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WHOSE RISK IS IT ANYWAY?

Desktop review of institutional ownership of risk
associated with natural hazards and disasters

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Executive summary

This desktop review presents a summary of risk ownership allocation for the strategic management of natural hazard risks in Australia. It forms part of the project *Mapping and understanding bushfire and natural hazard vulnerability and risks at the institutional scale* undertaken for the Cooperative Research Centre for Bushfire and Natural Hazards.

Risk ownership here is restricted to strategic pre- and post-events for natural hazard disaster management. Other aspects of ownership, such as the undertaking of emergency response, where Australia has a significant and well-recognised capacity, are not addressed.

Risk ownership is explored through three questions:

- Who pays for the risk?
- Who manages (is responsible for) the risk?
- Who is accountable for the risk?

These questions take in the two main definitions of risk ownership that cover the asset owner and the risk manager: the person or entity with the accountability or responsibility of managing a risk.

The key findings are described according to the strategic aspects of managing the risk of natural hazards:

- Building and maintaining resilience
- Mitigation
- Plan and prepare
- Early response and recovery
- Medium response and recovery
- Long-term response and recovery

Ownership was examined within a matrix of broad institutions (federal, state/territory and local government, business and industry, and civil society) and values (built, social and environment assets, and infrastructure). Risk ownership across this matrix was found to be allocated according to individual hazards, ownership of assets, tasks associated with the risk management process and policy/legislative instruments.

Risk ownership is highly dynamic. The systemic nature of natural hazard disasters is characterised by their potential to cross domains and move from one risk owner to another, affecting a wide range of ownership. Risk ownership is also changing as new operational structures and processes are emerging, and growing within and across institutions. Also found was variable interpretation of risk, risk ownership and lack of clarity of appropriate governance, particularly across areas of multiple ownership.

Review of pre- and post-event policies and strategies revealed ownership strengths in the following areas:

- Built infrastructure and assets have the most complete coverage of risk ownership, which is supported by a wide range of policies and regulation.
- Well-developed early and medium-term response plans for impacts on built assets and infrastructure and to a lesser extent on social assets and infrastructure. The majority of recovery funds are currently spent on roads and other transport infrastructure due to high levels of damage and lack of insurance in this area in most states.



- Growing allocation of ownership in risk planning and preparation at the state and local level, for civil society, and business and industry in designated high-risk areas for specific hazards such as flood and fire.
- Broad ownership by civil society of overall hazard risk in terms of insurance coverage, although growing exposure increases the risk of under-insurance.

Ownership gaps were observed in the following areas:

- Mitigation of risk to environmental assets and infrastructure has limited ownership, and there are important gaps in coverage for both environmental and social assets and infrastructure.
- Despite a degree of existing resilience, resilience is in all areas of the risk management process and its application is not well defined. Accountabilities also extend beyond emergency management into broader social, economic and environmental areas such as climate change adaptation and business development.
- Lack of clarity between investment in and relative effectiveness of active (e.g., emergency management plans, targeted mitigation) and passive resilience measures (e.g., building to regulation).
- Recovery plans for social and environmental assets and infrastructure. There was no defined funding mechanism for environmental recovery or for social recovery over the long term.

Areas of interest regarding ownership that will be explored further in the next phase of this project include:

- The need to provide positive incentives and fit-for-purpose funding to support change from current institutional and organisational practices that have had limited effect or provide perverse incentives. For example, betterment funding for local government and NDRRA payments for small business have had limited uptake.
- Possible unacknowledged risk ownership in existing areas of social vulnerability, such as health and unemployment, where risks may be exacerbated by the flow-on effects of disaster events.
- The inability of some institutions to fulfil the obligations of ownership due to lack of resources or capacity. As a result, the accountabilities and responsibilities of some organisations and groups may not be met, particularly in regional and outer urban municipalities.
- The issue of how strategic risk management is to be sustained over the long term in order to avoid mounting payments to fund recovery; who should be accountable for ensuring this and how should they be accountable?
- How different levels of incentive and enforceability of risk ownership instruments affect ownership uptake.

This review has highlighted some of the challenges for ascertaining the allocation of risk ownership for natural hazards and disasters. It has also revealed areas where ownership is less well allocated and potential pathways for this to be developed. The breadth and complexity of integration and coordination across institutions to enable effective management of natural hazard risk effectively needs the comprehensive allocation of risk ownership to evolve over time. This will require new structures and adaptive ways of thinking that can incorporate new knowledge as it emerges. It will also require institutions to think systemically, not only within and across their own domains, but also across the broad system of values that are the foundation of our economy.



Background for this project

Currently, government spending on natural disaster response is more than 20 times spending for mitigation. When natural disasters are large and combine in unpredictable ways, they also cross domains, moving from the private to the public realm, and shifting from a local, to a state or national concern. Many climate-related natural hazards are increasing and the number of people living in hazard-prone areas is also increasing. This raises the potential of future, unmanaged risks.

The spending mismatch between response and mitigation is well understood. We also face potential deficits in important social and environmental values that may not be adequately accounted for and compensated. Communities and the environment are vital components of liveability and sustainability, but their underlying values are not well understood. If a risk is owned (in that who is responsible or accountable for managing the values under threat can be clearly identified), then it is possible to start addressing this imbalance. If the risk is un-owned, these values then become 'invisible' and may be damaged and degraded, or lost as a result.

Mapping and understanding bushfire and natural hazard vulnerability and risks at the institutional scale aims to address this issue by investigating vulnerability and risks to natural hazards on a range of scales. It will look at institutions involved in natural disasters, such as local government, state government, federal government and the community and private sector; and assess how their specific values and rules interact with the broader values affected by natural disasters.

The project objective is to develop a framework for understanding the ownership of risks from bushfires and natural hazards at the institutional level. Its aim will be to enable more effective decision-making in relation to the allocation of risk ownership at the institutional scale, through a range of measures, including investment strategies, resilience and risk mitigation.

Key components of this project are:

- Develop an economic geography of values at risk at geographic and institutional scales: the values at risk maps. The format of this output will be developed in consultation with key stakeholders.
- Assess risk ownership by asking "Who is responsible?", "Who pays?", "Who manages the risk?" and "How is it managed?"
- Develop a governance framework to support the institutional understanding and management of these values at risk. This task will examine current governance before and after disasters, looking at both emerging and future needs.

This project aims to benefit decision makers in institutions such as local, state and federal government, the community and various private sectors by helping them to better identify the real value of these events and where their institutions may be at risk. It also aims to help clarify how governance can support the long-term management of natural hazard risk and assist in building greater resilience.



Introduction

Understanding the ownership of natural hazard disaster risks is a complex issue because of the systemic and dynamic nature of these events. At a given point in time, some risks may have multiple owners, and other risks, no owners at all. A recent sequence of natural disasters in Australia involving fire, flood, cyclone and extreme heat resulting in serious and far-reaching damage and loss (Steffen, 2015, PC, 2014) shows the need to understand more clearly what is risk and who is responsible for managing those risks.

A particular need is to better understand ownership as it relates to the strategic aspects of natural hazard risk before and after disaster events. This includes identifying interdependencies that arise from co-ownership and vulnerabilities that arise as a result of lack of ownership, both prior to and following these disasters. It is also important to understand more clearly the formal and informal social contracts attached to these arrangements and how they are used to define areas of ownership.

A risk owner is defined in the ISO 31000: risk standard as being “a person or entity that has been given authority to manage a particular risk and is accountable for doing so” (ISO, 2009). The Productivity Commission align risk ownership with assets stating “asset owners are generally best placed to manage risks to their property” (PC, 2014 p314). However ownership can be allocated in other ways such as:

- In relation to a hazard, for example, specific authorities and agencies are charged with managing bushfire risk, others manage flood.
- In relation to an activity or task required during a given phase of the risk management process (e.g., roles related to preparation, plan, response and recovery).
- Through policy, legislation and regulation.

Risk ownership will be discussed further in the framework paper for this project (Jones et al in preparation).

The purpose of this review

The purpose of this review is to provide a basic overview of current allocation of ownership of natural hazard risk in Australia and identify major gaps. It is not intended to provide a comprehensive overview of all aspects of risk ownership and is based upon materials reviewed. It will be used to facilitate the planning of the workshop phase of this project, which combines:

- The different aspects of risk ownership discussed in this paper.
- Draft maps of diverse values at risk covering economic, social and environmental values.

Scope of this review

The allocation of risk ownership is addressed from an institutional perspective for both tangible and intangible values using the following questions:

- Who pays for the risk?
- Who manages (is responsible for) the risk?
- Who is accountable for the risk?



Society has been divided into five key institutions; local, state and federal government, industry and business, and civil society. The roles of smaller institutional players that make up these larger groups will be investigated more fully during the workshops and follow-up research. The areas examined for ownership of values at risks falls into the broad categories of social assets and infrastructure, environmental assets and infrastructure and built assets and infrastructure. These three areas support the production of goods and services that constitute the market economy and sustain society and the environment.

The interactions between these assets underpin important areas of both the monetary and non-monetary economy. As a result, the loss of an asset or decrease in its condition underpinning any one area will have flow-on impacts for other parts of the broader economy. These impacts may persist for some time. For example, in locations where the tourism industry depends heavily on the environment, environmental damage can reduce the monetary flow into a local economy; that in turn can affect social and built assets and infrastructure. As such these risks are systemic; therefore ownership also needs to be addressed in a systemic manner.

Understanding the patterns of risk ownership that govern these interactions will assist greatly in addressing the strategic management of those risks. Key tasks of natural hazard risk management are illustrated in Figure 1. Emergency management processes form a core aspect of this process, but here ownership is restricted to natural hazard risk and not man-made emergencies. Tasks and ownership of risk change across short, medium and long-term time lines due to the dynamic nature of the activities undertaken.

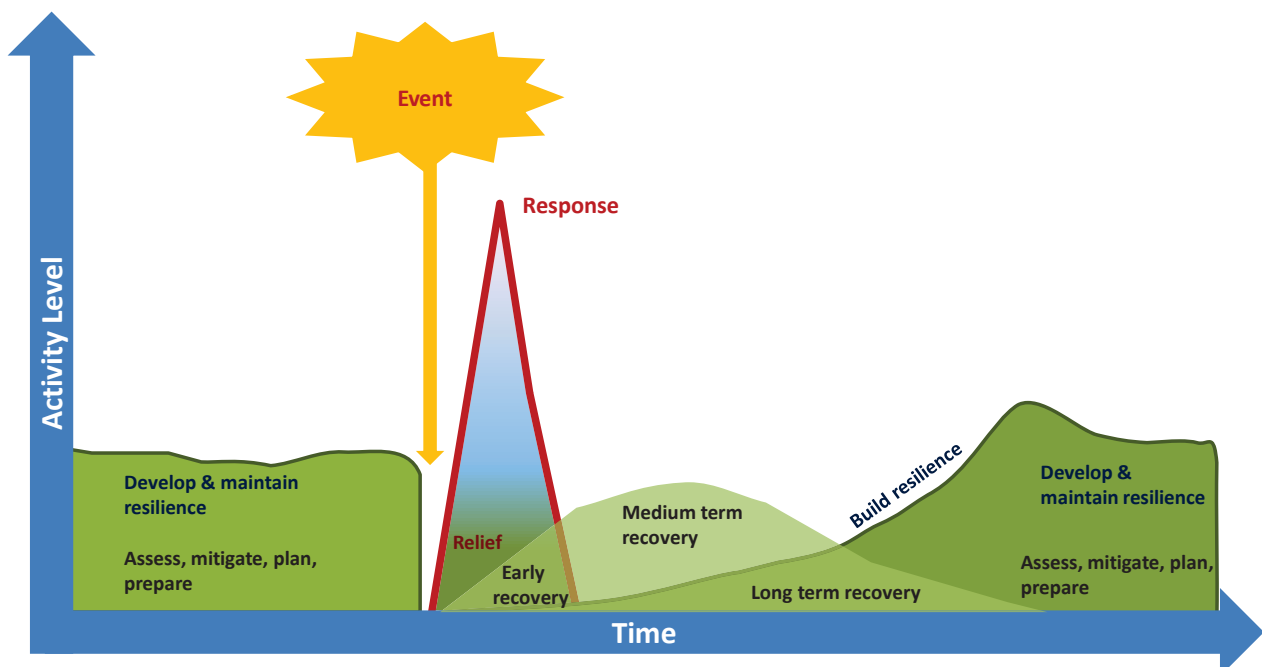


Figure 1: Projected resource requirements for effective integrated natural hazard risk management tasks across time scales. Adapted from (AEMI, 2011 p29).



The key areas we consider for this desktop review are pre-disaster preparation and the post-disaster recovery phases that contribute to strategic planning. Building and maintaining resilience are seen as complementary tasks where diverse activities taking place in other agendas increase the ability and capacity to deal with shocks such as natural hazards. Although the stated aim of national and state strategies for natural hazards is to increase resilience to hazard risk, work in this area is in its early stages and, as such, ownership in this area is still being defined.

Complexities

Establishing the ownership of natural hazard risk is made complex by the following characteristics:

- Natural hazards are dynamic in nature. Risk ownership throughout the management cycle is changeable, depending upon context and the event itself.
- Hazards may require several potential owners depending on the level of impact.
- Different types of hazard may require specific owners who specialise in aspects of that hazard, making the all-hazard approach difficult.
- Differences between the levels of perceived risk associated with these hazards can affect who assumes ownership.
- Incomplete knowledge about natural hazard risks and limited access to information may limit the ability to allocate ownership appropriately.
- Differing expectations from within, and external to, institutions that compete for limited resources and/or that promote competing agendas.
- Different approaches by state level agencies, e.g., comprehensive, all hazards, all agency, multi-hazard, single hazard.
- Uneven transition of public institutions to being more flexible and collaborative.
- Areas where ownership is not clearly delegated or shared.
- Systemic interdependencies where ownership actions in one area create impacts in another area.
- Related policies and plans that contribute to a specific region, activity or set of outcomes that are being addressed separately, e.g., adaptation to climate change, regional economic development.

The hazards

The hazards being reviewed in this desktop analysis are:

- Fire
- Flood
- Severe storm (includes wind and hail)
- Cyclones
- Heatwaves

Natural hazard and institutional risk

Institutional risk management needs to address two areas of activity: (1) risks external to an institution, which it has little or no agency over; and (2) those internal to the institution, which it has greater agency to address. Internal risks are generally task-



related and often determine the ability of institutions to manage external risks. Some examples are shown in Table 1.

External risk examples	Internal risk examples
Natural hazards, e.g., Fire, flood, extreme events, cyclones and heatwaves	Unclear communication
Lack of resilience in the surrounding natural, social and economic systems	Different levels of risk perception and awareness within institutions
Lack of clear accountability/responsibility in other institutions/organisations who are co-participants	Governance – lack of clear accountability/responsibility within the organisation
Abrupt changes in exposure via changing demography, economy or environment	Lack of adequate resources, capacity, organisational flexibility

Table 1: Examples of external and internal factors affecting institutional management of natural hazard risk.

As detailed previously, the dynamic and systemic nature of these risks can result in changes in the type and degree of ownership as circumstances and context change over time. The key tasks (see Appendix A) associated with systemic risk ownership fall into two areas:

- Funding and finance
- Accountability and management

These are discussed below.

Funding and finance

Funding to address natural disasters is provided by all levels of government, community groups and charities, individuals and business sectors (Biggs, 2012).

Funding arrangements are divided into pre- and post-disaster. Pre-disaster funding addresses disaster mitigation, whereas post-disaster funding concerns relief and recovery. Relief funding refers to short-term assistance to individuals, households and business affected by natural disasters. Recovery funding refers to reconstruction efforts to repair or replace damaged infrastructure (Webber and Jones, 2013). Financing of natural disaster risks is undertaken by both governments and private interests, mainly in the area of insurance.

Risk Frontiers (Risk Frontiers, 2012, cited in Worthington, 2015) examined the financial impact of natural disasters in terms of house equivalent (HE) losses. This approach was taken due to the recognition that damage to buildings in natural disasters has an enormous impact on the availability of shelter, and leads to displacement and subsequent health, economic and social losses. One HE loss is equivalent to a single medium-sized residential home and all building types are included. However, contents, cars, machinery, crops, etc. are not included. Using this approach, the four largest natural disasters for Australia in terms of damage (share of total HE losses in brackets) are hail (26%), floods (25%), cyclones (16%), and bushfires (14%). Together, these account for 81% of all HE losses associated with natural disasters in the country.



Government

All levels of government have a role in funding and financing natural disaster risk management and recovery. The Federal Government generally provides financial assistance to other levels of government and the broader community for natural disaster recovery and relief, due to its greater ability to raise revenue.

Between 1915 and 1942, income taxes were levied at both the state and Federal level; however, during the Second World War income taxation was consolidated into a Federal-only tax in an effort to increase revenue as a war-time measure. As a result, the states' tax base was reduced and was replaced by Federal government grants. The states' tax base was supplemented in 1971, when the Federal government ceded control of payroll taxes to the states. As a consequence, the Australian Government raises more revenue than it requires for its own expenditure, whereas states do not, referred to as 'vertical fiscal imbalance' (VFI) (Williams, 2012).

The average level of Australian Government support for state and territory government activities is almost 50%. VFI has given rise to the Australian Government acting as a safety net, and bearing some of the state and territory government's fiscal risks posed by natural disasters, which are mainly disaster recovery costs (Spasovejic and Nicholas, 2013).

Pre-disaster funding and finance

Federal Government mitigation funding

The Federal Government provides funding to states specifically for natural disaster mitigation activities. Total funding has generally been above \$40 million per year over the last four years. The Federal Government's main funding mechanism for natural disaster mitigation is the National Partnership Agreement on Natural Disaster Resilience (NPANDR).

The NPANDR was established by the federal, state and territory governments in 2009, replacing the Specific Purpose Payments for natural disaster mitigation. Its role is to enhance Australia's resilience to natural disasters by funding mitigation projects in accordance with the National Strategy for Disaster Resilience (NSDR) (COAG, 2009). Under the agreement, the Australian Government provides funding through the Natural Disaster Resilience Program for mitigation activities undertaken by states that increase disaster resilience. Each jurisdiction is required to agree to a two-year implementation plan. The Australian Government commits funding of up to 50% of the estimated costs of activities specified in the implementation plans. Governments agreed that each jurisdiction's funding allocation is capped, based on population, costs of disasters and relative disadvantage and is adjusted to provide a minimum share for the territories and Tasmania.

Examples of other programs include:

- The National Emergency Management Projects (NEMP)
- The National Flood Risk Information Portal
- The National Bushfire Mitigation Programme

These programs draw from the same body of funding (NEMP, 2014).



State and territory government mitigation funding

While the Federal Government contributes up to 50% of funding to activities specified in the NPANDR, the rest of the funding is provided by state and territory governments. However, a significant quantity of state and territory government spending comes from their usual spending on infrastructure and other programs (PC, 2014). These include ongoing programs such as prescribed burning and community awareness campaigns

Local government mitigation funding

Local governments have access to mitigation funding through grant programs that operate under the NPANDR, as well as other state government programs. However, local government expenditure is generally smaller than state and territory government expenditure (PC, 2014). Given the limited resources that local governments have access to, there is limited opportunity for them to invest in mitigation projects.

Government insurance

The federal, state, territory and local governments use insurance arrangements to address natural disaster risks. Insurance is one of the few ex-ante funding mechanisms that governments use. To be eligible for NDRRA funding, state and local governments must have adequate insurance.

State and territory governments generally have adequate insurance coverage for most essential public infrastructure assets, with the exception of roads. This does not include many social and environmental assets. A large part of NDRRA funding involves restoring damaged roads. State governments maintain that in many areas, such assets are uninsurable (PC, 2014). In Queensland between 2000 and 2010, 86% of expenditure on restoring essential state government public assets was spent on restoring roads (Finity Consulting, 2012). However, the uncapped formulation of NDRRA funding arrangements may produce a form of moral hazard and reduce the tendency of state and local governments to purchase insurance for roads where possible (Department of Finance and Deregulation, 2012).

Governments use various arrangements for insuring their assets and essential public infrastructure, which vary by jurisdiction and level of government. These arrangements include commercial insurance or reinsurance, self-insurance through government-owned insurers and non-insurance (Douglas et al., 2013).

The Federal Government has an in-house insurer, Comcover, which provides insurance to Australian government agencies, including purchasing reinsurance (Department of Finance 2014a). Most state governments also have a government-owned insurer that finances risks from public and product liability, as well as special industrial risks that include natural disasters. Larger risks are covered by external reinsurance. For example, the Victorian Government insures its assets through its state insurer, the Victorian Managed Insurance Authority (VMIA) (VMIA, 2013). The Authority manages insurance coverage for \$144 billion road and non-road assets. It provides cover for losses up to \$50 million and is reinsured for losses above this amount (PC, 2014 Victorian Government sub. 113 p279). While all state governments insure at least some of their non-road assets, only the Victorian and the ACT governments insure roads.

Some local governments insure through a mutual pool arrangement, while others use commercial insurance arrangements. For example, in Western Australia, local



governments obtain insurance through Local Government Insurance Services. In the Northern Territory, the Territory Insurance Office provides insurance to 14 local governments. Local governments do not insure their roads, however, some local governments in Queensland, Western Australia and South Australia insure select bridges (KPMG Actuarial, 2012).

Post-disaster funding and finance

Federal Government relief and recovery funding

The Federal Government provides funding on a cost-sharing basis to state, territory and local governments for natural disaster relief and recovery. The Natural Disaster Relief and Recovery Arrangements (NDRRA) is the Federal Government's main mechanism for providing financial assistance for recovery after natural disaster events (AG, 2012b). The Australian Government also provides immediate relief assistance to households, funded through the Australian Government Disaster Recovery Payment (AGDRP). Other recovery programs represent a small percentage of the total amount; these include the Disaster Income Recovery Subsidy, Disaster Recovery Allowance, ex-gratia assistance to New Zealand citizens, donations to disaster appeals, and ex-gratia payments to people who demonstrate loss of income as a direct result of a disaster. Payments are made for up to 13 weeks equivalent to the maximum Newstart/Youth allowance rate (PC, 2014).

Natural Disaster Relief and Recovery Arrangements (NDRRA)

The NDRRA provide a framework for Australian Government financial assistance to states in the wake of a natural disaster. The NDRRA are set by the Australian Government and can be amended without consulting the state or territory governments. The current terms and conditions are set out in the NDRRA Determination 2012 (AG, 2012b). Each successive NDRRA Determination has expanded the scope of the NDRRA to include a broader range of natural disasters, as well as enlarging the types of assistance that are eligible for funding. The NDRRA is uncapped and there has been a significant escalation of costs in the past decade which has led to some tightening of criteria (PC, 2014).

Eligibility conditions for NDRRA funding have also evolved over time. The conditions require states to:

- Have adequate access to capital to fund infrastructure losses (e.g., insurance).
- Submit independent assessments of their insurance arrangements to the Australian Government and respond appropriately to recommended changes (otherwise funds may be reduced).
- Develop and implement disaster mitigation strategies and encourage their local governments to do likewise (states must reduce assistance to a local government by 10 % if it has not done this).

NDRRA coverage

Under the terms and conditions of the NDRRA, the Australian Government reimburses states for a proportion of their expenditure after a natural disaster. According to the current Determination a Natural Disaster is defined as:

...a serious disruption to a community or region caused by the impact of a naturally occurring rapid onset event that threatens or causes death, injury or damage to property or the environment and which



requires significant and coordinated multi-agency and community response. Such serious disruption can be caused by any one, or a combination, of the following natural hazards: bushfire; earthquake; flood; storm; cyclone; storm surge; landslide; tsunami; meteorite strike; or tornado. (AG, 2012b p1)

Droughts, frosts and heatwaves, epidemics and events where human activity is a significant contributing cause (for example, poor environmental planning, commercial development, personal intervention (other than arson), or accident) are specifically excluded.

The NDRRA has 4 categories of funding as described in Table 2. Reimbursement is based on the total amount that state governments spend on the above eligible measures each financial year, counting only events where state government expenditure exceeds the 'small disaster criterion'. This is currently \$240,000 and has remained unchanged since 2004 (PC, 2014). Reimbursement rates depend on whether annual expenditure has exceeded either of two thresholds. These are:

1. First threshold: 0.225% of total state government revenue and grants in the financial year two years prior.
2. Second threshold: 1.75 times the first threshold.

Category	Area Covered
A	Emergency assistance to individuals which may include food, clothing and shelter.
B	Restoration of essential public assets; financial assistance to small businesses, primary producers, voluntary non-profit bodies and individuals; and 'counter disaster operations' for public health and safety.
C	Community recovery packages and recovery grants to small businesses and primary producers. This includes funds to restore social networks, community facilities and capacity building.
D	Acts of relief or recovery carried out in circumstances deemed to be exceptional.

Table 2: NDRRA Categories (AG, 2012b).

According to NDRRA provisions, essential public assets are to be repaired or restored to their pre-disaster standard in accordance with current building and engineering standards. However, the 'Betterment' clause within the NDRRA allows restoration to a more disaster resilient standard when it is cost effective to do so; though public assets restored under the betterment clause only receive 33% of funding for local governments and 50% for state governments, whereas those restored to a pre-disaster standard receive 75% of funding.

There is no further budget allocation for Betterment, so these projects must be funded from savings elsewhere, providing a double disincentive to improve damaged public assets. According to the Productivity Commission Draft Report, the Betterment provision has only been utilised once, where the Tumut Shire Council used it to relocate a flood-damaged swimming pool (PC, 2014). Local government report that they were discouraged from applying for Betterment funding by state governments and Federal Government agencies (PC, 2014). It is also worth noting that federal revenue to local



government has been reduced from 1.2% in 1993–1994 to 0.59% in 2013–2014 (MAV, 2015). This raises questions as to how some of the less well-resourced municipalities will be able to maintain their assets, let alone improve them, if mitigation to higher standards are required.

There is some suggestion that NDRRA support through Category B loans for small business is insufficient. The Regional Australia Institute undertook several post disaster case studies and found in the Emerald area of Queensland following floods in 2008 and 2010 that only two of the 190 businesses across the region had Category B loans approved for a total value of \$390,000. In the Marysville area post Black Saturday, Category B loans with an average value of \$20,500 were approved for a total of \$2.7 million (RAI, 2013).

Current eligible measures do not include any action to improve the state of the environment. However, a submission to the Productivity Commission by the Queensland Murray–Darling Committee Inc. stated that environmental assistance should be eligible for NDRRA category C funding rather than relying on the triggering of category D (special circumstance) funding (PC, 2014).

Australian Government Disaster Recovery Payment (AGDRP)

The other major source of post-disaster funding is the Australian Government Disaster Recovery Payment (AGDRP). This payment is a one-off, non means-tested payment of \$1,000 for adults and \$400 for children who are adversely affected by a major disaster. Whether someone is adversely affected is determined by the Attorney–General. Payments under the AGDRP can be made due to natural or man-made disasters. The Minister for Justice determines whether the AGDRP is activated or not and the circumstances that describe whether a person is adversely affected (Department of Social Services, 2015).

State and territory government relief and recovery arrangements

State and territory governments provide any upfront post disaster funds, which are then reimbursed to a certain level by the Federal Government. The funding usually takes the form of grants to departments, local governments, households or small businesses that have been adversely affected by a natural disaster. The size and particular arrangements vary considerably across the 8 states and territories (PC, 2014).

Local government relief and recovery arrangements

A large amount of local government funding comes from state and federal governments, constituting part of the vertical fiscal imbalance. State governments are also responsible for allocating relief and recovery funding to local governments, as local government do not receive NDRRA funding directly from the Federal Government. The funding arrangements are similar to those in the NDRRA. Arrangements vary between states, but eligibility criteria usually include:

- A threshold above which funding assistance for expenditure on disaster recovery will be provided to affected local governments.
- An expected contribution level from local governments, generally expressed as a percentage of their expenditure on recovery.

In Victoria, a Fire Services Levy was collected through insurance premiums, but in July 2013 it was removed and replaced by a levy collected through council rates. Now all



property owners contribute whether they have insurance or not, but the levy varies for Metropolitan Fire Brigade and Country Fire Authority areas according to the level of bushfire risk they face (Victorian Government, 2015).

A Queensland Local Government Association submission to the Productivity Commission inquiry into natural disaster funding arrangements stated:

It is not feasible for local governments to generally make provision for natural disaster liabilities in their budgets due to the potential size of such events relative to a council budget and local governments' limited revenue raising powers. (PC, 2014 p278)

Private sector

Households and business

Households are responsible for safeguarding their own property and assets from natural disasters by identifying risks, taking mitigation measures and purchasing adequate property and contents insurance. The same applies to businesses who are responsible for developing and implementing plans to reduce their natural disaster risk or mitigate against the impacts (Attorney-General's Department 2009).

Consequently, households and businesses also fund pre- and post-disaster activities and investment in assets. Households and businesses fund pre-disaster measures through mitigation (e.g., building a house on poles to elevate it above potential flood waters) or risk transfer through insurance.

Insurance is the main instrument to manage natural disaster risks and fund post-disaster activities. The Productivity Commission Inquiry into Natural Disaster Funding Arrangements suggests the vast majority of households and businesses have some form of building and/or contents insurance. Latham et al. (2010) estimate that 96% of households have some form of building insurance, with rates being lower within poorer demographic groups. For example, the Victorian Bushfire Royal Commission (Teague et al., 2010) found that 13% of destroyed houses may not have been insured. Latham et al. (2010) also report significant under-insurance with recent disasters, estimating that somewhere between 27% and 81% of households affected by the 2003 Canberra fires were under-insured by at least 10%. The presence of business insurance, particularly for small business continuity, remains unknown (PC, 2014).

The Federal Government has also committed \$100 million towards natural disaster mitigation projects to reduce insurance premiums. Identified areas of priority for funding include levees around the town of Roma and improved flood defences in Ipswich (Australian Government, 2014).

To date there have been few incentives for individuals to invest in mitigation to reduce insurance premiums as insurance companies have not been able to assess actions at a fine-enough scale. However, larger mitigation actions such as the building of the flood levees in towns such as St George have reduced flood insurance premiums on average between 15% (Suncorp Insurance) and 32% (InsuranceNEWS.com.au, 2014). *Protecting the North*, a program currently being developed by insurance company Suncorp, aims to form a partnership with government to provide positive incentives for individual home owners and vulnerable community members to help address this issue.



Private infrastructure providers

Private infrastructure providers own assets that are critical to communities and the economy. Infrastructure failure during a natural disaster could result in significant negative externalities for society. This critical infrastructure includes food and energy supply chains, water, transport, communications, health, banking and finance. These forms of infrastructure are not eligible for funding under the NDRRA, as they are not defined as essential public assets (AG, 2012b), despite their being vital to the functioning of society (Park et al., 2013, Kouadio et al., 2012, Frankenberg et al., 2013).

The Australian Government has recognised the importance of these assets and provides non-financial support through the Critical Infrastructure Resilience Strategy and the establishment of the Trusted Information Sharing Network (AG, 2010). Consequently, private infrastructure owners fund pre-disaster measures primarily in the form of insurance to mitigate losses from natural disasters.

Insurers

Insurers play an important role in natural disaster management by providing households, businesses and governments with products that help them to manage residual risk and finance the cost of a natural disaster. Insurance also provides a signal to policyholders about the level of risk they face, encouraging them to undertake risk reduction measures such as mitigation (Australian Treasury, 2011).

Insurance is a practical and clear way to maintain resilience by spreading risk and aiding recovery (see Resilience Section p 22). Natural hazards resilience programs targeted at home owners and small businesses are being supported by the insurance industry (e.g., <http://www.buildingresilience.org.au/>).

Civil society

Volunteers and not-for-profit agencies contribute to pre and post natural disaster funding by reducing fiscal costs of disaster response and recovery, as these functions would otherwise likely be taken on by government (Osa, 2013). For example, the Australian Red Cross noted their role in providing emergency preparedness, response and recovery services in addition to government authorities. Relief measures often involve running emergency community centres, soliciting donations and providing support to victims. For example, after the Black Saturday bushfires in 2009, donations made up approximately 13% (\$400 million) of funding for property losses (Latham et al., 2010).

Relief appeals have been set up after a number of disasters, including for Cyclone Larry in 2006, the 2006 Tasmanian bushfires, the 2009 Victorian Black Saturday bushfires and the 2011 Queensland floods (Latham et al., 2010, PC, 2014 Australian Red Cross sub. 56). However, the level of donations for natural disasters is highly variable. For example, the Cyclone Larry appeal raised about \$20 million compared to the Black Saturday appeal, which raised about \$400 million (Latham et al., 2010). The varying success of different appeals is due to reasons such as the level of media attention, the speed of onset, the scale of the tragedy (e.g., the number of lives lost) and the type of disaster. Relief appeals also require a large injection of resources, especially if collecting donated goods. Funding arrangements are summarised in Figure 2 (overleaf).

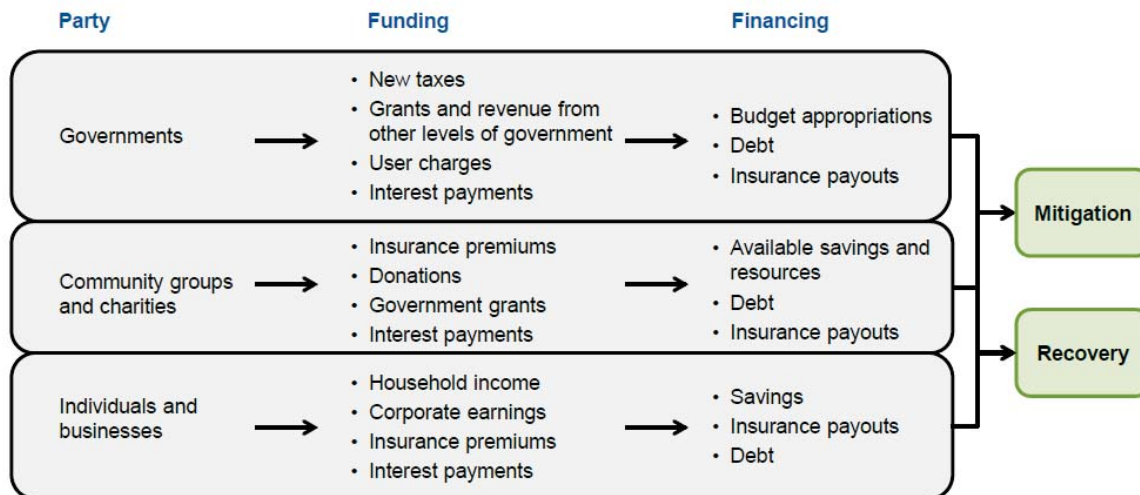


Figure 2: Responsibilities for funding and financing natural disaster management (PC 2014 p237).

Accountability and management

A review and analysis of recent Australian disaster inquiries by the Monash University Injury Research Institute stated: "the multi-organisational structure of emergency management arrangements also means that there is significant confusion over responsibilities and accountabilities" (Goode et al., 2011 p43). This confusion makes establishing a comprehensive understanding of ownership of risk challenging.

The main instruments used to allocate risk ownership are shown in Figure 3. Policy and strategy relate to over-arching principles and plans that guide and direct the economic, social and environmental terms for influencing the management and mitigation of natural hazard risks. Plans and assessments address the development of specific actions and their implementation – contracts and agreements are part of this process. Legislation provides the framework for the legal aspect of policy making, and regulations and standards support the enforcement of these by providing regulatory processes and rules.

Governance and law are components associated with all these instruments. Governance provides the frameworks for establishing accountability. The law provides legal frameworks through which aspects of risk can be allocated, tested and enforced. This is done through different areas of law, such as common and commercial law, which outline specific areas of responsibility and accountability. These are often linked to enforcement actions if they are not adhered to (MacIntoch et al., 2013)

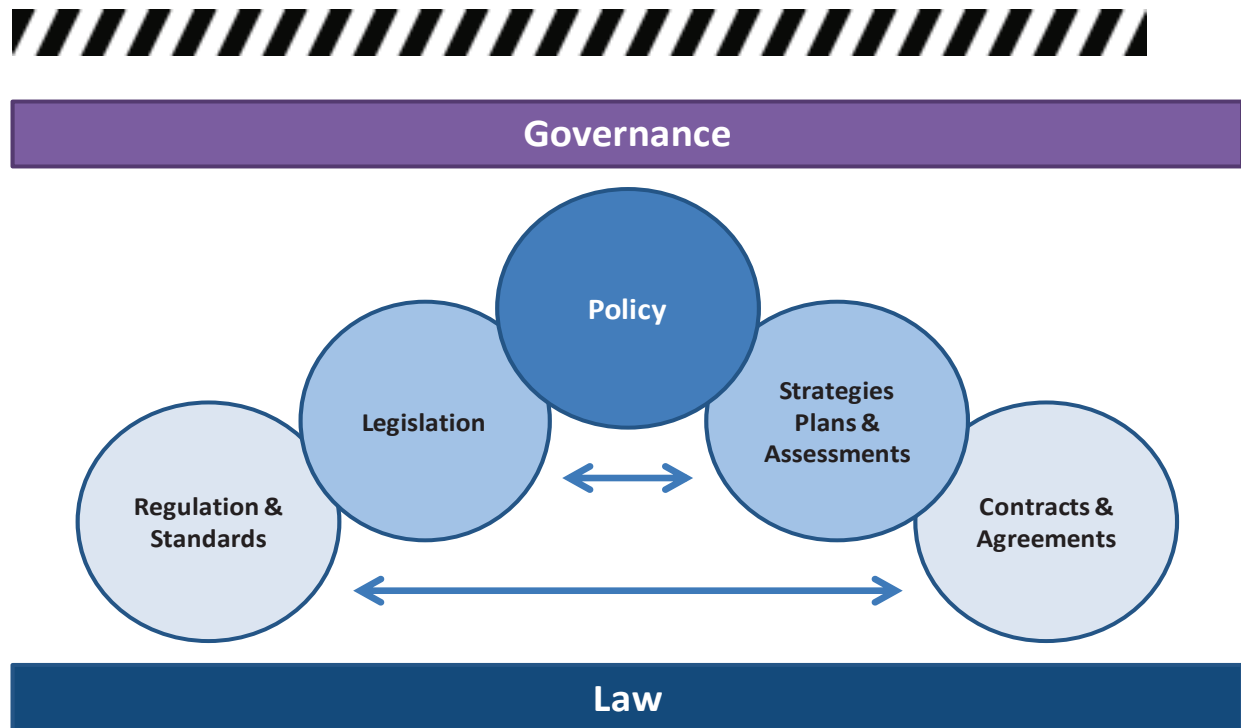


Figure 3: Instruments for allocating risk ownership.

These instruments are applied across institutions in different ways (Table 3 overleaf) as part of an interconnected and iterative process of development, implementation and review.

Instruments	Application in ascertaining risk ownership
Policy	All levels of government, industry and business and aspects of civil society. Includes overarching policy and principles at federal, state and local government levels and organisational policies in the private sector and community agencies.
Legislation	All institutions but less so for civil society. Includes international, federal and state legislation.
Regulations and standards	All levels of government and industry and business, but less so for civil society. Includes building and planning, consumer protection, official standards and professional codes of practice.
Strategies, plans and assessments	Applicable to all institutions in the form of risk assessments and response plans at federal, state, regional, municipal, sectoral, community and organisational level. Civil society has little accountability in this area, but can be allocated roles via specific policies and strategies associated with international treaties Australia is a signatory to.
Contracts and agreements	All institutions covering government, industry and business, and civil society. Contracts are a key driver for industry and business. These include vendor agreements, contractual arrangements, commercial law, common law and community arrangements. Includes all international legally binding treaties and agreements.

Table 3: Application of instruments to institutions.

Accountability and responsibility as forms of risk ownership are seen as related, but separate in this document. Accountability is viewed as an aspect of governance where an organisation or individual is ultimately answerable for actions undertaken ('where the buck stops'); whereas responsibility is seen as being allocated responsibility for



carrying out specific actions. For example, a government agency may be accountable for managing public land, but subcontracts its management to other bodies or private contractors, who are responsible for carrying it out.

Lenses that ownership can be ascertained through include:

- The risk management process (including natural hazard, emergency management and operational risk management).
- Ownership of the asset at risk.
- Hazard-based allocations of risk, e.g., bushfire or flood activities.
- Responsibility through legislation, policy and regulation.

The natural hazard risk management process

Tasks associated with managing natural hazard risks are allocated to specific agencies, groups and individuals. The type of task being undertaken and by whom, defines which institution is ultimately accountable for the risk and which institution/s actively manage it. All risk management processes for natural hazards are continuous and apply across multiple time frames (see Figure 1), and the risks they manage are dynamic and subject to change.

A number of key reviews over the past decade reflect this. They include:

- Natural Disaster in Australia: Reforming Mitigation, Relief and Recovery Arrangements, 2002
- National Inquiry on Bushfire Mitigation and Management, 2004
- Review of Australia's Ability to Respond to and Recover from Catastrophic Disasters, Australian Emergency Management Committee, 2005
- Victorian Bushfires Royal Commission, 2009
- The Incidence and Severity of Bushfires Across Australia, the Senate Select Committee on Agriculture and Related Industries, 2010
- A Shared Responsibility: The Report of the Perth Hills Bushfire February Review, 2011
- Review of the 2010–11 Flood Warnings and Response—Final Report, 2011
- Queensland Floods Commission of Inquiry, 2011
- National Strategy for Disaster Resilience, 2011 (Goode et al., 2011, Barnes et al., 2014)

Some of the key recommendations (Barnes et al., 2014) arising from these reports that specifically apply to risk ownership are: strengthen coordination between state and federal emergency management agencies; invest in mitigation to rebalance the over-funding of response and recovery; and professionalise the emergency services sector.

These reports have also influenced the ongoing transition in risk management to a more flexible and cohesive model. For example, Queensland has established the Inspector-General Emergency Management to ensure a more integrated and coordinated approach to emergency management across the state. Specific frontline emergency response and coordination roles have also been moved to the newly established Queensland Fire and Emergency Service (Barnes et al., 2014).

Victoria has also recently created a new statutory body, Emergency Management Victoria (EMV), which is applying a "genuine all hazard, all agencies inclusive



approach" (Department of Premier and Cabinet, 2012) to emergency management. The Emergency Management Commissioner oversees and ensures a coordinated response to major emergencies through management, provision of information and coordination across all government sectors. The Inspector-General for Emergency Management operates within the Department of Justice and is separate from the Emergency Management Commissioner (Barnes et al., 2014).

As both examples are relatively recent, risk ownership is still fluid, especially in areas relating to the aspects of strategic management discussed in this review. However, an overview of broad areas of institutional ownership and related tasks is presented in *Australian Emergency Management Arrangements* (AG, 2009). These roles are further explained in the *Australian Emergency Management handbook series* (AEMI, 2015).

For civil society and industry and business, general tasks for planning and preparation are allocated through regulation and standards (see Standards and regulation p18) and also through the uptake of insurance (see Insurers section p11). Civil society is also allocated roles via state and local government regulations for the planning and preparation of individual properties to mitigate risk. They can also be allocated active risk ownership through volunteer organisations. *The National Emergency Management Volunteer Action Plan, 2012* (AG, 2012a) outlines the conditions and responsibilities for agencies in regards to volunteers. This is supported by the National Partnership Agreement on Natural Disaster Resilience (NPA).

However, the responsibility for risk management lies primarily with the community and volunteer organisations, and it is unclear who owns this risk when addressing long-term planning relating to preventing losses to community values and in sustaining community resilience.

Risk ownership in the knowledge generation and communication area has multiple owners in all institutions. The diversity of communication tasks required before, during and after a disaster require clear ownership of risk to be understood and adopted, so that messages can be delivered to the right owner and that the feedback from those owners is better understood. Of particular note for this area is the AS 5037—2005 Knowledge Management standard which provides a framework for developing and maintaining knowledge through identifying knowledge assets in both technological and social systems.

The National Strategy For Disaster Resilience – Community Engagement Framework 2013 provides general guidance and allocation of roles across different levels of government. This is supported by a number of emergency management plans at state and local level that outline different communication strategies as part of preparing and responding to events. At a federal level, the National Flood Risk Information Project (NFRIP 2014) "aims to improve the quality, availability and accessibility of flood information across Australia, and raise community awareness of flood risk" (Geosciences Australia, 2015). The private sector also has a number of communication initiatives, particularly in the insurance and reinsurance area, who are active in providing resilience information to encourage uptake and understanding of insurance and in promoting resilient behaviours and actions prior to events.

In regard to warnings, *The Meteorology Act 1955* requires the Bureau of Meteorology to "disseminate warnings, watches and advices on weather events such as severe



thunderstorms, fire weather, coastal hazards, high winds, flood and tropical cyclone warnings" (AG, 2013 p5). All state, territory and local governments and associated agencies have communication plans that also allocate and identify specific networks for communication prior to, during and following a disaster.

This review was unable to find any recovery strategies that had provision for long-term communication strategies for recovering communities.

Ownership of assets

Ownership of assets is complicated, particularly where public assets and infrastructure owned by civil society are managed by both public and private institutions. For example, the Great Barrier Reef Marine Park, a Crown asset of the Commonwealth of Australia, is administered by Great Barrier Reef Marine Park Authority, which oversees management, but is accountable to the Federal Government. However, the responsibility for implementing actions is shared between state and local government, private industry and business, and civil society.

Public assets are managed by a number of policies that outline responsibilities at different scales. At local government level, the *National Sustainability Framework for Financial Reporting and Asset Management Approach to Asset Planning and Management* (2007) includes both hard (built) and soft (social and environmental) infrastructure. At the Federal Government level, the *Public Governance, Performance and Accountability Act (2013)* is supported by the *Strategic and Operational Management of Assets by Public Sector Entities (2010)*. All state governments have policies and frameworks that pertain to asset management which include: the Strategic Asset Management Framework (SA, WA, QLD, ACT, TAS), Asset Management Series (VIC) and the AZNEX System (NT).

Individual home owners are responsible for safeguarding their own assets, but if a natural hazard impacts on numerous homes, the public sector can then become accountable.

For pre-existing rental buildings, it is interesting to note that the *Building Act 1993* empowers local councils to take enforcement action and "this includes the power to make a building notice or order against a building that is unfit for occupation or is a danger to health, safety or life" (Victorian Government, 2009 p12). However, it is not clear if emerging natural hazards such as heatwaves have been incorporated into this.

Hazard-based ownership

Risk ownership is often allocated on a hazard basis by state and local government agencies, and can include responsibility for mitigation, prevention and preparedness. In some states, residents, businesses and communities are delegated the responsibility for developing and implementing fire and flood management plans in designated high risk zones. There are also a number of standards and guidelines that relate to mitigation activities such as the NSW Standards for Asset Protection Zones, Standards for Low Intensity Burning, Standards for Pile Burning and Standards for Windrow Burning. Another example are heatwave plans developed by municipal councils in Victoria that aim to "incorporate local heatwave responses into municipal planning processes" (Department of Human Services, 2015). Heatwave risk is also incorporated into



Workplace Health and Safety laws to ensure aspects of industry account for and mitigate against the impacts of heat and extreme weather on their employees.

The piece-meal process of dealing with single hazards is being replaced with multi-hazard plans such as the Queensland Local Disaster Management Guidelines (AG, 2012a). These plans are under different stages of development around the nation.

Many other areas of policy-making and application such as climate change adaptation, asset management, economic development, catchment and natural resource management and regional development have potentially unacknowledged risk ownership associated with pre- and post-event activities.

International treaties and agreements

A number of treaties and agreements that Australia is a signatory to outline responsibilities at an international level for the protection and conservation of social, environmental and economic values. These apply primarily to the Federal Government, but some, such as Agenda 21, also apply to state governments. These are:

- The Framework Convention on Climate Change (UNFCCC, 1992)
- The Declaration of the United Nations Conference on Environment and Development (UNCED, 1992)
- Agenda 21 (UN, 1992)
- Convention on Biological Diversity (UN, 1998)
- Convention on Wetlands of International Importance (Ramsar Convention, 1971)
- International Covenant on Economic, Social and Cultural Rights (UN, 1966)
- The Protection of the World Cultural and Natural Heritage (UNESCO, 1972)
- The Hyogo Framework for Action (UNISDR, 2005)
- Sendai Framework for Disaster Risk Reduction 2015-2030

The Hyogo Framework for Action is ratified by a UN General Assembly Resolution and applies directly to the management of disasters, describing and detailing the work required from all different sectors and actors to reduce disaster losses (UNISDR, 2007).

Legislation

The primary Acts that pertain to Emergency Management are at state and territory government level and include: *Emergencies Act 2004 (ACT)*, *State Emergency and Rescue Management Act 1989 (NSW)*, *Disasters Act 1982 (NT)*, *Disaster and Management Act 2003 (Qld)*, *Emergency Management Act 2004 (SA)*, *Emergency Management Act 1986, 2013 (Vic)*, and *Emergency Management Act 2005 (WA)*. These are supported by and implemented through risk assessments and response plans developed at both the state and local government levels, which are overseen by stipulated committees. Other areas of policy, such as those related to climate change adaptation also have complementary risk assessments and plans at local, regional and state scales not included in these Acts.

There is no specific legislation that mandates post-event recovery for the environment, although Acts at a federal level such as the *Environment Protection and Biodiversity Conservation Act (1999)* outlines the need for ongoing protection. Internationally, the World Heritage and Ramsar agreements require gazetted natural assets to be



maintained in good quality. There may be opportunities to include an ongoing provision for these types of responses in existing legislation such as the *Natural Resources Management (Financial Assistance) Act 1992*. This could also help to integrate the process more fully into existing management frameworks as an ongoing process.

Policies

At the Federal level, a number of key policies provide high level guidance and frameworks that pertain directly to risk management and resilience. The policies define general areas of risk ownership associated with the pre- and post-event areas. These are: National Disaster Resilience Framework (2009), Critical Infrastructure Resilience Strategy (2010), National Strategy for Disaster Resilience (2011), the Natural Catastrophic Natural Disaster Plan (2010) (NATCATDISPLAN) and National Emergency Risk Assessment Guidelines (2010) (NERAG).

There is a large cross-over with other areas of policy at all levels of government which support building and maintaining resilience, such as climate change adaptation, and social and economic development. Most levels of governments have made some sort of provision for the implementation of risk mitigation or resilience measures through funding arrangements in these areas. A state-level example is the Victorian Adaptation and Sustainability Partnerships Fund, which is designed "to deliver \$4.79 million to local government for adaptation planning projects and adaptation action" (Victorian Government, 2012). In cases such as this, the delegation of ownership for operational risk is allocated through the governance arrangements for each individual project.

The role of land-use planning

Land-use planning is a key area of policy for mitigating future losses and can be used to support the development of resilient and strategic development in vulnerable areas.

For built assets and infrastructure, assets are viewed through a long-term planning lens ranging from 30–50 years for houses to 100+ years for infrastructure such as bridges. The relevant state planning legislation and policies that support this vary from state to state. Natural and social assets are subject planning horizons of similar length but often do not have the same level of legislative or policy support. This may be in part because it is easier to plan for static assets such as building stock as they are more predictable and have a clear loss profile.

A gap analysis of jurisdictional progress towards achieving a resilient built environment was undertaken in 2012 (PlanDev Business Solutions, 2012) by the Land Use and Planning Building Codes Task Force, COAG Working Group. It found that legislative maturity in all states was at an 'almost intermediate' maturity level (there is a small gap, further implementation is required, but being addressed), whereas the Federal Government was assessed as having 'basic' legislative maturity (there is a significant gap).

This report also highlighted the interdependency between planning and building codes as both components are needed to achieve a resilient built environment (Figure 4 overleaf).

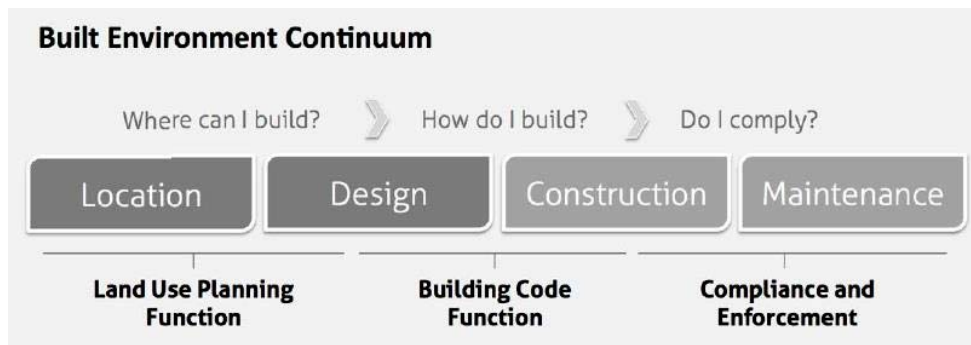


Figure 4: Built Environment Continuum (PlanDev Business Solutions, 2012).

Changes in planning approaches over the last decade implemented in response to specific events include: the centralisation of planning and bushfire mapping, reduction in red tape, integration of flood and bushfire maps into planning and the development of new Acts such as the *Queensland Reconstruction Authority Act 2011*.

As primary owners of public land and land use planners, “Local Government is responsible for policy development and implementation of land use planning, as well as regulating a wide range of activities” (Binning et al., 1999). State government has planning coordination and oversight. It often reserves the right to ‘call in’ specific projects. Local governments manage local social and community strategic planning and implementation at the municipal scale. Risk ownership can also be challenged by other aspects of planning. For example, land-use planning decisions made by state or local government may potentially create greater vulnerability in some areas (e.g., decisions to reduce green wedges or allow development in flood or bushfire prone areas). These decisions can increase the level of risk for local government, industry and business and civil society without there being a clear understanding of who ultimately owns the additional risk caused by those decisions.

Standards and regulation

Ownership of risk mitigation actions can also be allocated through passive actions such as the development of standards and codes. The Australian Building Codes Board (ABCB) aims “to provide high-level guidance on disaster management and mitigation to all sectors of society, nationally consistent minimum necessary standards of relevant safety (including structural safety and safety from fire), health, amenity and sustainability objectives efficiently” (ABCB, 2015b) through the National Construction Code. This body produces standards such as the Construction of Buildings in Flood Hazard Area (ABCB, 2015a) that allocate key responsibilities for mitigating risk in built infrastructure for the development, building and construction industry. ABCB is currently undertaking a review of resilience of building to extreme weather. There are also a number of guidelines and standards that relate to buildings and hazards such as cyclones developed by Standards Australia, for example, AS 4055, Wind Loads for Housing.

A number of standards and guidelines for public and private institutions relate to natural hazard management and mitigation. Standards that apply to operational risks include: AS/NZS ISO:31000 (2009) Risk management and AS/NZS 5050:2010 Business Continuity. Complementary standards to this area include AS/NZS ISO: 14001 (2004) Environmental Management, ISO 26000 (2010) Social Responsibility, AS 8003 (2003) Corporate



Governance, ISO 9000 (2009) Quality Management and ISO 19001 (2008) Quality Management Systems. Some Health and Safety (OH&S) regulations and guidelines are also applicable and general standards relating to prescribed burning at both state and local government level.

As this is an area of change and innovation, it is important to regularly assess and update all instruments used. Guidance for government institutions wanting to assess and develop regulation impact statements is provided by the COAG Best Practice Regulation, A Guide For Ministerial Councils and National Standard Setting Bodies (COAG, 2015).

The key challenge in ensuring that risk ownership is exercised, particularly in the private sector, is that not all standards are regulated and therefore are not enforceable. It is also unclear from the literature reviewed how much private industry and civil society is investing in mitigation or risk modification activities by adhering to standards and regulation.

Diversity of ownership

A diversity of organisations and groups in each institutional area is actively involved in different phases of the natural hazard disaster risk process (see Table 4), which complicates the issue of ownership. Some areas are clearly defined, whilst other are not. Although policy arrangements allocate leadership responsibility, the level of risk ownership relating long-term recovery and resilience building before and after the event remains unclear.

Institution	Examples of agencies involved
Australian Government and associated agencies	Individual Federal Government departments COAG Australian Maritime Safety Authority Air Services Australia Australian Defence Force Attorney-General's Department Emergency Management Australia Centrelink
State and territory government and associated agencies	Individual State Government departments Ambulance services Environmental agencies Fire services Health services Police force Providers and regulators of essential services State coroner Volunteer organisations State Fire Authority State Emergency Service Natural resource management bodies (e.g., water authorities) Road management and transport authorities



Institution	Examples of agencies involved
Local Government	Individual municipal councils Regional Organisations of Councils Local Government peak bodies
Industry & business	Industry peak bodies Individual companies and organisations Insurance and finance sector Critical infrastructure providers and operators
Civil society	Individual land owners Community organisations, groups and networks Volunteer organisations Non-government organisations Not-for-profit organisations Community

Table 4: Institutions and agencies involved in the natural hazard disaster risk process. Adapted from Productivity Commission (PC, 2012).

Responsibilities for provision and management of assets are often shared (as illustrated in Table 5). This can lead to a situation where everyone and no-one is accountable if the governance for asset management does not clearly allocate specific roles and responsibilities. Ownership is not always static because some risk will change ownership due to the dynamic nature of the risk and also because the tasks required throughout the risk management process require different skills and resources (see Attachment A).

Responsibilities for infrastructure provision		
Australian Government	State and Territory Governments	Local Government
National roads (shared)	Urban, rural and local roads (shared)	Local roads (shared)
Local roads (shared)	Railways (shared)	Public transport (buses)
Railways (shared)	Ports and sea navigation	Aviation (regional)
Aviation services (national and international)	Aviation (some regional)	Electricity supply
Telecommunications	Electricity supply	Sewerage treatment, water, dams and drainage
Postal services	Sewerage treatment, water, dams and drainage	
	Public transport (trains, buses)	

Table 5: Infrastructure provision and emergency management (Webb, 2008).

Crossing domains, ownership and capacity

Threat-based assessments are standard practice for disaster management in Australia, but an important gap exists in capability assessment matched to events of variable scale. In a way, focusing on threat and risk assessment alone can reduce agility by limiting our thinking about unexpected and large-scale disaster effects over wide geographical scales. (Barnes et al., 2014 p8)

If institutional actors tasked with management have inadequate levels of resources and capacity, ownership may cross domains and become the responsibility of other institutional areas as a result. The Australian Emergency Management Committee’s



Review of Australia’s ability to respond to and recover from catastrophic disasters identified a number of key areas which required further development (AEMC, 2005). A number of capacity thresholds were tested through scenarios as part of this exercise and a number of plans have been developed at federal level since then to address both coordination and provision of non-financial services to governments who are unable to cope due to impacts of a disaster or catastrophe.

The NATCATDISPLAN (2010) has been developed to ensure continuity “where the ability of a government to carry out its emergency management responsibilities is significantly affected either through insufficient resources due to the size of the disaster or the incapacity of the Executive” (Emergency Management Australia, 2010 p2) through allocation of alternative arrangements. However, the Federal Government has “no special or necessary emergency powers to give effect to the plan” (Eburn, 2011 p83).

This plan is consistent with:

- The Model Arrangements for Leadership during Emergencies of National Consequence (see Figure 5).
- Australian Emergency Management Arrangements.

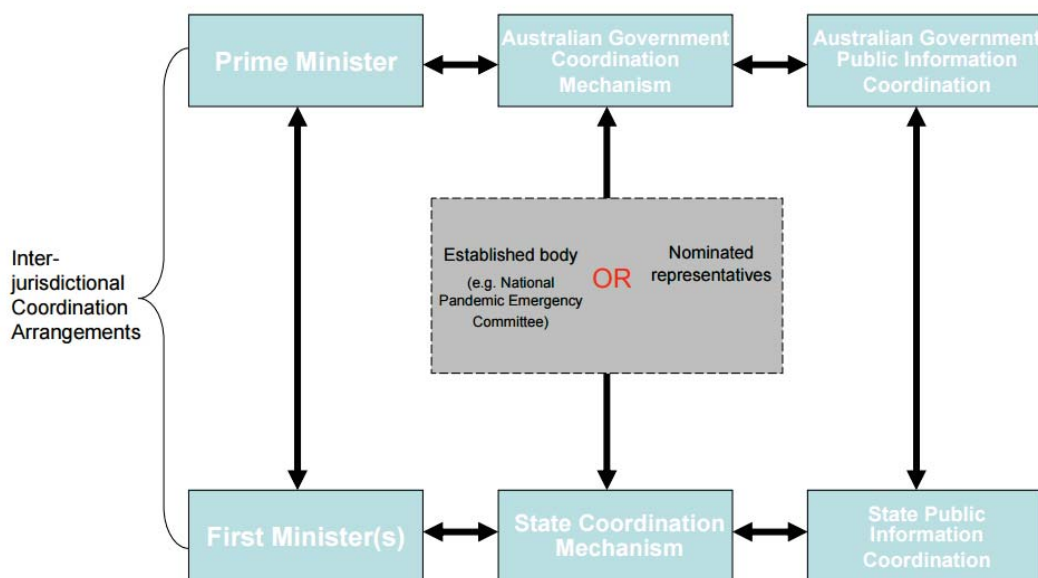


Figure 5: Model Arrangements for Leadership during Emergencies of National Consequence (Emergency Management Australia, 2010 p8).

The Australian Government Disaster Response Plan (COMDISPLAN) is also a plan for the provision of non-financial assistance to Australian states and territories in an emergency or disaster “When the total resources (government, community and commercial) of an affected jurisdiction cannot reasonably cope with the needs of the situation” (AG, 2014 p5).



Resilience

It was agreed in 2008, by the Ministerial Council for Police and Emergency Management – Emergency Management, that the foundation of future emergency management should be community and organisational resilience. In 2009, the Council of Australian Governments (COAG) agreed to adopt a whole-of-nation, resilience-based approach to disaster management to enhance Australia’s capacity to prepare for, withstand and recover from disasters. A Working Group, consisting of federal, state and territory representatives under the auspices of the National Emergency Management Committee (NEMC) developed the National Strategy for Disaster Resilience (COAG, 2011). The strategy provided high-level guidance on disaster management and mitigation to all sectors of society, allocating disaster resilience as a “collective responsibility of all sectors of society, including all levels of government, business, the non-government sector and individuals” (Emergency Management Institute, 2013). However, as most resilience is implemented at a local level, it is difficult to ascertain risk owners associated with key implementation tasks using these policies. NEMC is currently developing an implementation plan that may help clarify these issues.

A key challenge in allocating specific accountabilities to resilience, is that resilience as a concept has multiple definitions across diverse groups (Norris et al., 2008). As a result, there is no commonly understood definition of resilience at the institutional scale. The definition provided by the United Nations Office for Disaster Risk Reduction (UNISDR) is “The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions” (Geosciences Australia, 2015).

Resilience building also requires a systemic approach similar to that needed for natural disasters and ideally needs to be fully integrated with the more traditional areas of disaster risk management (Barnes et al., 2014, O’Brien et al., 2012). This is proving a challenge for institutions that are traditionally siloed in structure. Current and potential owners of resilience to natural hazards may be unacknowledged within more traditional management structures, resulting in a lack of cohesiveness. Resilience is also prominent in state and municipal plans and policies and strategies for climate change adaptation, and in some economic and social development plans. Potentially, these could be integrated into a broader social, economic and environmental resilience for a wide range of risks, including natural hazards.

NEMC is currently tasked with developing a national implementation framework. Implementation frameworks at a state and local level have yet to be developed, although resilience is included in areas of municipal and state policy and some resilience projects are being undertaken. There are also no established monitoring and evaluation criteria for assessing effectiveness of actions.



Key findings

Review of pre- and post-event policies and strategies revealed ownership strengths in these areas:

- Well-developed early and medium-term response plans for impacts on built assets and infrastructure and to a lesser extent on social assets and infrastructure.
- Growing ownership in risk planning and preparation at the state and local level, and for civil society and business and industry in designated high-risk areas for specific hazards.
- Broad ownership by civil society of overall hazard risk in terms of insurance coverage, although growing exposure increases the risk of under-insurance.

There are also ownership gaps in these areas:

- Mitigating risk to environmental assets and infrastructure with gaps in coverage for both built and social assets and infrastructure.
- Despite a degree of existing resilience, resilience in all areas of the risk management process and its application is not well defined. Accountabilities also extend beyond emergency management into broader social, economic and environmental policy.
- Long-term recovery in social and environmental assets and infrastructure.

Due to these gaps, local government, civil society, and industry and business may be the potential owners of large-scale damage and loss, of which they may be unaware. Who pays for recovery in such circumstances is also unclear. There is little information regarding the long-term costs of recovery and resilience, particularly in relation to secondary impacts. As a result, there may be unacknowledged owners at all levels of government regarding flow-on events affecting both the economy and society (e.g., poor health and unemployment leading to increased health costs and social security payments).

The contribution of private institutions and the community to building resilience via passive actions, such as applying regulatory standards to new buildings, and in developing and applying their own emergency management plans, remains unclear. The balance between investment in active and passive resilience measures is also unclear.

A brief 'snap shot' of key findings regarding current status of risk ownership across the phases surrounding natural hazard event risk is shown in Table 6 overleaf.



Functional area	Current risk ownership status
<p>Building and maintaining resilience</p>	<p>Resilience-building is in early development:</p> <ul style="list-style-type: none"> ▪ Within government, general allocation of broad areas of accountability, but lack of clarity as to accountability and responsibility for implementation. ▪ Private and business and civil society ownership primarily through provision of services such as insurance and housing improvements, e.g., hail-resistant roofing. ▪ Complementary ownership in other areas such as the climate adaptation agenda. ▪ Key barriers to establishing ownership are multiple owners, lack of clarity about what resilience is and uncertain goals.
<p>Mitigation</p>	<p>Mitigation supports resilience, but investment in mitigation is dwarfed nationally by recovery payments and insufficient to enable risk owners in some areas to fully achieve mitigation tasks:</p> <ul style="list-style-type: none"> ▪ Well-allocated risk ownership for built assets and infrastructure particularly through: <ul style="list-style-type: none"> ○ Planning and building regulation initiatives. ○ Flood and bushfire mapping at local and state level. ○ Insurance. ▪ Lack of clarity in other public areas regarding ownership of risk mitigation (e.g., community and environment). ▪ Limited ownership at household and small business scale, but improving for fire, flood, heat and cyclone (e.g., build back to regulation established for damaged pre-regulation buildings). ▪ Ownership of mitigation in natural areas primarily at state and local government levels. Actions limited but include fuel reduction burning, levees and environmental flow management. ▪ Many gaps remain as to who should own various aspects of risk mitigation in order to obtain the greatest benefits possible. ▪ Limited dedicated finance for mitigation at local government and community scale.
<p>Plan and prepare</p>	<p>Plan and prepare has established ownership at all levels of state and local government, but it is not always taken up in other institutions:</p> <ul style="list-style-type: none"> ▪ Accountability in this area falls mostly to state, territory and local governments. ▪ Management is often through state government, statutory bodies and associated state agencies, local government and volunteer organisations. ▪ Risk assessments and planning being undertaken at all levels of state and local government, and natural resource agencies. ▪ Property-scale management plans (e.g., bushfire, cyclone, and flood) mandated by planning overlays in some areas, but many gaps remain exposing civil society, private industry and business. ▪ Disaster plans include environmental assets, but capacity to deal with severe events limited by resources.



Functional area	Current risk ownership status
<p>Early recovery 1–2 months</p>	<p>Allocation of risk ownership clear at most government levels, but less for civil society and private industry and business:</p> <ul style="list-style-type: none"> ▪ Government payment and financing responsibilities clearly established, but currently under review. ▪ Unclear as to accountability and responsibility in industry and business, and civil society, except in areas of structured volunteer activities with organisations such as CFA, SES and community groups. ▪ Both public and private critical infrastructure providers have clearly defined responsibilities for business continuity to ensure service provision. <p>Environmental assets are usually assessed in the context of safety rather than recovery, so recovery can remain unowned in areas.</p>
<p>Medium term recovery 2 months – 2 years</p>	<p>Ownership of the medium-term recovery is variable, but generally reasonably defined for government:</p> <ul style="list-style-type: none"> ▪ Government payment and financing responsibilities clearly established, but currently under review. ▪ Local government have the primary responsibility of management in the local context with state government having accountability, but less responsibility. ▪ Civil society and private industry and business have less well-defined accountabilities and their capacities are not well understood. Unclear how consistent the ownership of volunteering is over time. ▪ Some areas of civil society lack resources, even if recovery is identified as a need, and may not always be able to fulfil the obligations of risk ownership. ▪ No clear ownership of funding for environmental recovery.
<p>Long term recovery 2–7 years</p>	<p>Risk ownership in all areas unclear:</p> <ul style="list-style-type: none"> ▪ It is not clear who "inherits" cumulative long-term losses, but it is likely that areas of local government, industry and business and civil society may be the default owners in this area. ▪ Ownership of the management of long-term risk is unclear but it is likely that areas of local government, industry and business and civil society may ultimately be responsible. ▪ Social and environmental assets and infrastructure do not appear to have risk ownership allocated for long-term response as current risk profiles are often shorter term. ▪ Aspects of long-term recovery in areas of health and community well-being may have unacknowledged owners in all levels of government through flow-on impacts in areas such as unemployment and health. ▪ Lack of ownership of long-term response for environmental assets and infrastructure makes this area particularly vulnerable.

Table 6: Snap-shot of institutional risk ownership of values at risk from natural hazards.



A summary of risk allocation found across institutions is provided below.

Federal Government is responsible for providing funding for recovery and some mitigation activities. They are accountable for national coordination of events, development of national standards and regulations. They also provide some non-financial assistance for catastrophic events and those that overwhelm other levels of governments. Currently, there is no specific provision for resilience activities, although some has been funded through other programs such as climate adaptation and targeted mitigation funding. The Federal Government also provides national training programs, information and research, and develops over-arching policies that provide nationally consistent approaches in areas such as volunteer management and resilience. They are also accountable for the protection of nationally significant environmental areas and ecological communities, and are obligated to provide social and economic security at a national scale.

State governments and territories are accountable for all aspects of emergency management including provision of a portion of recovery payments, and for pre-event activities such as mitigation, preparation, planning and jurisdictional assessment. They also have the oversight of development and execution of management plans, and development of state level standards, regulations and planning. State government, territories, statutory bodies, local government and associated agencies have primary ownership of risk management actions. They are also partially accountable for infrastructure with shared ownership, such as roads and drainage. State Governments are also accountable for resilience being implemented at the state level, but frameworks and programs have yet to be developed. They are accountable for the protection of environmental assets and the development and management of social infrastructure and planning, and maintenance at a state level.

Local government is accountable for service provision and emergency management activities, and recovery at the municipal scale. They are also accountable for mitigation activities at the municipal scale, particularly in areas of planning and resource management. Also for risks associated with land use and social planning in their local areas. Local Government is also accountable and responsible for insuring and maintaining its own infrastructure and assets. Risk ownership in this area may include multiple owners, particularly in relation to infrastructure such as roads, drainage and transport, which can confuse ownership at this level. Risk ownership allocated to local government may not always be able to be fulfilled due to lack of resources or capacity.

Business and industry provide some critical infrastructure and are accountable for ensuring its business continuity. The insurance industry provides insurance and associated information to policyholders and the public. Business and industry also assist in recovery, but accountabilities are unclear at a policy level, although there are some regulatory requirements and standards. It is also not clear what sorts of costs are incurred as a result of these requirements. It is likely that many organisations in this institution are not fully aware of their risks and as such there are likely to be a number of unacknowledged risk owners and costs in relation to these events, particularly related



to long-term recovery or flow-on effects from natural disasters. It is also not clear from the documents viewed what level of activities in this area business and industry undertake for different levels of government and what is the level of risk ownership they own as a result of this.

Civil society is responsible for planning, preparation, some mitigation and recovery at an individual and community level. It is unclear from the documents viewed exactly what financial and social costs are incurred, particularly in regard to long-term recovery from catastrophic or cumulative events. It was also not possible to ascertain the cost of mitigation activities as a result of regulations and by-laws. There is likely to be a level of unacknowledged ownership in this area.

Conclusion

Risk ownership is a key part of establishing effective strategic pre- and post-event natural hazard disaster management. In this desktop report, risk ownership is explored through three questions relating to “who pays?” “who manages?” and “who is accountable?” These questions take in the two main definitions of risk ownership, covering the asset owner and the risk manager, respectively. This expanded concept of risk ownership is relatively new, and the knowledge and systems needed to apply this are still evolving.

Risk ownership can be viewed through several lenses. The key findings are described according to the strategic aspects of the risk management process for natural hazards (Table 6). Ownership is also arranged within a matrix of broad institutions (federal, state/territory and local government, business and industry, and civil society) and values (built, social and environment assets, and infrastructure). Risk ownership can be also variously allocated according to individual hazards, tasks (e.g., response) and policy/legislative instruments.

The approach taken by the review is systemic because of the nature of natural hazard disasters, characterised by their potential to cross domains, move from one risk owner to another and affect a wide range of ownership. Factors that created challenges for developing a comprehensive overview of risk ownership included:

- Fluid operational and policy environments (transformation of traditional emergency management and government structures).
- The systemic and dynamic nature of both risks and their management. For example, risk ownership can change if one area of government or society is overwhelmed, becoming the responsibility of another area as a result.
- Variable understanding of the risks and appropriate governance, particularly where there is multiple ownership.
- Different ways of identifying risk ownership, e.g., through process tasks, policy-based instruments, types of hazard and asset ownership.

Risk ownership for different (built, social and environmental) value groups was found to be inconstant across institutional areas, and ranged from clear delegations to diffuse roles across multiple stakeholders and agendas. In particular, there is a lack of clarity regarding roles and responsibilities, which has been recognised as a deficit. This area is currently a focus for improvement across the Emergency Services Sector.



Other identified aspects that contribute to inconsistency within risk ownership include:

- Lack of consistency and cohesion between the different value groups (social, environmental and built) in terms of evaluation mechanisms and agenda priority.
- Variable levels of ability and capacity to fulfil the responsibilities of risk ownership (not all owners are able to undertake the actions needed to effectively do this due to lack of resources and capacity).
- Lack of integration and cohesion between different institutions, particularly between high-level policy and on-ground implementation needs, also between different policy areas that are related such as climate change adaptation.
- Variable levels of enforcement of risk ownership that range from legally mandated to voluntary, particularly in relation to industry and business and civil society.
- Uneven knowledge across institutions of the various types of natural hazard risk and the appropriate level of risk ownership needed to manage these.
- Lack of clarity in allocation of ownership between different levels of owner, so that risks are managed effectively when they eventuate, particularly across areas of shared ownership. Poor use of the existing tools may be a contributing factor to lack of uptake of and enforcement of some aspects of risk ownership.
- Institutions can be delegated ownership for a risk where other bodies have decision-making powers that can change the context of that ownership. For example, state government planning decisions may increase or decrease the risk level for local government, industry and business, and civil society institutions.

According to the documents reviewed, natural hazard risk ownership is not well defined in the areas of resilience, long-term recovery, or for social and environmental assets. Built infrastructure and assets have the most complete coverage of risk ownership for values and risk, supported by a wide range of policies and regulation. The majority of recovery funds are currently spent on roads and other transport infrastructure. Social and environmental assets are supported by policy arrangements that delegate ownership for their protection, but it is unclear who has the responsibility for their long-term recovery if they are severely damaged.

The implementation of recovery programs requires highly specialised knowledge that is often lacking. There is also no defined funding mechanism for the long-term recovery of environmental or social assets. Identifying more comprehensive risk ownership over these areas is a priority.

Vulnerability in less well-resourced areas may increase if an area is subject to cascading events or made vulnerable by other pressures, such as increasing financial and social stress. Cascading or catastrophic events may also result in flow-on social and environmental impacts. For example, the health and unemployment profiles of a region will influence the long-term recovery from severe impacts, but it is unclear who could or should take ownership of such a process.

It is important to provide positive incentives to change from current practices if perverse incentives are likely to hamper recovery or prolong vulnerability. For example, the Federal Government Betterment funding offers less than the standard recovery



payments to build back to the same level of performance¹ and it is notable that this program has had limited uptake. Also, there has been limited uptake of recovery payments by small business which suggests the relevant NDRRA arrangements may not be suitable to their needs.

Capacity is a key issue for ownership. Accountabilities and responsibilities may exceed the resources and capacity of some organisations and groups, particularly in regional and outer urban municipalities, leaving them unable to fulfil their ownership obligations. The roles of both local and state governments in the strategic management of natural hazard risk are often clearly identified, but how this should be resourced is less clear. Unanswered questions include: how funding of strategic management of risk can be targeted in order to avoid mounting recovery payments?; who should be accountable?; and how should they be accountable?

Resilience is established as an important policy mechanism at all levels of government, but is poorly integrated across government and civil society. The structures needed to effectively implement resilience programs at a state level are lacking, although individual projects building resilience to climate change and natural hazard risk have been undertaken in all states and territories and by local governments in other areas of policy. For business and industry, and civil society, the ownership of being resilient and of building resilience is less clear, although the use of insurance to protect built assets and infrastructure is widespread. The understanding of resilience across all levels of society and its applicability to risk management is a priority.

The large imbalance of payments between recovery and preventative, mitigation activities is currently under review by the Federal Government, who received the findings of the Productivity Commission Inquiry on Natural Disaster Funding Arrangements (PC, 2014) in late 2014. This will have a significant bearing on arrangements between government and other institutions. It may also potentially identify which natural hazard risk activities are likely to be resourced into the future and how this will be undertaken. This will have a direct effect on how risk ownership is managed and accounted for across all institutions.

The model for managing and understanding natural hazard disaster risks is adopting more integrated and flexible structures, so as processes and institutional arrangements mature; risk ownership will continue to evolve. As these risks are dynamic, risk ownership is also likely to change due to circumstances. This requires us to not only think differently about risk but also to think and act in a more adaptive fashion by adopting continuous review, learning and flexibility to adjust. As has been stated "Building resilience is everyone's responsibility" (Dun & Bradstreet, 2011) (pg 5), but to fully realise this there needs to be better understanding about not only what it means, but also how it actually works.

¹ An exception is the Queensland State Government Betterment Fund, which has been independently negotiated with the Federal Government in 2013.



Glossary

Adapted from (Emergency Management Australia, 1998).

Built assets and infrastructure. ‘Hard’ assets such as housing, business establishments, roads, communications, energy and water infrastructure.

Disaster. A serious disruption to community life which threatens or causes death or injury in that community and/or damage to property which is beyond the day-to-day capacity of the prescribed statutory authorities, and which requires special mobilisation and organisation of resources other than those normally available to those authorities.

Domains Geographical areas of jurisdiction such as local, state or national government areas, or institutional areas, such as the public and private economy.

Emergency management. A range of measures to manage risks to communities and the environment; the organisation and management of resources for dealing with all aspects of emergencies.

Emergency management involves the plans, structures and arrangements required to integrate the normal endeavours of government, voluntary and private agencies in a comprehensive and coordinated way to deal with the whole spectrum of emergency needs, including prevention, response and recovery.

Emergency service. An agency responsible for the protection and preservation of life and property from harm resulting from incidents and emergencies. Synonymous with ‘emergency services authority’ and ‘emergency service organisation’.

Hazard. A source of potential harm or a situation with a potential to cause loss; a potential or existing condition that may cause harm to people or damage to property or the environment.

Institution. Institutions are rules and norms held in common by social actors (individuals, groups and organisations) that guide, constrain, and shape human interaction. Institutions can be formal, such as laws and policies, or informal, such as norms and conventions. Institutions can influence human interaction through direct control, incentives, and processes of socialization.

Mitigation. Measures taken in advance of a disaster aimed at decreasing or eliminating its impact on society and environment.

Natural assets and infrastructure. The natural environment, sometimes modified by people, consisting of ecosystems, biodiversity and the biophysical environment of land, soil and water.

Preparedness. Measures to ensure that, should an emergency occur, communities, resources and services are capable of coping with the effects; the state of being prepared.

Prevention. Measures to eliminate or reduce the incidence or severity of emergencies.



Recovery. The coordinated process of supporting emergency-affected communities in reconstruction of the physical infrastructure and restoration of emotional, social, economic and physical wellbeing.

Response. Actions taken in anticipation of, during, and immediately after an emergency to ensure that its effects are minimised, and that people affected are given immediate relief and support.

Risk. The likelihood of harmful consequences arising from the interaction of hazards, communities and the environment; the chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood; a measure of harm, taking into account the consequences of an event and its likelihood.

Risk owner. Asset owner who faces a potential loss. A person or entity that has been given authority to manage a particular risk and is accountable for doing so (ISO, 2009).

Social assets and infrastructure. The soft assets of society and communities that bind them together such as health, education, social connectedness, knowledge, clubs and religious groups.

Values. Things considered important because they are useful or appreciated for their existence. Values can be tangible: good and services with a direct monetary value; or intangible: values that do not have an explicit monetary value but are still considered important. Intangible values include environmental and social values such as community connectivity, beauty of a landscape and environmental services such as clear air and water. These values also help to support the economy and enhance resilience.

Catastrophic natural disaster An extreme hazard event that affects one or more communities, resulting in widespread, devastating, economic, health, social and environmental consequences, and that exceeds the capability of existing State or Commonwealth Government emergency and disaster management arrangements. An event could be of sudden impact or sustained impact over an extended timeframe (Emergency Management Australia, 2010).



Attachment A: Key actions, institutional owners and instruments

Adapted from (PC, 2014)

Key actions	Institutional owner and key agencies	Key primary instruments	Related instruments
1. National coordination and strategy development			
<ul style="list-style-type: none"> ▪ Provide strategic direction through the development of key policies and documents ▪ Provide oversight and direction from a national perspective of coordination ▪ Lead national policy coordination 	<ul style="list-style-type: none"> ▪ Federal government leads but shared ownership with all other levels of government. Key agencies include: ▪ Attorney General's Department ▪ COAG, Ministerial councils, ANZEMC ▪ The Ministerial Council for Police and Emergency Management – Emergency Management (MCPPEM-EM) ▪ Emergency Management Australia (EMA) ▪ Infrastructure Australia ▪ Regional Development Australia 	<ul style="list-style-type: none"> ▪ National Disaster Resilience Framework 2009 ▪ Critical Infrastructure Resilience Strategy 2010 ▪ National Strategy for Disaster Resilience 2011 ▪ NATCATDISPLAN 2010 ▪ Trusted information sharing network 	<ul style="list-style-type: none"> ▪ National Consumer Law (2011) ▪ Building Code of Australia ▪ Climate Adaptation Outlook: A Proposed National Adaptation Assessment Framework (2013) ▪ National Climate Change Adaptation Action Plan (2007) ▪ Australian building codes and standards. ▪ National Sustainability Framework for Financial Reporting and Asset Management Approach to Asset Planning and Management (2007) ▪ <i>Environment Protection and Biodiversity Conservation Act (1999)</i> ▪ Australian Heritage Commission Act (1975). ▪ Cooperative Approach to Integrated Coastal Zone Planning Framework and implementation plan (2006) ▪ Industry Innovation and Competitiveness Agenda (2014) ▪ <i>Public Governance, Performance and Accountability Act 2013</i> ▪ <i>Work, Health and Safety Act 2011</i> ▪ <i>Natural Resources Management (Financial Assistance) Act 1992</i>

Key actions	Institutional owner and key agencies	Key primary instruments	Related instruments
2. Natural hazard information and research			
<ul style="list-style-type: none"> ▪ Undertake research and analysis 	<p>Federal Government is accountable and research delivers through the following agencies:</p> <p>ABS, BOM, CSIRO, Geoscience Australia and BNHCRC, research agencies, universities, private industry</p>	<ul style="list-style-type: none"> ▪ National Disaster Resilience Framework 2009 ▪ National Strategy for Disaster Resilience 2011 ▪ <i>Australia Research Council Act 2001</i> ▪ AS 5037—2005 Knowledge Management standard 	<ul style="list-style-type: none"> ▪ National Adaptation Framework ▪ National Climate Change Adaptation Action Plan (2007) ▪ Industry Innovation and Competiveness Agenda (2014)
<ul style="list-style-type: none"> ▪ Provide jurisdiction specific information for preparation, response and recovery efforts ▪ Information delivery through municipal and regional bodies ▪ Facilitation of knowledge sharing across community, private business and industry. ▪ Research development and collation in jurisdictional area 	<p>State government in collaboration with:</p> <ul style="list-style-type: none"> ▪ Local government ▪ Regional bodies ▪ Peak industry bodies ▪ Community organisations ▪ NGOs/NFPs ▪ EMA, AEMI 	<ul style="list-style-type: none"> ▪ Risk assessments and strategies (all states and territories) ▪ Fire management and Natural Hazard Response Plans (all states and territories) ▪ Trusted Information Sharing Network ▪ AS 5037—2005 Knowledge Management standard 	<ul style="list-style-type: none"> ▪ Regional, state and municipal adaptation plans (all states and territories) ▪ Regional development plans ▪ Municipal development plans
<ul style="list-style-type: none"> ▪ Provide local community with specific information for preparation, response and recovery efforts ▪ Enabling knowledge sharing across local private and community areas ▪ Provision of information to State Government of context specific information 	<p>Local government in collaboration with:</p> <ul style="list-style-type: none"> ▪ State Government and associated agencies ▪ Regional bodies ▪ Community ▪ NGO/NFP ▪ Private industry and business ▪ EMA, AEMI 	<ul style="list-style-type: none"> ▪ Municipal and State Emergency Management and Response plans. ▪ Fire management and Natural Hazard Response Plans (all states and territories) ▪ AS 5037—2005 Knowledge Management standard 	<ul style="list-style-type: none"> ▪ Local Government Act (all states) ▪ Regional and municipal adaptation plans ▪ National Sustainability Framework for Financial Reporting and Asset Management Approach to Asset Planning and Management (2007) ▪ Community Business Partnership ▪ Regional Development Plans (all states and territories)

Key actions	Institutional owner and key agencies	Key primary instruments	Related instruments
3. Natural hazard information and research			
<ul style="list-style-type: none"> ▪ Provision of relevant and sector specific information in relation to risks ▪ R&D to develop new market opportunities as a result of change ▪ Undertaking sector specific research 	<p>Industry and business</p> <ul style="list-style-type: none"> ▪ Peak bodies to develop and provide sector specific information and research ▪ Individual organisations information is updated - public liability, vendor agreements, standards, regulations ▪ Government (all levels) ▪ Australian Business Roundtable for Disaster Resilience and Safer Communities ▪ EMA 	<ul style="list-style-type: none"> ▪ ISO standards: 13000, 14001, 2600, 9000 ▪ AS NZS 31000: 2009, 5050 2010 ▪ Community Business Partnership ▪ AS 5037—2005 Knowledge Management standard 	<ul style="list-style-type: none"> ▪ Industry Innovation and Competiveness Agenda Federal (2014) ▪ Emergency Management Arrangements ▪ Community Engagement Action Plan (EMA)
<ul style="list-style-type: none"> ▪ Information dissemination through community and social networks 	<p>Civil Society</p> <ul style="list-style-type: none"> ▪ Private industry/business (Media) ▪ State and local government NGOs and community organisations ▪ Regional bodies ▪ EMA, BoM 	<ul style="list-style-type: none"> ▪ Community Engagement Action Plan (EMA) ▪ State Government guidelines on warnings, signals ▪ BoM ▪ National Emergency Management Volunteer Action Plan, 2012 	<ul style="list-style-type: none"> ▪ State and Local Government Communication and Engagement plans ▪ AS 5037—2005 Knowledge Management standard
4. Planning and readiness			
<ul style="list-style-type: none"> ▪ Risk assessments, business continuity ▪ Planning ▪ Budget provisioning ▪ Planning – asset management 	<p>Federal Government</p> <ul style="list-style-type: none"> ▪ Related government departments, committees and agencies in particular the Attorney General's Department ▪ Treasury and Finance 	<ul style="list-style-type: none"> ▪ NERAG ▪ Critical Infrastructure Resilience Strategy 2011 ▪ National Strategy for Disaster Resilience 2011 ▪ <i>Public Governance, Performance and Accountability Act 2013</i> 	<ul style="list-style-type: none"> ▪ Building Code of Australia ▪ AS/NZS ISO 31000:2009 ▪ Cabinet Implementation Unit Toolkit, 4:Risk 2013 ▪ Climate Adaptation Outlook: A Proposed National Adaptation Assessment Framework (2013)

Key action	Institutional owner and key agencies	Key primary instruments	Related instruments
4. Planning and readiness			
		<ul style="list-style-type: none"> ▪ Federal Risk Management Policy 2014 ▪ National Emergency Management Volunteer Action Plan 2012 	<ul style="list-style-type: none"> ▪ National Climate Change Adaptation Action Plan (2007)
External <ul style="list-style-type: none"> ▪ Risk assessments ▪ Budget provisioning 	Federal <ul style="list-style-type: none"> ▪ Attorney General's Department ▪ Treasury and Finance ▪ Related external agencies, committees and subcontractors 	<ul style="list-style-type: none"> ▪ NEMP ▪ NERAG ▪ Federal Risk Management Policy 2014 	<ul style="list-style-type: none"> ▪ <i>Natural Resources Management (Financial Assistance) Act 1992</i> ▪ Building Code of Australia
Organisational <ul style="list-style-type: none"> ▪ Risk assessments, business continuity planning ▪ Budget provisioning ▪ Planning – asset management 	State and territory governments <ul style="list-style-type: none"> ▪ Related government departments and agencies ▪ Attorney General's Department ▪ Treasury and Finance ▪ Agencies and stakeholders 	<ul style="list-style-type: none"> ▪ NERAG ▪ <i>State Work, Health and Safety Act 2011</i> ▪ State Government Risk Policies and Guidelines ▪ State Building Codes and standards ▪ 	<ul style="list-style-type: none"> ▪ State, regional and municipal adaptation risk assessments and plans ▪ State Government
External <ul style="list-style-type: none"> ▪ Risk assessment ▪ Budget provisioning 	State and Territory governments <ul style="list-style-type: none"> ▪ Related government departments and agencies ▪ Attorney General's Department ▪ Treasury and Finance ▪ External agencies and stakeholders 	<ul style="list-style-type: none"> ▪ <i>Disasters Act 1982 (NT)</i> ▪ <i>Disaster and Management Act 2003 (Qld)</i> ▪ <i>Emergencies Act 2004 (ACT)</i> ▪ <i>Emergency Management Act 2004 (SA)</i> ▪ <i>State Emergency and Rescue Management Act 1989 (NSW)</i> ▪ <i>Emergency Management Act 1986, 2013 (Vic)</i> ▪ <i>Emergency Management Act 2005 (WA)</i> ▪ NERAG 	<ul style="list-style-type: none"> ▪ State building codes and standards ▪ Regional development plans (all states and territories) ▪ State, regional and municipal adaptation risk assessments and plans

Key actions	Institutional owner and key agencies	Key primary instruments	Related instruments
4. Planning and readiness			
<ul style="list-style-type: none"> ▪ Organisational ▪ Risk assessments, business continuity planning ▪ Planning – asset management 	Local Government <ul style="list-style-type: none"> ▪ Associated agencies, committees and subcontractors 	<ul style="list-style-type: none"> ▪ Local Government Act (all states) ▪ Emergency Management Acts as detailed above (all states and territories) ▪ Standards and guidelines for mitigation activities such as pile burning 	<ul style="list-style-type: none"> ▪ National Sustainability Framework for Financial Reporting and Asset Management Approach to Asset Planning and Management (2007)
<ul style="list-style-type: none"> ▪ External ▪ Risk assessments ▪ Budget provisioning 	Local Government <ul style="list-style-type: none"> ▪ State Government bodies, committees and associated agencies 	<ul style="list-style-type: none"> ▪ Local Government Act (all states) ▪ Emergency Management Acts as detailed above (all states and territories) ▪ Standards and guidelines for activities related prescribed burning 	<ul style="list-style-type: none"> ▪ State, regional and municipal Adaptation risk assessments and plans. ▪ Heatwave plans (Local Government Vic) ▪ Regional Development Plans (all states and territories) ▪ National Sustainability Framework for Financial Reporting and Asset Management Approach to Asset Planning and Management (2007)
<ul style="list-style-type: none"> ▪ Risk assessments, business continuity planning 	Private industry <ul style="list-style-type: none"> ▪ Peak industry bodies ▪ Government (all levels). ▪ The Community Business Partnership 	<ul style="list-style-type: none"> ▪ NEMP ▪ ISO/AU:NZ Standards ▪ Standards and guidelines for activities related prescribed burning 	<ul style="list-style-type: none"> ▪ State and regional adaptation plans (all states and territories) ▪ Building Code of Australia ▪ Industry Innovation and Competiveness Agenda (2014) ▪ Vendor agreements ▪ Common law acts
<ul style="list-style-type: none"> ▪ Preparation and management of private properties and assets in relation to possible natural hazard events ▪ Local volunteer organisations training and information provision. ▪ Development of hazards management plans, e.g., evacuation plans for fire 	Civil Society <ul style="list-style-type: none"> ▪ The Community Business Partnership ▪ Local Government ▪ State government volunteer based agencies such as CFA, SES 	<ul style="list-style-type: none"> ▪ National Disaster Resilience Framework 2009 ▪ Local and state fire management and response plans ▪ Trusted Information Sharing Network ▪ Standards and guidelines for activities related prescribed burning. 	<ul style="list-style-type: none"> ▪ State and regional adaptation plans (all States and Territories) ▪ Building Code of Australia ▪ Vendor agreements ▪ AS 5037—2005 Knowledge Management standard

Key actions	Institutional owner and key agencies	Key primary instruments	Related instruments
5. Risk modification			
<ul style="list-style-type: none"> ▪ Mitigation activities ▪ General infrastructure spending ▪ Transfer risk by purchasing insurance 	Federal, state and local governments <ul style="list-style-type: none"> ▪ Insurance bodies (ICA, VMIA) ▪ Infrastructure Australia ▪ Regional Development Australia 	<ul style="list-style-type: none"> ▪ National Disaster Resilience Framework 2009 ▪ Critical Infrastructure Resilience Strategy 2010 ▪ National Strategy for Disaster Resilience 2011 	<ul style="list-style-type: none"> ▪ Building Code of Australia ▪ Adaptation activities all states and municipalities (e.g., Victorian Adaptation Sustainability Partnership Fund) ▪ <i>Natural Resources Management (Financial Assistance) Act 1992</i>
<ul style="list-style-type: none"> ▪ Risk transfer through buying insurance ▪ Mitigation activities ▪ Invest in management of mitigation activities related to resilience building 	Private/Industry <ul style="list-style-type: none"> ▪ Federal, state and local government ▪ Peak bodies ▪ Australian Building Codes Board ▪ Australian Business Roundtable for Disaster Resilience and Safer Communities 	<ul style="list-style-type: none"> ▪ National Strategy for Disaster Resilience 2011 ▪ State building laws, standards, regulations, codes (all states) ▪ NEMP 	<ul style="list-style-type: none"> ▪ Building Code of Australia ▪ State and regional adaptation plans (all states and territories) ▪ Coastal Protection Plans (WA, Tas, Vic, NT, Qld, SA) ▪ Vendor agreements ▪ ISO/AS:NZ standards ▪ Warranties
<ul style="list-style-type: none"> ▪ Risk transfer through buying insurance ▪ Mitigating activities 	Civil Society <ul style="list-style-type: none"> ▪ Australian Business Roundtable for Disaster Resilience and Safer Communities ▪ EMA ▪ Insurance and finance companies 	<ul style="list-style-type: none"> ▪ National Strategy for Disaster Resilience 2011 ▪ Local and State Government planning requirements (all states and territories) ▪ NEMP 	<ul style="list-style-type: none"> ▪ Vendor agreements ▪ Adaptation activities (all states and municipalities)
<ul style="list-style-type: none"> ▪ Land use planning ▪ Building regulations 	Federal, State and local governments <ul style="list-style-type: none"> ▪ Local Government and Planning Ministers' Council ▪ Regional Development Australia ▪ COAG ▪ Relevant peak bodies from the construction and building industries 	<ul style="list-style-type: none"> ▪ All government planning policies, plans, strategies and regulations ▪ Building Code of Australia ▪ State building laws, standards, regulations, codes (all states) ▪ Regional Development Plans ▪ Critical Infrastructure Resilience Strategy 2010 	<ul style="list-style-type: none"> ▪ Precinct planning (all Local Governments) ▪ State, regional and municipal development plans

Key actions	Institutional owner and key agencies	Key primary instruments	Related instruments
6. Relief and recovery arrangements			
<ul style="list-style-type: none"> ▪ Provision of funds ▪ Relief and recovery funding policies ▪ Monitor and review 	<p>Federal Government</p> <ul style="list-style-type: none"> ▪ State and local government, private industry and business and civil society ▪ Research Bodies ▪ COAG Committees and councils 	<ul style="list-style-type: none"> ▪ Provide recovery funding through the NDRRA ▪ Provide relief funding through the AGDRP ▪ NPANDR & NEMP ▪ COMDISPLAN 2014 ▪ NATCATDISPLAN 2010 	<ul style="list-style-type: none"> ▪ Cabinet Implementation Unit Toolkit, 5: Monitor Review and Evaluation 2013 ▪ <i>Work, Health and Safety Act 2011</i> ▪ <i>Public Governance, Performance and Accountability Act 2013</i> ▪ <i>Natural Resources Management (Financial Assistance) Act 1992</i>
<ul style="list-style-type: none"> ▪ Funding and financing of recovery ▪ Development of EM recovery plans ▪ Utilise Australian Government recovery funding ▪ Monitor and review 	<p>State Government</p> <ul style="list-style-type: none"> ▪ Department of Treasury and Finance, Department of Premier and Cabinet (all states) ▪ Associated agencies (NFP, NGO, CFA, SES) 	<ul style="list-style-type: none"> ▪ NDRRA ▪ NPANDR & NEMP ▪ State Emergency Management Recovery plans 	<ul style="list-style-type: none"> ▪ Guidelines and reporting requirements for expenditure (all states and territories) ▪ <i>Work, Health and Safety Act 2011</i>
<ul style="list-style-type: none"> ▪ Funding and financing of recovery ▪ Development of EM recovery plans ▪ Utilise Australian Government recovery funding ▪ Monitor and review 	<p>Local government</p> <ul style="list-style-type: none"> ▪ Financial and Insurance bodies ▪ Australian Business Roundtable for Disaster Resilience and Safer Communities ▪ Federal Government ▪ EMA ▪ CFA, SES 	<ul style="list-style-type: none"> ▪ NDRRA ▪ NPANDR & NEMP (applies to the resilience building). ▪ Local Emergency Management Recovery plans ▪ Community Business Partnerships 	<ul style="list-style-type: none"> ▪ Reporting requirements for expenditure and grant acquittals ▪ National Sustainability Framework for Financial Reporting and Asset Management Approach to Asset Planning and Management (2007) ▪ <i>Work, Health and Safety Act 2011</i>

Key actions	Institutional owner and key agencies	Key primary instruments	Related instruments
6. Relief recovery and arrangements			
<ul style="list-style-type: none"> ▪ Ensuring the provision and continuity of services and goods directly after the event ▪ Provision of essential items, finance, food, water, energy, support services. ▪ Management of economic issues at a local level 	<ul style="list-style-type: none"> ▪ Private/Industry ▪ Federal & State Government, SES ▪ Australian Business Roundtable for Disaster Resilience and Safer Communities ▪ EMA ▪ Local Government 	<ul style="list-style-type: none"> ▪ NDRRA ▪ Community Business Partnership ▪ ISO standards ▪ AU:NZ standards 	<ul style="list-style-type: none"> ▪ Legal requirements ▪ Critical Infrastructure Resilience Strategy 2010 ▪ Vendor agreements ▪ Subcontractor arrangements ▪ Organisation – internal guidelines for response and recovery
<ul style="list-style-type: none"> ▪ Donations and volunteers and support services through local community organisations ▪ Management of community/ individual, social and economic issues as a local level 	<ul style="list-style-type: none"> ▪ Civil Society ▪ NGOs, NFPs, ▪ Community organisations and groups ▪ State Government and associated agencies ▪ EMA ▪ Local Government 	<ul style="list-style-type: none"> ▪ NDRRA ▪ AGDRP ▪ NEMP ▪ National Strategy for Disaster Resilience 2011 ▪ Local and state Emergency Management recovery plans ▪ Community Business Partnership 	<ul style="list-style-type: none"> ▪ Local Government and private organisation guidelines



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