



**Appendixes** | 48



## Appendix 1: Organisations participating in the EM-SAP development process

Australian Red Cross	Local Government Association of Queensland
Australian Volunteer Coast Guard Association	Mackay Regional Council
BMT Consulting	Metro South Hospital and Health Services
Brisbane City Council	National Broadband Network
Bureau of Meteorology	National Climate Change Adaptation Research Facility
Cairns and Hinterland Hospital and Health Services	Private building contractor
Cairns Regional Council	Queensland Ambulance Service
Cassowary Coast Regional Council	Queensland Council of Social Services
Cath Moran Ecological Consultancy	Queensland Farmers' Federation
Central Queensland Hospital and Health Service	Queensland Fire and Emergency Services
Climate and Health Alliance	Queensland Health
Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Queensland Police Service
Department of Agriculture and Fisheries	Queensland Reconstruction Authority
Department of Communities, Disability Services and Seniors	Queensland Urban Utilities
Department of Environment and Science	Seqwater dam operations
Department of Natural Resources, Mines and Energy	Somerset Regional Council
Douglas Shire Council	Tablelands Regional Council
Geoscience Australia	Torres Strait Island Regional Council
Gladstone Regional Council	Torres Strait Regional Authority
Griffith University	Visionstream/Telstra
Inspector-General Emergency Management	Volunteering Queensland
Livingstone Shire Council	Wujal Wujal Aboriginal Shire Council



## Appendix 2: Stakeholder consultation findings

Sector stakeholder views were collected throughout the consultation process via 80 completed responses to the online survey, 74 participants in three workshops across the state, and two phone interviews. Data collected from consultation with Queensland stakeholders during the engagement process (survey, workshops, and interviews) was analysed to identify:

- the major climate change-related impacts on emergency management sector in Queensland
- existing adaptation activities within the emergency management sector
- major barriers to successful adaptation
- gaps and opportunities related to adaptation
- priority needs to enable successful adaptation (pathways to action).

Statistical frequency analysis was conducted on the objective questions of the online survey, and thematic analysis was conducted on the open-ended questions. A text analysis was conducted on the workshop and interview data using in NVivo software. Below we discuss findings on these analyses.

### Survey data collection

A discussion paper and an online survey were circulated to more than 200 relevant stakeholders across Queensland. Stakeholders were identified through the engagement process, which included

assistance from existing emergency management sector networks, the steering committee and NCCARF. The survey was open for five weeks and the response was encouraging, with 80

completed responses. In the following section, we look at who responded to the survey: where they work, what type of institution, and how they categorise themselves.

### Who responded to the survey?

The highest percentage of respondents (35%) work in government emergency services, with the second highest (27%) from local government. Local and district disaster management groups also had a good participation rate of about 13%

and 12% respectively. Participants from non-government emergency services accounted for 9% of respondents, and infrastructure and health service providers accounted for about 6.5% and 2.6% respectively. Non-government

organisations (NGOs), professional associations, research organisations and natural resource management organisations collectively accounted for about 12% of respondents (Figure 18).

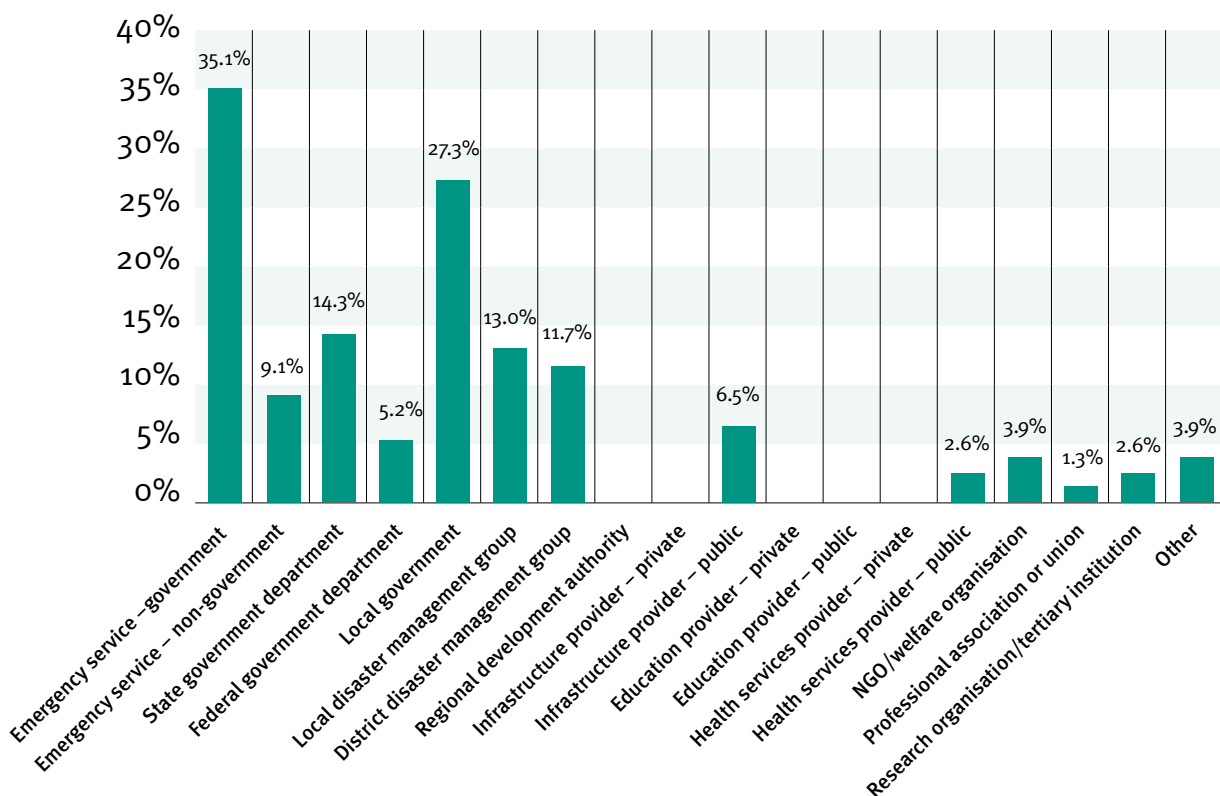


Figure 18: Distribution of organisations that participated in the survey. Sum of all categories will not add to 100% as respondents were allowed to categorise themselves into more than one.

When we asked people whether they were responding on behalf of their organisation or as individuals, 77% stated individual and the remaining 23% on behalf of an organisation.

Notably, 80% of respondents held a mid to senior level management position within their organisation, while more than

11% were advisors to the organisation. This suggests that survey responses captured viewpoints of relatively higher management within organisations.

Figure 19 shows the geographic distribution of the areas covered by the respondents.

A discussion paper was circulated along with the survey, and 51% of respondents reported reading the discussion paper before completing the survey. Out of those who read the paper, 73% read the full paper while others read parts of it. This indicates a good rate of readership of the paper among survey respondents.

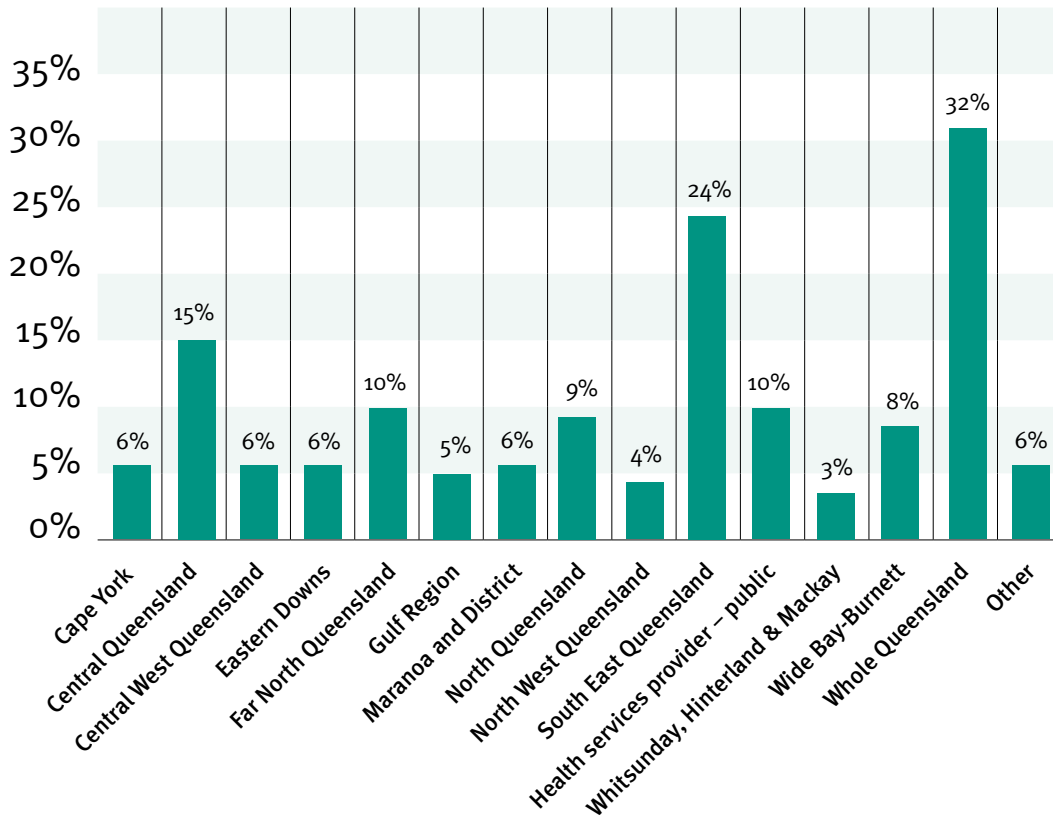


Figure 19: Geographic distribution of the respondents.



## Workshop data collection

### Who attended the workshops?

74 participants attended three workshops. Attendees were from a range of organisations from within and outside the sector, as reflected in Appendix 1.

### How the workshops were structured

The six-hour long workshops included a brief session on the project background and current knowledge on the topic, followed by five breakout sessions where participants were asked to discuss key questions. These included:

- What are the impacts of climate change on the emergency management sector?
- What are the existing adaptation initiatives within the sector?
- What are the barriers to acting on climate change in the emergency management sector?
- What are main gaps and what are the opportunities when acting on climate change, e.g. for improving health and wellbeing, economic, or other community outcomes?
- What is required to move adaptation forward? Strategies, policies, plans, actions? What about possible funding mechanisms?

Notes were taken at each breakout group for further analysis and reporting. Group facilitator notes and other written feedback from each breakout group were coded in NVivo software to extract the major themes of the discussions. The major themes of discussion in relation to each of the five workshop focus topics has been discussed in the main body of the report.

### Interview data collection

Two telephone interviews with local government representatives from the Remote Area Planning and Development Board in Longreach. The workshop structure and questions were used to guide the interview process, and the interviewees were encouraged to read the EM-SAP discussion paper prior to interview. Questions included:

- What programs does your local government currently have underway
- that are directly or indirectly contributing to climate adaptation for the emergency management sector?
- Further, if you are aware of any other programs not run by your local government that achieve the same outcome, please describe them. Do any of these provide a case study of best practice?
- What barriers and challenges does your local government and other organisations face in trying to implement emergency management climate adaptation initiatives?
- Finally, if you were to nominate three key priorities to feature in the emergency management sector adaptation plan, what would they be?
- Further, what gaps and opportunities have you experienced or foresee for the same group of stakeholders?

## Summary of stakeholder views

### Theme 1: Likely impacts of climate change on the sector

#### Awareness among stakeholders about climate change impact on the sector

91.5% of respondents reported having at least some level of awareness about climate change science. Interestingly, this falls to 81% when asked about their awareness of the impacts of climate change on the emergency management (EM) sector. 19% of respondents

suggested that they are 'not aware at all' of climate change impacts on the EM sector. This suggests that there is room for improvement among EM stakeholders in understanding climate change impacts. Table 2 shows the source of climate change-related information within

this 'climate change aware' group of respondents, which suggests that, apart from accessing national, international and government scientific sources, a number of respondents also use media and internet articles to obtain climate change-related information.

Table 2: Source of climate change information

Source of climate change related information	%*
Queensland state government sources (e.g. DES)	58.73%
CSIRO and Bureau of Meteorology (e.g. Climate Change in Australia website)	88.89%
NCCARF resources	28.57%
Other (e.g. scientific journal papers, media reporting, internet articles, documentaries)	26.98%

\* Sum of all categories will not add to 100% as respondents could select more than one source.

Figure 20 shows the distribution of natural hazards that respondents and their organisations cover under their portfolio. Severe weather events, heatwaves

and tropical cyclones are the top three in the list. Apart from these listed hazards, respondents also mentioned flash flooding and landslip under the

'other' category. These hazards have the potential to increase in frequency and intensity due to climate change, and place greater demand on the EM sector.

The following hazards have the potential to increase in frequency and intensity due to climate change. Which of these are relevant to your organisation or the people for which it is responsible?

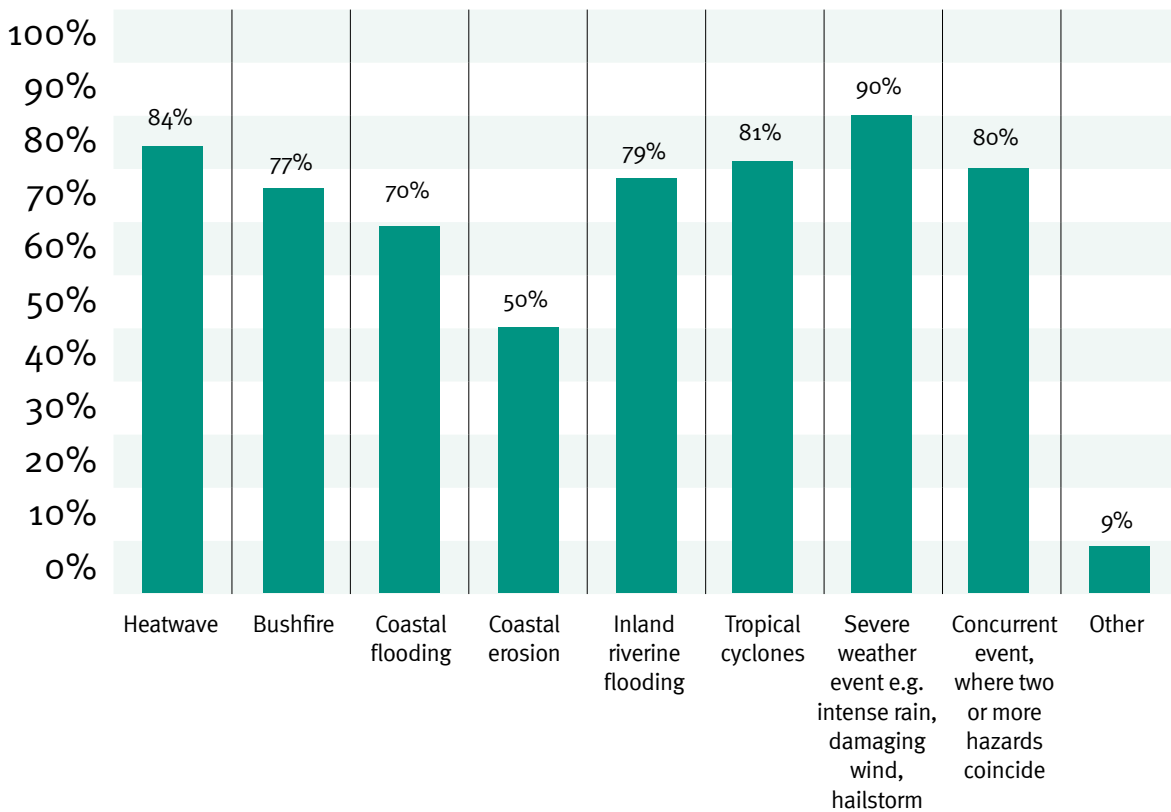


Figure 20: Distribution of natural hazards that respondents and their organisation cover under their portfolio.



## Climate change impacts of greatest concern to the EM sector

The following are the major climate change impacts the EM sector is concerned about. Figure 21 shows a word cloud generated from a text analysis of workshop responses around impacts of climate change on the EM sector in Queensland.

### Increased demand on services

Demand for service will increase for the EM sector as frequency, intensity and duration of events increases with climate change, and will be a major impact on the sector (32% of survey respondents). Participants suggested that co-occurrence of events such as bushfires and heatwaves, coastal cyclones and

upper catchment extreme rainfall, drought and bushfire can increase the complexity and uncertainty of future hazard events, which will stretch the service demand, potentially leading to resourcing issues (47% of survey respondents). The potential complexity associated with future climatic conditions, such as

an extended dry periods followed by excessive rainfall, can cause landslips, which can increase the challenge for emergency management and rescue. Workshop participants noted that managing current demand is prioritised over increasing future resilience, creating additional challenges for the sector.

### Health and wellbeing of staff, volunteers and emergency responders

Working in extreme conditions such as heatwaves and bushfires can have negative health effects on EM staff and volunteers. Heat stress is likely to affect volunteers in the EM sector more and more into the future. Workshop participants suggested a continual need to support permanent and volunteer staff with appropriate clothing and PPE

that is designed for the conditions that are faced, and activity management to reduce exposure. Increased frequency of natural disaster events in future in Queensland will provide less time for EM staff, emergency responders and volunteers to recover from stress, and can also increase the chances of workplace injuries, and create fatigue that will

impact on the mental health and overall wellbeing of staff and volunteers (36% of survey respondents). Such increased demand for services can also put pressure on personal and family relationships of staff and volunteers (25% of survey respondents).



Figure 21: Word cloud on impacts of climate change on the EM sector.

## Impact on infrastructure that supports the EM sector

Disaster and emergency services need interagency engagement and surge capacity to prepare for any pending response, and to recover following a response. Workshop participants highlighted the importance of making critical infrastructure climate-resilient, so that during emergencies, critical facilities can remain accessible and operational (e.g. prevent loss of telecommunications, electricity supply, water supply and road access). Complexity of emergency

management and coordination can further increase as a result of a breakdown in critical infrastructure or services and their supply chains as a result of an extreme event (48% of survey respondents). Understanding the connectivity of different services and the risk to many services as a result of a weakness in one service was considered important.

Increased risk of damage to EM organisations' own assets from extreme

weather events is also critical (36% of survey respondents). As an example, disaster coordination centres that are located in floodplains can become inaccessible during cyclones and flood emergencies. In particular, remote communities of Queensland can be at higher risk, as these remote regions can become inaccessible after a natural disaster as a result of flooded roads, damaged telecommunications systems, etc.

## Workforce management, volunteer recruitment and retention

Increased demand for, and complexity of, EM services are likely to place higher stress and cognitive demand on crews, emergency management teams and leaders. Reduction in capacity of government and other agencies that have historically supplied resources can further stress the sector. This has resulted from workforce rationalisation, economic restraints and restructuring. Workshop participants suggested that sometimes

there are not enough staff and equipment to support affected communities during extreme events, which can undermine the safety and quality of services (33% of survey respondents).

The aging population of Queensland will lead to an aging volunteer workforce. This will affect emergency management volunteers, as younger and less experienced personnel will need to

be recruited to step up and manage emergency events sooner than typical career progression pathways. Therefore, the mix of volunteer and permanent workforce that is used currently may not be optimal in the future. Retention of a skilled workforce and attracting volunteers is likely to become more difficult, particularly in regions where the climate is not conducive to sustaining an established population.

## Community expectations, preparedness and resilience

While impacts on the wider population from increased frequency or magnitude of extreme climate events is likely to increase, there is often inadequate community awareness of the increased threat of natural disasters, leading to them being unprepared and resulting in increased demand for services from the EM sector. Increased complexity in EM may arise as extreme events become larger, occur simultaneously and impact on places that have not experienced events of such intensity in the past,

potentially exposing an underprepared community. The potential for impacts from unfamiliar hazards on underprepared communities is a significant challenge facing disaster managers, as many community members may be unable to foresee how situations can deteriorate quickly and turn into a disaster. A further layer of complexity may arise as the underlying vulnerability of communities increases as a result of the gradual effects of climate change such as droughts. In such cases, an extreme event can

represent a threshold beyond which a community cannot recover, and further challenge emergency management. As an example, a general decline in health and wellbeing of the population as a result of climate change and associated impacts (e.g. reduced quality of the built environment including housing, water and food security) can gradually decrease community resilience and increase EM service demand in Queensland.

## Financial impacts

The complexity and uncertainty of future hazard events are likely to increase costs to disaster management organisations (45% of survey respondents). Financial impacts on communities from slow onset impacts of climate change and from extreme events were also noted by workshop participants. These impacts related to loss of income and difficulty

associated with access to finance. It was noted that, in regional areas, shrinking populations do not have the economic capacity to cover capital investments required for adaptation and mitigation measures. Impacts on climate vulnerable industries such as tourism and agriculture affect local and regional employment opportunities, which can

compound levels of disadvantage, reducing community resilience. Therefore, workshop participants highlighted the importance of increasing community resilience so that communities can be self-reliant, which will ultimately help in reducing service demand on the EM sector.





## Wider cross-cutting impacts

In order to realise community resilience outcomes and reduce service demand, understanding and consideration of cross-sectoral impacts in the planning process is critical. While asking about respondent understanding of these cross-sectoral links, the following were highlighted:

- critical infrastructure and supporting services such as communications, electricity, transport, water and sewage
- land-use planning (e.g. limit development in at-risk areas)
- local governments manage a number of critical infrastructure facilities (e.g. roads, water supply, sewerage) that

are critical for EM services to be able to operate effectively, making them a critical element in managing climate risks to the sector

- social and community services (e.g. vulnerable communities are more at risk during disasters)
- biodiversity and ecosystems (e.g. use of natural environment as a shield to hazards)
- health services and related infrastructure (e.g. health services and facilities need to be operational for effective management of a disaster)

- insurance sector (e.g. can provide incentive to communities and businesses to take actions that can increase their disaster resilience)
- private sector business and industry (e.g. tourism, agriculture, fisheries)—tourists are often unfamiliar with the region, and any local emergency procedures, and have limited resilience. This makes them more likely to be impacted by natural disasters, leading to increased demands on the EM sector.

## Theme 2: Current climate-related plans, strategies and frameworks relevant to the EM sector in Queensland

### Stakeholder awareness of existing adaptation initiatives within the EM sector

To address the impacts from climate-related hazards under current and future climate, a range of plans, strategies and frameworks are in place in Queensland. While they may not have been developed in response to climate change, they contribute towards increasing the resilience of the EM sector. When asked about their awareness of such relevant plans, strategies and frameworks, 57% of respondents suggested that they had some level of awareness, while 43% of respondents suggested that they were not

aware at all. Those who are aware of these strategies were asked to provide a list, which is summarised in Table 3.

When asked if organisations had assessed climate change risks to their organisation, its staff and the people it provides services to, about half (48%) responded positively and a fifth (20%) negatively. A third of the respondents were 'unsure' about this. When asked to provide details about the risk assessments that they have conducted,

responses included consideration of climate change and sea-level rise in flood and coastal hazard studies (storm surge, cyclone, erosion modelling), Queensland State Natural Hazard Risk Assessment 2017 and the QERMF. On the other hand, when asked if they had implemented initiatives to reduce identified risks (i.e. adaptation action), only a third said 'yes' and a quarter said 'no'. This suggests that adaptation action is lagging behind risk identification.

Table 3: Current plans, strategies, frameworks that are relevant to addressing climate change related impacts on the EM sector in Queensland.

Plan / strategy / framework	% of respondents aware
Disaster management plans (local, district and state)	9%
Qcoast2100	11%
Queensland Climate Adaptation Strategy	24%
Sector Adaptation Plans	8%
Disaster management Acts and Regulations in Queensland	1%
Queensland Climate Transition Strategy	13%
Queensland Climate Resilient Councils Program	5%
Queensland State Natural Hazard Risk Assessment	4%
Queensland Strategy for Disaster Resilience	5%
Queensland Emergency Risk Management Framework	6%
Individual local council adaptation strategies	6%
National Disaster Risk Reduction Policy	1%
National Climate Resilience & Adaptation Strategy	1%
National Strategy for Disaster Resilience	3%
Paris Climate Change Agreement	5%
Sendai Framework Disaster Risk Reduction (2015–30)	6%
Powering North Queensland Plan	1%



## Existing adaptation initiatives

Below we highlight major existing initiatives that emerged from stakeholder consultation.

### Sector-led initiatives

Participants highlighted the State Natural Hazard Risk Assessment conducted by QFES in 2017 as an important step in assessing statewide current and future natural disaster risks. Participants also noted the QERMF, which provides a risk assessment methodology that can be used within disaster management planning at all levels of the QDMA. QFES's

strategic and operational planning for service amalgamation and integration with meteorological services was also discussed as a good initiative.

Some ongoing initiatives were also noted such as 'Operation Cool Burn', which is a program under which QFES conducts bushfire mitigation activities such as hazard reduction burning to reduce fuel

loads, improvement of strategic fire breaks by landowners, and targeted community education. It was also noted that Queensland Ambulance Service has increased its capacity so that it can better manage surge in demand during future extreme events.

### Local government hazard mapping and mitigation programs

The Qcoast2100 program provides funds to coastal local governments to conduct their Coastal Hazard Assessment Studies, which aim to identify areas and assets that are likely to be affected by sea-level rise and its associated processes such

as erosion and inundation (e.g. coastal hazard maps). Local government flood studies also consider climate change impacts on local flood probability and extents, and produce hazard maps that also inform local government planning

schemes. These studies inform land-use planning by local governments and provide the opportunity to restrict development in hazard-prone areas.

### Increasing community resilience programs

Community engagement and education programs such as 'Get ready' by the Queensland Reconstruction Authority and 'Pillow case' by the Red Cross provide opportunity to engage with the community and educate them about disaster risks and their potential increase in the future.

Red Cross conducts a project which engages with migrants from cultural and linguistic diverse backgrounds to educate them about disaster risks. Although these programs are not directly associated with climate change, they support engagement with communities and provide them with

information and education about future risks. Workshop participants also noted the importance of better early warning systems (e.g. 'opt-in' messaging services for severe weather alerts) in increasing community preparedness.

### Increasing resilience of critical infrastructure and services

The EM sector is reliant on critical infrastructure such as telecommunications, electricity, transport facilities and hospitals, and workshop participants discussed examples where efforts have been made to increase

the resilience of this infrastructure and the services that it provides. Examples highlighted by participants included Seqwater developing strategies to ensure its business continuity under future extreme conditions; the hospital in the

Livingstone Shire Council being relocated from a flood-prone area to a higher ground; a remote indigenous community Wujal Wujal that developed a backup communications system by (see Case study 1).

### Volunteer education and capacity-building programs

QFES runs volunteer capacity-building and education programs. These programs aim to enrich support to QFES volunteers so that their time can be used effectively

and strategically, and a more rewarding experience can be delivered to them. It is important to build a sustainable model for attracting, recruiting and retaining

volunteers that is applicable to local community needs and risk. Some of these works are already underway.

### Use of technology

Use of new and advanced technology in the EM sector is on the rise. Geospatial information systems are used frequently to better analyse risk-prone areas and their characteristics. This allows overlaying hazard maps, including climate change projections and sea-level rise inundation maps, with existing assets

and community settlements to identify the ones which are at risk. There has been adoption of improved frontline personal protective equipment for firefighters and improved firefighting techniques such as compressed air foam systems. A number of councils (e.g. Logan, Cairns, Gold Coast) have developed disaster

dashboards, which provide disaster-related local and relevant information such as early warnings, information about evacuation centres, flood water levels and maps, and live camera feed of flood-prone roads.

### Theme 3: Barriers and challenges for climate adaptation in the EM sector

Figure 22 shows a word cloud of major barriers and challenges for climate adaptation in the EM sector. These barriers and challenges are also described below.

#### Increasing cost of adaptation and lack of funding

Dealing with conflicting priorities, for example, balancing demands of current challenges against planning for potential future issues, is a major barrier for climate adaptation (58% of survey respondents). Therefore, like most other sectors, the EM sector struggles to fund adaptation

projects. Higher initial costs of adaptation are also seen as a major barrier, since many benefits are deferred (longer term). Climate change risks are often seen as one of many risks faced by an organisation, but one which is seen as more distant. Capacity and resourcing of

adaptation projects are more challenging in rural and regional areas of Queensland than in urban centres. Participants noted that there are often funds available to rebuild and recover after a disaster event, but a shortage of funding in between disaster events to build overall resilience.

#### Lack of guidance, proactive and preventive approach

Lack of guidance to act on adaptation within government is seen as one of the major barriers by the participants (36% of survey respondents). Leadership for managing climate change risks is often reactive. Participants noted that ‘reinventing the wheel’ happens over and over, resulting in programs losing momentum. Political leadership and the

absence of bipartisan support provide inconsistent messages to the community, hindering progress of societal action on climate change. Although local governments are leading on climate adaptation, they often lack the capacity and ability to influence beyond their jurisdiction. They also suggested that legislative structure and arrangements

are not supporting good decision-making, and often promote taking long-term decisions with a short-term vision. Participants suggested that such a lack of clear direction and guidance from governments delays actions against climate change risks and place greater burden on the EM sector.



Figure 22: Word cloud for major barriers to adaptation by the EM sector.



## Lack of community education, awareness and understanding of climate change risks

There is a lack of awareness about climate change risks among governments, practitioners in the sector and the wider community. Limited coverage of risks in the media, public resistance to change and the complexity of the problem are contributing to this. Participants noted that there is scope for improvement in communication of climate change science to communities and practitioners. As a result of such lack of awareness, many EM sector agencies have not assessed climate change risks to their own assets and operation.

Broader engagement around climate adaptation through community participation and collaboration with other sectors is required at the local level. Lack of awareness of the legal liability of not managing climate change risks is also seen as an issue for this sector. There is a lack of information in relation to the psychological impacts on EM staff, volunteers and communities as a result of potential increased future service.

Climate change risks vary spatially and temporally, and workshop participants suggested that often they do not

understand local scale risks. This limits their ability to communicate those risks effectively and trigger any necessary action. Although regional scale climate change projections and local scale sea-level rise and catchment flood maps are available, often translating scientific information into consequences for the EM sector and services is challenging. The lack of knowledge on how climate change will affect EM organisations' assets and operation at a local level is a barrier to adaptation of the sector (41% of survey respondents).

## Lack of mainstreaming of climate change risks

Workshop participants suggested that climate change risks are seen as a problem in the future, and are therefore often pushed back in favour of addressing

current risks. As a result, they are often not considered or integrated into the core business processes of organisations. This leads to not allocating enough resources

for managing climate change risks, which limits the EM sector's ability to plan for adaptation.

## Lack of cross-agency and cross-sectoral collaboration

There is a lack of connectedness between layers of government and essential services in terms of managing climate change risks. Silos in portfolio policy-making prevent coordinated approaches. Creating a framework for cross-sectoral planning and response is vital for effective adaptation in the EM sector. Participants noted that there is confusion over accountability for action, related to the roles and responsibilities of the Commonwealth and state governments.

Participants also noted that interagency communication within the EM sector and cross-sectoral collaboration (with agencies external to the EM sector) on managing future climate change risks are not as prevalent or frequent as they should be.

Critical infrastructure resilience is important for EM operations during disasters. Critical infrastructure is highly interdependent (e.g. high reliance of

all infrastructure on electricity and communications technologies), and it is important for relevant agencies to communicate and share information to build overall resilience of these systems. In this regard, understanding the resilience of each other's businesses is critical, but workshop participants suggested that often this information is considered confidential, and is therefore not shared.

## Social vulnerability and lack of community capacity

Socially vulnerable and remote communities can be less resilient and have limited capacity to adapt to future increased disaster risks. Existing

inequality in those communities can affect the ability of individuals and communities to recover from disaster. Participants suggested there is a need

to support vulnerable community groups and civil society.

## Lack of coordinated funding

The costs of increasing resilience are often borne by one sector organisation, but the benefits are enjoyed by others (e.g. increasing the height of a hospital

access road beyond a certain flood level will cost the transport department, but the benefits are widespread). There is a need to better coordinate funding across

different government departments to enhance effective adaptation within the sector.

## Inadequate urban / infrastructure planning

Inadequate urban planning often increases exposure to climate change risks as it allows development in hazard-prone areas, which increases

future disaster risks and makes any future adaptation in those areas more expensive. Workshop participants also suggested that disaster coordination

centres are sometimes located in old buildings and not in safe parts of town.

## Theme 4: Gaps and opportunities for adaptation

Figure 23 below summarises the key themes that emerged from discussions on gaps in current adaptation activities, and opportunities for adaptation in the future. These are also described below.



Figure 23: Word cloud for gaps and opportunities for adaptation in the EM sector.

### Increase community resilience and take adaptation action

Participants felt that taking action and managing climate change risks will provide a great opportunity to increase resilience of the EM sector. This will bring communities together and promote collaboration within and across sectors to use resources efficiently for solving a common problem. The EM sector generates significant levels of trust within the community, which can unify people on climate action to achieve bipartisan

support from policy-makers. Initiatives to build capacity in the community, EM workforce and volunteers in regional areas are needed, so that when they are cut off by disasters, they can continue to serve the community before outside help arrives. Relying more on local capacity for transport, energy, food and water can build local resilience.

Rebuilding critical infrastructure better

after a disaster, with increased capacity to withstand future hazards, will reduce future costs. Increasing the resilience of critical infrastructure is essential for maintaining services that are required to support the EM sector. Planning for a resilient food system to ensure supply both during disasters and in relation to longer term climate stressors would provide food security.

### Awareness raising and engagement about climate change

Participants suggested that there are certain gaps in education and awareness among EM staff, volunteers and the community about climate change risks. Strategically designed education and awareness programs can enhance

preparedness and adaptive capacity and help build resilience. Using social media to disseminate information and alerts can be effective. A positive message about the benefits of climate action is needed. Better communication of climate science

and local climate change risks can also trigger actions within the community to build its resilience. Inclusion of climate-related education in all levels of the education curriculum is important.

## Work with insurance and business sectors to drive adaptation action

It is important to increase disaster resilience of the supply chain of the business sector so that impacts on local economies can be minimised. As an example, critical assets of businesses needs to be made more disaster-resilient

(e.g. relocating assets to higher ground in flood-prone areas). The insurance sector can drive change towards community resilience via price signals (e.g. higher cost of insurance in the hazard-prone areas). The EM sector needs to work

collaboratively with the business and insurance sectors to promote increasing community resilience and reduce reliance on emergency services.

## Co-benefits of climate mitigation and adaptation

Participants suggested that there is a gap in efforts to reduce carbon emissions by the EM sector. Mitigating carbon emissions by the EM sector,

including investment in renewable energy generation, can lead to more efficient use of resources and reduced costs. Use of renewable energy such as solar with

battery capacity can increase resilience of EM facilities under extreme events and make them less reliant on a centralised electricity supply.

## Better policy and urban design

There are gaps in coordinated policy-making across governments and sectors. Climate adaptation actions can provide opportunities to improve urban design and policy for improving the general wellbeing of the Queensland community. Improving early warning systems for natural hazards (e.g. heatwave, flood) will contribute towards making communities more resilient. A review and update of approaches at all levels of government to build on existing

knowledge and fill in gaps (e.g. taking a research approach) would be beneficial. Bringing stakeholders together in a cross-sectoral approach can improve engagement through co-production of policies. Policy can be improved by inclusion of monitoring and evaluation strategies to ensure recommendations are implemented and followed up. Participants suggested the need to review building codes to investigate whether they need to be updated, as cyclones may

move further south in the future. Often there are discrepancies in the resilience of different components of a building that need to be addressed (e.g. roofs are resilient to cyclone, but walls are not).

Participants noted that there are opportunities for better coordination between organisations and peak bodies across sectors (e.g. COAG, AFAC, Engineers Australia) to promote system-wide climate change risk management.

## Making climate change risks – ‘business as usual’

Often climate change risks are not integrated within core business processes of agencies. Including climate change risks within core business processes will

ensure close monitoring of these risks with time, and allow agencies to make long-term plans to gather necessary resources to implement adaptation

actions and reduce future risks on agencies’ assets and operations.

## Volunteer management and recruitment approaches

There are gaps in sharing resources across the EM sector for training and capacity building of volunteers. Participants noted that there are opportunities to develop

combined training programs for EM staff and volunteers for activities that are common across agencies. This will allow sharing volunteers across EM agencies,

and can also free up additional resources for further resilience-building of agencies.

## Interagency collaboration and integration

Participants noted that there is a gap in terms of leading and coordinating climate change initiatives of the EM sector in Queensland, as it is not clear what the roles of LDMGs or DDMGs are. There needs to be a greater collaboration across these groups in terms of climate change initiatives and action.

Participants highlighted gaps in coordination of data and information sharing across different agencies within the EM sector. Increasingly more data and information are available, but sharing across EM agencies and other organisations (e.g. councils, hospitals, infrastructure managers) is limited. There

are opportunities to develop data sharing arrangements so that information can be fed into the decision-making of multiple agencies across the EM sector. Such capacity and decision support tools can enhance the sector’s capacity to meet future demands.

### Use of advanced technologies to manage risks

The EM sector in Queensland is adopting new technologies for managing risks, and there are more opportunities to use smart technologies for future risk management. For example, participants

noted that drones are already in use for initial damage assessments after a disaster event. There are opportunities to use smart technologies such as sensors, the Internet of Things and analysis of

remotely sensed images to get real-time information in disaster coordination centres to assist decision-making under future extreme conditions.

### Filling knowledge gaps through research

The top three knowledge gaps identified by stakeholders were:

- understanding risks at a local scale
- behaviour and processes that can promote community preparedness

- understanding impacts on the EM sector as a result of cascading failure of infrastructure and services.

See Figure 24 for the full list of knowledge gaps. Participants recommended

coordinated efforts to fund practical research projects to address some of these knowledge gaps.

**What knowledge gaps prevent the best possible decisions being made about present and future climate change adaptation?**

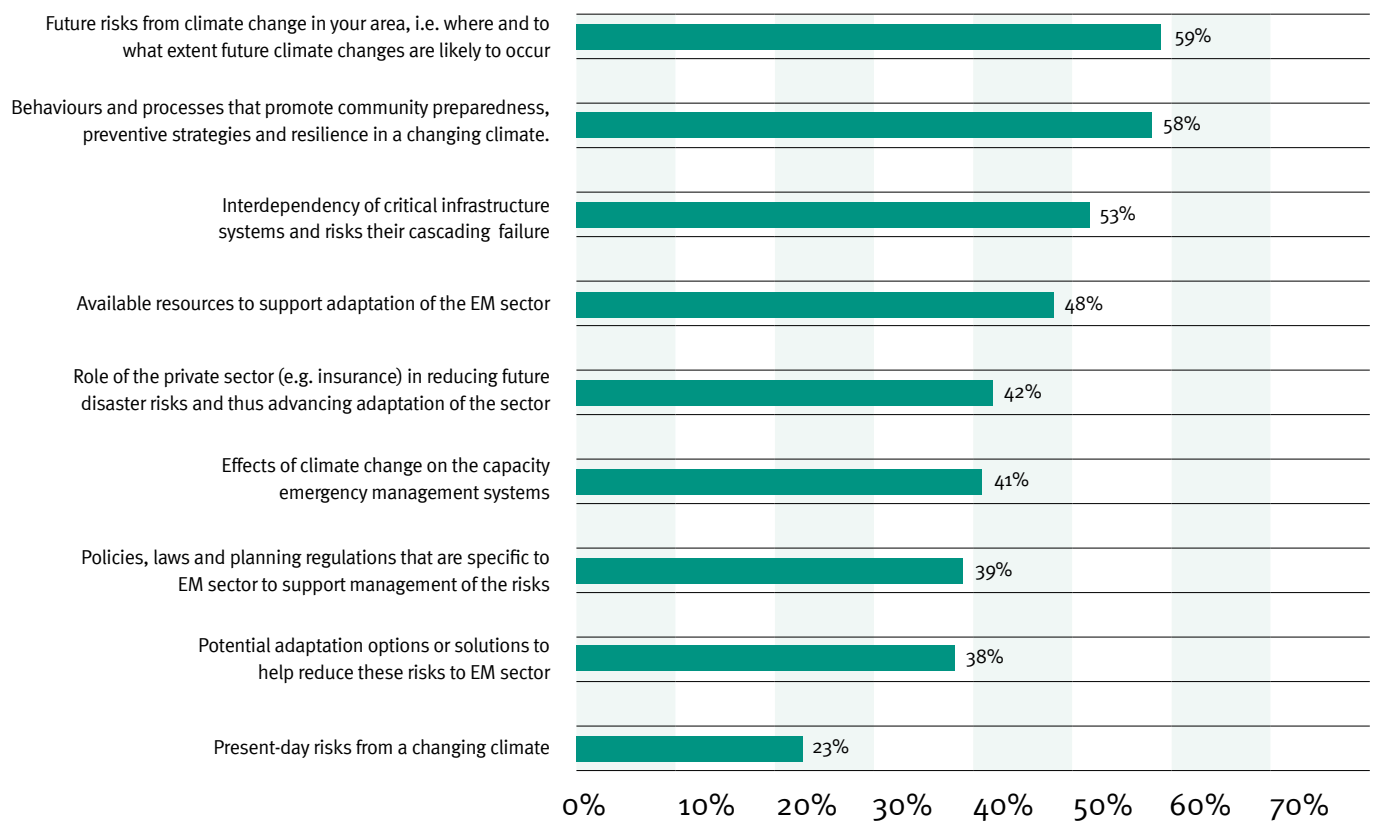


Figure 24: Knowledge gaps preventing future adaptation of the EM sector.





## Theme 5: Priority needs to enable successful adaptation (pathways to action)

Figure 25 broadly portrays the major adaptation pathways, which are further discussed below.

### Leadership and policy-making across governments and within sector organisations

Pragmatic action and coherent government policies are required for effective adaptation by the EM sector. Adaptation activities should be accommodated within the existing business practice of EM agencies and other related organisations. It is important to promote innovation in managing climate risks within the sector. Policies need to be developed that can allow EM sector agencies to move from ad hoc strategy to a more systematic approach,

and allow integration of climate change risks within organisations' core business processes.

Procurement policies within the sector need to be reviewed to ensure that they consider climate change risks. Climate change risks and their management options should be included in disaster management guidelines. It is also important to consider that increasing resilience of our communities and

infrastructure today will save future damage costs, which will provide an opportunity to free up disaster rebuilding funds. However, appropriate leadership and policies are required within the sector to invest in resilience building. Policy-makers and leaders should be lobbied to support climate adaptation across communities and sectors, as the benefits are widespread and enable disaster mitigation and preparedness.

### Education and awareness of climate change risks for EM staff, volunteers and the community

Participants suggested that awareness training within EM sector organisations, volunteers and the community in general is a priority action. Specifically, the EM

sector's credibility needs to be leveraged to influence education and awareness within community. There should be investment in community education

and awareness, including shared responsibilities and the importance of being resilient.

### Allocation of resources to support adaptation by EM sector organisations

Funding and support for EM sector organisations to undertake mitigation and adaptation activities is critical. Specifically, resources are required for understanding climate change risks to organisational assets and operations. Participants noted that it is important to leverage on existing funds and grant opportunities (e.g. National Disaster Relief and Recovery Arrangements) to support these activities. A pathways approach should be adopted by EM agencies so

that funding required for adaptation activities can be spent over many years, based on identified priorities that can reduce initial high cost of adaptation.

It was also suggested to promote innovation across the EM sector and provide funds to support development of innovative solutions to future EM sector challenges (e.g. start-up innovation grants). It is important to provide necessary data, tools and information to LDMGs and DDMGs about climate change

risks, and clearly define their roles and responsibilities.

Participants suggested that treasury departments (federal and state) should be engaged in the adaptation process so that appropriate funds are allocated for adaptation by the sector. It was suggested that the financial and legal drivers need to be made more prominent to encourage decision-makers to allocate funds to address adaptation and climate risk management.

### Increase resilience and adaptive capacity of EM sector organisations

Initiatives that build capacity of EM sector organisations to climate change risks should be promoted. Specifically, increasing the capacity of EM sector organisations in regional areas is critical.

It was suggested in the workshops that the focus should be on increasing resilience of the sector, not just adapting to climate change. Proper training should be provided to staff who are initiating

and managing ongoing cross-sector collaborative projects on climate change. It was also suggested that best practice guidelines on climate adaptation be developed for the EM sector.

### Understand climate change risks to assets and operations of EM sector organisations

EM sector organisations, including volunteer organisations, should conduct climate change risk assessments to understand risks to their own assets

and operations. Participants suggested audits to identify the extent to which agencies have already conducted such assessments, and areas for further action.

Where resources are not available for immediate risk assessments, agencies could plan to conduct this every two to three years.

### Collaboration and resource sharing

Stakeholders highlighted the need to collaborate with the insurance industry (e.g. Insurance Council of Australia). Participants noted that there needs to be collaboration within the EM sector to share volunteers and training facilities to enable combined training programs for

tasks and activities which are common across agencies and low in risk.

It is important to develop greater levels of trust between agencies within and outside the EM sector to promote information sharing and collaboration.

There is a need to establish formal data-sharing arrangements within the EM sector and across sectors for enhanced decision-making. Frameworks for cross-sectoral planning and response are vital for effective adaptation by the EM sector.

### Promote community resilience building and self-reliance

It is important to build community self-reliance and resilience to manage demand on the EM sector in future. Such awareness can be raised through campaigns focusing on climate change and community resilience (e.g. on-ground

campaign, social media or traditional media), climate change awards, and recognition of community climate change champions. There can also be a distinct disjunction between what the community ‘wants’ and what the community

‘needs’. Effective engagement with the community can drive change and build resilience. Participants suggested that resilience-enhancing behaviours should be promoted as part of community engagement.

### Volunteer and workforce management

Increased demand for volunteers in the future needs to be addressed. There should be programs to attract youth into

volunteering, potentially starting from schools. Notably, some of these programs are already underway. There also needs

to be increased collaboration between EM agencies to train and broaden the pool of volunteers.

### Increase resilience of critical infrastructure

Planning is a tool that can be used to great effectiveness in building resilience to climate impacts in both hard (physical) and soft (community and social assets) infrastructure. Urban planning that accounts for climate change can help address coastal hazards such as flooding,

but should also protect against heatwaves through building design, public transport and infrastructure. Future urban planning decisions need to account for potential risks from climate change (e.g. sites for key infrastructure like hospitals, roads, water storage, and sewerage plants).

Investing in better communications infrastructure is considered vital to improve access to regional and remote communities to help prevent disconnection following extreme weather events.

### Research and development of new knowledge and supporting tools

Better data (e.g. climate change and sea-level rise projections, finer scale asset information, real-time information of hazards) to understand local scale risks would help support better decision-

making. Research and development of data-driven decision support tools that can use new technologies (e.g. drones, Internet of Things, sensors), along with sophisticated models and advanced

analytics, will enhance the EM sector’s capacity to meet future increased and complex demands.



Figure 25: Word cloud for ways to support effective adaptation by the sector.



## Appendix 3: EM-SAP priorities categorised by EM phases

Allocation of priority adaptation measures across four distinct phases of emergency management (prevention, preparedness, response and recovery).

Priority	Identified actions	Prevention	Preparedness	Response	Recovery
Sector-led awareness and engagement about climate change	Build on existing community education and engagement programs within and outside the sector to include climate change science and associated impacts, and create engagement and awareness where they don't exist.		X		
	Incorporate or provide access to climate change education and training for the emergency management workforce.		X		
	Partner with schools, tertiary institutions and professional peak bodies to incorporate climate adaptation and emergency management as a consistent theme in curriculum and professional development training and education programs.		X		
Integration of climate change into sector governance and policy	Implement clear and long-term policy on climate adaptation within sector organisations.	X	X	X	X
	Facilitate integrated planning across the sector and within government for the management of climate change and adaptation activities.	X	X	X	X
	Influence legislative reform that supports a consistent approach to climate change at all levels of government.	X	X	X	X
	Examine sector procurement policy to understand future sustainability and adaptability to climate change, and where possible, to drive appropriate change in supply chains.		X		
Enhancing the sector's understanding of climate change risk and its ability to adapt	Incorporate climate change consideration into organisational resilience practices, including enterprise risk management, business continuity planning, crisis management, emergency management and security management.	X	X		
	Develop an approach consistent with the 'State Government pathway' that enables a consistent evaluation of climate risk across sector organisations.	X	X	X	X

Priority	Identified actions	Prevention	Preparedness	Response	Recovery
Enhancing the sector's understanding of climate change risk and its ability to adapt	Work with local governments, disaster management groups and natural resource management groups to manage 'natural infrastructure' to reduce harm from natural disaster events.	X	X		
	Deliver the necessary data, tools and information to disaster management groups about climate change.	X	X		
	Examine the feasibility of a review that conducts an assessment of existing and planned sector facilities and their interdependencies against future climate change projections, with the aim of reducing future climate risk	X	X		
Research and development of new knowledge and supporting tools	Provide support and partnerships for research projects that inform sector climate adaptation, such as those that explore climate change science, application-ready data for activities such as risk assessment, and development of innovative adaptation solutions.	X	X		
	Provide access to data and decision support tools for understanding local-scale climate change risks.	X	X		
	Use advanced technology to support sector activities and decision-making in climate change applications, such as enhancement of personal protective equipment to cater for anticipated climate change, use of remote sensing and imagery, and evolving mitigation options.	X	X	X	X
	Develop a dynamic suite of guidelines and tools that foster information sharing and provides examples of sector approaches or case studies of better practice for climate adaptation.		X		
Allocation of resources to support sector adaptation	Influence funding stream alignment within and beyond the sector where possible to allow for climate adaptation initiatives.		X		
	Encourage sector organisations to allocate resources for research and development, risk assessment and planning and, capacity and capability enhancement for the purposes of climate adaptation.	X	X		



Priority	Identified actions	Prevention	Preparedness	Response	Recovery
Allocation of resources to support sector adaptation	Forge partnerships that foster investment in climate adaptation between and beyond sector stakeholders, particularly those that support cost-sharing or sharing of other resources.	X	X		
	Identify opportunities across all levels of government to enhance the coordination of resources targeting climate adaptation.	X	X	X	X
Increasing the resilience of infrastructure critical to the sector and community	Understand infrastructure interdependencies and vulnerability of the sector, and plan and implement adaptation solutions.	X	X	X	
	Influence the incorporation of climate scenarios into land-use planning for essential infrastructure and communities.	X	X		
	Foster partnerships and joint planning between the sector and infrastructure operators and owners.	X	X		
	Where possible, ensure sector organisations are involved in land-use and infrastructure planning processes and are resourced to effectively contribute.	X	X		
Promoting and enabling community resilience-building and self-reliance	Continue to advocate for and facilitate activities that foster community resilience.	X	X	X	X
	Influence land-use and urban planning through incorporation of climate change scenarios and risk information.	X	X		
	Undertake engagement activities that incorporate community self-reliance and resilience-building activities in preparation for, and use during, times of disaster.	X	X	X	X
	Work closely with other government and non-government organisations to increase the resilience of the community to climate change.	X	X		
Volunteerism, volunteering and workforce management	Evaluate the impact of climate change on the availability of volunteers across the sector to continue to deliver goods and services across the state.		X		

Priority	Identified actions	Prevention	Preparedness	Response	Recovery
Volunteerism, volunteering and workforce management	Incorporate climate change risks into volunteering and workforce strategies and planning across sector organisations, and in emergency management planning.		X		
	Foster partnerships between sector organisations, the community and beyond to enhance collaboration and cross-utilisation of the existing and future volunteer and paid workforce.		X		





# Climate Change

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