

# WORKSHOP BRIEFING PAPER

Queensland Climate Adaptation Strategy

## Challenges and responses

Background context for policy development, including issues and responses across sectors

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# 1 Where are we now

Queensland knows too well the force of volatile and extreme weather conditions, floods, cyclones, heat waves and bushfires. However scientists warn that Queensland will increasingly be affected by changes in temperature, rainfall, sea level and an amplified frequency and severity of extreme weather events. With this knowledge, it makes good economic sense to take action sooner rather than later and better manage our climate risks.

Taking well-considered and effective action can limit the adverse impacts on communities, natural systems and the economy. Broadly, ‘adaptation’ actions aim to reduce the adverse consequences of climate change on both human and natural systems.

How we adapt to climate impacts can take many forms, including changing the way we do business, build infrastructure or facilitate species movement. Other actions may involve building the resilience of existing human and natural systems to withstand or recover from impacts. For some, this might include building flood levees to protect existing development or defending ecosystems from threats such as pests and weeds which weaken resilience.

While drought affected parts of Queensland remain stressed, and recent cyclones, floods and hail storms remind us of the vulnerability of our built environment and ecosystems, the capacity of Queenslanders to come together in response to major events also demonstrates our resilience.

## 1.1 Queensland Government investment in Climate Adaptation

### 1.1.1 Queensland Climate Adaptation Strategy (Q-CAS)

The Queensland Government is investing \$3 million over three years to support the development and implementation of a collaborative [Queensland Climate Adaptation Strategy \(Q-CAS\)](#), and investment in adaptation starts with consultation.

Working across sectors with help from [Q-CAS Partners](#), the strategy will seek to improve opportunities and reduce risks to our economy, environment, infrastructure and communities from current and future climate impacts. Central to the Q-CAS will be recognition that climate impacts are best managed by those who carry the risk. This will enable adaptation responses to influence how and where we live in the context of quality of life and affordability challenges, the need for resilient sources of food, water and energy, and the need to accommodate competing land uses.

By working together Queensland will be better placed to plan for and manage current and future climate impacts across different sectors and regions.

### 1.1.2 Climate Change (Coastal Hazards) Adaptation Program (CHAP)

Over the next three years, the Queensland Government will invest \$12 million in the [Climate Change \(Coastal Hazards\) Adaptation Program \(CHAP\)](#).

Delivered through the Local Government Association of Queensland, the CHAP will help coastal councils plan and prepare for storm tide, coastal erosion and rising sea levels from climate change. This will be critical to ensuring the long-term functionality and sustainability of coastal communities

The CHAP recognises that Queensland’s coastal councils are at different stages in their adaptation journey, with some yet to commence and others having completed a comprehensive coastal hazard

## Queensland Climate Adaptation Strategy – Background Briefing Paper Not Government Policy

adaptation strategy. As a maritime economy, Queensland's import and export trade, defence, and tourism industries will all benefit by avoiding impacts through better planning.

### 1.2 Queensland adaptation policy framework

Q-CAS will align with a number of Queensland Government planning, NRM, critical infrastructure, disaster resilience, innovation and industry development policies, investment and engagement frameworks including:

- ✓ Qld Government Climate Change Interdepartmental Committee
- ✓ Climate Change Adaptation Strategy and Action Plan Great Barrier Reef (2012-2017)
- ✓ Reef 2050 Plan
- ✓ Sustainable Planning Act 2009 [SPA]
- ✓ Coastal Protection and Management Act 1995
- ✓ State Planning Policies, the Integrated Development Assessment System (IDAS) and the State Assessment and Referral Agency (SARA) arrangements
- ✓ Disaster Management Act 2003 and the Disaster Management Strategic Policy Framework
- ✓ Advance Queensland

### 1.3 Adaptation connected to mitigation

With overwhelming evidence demonstrating the link between greenhouse gas emissions and climate change, policy development in many jurisdictions has focussed on reducing emissions to avoid catastrophic climate change. These efforts are commonly referred to as mitigation and will need to be continued and strengthened.

As the United Nations Framework Convention on Climate Change conference moves to Paris in December 2015, the world has agreed to take action to limit global warming to 2°C above pre-industrial levels. Even at 2°C global warming Queensland is expected to see serious risk from associated impacts. Despite this, if all the global commitments being made leading into the Paris negotiations were to be implemented, there would be a 3.5°C increase above pre-industrial levels.

This realisation provides even stronger arguments than before for continuing to pursue aggressive reductions in greenhouse gas emissions, particularly when the cost of mitigation is far lower than the cost of adaptation. For this reason, where possible, adaptation and mitigation action should be coupled to achieve maximum benefit and to ensure that adaptation supports mitigation.

When couched in a risk reduction approach, actions that combine adaptation and mitigation can strengthen the adaptation investment business case. For example biodiversity corridors that act as carbon sinks while building capacity for fauna and flora to adapt; decentralised energy and water systems that reduce greenhouse emissions while building energy/water system redundancy and resilience; and saltmarsh and mangrove ecosystem protection which sequesters blue carbon, promotes fish stocks and maintains buffers for sea level rise and storm surge.

## 1.4 The Climate

The 2014 ‘State of the Climate’ report by CSIRO and Bureau of Meteorology states:

*Air and ocean temperatures across Australia are now, on average, almost a degree Celsius warmer than they were in 1910, with most of the warming occurring since 1950. This warming has seen Australia experiencing more warm weather and extreme heat, and fewer cool extremes.*

*There has been an increase in extreme fire weather, and a longer fire season, across large parts of Australia. Rainfall averaged across all of Australia has slightly increased since 1900. Since 1970, there have been large increases in annual rainfall in the northwest and decreases in the southwest.*

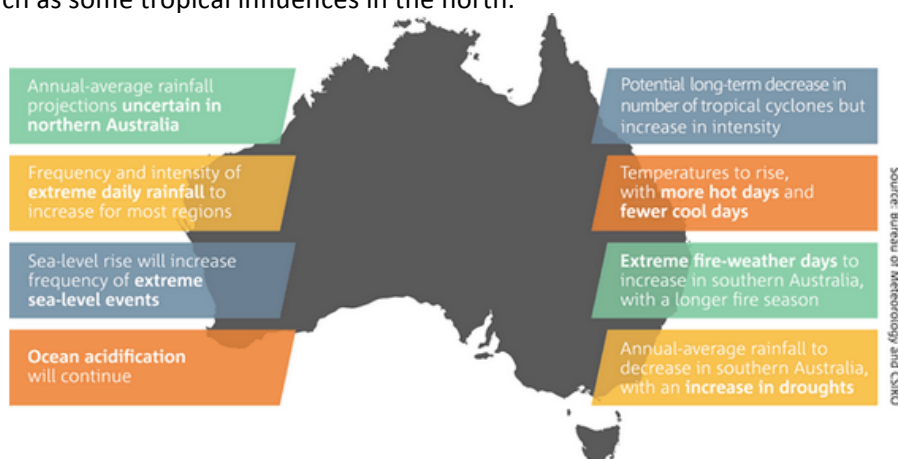
*Autumn and early winter rainfall has mostly been below average in the southeast since 1990. Atmospheric greenhouse gas concentrations continue to rise and continued emissions will cause further warming over this century. Limiting the magnitude of future climate change requires large and sustained net global reductions in greenhouse gases.*

### 1.4.1 Key State of the Climate 2014 projections include:

- ✓ **TEMPERATURE** - Temperatures are projected to continue to increase, with more hot days and fewer cool days. The number of extreme fire-weather days is projected to grow in eastern Australia with a longer fire season; by 10 to 50 per cent for low emissions and 100 to 300 per cent for high emissions, by 2050 compared with the climate of 1980 to 1999.
- ✓ **RAINFALL** - The frequency and intensity of extreme daily rainfall is projected to increase. For northern Australia the projected changes in rainfall range from a 20 per cent decrease to 10 per cent increase by 2070 for low emissions, and a 30 per cent decrease to 20 per cent increase for high emissions.
- ✓ **CYCLONES** - Fewer tropical cyclones are projected for the Australian region, on average, with an increased proportion of intense cyclones. However, confidence in tropical cyclone projections is low.
- ✓ **SEA LEVEL RISE** - Sea-level rise around the Australian coastline by 2100 is likely to be similar to the projected global rise of 0.28 to 0.61 metres for low emissions and 0.52 to 0.98 metres for high emissions, relative to 1986–2005. Higher sea levels by 2100 are possible if there is a collapse of sectors of the Antarctic ice sheet grounded below sea level. There is medium confidence that such an additional rise would not exceed several tenths of a metre by 2100. Under all scenarios, sea level will continue to rise after 2100. Projected sea-level rise will increase the frequency of extreme sea-level events.
- ✓ **OCEAN ACIDIFICATION** - The pH of surface waters in the open ocean has decreased by about 0.1 since 1750, equivalent to a 26 per cent increase in the activity of hydrogen ions (a measure of ocean acidity). Ocean acidification is projected to continue.

### 1.4.2 Climate Change in Australia: Projections for Australia’s NRM regions

CSIRO has released [updated climate projections](#) that align to NRM areas structured by regional clusters and sub-clusters. For example, the **East Coast North sub-cluster** comprises NRM regions in the central part of the eastern seaboard of Australia, and encompasses important headwater catchments for a high proportion of Australia’s population and has a predominantly sub-tropical climate, with regional variations such as some tropical influences in the north.



*Climate scenarios for Australia. Projections are based on our assessment of changes simulated by many climate models from around the world, including Australia.*



## 2 Previous feedback

In 2011 the Queensland Government released the *Climate Change: Adaptation for Queensland Issues Paper* soliciting public feedback to support climate adaptation strategy development. This process generated 63 written submissions.

### Overall the most discussed issues were:

- *Expressions of support for the adaptation work being undertaken by the State (54%)*
- *Need for more community education/information (50%)*
- *Need for more information at a regional/local level (48%)*
- *The disabling effect of uncertainty (29%)*
- *Problems with communication of scientific information (25%)*
- *Use of refuges and corridors in building ecosystem resilience (25%)*
- *Community perception of recycled water (22%)*
- *Need for State to play a 'hub' role with respect to information sharing, collaboration, programs (20%)*
- *Strengthening community cohesion (19%)*
- *Moving beyond a flood-centric focus to include risks such as bushfire, heatwave and drought (17%)*
- *Actual and perceived legal liability risks for local government (17%).*

Various barriers to adaptation were addressed including complacency, cost, lack of awareness and a need for community education. The primary barrier to adaptation reflected in submissions was uncertainty, particularly uncertainty around projected sea level rises and inconsistencies in messaging. Actual and perceived legal liability was a key barrier identified in local government submissions.

A number of submitters discussed the role the State should play in managing adaptation. Most of these submissions focussed on the need for the State to play a key role in filtering and disseminating information, educating the community and improving collaboration between affected organisations. One respondent succinctly summed the concept: *'the State should be a clearing house for information about adaptation and responses not just risks and impacts.'*

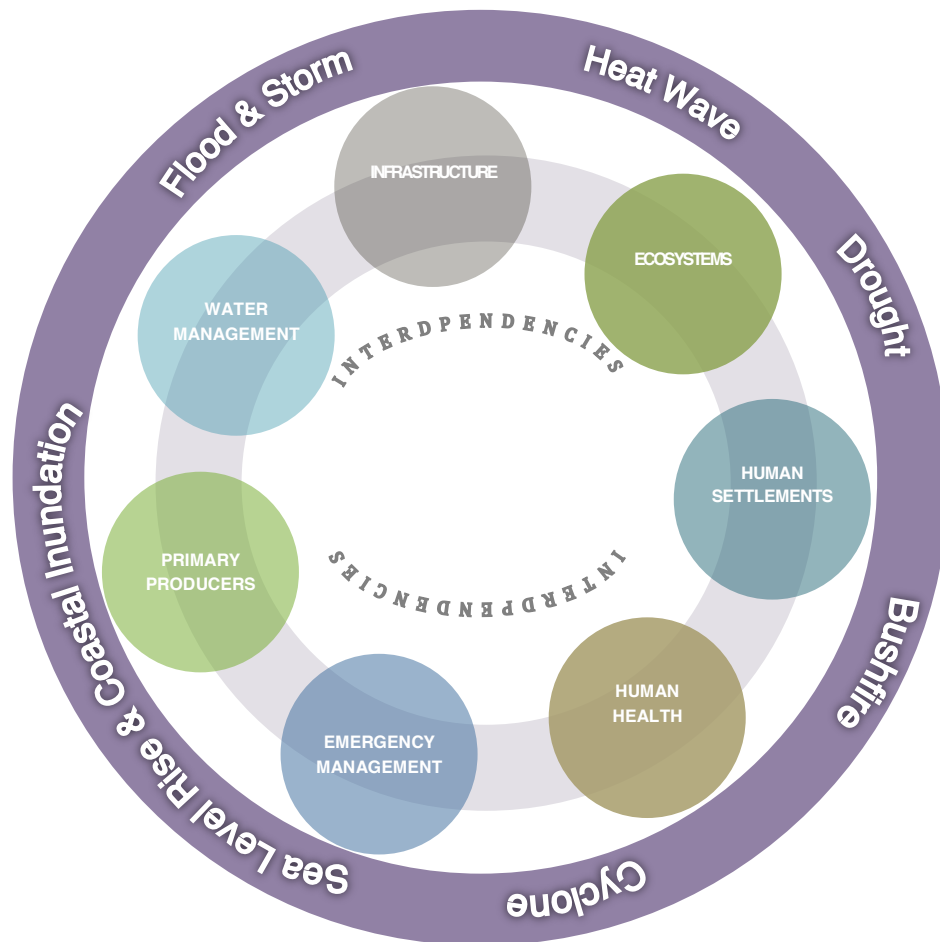
A significant number of submissions also discussed the need for more information at a local or regional scale, particularly regional-level modelling predictions and regional risks and impacts.

### Support was identified for:

- **INFRASTRUCTURE, WATER MANAGEMENT & HUMAN SETTLEMENTS** *risk of legal liability for local government; diversify energy & water supply and address interdependencies; strengthen building standards; 'climate proof' key infrastructure; address urban heat island; greater collaboration between infrastructure owners.*
- **HUMAN HEALTH & EMERGENCY MANAGEMENT** *strengthen communities and increase social cohesion; open public air conditioned areas for community use during heat wave events; more community open spaces and neighbourhood centres to strengthen communities; support disproportionately impacted low social-economic and disadvantaged Queenslanders; move beyond a flood-centric focus to include risks such as bushfire, heatwave and drought.*
- **ECOSYSTEMS** *more refuges & corridors to build ecosystem resilience; link carbon sequestration to biodiversity outcomes; ID indicator species for baseline monitoring; prioritise adaptation for the Great Barrier Reef.*
- **PRIMARY PRODUCERS** *improve food security through protection of good quality agricultural land, building and extending resilience planning, and by advancing urban agriculture.*

### 3 Issues and responses across sectors

Building on the 2011 ‘Climate Change: Adaptation for Queensland’ issues paper and public consultation responses, Q-CAS will address adaptation challenges and opportunities associated with responding to six major climate drivers across seven sectors, essential for maintaining the core functions of a healthy and prosperous society. Governments and financial institutions are key drivers of adaptation responses across all sectors.



Sector representatives are helping to frame the climate adaptation challenge.

- **PLANNERS** reflect that climate risks and vulnerability are unevenly distributed and generally greater for disadvantaged people and communities. Long-term strategic leadership can enhance coordination of policy responses across levels of government. Also, a sensible and sustainable framework for balancing property rights and community interests in a changing climate is essential. The rapidly evolving data and science on climate change also mean that planning systems need to be designed so that they too can adapt to change.
- **PROPERTY DEVELOPERS** have identified risks surrounding infrastructure interdependences and compounding risks that may lead to ‘black swan’ type events. Customer risks include health, safety and financial security.” Adaptation leaders are exploring ways to use existing knowledge, science, research and evidence to inform policy development and support collaborations across government, private and community sectors to take positive actions towards building climate resilience.
- **ADAPTATION RESEARCHERS** suggest reducing greenhouse emissions in ways that contribute towards long-term environmental and economic sustainability and build resilience to the impacts of climate change. They look for the win-win strategies that address present-day risks and build long-term resilience to climate change.

### 3.1 Human Settlements – key impacts, consequences and responses

Issues arising from climate change impacts				<i>Human Settlement Responses</i>
Higher temperatures	Variable rainfall	Extreme weather	Sea level rise	
<p>Property damage and air quality deterioration due to peri-urban bushfire</p> <p>Intensification of heat island effect</p> <p>Stress on urban landscapes</p> <p>Reliance on air conditioning with risk of black-outs and escalating greenhouse emissions</p>	<p>Flood risk to exposed urban areas</p> <p>Inadequate water supply for urban areas</p> <p>Impact of drought on urban food security</p> <p>Public attitudes towards recycled water and desalination</p>	<p>Increased damage to private property from storms, landslides, floods, bushfires, storm surges – especially given population growth and development.</p> <p>Risk of flash flooding in concentrated parts of cities</p> <p>Risk of flash flooding</p> <p>Need for redundancy in energy and water supply</p>	<p>Severe storms combined with rising sea levels cause severe erosion/inundation leading to property damage and reduced property values</p> <p>Increasing coastal erosion remediation costs and risks to tourism and amenity</p> <p>Uncertainty about liability associated with land use planning</p>	<p>Need to better plan for flood risks, develop adaptation strategies for high-risk coastal areas, address barriers to adaptation action and plan climate resilient developments.</p> <p>Need for innovative design, materials, planning and regulation responses and incentives to build resilient homes, buildings and communities.</p> <p>Local governments need down-scaled data and funding support for planning, implementation and evaluation of adaptation measures, as well as improved organisational and engagement models that integrate climate considerations. Risk of liability is a key barrier to adaptation. Needs to continue to be greater availability, transparency and exchange of hazard data so community and participating sectors have a greater chance of having united position to tackle different hazards.</p> <p>Developers need to minimise increase in operational and maintenance costs, enable informed future investment decisions, reduce liability and insurance premiums by ensuring assets are climate prepared, increase customer comfort levels and avoid early retirement of assets within portfolios.</p> <p>Ensure that the benefits and entitlements of working Queenslanders are protected into the future as climate impacts grow.</p> <p>Ensure that ports and rail networks connecting resource hubs and coastal settlements adopt pathways enabling adaptive capacity as impacts intensify.</p>
<p>Major consequences of impacts include property losses and damage from bushfires, reduced pedestrian comfort due to heat island effect, and disruption to business continuity from flooding and blackouts.</p> <p>Coastal trade related infrastructure is at risk from gradual climatic changes including sea level rise and severe shocks.</p> <p>Recognise limitations, small businesses may have to adapt.</p> <p>People from lower socio economic backgrounds impacted the most from CC impacts because-</p> <ul style="list-style-type: none"> <li>• Can't afford energy efficient products</li> <li>• Seniors and non-English speaking background people struggle to manage energy usage</li> <li>• Less prepared to disaster events</li> <li>• Require affordable insurance</li> <li>• Less access to energy efficient products and concessions.</li> <li>• Less likely to fully understand the risks, challenges and solutions.</li> </ul>				



### 3.2 Infrastructure – key impacts, consequences and responses

Issues arising from climate change impacts				Infrastructure Responses
Higher temperatures	Variable rainfall	Extreme weather	Sea level rise	
<p>Pressure on the energy grid during heatwave events and associated risks of supply failure and business disruption</p> <p>Accelerated deterioration of heat-sensitive infrastructure, such as road surfaces.</p> <p>Impacts on water security for other sectors including resources and primary producers if water shortages arise through competing uses.</p>	<p>Pressure on water supply systems</p> <p>Damage of existing infrastructure due to flooding</p> <p>Failure of sewage and wastewater systems during intense rainfall.</p>	<p>Increased damage to public infrastructure from storms, landslides, floods, bushfires, storm surges</p> <p>Disruption to essential services such as electricity, water, sanitation</p> <p>Business continuity disruption relating to disaster-affected assets and interdependent communities</p> <p>Reduce risk, damage and impact from climate change related events</p>	<p>Severe storms combined with rising sea levels damage public coastal infrastructure</p> <p>Rising sea levels will cause water tables to rise, with flow on effects for underground infrastructure</p> <p>Increased exposure of concrete foundations to salt water may affect structural integrity and longevity.</p>	<p>Green infrastructure benefits can outweigh costs and deliver multiple outcomes including wetlands that reduce impacts of storm surge and urban landscapes that mitigate flooding and urban heat island effects.</p> <p>A systems approach which prioritises adaptation for critical infrastructure is needed to minimise the chances of a cascade of infrastructure failures, particularly during and following extreme weather events.</p> <p>To maintain affordable service delivery, adaptation for infrastructure will need to be cost effective and innovative.</p> <p>Adaptation policy responses need to recognise that the drivers for decision-making are different for operators of private versus public infrastructure.</p> <p>Need to design critical infrastructure to cope with increased climate change and ensure up to date hazard data is available to assist infrastructure and land use planning.</p> <p>Need to develop a better understanding of the nature, timing, impact and consequences of climate change for the electricity network. Promote innovation in relation to the development, integration and use of renewable energy systems with a view to reducing greenhouse emissions while adapting.</p> <p>Distributed generation can build redundancy into energy supply (diesel generators may be better for night usage unless PV is coupled with storage).</p> <p>Need to move away from a culture of disaster-initiated responses and towards embedded processes that tackle vulnerabilities before disaster strikes.</p>
<p>Infrastructure such as transport, communications, energy, water, emergency services, schools, and hospitals, are vulnerable to climate change.</p> <p>Potential impacts include disruption to transport, failure of urban drainage and sewerage systems, more frequent power blackouts and lost telecommunications, damage to buildings, pipes and wires and accelerated degradation of structures and materials.</p>				

### 3.3 Ecosystems – key impacts, consequences and responses

Issues arising from climate change impacts			Ecosystems Responses
Higher temperatures & Variable rainfall	Extreme weather	Other stressors	
<p>Biodiversity decline in Queensland’s terrestrial and freshwater aquatic ecosystems will be driven by changes in average environmental conditions, including changes in temperature, rainfall patterns and levels of atmospheric carbon dioxide.</p> <p>Marine ecosystems will be affected by changes in water temperature, circulation patterns, water chemistry (for example, pH, salinity and/or nutrient supply), sea level, tropical cyclones and climatic anomalies such as ENSO events and El Nino/La Nina.</p> <p>Coral bleaching will have severe impacts on the Great Barrier Reef and the ecosystems and economies that depend upon them.</p> <p>Ecosystems that occur in and around fresh or salt water systems will be affected by a combination of these changes, and other factors such as sea level rise.</p> <p>Higher temperatures and variable rainfall adversely impact activities such as vegetation and protected area management and building corridors that enhance species resilience.</p>	<p>Long-term ecosystem stressors will be accentuated by increasing impacts of intermittent extreme weather events and natural hazards.</p> <p>These periodic events can result in dramatic local effects on biodiversity, and might have a greater long-term impact on the structure and function of ecosystems than changes in average condition.</p> <p>Increased bushfire risks intensify fire management requirements</p>	<p>Climate change is expected to compound the impact of non-climate stressors on terrestrial, freshwater aquatic and marine ecosystems.</p> <p>These include land clearing, pollution and invasive species. Non-climate stressors in marine environments include degraded water quality, habitat loss and over-exploitation of marine resources.</p>	<p>Ecosystem based adaptation can deliver multiple benefits to human and coastal settlements while bolstering capacity of natural environment.</p> <p>Although the general threat posed by climate change to Queensland’s biodiversity is clear, more needs to be understood about specific impacts on ecosystems and how they may respond. More detailed understanding will help government better prioritise and target future adaptation actions.</p> <p>Need to assist development of demonstrably sustainable agriculture, forestry and fisheries with minimal impact on biodiversity.</p> <p>Whole of landscape approach to planning for the likely consequences of climate change is needed.</p> <p>Need to research the likely landscape consequences of climate change and research effective adaptation/mitigation actions.</p> <p>Biodiversity offsets can support adaptive capacity of endangered species</p>
<p>Even the most ambitious adaptation program is unlikely to prevent significant impacts on biodiversity hotspots, such as the Great Barrier Reef and the Wet Tropics, and effective mitigation is imperative if the worst impacts on biodiversity are to be avoided.</p> <p>The tourism industry has a dependence on the health of world heritage areas and diverse ecosystems. Queensland’s coastal attractions, such as the Gold and Sunshine coasts, will be threatened by sea-level rise and coastal erosion.</p> <p>Tourist operators value reliable access to parks (marine and terrestrial) and fear loss of iconic species and ecosystems due to climate change.</p> <p>Cross-links between adaptation and government policies eg: land clearing and mining put biodiversity at risk and threatened biodiversity is at greater risk from impacts of climate change.</p>			

### 3.4 Water Management – key impacts, consequences and responses

Issues arising from climate change impacts			Water Management Responses
Higher temperatures	Variable rainfall	Diversification of water supply and demand options	
<p>Higher temperatures will lead to increased evaporation from open water and soils, and result in increased agricultural and residential water demand, as well as increased supply risk if relying solely on surface water</p> <p>Higher temperatures can also decrease water quality (reduced oxygenation), potentially negatively impacting aquatic life.</p> <p>Risk of heat wave induced energy system failure impacting on water system failure grows with higher temperatures.</p>	<p>Reduced stream flows resulting in long term reduction in system yields and hence requiring bulk water system to include climate resilient sources.</p> <p>Extreme rainfall events can negatively impact water quality and aquatic life through increased sediments, nutrients, and pathogens in waterways from runoff and sewer overflow.</p> <p>Depending on the region, annual mean rainfall is expected to decrease between 1% and 7%.</p> <p>Increases in drought/flood frequency have implications for NRM, agricultural irrigators, water security planning and water demand management strategies.</p> <p>Flood impacts on resource sector have large knock-on economic and social effects.</p>	<p>Stormwater: Investment in improved capture and storage of this important water resource would provide many benefits.</p> <p>Groundwater: 36 per cent of all water used in Queensland comes from underground water sources, but there is potential to increase this contribution through Managed Aquifer Recharge schemes.</p> <p>Recycled water: The expanded use of water recycling, including greywater, could reduce the consumption of potable water in residential areas, as recycled water could be used for external watering or internal water uses where drinking water quality is not required.</p> <p>SEQ bulk water supply system– a water supply network that integrates existing water sources with new climate resilient water supplies, such as desalination – that can boost water safety through floods - and purified recycled water.</p> <p>Small scale decentralised water infrastructure, and demand management strategies.</p>	<p>In managing future drought responses, Queensland can leverage community understanding about the essential nature of water resources developed during the Millennium Drought (which was one of the longest droughts in 100 years).</p> <p>The Queensland Government has invested heavily in water security policies and infrastructure in recent years, including the SEQ Water Grid, Regional Water Supply Strategies, water conservation measures, water recycling and desalination plants.</p> <p>Successfully adapting to climate change will require us to conserve and manage water more efficiently.</p> <p>Queenslanders will need further diversification of water sources.</p> <p>We need to deal with post-flood community perceptions about water availability, while anticipating greater use of social media in supporting drought responses.</p> <p>Water supply infrastructure must be suitably located and robust enough to withstand environmental and other impacts.</p> <p>Re-use of treated water from mining operations can build resilience for primary producers and can enhance environmental flows.</p> <p>Smarter water use and storage can not only help to drought and flood proof communities, but also deliver environmental benefits such as less run-off and sediment in waterways, particularly Great Barrier Reef catchments.</p>
<p>Although climate change is projected to result in longer periods of drought in some areas, rainfall may also become more intense, with an increased risk of flooding. Both may place pressures on water resources and the environment.</p>			

### 3.5 Primary Producers – key impacts, consequences and responses

Issues arising from climate change impacts			Primary Producers
Higher temperatures	Variable rainfall	Extreme weather	Responses
<p>Higher temperatures, and lower average rainfall, will decrease soil moisture.</p> <p>Impacts will vary across Queensland; SEQ is projected to be particularly affected, including poorer grain quality and disruption to horticultural crop processes.</p> <p>Increased heat stress in livestock, leading to higher rates of mortality – projections reach a 34% reduction in beef production by 2050.</p> <p>Biosecurity risks such as invasive pest species and diseases such as Queensland fruit fly and cattle tick infestations are expected to increase and spread south under a warmer climate.</p>	<p>Land degradation is likely to be exacerbated by both drier and wetter conditions.</p> <p>Although average rainfall is expected to decrease in areas of Queensland, projected increases in the intensity of rainfall will likely lead to greater floods.</p>	<p>Maintaining a secure food supply in urban areas will be a challenge where rural production of food or distribution nodes is disrupted by natural events such as cyclones or flooding.</p>	<p>Feedback from the sector and recent studies indicate significant barriers exist to the uptake of adaptation actions beyond information provision – access to relevant and easy to understand scientific information is a key barrier which must be addressed.</p> <p>There is a need for industry lead research, development and extension to determine what other adaptation actions are possible.</p> <p>The Commonwealth Government’s Carbon Farming Initiative (CFI, now part of the Emissions Reduction Fund) enables landholders to generate tradable carbon credits by reducing or storing CO2 in the landscape.</p> <p>Drought responses and the need to diversify revenue require linking into industry development strategies (e.g. National Agricultural Research, Development and Extension Strategy, National Drought Reform Policy).</p> <p>There is an opportunity for primary producers located in peri-urban areas to develop post-disaster food security strategies anticipating that trade-linked supply chains may be compromised in the aftermath of major weather events.</p> <p>The establishment of urban, vertical, and peri-urban gardens would also help to address risk of disaster related food supply disruptions. Research into what is feasible is needed.</p> <p>The sector would benefit from exploring the distribution and location of food precincts and food processing to buffer against transport and other supply interruptions such as floods, drought, and cyclones</p>
<p>Over the past 200 years, Queensland agriculture has evolved within one of the world’s most variable climates. Queensland farmers have developed highly adaptive land management systems in response to these varying climate regimes. However long-term climate change could increase this variability beyond the range considered normal and threaten the viability of some primary production systems.</p> <p>The sector is vulnerable to a range of climate risks, particularly increased temperatures that will trigger decreased water availability, increased pest and weed incursions, and greater land degradation.</p> <p>Even small long-term increases in temperature can lead to a decline in overall production from agriculture and forestry.</p> <p>Based on detailed regional projections undertaken by CSIRO and QCCCE, primary industry production is projected to decline by 2030 over much of eastern Australia due to increased drought, reduced water resources and higher temperatures.</p>			

### 3.6 Emergency Management – key impacts, consequences and responses

Issues arising from climate change impacts				<i>Emergency Management Responses</i>
Higher temperatures	Variable rainfall	Extreme weather	Sea level rise	
<p>Impacts on electricity and flow on effects for essential services, e.g. communications networks, ability to use high-rise elevators, sewerage and other services.</p> <p>Heat waves can damage road surfaces and train infrastructure, crippling public transport.</p> <p>Extreme heat impacts on vulnerable groups including the elderly, trades, babies and people with particular illnesses.</p> <p>Effect of extreme heat disruptions in electricity on drinking water supply.</p>	<p>Flooding of underground car parks reducing private vehicle access.</p> <p>Evacuation routes impeded.</p> <p>Flash flooding and hailstorms draw heavily on emergency responders including volunteers, and responses can be disrupted by infrastructure breakdown.</p>	<p>Stranding/impacts on evacuation routes especially for elderly residents and those requiring assistance</p> <p>Risk of comms networks going down during cyclones leading to social isolation and disrupted early response.</p> <p>Hazards from debris continue to impact on neighbours after events pass through.</p> <p>Bushfire ember attacks impact on properties before and after flames appear – need for education to empower continued vigilance.</p> <p>Aging emergency volunteer base is puts capacity at risk.</p> <p>Mining sector desires flexible environmental protection regulation during extreme weather events.</p> <p>Strong wind can bring down power lines; if comms networks go down it can also impact water treatment plant operation and flood response.</p>	<p>Hazards from erosion of river bank and damage to infrastructure may lead to greater call on SES and other emergency response capabilities.</p> <p>Combination of gradual sea level rise and more intense storm surge events, especially if they occur at high tide, put people who risk going into the water at greater risk – as well as endangering emergency responders.</p>	<p>Effective adaptation through land use planning can help to mitigate the impact of natural disasters on the community, and relieve some of the excess pressure on emergency management resources.</p> <p>There is a need to shift disaster related funding towards mitigation to avoid more costly responses in the aftermath of major events.</p> <p>Self-reliance will help to relieve excess pressure on emergency management resources stemming from climate change. Initiatives that support families, neighbourhoods and even metropolitan centres to cultivate self-reliance before, during and in the aftermath of natural disasters are required.</p> <p>There is a need to design and develop construction technologies for extreme weather event resistance (floods, cyclones, droughts).</p> <p>Ensure plans are in place to assist regional and rural communities recover from extreme weather events.</p> <p>Use social media and spontaneous volunteering strategies to grow and support emergency volunteering base.</p>
<p>Climate change will result in increased frequency and intensity, and changes in the geographic pattern of natural disasters and extreme weather events.</p> <p>Over time, the main impact of climate change on the emergency management sector will be to increase overall pressure on emergency management resources.</p> <p>Australia’s emergency volunteering base is aging and will become increasingly stresses as climate impacts grow unless younger volunteers are motivated.</p>				



### 3.7 Human Health – key impacts, consequences and responses

Issues arising from climate change impacts		Human Health Responses
Higher temperatures / Variable rainfall	Extreme weather / Sea level rise	
<p>Mortality and morbidity during heat wave events (especially significant with an ageing population).</p> <p>Spread of vector borne and foodborne diseases.</p> <p>Death and injury resulting from bushfire and air quality impacts.</p> <p>Increased stress on public health systems during heatwave events.</p> <p>Spread of vector borne diseases.</p> <p>Water quality impacts if energy network failures impact on water purification systems.</p>	<p>Risks to human life and health from flooding, storms, bushfires, and cyclones.</p> <p>Mental health problems associated with coping with drought and the aftermath of extreme weather events.</p> <p>Risks to human life and health from flooding and storm surges.</p> <p>Tourists and people from non-English speaking backgrounds may struggle to access and understand disaster messages and refuge advice.</p> <p>Heat waves can disrupt businesses with trades exposure (mining and construction)</p>	<p>Strategies that encourage disaster preparedness and self-reliance are needed to reduce health impacts when natural disasters occur.</p> <p>Awareness raising programs are needed to prepare elderly, infant, and other vulnerable Queenslanders for heat waves, including alert systems and methods for contacting isolated people at risk.</p> <p>Support for mental health services after disasters and during droughts is needed.</p> <p>Programs that educate and empower health care professionals to better support the public through severe weather impacts are important.</p> <p>Education and practical support for trades can enhance business continuity through heat waves.</p> <p>The mining sector has advanced heat stress responses; see:</p> <ul style="list-style-type: none"> <li>✓ awareness module: <a href="http://ninelanterns.com.au/portfolio/heat-stress-awareness/">http://ninelanterns.com.au/portfolio/heat-stress-awareness/</a></li> <li>✓ heat stress monitoring program: <a href="http://www.4crisk.com.au/services/occupational-medicine/hsm-program-menu">http://www.4crisk.com.au/services/occupational-medicine/hsm-program-menu</a></li> <li>✓ heat stress management system: <a href="http://www.csghseforum.org/Lists/Team%20Discussion/Attachments/27/Santos%20Heat%20Stress%20Awareness%202008-09.pdf">http://www.csghseforum.org/Lists/Team%20Discussion/Attachments/27/Santos%20Heat%20Stress%20Awareness%202008-09.pdf</a></li> </ul>
<p>Climate change is unlikely to generate new health conditions or diseases, but is expected to vary the incidence, pattern, range and seasonality of illnesses and disease.</p> <p>Climate change poses direct threats to human health through changes in weather patterns and an increase in extreme events such as heatwaves, cyclones and flash flooding.</p> <p>There are also indirect threats to health stemming from the impact of climate change on social and economic systems.</p> <p>Vulnerable members of the community, including the sick, elderly and low socio-economic members of the community, are more likely to suffer health impacts as a result of climate change.</p>		

## 4 CASE STUDIES of adaptation responses

### HUMAN SETTLEMENTS: Stockland property resilience retrofitting program

- Stockland’s Climate Adaptation Strategy includes a “Climate vulnerability and resilience protocol” that assesses property portfolio impacts out to 2070 resulting in a scorecard that ranks vulnerability and resilience across all property assets. In order to reduce the vulnerability of large scale Queensland master planned communities, shopping centres and retirement communities, a number of asset planning and actions are underway, eg:
  - Asset planning - Specify heat reflective and thermally insulating roof coatings
  - Maintenance and operations - Protect air cooled HVAC equipment against hail damage
  - Design & development - Design for increased extreme heat days in developments
- Stockland has been systematically upgrading its shopping centres and retirement communities to lift resilience benchmarking. In 2014 demonstrated resilience improvements resulted in reduced insurance premiums.
- Stockland property retrofitting program *Assessing Climate Change Vulnerability and Resilience in a Commercial Property Portfolio 2013 Local Government Planners Forum* can be found here <http://www.planning.org.au/documents/item/5567>

### HUMAN SETTLEMENTS: Urban resilience lessons from Rio de Janeiro

- 85% of Brazil’s population live in cities that are experiencing the effects of climate change. Intense rains and floods in Rio de Janeiro are causing fatal landslides with high social and infrastructure costs.
- In 2010 the city of Rio de Janeiro established the Centre for Operations (COR) to build resilience to fatal landslides.
- The Centre monitors indicators such as rainfall, fire hazards, and temperature on a 24/7 basis. COR’s governance model integrates 30 agencies (municipal, state and utilities) to ensure multi-disciplinary decision-making. The Centre actively engages communities through training and proactively communicates with citizens. It provides alerts through news and social media channels and crowd-sources data from citizens through the city’s mobile app, <http://olhosdacidade.com/map/> (City Watch).
- Pedro Junqueira, COR’s Chief Executive said, “Above and beyond technology, having the right people sit at the same table and share knowledge, information and experience, has helped us to vastly improve the effectiveness of our disaster response rate.”
- An early warning system of pluviometers has been installed to measure rainfall, alerting city officials once rainfall reaches 40 millimetres and warning citizens of potential floods through siren calls and mobile phone texts.
- City officials have mapped vulnerable citizens by type of disability and residence so emergency responders can reach them quickly. Due to this sophisticated data and planning system, Rio de Janeiro hasn’t seen any natural disaster-related deaths since 2010.  
<http://www.wri.org/blog/2014/12/3-climate-adaptation-lessons-brazil%E2%80%99s-cities>

**INFRASTRUCTURE: Queensland Betterment Fund in the North Burnett**

- Gayndah-Mundubbera Road is an essential freight and transport link for the North Burnett region, connecting the highly productive agricultural towns of Gayndah and Mundubbera.
- The road sustained significant damage in 2011 and again in the 2013 floods, when approximately two kilometres was completely washed away. The damage closed the road for three months, forcing the local community and emergency services to use an alternative route.
- North Burnett Regional Council's betterment project will relocate the two-kilometre section of the road uphill by up to 11 metres, and construct new stormwater drainage to provide more flood protection. These works will increase the resilience of the section that was washed out as well as provide better functionality of the entire Gayndah-Mundubbera Road.
- The total cost of the Gayndah-Mundubbera Road betterment project is estimated at \$8,857,472, with \$1,971,765 provided through the Queensland Betterment Fund, a joint State and Commonwealth initiative.
- For more see: <http://www.qldreconstruction.org.au/the-queensland-betterment-fund-building-resilience/north-burnett-regional-council-gayndah-mundubbera-road/>

**INFRASTRUCTURE: NYC Superstorm Sandy 'Rebuild by design' project: Living Breakwaters**

- Living Breakwaters will provide environmental co-benefits of improving water quality and protecting the marine habitat by reducing the force of waves in the NYC Staten Island area. A system of concrete and recycled glass composites will be installed in the Raritan Bay to dissipate destructive waves, and incorporate small pockets to serve as homes for finfish, shellfish and crustaceans.
- The structures will also be seeded with oysters, forming an oyster reef that will physically grow the breakwater over time. The oyster reef will further buffer against wave damage, flooding and erosion, while filtering pollutants from harbour waters. Once completed, Living Breakwaters will form a "necklace" of in-water structures that span Staten Island's South Shore.
- The project proposes a number of social resiliency plans including the Water Hub, which is an on-shore facility designed to be a gathering space for lectures, community meetings and more. The Water Hub will promote existing public and private programming and will provide for on-site ecological education space and amenities. Recreational activities can be expanded through new programming and waterfront access opportunities, such as kayaking and fishing. See more here: <https://www.governor.ny.gov/news/governor-cuomo-announces-60-million-living-breakwaters-barrier-protect-staten-island-shoreline>

**ECOSYSTEMS: Great Barrier Reef Climate Change Adaptation Strategy**

- The Great Barrier Reef Marine Park Authority has embraced an ecosystem based adaptation strategy guided by the following key principles:
  - Focusing on reducing non-climate stresses
  - Involving local communities
  - Multi-partner strategy development
  - Building on existing good practices in natural resource management
  - Adaptive management approaches
  - Integrating ecosystem-based adaptation with wider adaptation strategies
  - Communicating and educating
- Targets include development of tools, management frameworks, adaptation plans and enabling of four priority adaptation initiatives by Reef-dependent industries and communities that contribute to ecosystem resilience identified and supported.
- More information can be found at:  
<http://elibrary.gbrmpa.gov.au/jspui/bitstream/11017/1140/1/GBR%20Climate%20Change%20Adaptation%20Strategy%20and%20Action%20Plan%202012-2017.pdf>

**ECOSYSTEMS: Sea turtle adaptation support**

- Sea turtles are highly vulnerable to climate change.
- As the most important breeding site in the world for the green turtle (*Chelonia mydas*), Raine Island provided a valuable case study for climate change adaptation in the Great Barrier Reef.
- Under the Great Barrier Reef Climate Change Action Plan (2007-2012) GBRMPA partnered with Queensland Government agencies, Traditional Owners and scientific experts to develop and apply a climate change adaptation framework. This enabled the identification of key sources of vulnerability, develop strategies for building resilience, prioritise potential adaptation strategies and implement a trial management action in 2012.
- A fencing trial greatly reduced the mortality of nesting turtles associated with falls from a rock ledge on the island. While the rock hazard was not caused by climate change, the management strategy highlighted the potential to reduce total vulnerability by offsetting climate risk.
- This project is one of the first to trial an adaptation strategy to help a vulnerable species build resilience to climate change.

**ECOSYSTEMS: Maroochy River Mangrove Nursery & Revegetation Project**

- This project supports local Kabi Kabi (Gubbi Gubbi) Traditional Owners & historically connected Aboriginal people, to assist landowners & stakeholders in revegetation.
- The aims are to revegetate areas of eroding riverbank along the Maroochy Estuary & neighbouring rivers, where riverfront properties & some Sunshine Coast Council park estates have minimal vegetation.
- Activities enhance & link quality Fish Habitat Areas (FHAs) within the Maroochy River. Partnerships include the Qld Government, Maroochy Landcare, SEQ Catchments, Sunshine Coast Council, Wetland Care Australia, Coolum & North Shore Coast Care, Petrie Creek Catchment Care Group, Maroochy Wetlands, and Landcare Australia & Maroochy Waterwatch. FHAs are improved in the Maroochy Estuary by reducing riverbank erosion & sedimentation.
- Carbon sinks can be expanded through the planting & maintenance of mangrove seedlings at new sites. See more here: <http://community.sunshinecoast.qld.gov.au/directory/maroochy-river-mangrove-nursery-revegetation-project>

#### **WATER MANAGEMENT: Rotterdam Water City 2035**

- Rotterdam is the Netherlands' second-biggest city, located in a delta of the Rhine and Meuse rivers. Around 90% of it is below sea level, making it particularly vulnerable. The city has devised a series of adaptive responses through a long term plan that includes:
  - A parking garage that incorporates a 10,000 cubic metre underground rainwater store. Several million euros were saved by combining the car park and water storage;
  - "Water plazas" that under normal conditions are playgrounds but that temporarily hold water during heavy rain, then slowly release it to the drainage system;
  - An Olympic rowing course that doubles as a water store;
  - Rooftop gardens that absorb rain and CO2 and reduce urban island effects, being built at a rate of 40,000 square metres a year with a 50% subsidy; City offers €30 for every square meter of green roof installed
  - Premium-priced floating communities on waterside sites as vacated port facilities move.

#### **PRIMARY PRODUCERS: Disaster preparedness videos QFF**

- QFF promotes a series of member-created short videos with resilience tips for farmers who are preparing for, and recovering from, natural disasters.
- Practical preparedness videos were prepared following Cyclone Yasi in 2011, but much of the core information remains relevant for farmers preparing for natural disasters.
- This practical tip-sharing approach is a practical technology transfer solution. See videos here: <http://www.qff.org.au/policy-projects/our-work/cyclone-resilience/>
- Another video series addressing flood recovery can be viewed here: <http://www.qff.org.au/flood-recovery-videos/>

#### **EMERGENCY MANAGEMENT: ACT First Canberra disaster resilience website**

- ACT First helps to create empowered communities who are aware of their risks and are better prepared to respond to - and survive - severe weather events or natural disasters. See: <http://actfirst.org.au/>
- The website is an easy to use, personalised online resource to help residents of the Australian Capital Territory prepare for natural disasters. It aims to boost readiness and resilience with customised preparedness information for each user. ACT First has been developed by Green Cross Australia with a partnership with the ACT Government and support from CSIRO, BoM, and the Australia National University; the Natural Disaster Resilience Program funds it.
- So far 8,460 Canberra residents have used ACT First to develop personal resilience plans that are localised to offer neighbourhood scale resources and tips to support user property, family and neighbourhood circumstances.



### **HUMAN HEALTH: Hobson’s Bay Heat Health Response Plan**

- Hobsons Bay City Council developed a Heat Health Response Plan under the Victorian Heatwave Strategy to support community members most vulnerable to heatwave conditions.
- Guided by the Emergency Management Manual Victoria, the Heat Health Response Plan links with the council’s Municipal Emergency Management Plan, a plan required under the Emergency Management Act 1986, and utilises the framework provided by this existing council plan. The Heat Health Response Plan prepares the council for the coordination and activation of council departments and community groups, working with state government agencies to create a more resilient Hobsons Bay community in the face of dangerous extreme heat events.
- What drove the need to change? Extreme heat poses a risk to all Victorians. However some members of the community, such as the elderly and those with pre-existing medical conditions, are particularly vulnerable. Previous heatwaves, such as the 2008-09 Victorian summer, have demonstrated the significant health impacts of extreme heat.
- Climate change predictions suggest it is likely that the number of days over 35°C in Melbourne may increase from nine days in 1990, to 11-13 days per year by 2030; and to 15-26 days in 2070 (Commonwealth Scientific and Industrial Research Organisation & Bureau of Meteorology, 2007).
- Why did the project succeed?
  - A ‘whole of council’ approach to enable a ‘whole of council’ response plan
  - The plan was informed by consultation with the local community and businesses.
  - A dedicated coordinator to lead the project.
  - Collaboration between government, council and community organisations.
  - Strong partnership with the established community support group, Gateway Social Support.
  - Continuous improvement since it’s beginning as a pilot with the Victorian Government in 2008.
- Tips from the project team
  - Use the experience gained from each heatwave season to inform the yearly review of the plan.
  - Link the heat health plan with other council plans, such as the Municipal Emergency Management Plan, to avoid duplication.
  - Consider the emergency management networks and processes that are already available to council.
  - Utilise the tools and resources available through the Department of Health when preparing the plan.
- See more here:  
[http://www.depi.vic.gov.au/\\_data/assets/pdf\\_file/0011/278678/5053\\_DEP\\_Vic\\_Climate\\_Change\\_Adaptation\\_Case\\_Study\\_WEB\\_FINAL.pdf](http://www.depi.vic.gov.au/_data/assets/pdf_file/0011/278678/5053_DEP_Vic_Climate_Change_Adaptation_Case_Study_WEB_FINAL.pdf)

## 5 APPENDIX: Feedback on sector issues

	Sector Organisation	Key issues
1	Property Council of Australia	Understand consequences of climate change (CC) for build environment Reduce risk and damage from CC related events Promote innovation urban and building design resilient to impacts of CC
2	Queensland Farmers Federation	Projected increased extreme weather events create significant challenges for agriculture Need industry lead research, development and extension to determine what other adaptation actions are possible.
3	QLD Chief Scientist	Queensland science research priorities include “Building resilience and managing climate risk, through design and development of construction technologies for extreme weather event resistance (floods, cyclones, droughts), particularly in tropical environments”
4	Queensland Resources Council	Infrastructure issues-designing key infrastructure to cope with increased climate change Planning issues-ensure plans are in place to assist regional and rural communities recover from extreme weather events Evidence-based policy-using best possible science to understand natural systems Regulatory-ensure environmental protection regulation does not become straitjackets during extreme weather events.
5	QCOSS	People from lower socio economic backgrounds impacted the most from CC impacts because- Can’t afford energy efficient products Seniors and non-English speaking background people struggle to manage energy usage Less prepared to disaster events Require affordable insurance Less access to energy efficient products and concessions.
6	Red Cross	Building community resilience to prepare for inevitable disasters faced by Queenslanders Recognise that priority needs to be given to the needs of vulnerable people during disaster and recovery efforts Clear guidelines and plans for disaster and recovery assistance to discrete Aboriginal and Torres Strait Islander Communities
7	Growcom	Key CC risks and impacts include- <ul style="list-style-type: none"> <li>✓ Increased temperatures effecting plant growth and productivity</li> <li>✓ Increase in frequency and severity of extreme weather events, droughts and increased risk of natural disasters, such as floods disrupting supply chains and potential loss of markets</li> <li>✓ Changes in rainfall patterns increasing the need for irrigation and water storage</li> </ul>
8	Queensland Tourism Industry Council	Serious discomfort from prolonged heat waves Drought conditions for travellers and host communities Increased frequency or severity of severe weather events, floods and cyclones Reliability of access to areas: parks (marine and terrestrial), island, etc. Particularly significant in the context of the Great Barrier Reef: coral cover, fish population, water quality Loss of ‘bio assets’: iconic species of animals, damage to bio systems and biodiversity.
9	Local Government Association Queensland	Appropriately scaled data and knowledge of the limitations of data Appropriate methodologies and guidelines to understand vulnerability and risk tolerances and determine adaptation actions Access to technical information particularly about cost effective adaptation responses to improve elected members confidence in adaptation responses Improved integration of organisational integration of climate change adaptation in to statutory documents Activating funding streams to ensure CC planning and adaptation responses can be implemented Exposure to litigation and political risk Monitoring and evaluation frameworks for measuring, reporting and reviewing progress.

## Queensland Climate Adaptation Strategy – Background Briefing Paper

### Not Government Policy

	Sector Organisation	Key issues
		Stakeholder engagement and integration.
10	Stockland	<p>Future climate change impacts will place greater demands on our assets and communities.</p> <p>By maintaining an active focus on climate change adaptation and resilience we are able to understand future climate trends and predictions</p> <p>Identify where we are exposed to the impacts of climate change in different regions where we operate</p> <p>Take action to address vulnerability in the short term and develop plans to improve resilience over the long term - This will assist us to respond to current and predicted CC-</p> <p>Minimise increase in operational and maintenance costs</p> <p>Enable informed decisions about future investments</p> <p>Reduce liability and insurance premiums by ensuring assets are climate prepared</p> <p>Increase customer comfort levels within our assets</p> <p>Helps avoid early retirement of assets within our portfolio</p>
11	Queensland Conservation Council	<p>Sea level rise impacts to coastal communities</p> <p>Increase risk to coastal communities from storm surges and more intense cyclones</p> <p>Climate change and protected area management</p> <p>Cross links between adaptation and government policies for example- land clearing and mining threaten biodiversity and threatened biodiversity is at greater risk from impacts of climate change</p> <p>Impacts of climate change on agriculture and human health-i.e. hotter days and impacts for vulnerable people</p>
12	WWF	<p>Conserve QLDs wildlife and natural ecosystems</p> <p>Strategic growth of protected areas over key wildlife habitats, climate refuges corridors.</p> <p>Saving the GBR ecosystem from water pollution and climate change</p> <p>Assisting development of demonstrably sustainable agriculture, forestry and fisheries with minimal impact on biodiversity</p> <p>Land use planning that anticipates climate change, assist reduce greenhouse gas emissions.</p>
13	NRM	<p>Whole of landscape approach to planning for the likely consequences of climate change.</p> <p>Need for significant research into the likely landscape consequences of climate change will be and what are the most effective adaptation/mitigation actions we can implement.</p>
14	Suncorp Insurance	<p>Community exposure to natural hazards through population growth and development.</p> <p>Increasing resilience of our homes, business and infrastructure to protect our health, livelihoods and economy.</p>
15	Chamber of Commerce and Industry Queensland	<p>Supports efforts to mitigate the increasing frequency of floods, cyclones and fire events throughout Queensland.</p> <p>Important for the small business community that the QLD gov. works to ensure there are adequate plans in place to address current and future impacts of climate change weather events.</p> <p>Recognise limitations that small business may have to adapt.</p> <p>Available up to date hazard data to assist infrastructure and land use planning.</p>
16	SEQ Water	<p>Reduced stream flows resulting in long term reduction in system yields and hence requiring bulk water system to include climate resilient sources.</p> <p>More evaporation from dams, therefore increased supply risk if relying solely on surface water</p> <p>Increased risk of poor water quality as a consequence of sediment carried in flood waters and bushfires in catchments during drought</p> <p>Water supply infrastructure must be suitably located and robust enough to withstand environmental and other impacts.</p>
17	QCU	Ensuring that the benefits and entitlements to working Queenslanders are protected into the future.
18	Planning Institute of Australia	<p>Climate risks and vulnerability are unevenly distributed and generally greater for disadvantaged people and communities.</p> <p>There is a need for long-term strategic leadership on this issue to enhance coordination of policy responses across levels of government. Clear lines of sight are required between the planning policies and mitigation and adaption strategies being employed by local, state and federal governments.</p>

## Queensland Climate Adaptation Strategy – Background Briefing Paper Not Government Policy

	Sector Organisation	Key issues
		<p>A sensible and sustainable framework for balancing property rights and community interests in a changing climate is essential.</p> <p>The rapidly evolving data and science on climate change also mean that planning systems need to be designed so that they too can adapt to change.</p>
19	Lend lease	<p>Lend lease has a group wide strategy to build resilient and prepared communities.</p> <p>Risks to our sector include the slow change in building code, standards and legislative environment when looking at future climate risk parameters and the conflicting requirements across local, state and federal legislation</p> <p>The risk to our wider business is surrounding the interdependences and compounding risk which creates 'black swan' type events. The risk to our customers is health, safety and financial security.</p> <p>How do we use the existing knowledge, science, research and evidence to inform policy development and support collaborations across government, private and community sectors to take positive actions towards building climate resilience?</p>
20	NCCARF	<p>Reducing greenhouse gas emissions using strategies that contribute towards long-term environmental and economic sustainability and build resilience to the impacts of climate change.</p> <p>Understanding where and when to adapt to climate change, and what are the win-win strategies that address present-day risks and build long-term resilience to climate change.</p> <p>Building community willingness to adapt and mitigate through a mix of engagement, incentives and regulatory framings.</p>
21	Ergon	<p>Develop a better understanding of the nature, timing, impact and consequences of climate change for the electricity network</p> <p>Reduce risk, damage and impact from climate change related events</p> <p>Promote innovation in relation to the development, integration and use of renewable energy systems with a view to the future.</p>