

· 100 Resilient Cities framework and top shocks, stresses, and megatrends identified for cities within Australia and New Zealand and globally across the 100RC network

· Global frameworks including: World Economic Forum's Global Risks Report (2016), United Nations Sendai Framework for Disaster Risk Reduction, KPMG Future State 2030: the global megatrends shaping governments (2014), and United Nations Sustainable Development Goals (2015)

· Key issues identified in local strategic plans and assessments such as NSW Office of Environment and Heritage (OEH) Towards a Resilient Sydney, and identified by industry bodies such as the Committee for Sydney, Green Cross Australia's Business Adaptation Network, and Australian Business Roundtable for Disaster Resilience and Safer Communities

· Desktop study of shocks and stresses which are current or have occurred in the past across Sydney.

3.2   Understanding Sydney's shocks

Acute shocks are the sudden, sharp events that threaten a city, including earthquakes, floods, disease outbreaks and terrorist attacks.

The failure of climate change mitigation and adaptation was identified as the number one global risk for cities in the World Economic Forum's Global Risks Report 2016. It was considered the most significant risk ahead of weapons of mass destruction and water crises. Large-scale involuntary migration was also rated among the top five, as was severe energy price shock.

At an Asia-Pacific regional level natural catastrophes and extreme weather events were considered the most likely risk.[5] On average natural catastrophes currently cost the Australian economy $9 billion per year. This is expected to rise to $33 billion by 2050.[6]

Natural disasters such as the 2015 Victorian bushfires, the 2013 Blue Mountains bushfires, 2013 Cyclone Oswald and the associated widespread flooding across Queensland and New South Wales have claimed many lives and hundreds of homes.

The risks identified in the Global Risks Report 2016 are comparable to the 100RC definition of a 'shock' and are considered the international benchmark for risk management. For this reason the global risks were used as the principal source for identifying the shocks to be considered for metropolitan Sydney.

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[5] World Economic Forum, 2016, The Global Risks Report 2016
[6] Australian Business Roundtable for Disaster Resilience and Safer Communities, 2016, The economic cost of the social impact of natural disasters.

Table 3 provides an outline of the shocks of greatest relevance to Sydney, now and in the future. Examples of past events have also been captured to highlight Sydney's previous experiences to such shocks. 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.

Table 2 Shocks of greatest relevance to Sydney, now and in the future

Top shocks (highest to lowest risk)	Sydney experience
Extreme weather events (bushfires, floods, storms and heat waves)	Sydney has experienced a number of events over the past 30 years. These include the storms associated with the east coast low in April 2015 (see case study below)[7], the tornado at Kurnell in December 2015, hailstorm in 1997, Hawkesbury River floods in 1986 and bushfires in 1991, 1994 and 2001. In 2013 the Blue Mountains bushfires destroyed 196 homes and significantly damaged an additional 132. The total cost of damages to homes was over $180 million. Extreme heat is having significant impacts on Sydney. Sydney's highest recorded temperature was 46°C in January 2013. During the event 133 people were
	treated after falling unconscious and an additional 220 for other heat-related illnesses. The heatwave also caused major widespread train delays from network and signalling equipment failure.
Failure of a major financial mechanisms or institution	The failure of core financial mechanisms or institutions (such as a big four bank or major insurer) has the potential to seriously degrade the functionality of Sydney's economy. Sydney has demonstrated resilience to global financial crises such as the 2007 Global Financial Crises, but the likelihood and consequence of another crisis remains high. In 2001, Australia's second largest insurance company HIH collapsed. This was the largest corporate collapse in Australia's history with liquidators estimating losses totalling of $5.3 billion.
Rapid and massive spread of infectious diseases	Australia's natural and regulatory barriers have mostly restrained the spread of infectious disease. However notable past incidents include the H1N1 swine flu pandemic in 2009 which resulted in over 37,000 confirmed cases, 4,900 hospital admissions and 191 deaths Australia-wide. This highlights the fact Sydney is not immune to the increasing global threat.
Failure / shortfall of critical	The majority of past events associated with the failure and or shortfall of critical infrastructure relate to power outages.

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[7] At the time of writing, Sydney suffered another storm event, in late June 2016, combining an east coast low with a king tide, causing severe damage including the loss of homes in the Northern Beaches . The extent of damage from this event is likely to cause changes in legislation and coastal defence liability.

Top shocks (highest to lowest risk)	Sydney experience
infrastructure	These include an event at Sydney Airport in 2014 in which airlines were forced to delay or cancel services to and from Sydney. Other power outages in Sydney CBD have resulted in the forced closure of the Sydney Harbour Tunnel and Eastern Distributor during peak hour. Events at Sydney Opera House have been cancelled, people have been trapped in elevators around the city (due to an inundation of calls for fire fighters) and traffic light outages have caused traffic chaos. There have been disruptions at the Garden Island Department of Defence facility and environmental spills have occurred in Sydney Harbour. Transport-related incidents have also contributed to a number of infrastructure-related shocks across Sydney. In March 2014 a construction fire at Barangaroo South triggered CBD chaos. Major roads leading onto the Harbour Bridge were closed because of the close proximity of the fire. Other major transport emergencies include the Sydney Ferry accident in 2007 which resulted in 4 deaths and 2 vessels being destroyed; the Waterfall train crash in 2003 causing 7 deaths and 40 injuries, and the 83 deaths from the Granville train crash in 1977 - Australia's worst rail disaster.

Top shocks (highest to lowest risk)	Sydney experience
	Most recently, technical failures from a slipped fan belt resulted in network wide disruptions during peak hour in 2013.
Water crisis	The Sydney Water giardia outbreak in 1998 resulted in a week of Sydney-wide "boil water" alerts affecting up to three million residents. This led to the establishment of Sydney Catchment Authority to manage bulk water supply. Over the coming decades, Sydney can expect lower average rainfall and higher temperatures, which will result in less runoff and lower drinking water yields.
Breakdown of critical information infrastructure and networks	All cities are becoming increasingly dependent on information and communications technology (ICT). This ranges from the daily use of emails, smart phones and online retail trade through to the running of systems for critical services such as air traffic control and banking transactions. Failure of ICT backbone systems would significantly compromise Sydney's economy. Such an event was experienced in Sydney in February 2016 when Telstra, Australia's largest telecommunications provider, suffered a mass service disruption to millions of customers. The impact included significant loss of productivity for businesses.

Top shocks (highest to lowest risk)	Sydney experience
Cyber attack	Cyber-attack is an emerging risk with the potential to affect all Sydney. Serious impacts to the business sector and government agencies are highly probable. For instance the recent cyber-attack on the Bureau of Meteorology in 2015 compromised sensitive government systems.
Terror attack	Terror attacks have emerged over the past decade as a significant risk for cities and their communities. The 16-hour siege of the Lindt café in Martin Place in December 2014 showed Sydney is not immune. This incident resulted in 3 deaths and the closure and lock down of the financial district. Losses of over $1.2 million were recorded. Since the siege there have been a number of police arrests over terror plots to attack Sydney landmarks, as well as one executed terror attack in the Parramatta CBD where a police finance worker was shot dead.

3.2.1   Case study – Sydney storms, April 2015[8]

In April 2015 a massive storm struck metropolitan Sydney, the Hunter and Central Coast regions with severe rainfall and cyclonic winds. The storms resulted in loss of life (3 people in the Hunter region), significant flooding, extensive property damage, power outages and public transport delays.

The Pittwater and Warringah local government areas were declared natural disaster zones in Sydney. Another 10 areas north of Sydney were also declared natural disaster zones. Management of these zones reduced the availability of emergency services resources elsewhere.

The storm's impact was high because of its duration, ferocity and the geographical extent of the area affected. In metropolitan Sydney 100-150mm of rainfall was recorded along with very strong winds of up to 130km/h.

The low-pressure system was slow moving and the impacts were sustained over a two-day period. Soon afterwards a severe hailstorm hit Sydney causing further damage to property, particularly in the central and western suburbs of Sydney. The impact from this series of storm events included:

- Delays to commuters because of flash flooding and debris on several Sydney train lines.
- Disruptions to ferries due to flooding on the Parramatta River.
- Delays to bus services with cancellations of several bus services due to flooding, particularly in Sydney's southwest and west.

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[8]At the time of writing, Sydney suffered another storm event, in late June 2016, combining an east coast low with a king tide, causing severe damage including the loss of homes in the Northern Beaches . The extent of damage from this event is likely to cause changes in legislation and coastal defence liability.

- Collapse of the roofs of five warehouses under the weight of hail and heavy rain in an industrial estate in western Sydney. This included an area of 100,000 square metres, with an estimated cost of $80 million.
- Power outages affecting communication between emergency response teams.
- Major disruptions from damaging winds during the storm from fallen trees, damaged power lines, and coastal erosion with more than 90 cubic metres of sand stripped from Collaroy Beach.
- Temporary closures of over 80 schools in the Sydney metropolitan area, Hunter and Central Coast regions.
- Flooding of basements flooded due to insufficient stormwater infrastructure.

A strong response was seen from government, emergency services, the private sector and the local community. Effective collaboration between local government and state agencies, deployment of early warning systems, provision of interstate resources, introduction of flexible working arrangements and increased provision of evacuation centres were important for reducing loss of life.

3.3   Sydney's chronic stresses

Chronic stresses weaken the fabric of a city on a day-to-day or cyclical basis. Whilst stresses and shocks are presented separately in our tables we see them as interconnected. For example extreme weather events have been found to cause depression in affected communities. This can in turn contribute to alcohol abuse and anti-social behaviour.

Table 3 Major stresses for Sydney

Top stresses (Ranked by most likely to least likely)	Sydney experience
Increasing health services demand	Despite a significant commitment to health infrastructure investment demand for health services is increasing. This is due to an ageing population and increase in chronic illnesses. The increase is spreading across Sydney and is linked to inequity.
Diminishing social cohesion	Social cohesion is being impacted by rising inequity across Sydney. Other stresses, such as housing unaffordability, drug and alcohol abuse and inequitable access to transport contribute to social cohesion. Settlement of migrant communities within certain parts of the city has led to some localised unrest. Globally, social cohesion has also been identified as a key stress leading to social unrest.
Loss of housing affordability	Housing affordability is a significant problem in both the rental and owner occupied housing markets. Policy drivers, existing stock of affordable housing and diverse housing types are

Top stresses (Ranked by most likely to least likely)	Sydney experience
	lacking in Sydney. Market prices for property are being driven up by population growth and immigration, desirability of inner city living, demand for investment properties and low interest rates. The fact that income growth has not kept up with purchase and rental prices compounds the problem.
Increasing chronic illnesses	Chronic illnesses are the highest cause of death and disability within Sydney. More people are living with chronic illnesses and rates are increasing generally. There is a correlation to risk factors associated with lifestyle and lower socio-economic status. Chronic illnesses include chronic diseases and mental health illnesses. Many chronic diseases have lifestyle and behavioural risk factors smoking, obesity, poor nutrition, drug and alcohol abuse and physical inactivity.
Lack of transport diversity	There is inequitable access to multimodal transport options across Sydney, with poorest access in the west and southwest. This is especially problematic for people wishing to access jobs far away from where they live. Privatisation of infrastructure to fund transport projects and poor integration of land use planning

Top stresses (Ranked by most likely to least likely)	Sydney experience
	and transport are problematic.
Insufficient employment diversity and inequitable distribution of employment density	Employment opportunities are failing to respond to a changing workforce. Changes include increased diversity in age, cultural background and gender, and increased population density in the west and southwest. Employment centres are geographically concentrated affecting equitable access to employment.
Increasing geographic inequity	Inequity is increasing within metropolitan Sydney with rising income disparity and unequal access to infrastructure.
Rise in drug and alcohol abuse	Sydney communities are affected by drug and alcohol abuse. Examples include the rise in drug-related crime, which impact social networks, and are linked to chronic illnesses such as mental health illnesses, unemployment, family violence and homelessness.

3.4 Megatrends shaping Sydney

Priority megatrends were identified using scenario analysis, considering what impact each relevant megatrend would have on the city, taking into account: Current state and trend within the city, Level of consensus on the impact the megatrend will have, Maximum consequence of the impact scenario, and Likelihood of occurrence. Megatrends were then prioritised considering their relationship to Sydney's stresses.

Megatrends anticipated to have the most impact in shaping Sydney's resilience over the next 30 years include:

Health and wellbeing

- Decrease in housing affordability and diversity of housing supply
- Increase in the rate and distribution of chronic illness

Economy and society

- Increased interdependencies with global supply chains
- Pressure on society with an increase in domestic and drug-related crime
- Increased cultural diversity and distribution of population.

Infrastructure and environment

- Unequal access to multimodal transport options
- Increase in reliance on digital solutions
- Increase in temperatures, extreme weather events and rising sea levels.

Leadership and strategy

- Increased focus on metropolitan scale governance
- Short term political cycles and fragmented political governance

The full list of key megatrends which will shape Sydney over the next 30 years was identified and are listed in Appendix A.

3.5 Understanding Sydney's critical infrastructure

Sydney's infrastructure underpins the city's economic strength and supports our standard of living.[9]

The current condition of Sydney's critical infrastructure in relation to the top shocks were assessed against the following criteria to understand the vulnerability of our assets:

- Management of assets
- Level of service
- Condition and state of repair
- Criticality and business risk.

From this assessment the most vulnerable asset types to shocks within Sydney were identified, ranked from most to least vulnerable.

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[9] NSW Office of Environment & Heritage, 2014,Towards a Resilient Sydney Urban Adaptation Research Synthesis

Table 4 Most vulnerable assets

Most vulnerable assets (from most to least vulnerable)
Health infrastructure
Airports
Railways
Wastewater and stormwater
Commercial buildings and structures
Communication networks
Energy network
Water supply

Table 5 outlines the interactions of shocks and Sydney's most vulnerable assets.

Table 5 Sydney's experience - most vulnerable asset types

Most vulnerable to shock events	Sydney experience
Health infrastructure	Health infrastructure was assessed as being the most vulnerable asset type. This takes into account current condition, high criticality during emergency response and increasing demand and interdependency with our ageing, growing population.

Rising rates of chronic illnesses adds to demand and increases pressure on health services. |
| Airports | Sydney has two airports. Sydney Airport is located at Botany Bay, a vulnerable coastal area. A second, much smaller airport is located at Bankstown.

Sydney Airport is considered one of the critical economic links for our city. It is currently and is expected to remain, Australia's busiest airport. It is estimated there will be 72 million annual passenger movements by 2030.

A second main passenger airport has been proposed for Badgerys Creek in Sydney's west by the Commonwealth government. This will provide additional critical transport links for Sydney, and employment opportunities in western Sydney. |
| Railways | Sydney has witnessed a number of major railway infrastructure failures including the Waterfall and Granville disasters.

Demand for rail is increasing - each day almost 1 million passengers travel by rail to work. 65% of rail journeys are made in the peak. 50% of rail passengers |

Most vulnerable to shock events	Sydney experience
	during the morning peak alight in the Sydney central business district (CBD). [10]
Wastewater and stormwater	The range of water infrastructure across Sydney is extensive, from natural assets such as waterways, through to ageing pipelines, treatment plants and pumping stations. Sydney Water manages this network, providing water and wastewater services to over four million people across the metropolitan area. Sydney Water is currently investing in climate change adaptation measures during the planning and construction stages. These measures are a response to increasing vulnerabilities in infrastructure and supply. The organisation is also implementing climate change adaptation measures progressively during refurbishment and renewal of infrastructure. [11]
Commercial buildings and structures	Although in relatively good condition, the majority of commercial buildings are very dependent on critical infrastructure systems such ICT and energy supply. These systems are highly exposed to extreme weather events such as heat waves. Dependencies on these systems increase the vulnerability of commercial buildings and structures.

Most vulnerable to shock events	Sydney experience
Energy network	There is a lack of redundancy/back-up and diversity in mains energy supply across metropolitan Sydney - 70% of our supply comes from gas and coal.[12] Yet the energy network is critical for the ongoing operation of every other infrastructure sector.[13] Sydney's energy network is exposed to extreme weather events. The network is structurally designed to accommodate certain loads. These loads are exceeded during extreme weather when demand soars. Extreme weather events are the main cause of network failure.
Communication networks	Sydney is becoming increasingly dependent on information and communications technology (ICT) for critical services such as air traffic control and banking transactions. Failure of core ICT systems would significantly compromise the ability of Sydney's economy to function. Telecommunications providers are also experiencing the physical impacts of extreme weather events. Meanwhile there is an increasing need for ICT solutions for disaster response and business continuity across city systems.

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[10] Infrastructure NSW, 2014, State Infrastructure Strategy Update
[11] Sydney Water, 2010 Climate change adaptation

[12] Department of Resources & Energy, 2016, Electricity generation in NSW
[13] NSW Office of Environment & Heritage, 2014,Towards a Resilient Sydney Urban Adaptation Research Synthesis

Most vulnerable to shock events	Sydney experience
Water supply	Water supply within Sydney is of a high quality and reliability, however faces challenges from aging infrastructure across the network, lack of integrated planning for new water infrastructure in growth sector areas, lack of integrated water cycle management to increase water supply diversity and complex regulation, licencing and pricing arrangements.

3.6   City perceptions

Feedback on perceptions of Sydney's current resilience were gathered via an online survey of community, business and government stakeholders, and face to face interviews with key stakeholders, including business, and key government and private agencies.

Community

380 community members were selected to provide a mix of age, gender, socio-economic status, cultural and diverse ability groups. There was a slight weighting towards residents of Sydney's key growth areas in the west.

The community perceptions recognise diversity, local culture and a sense of place as strengths. They highlight a need for improvement to public transport, housing affordability, health awareness and services, and social cohesion.

Business and Government Stakeholders

Over 200 people from government, business, community sector (e.g. not for profit), research, education and policy bodies were surveyed.

Stakeholders saw affordable housing, maintenance and optimisation of critical infrastructure, transport networks and integrated planning as key challenges. Diversity and social tolerance were also raised as important issues.

Interviews with key government and private agencies and business indicated that a new 'habit of collaboration' is required in Sydney. Many people engaged in similar activities across Sydney are not networked together. There is an opportunity to digitally and physically connect people to gain efficiencies in effort, derive best practice and scale opportunities in Sydney.

These perceptions reflected the issues being raised at the Agenda Setting Stakeholder Workshop in June 2015 which was attended by 150 people mostly from state and local government (61%) and business (21%).

Outcomes from the city perceptions surveys are represented in Figure 6 and Figure 7.
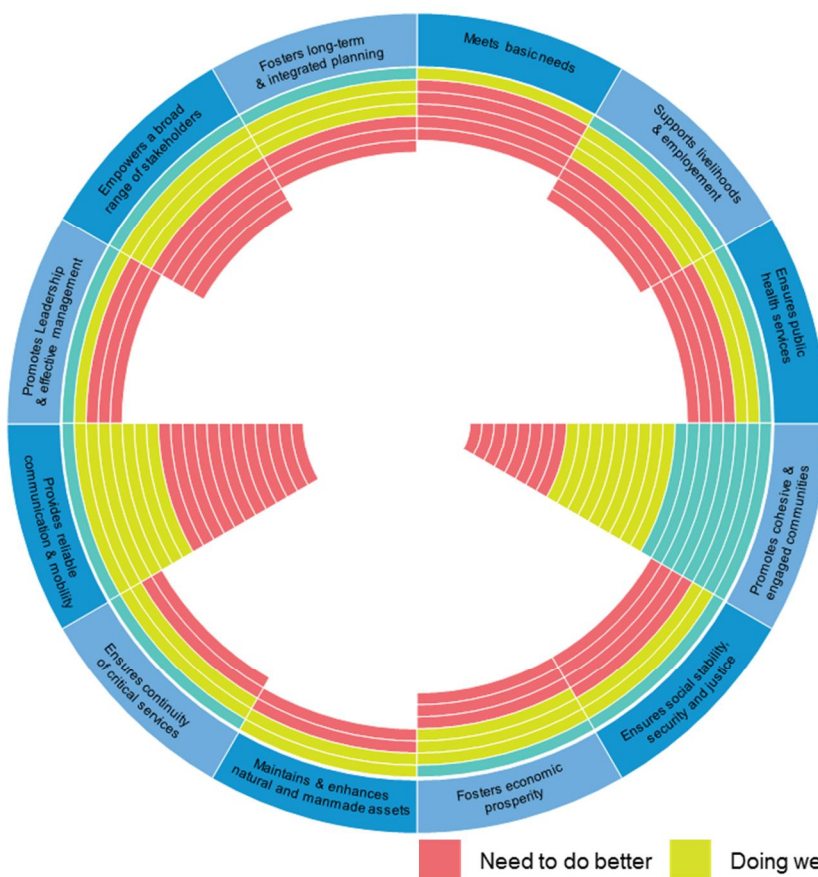
Figure 6 City Perceptions - community across metropolitan Sydney
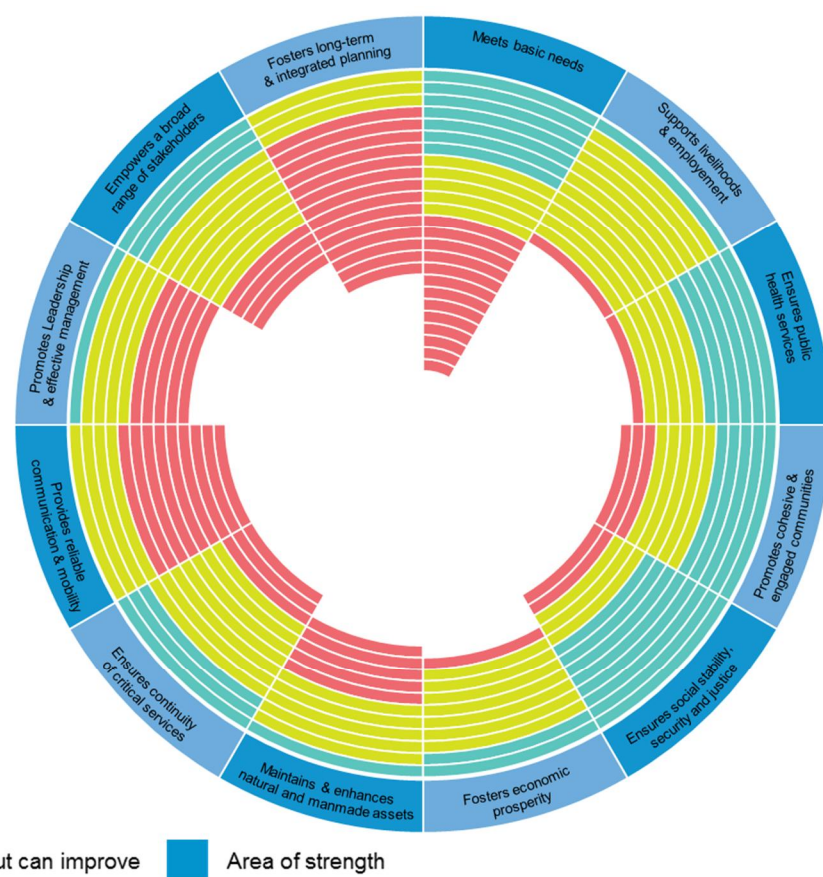
Figure 7 City Perceptions – business and government stakeholders (Agenda Setting Workshop)

Legend:
- Need to do better
- Doing well, but can improve
- Area of strength

Segment labels (both figures): Meets basic needs, Supports livelihoods & employment, Ensures public health services, Promotes cohesive & engaged communities, Ensures social stability, security and justice, Fosters economic prosperity, Maintains & enhances natural and manmade assets, Ensures continuity of critical services, Provides reliable communication & mobility, Promotes Leadership & effective management, Empowers a broad range of stakeholders, Fosters long-term & integrated planning

4 Understanding Sydney's existing efforts to build resilience

A City Actions Inventory was developed as part of the Preliminary Resilience Assessment. It has identified a broad range of resilience actions across Metropolitan Sydney. Actions include strategies, frameworks, programs, networking and support groups, and funding grants. A number of innovative tools and initiatives (such as interactive heat maps and 'Cool Parramatta', an initiative for coping with extreme heat conditions) were also documented.

These city actions are currently being undertaken by:

· The Australian government, NSW state government and government agencies and local councils
· Business
· Community groups and not for profit organisations
· University and research organisations and
· The community.

Approximately 100 actions were reviewed. Examples of city actions have been referenced throughout the body of this report as relevant. The outputs of the City Actions Inventory are provided in Appendix A in full.

4.1 Towards a Resilient Sydney project

The NSW Office of Environment and Heritage (OEH) have been focusing on resilience within metropolitan Sydney via Towards a Resilient Sydney[14].

This project aims to:

· Develop improved information of climate risks for Sydney
· Assess cross-sectoral vulnerability to the risks
· Identify responses and opportunities to help local communities improve resilience and minimise impacts.

A number of sub-projects have helped OEH develop a comprehensive understanding of climate change vulnerabilities and potential adaptation responses and have included to date:

· Towards a Resilient Sydney Adaptation Review Paper which uses global examples to identify 'best practice' principles and actions for adaptation planning for climate change;
· Towards a Resilient Sydney Urban Adaptation Research Synthesis which lists areas for further investigation and outlines cross-sectoral knowledge themes;
· 2013 Socioeconomic profile for Sydney which outlines economic and demographic trends and projections for Sydney; and
· Sydney Integrated Regional Vulnerability Assessment (IRVA) which summarises the Sydney metropolitan region's vulnerability to climate change and adaptation opportunities.

IRVA was informed by a series of workshops in late 2013 with representatives from government service providers from five key sectors: Human Services, Economy and Industry, Emergency Management, Infrastructure and the Built Environment, and Natural and Cultural Assets. The sector workshops provided an in-depth regional understanding of the vulnerability of the Sydney Metropolitan Area to climate change impacts. The Integration workshop prioritised actions to address these vulnerabilities.

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[14] NSW Office of Environment and Heritage (OEH), 2016, Towards a Resilient Sydney

OEH will be an ongoing key stakeholder for the development of the Resilient Sydney Strategy.

4.2   Resilience initiatives led by business

Business is leading the way in developing and implementing resilience responses.

The Australian Business Roundtable for Disaster Resilience & Safer Communities has evaluated the cost of disasters for communities and business across Australia.

Their City Context Reports include:

- March 2016: Building Resilient Infrastructure;
- March 2016: The Economic Cost of the Social Impact of Natural Disasters;
- July 2014:   Building an Open Platform for Disaster Resilience Decisions; and
- June 2013: Building our Nation's Resilience to Natural Disasters.

The Business Adaptation Network is also leading resilience practice. The network was formed by business and infrastructure providers to share best practice adaptation and resilience building across Australia. The network includes Green Cross and the Australian Built Environment Council Resilience Task Group.

As an example, at Optus, the second largest telecommunications provider in Australia, they are developing responses to resilience across a range of issues including:

- ensuring that they have resilient infrastructure for our customers and more broadly the community in times of shock

- assessing resilience with a climate change lens to inform the Optus business of the future shocks and stresses we may encounter
- ensuring continuity of service in times of shock so that Optus customers and the broader community remain connected
- working toward a more resilient country and outcomes through association with the Australian Business Roundtable.

5 Metropolitan Sydney – city context

The following section provides a snapshot of the key components of metropolitan Sydney.

The City Context provides data and information through the dimensions of the City Resilience Framework – health and wellbeing, economy and society, infrastructure and environment and leadership and strategy.

The context considers Sydney's current state, key indicators and future trends.

5.1   Sydney demographics

Key challenges – A growing, ageing population

How can Sydney's infrastructure and services be flexible and adaptable enough to support population growth? How can we ensure that wellbeing is not limited for all our community, including the ageing?

5.1.1   Population

Metropolitan Sydney is located in the state of New South Wales (NSW) on the east coast of Australia. Home to 4.6 million people within around 12,000 square kilometres[16], it is Australia's largest city.

Metropolitan Sydney includes 41 local government areas (LGAs) across 6 districts. These 41 LGAs are currently undergoing reform by the NSW state government, aiming to reduce the 41 to 25 LGAs. The six districts are defined by the new metropolitan planning authority, the Greater Sydney Commission. We refer to the districts throughout this paper.

Adjacent regions include the Central Coast to the north (population 331,007) and the Illawarra region to the south (population 344,454).

Figure 8 Metropolitan Sydney districts, local government areas and CBDs[15]

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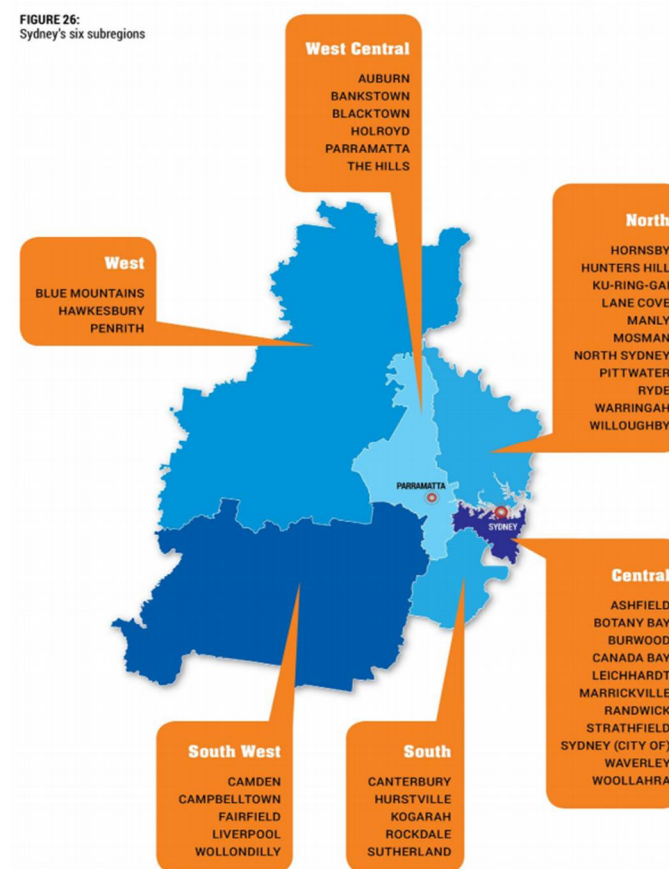
[15] Dept of Planning 2014, A Plan for Growing Sydney

Table 6 Population Statistics for Metropolitan Sydney[16,17]

District	Population 2011	Projected Population 2031	Percentage total population 2011	Projected percentage total population 2031	Projected growth 2031
West	327,500	439,350	8%	7%	34%
South	610,550	765,300	14%	13%	25%
Central	819,400	1,086,250	19%	19%	33%
South West	638,800	964,650	15%	16%	51%
North	853,150	1,090,750	20%	19%	28%
West Central	1,036,850	1,515,500	24%	26%	46%
Total	4,290,700	5,860,000	-	-	37%

Metropolitan Sydney joins the Gosford (population 169,574) and Wyong (population 159,015) local government areas to form the Greater Sydney statistical area for the Australian Bureau of Statistics. Where possible, statistics have been provided for metropolitan Sydney[16].

Population growth is 1.6% per annum on average, and metropolitan Sydney is expected to hit 5 million in 2016. A projected additional 1.6 million people by 2031 in Sydney is caused by a nearly even split between natural increase from births and longer life, and net migration. The latter is led by overseas migration into Sydney[17].

Growth is expected to be strongest in the West Central and Southwest Districts, nearly doubling by 2031 to 2.7 million, about 45% of Metropolitan Sydney's total population[18].

Sydney's population is young with a median age of 37. We have a fairly even gender distribution with 49% males and 51% females[19]. The largest proportion of the population is young adults in their late 20s and 30s[20].

The projected number of people aged over 65 years will nearly double in the next 20 years, from around 520,000 in 2011 to over 995,000 in 2031 - or from 12% to 17% of the total population[19].

The number of children under 15 years old is projected to grow from around 800,000 in 2011 to just over 1.1 million in 2031[55].

The life expectancy for metropolitan Sydney is increasing. In 2006 life expectancy was 81.8 years. In 2012 this had risen to 83.1 years[15].

[16] ABS 2014, Population Estimates by Local Government Area
[17] NSW Department of Planning & Environment, 2015, Metropolitan Sydney Factsheet
[18] IPART, 2015, Review of local councils for Fit for the Future proposal

[19] Dept of Planning 2013, Towards a resilient Sydney – Socio-economic profile
[20] Australian Government, 2015, State of Australian Cities 2014–2015

Figure 9 Metropolitan Sydney - Landmarks

5.2   Health and wellbeing

Key challenges – housing affordability, increasing chronic illness, vulnerability to heatwaves, employment diversity

Quality of life indicators developed by the Economist Intelligence Unit put Sydney in the top 10 world cities in 2012 and 2013. Rankings are based on political and social stability, health care, culture, environment, education and infrastructure. The 2015 Anholt-GfK City Brands Index ranked Sydney in the top five of the world's best cities. The index considers

- Presence - the city's international status and standing
- Place - outdoor environment and transport
- Pre-requisites – basic needs such as affordable accommodation and the standard of public amenities
- People – friendliness, cultural diversity and sense of personal safety
- Pulse- interesting things to do: and
- Potential - the economic and educational opportunities available[21]

Community wellbeing indicators are used across metropolitan Sydney to guide strategic plans and measure the impact of community and wellbeing initiatives. Indicators come from a range of sources including local government records and surveys, the Australian Bureau of Statistics and NSW Health surveys. These indicators have informed this study where relevant.

5.2.1   Food production

20% of metropolitan Sydney's food is produced within the Sydney basin[22]. Food production includes high value intensive industries such as market gardens, poultry and mushrooms. Preservation of agricultural land in close proximity to the urban market is an important consideration for the region. Whilst covering only 1.5% of the land area of NSW, the greater Sydney region accounts for 7% of the State's agricultural production[128]. Refer to Section 5.5.2 for additional consideration of the agricultural and horticultural land uses within Metropolitan Sydney.

5.2.2   Housing and development

Key challenge – housing affordability

How can we improve affordability in the rental and owner occupied housing markets? How can we prevent the population moving further away from employment, key services and infrastructure and improve liveability?

Medium density and urban infill residential development has increased in Sydney. Market prices for property are being driven up by population growth and immigration, the desire of high-income professionals for housing in the inner city, high demand for investment properties, tax incentives and low interest rates. At the same time, income growth has not kept up with purchase and rental prices.

Residential property prices have shown a substantial and mostly sustained rise in value since the mid-1990s, except for a short plateau period around the time of the Global Financial Crisis.

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[21] GfK, 2016, 2015 Anholt-GfK City Brands Index

[22] Institute for Sustainable Futures, 2015, Feeding Cities: Mapping Sydney's potential foodshed

Semi-detached and apartment dwellings made up 56% of all new dwellings built over the last decade in metropolitan Sydney. This is a change from previous years. At the beginning of 2001 semi-detached and apartment dwellings only comprised 35% of Sydney's total housing stock[23].

The condition of residential housing stock is generally good. However rising temperatures, heatwaves and the impact of the urban heat island effect pose challenges. The relationship between housing condition, quality of construction and how occupants fare during heatwaves needs better understanding. Parramatta and Penrith Councils, and the Southern Sydney Regional Organisation of Councils have conducted aerial heat mapping to identify extreme heat pockets within their local areas. Councils across the West Central and Southwest Districts now provide advice to residents on how to cope during heatwaves.

### 5.2.2.1 Housing Affordability

Housing is becoming increasingly unaffordable in metropolitan areas. The most affordable housing for buyers and renters alike is found in the west and southwest of Sydney. These areas are located far from jobs forcing residents to commute long distances to work. Poor public transport in the west and southwest mean this commute is largely by car. This is particularly an issue as population growth is expected to be strongest in the West Central and Southwest Districts, nearly doubling by 2031 to 2.7 million, about 45% of Metropolitan Sydney's total population[24]. There is also a lack of diversity of housing catering to Sydney's growing, aging and diverse population, with a need for user centred and people driven responses to housing affordability issues, including housing type and financing structures.

Younger people who have not benefited from the last two decades of rising house prices are being locked out of the market, creating significant and increasing inequity across the generations. It is now extremely difficult for middle and lower income households to rent or buy without spending more than 30% of their income on housing.

Figure 4 Rental Affordability – Greater Sydney[29]
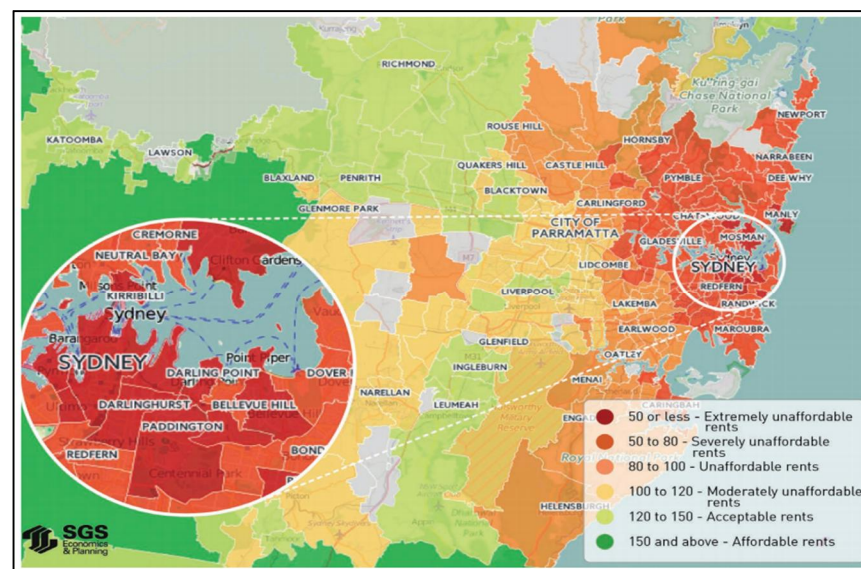
The median house price in Sydney is now 12.2 times the median household income[25]. Rental affordability in metropolitan Sydney is in a critical position with the average household required to spend 28% of household income to access a rental dwelling, very close to the 30% housing stress threshold, and more than 30% within the inner city[26].

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[23] Australian Government, 2015, State of Australian Cities 2014–2015
[24] IPART, 2015, Review of local councils for Fit for the Future proposal

[25] News.com.au, 2016, Australian city has come in as second least affordable in housing survey

This is now an acute issue across Sydney with important economic ramifications. Middle-income professionals (teachers, members of the police force, nurses and childcare workers) are critical to the functioning of Sydney as a global city. Lack of affordable housing and associated long commutes undermine the ability of business to attract and retain staff. This may ultimately lead to a drain of critical human capital from the city[26].

Indications of housing stress -

- Sydney was ranked the second least affordable city in the world by the Annual Demographia Housing Affordability Survey (2016);
- Sydney was ranked last in National Shelter's recent 'Rental Affordability Index'. This has led to calls from non-for-profit housing providers for the NSW government to address the issue by mandating affordable housing on government-owned land and setting mandatory affordable housing targets for all new developments[27];
- Sydney now has a median house price of $1 million[28]. The median sales price for all dwellings across metropolitan Sydney increased by 15% over 2014. This was a higher increase than that for income;
- All households in the lower 40% of total household incomes are facing severely and extremely unaffordable rents. These include a range of key worker occupations such as nurses, teachers, care workers and apprentices[29]; and
- Home ownership among persons under 35 years of age has dropped from nearly 40% in 1995 to around 33% in 2012. By 2019 research

house BIS Shrapnel predicts that just 24% of Sydneysiders aged 20 to 34 will own their home, compared to 43.2% in 2011[30].

Sydney has an extremely limited supply of affordable rental housing for essential workers at below market rates. The City of Sydney reported more than 84% of very low to moderate income inner city households are experiencing housing stress. The supply of social housing to provide a safety net for those who cannot afford market housing is also severely constrained[26]. In April 2015, there were 59,500 households on the waiting list for social housing across the State. The NSW Auditor-General forecasts this will increase to more than 86,000 households by 2016[26].

The City of Sydney has been able to implement inclusionary zoning or developer contributions to support the development of affordable housing for key workers in low and medium income households in some locations. Developments such as Green Square were subject to a 3% inclusion of affordable housing units or a comparative developer contribution.

Funding from developer contributions goes towards projects such as the Platform Apartments in Eveleigh. This initiative provides means tested rental accommodation at below market rents for key workers in low and medium income households. The Platform Apartments were also partly funded by the Commonwealth government's Affordable Housing Fund and the National Rental Affordability Scheme.

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[26] City of Sydney, 2015, Housing Issues Paper
[27] NSW Federation of Housing Associations, 2015, Rental Index Highlights Need for 30% Affordable Housing Targets
[28] Sydney Morning Herald, 2015, Sydney Median House Price Now $1 Million
[29] SGS Economics and Planning, 2015, Rental Affordability Index

[30] BIS Shrapnel 2016 Sydney a no-go zone for first home buyers

The 2011 Camperdown Common Ground Project is an example of a recently completed social housing project. Common Ground is a socially integrated housing complex accommodating formerly homeless people and people on low to moderate incomes in the inner city of Sydney. The National Partnership Agreement on Homelessness funded Common Ground. The partnership is between the Commonwealth and NSW governments. Its purpose is joint investment in social services.

5.2.3   Livelihoods and employment

Key challenge – limited employment diversity and inequitable distribution of employment density

How can Sydney provide sufficient employment diversity and density to reduce unemployment and underemployment in the youth, ageing and unskilled populations and provide equitable access to employment?

During the 2011 census the total labour force for metropolitan Sydney was 2,048,135. This represents nearly 19% of the total national workforce. 63% of people were employed on a full-time basis, 26% were part-time, and 6% were employed but away from work at the time of the census[31].

The unemployment rate for Greater Sydney residents was 5.2% in April2016, slightly lower than the New South Wales average of 5.3% and lower than the national average of 5.7%[34]. Greater Sydney hosts 21% of Australia's working age population, with a participation rate of 66.7%, compared to a national average of 64.8%.

Unemployment is highest in the southwest and west. Median incomes in metropolitan Sydney are higher than national averages.

Underemployment has been identified as an issue. Underemployment occurs in metropolitan Sydney because of a lack of full time roles, flexible working arrangements, commuting time and transport access, and an increasing ageing population staying in the workforce.

Employment diversity has increased. 32% of Australians[32] now undertake freelance work as their sole source of income - 'moonlighting' as freelancers after hours, combining part time and freelance work, or engaging in short term contract work. Increasing flexible working arrangements are occurring, with companies like Telstra and ANZ offering all roles as flexible[33]. Employment centres are geographically concentrated affecting equitable access to employment.

Changes in Sydney's workforce include increased diversity in age, education level, cultural background and gender. Increasing population density in the west and southwest raise issues around the location of jobs and the length of commuting time. These changes translate into demand for greater diversity within Sydney's employment market in terms of where high value jobs are located.

Refer to section 5.3.3 for further information on economic prosperity including access to employment, employment centres and opportunities.

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[31] ABS, 2011, Greater Sydney Labour Force

[32] Daniel Edelman, 2015, Freelancing in Australia
[33] Josh Butler, 2015, Flexible working arrangements taking over Australian companies

Table 7 Employment rates across Greater Sydney (April 2016)[34]

District	Region	Participation Rate (15+)	Unemployment (15+)	Youth Unemployment (15-24)
North District, Gosford	Sydney - North Sydney & Hornsby	70%	4%	8%
	Sydney - Northern Beaches	71%	4%	5%
	Sydney – Ryde	68%	8%	15%
Central District	Sydney - City & Inner South	71%	6%	8%
	Sydney - Eastern Suburbs	71%	4%	11%
	Sydney - Inner Southwest	60%	5%	15%
South District	Sydney - Inner West	75%	4%	8%
	Sydney – Sutherland	70%	5%	8%
West & West Central	Sydney - The Hills & Hawkesbury	71%	5%	10%
	Sydney – Blacktown	66%	6%	13%
	Sydney - Outer West & Blue Mountains	64%	5%	9%
	Sydney – Parramatta	62%	6%	11%
Southwest District, Wyong	Sydney - Outer Southwest	66%	5%	14%
	Sydney - Southwest	60%	7%	9%
Greater Sydney		67%	5%	11%
New South Wales		64%	5%	12%
Australia		65%	6%	12%

Key		Better or equal to the average for Greater Sydney
		Worse than the average for Greater Sydney

[34] Australian Government, 2016, Labour Force Area Profile

5.2.4   Education

Key challenge – segregation of schooling

How can we improve social cohesion and prevent segregation between communities and socio-economic stratification, including within Sydney's education system?

In 2011 55% of people over the age of 15 had completed 12 years of schooling within metropolitan Sydney, higher than the 48% average for NSW. Trends show an increase in the proportion of people completing Year 12 or equivalent schooling, with a lower proportion of people leaving school in earlier years[35]. High school student retention rates by statistical areas (2007 to 2013) show lower retention rates in Sydney's south, southwest and west compared to north and inner statistical areas in years 10-12.

Educational inequality in Australia is persistent. One in four young Australians are now being left behind according to a recent report from the Mitchell Institute[36], with families with sufficient cultural, social and economic capital able to send their children to schools with better quality facilities[37].

Australia ranks fourth in the OECD for its proportions of students attending private primary and lower secondary schools at 31%, and fifth for private upper secondary schools at 36%.

Data from the ABS and the Independent Schools Council of Australia suggest 94% of Australian private schools are religious[38], which indicates that communities around these schools may be separated from the broader community due to religious regions.

Between 2004 - 2013 enrolments in private schools in NSW increased by 10%, compared to a 1% rise in public school enrolments. In recent years, this has dropped with private school enrolment rising 6% in the period 2009-2013 and public school enrolment rising 2.5%. The migration to private schools has occurred mainly at high school level[39].

Western Sydney has low high school completion rates - 42% completed Year 12 compared with 54% for the rest of Sydney. Western Sydney also has lower levels of tertiary qualifications with 20% holding a degree compared with 29% for the rest of Sydney[40].

Refer to Section 5.3.3.1.1 for further detail, especially on the importance of the education sector to Metropolitan Sydney's economic prosperity

5.2.4.1   Tertiary qualifications in Sydney

Tertiary qualifications within Sydney have increased over recent years. As more students complete high school more enrol in university. Numbers vary across Sydney and the proportion of those with tertiary qualifications ranges from 40% to 65% with an average of 55%[55].

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[35] City of Sydney, 2011 Community Profile: Greater Sydney
[36] Mitchell Institute 2015 Educational opportunity in Australia 2015: Who succeeds and who misses out
[37] Stewart Riddle 2015, Educational researcher unite to challenge inequality in Australian schooling, Australian Association for Research in Education

[38] ABC 2015, Factcheck Private schools and religion
[39] Sydney Morning Herald, 2015, NSW families abandon public schools in favour of private education
[40] WSROC, 2016, Education

On average, 60.6% of Greater Sydney holds post school qualifications, ranging from 44.9% in the South West, to 71.9% in North Sydney and Hornsby, as shown in Table 8, shows the highest proportion of post-school qualifications in northern and eastern suburbs of Sydney, with lowest proportions in south and south west[41].

As acknowledgement of the unequal access to education opportunities, the NSW government committed to increase enrolments in higher education in NSW by students from low socio-economic backgrounds to 20% of university enrolments by 2020[42].

Table 8 Tertiary qualification rates

Region	Persons with post school qualifications
Sydney - North Sydney & Hornsby	71.9%
Sydney - Northern Beaches	66.8%
Sydney – Ryde	66.0%
Sydney - City & Inner South	69.4%
Sydney - Eastern Suburbs	70.4%
Sydney - Inner Southwest	53.7%
Sydney - Inner West	66.3%
Sydney – Sutherland	62.0%
Sydney - The Hills & Hawkesbury	62.6%
Sydney – Blacktown	52.5%
Sydney - Outer West & Blue Mountains	54.5%
Sydney – Parramatta	56.3%
Sydney - Outer Southwest	51.7%
Sydney - Southwest	44.9%
Greater Sydney	60.6%

The population of metropolitan Sydney is projected to increase by 1,140,000 by 2031. Nearly 60% of this growth will occur in the greater west. While there are specialist smaller campuses of other universities located in the area Western Sydney University is the only major university located in the greater west.

Furthermore there is less opportunity for partnerships between business and research facilities in the greater west.

Access to tertiary education can be defined in physical terms or in reference to an individual's capacity to engage. Both aspects are problematic for western Sydney. The physical barrier and costs of travelling extended distances for higher education will likely impact on the region's ability to produce a highly-educated workforce.

The impacts of inequitable access

Income mobility is the ability of an individual, family or some other group to improve or lower their economic status, as measured by income. The impacts of education on income mobility are noteworthy. Learning Curve Issue 12 – Income Mobility in Australia[43] presents recent findings which indicate income mobility is much lower than previously thought in Australia. The study suggests the lower mobility is linked to lack of investment in public education.

[41] ABS 2011, National Regional Profile – Sydney Statistical Area Level 4 locations
[42] NSW Government 2010, NSW Tertiary Education Plan

[43] Centre for Education Statistics and Evaluation (CESE), 2015

Further education plays a substantial role (25-40%) in economic immobility between the generations. The impact of socio-economic status has more impact on education attainment for females than males, and education explains a greater component of income immobility for females.

Changing schools is also harmful. Studies have found the more times a student changes schools the lower the academic achievement. Changing schools is more common in lower socio-economic areas, with the highest number for Sydney found in the west and southwest.[44]

5.2.5   Public health

Key challenge – increasing chronic illness

How can we prevent increase in chronic illnesses across broader populations? How can communities address the lifestyle and socio-economic factors which contribute to chronic illnesses? How can we prepare our health services for increased demand? How can Sydney communities work to support economic participation for those with chronic illnesses? How can we prevent increasing death and illness from heatwave events in sensitive community groups?

Community perceptions of health in Sydney are good with around 81% of the population rating their health as excellent, very good or good. This varies between 77% in the southwest to around 83% in the north.

However research shows that chronic illnesses are increasing in Sydney along with demand for health services. An ageing population is compounding the problem. Whilst there is a significant commitment to investment in health infrastructure, questions remain around the capacity to answer present and future demand, particularly in crises.

Government and the community recognise the need for action to increase levels of physical activity and reduce sedentary behaviour. In 2014–2017 the Office of Preventive Health funded the Healthy Children and Healthy Worker initiatives (with contribution from Institute for Sustainable Futures (UTS), as well as the Get Healthy Information and Coaching Service. These initiatives aimed to improve population health, reduce inequities, and reduce hospitalisations.

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[44] Ho, Vincent, Butler 2015 Everyday and Cosmo-Multiculturalisms: Doing Diversity in Gentrifying School Communities

Preventable hospitalisations are highest in the poorest LGAs, and lowest in the wealthiest local government areas.

Figure 10 Preventable hospitalisations by LGA[45]
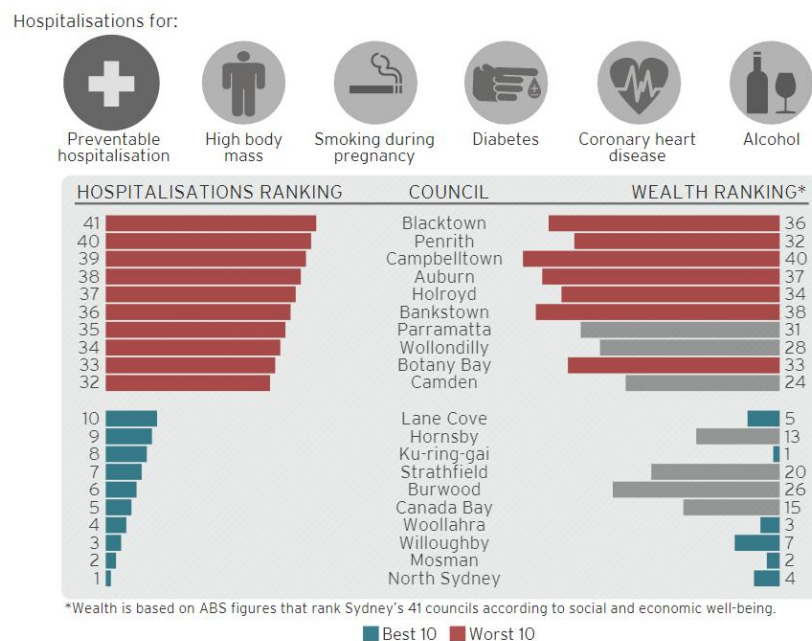
Graphic: Francisca Sallato, Conrad Walters | Source: Health Statistics NSW, Australian Bureau of Statistics

Initiatives like the NSW Liveable Communities Grant aims to encourage and support living in communities for the elderly and people with disabilities.

There is considerable variation in levels to which children and young people aged between 5-17 years consume the recommended daily intake of fruit and vegetables across NSW. This variation is also found in activity levels.

Across NSW, primary school children are more likely than high school children to consume recommended amounts of fruit and vegetables. High school children are more physically active than those in primary schools.

Children who are overweight or obese have a much greater chance of becoming overweight or obese adults. The prevalence of overweight or obesity among young people aged 5 to 17 years has stabilised in recent years, but is still at concerning levels, with more than one in five (22.8%) children (24% of boys and 21.5% of girls) being overweight or obese[46]

The Australian Child Wellbeing Project will create Australia's first major nationally representative and internationally comparable survey of wellbeing among children aged 8-14 years. Particular attention will be given to the perspectives of six groups of young people with experiences and needs that may have a bearing on their wellbeing:

- Culturally and linguistically diverse young people
- Economically disadvantaged young people
- Young people with disability
- Young people in regional and remote Australia
- Aboriginal and Torres Strait Islander young people
- Young people in out-of-home care

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[45] Sydney Morning Herald, 2013, City's poor get sick, rich get drunk

[46] NSW Health, 2016, NSW Healthy Eating Strategy

5.2.5.2 Chronic illnesses

Chronic illnesses include chronic diseases such as diabetes, cancer, cardiovascular, oral, musculoskeletal, kidney, and respiratory diseases, and mental health illnesses. Many chronic diseases have lifestyle and behavioural risk factors smoking, obesity, poor nutrition, drug and alcohol abuse and physical inactivity.

Chronic illnesses are the highest cause of death and disability within Sydney. Australians are also increasingly living with chronic illnesses. Typically, chronic illnesses are long-lasting, and have persistent effects. They can result from complex causes, and many people have more than 1 chronic illness or condition at the same time.

The cost of the four most expensive chronic illnesses – cardiovascular diseases, oral health, mental disorders and musculoskeletal diseases - equated to around 36% of all health expenditure in 2008-09[47].

An ageing population will bring higher numbers of people with chronic disease in the future – this has been described as "Australia's greatest health challenge" by the Australian Institute of Health and Welfare[47].

The growing ageing population is predicted to dominate health service planning over the next few decades. It is anticipated that climate changes such as increased temperatures will exacerbate health concerns related to ageing[55]. Failure to address this challenge could mean poorer health and even greater pressure on government budgets.

Around 50% of the population is overweight or obese. The number of people reported as overweight or obese varies across Sydney from around 45% in the north to 55% in Nepean-Blue Mountains in the west[55].

Aboriginal and Torres Strait Islander peoples have higher rates of pre-existing chronic illnesses and social disadvantage than other Australians, and are likely to be affected disproportionately by shocks and stresses.

The NSW Government is currently implementing reforms across the NSW Health system at the State and local level, including reform of mental health services.

5.2.5.3 Mental health

It is estimated nearly half of all Australians will experience mental illness ranging from anxiety and depression to chronic and complex mental disabilities over the course of their lives[59]. A higher prevalence of mental illness is found among people who experience compounding disadvantage and marginalisation, particularly people living in remote areas, Aboriginal and Torres Strait Islander peoples, LGBTIQ people, people with a disability and people who have difficulties with alcohol or drugs.

Prevalence of mental illness decreases with age, with figures greatest among 18-24 year olds. Many of the risk factors are associated with lifestyle. The prevalence of mental or behavioural disorders among people born overseas is similar to those born in Australia[48].

5.2.5.4 Health services

Health expenditure is rising for a number of reasons. The median age of our population is projected to continue rising as more people live into very old age. The number of older Australians is growing as a proportion of the total population.

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47 Australian Institute of Health and Welfare, 2014, *Australia's Health 2014*, p. 98.

48 Mindframe National Media Initiative, 2016, Snapshot of mental illness in Australia

Population ageing is not a problem in itself. Indeed, there are benefits that come from having a healthy and engaged aged population[49]. However the incidence of sickness and disability rises with age and older people tend to be higher consumers of health care services. They are more likely to suffer from chronic diseases such as arthritis, dementia and cancer[50].

Non-demographic factors are also important. There is increasing utilisation of services across all age groups, as well as the use of new and more expensive technologies.

These are a major source of cost pressures in Australia and many other developed countries[51]. People of all ages are "seeing doctors more often, having more tests, treatments and operations, and taking more prescription drugs"[52].

5.2.5.5   eHealth

The accessibility of affordable healthcare is increasing with advances in connectivity through technology and remote communication. Use of wearable devices like FitBits heralds the increasing sophistication of technology to monitor more complex medical issues.

The Australian biotechnology field is growing, with leaders located in Macquarie Park. Overall trends are for increasing innovation including personalised drugs, and treatments derived from genetic mapping[53].

5.3   Economy and society

Key challenges – growing, diverse population, concentrations of domestic violence and drug related crime, global competition and interdependency, geographic inequity

5.3.1   Cohesive and engaged communities

Key challenge – growing, diverse population

How can we ensure Sydney communities are cohesive and engaged when undergoing rapid growth in population and cultural diversity? How can rapid growth in specific geographic areas be supported with sufficient social and economic infrastructure? How can Sydney continue to recognise, celebrate and grow cultural diversity within and across geographically dispersed communities? How can we better understand and manage the social pressures increased density has on communities?

Metropolitan Sydney has a relatively safe, stable community, with decreasing crime rates and high levels of trust. When surveyed around 50% of Sydneysiders aged 18 years or over felt 'most people' could be trusted[55].

Social networks within Sydney are generally good, although tend to be limited to immediate family and friends. 92% of people within Sydney reported they were able to get support from a person living outside their household in times of crisis, whilst 28% said they provided support to a relative living outside the household.

In 2011, 4.4% of the population reported a need for assistance in their day-to-day lives due to disability. Trends show an increase in the number of people over 75 with a need for assistance.

49 Productivity Commission, 2005, *Economic Implications of an Ageing Australia*
50 National Commission of Audit, 2014, *Towards Responsible Government*
[51] Productivity Commission, 2016 An Ageing Australia: Preparing for the Future
[52] Grattan Institute, 2014, Budget Pressures on Australian Governments 2014 edition
53 Alex Butterworth, 2014, Intellectual property is what drives biotech innovation

A growing ageing population is increasing social issues for older Australians. Loneliness and social isolation top the list of main concerns for older people living at home according to a national survey by care franchise Just Better Care.

The finding is supported by Aged and Community Services Australia 2015 study on social isolation and loneliness among older Australians[54].

Social cohesion is being impacted by rising inequity across Sydney. Other stresses, such as housing unaffordability, drug and alcohol abuse and inequitable access to transport contribute to social cohesion. Globally, social cohesion has also been identified as a key stress leading to social unrest.

5.3.1.1 Population diversity

Resilient Sydney acknowledges Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of this place we now call Sydney. The traditional custodians of this place we now call metropolitan Sydney have inhabited the area for at least 60, 000 years. They have an unbroken and continuing connection to Sydney.

Metropolitan Sydney belonged to several major language and clan groups. The people of the 29 clan groups of the central and coastal area of Sydney are referred to collectively as the Eora Nation. The land of the Dharug (Darug) people is inland including Parramatta to the Blue Mountains. The land of the Dharawal (Tharawal) people extends south of Botany Bay and to the Georges River in the west, and the land of the Guringai (Kuring-gai) people is north of the harbour.

1% of the metropolitan Sydney population are Aboriginal and Torres Strait Islander peoples. At 45,719 people this is the largest population of Aboriginal and Torres Strait Islander peoples in Australia.[55]

Sydney has become one of the most hyper-diverse cities on earth. Over a million people or 36% of the population were born elsewhere in the world[55] Sydney is as diverse as London (27%), Singapore (33%), San Francisco (29%), Riyadh (31%), and New York (27%). We are yet to reach the hyper-diversity levels of Hong Kong (42%), Toronto (50%), and Dubai (87%).

Sydney is home to a number of established migrant communities and continues to attract more for education and employment opportunities.

36% of Sydney's population were born overseas. The top 5 countries for residents born overseas were China (3.6%), England (3.4%), India (2.1%), New Zealand (1.9%) and Vietnam (1.7%)[17]. Trends indicate that the migration of people born in India and China is increasing nationally[56].

60% of Sydney's population speaks only English at home. The most common languages other than English were: Arabic (4.4%), Mandarin (3.3%), Cantonese (3.2%), Vietnamese (2.1%), and Greek (2%)[17]. 5.8% of our population have difficulty speaking English, higher than the average 3.9% for NSW.[56]

Statistics from 2011 show a concentration of migrants around the Sydney and Parramatta CBDs.

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[54] Aged and Community Services Australia, 2015, Social isolation and loneliness among older Australians

[55]Dept of Planning 2013, Towards a resilient Sydney – Socio-economic profile
[56]City of Sydney 2016, Community profile

Parramatta (70%) and surrounding suburbs like Harris Park (76%), Westmead (68%), Rhodes and Homebush West (both 73%) also have large concentrations of migrants. Burwood (68%) in the Central District also has high numbers. In the southwest relatively large populations of migrants are located in Cabramatta (68%) and Fairfield (66%). These suburbs differed from the others in that overseas-born residents tended to be more established in the community.

Metropolitan Sydney's top 10 most diverse suburbs by birthplace[57]
- Rockdale, Wolli Creek, Campsie - South District
- Sydney, Ultimo, Homebush West - Central District
- Auburn, Parramatta, Lidcombe - West Central District
- Waitara – North District

Nearly 39% of households in western Sydney use a language other than English at home, compared to the Australian average of 18%[58].

12,872 refugees were settled in western Sydney local government areas (LGAs) in the period 2009-2014[58].

Figure 11 Migrant populations across Metropolitan Sydney suburbs[59]
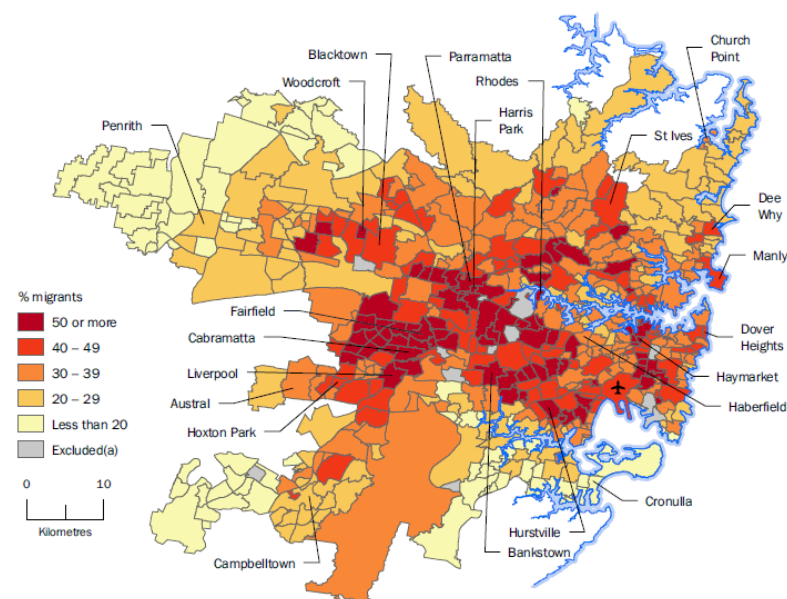
Metropolitan Sydney includes a diverse population who identify as part of the lesbian, gay, bisexual, transgender, intersex and questioning (LGBTIQ) community. While there has been growing recognition and acceptance in recent years, discrimination, violence and mental health are key concerns for the LGBTIQ diverse community. Research suggests that LGBTIQ people are at an increased risk of a range of mental health problems, including depression, anxiety disorders, self-harm and suicide[59].

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[57] SBS, 2016, How diverse is my suburb?
[58] Western Sydney University 2016, Centre for Western Sydney Data and Visualisations

[59] National Mental Health Commission, 2014, National Review of Mental Health Programmes & Services

5.3.1.2   Contribution from refugee and migrant communities

The migrant community is generally much younger than Sydney's local residential community. According to the 2015 Australian Commonwealth Intergenerational Report around 88% of migrants are aged under 40 years, as opposed to only 54% of resident Australians. Almost half of newcomers are aged 20-34 years versus only one in five resident Australians.

This young age profile makes a very positive contribution to a labour market in which new retirees now exceed new labour force entrants. Refugees face the need to set up and establish themselves in a new environment and are more likely to be entrepreneurial.

The 2000 Business Review Weekly's annual 'Rich 200' list, for example, showed that five of Australia's eight billionaires were people whose families had originally come to the country as refugees.

The entrepreneurial attributes of non-English speaking background (NESB) migrants is also evident in the New Enterprise Initiative Scheme (NEIS). An evaluation of the program found that NESB migrants had business survival rates (i.e. enterprises still running two years after the program) that were significantly higher (65%) than those rates for the native-born and for immigrants from English-speaking countries (55%)[60].In November 2013 the ABS released a survey on the characteristics of recent migrants. The labour participation rate of those who obtained Australian citizenship since arrival was 77%. This is above the national average rate of around 65%.

Of the last 190,000 places available in Australia's Migration Programme, more than two thirds corresponded to skilled migration where deeply-valued human capital must be demonstrated before receiving residency[61].

Initiatives supporting refugee and migrant enterprise in Metropolitan Sydney include the Settlement Services International Ignite Small Business Start-ups initiative.

5.3.1.3   Cohesive communities

Sydney is trending away from cultural tolerance and is less tolerant than Melbourne, Australia's next biggest city.

The 2015 Scanlon Foundation Social Cohesion Surveys ask a number of questions to determine levels of cultural tolerance. Nearly 54% of people in Sydney disagree with the statement 'the government should assist ethnic minorities', compared with 44% of people in Melbourne.

Attitudes towards Muslims are significantly more negative in Sydney, with 25%-27% indicating 'strong negative' or 'negative' response to Muslims, compared with a substantially lower overall 'negative' response of 16% in Melbourne and Canberra[62].

Research undertaken by UNSW in 2001, showed that within Sydney, the most-racist opinions were located within areas of lower socioeconomic status and high recent migrant settlement. These included the West Central LGAs of Auburn and Parramatta, as well as Liverpool, Strathfield and Fairfield.

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[60] Refugee Council of Australia, 2010, Economic, civil, and social contributions of refugees and humanitarian entrants

[61] ABC, 2015, Why migrants may be our greatest economic asset
[62] Scanlon Foundation 2015 Mapping Social Cohesion

Other areas of generally higher intolerance were the rural fringe LGAs of Wollondilly and Hawkesbury. The geography just described accords with research expectations that racist attitudes are linked to levels of education and to economic vulnerability. The research also supported that areas with much longer standing cultural diversity (Marrickville, Ashfield, South Sydney and Leichhardt) are places where people have become more accustomed to, and perhaps appreciative of, cultural diversity. The generally least-racist opinions were located within LGAs in the affluent north shore (North Sydney, Drummoyne, Kuring-gai, Manly), the very inner city (Sydney and Waverly) and especially those SLAs with considerable cultural diversity (LGAs like South Sydney, Ashfield, Marrickville, Leichhardt and Waverley)[63].

Australia has in the past decade seen a decline in political support for multicultural values, whilst public opinion on multiculturalism varies with strong levels of support for cultural diversity co-existing with anti-multicultural attitudes. Evidence shows that multicultural values relate to spatial context and the specific mix and presence of the cultural groups, and the socio-demographic and economic attributes of local populations. Survey within Eastern Australia have shown that about 85% of respondents accept that cultural diversity is good for Australia, and three-quarters feel secure among people of different ethnic backgrounds. Yet at the same time, 45% agree that Australia has been weakened by people of different ethnicities sticking to their old ways, while just 38% disagreed. This indicates support for assimilation in immigration rather than a recognition of value for multicultural values enshrined in government policies[64].

5.3.1.4   Poverty and inequity

Key challenge – increasing spatial inequity

How can we measure and prevent increasing spatial inequity across metropolitan Sydney? How can Sydney's economic and social infrastructure support economic prosperity across diverse geographic locations? How can equitable access to economic centres be improved?

Sydney recently emerged as Australia's most unequal major city. Almost all the city's top 1% of earners are found in the suburbs of the Central District. Residents of suburbs such as Vaucluse, Rose Bay, Bellevue Hill and Double Bay bring home 22% of all income.

Less than 6% of all income goes to workers in the West and West Central District suburbs of Blacktown, Campbelltown and Penrith[65].

The SEIFA index[66] shows the most disadvantaged suburbs are all located in the West Central and Southwest Districts.

The exception is The Hills in the West Central District, which falls in the top 20 most advantaged areas[65.]

5.3.1.5   Drug and alcohol abuse

About 5% of Australians will experience substance abuse disorders in any 12 month period, with men more than twice as likely as women to have substance abuse disorders[67].

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[63] UNSW 2001, The geograohy of race and racisms
[64] Dunn, Forrest, 2010 Attitudes to Multicultural Values in Diverse Spaces in Australia's Immigrant Cities, Sydney and Melbourne

[65] Sydney Morning Herald, Matt Wade, 2016, NSW the state of inequality when it comes to income
66 Socio-Economic Indexes for Areas (SEIFA) provides a broad assessment of welfare of an area, defining a rank relative socio-economic advantage and/or disadvantage in terms of access to material and social resources and the ability to participate in society (ABS, 2013). Values are given for Index of Relative Socio-economic Advantage and Disadvantage (IRSAD)

The most commonly used illicit drug in Australia is cannabis with 10% of Australians reporting use in the last year. 35% of Australians report using it at some time in their life. The next most popular illicit drug in Australia is ecstasy. Usage is well behind cannabis with 2.5% of Australians saying they have taken ecstasy in the past year. 2.1% of Australians report using cocaine in the past year, the same number have used methamphetamines[67].

Despite increasingly restrictive anti-smoking laws and public health measures such as plain packaging, nicotine remains one of the most commonly used drugs in Australia. 16% of Australians over the age of 18 smoke tobacco daily. 15,000 Australians still die each year as a result of tobacco-related illness.

Alcohol use is very common with one in three Australians having an alcoholic beverage on any given day. 13% drink wine, 11% drink beer and 2.1% have spirits. The largest number of drinkers in any age group is men aged 51-70. 45% of men in this age group have a drink on a given day. 31.5% of women of the same age have a drink[67]. Men aged 55-64 are the most likely to have more than the recommended limit of two drinks a day.

More than 5,500 Australians are killed by alcohol each year, and 157,132 Australians are hospitalized each year as a result of alcohol consumption[67].

Around 4.7% of the population misuse pharmaceutical drugs, most of those (around 3%) misuse painkillers[67].

Legislation was recently introduced to curb drug and alcohol violence within the Sydney CBD. The 'lockout laws' imposed restrictions on how long premises serving alcohol could stay open, and when last-drinks could be served. Whilst evidence shows violent incidents have significantly reduced there is contention violence has shifted to precincts located outside lockout areas. Opponents to the laws say the impacts on hospitality businesses have been extremely detrimental to local economies and the overall reputation of the city.

1.1.1.1 Homelessness

There are around 28,000 people experiencing homelessness in New South Wales[68]. Street counts in the Sydney and Parramatta CBDs have recorded increases in the number of rough sleepers in recent years[69]. 303 people were counted as homeless in the Parramatta LGA in 2015, an 11% increase from 2014. The City of Sydney recorded a 16% increase and 5 year high in the number of rough sleepers in 2014[70].

Homelessness NSW has requested government assistance to undertake street counts and improve information on rough sleeper populations across NSW70. Service providers indicate more people, and entire families in western Sydney, are experiencing homelessness.[71]

The largest provider of homelessness services in Australia, the Salvation Army, is seeing a concerning increase in the number of young people accessing their services[72].

67 ABC Fact Check, 2015, The rise of ice and the changing face of Australian drug use

68 Homelessness Australia, 2014, Homelessness in NSW
69 Parramatta Region Homelessness Interagency, 2015, Parramatta 2015 Street Count results
70 Pro Bono Australia, 20144, Sydney Homeless on the Rise
71 Andrew Carswell, 2015, Daily Telegraph Homeless people in Sydney grow in number as figures hit five–year peak
72 Salvation Army, 2015, The Cost of Youth Homelessness

A recent study showed people experiencing homelessness in Sydney and Melbourne have a higher rate of mobile phone ownership than average Australians. It was found mobile phones are essential for survival and safety, job prospects and moving out of homelessness[73].

5.3.2   Social stability, security and justice

1.1.1.1   Crime

> **Key challenge – concentration of domestic violence and drug related crime**
>
> How can we measure and prevent increasing geographical concentrations of domestic violence and drug related crime? How can we support communities and individuals to reduce the effect crime has on social cohesion and economic participation? How do we track the impacts crime and a lack of social stability has on homelessness and mental health issues? How do we support communities and individuals impacted by homelessness and mental health issues?

Some types of crime are increasing. Sydney is seeing rising rates of domestic violence, sexual and indecent assault, cyber-crime (especially identity fraud) and drug offences. Recent reports show fraudulent credit applications involving identity takeovers rose 59% in the past two years in Australia[74]. Whilst overall crime rates are declining the West Central and Southwest Districts record the highest numbers, especially for violent offences[75].

For example, domestic violence in Blacktown, and Campbelltown occurred at 1.5 times the NSW rate per capita in 2015. Sexual assault occurred at 2.1 times the NSW rate in Wollondilly, and 1.5 times the NSW rate in the City of Sydney. Fraud occurred at 2.9 times the NSW rate in Burwood and 4.7 times the NSW rate in the City of Sydney.

Figure 12 Cyber-crime incidents responded to by CERT Australia affecting systems of national interest and critical infrastructure in 2014[76]
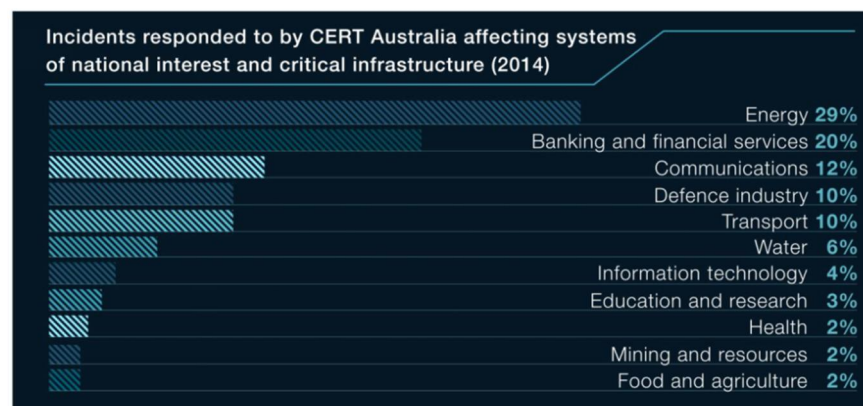
Cyber-crime relating to systems of national interest and critical infrastructure has been on the rise. There has been a 119% increase from 2011-12, 37% in 2012-13, and 20% in 2013-14[76].

1.1.1.1   Human rights

Human rights issues around fair work, human trafficking and slavery are gaining attention in Sydney. This reflects global trends.

Evidence of systemic underpayment of wages and doctoring of payroll records has been revealed at hundreds of 7-Eleven franchises. Two thirds

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[73] The University of Sydney, 2014, 95 per cent of homeless in Sydney and Melbourne own a mobile – study
[74] Veda, 2016
[75] BOCSAR, 2014, NSW Recorded Crime Statistics 2015

[76] ACS, 2015, ACSC Threat Report

of Australian stores have been subject to back-pay claims after numerous raids and audits by the Fair Work Ombudsman[77].

The scandal has affected some of Australia's most vulnerable workers. Most of the 4,000 employees working at 7-Eleven stores are on temporary and international student visas. Employees were threatened with deportation if they did not comply with illegal conditions.

1.3 million (1 in 10) workers in Australia are on visas. Cases such as these seriously undermine Sydney's international appeal as a place of employment[77].

Human trafficking, including labour exploitation and sex slavery is on the rise around the world. New data shows the Australian Federal Police investigated twice as many human trafficking cases in 2014 as in 2013. The rise is attributed to increasing demand for cheap and unregulated workers.

Forced marriages and sex slavery also continue to rise[77,78]. The Australian Federal Police recently revealed 1 in 4 investigations into sexual exploitation are centred on Sydney brothels. Police believe many cases of human trafficking continue to go unreported78.

5.3.2.1   Terrorism threat
The National Terrorism Threat Advisory System uses a five level scale of likelihood for an act of terrorism occurring in Australia. Australia's current National Terrorism Threat Level is 'probable'.

The National Terrorism Threat Level is regularly reviewed within the intelligence and security environment. Credible intelligence indicates individuals or groups have developed both the intent and capability to conduct a terrorist attack in Australia.

5.3.3   Economic prosperity
Key challenge – global competition and interdependency

How can we ensure Sydney continues to compete on a global scale? How can we reduce vulnerability to Sydney's increased interdependencies with global supply chains, and prepare to bounce back from global economic shocks?

5.3.3.1   Key economies
The Sydney economy grew by 3% in the 2014-15 financial year to $378 billion, 23.3% of gross national product. The financial services sector was Sydney's strongest performing industry followed by media and telecommunications, construction, retail and real estate services[79]. Other key sectors include tertiary education and tourism.

There has been a significant move away from manufacturing in the last decade.

As Australia's main financial centre the Sydney CBD is home to the Australian Stock Exchange and the Futures Exchange. More than 75% of all foreign and domestic banks in Australia have their headquarters located in Sydney.

According to the 2011 census there were over 151,000 workers employed in the finance and financial services sector in metropolitan Sydney with more than 55% located within the City[80].

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77 Sydney Morning Herald, 2015, 7-Eleven, a sweatshop on every corner
78 Sydney Morning Herald, 2015, AFP reveals sex-trafficking based in Sydney brothels

79 Sydney Morning Herald, 2016, Booming Sydney drives the nations growth
80 Regional Development Australia, 2016, Economic profile

Over the last five years the overall economic structure of metropolitan Sydney has changed. There is a trend towards a greater contribution by the services sector, in line with many other regions in Australia.

The financial and insurance services sector accounts for around one-fifth of the Region's gross regional product. This reflects the significance of the financial sector and Sydney's status as one of the financial hubs of the Asia Pacific Region. The majority of this activity is focused around the Sydney CBD.

Sydney's business leaders see opportunity to increase planning for the next evolution of Sydney's economic journey. Investigating and identifying how Sydney can better position for success in terms of different industry growth areas, and provide social, and economic infrastructure with capacity to support this change.
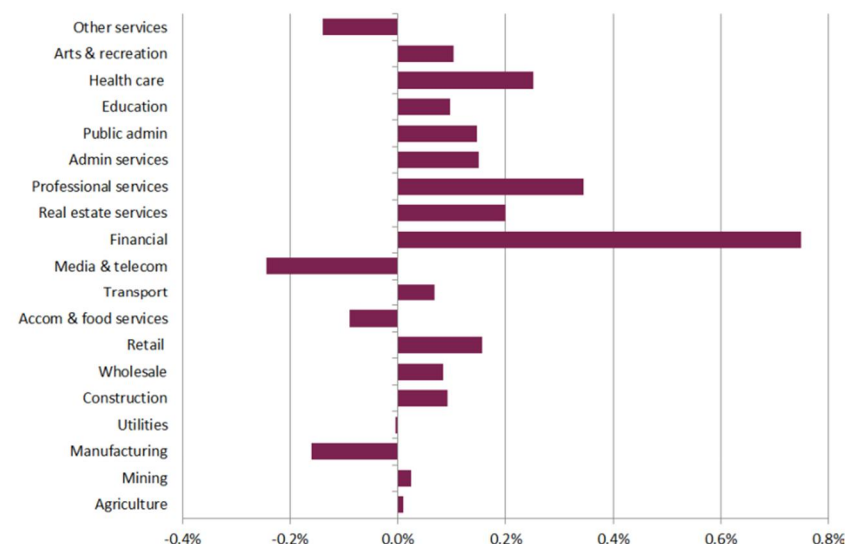
Source: SGS Economics & Planning

Figure 13 Employment sector contribution to Sydney GDP Growth (2012-13)[81]

Sydney is ranked 15 on the Global Financial Centres Index 18 – ahead of Vancouver, Shanghai, Melbourne, Beijing, Paris and Munich[82].

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[81] SGS EP, 2013, GDP by Major Capital City
[82] Qatar Financial Centre, 2015

5.3.3.1.1 Tertiary education

The NSW higher education and vocational education and training sectors play a critical role in driving the state's economic, social and cultural development.

International students contributed a record $17.5 billion to the Australian economy for the 12 months to the end of March 2015. The figure is the highest since the $16.1bn recorded in 2009, a 14 per cent surge compared to the previous corresponding period, according to the Australian Bureau of Statistics[83].

There are currently 413,000 international students in Australia. Spending on tuition and goods and services is rising at a faster rate than the number of students[83].

Over the past five years, NSW has accounted for approximately 39% of all international students in Australia. In 2009 about 238,300 international students enrolled in the NSW education sector. This included schools, vocational training, English Language Intensive Courses for Overseas students and higher education providers[53].

The rapid growth and increasing dependence on international students by universities is creating governance problems and issues with visa integrity around the nation.

NSW universities and private higher education institutions educate over 30% of Australia's future professionals. Providers of vocational education and training enrol more than 30% of the national student total[53]. Two of metropolitan Sydney's universities – the University of Sydney and

University of New South Wales – are ranked in the top 50 in The Times HES ranking[84].

Metropolitan Sydney has six major universities and nine campus sites for non-Sydney universities. There are specialist smaller campuses outside the CBD, however the primary physical locations of our major universities are located in the Central and North Districts. Western Sydney University is the only exception. This is problematic given 60% of Sydney's population growth is set to occur in west and southwest Sydney. A university can be a critical economic driver for a subregion, opening up opportunities for industry diversification and the introduction of higher order jobs.

NSW also boasts more than 50 non-university higher education providers – more than a third of the national total. In 2009 the ten NSW TAFE institutes enrolled almost 525,000 students in vocational and further education courses. There are around 1,060 Registered Training Organisations in New South Wales also providing skills qualifications[84].

The focus on higher level qualification attainment has caused TAFE to expand its capacity to offer advanced diploma and in some instances degree courses. The TAFE Institutes have established partnerships with some universities depending on the courses being offered and have also explored co-location options. Education and training has been one of metropolitan Sydney's key growth sectors with employment increasing at an average annual rate of 3% over the past five years.

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[83] The Australian, 2016, International students add record $175 billion to economy

[84] NSW Govt, 2015, NSW Tertiary Education Plan

5.3.3.1.2 Tourism

Sydney is perceived as "a busy, beautiful, vibrant and cosmopolitan city"[85] for tourists and sees high rates of repeat visitation. NSW has the highest total visitor nights, visitor numbers and visitor expenditure within Australia. Tourism accounts for $8.4 billion of money spent in NSW, as well as and 90,600 jobs in Sydney.

Sydney receives 93% of visitors to NSW. In 2015, Sydney received over 3.1 million international overnight visitors, an increase of 6% from 2014. Visitors spent 69 million nights in the region, up by 9% on 2014. The top four source markets to Sydney include the NZ, China, USA, and the UK[86].

The top three precincts of interest for tourists are in the Sydney CBD. They include Darling Harbour (61%), The Rocks (58%) and Chinatown/Haymarket (52%)[85]. Attractions within these precincts include cultural icons like the Sydney Opera House, Sydney Harbour Bridge and Sydney Harbour, and activities like shopping, cafes and restaurants. Also popular are Sydney's beaches including Bondi, Palm Beach, and Manly.

Key tourism events within Metropolitan Sydney include New Years Eve, Vivid, Chinese New Year, and Mardi Gras[87]. Sydney's Gay and Lesbian Mardi Gras parade attracts more than 25,000 interstate and overseas visitors each year, generating around $30 million for the local economy. Vivid attracted over 1.5 million people over 18 days in 2014, generating more than $20 million to the economy. This is expected to rise to $50 million in 2015.[88]

Cruise ship arrivals continue to be one of the fastest growing components of the tourism industry. 2012–13 was the busiest on record with 265 cruise ships visiting Sydney Harbour. In 2010 – 11 the combined passenger, crew spend and vessel-related spend contributed $350 million to the NSW economy. This is forecast to increase to $1.1 billion in 2019–2024[89].

5.3.3.1.3 Manufacturing

Manufacturing is concentrated in western Sydney where extreme heat hits hardest. Warming temperatures will increase with climate change and are likely to affect workforce health and infrastructure in the future (OEH, 2014).

The sector has shrunk in recent years - advances in efficiency, outsourcing and automated technology have led to significant reductions in the numbers of manufacturing jobs in Sydney. There is now a greater reliance on overseas and out of state manufacturing.

5.3.3.1.4 Digital economy

The digital economy is already transforming the way companies and agencies operate and engage with each other, their customers, their personnel and suppliers. Studies show that one-third of the Australian economy faces imminent and major digital disruption and Sydney is comparatively more likely affected to be affected with digital disruption, due to its relative strength in the financial and ICT sectors and smaller-than-average mining industry[90].

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[85] Destination NSW, 2014, Sydney Precinct Factsheet
[86] Destination NSW, 2015, Travel to Sydney Tourism Region YE Sept 2015
[87] BBC News, 2015, Can Sydney's Mardi Gras stay competitive?
[88] Commonwealth Band, 2015, Vivid Sydney 2015 to boost NSW economy

[89] City of Sydney, 2013, Tourism Action Plan
[90] Deloitte Access Economics 2012 Digital disruption Short fuse, big bang?

Figure 14 Digital economy – potential for digital disruption across market sectors
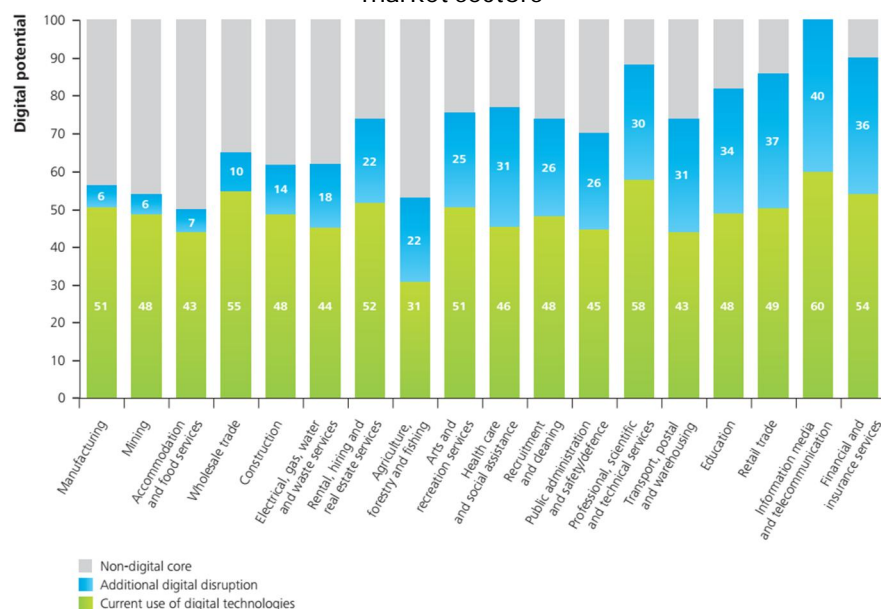
Big data is playing an increasing role in giving commercial advantage to banks, telecommunications providers and retailers.

Economic disruption from digital sources is increasingly likely as technologies such as driverless vehicles are developed.

An increasingly mobile workforce has also been enabled by digital technology, with more reliance on digital solutions and high levels of service.

There is also a shift towards a cashless economy, with greater acceptance of digital payment including cards, and paypass technologies.

5.3.3.1.5   Emerging areas – innovation, start ups

Over 60% of Australian start-ups are based in Sydney and there has been recent growth in tech start-ups and innovation in Sydney.

Initiatives include co-working spaces such as Fishburners, a 'Knowledge Hub' named Piivot at the University of Technology and Stone and Chalk, an organisation that fosters and accelerates the development of fintech start-ups[91].

Social impact investment is a developing sector. The Office of Social Impact and Investment works closely with government agencies and other stakeholders to lead implementation of the NSW Social Impact Investment Policy. Key elements of this work include developing new social impact investment transactions and helping to build the capability and capacity of organisations to participate in the social impact investment market.

5.3.4   Employment centres

Key challenge – access to employment

How can we ensure that population growth in Sydney is adequately supported by diverse transport networks and access to diverse employment opportunities, and key social and health infrastructure?

Half of metropolitan Sydney's economic activity is generated by less than 1% of its land mass[92]. 37% of employment is located in the Sydney CBD (including North Sydney), followed by Parramatta (17%) and Macquarie Park (16%)[93].

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[91] Committee for Sydney, 2015, We the City Volume 2
[92] Grattan Institute 2014 Mapping Australia's economy
[93] SGS Economics and Planning, 2016, Effective Job Density

Professional services are particularly concentrated in the CBD. Manufacturing, wholesale trade and other services, such as health and education, are clustered in suburbs outside the centre.

Figure 15 Half of Greater Sydney's economic activity is generated by less than 1% of its land mass (2011-12)[92]
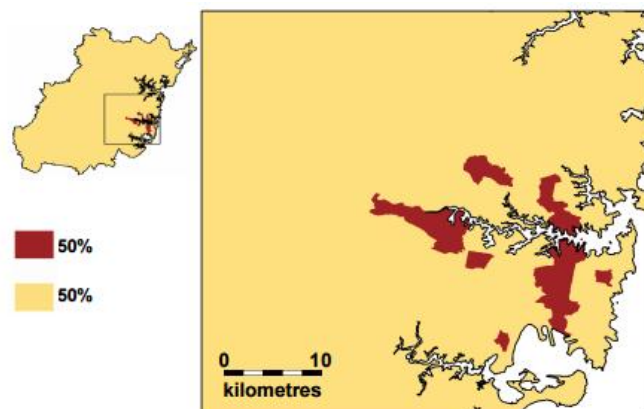
This is particularly an issue as population growth is expected to be strongest in the West Central and Southwest Districts, nearly doubling by 2031 to 2.7 million, about 45% of Metropolitan Sydney's total population[94].

Over the last 25 years, new campus-style business parks have attracted businesses out of traditional Sydney employment centres with growth in locations such as Macquarie Park, Norwest and Marsden Park.

Businesses located in the Sydney CBD generate almost one quarter of income in metropolitan Sydney. Other major centres of economic activity are located in the Northern District including North Sydney (3.6%), Macquarie Park (2.6%), and Parramatta (2.6%) in West Central[95]. These concentrations of economic productivity are at odds with population growth, which is far more dispersed.

The job deficit in greater western Sydney is estimated to be between 180,000 and 190,000. That is, each day over 180,000 commuters from Western Sydney join public transport or traffic on roads heading eastwards for work. Most go to the CBD, North Sydney or Macquarie Park. The economic and social costs of long daily commutes on western Sydney families, many of whom are in the lowest socio-economic strata, are considerable. So too, is the impact on Sydney's transport system and on the state's productivity.

Western Sydney is seriously under-represented in professional employment, providing only 17% of Sydney's banking, finance and business services jobs but almost 60% of its manufacturing jobs[96].

Over 30% of all western Sydney's jobs are in manufacturing, retail, construction, transport and warehousing. Many of these industries are subject to economic downturns and/or competition from overseas (exacerbated by the high Australian dollar) and western Sydney employees are more vulnerable to the threat of unemployment. Conversely, the low number of high level tertiary standard jobs means a larger proportion of the region's highly qualified tertiary graduates must look outside the area to access suitable employment[97].

[94] IPART, 2015, Review of local councils for Fit for the Future proposal

[95] Committee for Sydney, 2014, Sydney adding to the dividend, ending the divide 2014 update
[96] Regional Development Australia 2010 Sydney Regional Plan for Sydney 2010
97 WSROC 2013 WSROC response to DPI on The Broader WS Employment Area, August 2013

Figure 16 Access to jobs by public transport[92]

Percentage of jobs that can be reached in 60 minutes by public transport, Sydney, 2011

Legend:
>50%
40-50%
30-40%
20-30%
10-20%
<10%
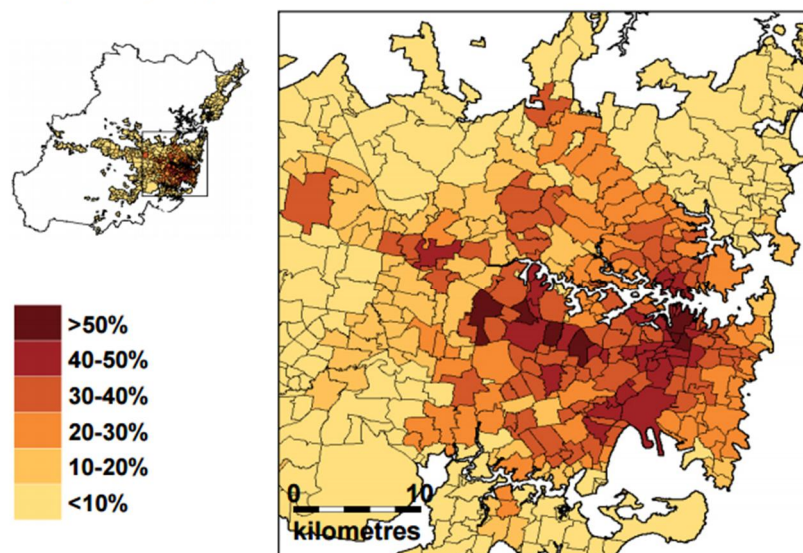
Source: SGS Economics and Planning using Strategic Travel Model supplied by the NSW Bureau of Transport Statistics

5.3.4.1 Income

The median weekly individual income for persons aged 15 years and over ranges from $400-$599 in metropolitan Sydney, compared with $577 across the nation. The median weekly household income in metropolitan Sydney ranged between $1,500-1,999, higher than the national median of $1,234. The median weekly family income ranged between $1,500-1,999 above the national median of $1,481[20]. 23.6% of Greater Sydney households earned a high income and 18.3% were low income households, compared with 17.6% and 21.2% respectively for Australia[98].

Figure 17 Sydney labour productivity[95]

Sydney $ Labour Productivity
$100 +
$60 to $100
$55 to $60
$52 to $55
$50 to $52
$49 to $50
$47 to $49
$44 to $47
$37 to $44
$25 to $37
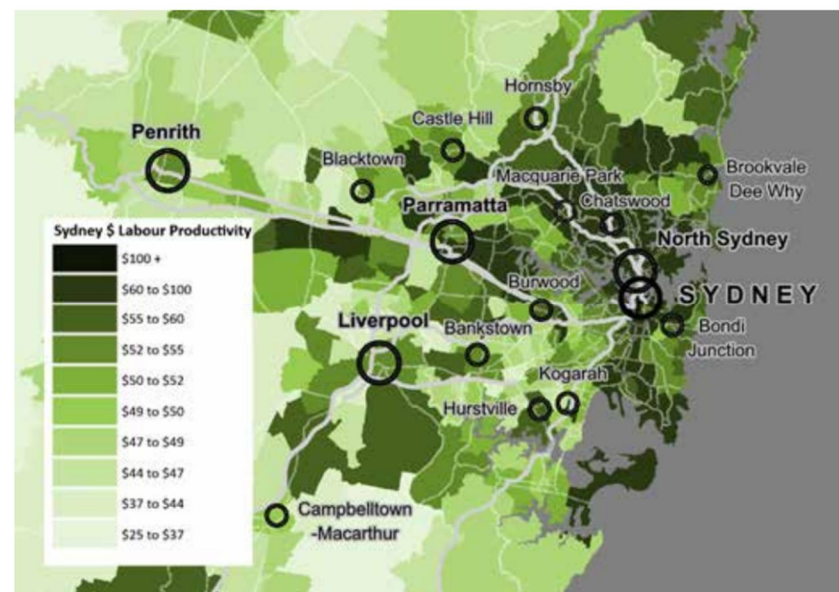
Overall metropolitan Sydney real household weekly income grew from $1,300 in 2001 to approximately $1,450 in 2011. This increase is not evenly distributed. For instance in the same period real weekly household income grew by less than $50 in southwest Sydney[20].

[98] Profile.id 2016 Greater Sydney

The CBD has the highest labour productivity in Sydney. $104 of income is generated for every hour worked in the CBD. North Sydney and Macquarie Park are also highly productive centres at $91 and $82 respectively. Parramatta generates $77 of income. Sydney Airport generates $71 and is also in the top ten most productive places in Sydney. The median labour productivity of all suburbs in Sydney is $51[95].

5.3.4.2   Accessibility to Jobs by Public Transport

There is a strong link between access to affordable housing, employment opportunities and transport infrastructure. Typically the greater the distance from the CBD or major centres, the more affordable the housing. Public transport infrastructure is extremely limited in these areas and people have to travel further to access jobs and services. As rising house prices force people to move further out, the impacts are increasingly felt within lower socio-economic groups.

Figure 18 Accessibility to Jobs by Public Transport[99]
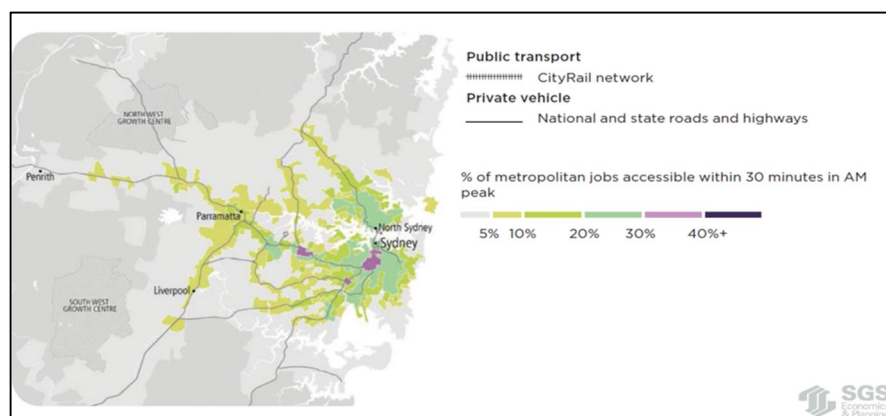
5.3.5   Media

Australia has a mix of print, television, radio and internet-based media. The Australian Communications and Media Authority regulates media ownership in Australia under the Broadcasting Services Act 1992.

There are two national newspapers in Australia, ten state/territory daily newspapers, 37 regional dailies and 470 other regional and suburban newspapers.

Media ownership, particularly print media, is dominated by News Corporation Australia and Fairfax Media. Capital city and national daily newspapers are considered the most influential in setting the news agenda. News Corporation owns 14 of the 21 metropolitan daily and Sunday papers and accounted for 65% of newspaper circulation in 2011. Fairfax Media, the next biggest publisher, controlled 25%.

Together News Corporation and Fairfax accounted for 86% of newspaper sales in Australia in 2011. This concentration is rarely seen in other countries. For instance 54% of sales go to the top two newspaper owners in the United Kingdom and 14% to the top two in the United States.

Television media includes publicly funded and commercial free to air channels. Foxtel is the only major subscription television provider in Australia.

In most parts of Australia there is a choice of three free-to-air commercial broadcasters and two national public broadcasters - the ABC and SBS.

The decline of traditional media (including print media), the move towards internet-based news outlets, the 24/7 news cycle and the rise of social media are changing the landscape in Australia.

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[99] Pat Fensham, SGS

The Sensis Social Media Report (2015)[100] found an increase in the amount of time people spend on social media sites. The report states social media activity in places other than the home is increasing (such as at work and in transit).

5.4 Infrastructure and assets

Key challenges –interdependency of energy supply, diversity and distribution of transport networks, privatisation of infrastructure, increasing heatwaves impacting vulnerable infrastructure, urban development

5.4.1 Key infrastructure bodies

Key challenges – privatisation of infrastructure

How does Sydney manage an increased reliance on private organisations due to privatisation of public infrastructure?

There are a number of key infrastructure bodies within metropolitan Sydney.

Infrastructure Australia is a Commonwealth government independent statutory body with a mandate to progress nationally significant infrastructure. Infrastructure Australia provides independent research and advice to all levels of government, as well as investors and owners of infrastructure.

Under the Australian Government Infrastructure Australia Act 2008 Infrastructure Australia is charged with strategically auditing Australia's nationally significant infrastructure. The organisation must develop 15-year rolling infrastructure plans to specify national and state level priorities.

Infrastructure NSW was established in July 2011 to assist the NSW government identify and prioritise the delivery of critical public infrastructure for NSW. It is an independent statutory agency, established under the Infrastructure NSW Act 2011.

5.4.2 Health and social infrastructure

Health infrastructure was assessed as being the most vulnerable asset type. This takes into account current condition, high criticality during emergency response and increasing demand and interdependency with our ageing, growing population. Rising rates of chronic illnesses adds to demand and increases pressure on health services.

The western Sydney region has almost 10% fewer hospital beds per 100,000 residents than the northern, eastern and southern Sydney regions combined. There are also proportionally fewer staff working in western Sydney hospitals than in the other regions. Despite this, the western Sydney region has a slightly higher rate of hospital admissions than the rest of Sydney. This data suggests hospital resources are more stretched in western Sydney with fewer beds and hospital staff taking care of more patients when compared to the rest of Sydney[101].

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[100] Sensis, 2015, Sensis Social Media Report 2015

[101] WSROC, 2012, Comparative study of health services

This is particularly an issue as population growth is expected to be strongest in the West Central and Southwest Districts, nearly doubling by 2031 to 2.7 million, about 45% of Metropolitan Sydney's total population[102].

State and local government mostly own health infrastructure. Private investors also play a role. Local government supplies most community and social facilities, with support from state and Commonwealth governments.

Education facilities across metropolitan Sydney are in excellent condition. However there is high demand for childcare centres and continued demand for more schools.

5.4.3 Buildings and structures

There is a high level of private investment from private enterprise in commercial and industrial real estate generally across Metropolitan Sydney.

State government organisations own many public assets including cultural icons like the Sydney Opera House.

Although in relatively good condition the majority of commercial buildings are highly dependent on critical infrastructure such as ICT and energy supply. These assets are exposed to extreme weather events such as heat waves. This dependency increases vulnerability in the built environment.

There is a high level of collaboration and leadership within the private sector, especially for sustainability. There are over 180 Green Star rated buildings within metropolitan Sydney out of the 206 certified Green Star projects. These are generally concentrated in the Sydney, and Parramatta CBDs, and centres like Macquarie Park.

Industry and advocacy bodies include the Property Council of Australia, the Green Building Council of Australia, Australian Built Environment Council (ASBEC), and the Better Buildings Partnership[103] whose members collectively own 50% of commercial buildings in the Sydney CBD.

The Global Real Estate Sustainability Benchmark (GRESB) organisation assesses the performance of portfolios and infrastructure assets.

GRESB studies show Australian companies are performing well in terms of environmental, social and sustainability reporting for real estate portfolios. Australian companies scored highly on disclosure for sustainability performance at 93%, compared with 85% globally. 54% of Australian companies had green building certifications such as Green Star and 87% had energy efficiency ratings, compared with 71% globally. 91% of GRESB participants in the Australian region included sustainability-specific requirements in standard lease contracts. The global number was 60%[104].

The National Construction Building Code of Australia includes a specific section to address energy efficiency, improving building performance and reducing energy consumption.

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[102] IPART, 2015, Review of local councils for Fit for the Future proposal

[103] City of Sydney 2016, Better Buildings Partnership
[104] Fifth Estate, 2015, Aussies top the charts in GRESB

There has been an increase in direct foreign investment in real estate within metropolitan Sydney. For example, Chinese foreign direct investment in Australia is now second to the US, with nearly $2 billion invested between January – May 2015.

Most of this is occurring in Sydney, resulting in an increase in diversity of property owners, whilst increasing interdependency with other global economic markets.

Refer to section 5.2.2 for information on residential property.

5.4.4   Water, wastewater and stormwater

Key challenge – increased intensity and frequency of heatwave events

How do we upgrade and diversify our water supply in order to maintain availability during periods of drought and heat? How can Sydney plan for increased water demand and costs, and additional pressure and demand for water bodies due to population growth and increased extreme weather events? How can we improve and maintain equitable access and water quality across metropolitan Sydney?

Water, wastewater and stormwater infrastructure is owned and managed by local and state government organisations, with some ownership by private organisations. Local government responsibilities are related to stormwater drainage infrastructure.

The NSW Department of Primary Industry (DPI) Water has responsibility for policy and water market regulation, with oversight of major government funded water infrastructure projects.

Water NSW provides drinking water, in-field services relating to groundwater and surface water and customer services. Water NSW is responsible for surface and groundwater management including planning to ensure water security for NSW.

The water utility provider for Metropolitan Sydney is Sydney Water. Sydney Water is a statutory State Owned Corporation, wholly owned by the NSW Government who purchases water from DPI Water to supply the Sydney community.

In addition to supplying water, Sydney Water also supplies wastewater, recycled water and some stormwater services. Each day, Sydney Water supplies over 1.4 billion litres of drinking water across the city. About 80% of it comes from Warragamba Dam which is managed by the Sydney Catchment Authority (SCA) who also manages a network of 21 storage dams and reservoirs. Sydney Water also outsources services to private utilities under a range of contracting models.

The NSW government recently committed to raising the Warragamba Dam wall due to the risk of the dam overflowing during extreme rainfall events.

Sydney Water's supply is supplemented with a number of private schemes licensed under the Water Industry Competition Act (WICA) which compete with Sydney Water, including the Sydney Desalination Plant at Kurnell which has the ability to supply water to up to 1.5 million people across Sydney when dam levels fall below 70%. The Desalination Plant which is now privately owned was originally funded by the NSW Government in response to the worst drought in 100 years, which saw Sydney's dam levels fall to 34%. The Desalination Plant has been in hibernation mode since 2012, and has not yet been used beyond the initial two year testing period.

Across Sydney, urban water consumption was 543,588 ML during 2014-2015, representing 48% of all urban water supply system outflows. 42,699 ML, or about 8%, was reported as being lost through leakage to landscape and operational losses.[105] This is primarily due to the aging infrastructure across the network. In response to these increasing vulnerabilities in infrastructure and supply, Sydney Water has started investing in adaptation measures during the planning and construction stages of infrastructure delivery. Sydney Water is also progressively adapting during refurbishment and renewal of their water network infrastructure.[106]

Despite a population increase across Sydney Water's area of operations of about 27% over the past two decades, total water use has declined by about 15%. This sustained decline is primarily due to changes in water use behaviour (influenced by voluntary and mandatory water restrictions) together with various demand management programs.[107]

However, there are a number of challenges facing Sydney's water network include the lack of integrated planning for new water infrastructure in growth sector areas, lack of integrated water cycle management to increase water supply diversity and complex regulation, licencing and pricing arrangements. For example across the urban areas of Sydney, NSW Health still does not support the use of rainwater tanks for drinking purposes[108] placing greater reliance on the public water supply.

Sydney Water also owns 24 separate wastewater systems licensed by the NSW Environment Protection Authority (EPA), 24,800 kilometres of pipes, 16 wastewater treatment plants, 14 water recycling plants and 679 wastewater pumping stations. A significant portion of this wastewater system is in need of significant upgrades, including in the Northside Storage Tunnel which improves water quality in Sydney Harbour by storing wastewater and stormwater that would have otherwise overflowed into the harbour during heavy rain. The wastewater system is built with overflow points that act as 'relief valves' when pipes reach their capacity.

Although there has been a significant improvement in the quality of Sydney's waterways in the last 10 years until such major upgrades to the network are completed, wet weather overflows from the sewerage system during storms will continue to be one of the main causes of water pollution in Sydney's waterways. With the communities growing dependence on Sydney's waterways, including our beaches, rivers and aquatic facilities to provide areas of respite during heat wave events, upgrading Sydney's ageing water infrastructure is emerging as a key priority adaptation response for Sydney.

An example of a response to flood risks is the Hawkesbury-Nepean Valley Flood Management Taskforce, which is working to develop an integrated and well-coordinated approach to improving the local community's resilience to flood risk. The Taskforce includes representatives from a number of NSW Government agencies, including Infrastructure NSW, State Emergency Service, Ministry of Police and Emergency Services, the State Emergency Service, NSW Police, Environment and Heritage, Planning and Environment, and Transport for NSW. The Taskforce is also working with a Stakeholder Reference Panel that includes local councils and stakeholders from insurance, flood and water management agencies.

[105] Bureau of Meteorology, 2015 National Water Account
[106] Sydney Water, 2010 Climate change adaptation
[107] NSW Environment Protection Authority, 2016, State of the Environment 2015
[108] NSW Health, 2007, Guideline - Rainwater Tanks Where a Public Water Supply is Available - Use of

5.4.5   Energy

Key challenge – strong interdependency for continuous energy supply
How do we maintain a high reliability of energy supply whilst transitioning to cleaner renewable sources? How can we reduce vulnerability of Sydney's critical services to cascading failures under stress and shock conditions?

The energy network is critical for the ongoing operation of every other infrastructure sector in Sydney.[109] In Sydney the electricity network was recently privatised by the NSW Government in 2015 and is part of the National Electricity Market (NEM) with access to a diversity of power suppliers from interstate and NSW (90% of local demand).[110] The Australian Energy Market Operator (AEMO), in its annual Statement of Opportunities, forecasts that NSW has surplus capacity across high, medium and low growth scenarios till 2023-24.[111]

In NSW the total electricity consumption from the grid peaked in 2008–09 and has been falling over the past six years with the current demand close to 2001–02 levels. Electricity consumption from the grid per person peaked in 2007–08 and has recently been well below 1997–98 levels.

Key factors driving these reductions in electricity demand include the closure of two major petroleum refineries across Sydney, growth in energy conservation in response to higher retail electricity prices and the increasing deployment of residential rooftop solar PV systems due to lower system prices and other incentives.[112]

Critical services across Sydney are highly dependent on continuous power supply; to address this risk a unique triplex system has been introduced to increase redundancy in power supply across the CBD. More broadly across Metropolitan Sydney, there are reliability standards for the NSW electricity distribution businesses which express in terms of the average frequency of interruptions a customer may face each year, and the average time those outages may last. The reliability standards include incentives for distribution and transmission businesses to improve their level of service performance compared to historic outcomes over time. Overall the reliability performance of the two NSW distribution businesses which operate across Sydney have traditionally been comparable to that of other distribution businesses in the NEM.[113] The target for NSW is to achieve an average electricity reliability standard of 99.98% across the network.

Notwithstanding these high reliability standards, Sydney's energy distribution network is still particularly exposed to extreme weather events such as severe storms and heat waves which are the main cause of local network failure. Networks are structurally designed to accommodate certain loads which are vulnerable to failure in peak demand during heat waves when there is increased demand for cooling and refrigeration.

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[109] NSW Office of Environment & Heritage, 2014,Towards a Resilient Sydney Urban Adaptation Research Synthesis
[110] NSW Environment Protection Authority, 2015, NSW State of the Environment 2015
[111] Australian Energy Market Operator, 2014, Electricity Statement of Opportunities for the National Electricity Market

[112] NSW Environment Protection Authority, 2015, NSW State of the Environment 2015
[113] Houston Kemp, 2014, Electricity Networks Service Standards: An Overview

Another key issue with power in NSW is a lack of diversity in power generation and supply – with 70% of supply from carbon intensive sources - gas (11%) and coal (59%).[114] The concern is that post the Paris Agreement, energy carbon emissions must progressively decline to net zero by mid-century for a 75% chance of limiting temperature rise to less than 2°C, and an even chance of achieving the 1.5°C goal. This can only be achieved by switching to zero or near-zero emission power sources.

However, Australia's electricity market lacks a framework for orderly replacement of old, inefficient and high-carbon coal stations with cleaner renewable power.[115] Coupled with this there is a global trend of shifting investor appetite for carbon intensive assets, with superannuation funds opting out of investing in coal fired power generation, resulting in these assets being priced, regulated, stranded by technology, or incurring legal risk.[116] As an offset to carbon intensive energy sources, there is an increasing contribution from large scale solar and wind generation[117]. Approximately 30% of current installed electricity generation capacity is powered by renewables, however actual generation is lower and varies from year to year (e.g. due to weather related water availability for hydroelectricity).[118]

Across other energy supplies, NSW has the largest market for petroleum due to the highest vehicle ownership of any Australian state.[119] With continued strong growth in fossil fuel use by the transport sector, this is now the largest sector for final energy demand in NSW and proportionally has the lowest use of renewable energy.[120] Diversification in fuel sources will continue to be key pressure for business continuity across the city as approximately 90% of fuel is imported, from the Middle East and it is estimated that national reserves would only last about 12 days.[121]

Due to this vulnerability to transport fuel supply disruptions, there are increasing opportunities for electric vehicles to provide a solution for Sydney's potential fuel security issues. Over the last year there has been a significant growth in global electric vehicles sales, however in Australia sales only equate to 0.09% of the total vehicle market in 2014. This uptake of electric vehicles, when linked to a cleaner supply of electricity, can provide emission reductions of 16 and 47% in the passenger and light commercial vehicle segments by 2050.[122]

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[114] Department of Resources & Energy, 2016, Electricity generation in NSW
[115] The Climate Institute, 2016, A Switch in Time: Enabling the electricity sector's transition to net zero emissions
[116] The Climate Institute, 2015, Australia's Financial System and Climate Risk
[117] Department of Resources & Energy, 2016, Electricity generation in NSW
[118] NSW Environment Protection Authority, 2015, NSW State of the Environment 2015

[119] ABS, 2014, Motor Vehicle Census, Australia: 31 January 2014
[120] NSW Environment Protection Authority, 2015, NSW State of the Environment 2015
[121] ABC, 2014, How long could Australia survive if oil supplies dried up
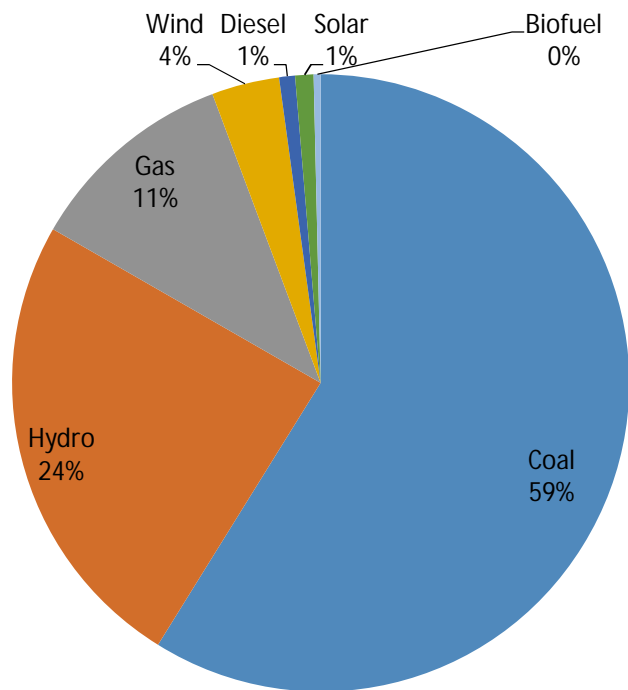[122] Climate Works, 2016, The Path Forward for Electric Vehicles in Australia

Figure 19 Sources of power generation in NSW[114]

5.4.6 Communication networks

Sydney is becoming increasingly dependent on information and communications technology (ICT) for critical services such as air traffic control and banking transactions. Failure of core ICT systems would significantly compromise the ability of Sydney's economy to function.

Telecommunications providers are also experiencing the physical impacts of extreme weather. At the same time there is an increasing need for ICT solutions for disaster response and business continuity across city systems.

A mix of Commonwealth government and private entities owns the ICT networks.

5.4.7 Transport network and infrastructure

Key challenge – lack of access to multimodal transport networks, and vulnerability to heatwave events

How can we ensure that population growth in Sydney is adequately supported by diverse transport networks and access to diverse employment opportunities, and key social and health infrastructure?
How can we improve diversity and accessibility of transport networks and ensure they are resilient to the effects of extreme weather events, including heatwaves? How can the connectivity of active transport networks be supported and improved? How can Sydney address the effects of extreme heat and heat island effect and reduce the impact they will have on diverse transport networks?

5.4.7.1 Railways, roadways and public transport

Sydney has inequitable access to multimodal transportation. The impacts are particularly significant for commute times and access to employment.

Poor integration of land use and transport planning is evident across metropolitan Sydney.

There is a trend towards privatisation of infrastructure, with funds being directed towards transport projects.

Metropolitan Sydney contains approximately 550-600 suburbs linked by a complex transport network including roads, heavy and light rail services, public and private bus services, ferries, taxis and a cycle network.

In 2013, 635.4 million public transport trips were made in the metropolitan Sydney area, with the average person travelling 12,400km over the year[123].

Figure 20 Sydney's constrained strategic corridors and regional employment centres (NSW Long Term Transport Masterplan)
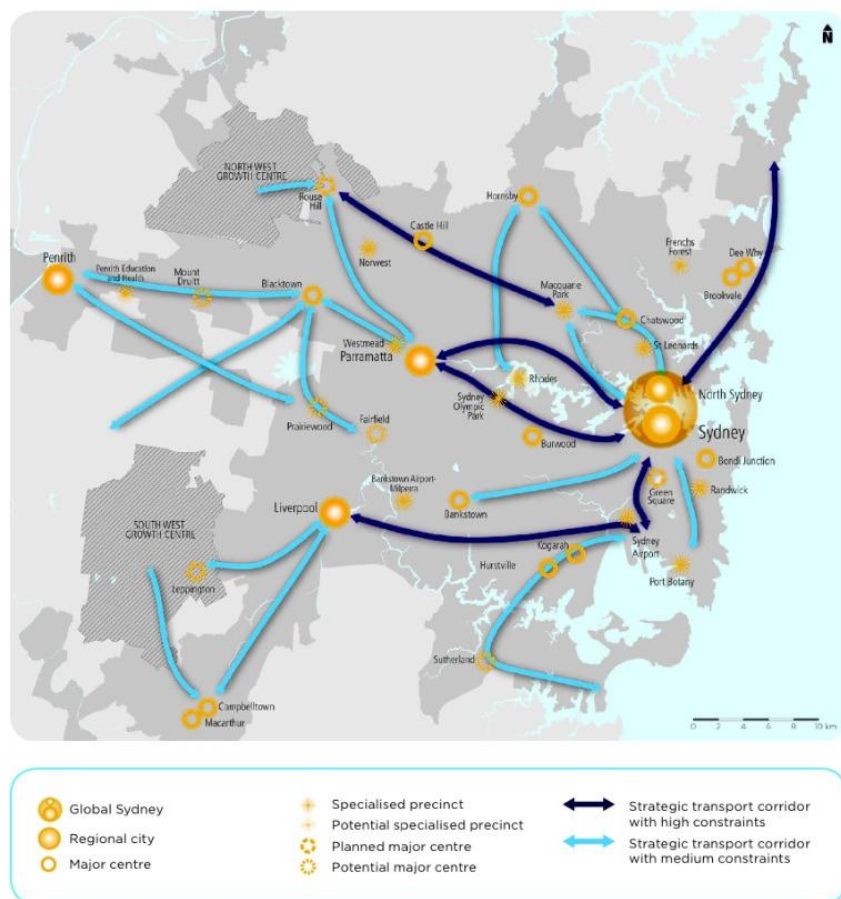
17.6 million trips are made every work day in Sydney of which:

- 945,000 are by rail
- 1,058,000 are by bus
- 3.5 million are walking, ferry and light rail
- 12.1 million are by vehicles[123]

Within public transport:

- 23% of journeys to work each day are by public transport
- 65% of rail journeys and 64% of bus journeys are made in the peak. 50% of rail passengers during the morning peak alight in the Sydney CBD
- Overall rail usage increased by 2.6% in 2013/14 and morning peak rail patronage grew by 3%.
- Rail patronage in the morning peak is forecast to grow by 2.7% a year over the next 20 years.
- Bus usage grew at 1.9% in 2012/13 and is forecast to grow at 1.4% a year to 2031[123].

However not all trips are made by public transport. Metropolitan Sydney (particularly the southwest and outer suburbs) had the largest share of commuters by private vehicle in Australia (up to 80%). 72% of the 183, 000 people who work in the Parramatta CBD commute by private vehicle. Passenger vehicle kilometres travelled on roads have risen 4.3 billion km to 37.3 billion km in the period 2001-02 to 2011-12[20].

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[123] Infrastructure NSW, 2014, State Infrastructure Strategy Update

Traffic congestion in Sydney is problematic and getting worse. Infrastructure Australia has noted Sydney has 7 of the 8 most congested corridors in Australia.

Metropolitan Sydney had an increase in average network delay due to congestion of 0.12 minutes per km, 2002-03 to 2010-11. Sydney has the longest delay nationally and it continues to rise. Melbourne and Brisbane had slight decreases over this period[20].

People are increasingly commuting more than one hour each way between low density residential areas to jobs in mixed–use, high density, knowledge-rich centres[124].

Parramatta and Macquarie Park will need new public transport systems to enable faster connections to each other, surrounding areas and the Sydney CBD.

Metropolitan Sydney had an increase in active travel by walking between 2009 and 2012, up by 3.1 percentage points. The number of people cycling to work increased by 47%, up to 17,838 from 2001 to 2011[20]. Mobility (especially active travel) is impacted by heatwave events.

The NSW Government's Action for Transport 2010 includes a ten-year program of new transport infrastructure to take Sydney forward as a global city. Ten major new road, eight new rail and six new bus transit projects are outlined in the plan.

Of these, all the road projects have been completed or are being finalised. Only two of the rail projects are fully completed, an additional one is now under construction. User pays models have been prioritised due to funding issues, i.e. road projects with higher operational revenue.[124.]

Roadways are owned by a mix of state and local government with privatisation of key connections such as toll roads. There are a number of major arterial upgrades in progress.

Transport for NSW (NSW Government) owns and operates passenger trains but there is an increasing move to privatisation. The new Sydney Metro currently under construction will be operated by private entities.

Public transport in Sydney is a long-term operational burden with no adequate funding stream in place. Fares only cover around 25% of total operating costs. This means every new public transport link is a perpetual cost to the NSW Government. This has led to prioritisation of toll roads over mass public transport infrastructure[141].

Passenger ports and maritime services passenger terminals are state owned but privately managed.

5.4.7.2   Freight

Metropolitan Sydney has had the largest increase in the value of international freight in Australia. The value of freight rose by almost $18 billion between 2006-07 and 2012-13. Sydney's freight was valued at over $113 billion in 2012–13[20]. There is a high reliance on road freight.

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[124] Committee For Sydney, 2016, Are we there yet? Value capture and the future of public transport in Sydney

Port Botany and Port Kembla were privatised in April 2013. Freight railways are privately owned.

5.4.7.3   Air travel and airports

Sydney has two airports. Sydney Airport is located in Botany Bay, a vulnerable coastal area. A second much smaller airport is located at Bankstown.

Sydney Airport is considered one of the critical economy links for Sydney. It is currently, and expected to remain, Australia's busiest airport. It is estimated to have 72 million annual passenger movements by 2031.

67% of business and 36% of tourist travellers arrive by plane to the Sydney Airport[125].

Sydney Airport has been privately owned since 2002, and the Sydney Airport Corporation has first right of refusal on the development of the Badgery's Creek Airport. A second main passenger airport has been proposed for Badgerys Creek in Sydney's west by the Commonwealth government. This will provide redundancy and a critical transport link for Sydney as well as employment opportunities in western Sydney.

Metropolitan Sydney had a decrease in international visitors of 41.5 visits per 1,000 residents in the period 2006-2012. Sydney had the highest percentage of business travellers amongst their international visitors at 14%, with an estimated 400,000 international business travellers[20].

5.4.8   Emergency and disaster response

The protection of life and property is a responsibility of State and Territory governments within Australia. This includes the provision of Emergency Services Organisations (ESOs) such as the police, fire and ambulance services. Calling Triple Zero in Metropolitan Sydney will connect to NSW specific police, fire and ambulance services.

Additional emergency contacts in Metropolitan Sydney include:

- Flooding and storm - NSW State Emergency Service
- Bushfire - NSW Rural Fire Service
- Police - NSW Police Force
- Urban fire - NSW Fire & Rescue
- National Security Hotline

NSW-specific smart phone apps are available including Emergency+ and Live Traffic.

NSW has a framework of plans, guidelines and committees for emergency Planning, Preparation, Response, and Recovery (PPRR) activities at state, district, and local levels. They prescribe the role, responsibilities and arrangements for each agency involved in emergency management.

NSW is divided into 11 Emergency Management Regions. Each Region is made up of local government councils. Metropolitan Sydney is divided into three regions, designated as Sydney Metro, North West Metro, and Southwest Metro.

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[125] Destination NSW, 2015, Sydney Tourism Statistics

Emergency Management Plans for Metropolitan Sydney include:

- Sydney & North Sydney CBD Evacuation Management sub plan (Sydney CBD Emergency sub plan)
- Sydney Harbour Marine Emergency sub plan
- Botany Bay Precinct Emergency sub plan
- Lucas Heights Emergency sub plan - including Lucas Heights Emergency Evacuation sub plan and Strategy for off-site iodine distribution sub plan
- Southwest Metropolitan District Disaster plan
- North West Metropolitan District Disaster plan
- Hawkesbury-Nepean Flood Emergency sub plan
- Blue Mountains Snow plan (Local plan).

These documents are sub-plans to the New South Wales State Emergency Management Plan (State EMPLAN).

The following Sub-Plans have also been produced for specific emergencies, as administered by specific agencies where applicable:

- Asbestos Emergency
- Biosecurity (Animal and Plant): NSW Agriculture
- Aviation Emergency: Emergency Operations Controller
- Bushfire: NSW Rural Fire Service
- Counter terrorism: Secure NSW
- Fire – Urban: Fire and Rescue NSW
- Flooding, Storms, Tsunami: NSW State Emergency Service
- Food Industry
- Heatwave
- Human Influenza Pandemic
- Hazardous Materials/Chemical, Biological, Radiological and Nuclear sub plan

- State Waters Marine Oil and Chemical Spill Contingency plan
- Major Structural Collapse.

Function area supporting plans also include: Agriculture and Animal Services, Disaster Recovery Human Services, Engineering Services, Environmental Services, Health Services, Public Information Services, and Transport Services.

Fire and Rescue NSW (FRNSW), NSW Rural Fire Service (RFS), and NSW State Emergency Service (SES) are funded through the Commonwealth Government Emergency Services Levy (ESL) on the insurance policies (73.7%), Local Government (11.7%), with the NSW Government contributing (14.6%).

Support for community resilience post-disaster includes the NSW Department of Emergency Community Resilience Innovation Plan. The plan rolls out local projects across Sydney and the state. Nearly $2 million has been provided to communities. Projects include increasing the emergency preparedness of community services and people with disabilities in Ryde, Epping and Lane Cove.[126]

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[126] NSW Department of Emergency Community Resilience Innovation Plan 2016

5.5   Environment

Key challenges – housing affordability, increasing chronic illness, vulnerability to heatwaves

5.5.1   Environmental conditions

Sydney lies within the greater Sydney Basin Bioregion - one of the most species diverse in Australia. The Royal National Park, Towra Point Nature Reserve, and Dharawal State Conservation Area contribute to Sydney's overall biodiversity.

The region contains 2 endangered and 4 vulnerable frog species, 54 vulnerable and 14 endangered bird species, 25 vulnerable, 3 endangered and one extinct mammal species, and 11 vulnerable and 2 endangered reptile species (OEH, 2011).

The Cumberland Plain of western Sydney has experienced extensive clearing in recent times and only 12% remains as intact bushland (DEC, 2005). Multiple vegetation communities have since been listed as endangered under the NSW *Threatened Species Conservation Act 1995.* Cumberland Plain Woodland community has been escalated to critically endangered under both NSW and Commonwealth legislation.

NSW has a number of ways to measure and offset the impact from development on biodiversity. Formal offset arrangements are a feature of:

- the NSW BioBanking Scheme
- land-use planning through biocertification of land
- the regulation of native vegetation under the Native Vegetation Act 2003.

5.5.1.1   Waterways

Sydney Harbour is the largest natural harbour in the world. It is approximately 30 km long with a surface area of 50 km^2 and a total catchment of 500 km^2.

Recent research into Sydney Harbour has highlighted its high species richness and diversity of habitats. Over 3,000 marine species have been identified to date.

Poor environmental management from upstream industries has historically caused substandard water quality in Sydney Harbour. A commercial fishing ban and improvement plans were put in place in 2006 and water quality has begun to recover.

5.5.1.2   Air

The northern and southern extents of western Sydney (Richmond and Camden) have higher percentages of calm winds than other parts of Sydney. This creates poorer dispersal conditions and higher ground level concentrations of air quality pollutants in those areas.

Pollutant data extracted from monitoring sites show southwest Sydney (Camden, Oakdale) experiences higher levels of air quality pollutants during the year (PM_{10}) and generally exceed environmental criteria at least once a year.

It is anticipated Sydney's growth will cause more incidences of pollution. Impacts on air quality are likely to be exacerbated by the effects of climate change, especially the increase in bushfire conditions. These are expected to rise as the climate becomes hotter and drier, with the duration of very high fire danger periods expected to increase 10–50%. Bushfires result in smoke and poor air quality as seen during the Blue Mountains bushfires in 2013.

High daytime temperatures combined with fossil fuel emissions (such as vehicle exhausts) and bushfire smoke can lead to respiratory difficulties and hospitalisation.

Decreasing air quality will place additional strains on Sydney's healthcare services particularly in those areas that are more prone to poor air quality due to Sydney's geography and prevailing winds.[127]

5.5.1.3   Vegetation

The forests, woodlands and wetlands of Sydney are significant natural assets. In addition to their intrinsic, social and recreational values they provide drinking water to 4.3 million people and are the backbone of our multi-million dollar tourism economy[128].

With 80 national parks and seven state forests almost 70 per cent of the greater Sydney region contains native vegetation.

However less than 10% of the shale woodlands, wetlands and estuaries of the region are protected, and even the National Parks and Wilderness areas of the plateau are threatened by pest species and the effects of adjoining land use[128].

The Blue Mountains is dominated by over one million hectares of World Heritage and Wilderness listed National Parks. The north and south also include the Royal and Ku-ring-gai Chase National Parks.

By contrast the Cumberland Plain in the southwest has been heavily cleared for urban development and agriculture. Very little of the remaining vegetation is protected.

5.5.1.4   Wildlife

Greater Sydney includes some of the most critically endangered wildlife, plants and ecological communities in NSW. Urbanisation, intensive agriculture and abandoned land awaiting development increase threats to natural areas.

The forests of the sandstone plateau to the north and south include at least seven threatened ecological communities, 32 threatened resident animals and 100 threatened plant species.

The Cumberland Plain woodlands and estuaries include a disproportionately large 25 threatened ecological communities, 30 threatened plant species, 38 resident terrestrial threatened animals, 15 threatened aquatic animals and 27 threatened seabirds. The region also boasts hundreds of species of threatened and protected migratory bird species[128].

Key threats to vulnerable species within protected areas include weeds, feral animals, disease, inappropriate recreational use, climate change and pollution from surrounding developed areas.

Outside protected areas wildlife is also threatened by land clearing, under scrubbing, removal of old & dead trees, firewood collection, herbicide and fertiliser use, noise, light and air pollution, urban heat effect and stormwater pollution.

Aquatic areas including estuaries are further impacted by recreational and commercial fishing and sewage disposal[128].

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[127] City of Sydney, 2015, Adapting for Climate Change
[128] Greater Sydney Local Land Services 2016

The impacts of pest species vary significantly across natural areas. Pest species have a particularly big impact in the small remnants in urban areas, the rural Cumberland Plain and in estuaries. The Blue Mountains is bisected by suburban housing and roads along the two major transport corridors[128]. This has a considerable impact on the natural environment.

5.5.2 Agricultural and horticultural land

Key challenge – increasing urban development in greenfield areas

How can we limit the impact of urban development on horticultural and agricultural land? How can we protect and diversify Sydney's food supply networks?

Sydney's agricultural industries contribute approximately seven per cent of the state's total value of agricultural production. However they comprise just 0.2 per cent of NSW's total rural holdings. ABS data valued all Sydney farm production at $630 million in 2006. Total agricultural production, including value adding and processing, is around $1.5 billion annually. Spreading urbanisation and population growth are putting pressure on agricultural lands on the fringes of Sydney[129].

From 1989 to 2008 a total of 6,289.74 ha of residential land was added to Sydney. At the same time there was a significant decrease of green and tree area, with declines of 4,982.58 and 895.88 respectively[130].

Comprehensive data on Sydney's agricultural lands is key to effective planning on Sydney's urban fringe. Relevant data will need to be used in the five-year review of the Sydney Metropolitan Strategy. Previous studies of Sydney's agricultural land have consistently failed to create a coherent picture of Sydney's agricultural industry and its changing nature and extent[131].

20% of Metropolitan Sydney's food is produced within the Sydney basin[132]. Food production includes high value intensive industries such as market gardens, poultry and mushrooms. Preservation of agricultural land in close proximity to the urban market is an important consideration for the region. Whilst it covers only 1.5% of the land area of NSW, the greater Sydney region accounts for 7% of the State's agricultural production[128].

5.5.3 Environmental regulation

NSW legislation applies to the Sydney region. The legislation provides for a number of environmental agencies, policies and regulations to ensure the protection of environmental values. These include biodiversity and vegetation, water (surface and groundwater) and air quality. The regulatory environment for Sydney is generally well developed and rigorously applied.

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[129] NSW Parliament 2015 Agriculture in the Sydney Region
[130] Nuo Tang, Analysis on Land Use Cover Change in Western Sydney from 1989 to 2008 (M.Phil. Thesis, University of NSW, 2010), p.47

[131] Urban Research Centre, University of Western Sydney, 2010, *Sydney's Agricultural Lands – An Analysis.*
[132] Institute for Sustainable Futures, 2015, Feeding Cities: Mapping Sydney's potential food shed

However there is increasing conflict between the need to protect biodiversity values and the pressure of urban development, particularly in western Sydney. This can be seen in the recent review of the NSW biodiversity offset policy for major projects and the way offsets are secured (such as the introduction of the NSW Biodiversity Offsets Fund). Further review and change to offset legislation is anticipated as pressure from urban sprawl increases.

5.5.4 Climate change

Key challenge – increased intensity and frequency of heatwave events

How can Sydney respond to increasingly frequent and intense of heatwave events? How do we reduce vulnerability of the energy network to extreme weather events? How do we manage the impacts of urban heat island effect and the effects of extreme weather events on health and wellbeing, including air quality and walkability?

Temperatures in the Sydney region increased by around 0.8 °Celsius (C) between 1910 and 2013. Sydney's average temperature is projected to continue warming in both the short and long term. Hotter days are expected to occur more frequently, with more frequent consecutive warm days. Harsher fire weather is projected. Days with an incidence of frost are expected to substantially decrease.

The intensity of heavy rainfall events is set to increase.[133]

Sea levels have risen at an average rate of 1.6mm per year from 1966 – 2009. This rise is projected to continue.

There is a trend for more climatic events that affect the city. These will include heatwaves, floods, severe storms, bushfire, sea level rise and drought. These events will continue to place increasing pressure on city assets and intensify city stresses.

Heatwaves place the greatest pressure on city assets of all extreme weather events. Heatwaves cause energy, water and health demands to soar. Heat-related stress is related to high hospitalisation and mortality rates. Downstream economic impacts from higher energy costs and agricultural losses are a serious consideration.
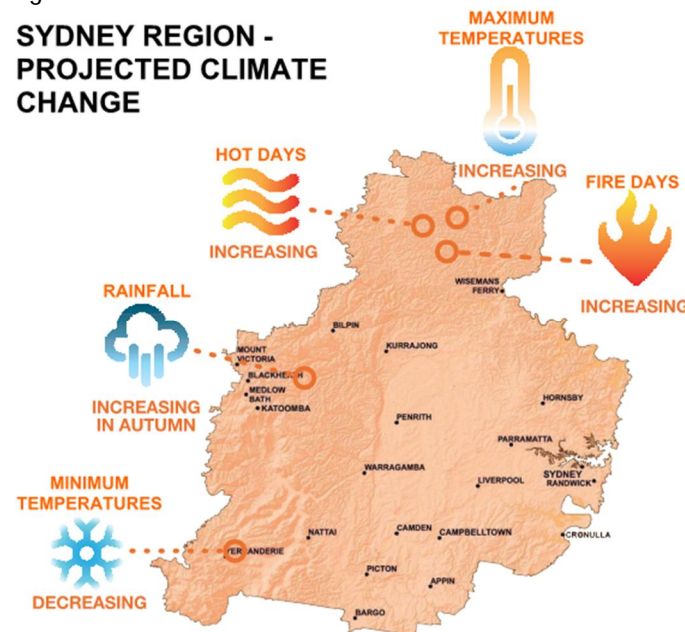

Figure 21 Projected climate change in the Sydney region[134]

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[133] CSIRO & BoM, 2015, Climate Change in Australia

[134] NARCIiM, 2016, Metropolitan Sydney Climate Change Snapshot

5.5.4.1   Rising temperatures and urban heat

Sydney has 15% tree cover and is second to Melbourne nationally in lacking canopy.[135] People in Sydney are more susceptible to heatwaves than those in surrounding regional areas. This is because of the urban heat island effect. The use of dark bitumen, concrete, pavement and roofing material in cities increases temperatures and radiates heat back into the atmosphere. A lack of shade from trees and green space compounds the effect. The result is that cities are often substantially hotter than surrounding areas.

Heatwaves also cause blackouts and accelerate the ageing of infrastructure. Population growth alone will significantly increase our vulnerability to heat[136].

Heat related deaths are expected to rise with 79 additional deaths per annum expected in Sydney by 2050. Western Sydney council areas will be particularly at risk with an expected five to 10 additional hot days by 2030 as a result of rapid rates of construction[137].

Western Sydney's unique geography and lack of sea breeze means the region is already much hotter than eastern areas of metropolitan Sydney. On average Parramatta experiences around thirteen days per year of temperatures 35 degrees and over. The Sydney CBD averages around four.

New designs for heat-resistant bus shelters, tree-planting programs and aerial heat mapping are some of the initiatives western Sydney councils are exploring in an attempt to design communities that are heat resilient.

The NSW and ACT Regional Climate Modelling Project (NARCLiM) undertakes detailed climate modelling for the NSW and ACT regions. NARCliM began in 2011 in response to a need for high-resolution climate projections for regional researchers and decision makers. Prior to this work climate change information had not been available at a useful scale for local decisions. NARCliM has produced an ensemble of robust regional climate projections for south eastern Australia that can be used by the NSW and ACT community to plan for the range of likely future changes[138].

Building Resilience to Climate Change Grants is a $1 million program to address climate change risks facing NSW councils. The initiative is funded through the Office of Environment and Heritage and the NSW Environmental Trust. It is administered by Local Government NSW.

Round one of the grants went to building resilience to extreme heat or adapting priority infrastructure. Round two will go to water supply and/or quality management, or adapting priority infrastructure[139].

Most climate change adaptation and resilience planning is being undertaken by local councils. Examples include the recent *Adapting for Climate Change* strategy released by the City of Sydney.

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[135] 202020 Vision, 2016, Where are all the trees

[136] Infrastructure Australia, 2013, State of Australian Cities report

[137]Sydney Morning Herald, Lucy Cormack, 2016 Sydney area an 'urban heat island' vulnerable to extreme temperatures

[138] NARCLiM 2016

[139] Office of Environment and Heritage (OEH) and the NSW Environmental Trust, Building Resilience to Climate Change Grants

5.6 Leadership and strategy

Key challenges – limited funds and increased accountability, complexity, lack of collaboration, privatisation of publically owned infrastructure, coordinated governance response to spatial inequity

5.6.1 Governance

There are three layers of government with jurisdiction over metropolitan Sydney: the Australian Commonwealth Government, New South Wales State Government, and local government.

This multi layered and complex governance system limits effective strategic planning and implementation at metropolitan scale. Frequent conflict occurs between state level objectives and local government implementation. The NSW government has recently introduced significant reforms with the establishment of an additional regional planning body (the Greater Sydney Commission) and proposed local council amalgamations, as shown in Figure 2222 and

Figure 233.

Figure 22 Governance structure of Metropolitan Sydney prior to amalgamations (April 2016)
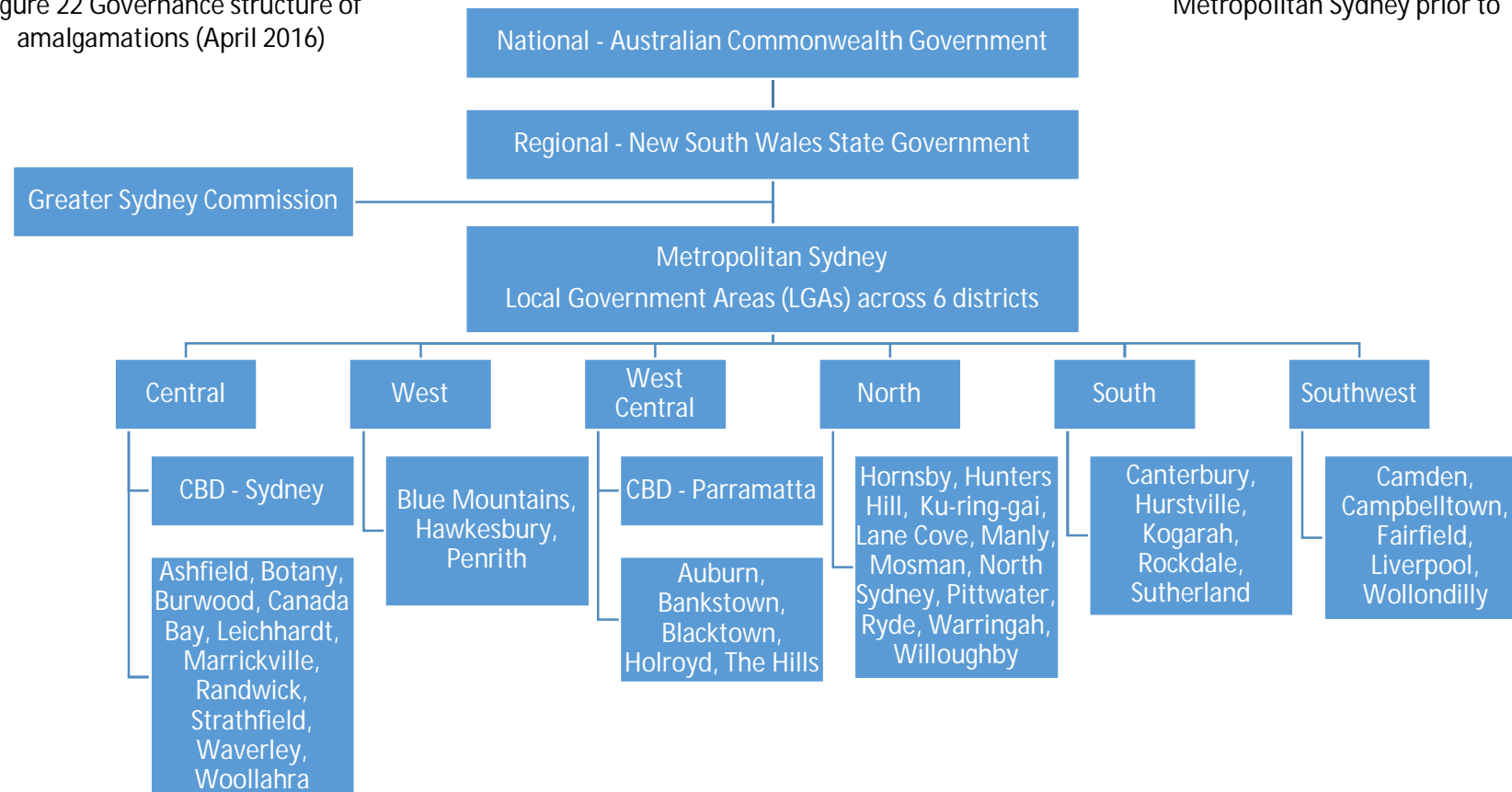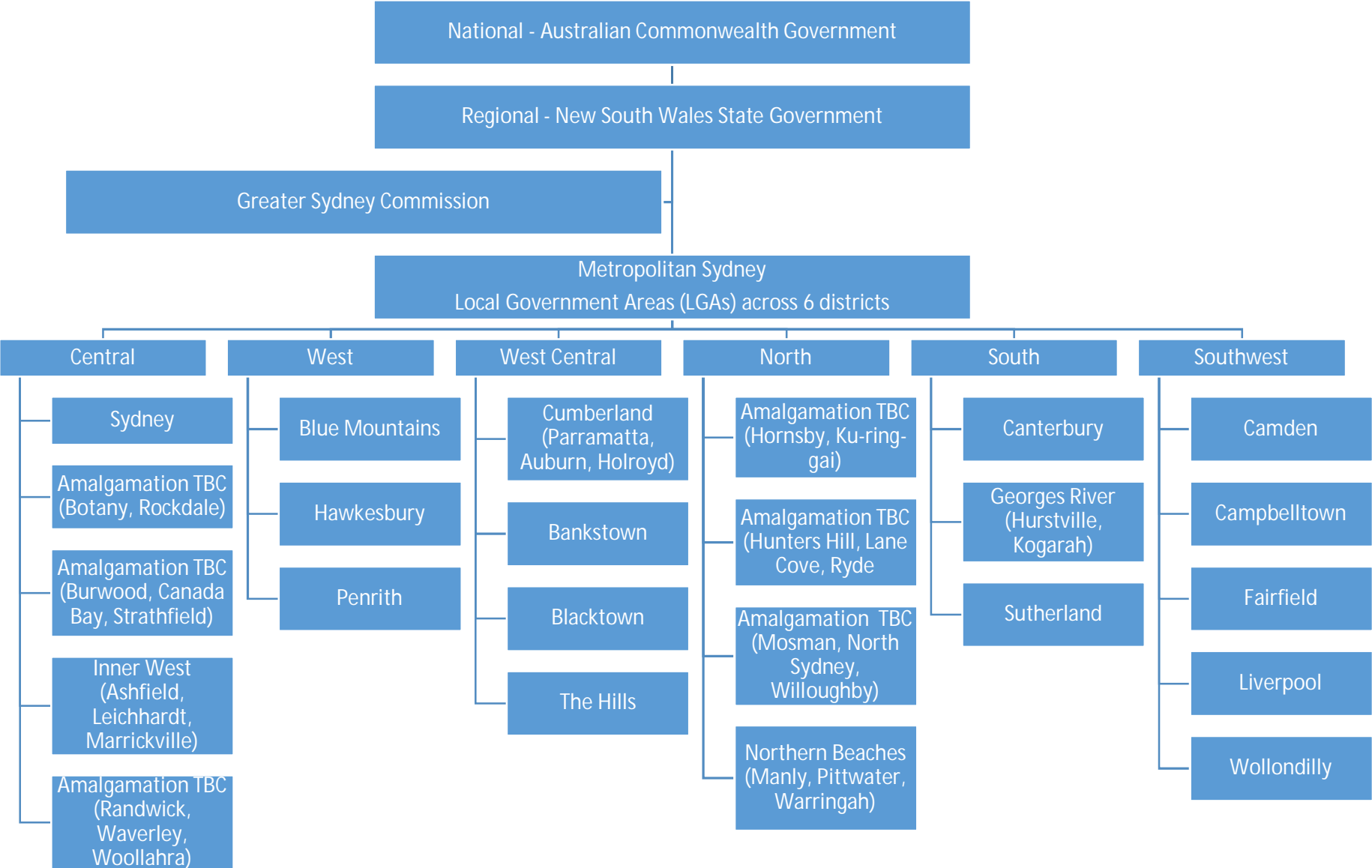
Figure 23 Governance structure of Metropolitan Sydney prior including proposed and adopted amalgamations (May 2016)

The establishment of the Greater Sydney Commission (GSC) in late 2015 offers an opportunity for integration and implementation of the Resilient Sydney strategy on a metropolitan scale. The Resilient Sydney team are currently exploring options with the commission.

The NSW government's 'Fit for the Future' reform package will result in amalgamation of a number of local government areas. The package is based on the recommendations of the Independent Local Government Review Panel and the Local Government Acts Taskforce. The government released a report in late 2015 recommending the number of Sydney councils be almost halved through amalgamations, from 41 to around 25.

A number of key strategic plans apply to metropolitan Sydney. Key plans include:

Commonwealth

- Establishment of Minister for Cities, 2015.

State

- A Plan for Growing Sydney (2014)
- NSW Long Term Transport Master plan (2012)
- Metropolitan Sydney Water Plan (2010)
- District Plans (pending)
- Other plans, including health, education, community services, emergency services, tourism, premiers priority list, electricity, environment, trade and investment plans.

Local

- Local government strategic plans
- Local environment plans (LEPs) and development control plans (DCPs)

- Other strategic local government plans addressing economic development, environment, social sustainability and culture.

5.6.2   City Organisation and Operations

Key challenge – complexity of collaboration

How do we work to improve collaboration across complex levels of government? How can Sydney improve and learn from fragmented application of solutions at a local level? How can we use these lessons to gain metro wide benefits? How can we support government to provide a coordinated response to geographic inequity across metropolitan Sydney?

Commonwealth Government

The Australian Commonwealth Government is responsible for

- Defence and foreign affairs
- Trade, commerce and currency
- Immigration
- Postal services
- Telecommunications and broadcasting
- Air travel,
- Most social services and pensions.

Figure 24 NSW State Government clusters, with key bodies identified
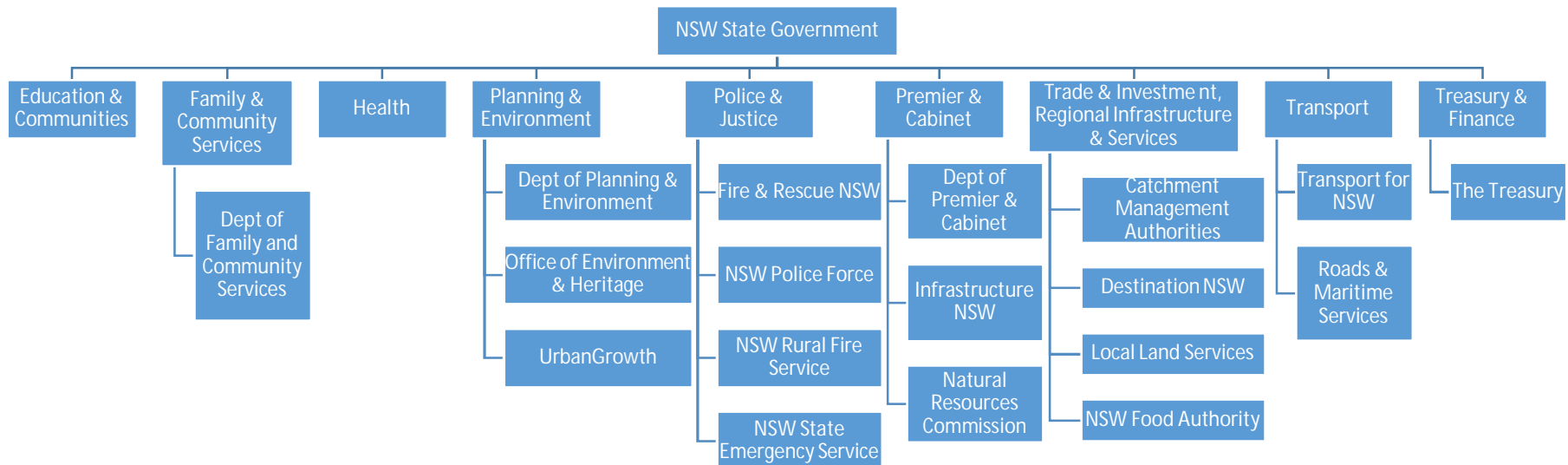
The Commonwealth Government also provides funding to the NSW Government for health, welfare, education, and infrastructure.

International policies and law currently allow for significant foreign investment in property, resulting in high levels of foreign investment. A number of trade policies and tariffs are in place, favouring international import, and export. More trade agreements are being brokered e.g. the Trans-Pacific Partnership Agreement (TPPA).

Historically, the level of support from the Commonwealth government for strong strategic city leadership has varied over the years, and there is currently recognition of the importance of cities with a Minister for Cities established in late 2015.

5.6.2.1　NSW State Government

Major State responsibilities include

- Schools and hospitals
- Conservation and environment,
- Roads, railways and public transport
- Public works
- Agriculture and fishing
- Industrial relations
- Community services
- Sport and recreation
- Consumer affairs
- Police, prisons and emergency services.

State government defines the powers of local government, and decides the geographical boundaries of each local government area.

5.6.2.2　Local Government

Local governments:

- Ensure local public services and facilities respond effectively to community needs;
- Provide a representative, informed and responsible decision-making body; and
- Develop the local community and its resources in a socially just and environmentally responsible way.

Local Government is responsible for:

- Building development and regulations
- Public health
- Local roads and footpaths

- Public recreation facilities such as aquatic centres, playgrounds and youth centres, libraries, parks and playing fields
- Local environmental issues, waste disposal
- Childcare facilities and many other community services.

Councils also have the authority to make regulations and by-laws.

5.6.3　Greater Sydney Commission

The Greater Sydney Commission will be responsible for metropolitan planning in a partnership between state and local government.

The Commission will include:

- The Chief Commissioner who will report to the Minister for Planning
- Four independent commissioners including a Social Commissioner, Environment Commissioner, Economic Commissioner and a Deputy Chief Commissioner
- Six District Commissioners nominated by Sydney councils to advocate their needs
- Three key government heads from the Department of Planning and Environment, Transport for NSW and NSW Treasury.

Committees for finance and governance, infrastructure delivery and strategic planning as well as the Sydney Planning Panel will support the commission.

The Sydney Planning Panel will take on the functions of the current Sydney Joint Regional Planning Panels.

5.6.3.1 Role of the Greater Sydney Commission

The Greater Sydney Commission will be responsible for:

- Finalising district plans for each of Sydney's six districts
- Conducting regular reviews of councils' Local Environmental Plans
- Conducting all decision-making and plan-making on rezoning proposals currently undertaken by the Minister (or delegate)
- Taking on the current determinations on development applications and plan making functions of the Sydney Joint Regional Planning Panels, including rezoning reviews
- Monitoring and reporting to government on implementation of actions in A Plan for Growing Sydney
- Requiring councils to give effect to district plans (or the regional plan if a district plan is not in place) when amending their local plans.

5.6.3.2 Strategic land use plans

The commission is the strategic planning authority for metropolitan Sydney. It will prepare and review Regional and District plans.

Regional plan

A Plan for Growing Sydney is the regional plan for metropolitan Sydney under the *Greater Sydney Commission Act 2015*. It establishes principles and sets out a framework for shaping Sydney's growth over the next 20 years.

The commission will coordinate and drive the delivery of all actions in the plan. The commission is required to establish a monitoring and reporting process for the delivery of actions.

The commission will review *A Plan for Growing Sydney* before the end of 2017 and at the end of every subsequent five-year period. The commission will work with key stakeholders including councils to undertake the review and will contact councils in the future about its program.

District plans

Six planning districts are identified in *A Plan for Growing Sydney*. The Minister for Planning declared these as districts for metropolitan Sydney pursuant to section 75AB(b) of the *Environmental Planning and Assessment Act 1979* (EP&A Act), on 27 January 2016.

Plans are currently being prepared for each of the six districts. All district plans will begin public exhibition before 27 January 2017. The commission will contact councils to provide input into this process.

Once district plans are in place councils must review their Local Environmental Plans (LEPs) and give effect to the relevant district plan. In the interim councils' planning proposals must give effect to *A Plan for Growing Sydney*.

The commission will oversee, monitor and report on the implementation of district plans in metropolitan Sydney. The Strategic Planning Committee will assist the commission in carrying out these functions and will seek support from councils.

5.6.4 Fiscal pressures and strengths

Key challenge – limited funds and increased accountability

How can Sydney resolve the impacts of limited funds and increased accountability at local government level? How can we better consider the costs placed on local communities (congestion, increased rates etc) from fragmented application of solutions at a local level? How can we support government to provide a coordinated response to geographic inequity across metropolitan Sydney?

Sydney has Australia's highest productivity and makes the largest contribution to the nation's gross domestic product[140].

Sydney generated $90 billion worth of taxation revenue in 2011-12. The Commonwealth government collected 82% of this via income and company tax, leaving only 18% for State and local councils. Some of the revenue is used to subsidise other states.

Much is returned to fund health, aged care and education services in New South Wales. State government frequently administers these services. Little is returned in the form of Commonwealth infrastructure funding. State government has to look to other opportunities to facilitate increased Commonwealth investment in infrastructure[140].

The NSW Government holds an AAA rating and has the ability to raise funds more cheaply than it has for over a century. The NSW Government has recently begun further fundraising through privatisation of public assets. The sale of major ports and energy network assets has provided a significant increase to government capital[141]

Most state government spending is directed to transport infrastructure and health. As previously stated public transport in Sydney is a long-term operational burden with no adequate funding stream in place. Fares only cover around 25% of total operating costs. This means that every new public transport link is a perpetual cost to the NSW Government. This has led to prioritisation of toll roads over mass public transport infrastructure[141].

Local government is able to request additional funding from state government to support specific infrastructure projects. For example Parramatta City Council has obtained financial support for the Parramatta Square development. State capital projects are either funded by state treasury or through requests to Commonwealth government.

There is an increasing move to privatisation of public infrastructure. Most major assets have been, or are in the process of being, privatised by Commonwealth or state government. Assets include the energy distribution network, ports and foreshore transport operation.

Local government funding comes from rates, fees and charges. These are supplemented by an allowance from the Commonwealth government, which is administered by the state government.

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[140] Committee for Sydney, 2014, Sydney adding to the dividend, ending the divide 2014 update

[141] Committee For Sydney, 2016, Are we there yet? Value capture and the future of public transport in Sydney

Table 9 State Government Cluster Capital expenditure, 2015-2016[142]

State Government Cluster	Capital expenditure, $ million
Transport	$ 6,626
Health	$ 1,170
Police & Justice	$ 588
Education & Communities	$ 501
Treasury & Finance	$ 463
Family & Community Services	$ 333
Planning & Environment	$ 165
Trade & Investment, Regional Infrastructure & Services	$ 133
Premier & Cabinet	$ 114

Table 10 Local Government Expenditure across the Metropolitan Sydney Districts[18]

District	Average Local Government Area Expenditure per person, $
Central	$ 1,293
North	$ 1,173
West	$ 1,022
Southwest	$ 884
West Central	$ 842
South	$ 763
Average across Metropolitan Sydney	$ 1,061

Average local government expenditure per person is highest in the Central, North and West Districts. Local government areas such as Sydney, Waverley, North Sydney, and Willoughby spend over 1.5 times the average, and Sydney over twice times the average (IPART, 2015). Spending is lowest in the South and West Central Districts.

Most key strategic assets within metropolitan Sydney are not controlled by local government including the Department of Defence, National Trusts, National Parks, Sydney Harbour and Foreshore Authority and Sydney Ports.

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[142] NSW State Government, 2015 Budget

5.7 Data Management

Key challenge – disparate ownership and availability

How can we improve access to data, working with disparate ownership across multiple stakeholders?

Much data is collected within metropolitan Sydney. However availability is low and increasingly complex.

Data is owned or developed by different levels of government and private entities. There are no clear processes or central portals for access by other organisations or the public. Privatisation of assets means ownership of data on infrastructure is moving outside government.

Initiatives to increase the accessibility of information are occurring. The NSW Department of Planning and Environment and NSW Treasury worked with industry during the 2014/15 NSW Budget to produce an interactive map showing the location of infrastructure projects using open source technology[91]

5.7.1 Census

The Australian Bureau of Statistics (ABS) is a Commonwealth organisation that undertakes a national census every 5 years. The last census was held in 2011, and the next will be held in August 2016. It provides a reliable basis for understanding the population of the states, territories and local government areas. The census is primarily delivered for electoral purposes and the distribution of government funds.

The Census also collects information on the characteristics of the Australian population within small geographic areas and for small population groups.

The Census works directly with service providers to try to capture communities that may be missed. Three key groups are homeless youth, homeless people displaced due to domestic and family violence, and homeless Aboriginal and Torres Strait Islander Australians.

6 Identifying Discovery Areas

The Preliminary Resilience Assessment uses the material in this City Context Report to identify Discovery Areas, or research questions, proposed for further investigation in Phase II of the Resilient Sydney program. The Discovery Areas are described below.

Table 11 Discovery Areas

How Sydney works	Adaptive Sydney	Identity in Diversity	City of Opportunity
How can we understand the connections between critical systems to manage uncertainty and productivity in our city?	How can we adapt city planning, the built environment and financing to cool our city and care for our water resources?	How can we value diversity in our community to improve social cohesion, inclusion and economic productivity?	How can our plans for Sydney's growth ensure everyone has equal opportunities to grow and thrive?

The identification of the Discovery Areas was an iterative process, with the challenges emerging from the City Context Report identifying where the effort or focus should be for the Discovery Areas in the Preliminary Assessment Report. The Discovery Areas have been developed to address these key challenges in order to maximise the resilience dividend for Sydney. Sydney's key challenges are summarised below in alignment against the Discovery Areas, and resilience behaviours.

Table 12 Summary of Metropolitan Sydney's key challenges

Sydney's key challenges to resilience		Alignment to discovery areas	Resilience Behaviours
Health and wellbeing			
Sydney has a growing, and ageing population	How can Sydney's infrastructure and services be flexible and adaptable enough to support population growth? How can we ensure that wellbeing is not limited for all our community, including the ageing?	How Sydney Works	Aware, Integrated
There is a lack of housing affordability in the rental and owner occupied housing	How can we improve affordability in the rental and owner occupied housing markets? How can we prevent the population moving further away from employment, key services and infrastructure and improve liveability?	City of opportunity	Self regulating

Sydney's key challenges to resilience		Alignment to discovery areas	Resilience Behaviours
markets			
Increase in chronic illnesses	How can we prevent increase in chronic illnesses across broader and vulnerable populations? How can communities address the lifestyle and socio-economic factors which contribute to chronic illnesses? How can we prepare our health services for increased demand? How can Sydney communities work to support economic participation for those with chronic illnesses?	City of opportunity	Self regulating
Reduced respite from heatwave events	How can we prevent increasing death and illness from heatwave events in sensitive community groups?	Adaptive Sydney	Adaptive
There is limited employment diversity and inequitable distribution of employment density	How can Sydney provide sufficient employment diversity and density to reduce unemployment and underemployment in the youth, ageing and unskilled populations and provide equitable access to employment?	City of opportunity	Self regulating
Economy and society			
There is increasing spatial inequity across Metropolitan Sydney	How can we measure and prevent increasing spatial inequity across metropolitan Sydney? How can Sydney's economic and social infrastructure support economic prosperity across diverse geographic locations? How can equitable access to economic centres be improved? How can we improve social cohesion and prevent segregation between communities and socio-economic stratification, including within Sydney's education system?	Identity in diversity City of opportunity	Diverse Self regulating
Sydney has a very diverse, growing population	How can we ensure Sydney communities are cohesive and engaged when undergoing rapid growth in population and cultural diversity? How can rapid growth in specific geographic areas be supported with sufficient social and economic infrastructure? How can Sydney continue to recognise, celebrate and grow cultural diversity within and across geographically dispersed communities?	Identity in Diversity	Diverse

Sydney's key challenges to resilience		Alignment to discovery areas	Resilience Behaviours
Sydney must compete on a global scale	How can we ensure Sydney continues to compete on a global scale? How can we reduce vulnerability to Sydney's increased interdependencies with global supply chains, and prepare to bounce back from global economic shocks?	How Sydney Works	Aware, Integrated
Concentration of domestic violence and drug related crime	How can we measure and prevent increasing geographical concentrations of domestic violence and drug related crime? How can we support communities and individuals to reduce the effect crime has on social cohesion and economic participation? How do we track the impacts crime and a lack of social stability has on homelessness and mental health issues? How do we support communities and individuals impacted by homelessness and mental health issues?	City of opportunity	Self regulating
Rapid diversity and population growth in specific locations	How can we ensure Sydney communities are cohesive and engaged when undergoing rapid growth in population and cultural diversity? How can rapid growth in specific geographic areas be supported with sufficient social and economic infrastructure? How can Sydney continue to recognise, celebrate and grow cultural diversity within and across geographically dispersed communities? How can we better understand and manage the social pressures increased density has on communities?	Identity in diversity	Diverse
Infrastructure and environment			
There is a strong interdependency for continuous energy supply across critical services in Metropolitan Sydney	How do we maintain a high reliability of energy supply whilst transitioning to cleaner renewable sources? How can we reduce vulnerability of Sydney's critical services to cascading failures under stress and shock conditions?	How Sydney Works Adaptive Sydney	Aware, Integrated Adaptive
Population growth in Sydney is not adequately supported	How can we ensure that population growth in Sydney is adequately supported by diverse transport networks and access to diverse employment opportunities, and key social and health infrastructure? How can we support government to	Adaptive Sydney City of opportunity	Adaptive Self regulating

Sydney's key challenges to resilience		Alignment to discovery areas	Resilience Behaviours
by diverse transport networks	provide a coordinated response to geographic inequity in transport networks across metropolitan Sydney? How can the connectivity of active transport networks be supported and improved?		
There is increasing urban development in greenfield areas	How can we limit the impact of urban development on horticultural and agricultural land? How can we protect and diversify Sydney's food supply networks?	How Sydney Works	Aware, Integrated
Increase in frequency and intensity of heatwaves impacting vulnerable infrastructure	How can Sydney respond to increasingly frequent and intense of heatwave events? How do we reduce vulnerability of the energy network to extreme weather events? How do we manage the impacts of urban heat island effect and the effects of extreme weather events on health and wellbeing, including air quality and walkability? Transport – How can we improve diversity and accessibility of transport networks and ensure they are resilient to the effects of extreme weather events, including heatwaves? How can Sydney address the effects of extreme heat and heat island effect and reduce the impact they will have on diverse transport networks? Energy – How do we maintain a high reliability of energy supply whilst transitioning to cleaner renewable sources? How can we reduce vulnerability of Sydney's critical services to cascading failures under stress and shock conditions including heat waves? Water – How do we upgrade and diversify our water supply in order to maintain availability during periods of drought and heat? How can Sydney plan for increased water demand and costs, and additional pressure and demand for water bodies due to population growth and increased extreme weather events? How can we improve and maintain equitable access and water quality across	Adaptive Sydney	Adaptive

Sydney's key challenges to resilience		Alignment to discovery areas	Resilience Behaviours
	metropolitan Sydney?		
Leadership and strategy			
Limited funds and increased accountability at local government level	How can Sydney resolve the impacts of limited funds and increased accountability at local government level? How can we better consider the costs placed on local communities (congestion, increased rates etc) from fragmented application of solutions at a local level?	How Sydney Works	Aware, Integrated
Complexity of collaboration across government	How do we work to improve collaboration across complex levels of government? How can Sydney improve and learn from fragmented application of solutions at a local level? How can we use these lessons to gain metro wide benefits?	How Sydney Works	Aware, Integrated
Privatisation of publically owned infrastructure	How can we improve access to data, working with disparate ownership across multiple stakeholders? How does Sydney manage an increased reliance on private organisations due to privatisation of public infrastructure?	How Sydney Works	Aware, Integrated
Coordinated governance response to spatial inequity	How can we support government to provide a coordinated response to geographic inequity across metropolitan Sydney?	City of opportunity	Self regulating

7 Next steps

A scope of works for Phase II will be developed to provide an overview of the next steps, identify timelines and the critical path for the development of the resilience strategy.

The PRA will be presented to the Resilient Sydney Steering Committee for endorsement. Once it is endorsed Phase I of this project will be complete.

Phase II will involve the establishment of Discovery Area Working Groups. The working groups will undertake a detailed exploration of the Discovery Areas including further analysis, stakeholder engagement and the development of actionable plans, projects and initiatives for incorporation into the Resilient Sydney Strategy.

The working groups will comprise representatives from a range of sectors across metropolitan Sydney. Each will have a dedicated convenor.

Phase III will see implementation of the resilience strategy.

8 Glossary

Term	Definition
Adaptation	Anticipating adverse effects and taking appropriate action to prevent or minimise the damage they can cause.
Asset	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.
Cyber attack	An attempt by hackers to damage or destroy a computer network or system.
Discovery Areas	Important areas for discovery during Phase II activities of the resilience strategy.
Megatrends	Global, sustained and macro-economic forces of development that impacts business, economy, society, cultures and personal lives thereby defining our future world and its increasing pace of change.
Metropolitan Sydney	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. This area covers 12,367.7 square kilometres and is made up of 43 local councils.
Mitigation	The action of reducing the severity, seriousness, or painfulness of something
Phase I	This phase is designed to conduct a holistic scan of the city's state of resilience, establish the office of the CRO, and begin to engage and galvanize stakeholders, critical voices and experts around resilience.
Phase II	Building on the mobilization and analysis of Phase I, in Phase II the CRO will partner with diverse and interdisciplinary teams and platform partners to explore the challenges and innovate solutions generating from the city's defined Discovery Areas.
Resilience	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.
Risk	A function of the likelihood/probability of a shock or stress combined with the consequence of the shock or stress.
Shocks	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.
Strategy	The overall collection of priorities, initiatives and action plans that the CRO and stakeholders will identify and implement to build resilience in the city.
Stresses	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.
Vulnerable assets	Sydney assets that are vulnerable to shocks including health services infrastructure, railways, potable and wastewater systems and airports.

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Appendices

Appendix A - Outcomes from 100 Resilient Cities tools
Global shocks, stresses and megatrends

A full list of shocks, stresses and megatrends (external forces) relevant to cities was compiled. This list was informed by the shocks, stresses, megatrends and issues identified in the:

· 100 Resilient Cities framework, including the Assets and Risks Tool

· Top shocks, stresses, and megatrends identified for cities within Australia and New Zealand, including Melbourne, Christchurch, and Wellington

· Top shocks, stresses, and megatrends identified for cities globally across the 100RC network

· World Economic Forum's Global Risks Report 2016

· KPMG Future State 2030: the global megatrends shaping governments (2014)

· United Nations Sustainable Development Goals (2015)

· Key issues identified in local strategic plans and assessments such as NSW Office of Environment and Heritage (OEH) Towards a Resilient Sydney

· Key issues identified by industry bodies such as the Committee for Sydney, Green Cross Australia's Business Adaptation Network, and Australian Business Roundtable for Disaster Resilience and Safer Communities

· Desktop study of shocks and stresses which are current or have occurred in the past across Sydney.

A full list of the global shocks and stresses have been provided. By filtering the megatrends based on the shocks and stresses relevant to the Sydney context, a long list of the key megatrends which will shape Sydney over the next 30 years was identified. This list is provided in full below.

Table 13 Global Shocks

Shocks
Asset bubble in a major economy e.g. manufacturing, natural resources, property)
Deflation in a major economy e.g. devaluation in property prices, reduced economic growth in China/India
Financial institution failure
Fiscal crises in key economies e.g. GFC
High structural unemployment or underemployment e.g. major state govt layoffs, major industrial shutdowns
Illicit trade (e.g. illicit financial flow, tax evasion, human trafficking, organised crime, etc.)
Severe energy price shock (increase or decrease)
Unmanageable inflation
Failure of urban planning
Food crises
Large scale involuntary migration
Profound social instability
Disease pandemic
Water crisis
Extreme weather events (heat wave, flood, severe storms, bushfire)
Failure of climate change mitigation and adaptation (e.g. policy and implementation)

Shocks
Major biodiversity loss and ecosystem collapse (land or ocean)
Major natural catastrophe (e.g. earthquake, tsunami, volcanic eruption, geomagnetic storms)
Man-made environmental catastrophes (e.g. oil spill, radioactive contamination)
Adverse consequences of technological advances
Digital network failure
Cyber attack
Massive incident of data fraud / theft
Failure of national governance (e.g. failure of rule of law, corruption, political deadlock)
Interstate conflict with regional consequences (interstate includes immediate neighbouring countries)
Terror attack
State collapse or crisis (e.g. military coup, civil conflict, failed states)
Weapons of mass destruction
Infrastructure failure

Table 14 Global Stresses

Stresses
Health and Wellbeing
Homelessness
High energy costs
High food costs
Lack of food security
Water pollution/shortage
Unemployment
Geographic inequity
Housing affordability
Employment diversity

Stresses
Low education levels
Limited access to education
Lack of social security
Limited access to financial assistance
Lack of access to affordable health care
Health services demand
High health care costs
Drug and alcohol abuse
Major influx of refugees and/or asylum seekers
Youth unemployment
Family violence
Aging population
Chronic disease
Economy and Society
Unclear local identity
Social cohesion
Lack of community participation
High crime rate
Rampant corruption
Ineffective and/or lack of policing
Public lacks trust in authorities
Low productivity
Political instability/sectarian violence
Radicalism
Unmanageable inflation
Illicit trade (e.g. illicit financial flow, tax evasion, human trafficking, organised crime, etc.)
Adverse consequences of technological advances
Infrastructure and Environment
Economic downturn

Stresses
Depletion of natural resources
Lack of investment in local business and economy
Depressed local economic conditions
Poor fiscal management
Lack of linkages to the broader regional market
Over-reliance on one industry
Environmental degradation
Loss of ecosystem services
Invasive species
Loss of biodiversity
Exposed critical infrastructure
Ageing infrastructure
Energy demand outstrips supply
Limited continuity planning and redundancy for critical services and infrastructure
Transport diversity
Limited access to telecommunications and/or broadband
Climate change – increasing temperatures
Climate change - Rising sea level & coastal erosion
Drought & water shortage
Infrastructure financing burdens
Urban encroachment on agricultural land
Leadership and Strategy
Lack of/low levels of trust in city leadership
Siloed planning and management
Lack of awareness of hazards and risks among city inhabitants
Poor public messaging, information and communication
Lack of inter-city regional networks
Lack of up-to-date and relevant data for future planning
Lack of integrated planning

Stresses
Outdated land use plans

Table 15 Megatrends shaping Sydney over the next 30 years

Megatrends
Health and wellbeing
Decrease in housing affordability and diversity of housing supply
Population adopting biotechnological health treatments instead of behavioural change
Increased accessibility to and connectivity of healthcare and medical information
Increasing chronic illnesses in a wider spread of the population due to social inequity, socio economic standing and availability of convenience foods
Increased rate and distribution of chronic illnesses, including increase in population living with chronic illnesses
Urban development reducing agricultural capacity through encroachment
Reliance on food supply from greater distances away
Society
Pressure on society with an increase in domestic and drug-related crime
Increased cultural diversity and distribution of population
Concentrations of population growth inadequately supported by critical infrastructure
Social disconnection of vulnerable groups
Lack of awareness and empathy for socio economic and cultural diversity
Pressure on society with an increase in domestic and drug-related crime
Increased cultural diversity and distribution of population
Inequality between districts causing social unrest, and lack of social connectivity and cohesion
Continued isolated conflict / social unrest events
Widespread loss of indigenous cultural heritage

Megatrends
Economy
Increased interdependencies with global supply chains and economies
Increase in under employment and/or unemployment
Lack of employable workforce
Pricing point for alternative energy generation takes 5-10 years to mature
Outsourcing of manufacturing
Increase in retail availability and consumer activity
Increased reliance on digital solutions
Increased availability and ease of access to private information and big data
Increased interdependencies with global supply chains
Insufficient political / economic support for business, especially entrepreneurial and start-up businesses
Increasing income inequity
Neighbouring regions experience significant economic downturn
Key national economies fail causing greater reliance on metropolitan region
Global economic downturn
Lack of diverse employment opportunities
Inadequate support for business infrastructure and services
Limited diversity of investors, including foreign investment in property
Infrastructure
Limited access to multimodal transport options
Increasing travel times
Increased reliance on digital solutions
Lack of flexible and adaptable infrastructure and services to support ageing population
Increase in population with limited access to critical infrastructure
Digital disruption affecting existing infrastructure
Key private critical infrastructure providers change service charges or fail

Megatrends
Environment
Increase in global temperatures and rising sea levels
Sea level rise increasing impact of coastal erosion and storm event damage
Increased frequency and intensity of extreme events
Increased pressure placed on natural capital due to population growth, especially water bodies
Increased global, national and local demand depleting natural resources
Increase in regulation around resource use, land use planning, and emissions
Increased respiratory diseases in specific locations
Leadership and strategy:
Uncertainty in local government
Lack of coordination and collaboration at state government level
Increased focus on metropolitan scale governance
Local and state government required to provide increased commitment and resources to national government
Short term political leadership
Increasing inequity in stakeholder engagement

Assets and Risk Assessment Tool

The 100RC Assets and Risk Assessment Tool was used to undertake 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. A full list of the critical assets and infrastructure assessed is provided below.

Table 16 Full list of Sydney's critical assets and infrastructure

Full List of Critical Assets and Infrastructure assessed
Health infrastructure
Energy network
Communication networks
Roadways
Railways
Wastewater and stormwater
Community and social service facilities
Water supply
Agricultural and horticultural land
Foreshore infrastructure
Residential buildings and structures
Commercial buildings and structures
Airports

Full List of Critical Assets and Infrastructure assessed
Waterways
Education facilities
Power generation
Ports and maritime services
Oil and gas
Defence assets
Emergency service facilities
Cultural assets and icons
Ferries
Financial institutions
Public open space
National parks and reserves

City Actions Inventory

A summary of over 90 existing actions which are already building resilience within metropolitan Sydney, and which area of resilience they relate to as mapped against the City Resilience Framework. This list includes actions which contribute to resilience within the Sydney context, and includes national, regional and local actions. This list is not intended to be exhaustive, but primarily to acknowledge the amount and level of work already happening within the resilience space in Sydney.
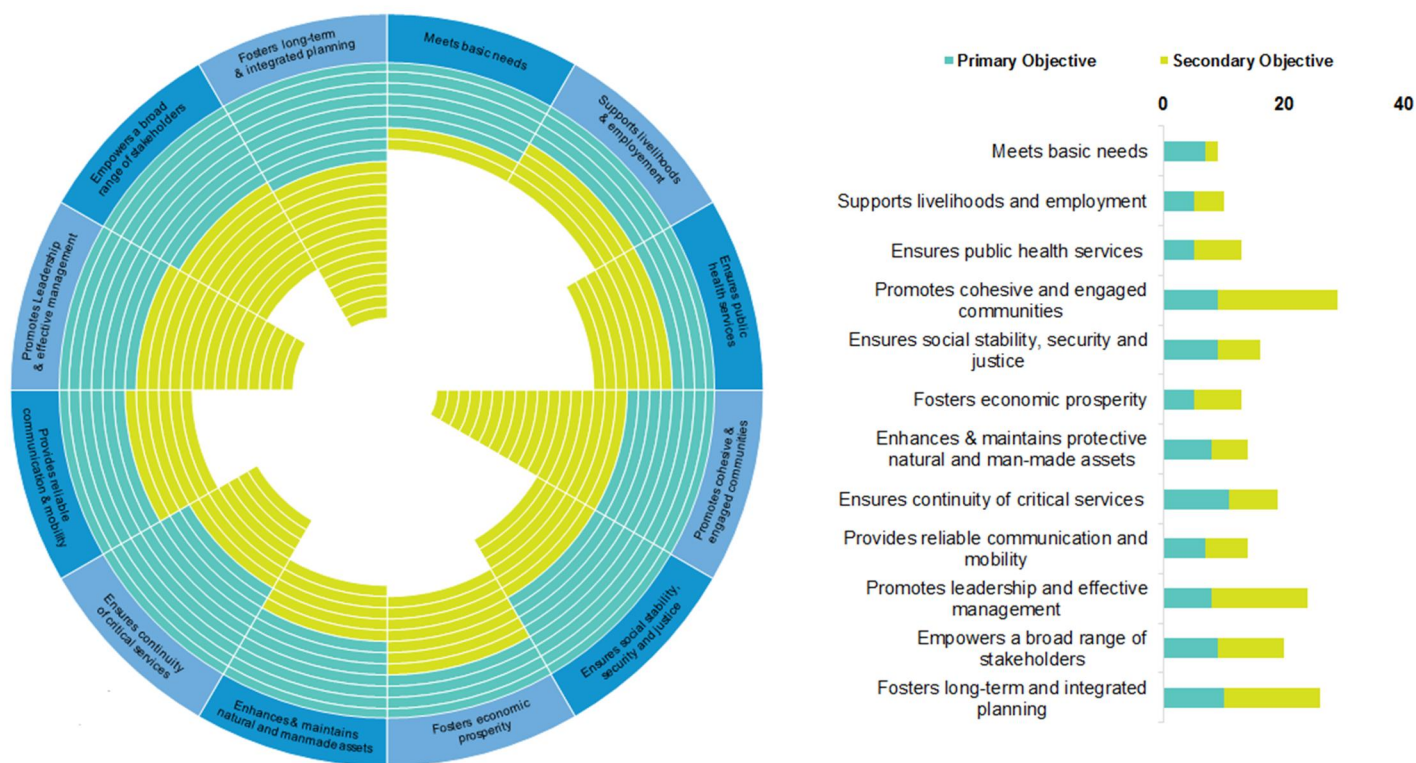

Figure 25 City Actions Inventory

Table 17 City Actions Inventory –Sample of Resilience Actions within the metropolitan Sydney context

City Actions Inventory Sample of Resilience Actions within the metropolitan Sydney context
Resilient Australia Awards, Attorney General's Department
NSW Government Emergency Management Plan (EMPLAN)
Building Resilience to Climate Change Grants
Hawkesbury-Nepean Valley Flood Management Review
NSW and ACT Regional Climate Modelling Project (NARCLiM)
Towards a Resilient Sydney
Technical Guidelines for Urban Green Cover
Community Resilience Innovation Program (CRIP)
Rouse Hill Land & Waterways Program
Sydney desalination plant
Guide to Integrated Regional Vulnerability Assessment (IRVA) for Climate Change
Blue Mountains City Council: Local Community Bushfire Recovery
Risk to resilience workshops
Adapting for Climate Change - Draft
City of Sydney Decentralised Energy Master Plan, Renewable Energy
City of Sydney Decentralised Water Master Plan
Sydney Peri-urban network (SPUN) Action Plan
City of Sydney Travel Plan Guideline (draft)
Community Engagement and Participation Plan for food waste collections
Adapting to urban heat island events
HeatMap: Urban Heat Island Mapping for Southern Sydney
Strategic risk management by Westpool and Metro Pool Councils
Climate Change Adaptation and Community Resilience Report for Barangaroo South
Common Ground, Camperdown Project.
Workplace health program
P-FUTURES: Transforming the way cities secure food and water through

City Actions Inventory Sample of Resilience Actions within the metropolitan Sydney context
innovative phosphorus governance
Sydney food futures
Sydney Agriculture Strategic Approaches Working Group
National Strategy for Disaster Resilience
Emergency Management Planning for children and young people
Heart Foundation's Blueprint for an active Australia
Western Sydney Infrastructure Plan
The Australian Child Wellbeing Project
Rethinking disaster risk management and climate change adaptation
Witness King Tides
NSW Meals on Wheels
Planning Schemes online
ASBEC Built Environment Adaptation Framework
National State of the Assets Report
Australian infrastructure financial management guidelines (Now AIFMM)
Smart Blocks
Metropolitan Water Plan
Council Strategic Plans
Sydney Water Climate Change Adaption Program
Liveable Communities Grant
Creative Ageing Grant
A Plan for Growing Sydney
NSW Long Term Transport Master Plan
Sydney Water Growth Servicing Plan 2014-2019
Parramatta 2038 Community Strategic Plan
Rebuilding NSW Plan (State Infrastructure Strategy)
NSW State Health Plan
The Critical Decade
Adapt NSW
Be Prepared: Climate Change and the NSW Bushfire Threat
Australian Business Roundtable for Disaster Resilience & Safer

City Actions Inventory Sample of Resilience Actions within the metropolitan Sydney context	City Actions Inventory Sample of Resilience Actions within the metropolitan Sydney context
Communities	Sydney major developments and improvements
Business Adaption Network	NSW Flood Prone Land Policy and Floodplain Development Manual
Cool Parramatta (incl. Heat Maps)	SES FloodSafe
NSW Sustainable Design Guidelines	Bureau of Meteorology
AGIC Guideline for Climate Change Adaption	Natural Disaster Resilience Program (NDRP)
Investing Through an Adaption Lens - A Practical Guideline for Investors	Australian Infrastructure Plan
Organisational Resilience Group	Community Safety Fund
Stockland Climate Resilience FY15 Disclosure on Management Approach	Multicultural Disability Advocacy Association of NSW
Financial System Inquiry 2014	Australia's Biodiversity Conservation Strategy 2010-2030
Parramatta City Council Climate Extremes Risk Assessment & Adaption Plan	Cumberland Plain Recovery Plan
Value Capture Roadmap	OEH principles for the use of biodiversity offsets in NSW
Martin Place Siege Joint Commonwealth - NSW review	Biodiversity Offsets Policy for Major Projects
National Guidelines for Protecting Critical Infrastructure from Terrorism	BioBanking Scheme
SecureNSW	Hot and Getting Hotter! Regional Heatwave Resilience Project
Australian Cybercrime Online Reporting Network (ACORN)	ACOSS - Building the Disaster Resilience of the Australian Community Services Sector
The National Counter-Terrorism Plan	Hawkesbury-Nepean Taskforce
NSW Counter Terrorism Plan	ACSC 2015 Threat Report
The Committee for Sydney	Australian Renewable Energy Mapping Infrastructure
Sustainable Sydney 2030	Options Assessment Framework
Social Impact Investment and Knowledge Hub	Ascendance, resistance, resilience : concepts and analyses for designing energy and water systems in a changing climate
City of Sydney Floodplain Management	Lloyd's City Risk Index 2015-2025
Tomorrow's Sydney	

Keep in touch

If this City Context Report has inspired you to contribute to shaping your city's future, read further in the Resilient Sydney Preliminary Resilience Assessment, available on cityofsydney.nsw.gov.au, or get in touch. Throughout 2016 Working Groups will further explore the Discovery Areas and resilience challenges of Sydney as we develop a Resilience Strategy for our city. We encourage you to get involved:

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