

South East Queensland Climate Change Management Plan

Draft for Public Consultation

July 2009

Draft actions to implement the climate change policies of the
South East Queensland Regional Plan 2009–2031



For copies of this draft plan, visit:
www.dip.qld.gov.au/climatechange

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Disclaimer

The actions in the Draft SEQ Climate Change Management Plan do not represent Queensland Government policy, nor do they necessarily represent the views of the Minister for Infrastructure and Planning and do not commit the government to these actions.

All figures have been calculated using the best-available data.



Foreword

The climate change policies of the *South East Queensland Regional Plan 2009–2031* (SEQ Regional Plan) are an essential element of the state government's Climate Smart agenda. They demonstrate our commitment to be innovative and proactive, and to a long-term strategy for climate change planning in South East Queensland.

South East Queensland's population is predicted to be more than 4.4 million people by 2031. Our region will require around 754 000 additional dwellings to house these people, as well as supporting infrastructure and services. Our urban development needs to become more energy and transport efficient, and responsive to projected climate changes so that we can successfully and sustainably manage our growing region.

This *South East Queensland Climate Change Management Plan—Draft for Public Consultation* (the draft plan) is a bold step to ensure we implement the climate change policies of the SEQ Regional Plan with clarity and commitment.

We need to ensure that future development has high standards of energy efficiency and maximises opportunities to use renewable energy to reduce our region's carbon footprint. New innovations will need to be practical and in step with people's expectations so that new homes are affordable and long-term household operating costs are kept to a minimum.

Through improved planning and design of new development and redevelopment, we can also provide more opportunities for walking, cycling and public transport, and reduce our reliance on private vehicles that create emissions and traffic congestion.

The Queensland Government is committed to addressing the community's widespread and growing concerns about the impacts of climate

change on the built environment, our communities, infrastructure and natural ecosystems.

A number of actions in the draft plan to reduce greenhouse gas emissions and improve community resilience to natural hazards and the projected effects of climate change are already underway. We have already made substantial commitments to promote transit oriented developments. A new Queensland Coastal Plan will also help to manage the vulnerability of coastal development to climate change.

Proposed actions presented in this draft plan will reinforce and supplement these current initiatives.

There are challenges ahead. By working collaboratively with other levels of government, the development industry, councils and the residents of South East Queensland, we will find practical and cost-effective ways to make a real difference.

Actions resulting from this draft plan and your feedback will contribute to the reduction of greenhouse gas emissions and help the region become more resilient to climate change impacts.

Your feedback on these actions will help to make South East Queensland a better region for current and future generations.

The Honourable Stirling Hinchliffe MP
Minister for Infrastructure and Planning



Purpose of this draft plan

The *South East Queensland Climate Change Management Plan—Draft for Public Consultation* (the draft plan) provides residents of South East Queensland with an opportunity to have their say on a range of draft actions to support the implementation of the climate change policies of the *South East Queensland Regional Plan 2009–2031* (SEQ Regional Plan).

The proposed actions will help to make future development, infrastructure and communities in SEQ more resilient to the possible impacts of climate change and help reduce regional greenhouse gas emissions to support international, national and Queensland Government mitigation policies.

The Queensland Government wants to make sure that climate change planning actions are also practical and cost effective for local governments and developers to incorporate into new planning schemes and urban designs, and that they are consistent with Queensland Government policies on affordable housing.

How do I provide comments?

Your response and comments will help the Queensland Government to develop and finalise actions for the final SEQ Climate Change Management Plan. They will also provide guidance for ensuring the future sustainability of SEQ.

The government wants to know how you think the draft actions should be prioritised—and whether there are any additional actions that should be considered.

You can complete and submit a response online at www.dip.qld.gov.au/climatechange

Other ways to comment

You can complete the response form inserted in this draft plan or you can download and print the form at www.dip.qld.gov.au/climatechange. Forward your response to:

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Closing date for comments

Responses to the draft plan must be received no later than 5pm on **Friday 11 September 2009**.

More information

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1. The challenge of climate change

1.1 Introduction

Climate change is a global issue requiring an urgent response from all levels of government and the community. Internationally, it is accepted that human activities such as the use of fossil fuels and land use are responsible for a continuing and rapid increase in the level of greenhouse gases, particularly carbon dioxide (CO₂) in the atmosphere¹. Global temperatures continue to rise and induce marked shifts in weather and climate patterns. The projected increases in the severity, frequency and variability of extreme weather events are expected to cause increased risks to human settlements from rising sea levels, flooding, landslides, storm damage, droughts, heatwaves, bushfires and coastal inundation or erosion².

Some of the existing international, national, state and local initiatives to reduce greenhouse gas emissions or assist with adaptation to the impacts of climate change are listed in Appendix 1.

1.2 International initiatives

In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was established to bring together global efforts to address climate change³. By 1997, most world leaders had adopted the Kyoto Protocol and industrialised nations had agreed to specific and legally binding goals to reduce emissions to an average of five per cent below 1990 levels by 2012⁴. The protocol permitted an emissions increase of eight per cent on 1990 levels for Australia⁵.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) highlighted the imperative to reduce emissions: ‘the world has less than eight years to arrest global warming or risk what many scientists warn could be catastrophic changes to the planet’⁶. The IPCC concluded that a 50–85 per cent reduction in emissions was needed to stabilise levels of carbon dioxide equivalents (CO₂-e) in the atmosphere at between 445–490 parts per million (ppm). This scenario, with emissions peaking by 2015 would constrain temperature rises to between 2.0 to 2.4° C. At this level, likely changes include losing most of the Great Barrier Reef to coral bleaching by 2050. The current concentration of atmospheric CO₂ is over 380 ppm⁷.



Many governments have since made additional commitments to reduce emissions by 2050: Australia to 60 per cent, European nations to 60–80 per cent and California, USA to 80 per cent. Interim targets will be clarified at the 2009 UNFCCC conference in Copenhagen.

1.3 Australian, state, regional and local initiatives

1.3.1 Reducing greenhouse gas emissions

From July 2011, the key driver for the reduction of emissions in Australia will be the proposed national Carbon Pollution Reduction Scheme (CPRS), which will place a cap on industrial scale carbon emissions for entities emitting more than 25 Kt CO₂ per year⁸. The CPRS will be complemented by initiatives such as the Commonwealth Government's expanded national Renewable Energy Target (RET) (20 per cent by 2020) to support investment in renewable energy generation⁹, and programs to improve energy efficiency such as the National Strategy for Energy Efficiency¹⁰.

The Queensland Government's, *Toward Q2: Tomorrow's Queensland* target is to cut Queensland's carbon footprint by one third by 2020 and Queensland will contribute to the national target to cut emissions by 60 per cent by 2050¹¹.

Many local governments in SEQ have set their own emission reduction targets through the International Council for Local Environmental Initiatives (ICLEI) Cities for Climate Protection program. The Council of Mayors (SEQ) has been proactive in developing initiatives on waste minimisation, a regional carbon sink and renewable energy¹².

1.3.2 Climate change adaptation

The Council of Australian Governments (COAG) endorsed the National Climate Change Adaptation Framework (NCCAF) at its meeting on 13 April 2007 as the basis for government action on adaptation over the next five to seven years¹³. The Australian Government also established the National Climate Change Adaptation Research Facility (NCCARF) in early 2008. The Facility is hosted by Griffith University in partnership with seven other universities and the Queensland Government.

COAG and the Natural Resource Management Ministerial Council (NRMCC) have both identified the coast as a priority for climate change adaptation. The Department of Climate Change, in consultation with state and territory governments, is conducting a National Coastal Vulnerability Assessment (NCVA) to identify the risks to Australia's coastal zone from climate change (including the implications of sea level rise), provide decision makers with a better understanding of the potential risks and identify priority areas for research¹⁴.

The South East Queensland Climate Adaptation Research Initiative (SEQCARI) is a three-year research initiative examining SEQ's vulnerability to climate change. SEQCARI is designed to develop practical and cost-effective adaptation strategies to assist decision makers in government, industry and the community¹⁵. It involves over 30 scientists from the CSIRO Climate Adaptation National Research Flagship, Griffith University, the University of the Sunshine Coast and the University of Queensland. This initiative is supported by funding from all four research organisations, the Queensland Government Smart State Fund and the Australian Department of Climate Change. It will be guided by an Advisory Committee representing major stakeholders in the region. A summary of key activities is given in Table 1.



Table 1. Research highlights of the South East Queensland Climate Adaptation Research Initiative

Climate change projections
<ul style="list-style-type: none">• CSIRO’s climate scientists will develop new, tailor-made, high-resolution climate change projections and scenarios for SEQ.• They will develop new projections to examine extreme weather events in SEQ, such as extreme heat and rainfall.
Adaptive capacity
<ul style="list-style-type: none">• The University of the Sunshine Coast will lead new research exploring the capacity of stakeholders in SEQ to adapt to climate change.• They will examine how socio-economic trends in the region will interact with the effects of climate change.
Human settlements
<ul style="list-style-type: none">• Griffith University will use a case study approach to examine how urban planning and emergency preparedness and management can facilitate adaptation.• CSIRO will contribute to the human settlements research by developing spatial vulnerability maps for critical and urban infrastructure, and use these to explore adaptation options.
Agriculture
<ul style="list-style-type: none">• CSIRO will lead research exploring the impact of climate change on the SEQ agricultural industry.• They will develop models to predict the productivity of future horticultural crops.
Ecosystems and biodiversity
<ul style="list-style-type: none">• The University of Queensland will examine ways to support our ecosystems in a changing climate.• They will conduct field research to examine how changing climate will affect rainforest diversity.
Energy
<ul style="list-style-type: none">• CSIRO will build models to project the electricity demands of the future, in particular focusing on managing peak demand and pricing.• They will engage with the energy industry to use modelled projections to develop adaptation strategies that integrate issues of urban planning and health.
Regional synthesis
<ul style="list-style-type: none">• CSIRO will lead the project’s integration to ensure that the adaptation strategies delivered by SEQCARI consider the trade-offs between various adaptation options.• Workshops will be held to identify which adaptation strategies most critically require integration.

The SEQCARI project will provide major insights into the impact of natural hazards under climate change and research outputs will inform the development of future actions in the SEQ Climate Change Management Plan.

One of the actions proposed in this draft plan is to facilitate SEQ local governments’ and state government agencies’ access to research outcomes from the SEQCARI and related research projects (see **Draft action 31**).



1.4 The role of planning

1.4.1 Reducing greenhouse gas emissions

While Australia's **CPRS** will be the primary national tool for reducing greenhouse gas emissions, urban and regional planning can also contribute to reducing greenhouse gas emissions and supporting the community's transition to a low carbon economy¹⁶.

Urban transport, inefficient settlement patterns, land use change, infrastructure and buildings are major contributors to global greenhouse gas emissions. Good planning and design of cities can successfully help to reduce greenhouse gas emissions while maintaining a high standard of living¹⁷.

Planning the form, density and spatial pattern of urban development and associated infrastructure can help to reduce travel distances and transport emissions¹⁸. For example, providing shops and services that are closer to people's homes, and walking or cycling trails in new developments can help to reduce transport emissions. Ensuring commercial developments incorporate new technologies such as teleconferencing facilities can also help reduce business related travel.

Cities with higher population densities tend to have lower energy use for private transport. For example, lower density cities in Australia and the US tend to have higher per capita automotive fuel use than densely populated and developed cities of Europe and Asia¹⁹.

The planning and design of new communities can also help to improve energy efficiency through encouraging appropriate solar orientation, maximising the shading of walls exposed to high temperatures, protecting appropriate solar access for hot water systems and photovoltaic panels and providing opportunities for community scale renewable energy generation. These measures are particularly important in higher-density urban areas, which tend to have higher energy consumption²⁰.

1.4.2 Building resilience to natural hazards and adapting to climate change

Urban and regional planning has a key role in building resilience to natural hazards and climate change by guiding the patterns of development and infrastructure to locations that offer greater protection from impacts such as coastal inundation, flooding, landslide or bushfires^{21, 22}.

The Queensland building framework, including codes for the design of buildings, also helps to ensure that buildings are more resilient to natural hazard and climate change impacts. For example, buildings can be designed to incorporate measures that reduce vulnerability to flood inundation, bushfires or cyclonic winds.

The design and planning of new human settlements can also identify suitable locations and standards for the construction of essential infrastructure that provides shelter in the event of natural disasters.

1.4.3 Queensland's planning system

Climate change is receiving increasing recognition within Queensland's planning system as a critical aspect of sustainable development.

Sustainable development principles are included in a range of Queensland's legislative instruments such as the *Environmental Protection Act 1994*, *Integrated Planning Act 1997* and *Water Act 2000*.

Queensland's planning system currently includes a range of statutory planning instruments and authorities, including:



- *Integrated Planning Act 1997*
- *Building Act 1975* and other building, plumbing and electrical codes
- Urban Land Development Authority
- Board of Urban Places
- state planning regulatory provisions
- statutory regional plans
- state planning policies (SPPs)
- local government planning schemes
- development assessment processes under the Integrated Development Assessment System (IDAS).

The Government has also tabled a new *Sustainable Planning Bill 2009* which is intended to replace the *Integrated Planning Act 1997*.

Statutory regional planning instruments such as the [SEQ Regional Plan](#) play an important role in managing the impacts of climate change and helping to reduce greenhouse gas emissions in balance with the need to deliver other planning outcomes. Statutory regional plans identify a future land use pattern that includes areas for urban development, and set out desired regional outcomes, principles and policies on a broad range of planning issues such as green space, compact settlement, community infrastructure, transport integration and economic development.

Local government planning schemes reflect the land use pattern, desirable regional outcomes, principles and policies of statutory regional plans to deliver a broad range of sustainability, climate change, urban development and infrastructure outcomes at subregional and local scales.

Climate change and other sustainability outcomes defined in statutory regional plans are also supported by the development and implementation of a wide range of non-statutory plans, such as regional natural resource management (NRM) plans and other community, corporate and government plans and programs.



2. Climate change in SEQ

2.1 The setting

The SEQ region covers over 22 000 km² and includes 11 regional and city councils that encompass a wide range of geographical features (Figure 1).

The coastal zone of SEQ is characterised by a low-lying and narrow coastal plain, sandy beaches and a series of sand islands along the eastern margin of Moreton Bay. The region also features 18 major river catchments including the Brisbane, Logan, Nerang and Maroochy rivers. The D'Aguilar Range, Blackall Ranges, the Border Ranges, the Great Dividing Range, Tamborine Mountain escarpment and the Glass House Mountains are some of the better known mountain ranges which frame the region.

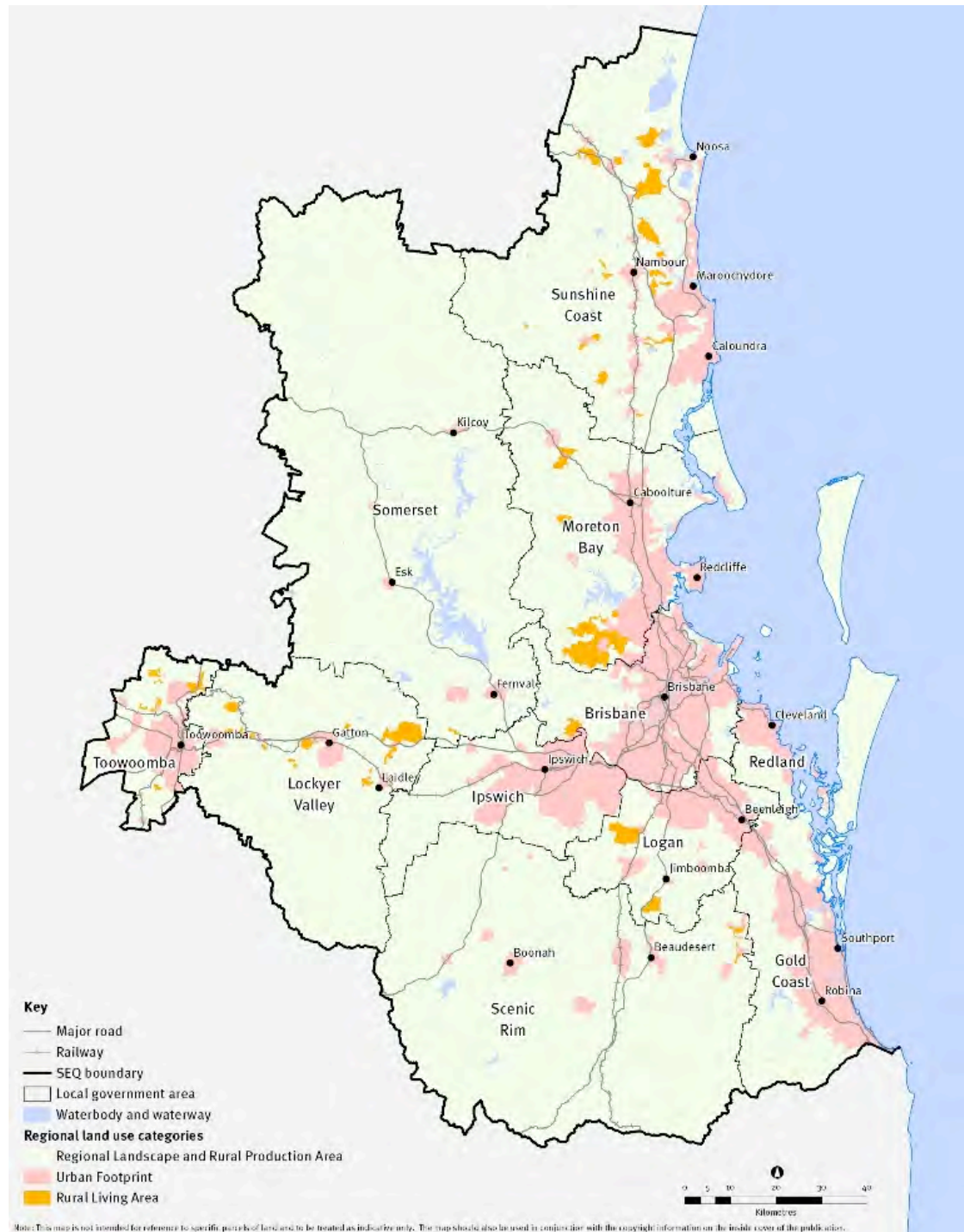
The current climate in SEQ is mild and sub-tropical and typically features hot rainy summers and mild, dry winters.

The region also has a wide range of marine and terrestrial habitats including reefs, rocky shores, mangroves, sub-tropical rainforest, waterways, lakes, wetlands and eucalypt forests. SEQ is renowned for its rich biodiversity including many unique plants and animals of high conservation significance.

SEQ rural areas and waterways provide food and materials for local consumption and export, such as vegetables, poultry, cattle, fish and timber.



Figure 1. SEQ Region and regional land use categories



Source: *South East Queensland Regional Plan 2009–2031*



2.2 Current sources of emissions

When taking into account indirect as well as direct emissions, it is estimated that the SEQ region was responsible for some 47.9 million tonnes CO₂e in 2006²³. The sector with the greatest contribution to these regional emissions was industry (40 per cent) followed by transport due to road based consumption of fossil fuels (22 per cent) (Figure 2). Electricity generation is the greatest source of regional emissions (42 per cent) (Figure 3). (*Note: These estimates are not directly comparable with state or national emissions data.*)

Figure 2. Greenhouse gas emissions in SEQ by sector

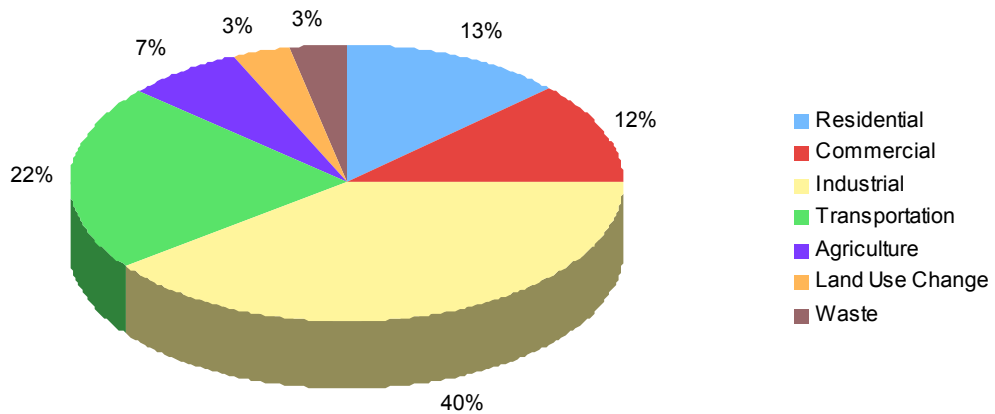
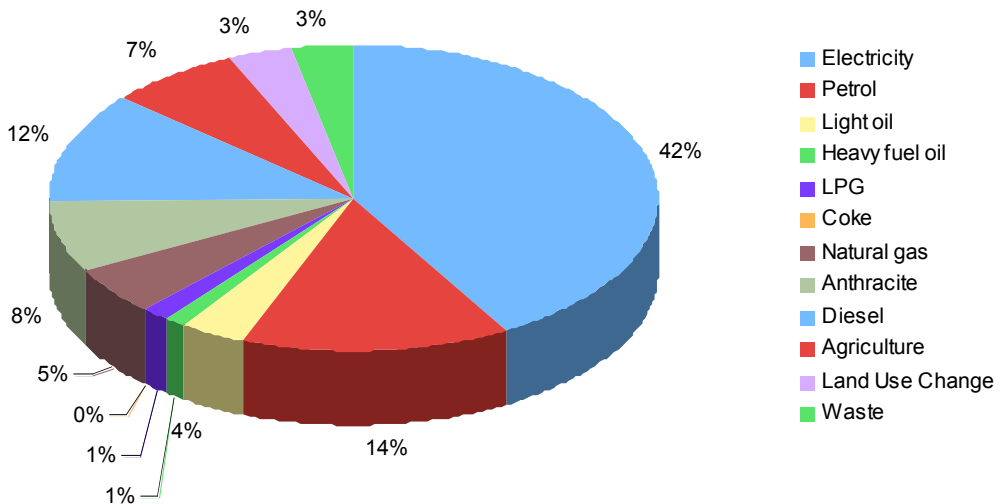


Figure 3. Greenhouse gas emissions in SEQ by source





2.3 Climate projections

Our knowledge of projected climate change in SEQ is informed by global climate models developed by international centres for climate excellence in collaboration with the IPCC.

CSIRO is working closely with the Bureau of Meteorology to develop an improved global climate model that builds on Australia's extensive knowledge of historic weather patterns²⁴. The Queensland Centre for Climate Change Excellence (QCCCE) also collaborates with CSIRO and the international community to develop and enhance climate projections for Queensland. These initiatives will contribute to development of improved climate change models that will be released by the IPCC in their fifth assessment report (AR5), due for release in 2014.

Natural hazard and climate change risk or vulnerability assessments for SEQ will rely on the best available climate projections (see Draft Actions 27 and 31).

While the quality of evidence of climate change is rapidly evolving, the following changes are likely to occur in SEQ over the next 100 years²⁵.

- increased inundation as a result of more intense weather systems, associated storm surges and higher mean sea level
- reduced water availability for cities, industries, agriculture and natural ecosystems
- an expected increase in high temperatures and the number of days over 35 °C, potentially affecting human health and peak energy demand.

The Fourth Assessment Report of the IPCC (AR4), released in 2007, identified SEQ as one of six 'hot spots' in Australia because of potentially significant losses to the built environment as a result of rising sea levels, storm surges and flooding. This finding has implications for land use planning decisions and design criteria relating to buildings, transport, telecommunications, energy and water. For example, the IPCC projects a sea level rise of 0.18 m to 0.79 m by 2100. Planning for natural hazards in SEQ will be informed by the projected sea level rise figures in the 2009 Queensland Coastal Plan. Under the coastal plan:

- for land not already subject to a development commitment, a sea level rise of 0.8m by 2100 will need to be taken into account
- for land already subject to a development commitment, the following sea levels will need to be accommodated:

<i>Year of end of planning period (asset life)</i>	<i>Projected sea level rise</i>
Year 2050	0.3 m
Year 2060	0.4 m
Year 2070	0.5 m
Year 2080	0.6 m
Year 2090	0.7 m
Year 2100	0.8 m

'Ongoing coastal development and population growth in areas such as Cairns and south east Queensland (Australia) and Northland to Bay of Plenty (New Zealand) are projected to exacerbate risks from sea level rise and increases in the severity and frequency of storms and coastal flooding by 2050 (high confidence).'

Source: IPCC 2007



2.4 Regional challenges

Climate change mitigation and adaptation in SEQ presents a challenge for regional planning, not only because of the projected impacts to the region, but because of other social and economic trends and historic developments such as:

- the expanding population—SEQ is Australia's fastest growing region with a projected growth from 2.8 million to 4.4 million people by 2031. This will require around 754 000 new dwellings, and supporting infrastructure and services by 2031.
- SEQ's population distribution—SEQ is heavily urbanised and concentrated in coastal areas. While SEQ has the highest population density in Queensland and the third-highest in Australia this density is low by world standards.
- the distribution of essential services and infrastructure—while Brisbane is the hub of manufacturing and product distribution for SEQ, some service centres are challenged by limited major road and rail links for freight and passenger transport. The Port of Brisbane, Brisbane Airport and two fuel refineries are located at the mouth of the Brisbane River which is some distance from other service and transport centres.
- major modifications to our natural landscape—the construction of coastal groynes and canal estates, dams, reservoirs, urban development, transport infrastructure and the clearing of natural vegetation have altered natural processes in the region.



3. Climate change planning in SEQ

3.1 Regional planning response to climate change

The SEQ Regional Plan establishes a framework for a comprehensive and integrated response to balance the challenges and opportunities presented by climate change with other social, economic and environmental imperatives. It establishes a platform for the future sustainability and liveability of SEQ. This integrated planning approach is expressed as a vision for SEQ (Table 2).

Table 2. Vision for the SEQ region

The vision for SEQ is a region of interconnected communities, with excellent accessibility and an extensive and efficient public transport system that contributes to reducing greenhouse gas emissions. At its heart is Brisbane, state capital and subtropical world city. Surrounding the capital are several large urban areas separated by open space, and many small- to medium-sized towns and villages, each with its own character and identity. It is a region characterised by choice and diversity, with mountain ranges and hinterlands, Moreton Bay and islands, extensive beaches, wetlands, parks, bush and farmlands supporting a rich biodiversity.

SEQ is well managed with a sustainable quality of life based on a unique landscape, quality built form and diverse cultures, acknowledging and respecting the significance of Aboriginal heritage since and prior to European occupation of the region. It has a progressive and well-informed community and enjoys international recognition for leadership in fostering sustainable regional equality and prosperity.

The regional vision for SEQ is a future that is sustainable, affordable, prosperous, liveable and resilient to climate change, where:

- communities are safe, healthy, accessible and inclusive
- there are diverse employment opportunities and quality infrastructure and services, including education and health
- urban and rural areas are mutually supportive and collaborative in creating wealth for the community



- development is sustainable and well designed, and where the subtropical character of the region is recognised and reinforced
- ecological and culturally significant landscapes are valued, celebrated, protected and enhanced
- the community has access to a range of quality, open-space, recreational opportunities.

Source: South East Queensland Regional Plan 2009–2031

The desired regional outcomes of the SEQ Regional Plan support the vision statement. For each desired regional outcome, a set of principles are set out that are to be followed to achieve each outcome. The principles are followed by specific policy and program statements. Policy statements indicate what must be done for the principles to have effect. Programs identify actions that need to be implemented over the life of the plan. Desired regional outcome 1—Sustainability and climate change, relates to climate change (Table 3).

Table 3. Desired regional outcome 1—Sustainability and climate change

The region grows and changes in a sustainable manner—generating prosperity, maintaining and enhancing quality of life, minimising the use of resources, providing high levels of environmental protection, reducing greenhouse gas emissions and becoming resilient to natural hazards including the projected effects of climate change and oil supply vulnerability.

Source: South East Queensland Regional Plan 2009–2031

To achieve the regional vision and the desired regional outcome for sustainability and climate change, the SEQ Regional Plan identifies the need for sustainable development that achieves the following sustainability characteristics (Table 4).

Table 4. Characteristics of sustainable development in SEQ

- Sustainable development in SEQ is expected to include the following sustainability characteristics:
- compact urban form that minimises impacts on natural resources and environmental values and reduces the need for travel by private vehicles
- well-designed activity centres and corridors based on high-frequency public transport services and accessible active transport networks
- high-level and equitable access to activities and services through transport and communication systems
- buildings that are designed and oriented to take advantage of the region’s climate and reduce the use of energy, especially for cooling and heating
- low levels of water, energy and material consumption, and high levels of recycling and re-use of natural resources, materials and waste products
- generation and distribution of energy from renewable sources
- a well-protected system of wildlife habitats including open space, biodiversity networks and green space
- adequate and well-situated open space—including public parks, trails and sporting and recreational facilities—which supports healthy behaviour, social activity and physical and psychological wellbeing



- total water cycle management to minimise impacts on the natural water cycle, including aquatic ecosystems
- protection from natural hazards, including the effects of climate change
- local and diverse employment opportunities
- retention of distinctive regional and local character and scenic amenity
- cultural and landscape heritage that is appreciated, protected and managed.

Source: *South East Queensland Regional Plan 2009–2031*

Many of these characteristics reinforce the climate change principles, policies and programs of the SEQ Regional Plan (Table 5). Policies and programs in other desired regional outcomes also contribute to reducing greenhouse gas emissions and adapting to climate change.

Table 5. Climate change principles, policies and programs of the SEQ Regional Plan

1.3 Reducing greenhouse gas emissions	
Principle	
Reduce greenhouse gas emissions from development, land management and other planning decisions in the region.	
Policies	
1.3.1	Incorporate planning and design measures in development, land management and other planning decisions to reduce greenhouse gas emissions in accordance with agreed performance criteria.
1.3.2	Reduce greenhouse gas emissions from transport fuel consumption by adopting patterns of urban development that reduce the need to travel and the distance travelled and by increasing the provision of active and public transport.
1.3.3	Improve energy efficiency through siting, design, construction and use of demand management technologies to reduce greenhouse gas emissions from electricity use.
1.3.4	Increase the local provision of renewable energy and low emission technology in Development Areas, activity centres and other urban areas identified to accommodate future growth.
1.3.5	Increase stored carbon through the retention or planting of trees or other vegetation, and other land management practices that also provide sustainability and amenity outcomes.
1.3.6	Minimise greenhouse gas emissions from landfill and implement capture and re-use of landfill gas.
Programs	
1.3.7	Align and coordinate the implementation of regional policies to reduce greenhouse gas emissions through the <i>South East Queensland Climate Change Management Plan</i> (SEQ Climate Change Management Plan).
1.3.8	Develop agreed performance criteria for reducing greenhouse gas emissions in development, land management and other planning decisions.
1.4 Natural hazards and climate change adaptation	
Principle	
Increase the resilience of communities, development, essential infrastructure, natural environments and economic sectors to natural hazards including the projected effects of climate change.	



Policies

- 1.4.1 Reduce the risk from natural hazards, including the projected effects of climate change, by avoiding areas with high exposure and establishing adaptation strategies to minimise vulnerability to riverine flooding, storm tide or sea level rise inundation, coastal erosion, bushfires and landslides.
- 1.4.2 Reduce the risk from natural hazards, including the projected effects of climate change, by establishing adaptation strategies to minimise vulnerability to heatwaves and high temperatures, reduced and more variable rainfall, cyclones and severe winds, and severe storms and hail.
- 1.4.3 Planning Schemes and development decisions shall be in accordance with the Queensland Coastal Plan including the range of potential sea level rises.

Programs

- 1.4.4 Align and coordinate the implementation of regional policies to increase resilience to and reduce risks from natural hazards, including the projected effects of climate change, through the SEQ climate change management plan.
- 1.4.5 Develop performance criteria for the planning and design of development and infrastructure to manage risks from natural hazards and climate change.

Source: South East Queensland Regional Plan 2009–2031

3.2 Climate change aspirations for SEQ

Achieving the SEQ Regional Plan vision for SEQ and the desired regional outcome for sustainability and climate change will also be advanced by embracing climate change aspirations for sustainable development in our region, neighbourhoods or precincts, buildings and communities (Table 6).

Table 6. Climate change aspirations for SEQ

We live in a region where:

- settlement patterns are arranged to generate low transport emissions
- public transport is frequent, reliable and safe
- vehicle use and the movement of goods are minimised
- the form of urban development is compact and climate smart
- the region is a leader in the use of renewable energy technologies
- emissions from landfill are minimal
- water is available, secure and well managed
- food is grown close to markets with water efficient and energy efficient practices
- risks from natural hazards to people, buildings and infrastructure are minimised and well managed
- the natural environment is resilient to the impacts of climate change
- there is adequate open space for recreation and nature conservation under climate change
- communities and supporting infrastructure are resilient to climate change.

We live in neighbourhoods and precincts where:

- climate smart design is the norm
- transit oriented developments are widespread and accepted
- public or active transport is the common mode of travel
- community gardens and local shops are commonplace



- streets are designed take advantage of the local microclimate
- shading vegetation is well located and abundant
- local natural areas support regional resilience of biodiversity to climate change
- communities are resilient to natural hazards and climate change.

We construct and live in buildings with:

- low emissions technology
- a high proportion of energy use from renewable sources
- innovative climate smart designs
- cooling green roofs or living walls
- optimal energy efficiency
- intelligent energy demand management systems.

We live as a community of residents who:

- are keen to contribute to sustainable planning outcomes
- routinely make choices to reduce emissions
- demand climate resilient and energy efficient housing with ample opportunities for safe, active and public transport
- are aware of and enthusiastic about opportunities arising from a low-carbon economy
- respect decision makers who intelligently address climate change with conviction and foresight.



4. Role of the SEQ Climate Change Management Plan

4.1 Introduction

As described in preceding sections of this draft plan, the international community, Australian Government, Queensland Government and SEQ local governments have embarked on a wide range of initiatives to support adaptation to climate change impacts and the reduction of greenhouse gas emissions through economic, educational and regulatory measures across all levels of government.

The SEQ Regional Plan and the draft plan have critical roles in ensuring these measures are applied to match the geographical, ecological, social and economic characteristics of the region at a scale that is relevant to regional and local government planning.

The draft plan recognises the important contribution of existing government projects and investments to the reduction of greenhouse gas emissions and building resilience to climate change impacts. In many cases, projects that were originally designed to achieve other sustainable outcomes also contribute to climate change outcomes. An example is transit oriented precincts, which will help to reduce greenhouse gas emissions as well as maximise the efficient use of existing transport infrastructure.

By ensuring developments and buildings are energy efficient and well located with good access to active and public transport, the Queensland planning system—including the SEQ Regional Plan and draft plan—can support communities in adjusting to a low-carbon economy and new patterns of behaviour and energy use. This will mean SEQ is better placed to respond to the proposed Carbon Pollution Reduction Scheme or other economic trends that influence the price and availability of fuel and electricity.

The SEQ Regional Plan and draft plan have a key and strategic role in driving responses to natural hazards and climate change adaptation in conjunction with other approaches such as **disaster management plans**. Some of the greatest impacts of climate change will arise from an increase in the variability and uncertainty of extreme weather events that cause natural disasters.



4.2 Objectives and scope

The objective of the SEQ Climate Change Management Plan—as defined by Programs 1.3.7 and 1.4.4 of the SEQ Regional Plan—is to align and coordinate the implementation of regional policies to reduce greenhouse gas emissions and increase resilience to, and reduce risks from, natural hazards, including the projected effects of climate change.

This draft plan identifies potential planning and related actions that are needed to achieve this objective.

Actions in the draft plan align with the scope of the SEQ Regional Plan, and relate to the following range of planning decisions:

- development (and associated infrastructure) that is regulated through planning legislation, including local government planning schemes, structure or master plans and development applications made under the Integrated Development Assessment System
- relevant state agency plans and policies
- statutory and non-statutory planning actions
- planning support actions, such as providing spatial information and planning guidance.

The final SEQ Climate Change Management Plan (final plan) will be used to help coordinate and align planning responses to climate change in SEQ by:

- implementing statewide and national policies at a regional scale
- coordinating regional-scale planning decisions
- providing guidance to local-scale planning actions
- facilitating the flow of information for policy review.

It will also:

- identify roles, responsibilities and timeframes for the implementation of actions
- describe coordination and evaluation mechanisms
- establish a regular program of review—including an evaluation of progress and integration of new science—to inform relevant guidance documents, plans, strategies, programs or policies.

The draft plan recognises that some climate change actions are relevant to several desired regional outcomes of the SEQ Regional Plan, while other climate change actions are specific to individual desired regional outcomes. This thematic view of actions provides the Queensland Government with a mechanism to focus effort on the most effective and priority initiatives to address climate change in SEQ. It also reinforces the need for climate change actions to be embedded in the implementation of the individual policies and programs of the SEQ Regional Plan.

4.3 Governance and review

Existing governance arrangements established to implement of the SEQ Regional Plan will be used to oversee the implementation of the final plan. Responsibility for the implementation of the final plan will therefore rest with the Regional Coordination Committee (RCC). The RCC advises the Queensland Government through the Minister for Infrastructure and Planning. The RCC will consider advice and recommendations regarding the implementation of the climate change policies of the SEQ Regional Plan and agreed actions of the final plan.

The final plan will be reviewed at least once every five years to align with the review of the SEQ Regional Plan or to reflect critical scientific evidence or policy decisions. The RCC will approve the timing and terms of reference for the review and evaluation of the final plan. The review of the final plan will also contribute to the review of the SEQ Regional Plan by including an assessment of the climate change principles, policies and sustainability criteria of the SEQ Regional Plan. Climate change-related actions will be reported on as required by the RCC and the *Toward Q2: Tomorrow's Queensland* initiative.



5. Draft actions

5.1 Introduction

This document identifies draft actions needed to implement the climate change policies of the SEQ Regional Plan based on suggestions identified through preliminary consultation with government and non-government stakeholders. The draft actions are also informed by investigations conducted by the [Department of Infrastructure and Planning](#) in collaboration with the [Office of Climate Change](#), SEQ local governments—through the [Council of Mayors \(SEQ\)](#)—and state government agencies. Draft actions in Sections 5.2 and 5.3 of this document are presented in groups that coincide with the climate change principles and policies of the SEQ Regional Plan (**Table 7**).

Table 7. Alignment between draft actions and SEQ Regional Plan climate change policies

Principle 1.3 Reducing greenhouse gas emissions (section 5.2)
Transport and settlement pattern—Policies 1.3.1 and 1.3.2; and draft actions 1–6
Energy efficiency— Policies 1.3.1 and 1.3.3; and draft actions 7–11
Renewable energy— Policies 1.3.1 and 1.3.4; and draft actions 12–14
Storing carbon— Policies 1.3.1 and 1.3.5; and draft actions 15–16
Waste emissions— Policies 1.3.1 and 1.3.6; and draft action 17
Community awareness and behaviour—Program 1.3.7; and draft actions 18–19
Principle 1.4 Natural hazards and climate change adaptation (section 5.3)
Coastal hazards—Policies 1.4.1 and 1.4.3, and Program 1.4.5; and draft actions 20–24
Riverine flooding, bushfires, high temperatures and other hazards—Policies 1.4.2 and 1.4.5; and draft actions 25–28
Biodiversity conservation—Policies 1.4.1 and 1.4.2; and draft actions 29–30
Climate change adaptation research— Policies 1.4.1 and 1.4.2; and draft action 31
Building resilience through increasing awareness and behaviour change—Program 1.4.4; and draft action 32

Have your say:

- How should the draft actions be prioritised?
- Are there any additional actions that should be considered?

See the enclosed response form or submit your response at www.dip.qld.gov.au/climatechange

Your responses and comments will help the Queensland Government determine the priority actions in the final SEQ Climate Change Management Plan.

Draft actions in sections 5.2 and 5.3 (below) are labelled with their current status, as follows:

underway—actions under existing Queensland Government programs with direct relevance to the climate change policies of the SEQ Regional Plan

proposed—potential new actions that would accelerate the implementation of the climate change policies of the SEQ Regional Plan that have no current government commitment.



Draft actions are also labelled according to their proposed implementation sequence:

- **immediate priority**—actions to be completed in the short term (typically in one to three years)
- **follow up**—actions that flow directly from an immediate priority action or represent other important projects.

Each draft action also has a proposed organisation or organisations that would be responsible for its implementation:

- **lead agency**—organisations that would have principle responsibility for coordinating or conducting the action
- **contributing partners**—other organisations that would play a role in supporting the lead agency.

The *Notes* section accompanying each draft action briefly describes the rationale for the proposed action, steps needed to achieve the action, and its relationship to other actions or existing government programs.

The actions in the Draft SEQ Climate Change Management Plan do not represent Queensland Government policy, nor do they necessarily represent the views of the Minister for Infrastructure and Planning and do not commit the government to these actions.



5.2 Reducing greenhouse gas emissions

5.2.1 Transport and settlement pattern

Program A. Achieve higher integration of transport and land use planning in SEQ to reduce greenhouse gas emissions

Key climate change policies and programs

Policy 1.3.2 Reduce greenhouse gas emissions from transport fuel consumption by adopting patterns of urban development that reduce the need to travel and the distance travelled and by increasing the provision of active and public transport.

Also relates to

DRO 8—Compact settlement
 Principle 8.9 Ensure new development utilises existing infrastructure or can be provided with timely transport infrastructure, community services and employment.
 DRO 10—Infrastructure
 DRO 12—Integrated transport
 Principle 12.1 Support integrated land use and transport planning, regional connectivity and greater levels of trip self-containment within sub-regions.
 Policy 12.1.7 Develop Connecting SEQ 2031 to manage congestion, improve freight movement and increase the use of public transport, cycling and walking.
 Program 12.2.7 Implement the South East Queensland Principal Cycle Network Plan and the Action Plan for Walking 2008–2010.
 Program 12.2.8 Develop and implement an Urban Congestion management Strategy for SEQ.

Draft action 1. Complete *Connecting SEQ 2031: An Integrated Regional Transport Plan (IRTP)* and align it with the SEQ Regional Plan

Status: Underway	Sequence: Immediate priority
Responsibility: Lead agency: DTMR Contributing partners: DIP, local governments, industry associations, Australian Government	

Notes

The preparation of Connecting SEQ 2031: An IRTP for SEQ is already underway. Completion of this plan is a priority action because its implementation is vital to achieving the integration of transport and land use necessary to assist in implementing the SEQ Regional Plan and reducing greenhouse gas emissions in SEQ.

Connecting SEQ 2031: An IRTP for SEQ will plan the future public transport networks for SEQ and a range of measures to encourage people to travel by active and public transport.



Some examples that could be considered in SEQ include:

- Identifying priority transit corridors suited to high frequency all day / all week public transport suited to increased urban densities
- linking car parking rates to pricing and timing
- prioritising investment in public and active transport over investment in private vehicle transport
- offering incentives to increase the use of public transport, e.g. reduced fees and off-peak travel incentives
- offering incentives to increase the use of existing services
- increasing frequency of services
- providing park-and-ride facilities
- providing shuttle feeders to main transit hubs
- allowing individuals to salary sacrifice public transport fares.

Related programs such as the SEQ Urban Congestion Action Plan will identify other strategies to reduce reliance on private vehicles, and may include initiatives such as:

- congestion management
- vehicle registration incentives.

Other relevant plans include:

- SEQ Principal Cycle Network Plan
- SEQ Action Plan for Walking 2008–2010.

Draft action 2. Implement Connecting SEQ 2031: An Integrated Regional Transport Plan (IRTP)

Status: Proposed	Sequence: Follow up
Responsibility: Lead agency: DTMR Contributing partners: DIP, local governments, ULDA	

Notes

The implementation of Connecting SEQ 2031: An IRTP for SEQ is vital to achieving the integration of transport and land use necessary to assist in implementing the SEQ Regional Plan and reducing greenhouse gas emissions in SEQ. It will outline an implementation plan with short, medium and long term initiatives

This implementation could include:

- informing the 2010 and subsequent reviews of the South East Queensland Infrastructure Plan and Program (SEQIPP)
- local government review of budgets and corporate plans to align with the outcomes of Connecting SEQ 2031
- local government amendments to planning schemes to ensure alignment between the outcomes of the SEQ Regional Plan and Connecting SEQ 2031—for example, higher densities and public transport routes
- ensuring infrastructure contributions adequately cover public and active modes of transport
- reinforcing links with the Translink Network Plan
- implementing incentives for commuters.

Program B. Increase adoption of leading practice design of transit oriented communities and concentrate planning efforts and infrastructure investment in priority locations

Key climate change policies and programs

Policy 1.3.1 Incorporate planning and design measures in development, land management and other planning decisions to reduce greenhouse gas emissions in accordance with agreed performance criteria.

Policy 1.3.2 Reduce greenhouse gas emissions from transport fuel consumption by adopting patterns of urban development that reduce the need to travel and the distance travelled and by increasing the provision of active and public transport.

Policy 1.3.3 Improve energy efficiency through siting, design, construction and use of demand management technologies to reduce greenhouse gas emissions from electricity use.

Also relates to

Policy 8.2.1 Accommodate regional growth in locations that provide superior transportation choices or otherwise reduce car use, particularly through supporting growth in established urban areas and redevelopment in and around existing urban centres, and along priority transit networks and other high-frequency transit corridors.

Policy 8.2.2 Make Development Areas contiguous with existing communities wherever possible, or otherwise provide development with direct transport linkages to established urban areas early in the development.

Program 8.3.6 Prepare a Model Code for Smart Growth to guide state and local governments on sustainable development approaches to planning of Regional and Local Development Areas and development standards for new urban areas.

Program 8.5.7 Prepare a Model Code for Smart Growth to guide state and local governments on sustainable approaches to planning and development standards for residential subdivision, and dwelling location and design.

Policy 8.6.1 Ensure that development supports the activity centres network and the transport system.

Policy 8.6.2 Locate major employment and trip-generating activities in regional activity centres and on priority transit



corridors and other high-frequency transit corridors.
Policy 8.6.6 Ensure optimal use of transport and service availability in regional activity centres and corridors by delivering appropriate densities and by maximising business location opportunities.
Policy 8.10.1 Undertake necessary land use and infrastructure planning for all Development Areas using smart growth principles and practices.
Policy 8.10.3 Ensure delivery of Development Areas is coordinated with the provision of public transport.
DRO 8—Compact settlement
DRO 12—Integrated transport

Draft action 3. Complete guidelines for transit oriented development (TOD) precincts

Status: Underway	Sequence: Immediate priority
Responsibility: Lead agency: DIP Contributing partners: DTMR, local governments	

Notes

The transit oriented development (TOD) guidelines are well advanced due to the work of the TOD Taskforce and DIP. They will provide advice on leading practice for designing and creating transit oriented communities.

Successful transit oriented development precincts rely on clustering employment, centre activities and higher-density residential areas close to public transport nodes, tied together with high-quality urban design.

In turn, this can assist in reducing greenhouse gas emissions by contributing to compact urban form, reducing the need for travel and private vehicle use and concentrating population and employment close to public transport.

Draft action 4. Identify priority locations for transit oriented development (TOD) precincts

Status: Underway	Sequence: Immediate priority
Responsibility: Lead agency: DIP Contributing partners: DTMR, local governments	

Notes

A project seeking to identify priority transit oriented development precinct locations consistent with the principles in the SEQ Regional Plan has been started by the TOD Taskforce and DIP, in conjunction with DTMR.

Identifying priorities for TOD precincts will enable governments (both state and local) to concentrate their planning efforts and infrastructure investment in locations that can make the biggest contribution to achieving these outcomes in the short and medium term. It also provides certainty to the community and development industry as to where this form of development is being planned.

The early completion of this work will mean development of these areas can commence in the short term to bring forward their contribution towards reducing greenhouse gas emissions.



Draft action 5. Implement guidelines for transit oriented development (TOD) precincts in priority locations

Status: Proposed	Sequence: Follow up
Responsibility: Lead agency: Local governments, ULDA Contributing partners: DIP, DTMR	

Notes

When the TOD guidelines and list of priority locations are completed, local governments can incorporate appropriate provisions based on the guidelines for those locations into planning schemes to ensure that:

- decisions on new development are consistent with the intent, principles and outcomes of the guidelines
- the priority TOD precinct locations are reflected in planning schemes and provisions are included to protect and facilitate these areas for TOD purposes.

Where the Urban Land Development Authority (ULDA) is involved, it can ensure preparation of development schemes consistent with the intent, principles and outcomes of the guidelines.

Implementation of the TOD guidelines and priority locations will also require:

- aligning council budgets to provide any necessary infrastructure upgrading
- setting consistent expectations or development outcomes/standards for development industry.

On completion of the TOD guidelines, consideration should be given to increasing professional, community and industry awareness, understanding and acceptance of the guidelines.

This action will also examine the contribution of other regional strategies to developing a compact urban form to reduce transport emissions.

Draft action 6. Prepare local area Climate Smart active and public transport design guidelines and performance criteria

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: DIP Contributing partners: DTMR, DERM, local governments, CSIRO, industry	

Notes

The guidelines would focus on achieving sustainable transport outcomes at the local, precinct and neighbourhood level.

The purpose of the guidelines would be to provide guidance on how to design communities at the local level that have high standards of active and public transport, including pedestrian and cycle paths.

The guidelines would provide advice on location and design performance criteria and incorporating Climate Smart outcomes and requirements into planning schemes and other development plans, e.g. structure or master plans. The guidelines would also identify preferred mechanisms for linking local commercial centres and residential areas via active and public transport.

They would indicate appropriate links to other climate smart, climate resilient or sustainable planning guidelines and other land use, transport and public open space design and planning parameters.

The guidelines would also draw from and reinforce a proposed model code for smart growth (SEQRP program 8.3.6).

5.2.2 Energy efficiency

Program C. Increase adoption of leading practice energy-efficient design for multi-unit housing

Key climate change policies and programs

Policy 1.3.1 Incorporate planning and design measures in development, land management and other planning decisions to reduce greenhouse gas emissions in accordance with agreed performance criteria.

Policy 1.3.3 Improve energy efficiency through siting, design, construction and use of demand management technologies to reduce greenhouse gas emissions from electricity use.

Also relates to

DRO 8—Compact settlement
Building Code of Australia
Queensland Development Code



Draft action 7. Prepare leading practice energy-efficiency guidelines for multi-unit housing

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: DIP Contributing partners: DERM, DPW, local governments, industry.	

Notes

Significant effort has been made to improve the energy efficiency of detached housing, however research indicates there is considerable room for improvement in the energy efficiency and level of greenhouse gas emissions of multi-unit housing.

There is an opportunity to raise the energy efficiency of multi-unit housing by improving design standards, building code requirements and building services standards (e.g. hot water, mechanical services and lifts).

There is significant potential for this form of development in SEQ. Under the SEQ Regional Plan, at least an estimated 6.5 additional dwellings will be required by 2031 for every 10 existing dwellings. Consequently, improved design standards for multi-unit housing in SEQ could make a large contribution to reducing greenhouse gas emissions from the built environment.

Draft action 8. Implement leading practice energy-efficiency guidelines for multi-unit housing

Status: Proposed	Sequence: Follow up
Responsibility: Lead agency: Local governments, ULDA Contributing partners: DIP, DERM, DPW, industry	

Notes

Implementation of the guidelines may entail:

- local governments incorporating the guidelines into their planning schemes
- increasing professional and industry awareness and understanding of the guidelines
- developing benchmarking tools to monitor and evaluate the greenhouse gas emissions of new multi-unit housing

These energy efficiency guidelines will need to complement and not duplicate the Building Codes and code requirements.

Program D. Increase adoption of leading practice energy-efficient planning and design for urban developments

Key climate change policies and programs

Policy 1.3.1 Incorporate planning and design measures in development, land management and other planning decisions to reduce greenhouse gas emissions in accordance with agreed performance criteria.

Policy 1.3.3 Improve energy efficiency through siting, design, construction and use of demand management technologies to reduce greenhouse gas emissions from electricity use.

Also relates to

Policy 8.3.6 Prepare a Model Code for Smart Growth to guide state and local governments on sustainable approaches to planning of Regional and Local Development Areas and development standards for new urban areas.

Policy 8.5.7 Prepare a Model Code for Smart Growth to guide state and local governments on sustainable approaches to planning and development standards for residential subdivision, and dwelling location and design.
 DRO 10—Infrastructure



Draft action 9. Prepare local area Climate Smart energy-efficient urban design guidelines and performance criteria

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: DIP Contributing partners: DERM, DPW, local governments, CSIRO, industry	

Notes

The guidelines would focus on achieving sustainability outcomes at the local or neighbourhood level—much work has been, or is currently being, undertaken at the building scale.

The guidelines would provide advice on how to design energy-efficient communities, including street layout and its effect on building orientation, location and design performance criteria, and incorporating Climate Smart outcomes and requirements into planning schemes and other development plans, e.g. structure and master plans.

The guidelines would identify links to other Climate Smart, climate resilient and sustainable planning guidelines and related land use, transport and public open space design and planning parameters. They would also draw from and reinforce a proposed model code for smart growth (SEQRP programs 8.3.6 and 8.5.7).

Program E. Increase the proportion of energy derived from low-emission sources

Key climate change policies and programs

Policy 1.3.1 Incorporate planning and design measures in development, land management and other planning decisions to reduce greenhouse gas emissions in accordance with agreed performance criteria.

Also relates to

Policy 10.5.5 Increase the proportion of energy derived from low emission and renewable sources to reduce greenhouse gas emissions from electricity use.

Draft action 10. Implement the Queensland Solar Hot Water Program in SEQ

Status: Underway	Sequence: Immediate priority
Responsibility: Lead agency: DEEDI Contributing partners: DIP, local governments	

Notes

Beginning in 2009, the Queensland Solar Hot Water program will accelerate the installation of up to 200 000 solar hot water systems over three years. It is anticipated that a high proportion of the solar hot water systems will be installed in SEQ homes.

Program F. Improve uptake of exemplary sustainable and Climate Smart urban developments

Key climate change policies and programs

Policy 1.3.1 Incorporate planning and design measures in development and planning decisions to reduce greenhouse gas emissions in accordance with agreed performance criteria.

Policy 1.3.3 Improve energy efficiency through siting, design, construction and use of demand management technologies to reduce greenhouse gas emissions from electricity use.

Also relates to

Policy 1.1.2 Reflect the sustainability characteristics in all land use and infrastructure planning.

Program 8.3.7 Utilise the Board for Urban Places to deliver high-quality urban design outcomes in the region’s urban environment.



Draft action 11. Implement the Queensland Government’s ‘green door’ policy to fast-track new sustainable developments

Status: Underway	Sequence: Immediate priority
Responsibility: Lead agency: DIP Contributing partners: Local governments, industry	

Notes

The Queensland Government has adopted a new policy to fast-track new sustainable developments through a “Green Door” as part of its commitment for cleaner, greener buildings.

The intention is to identify urban development projects which demonstrate exemplary sustainable and climate smart practices that would be the subject of a fast-tracked approval process. These projects would provide an opportunity to demonstrate innovation and establish leading practice examples of energy efficiency and other aspects of sustainability in urban development in SEQ.

5.2.3 Renewable energy

Program G. Increase the proportion of energy derived from low emission and renewable sources in SEQ

Key climate change policies and programs

Policy 1.3.4 Increase the local provision of renewable energy and low emission technology in Development Areas, activity centres and other urban areas identified to accommodate future growth.

Policy 1.3.6 Minimise greenhouse gas emissions from landfill and implement capture and re-use of landfill gas.

Also relates to

Policy 10.5.5 Increase the proportion of energy derived from low emission and renewable sources to reduce greenhouse gas emissions from electricity use.

Policy 10.5.6 Encourage opportunities for low emission, renewable and decentralised sources of energy supply and supporting infrastructure.

Policy 10.5.7 Identify and protect optimal locations for low emission, renewable energy resources, taking into consideration needs and constraints arising from market mechanisms, infrastructure and growth.

Draft action 12. Identify and map significant sources of renewable energy in SEQ

Status: Underway	Sequence: Immediate priority
Responsibility: Lead agency: DEEDI Contributing partners: Local governments, DIP	

Notes

Identifying and protecting opportunities for regional and local renewable energy production can assist in the shift to these sustainable forms of energy and reduce reliance on non-renewable resources such as coal and oil.

Forms of renewable energy suitable in SEQ could include wind farms, solar energy plants, tidal action and geothermal resources.

The Coastal Geothermal Energy Initiative is a \$5 million drilling program which aims to identify possible sources of geothermal energy close to existing electricity transmission lines and coastal population centres, possibly including SEQ. Areas under consideration include Tarong, Inglewood, Stanthorpe, Helidon, and Esk. This work is being undertaken as part of the *Queensland Renewable Energy Plan* managed by the Office of Clean Energy (DEEDI)

Because SEQ is the state’s most densely populated region and continues to grow quickly, it represents the largest concentration of current and future energy consumers in Queensland and a prime location for the expanded use of renewable energy.

It is anticipated that this action would need to be informed by existing research on suitable renewable energy options and an understanding of site location criteria for specific renewable energy sources.



Draft action 13. Implement the Clean Energy Communities program in SEQ

Status: Underway	Sequence: Immediate priority
Responsibility: Lead agency: DEEDI Contributing partners: DIP, local governments, Industry	

Notes

Master-planned communities in SEQ’s population growth hot spots, such as Greater Springfield and Ripley Valley, are being designed with Clean Energy Plans which consider demand management, energy conservation and renewable energy options. The Office of Clean Energy (DEEDI) is working with the development industry to identify opportunities to implement the renewable energy options in these plans. This work is being undertaken as part of the *Queensland Renewable Energy Plan* managed by the Office of Clean Energy (DEEDI)

Draft action 14. Develop planning, assessment and performance guidelines for on-site energy generation

Status: Underway	Sequence: Immediate priority
Responsibility: Lead agency: DEEDI Contributing partners: DIP, local governments, industry	

Notes

These guidelines will assist local councils and the development industry to resolve unnecessary constraints to on-site renewable or low-emissions energy generation for master-planned communities, mixed-use precincts and large commercial, community service or residential buildings. The guidelines will also provide certainty on technical standards and connection agreements for on-site generation. The guidelines will align with Australian Energy Market Operator (AEMO) technical requirements, help reduce connection costs and facilitate the uptake of on-site renewable or low-emissions energy generation opportunities.

5.2.4 Carbon storage

Program H. Increase stored carbon through the retention or planting of trees

Key climate change policies and programs

Policy 1.3.5 Increase stored carbon through the retention or planting of trees or other vegetation, and other land management practices that also provide sustainability and amenity outcomes.

Also relates to

Policy 3.2.3 Coordinate the locations of environmental, carbon and other development offsets to establish multiple-value regional offset areas in strategic locations within priority regional landscape areas.
DRO 2 – Natural environment
DRO 3 – Regional landscape
DRO 4 – Natural resources

Draft action 15. Identify and map areas suitable for carbon sequestration through vegetation retention or enhancement

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: Local governments Contributing partners: DIP, DEEDI, DERM, SEQ Catchments	

Notes

Bio-sequestration refers to the capture and long-term storage of carbon in forests or soils, which extract carbon from the atmosphere and tie it up in organic matter. Using land and vegetation to increase carbon storage can help reduce greenhouse gas emissions.

Local government is currently investigating, both individually and through the Council of Mayors (SEQ), via the SEQ Regional Carbon Sink Task Force, opportunities to develop and implement bio-sequestration on a regional scale, which could form the basis for this work.

Planning for bio-sequestration needs to consider:

- an integrated approach for bio-sequestration between local and state government
- alignment of bio-sequestration outcomes with other natural resource management outcomes, including biodiversity protection, healthy waterways and restoration of ecosystems to increase the resilience of SEQ’s biodiversity assets, especially in strategic rehabilitation areas
- use of a standardised methodology that aligns with national and international guidelines for bio-sequestration (i.e. Kyoto Protocol criteria)
- economic development opportunities in the rural sector



- investigation of soil carbon sequestration
- areas where bio-sequestration is suitable and viable
- education and awareness about bio-sequestration in the region.

Land management practices can also contribute significantly to storing carbon in soil.

Draft action 16. Increase carbon sequestration through vegetation retention or enhancement

Status: Proposed	Sequence: Follow up
Responsibility: Lead agency: Local governments Contributing partners: DIP, DEEDI, DERM, SEQ Catchments	

Notes

Once the mapping of areas suitable for bio-sequestration is completed, local government can use non-statutory means or amend planning schemes to reflect mapped areas identified as being suitable for bio-sequestration through vegetation retention and enhancement.

The opportunity to increase the bio-sequestration capacity of these areas could then be considered:

- by local government when framing environment strategies, corporate plans and budgets
- in the SEQ natural resources management (NRM) plan, to identify and manage these areas
- in revegetation and rehabilitation projects, for example by catchment or local community groups
- in large-scale commercial revegetation projects
- through the implementation of offset policies for vegetation, biodiversity and koala habitat.

5.2.5 Waste emissions

Program I. Reduce methane lost to the atmosphere from landfill and sewage works

Key climate change policies and programs

Policy 1.3.6 Minimise greenhouse gas emissions from landfill and implement capture and re-use of landfill gas

Also relates to

Policy 10.7.2 Minimise greenhouse gas emissions by diverting green and organic waste from landfill and by implementing capture and re-use of landfill gas.

Draft action 17. Develop a strategy to support additional waste-to-energy and flaring projects

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: Local governments Contributing partners: DERM, industry	

Notes

Local governments are generally responsible for the management and disposal of waste and greenhouse gas emissions from that waste. However, there are opportunities to reduce the methane lost to the atmosphere from landfill and sewage works through waste-to-energy projects and/or flaring. Collaboration between all levels of government is also required to address the reduction of methane emissions from landfill sites.

Waste management discussion papers, including an action plan, are being finalised by the Council of Mayors (SEQ), including a regional waste management program. This initiative focuses on strategic approaches, including resource sharing, regional infrastructure provision, and partnerships. DERM is also developing a waste strategy for Queensland and released a Queensland Waste Strategy discussion paper in 2007.

This work could form the basis of a strategy to reduce methane emissions from landfill and sewage.

Local governments seeking to reduce methane emissions from landfill and sewage may be eligible for financial support from Queensland Government.



5.2.6 Community awareness and behaviour

Program J. Increase community awareness and influence behaviour regarding regionally specific actions to reduce greenhouse gas emissions

Key climate change policies and programs

Policy 1.3.2 Reduce greenhouse gas emissions from transport fuel consumption by adopting patterns of urban development that reduce the need to travel and the distance travelled and by increasing the provision of active and public transport.

Policy 1.3.3 Improve energy-efficiency through siting, design, construction and use of demand management technologies to reduce greenhouse gas emissions from electricity use.

Policy 1.3.4 Increase the local provision of renewable energy and low emission technology in Development Areas, activity centres and other urban areas identified to accommodate future growth.

Policy 1.3.5 Increase stored carbon through the retention or planting of trees or other vegetation and other land management practices that also provide sustainability and amenity outcomes.

Policy 1.3.6 Minimise greenhouse gas emissions from landfill and implement capture and re-use of landfill gas.

Also relates to

DRO 6—Strong Communities

Draft action 18. Develop and implement a communications strategy to support actions to reduce greenhouse gas emissions in SEQ

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: DIP Contributing partners: DERM, local governments, industry	

Notes

Community attitudes, behaviour and awareness of climate change issues are key issues. There is already a wide range of work underway in this area, including projects listed in Appendix 1 of this draft plan.

This action would augment existing national and state education and awareness initiatives (e.g. the Queensland Government's Towards Q2: Tomorrow's Queensland program). It may include an education and behaviour-change campaign targeting industry and the community.

Draft action 19. Update the *South East Queensland State of the Region Technical Report 2008* to incorporate improved climate-change indicators

Status: Underway	Sequence: Follow up
Responsibility: Lead agency: DIP Contributing partners: DERM, local governments, industry	

Notes

The *South East Queensland State of the Region 2008 Technical Report* included indicators related to climate change, including greenhouse gas emissions, climate change trends, electricity generation, electricity demand and use of renewable energy. Information in the 2008 report on greenhouse gas emissions, electricity generation and use of renewable energy was only available at a statewide level and not for the region. The information on climate change trends included historical and projected temperature and rainfall for Brisbane.

An SEQ State of the Region Technical Report will be produced every five years to inform the review of the SEQ Regional Plan. An assessment will be undertaken to determine the scope and utility of the climate change information included in the report.



5.3 Natural hazards and climate change adaptation

5.3.1 Coastal hazards

Program K. Reinforce and enhance government directives, guidance and mapping to reduce the exposure and vulnerability of communities, development and essential infrastructure to coastal hazards

Key climate change policies and programs

Policy 1.4.1 Reduce the risk from natural hazards, including the projected effects of climate change, by avoiding areas with high exposure and establishing adaptation strategies to minimise vulnerability to riverine flooding, storm tide or sea level rise inundation, coastal erosion, bushfires and landslides.

Policy 1.4.3 Planning schemes and development decisions shall be in accordance with the Queensland Coastal Plan including the range of potential sea level rises.

Policy 1.4.5 Develop performance criteria for the planning and design of development and infrastructure to manage risks from natural hazards and climate change.

Also relates to

DRO 2— Natural Environment

Policy 2.4.2 Ensure development other than maritime infrastructure avoids erosion prone areas, storm tide inundation hazard areas, and undeveloped sections of tidal waterways in accordance with the Queensland Coastal Plan.

DRO 6— Strong Communities

DRO 10— Infrastructure

Draft action 20. Prepare a new Queensland Coastal Plan and supporting guidelines

Status: Underway

Sequence: Immediate priority

Responsibility:

Lead agency: DERM

Contributing partners: DIP, local governments, industry

Notes

Climate change is expected to increase the severity and frequency of storm tides, coastal erosion and sea level rise. The State Coastal Management Plan and supporting guidelines are currently being reviewed and will address climate change impacts in the coastal zone. A new Queensland Coastal Plan will provide policy direction on storm tide, sea level rise and coastal erosion.



Draft action 21. Update the current guideline, *Mitigating the adverse impacts of storm tide inundation* to incorporate current climate change science

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: DERM Contributing partners: DERM, DIP, DCS, CSIRO, BOM, local governments	

Notes

It is important to understand the risks posed by coastal natural hazards, including the effects of projected climate change and where at-risk and hazard-prone areas are located in the region.

The identification of at-risk and hazard-prone areas requires a consistent methodology. The new Queensland Coastal Plan will include a state planning policy mandating a consistent methodology for undertaking hazard and risk mapping.

Key issues to consider in undertaking this action could include the following:

- mapping of areas where a coastal hazard risk may exist, having particular regard to impacts on human health, agriculture, transport, essential infrastructure, buildings and biodiversity
- the need for a methodology to assess any increased risk in areas where storm surge and riverine flooding could coincide
- identifying regionally sensitive areas and other hazard categories and associated preferred forms of development or design
- ensuring a consistent hazard and risk mapping methodology is used by governments and development proponents at regional, local and site scales.

Draft action 22. Implement the policies of the new Queensland Coastal Plan through regional and local planning, and development and infrastructure decision making in SEQ

Status: Underway	Sequence: Immediate priority
Responsibility: Lead agency: Local governments, DIP Contributing partners: DERM, DCS, industry	

Notes

Implementation of the new Queensland Coastal Plan will be achieved through regional planning and amendments to local government planning schemes to reflect the outcomes and requirements of the coastal plan, and ensure new developments meet the requirements of the updated development assessment process. Structure plans and master plans should also be consistent with the outcomes and requirements of the coastal plan.

Draft action 23. Acquire fine-scale digital elevation data for coastal areas for use in assessing risk and mapping hazard-prone areas in SEQ

Status: Underway	Sequence: Immediate priority
Responsibility: Lead agency: DERM Contributing partners: Local governments, DIP, DCS, industry	

Notes

High-quality, fine-scale digital elevation data is essential for the assessment of coastal hazards and risks. While many councils have purchased data, the data-capture standards and scales vary and much of the data is not readily available due to contractual agreements with data suppliers. The Queensland Government, in partnership with the Australian Government, is in the process of capturing digital elevation data for SEQ that will become progressively available from the end of 2009 or early 2010.

Draft action 24. Prepare and publish regional- and local-scale risk assessments and maps of coastal hazard-prone areas using the methodology, sea-level rise and storm-intensity factors in the new Queensland Coastal Plan

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: Local governments Contributing partners: DERM, DIP, CSIRO, BOM	

Notes

It is important to undertake coastal hazard and risk mapping in order to understand the risks posed by coastal natural hazards, including the effects of projected climate change and where hazard-prone areas are located in the region. Under the new Queensland Coastal Plan, SEQ local governments are required to assess and manage the risk of coastal hazards, including sea level rise, coastal erosion, and storm surge.



5.3.2 Riverine flooding, bushfires, high temperatures and other natural hazards

Program L. Reinforce and enhance government directives, guidance and mapping to reduce the exposure and vulnerability of communities, development and essential infrastructure to riverine flooding, bushfires, high temperatures and other relevant natural hazards

Key climate change policies and programs

Policy 1.4.1 Reduce the risk from natural hazards, including the projected effects of climate change, by avoiding areas with high exposure and establishing adaptation strategies to minimise vulnerability to riverine flooding, storm tide or sea-level rise inundation, coastal erosion, bushfires and landslides.

Policy 1.4.2 Reduce the risk from natural hazards, including the projected effects of climate change, by establishing adaptation strategies to minimise vulnerability to heatwaves and high temperatures, reduced and more variable rainfall, cyclones and severe winds and severe storms and hail.

Policy 1.4.3 Planning schemes and development decisions shall be in accordance with the Queensland Coastal Plan including the range of potential sea level rises.

Also relates to

Policy 11.6.1 Avoid areas of unacceptable flood risk, including additional risks from climate change, and areas where development may unacceptably increase flood risk elsewhere.

Policy 11.6.3 Identify areas of flood risk, including the projected effects of climate change, and undertake programs to mitigate the risk.

DRO 2 – Natural environment

DRO 6 – Strong communities

Draft action 25. Review and update *State Planning Policy (SPP) 1/03 – Mitigating the Adverse Impacts of Flood, Bushfire and Landslide*, and develop supporting guidelines

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: DIP Contributing partners: DCS, DERM, LGAQ, COM SEQ, industry	

Notes

Climate change is expected to increase the severity and frequency of extreme weather events that cause natural hazards.

SPP 1/03 articulates the state's policy position on flooding, bushfire and landslide, but needs to be reviewed and updated to reflect the projected effects of climate change. Consideration will also need to be given to the role of planning in reducing the risks from other hazards such as storms, cyclonic winds, high temperatures and heatwaves.

An updated SPP would provide an opportunity to better understand and reduce the risks from natural hazards by ensuring development (and supporting infrastructure) avoids hazard-prone areas and improving the design of development and infrastructure in at-risk or hazard-prone areas.

The proposed review of SPP 1/03 would consider how the methodologies for determining risk could be updated to take into account the projected effects of climate change and would provide updated policy direction on how to manage those risks.

Implementation of the SPP would be achieved through amendments to local governments planning schemes to incorporate the outcomes and requirements of the SPP, and through the development assessment process.



Draft action 26. Develop guidelines for the preparation of hazard and risk maps including the projected effects of climate change on natural hazards within the scope of the revised SPP 1/03

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: DIP Contributing partners: DCS, DERM, DIP, CSIRO, BOM, local governments	

Notes

It is important to understand the risks posed by riverine flooding, bushfires and landslides, including the projected effects of climate change and where hazard-prone areas are located in the region, i.e. through regional hazard and risk mapping.

One of the proposed outputs of draft action 25 is the development of guidelines for preparing of hazard and risk maps within the scope of a revised State Planning Policy 1/03. The guidelines would be used as the basis for updating local government hazard and risk maps. The guidelines and local government maps would be complemented by state codes for buildings that would help reduce these risks. These codes may include, for example, a bushfire building code and a flood building code.

Draft action 27. Develop a regional summary of projected climate change impacts for SEQ

Status: Underway	Sequence: Immediate priority
Responsibility: Lead agency: DERM Contributing partners: CSIRO, BOM	

Notes

In recognition of local and state government agencies' need for more detailed advice on projected climate change impacts across Queensland (including SEQ), the Queensland Centre for Climate Change Excellence (QCCCE), with input from CSIRO, has undertaken a detailed analysis of climate projections across the state by downscaling global climate models to a regional level.

Draft action 28. Prepare local-scale climate-resilient urban planning and design guidelines and performance criteria for sensitive areas

Status: Proposed	Sequence: Follow up
Responsibility: Lead agency: DIP Contributing partners: DCS, DERM, DPW, local governments, CSIRO, industry	

Notes

The guidelines would focus on making communities, development and essential infrastructure more resilient to climate change impacts at the local or neighbourhood level. They would also clarify the relationship between local or neighbourhood level planning and design responses and building-scale hazard mitigation procedures (i.e. Building Codes).

The guidelines would provide advice on how to design climate-resilient communities, including location and design performance criteria, and how to ensure climate-resilient outcomes and requirements can be incorporated into planning schemes and other development plans.

Preparation of the guidelines would be informed by the new Queensland Coastal Plan, and the proposed review of SPP 1/03. These guidelines would be linked to other Climate Smart and sustainability planning guidelines, and related land use, transport and public open space design and planning parameters.

This guideline would also draw from and reinforce a proposed model code for Smart Growth (SEQRP programs 8.3.6 and 8.5.7).



5.3.3 Biodiversity conservation

Program M. Reinforce and enhance research knowledge, and government directives, guidance and mapping to build the resilience of natural ecosystems to climate change

Key climate change policies and programs

Policy 1.4.1 Reduce the risk from natural hazards, including the projected effects of climate change, by avoiding areas with high exposure and establishing adaptation strategies to minimise vulnerability to riverine flooding, storm tide or sea-level rise inundation, coastal erosion, bushfires and landslides.

Policy 1.4.2 Reduce the risk from natural hazards, including the projected effects of climate change, by establishing adaptation strategies to minimise vulnerability to heatwaves and high temperatures, reduced and more variable rainfall, cyclones and severe winds and severe storms and hail.

Also relates to

Program 2.4.6 Identify and protect areas that provide for the landward retreat of coastal habitats and species at risk from predicted sea level risk.

DRO 3—Regional landscapes

DRO 4—Natural resources

Draft action 29. Improve understanding of the vulnerability of ecosystems to the impact of climate change in SEQ

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: DERM Contributing partners: DERM, CSIRO, local governments, community	

Notes

Knowledge of the actual impacts of climate change on natural ecosystems is limited. However, sea level rise, increased temperature and changes in rainfall patterns are likely to bring about significant changes to ecosystems generally. Some may be lost, particularly ecosystems at high elevations; or displaced, particularly coastal ecosystems.

Draft action 30. Prepare regional and local adaptation strategies and programs to mitigate the impacts of climate change on natural ecosystems in SEQ

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: Local governments Contributing partners: DERM, DIP, CSIRO, local governments, community	

Notes

Some work has been done in SEQ to assess the possible impacts of climate change. For example, a case study for the Pimpama Catchment, funded through the National Coastal Vulnerability Assessment, shows that mangrove and coastal wetland communities will be displaced by sea level rise. While knowledge is limited, one important adaptation strategy would be to ensure land use and development decisions and natural resource management programs maintain ecosystem resilience and connectivity.

5.3.4 Climate change adaptation research

Program N. Reinforce and enhance government applications of research knowledge about climate change adaptation in SEQ

Key climate change policies and programs

Policy 1.4.1 Reduce the risk from natural hazards, including the projected effects of climate change, by avoiding areas with high exposure and establishing adaptation strategies to minimise vulnerability to riverine flooding, storm tide or sea-level rise inundation, coastal erosion, bushfires and landslides.

Policy 1.4.2 Reduce the risk from natural hazards, including the projected effects of climate change, by establishing adaptation strategies to minimise vulnerability to heatwaves and high temperatures, reduced and more variable rainfall, cyclones and severe winds and severe storms and hail.

Also relates to

DRO 2—Natural environment

DRO 6—Strong communities

DRO 10—Infrastructure



Draft action 31. Facilitate the uptake of research knowledge about climate change adaptation by SEQ local governments and state agencies

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: DIP, DERM Contributing partners: CSIRO, DTMR, DCS, DEEDI, COM SEQ, local governments	

Notes

National climate change research by the SEQ Climate Change Research Initiative (SEQCARI), the CSIRO Climate Change Adaptation Research Flagship (CCARF), the National Coastal Vulnerability Assessment (NCVA), and the National Climate Change Adaptation Research Facility (NCCARF) will generate improved knowledge to support climate change adaptation decisions in SEQ. The efficient communication of these research results will inform the adaptation planning undertaken by SEQ local governments and state agencies.

The Queensland Government will work with research providers to identify the nature and timing of research outputs and the best ways of sharing this knowledge with state agencies and SEQ local governments.

5.3.5 Building resilience through increased awareness and behaviour change

Program O. Increase community awareness and influence behaviour regarding actions to build resilience to natural hazards and climate change in SEQ

Key climate change policies and programs

Policy 1.4.1 Reduce the risk from natural hazards, including the projected effects of climate change, by avoiding areas with high exposure and establishing adaptation strategies to minimise vulnerability to riverine flooding, storm tide or sea-level rise inundation, coastal erosion, bushfires and landslides.

Policy 1.4.2 Reduce the risk from natural hazards, including the projected effects of climate change, by establishing adaptation strategies to minimise vulnerability to heatwaves and high temperatures, reduced and more variable rainfall, cyclones and severe winds and severe storms and hail.

Program 1.4.5 Develop performance criteria for the planning and design of development and infrastructure to manage risks from natural hazards and climate change.

Also relates to

DRO 6—Strong communities

Draft action 32. Develop and implement a communications strategy to support actions to build resilience to natural hazards and the projected effects of climate change in SEQ

Status: Proposed	Sequence: Immediate priority
Responsibility: Lead agency: DIP Contributing partners: DCS, DOC, DERM, local governments, industry	

Notes

Building community awareness of, and influencing behaviour and attitudes to the impacts of climate change, is important in building community resilience. National disaster management programs are focusing significant effort on initiatives to build community resilience to natural hazards and foster greater self-reliance. A regionally specific communication strategy would complement and build on work already being undertaken at a national and state-wide level.



6. Glossary

Adaptation	Adjustment to climate changes that will occur despite efforts to reduce greenhouse gas emissions. Adaptation can help human and natural systems reduce their vulnerability to climate change and create new economic opportunities.
Biosequestration	The removal from the atmosphere and storage of greenhouse gases through biological processes, such as growing trees and practices that enhance soil carbon in agriculture.
Carbon Pollution Reduction Scheme	The Australian Government's emissions trading scheme, which it is proposing to commence in 2011. It would apply to large-scale emitters of greenhouse gases.
Carbon sink	A natural or man-made reservoir that accumulates and stores some carbon-containing chemical compound for an indefinite period.
Climate change	Any change in climate over time whether due to natural variability or as a result of human activity. (IPCC Working Group 1) A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. (UNFCCC)
Equivalent Carbon Dioxide	A unit of measurement to standardise and compare the impact of different greenhouse gases (e.g. methane, nitrous oxide) on the transfer of radiative heat through the atmosphere. The measure is the concentration of carbon dioxide required to produce the same effect as the specified gas and expressed as parts per million by volume (ppmv).
Exposure	The geographical location and relative value of social, environmental or economic assets that influences the level of risks posed by a natural hazard.
Greenhouse gas	A gas which absorbs heat radiation in the atmosphere. Includes water vapor, carbon dioxide, methane, nitrous oxide and ozone.
Intergovernmental Panel on Climate Change	A scientific body with broad international representation to integrate current technical and socio-economic information associated with climate change.
Kyoto Protocol	An international agreement linked to the United Nations Framework Convention on Climate Change for participant nations to set binding targets to reduce greenhouse gas emissions between 2008–2012 ⁴ .
Mitigation	Taking actions to reduce greenhouse gas emissions and to enhance carbon sinks aimed at reducing the extent of global warming.
Natural hazard	A naturally occurring event which poses a threat to human health, life and the built or natural environment. Climate change will increase the intensity, predictability and frequency of natural hazards that can be geological (e.g. landslides), hydrological (e.g. flooding), climatic (e.g. droughts, heatwaves, storms) or bushfires.
Risk	The likelihood of an adverse outcome, estimated from the combined probability of a natural hazard and the severity of the potential consequences. Potential consequences are determined by the level of vulnerability and the exposure of an asset to that hazard.
Vulnerability	Susceptibility of social, environmental or economic assets to harm that influences the level of risks posed by a natural hazard.



7. Abbreviations

AEMO	Australian Energy Market Operator
BOM	Australian Bureau of Meteorology
CO ₂	Carbon dioxide
CO ₂ e	Equivalent carbon dioxide.
COAG	Council of Australian Governments
COM SEQ	Council of Mayors South East Queensland
CPRS	Carbon Pollution Reduction Scheme
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DCS	Department of Community Safety
DEEDI	Department of Employment Economic Development and Innovation
DERM	Department of Environment and Resource Management
DIP	Department of Infrastructure and Planning
DTMR	Department of Transport and Main Roads
DPW	Department of Public Works
ICLEI	International Councils for Local Environmental Initiatives (also referred to as Local Governments for Sustainability)
IDAS	Integrated Development Assessment System
IPCC	Intergovernmental Panel on Climate Change
IPCC (AR ₄)	IPCC Fourth Assessment Report—produced in 2007
IRTP	Integrated Regional Transport Plan
LGAQ	Local Government Association of Queensland
NCCAF	National Climate Change Adaptation Framework
NCCARF	National Climate Change Adaptation Research Facility
NCVA	National Coastal Vulnerability Assessment
OCC	Office of Climate Change (DERM)
PPMV	Parts per million by volume
QCCCE	Queensland Centre for Climate Change Excellence (DERM)
SEQCARI	South East Queensland Climate Change Adaptation Initiative
SEQIPP	South East Queensland Infrastructure Plan and Program
SEQRP	South East Queensland Regional Plan 2009–2031
SPP	State Planning Policy
TOD	Transit-oriented development
ULDA	Urban Land Development Authority
UNFCC	United Nations Framework Convention on Climate Change

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9. Bibliography

1. Intergovernmental Panel on Climate Change 2007a. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. and Miller, H.L. (eds.)], Cambridge University Press, United Kingdom and New York, NY, USA.
2. Intergovernmental Panel on Climate Change 2007b. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J. and Hanson, C.E. (eds.)], Cambridge University Press, Cambridge, UK, 976 pp.
3. United Nations Framework Convention on Climate Change. Viewed on 1 July 2009, www.unfccc.int/2860.php
4. United Nations Framework Convention on Climate Change. Kyoto Protocol. Viewed on 1 July 2009. www.unfccc.int/kyoto_protocol/items/2830.php
5. Australian Government (Department of Climate Change) 2008. Implementing the Kyoto Protocol in Australia. Commonwealth of Australia. Viewed on 1 July 2009. www.climatechange.gov.au/international/publications/fs-kyoto.html
6. Intergovernmental Panel on Climate Change 2007c. Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA
7. Dr. Pieter Tans. Trends in Atmospheric Carbon Dioxide – Global. U.S. Department of Commerce. National Atmospheric and Oceanic Association, Earth System Research Laboratory. Viewed on 1 July 2009. www.esrl.noaa.gov/gmd/ccgg/trends
8. Australian Government (Department of Climate Change) 2008. Carbon pollution reduction scheme. Viewed on 1 July 2009. www.climatechange.gov.au/emissionstrading/index.html
9. Australian Government (Department of Climate Change) 2008. Australia's Renewable Energy Target. www.climatechange.gov.au/renewabletarget/index.html
10. Council of Australian Governments (COAG) National Strategy for Energy Efficiency - COAG Communiqués of 30 April and 2 July 2009. Viewed on 7 July 2009 www.coag.gov.au/coag_meeting_outcomes/archive.cfm
11. Queensland Government (Department of the Premier and Cabinet) 2008. Toward Q2: Tomorrow's Queensland, Department of the Premier and Cabinet, Brisbane.
12. Council of Mayors, South East Queensland. Viewed on 1 July 2009. www.councilofmayorsseq.qld.gov.au/content/AboutUs.asp
13. Council of Australian Governments, 2007. National Climate Change Adaptation Framework. Viewed on 1 July 2009. http://www.coag.gov.au/coag_meeting_outcomes/2007-04-13/docs/national_climate_change_adaption_framework.pdf
14. Australian Government (Department of the Climate Change). Viewed on 1 July 2009. www.climatechange.gov.au/impacts/coasts.html#research
15. Commonwealth Scientific Industrial Research Organisation. South East Queensland Climate Adaptation Research Initiative. Viewed on 1 July 2009. www.csiro.au/partnerships/seqcari.html
16. Garnaut, R. 2008. The Garnaut Climate Change Review. Cambridge University Press Australia ISBN-13: 9780521744447.



17. David, D. 2009. Blaming cities for climate change? An analysis of urban greenhouse gas emissions inventories *Environment and Urbanization* 21: 185-201.
18. Chandra, L. 2006. Modelling the Impact of Urban Form and Transport Provision on Transport-Related Greenhouse Gas Emissions. Masters Thesis (Perth, Institute for Sustainability and Technology Policy, Murdoch University).
19. Newman, P. & Kenworthy, J. (1989) *Cities and Automobile Dependence: An International Sourcebook* Gower, England. (1999) *Sustainability and Cities: Overcoming automobile dependence* Island Press. Washington, DC.
20. Gray, R., Gleeson, B. and Burke, M. 2008. Urban consolidation and household greenhouse emissions: Towards a full consumption impacts approach. Griffith University, Brisbane. ISBN 978-1-921291-48-7
21. Crichton, D., 1999. 'The risk triangle', in J. Ingleton (ed), *Natural disaster management*, Tudor Rose, London.
22. Crichton, D., 2001. *The Implications of Climate Change for the Insurance Industry – An Update and Outlook to 2020*. BRE, Watford.
23. ICLEI Local Governments for Sustainability 2009. SEQ Regional Plan Climate Change Project Phase 2 Emissions Analysis, Unpublished report to the Department of Infrastructure and Planning, Brisbane.
24. Smith, N. and Mitchell, C. 2007. The Bureau-CSIRO Joint Research Centre. Viewed on 1 July 2009. <http://www.bom.gov.au/bmrc/basic/wksp18/papers/Smith.pdf>
25. Queensland Government (Office of Climate Change) 2008, *Climate Change in Queensland: What the science is telling us*, Environmental Protection Agency, Brisbane. www.climatechange.qld.gov.au/downloads/downloads/ClimateScienceReport_WEB.pdf



10. Appendix 1

Key climate change initiatives

International initiatives

Intergovernmental Panel on Climate Change (IPCC)
Kyoto Protocol
United Nations Framework Convention on Climate Change—2009 conference, Copenhagen

Australian Government initiatives

Reducing greenhouse gas emissions

Proposed Carbon Pollution Reduction Scheme (CPRS)
Renewable Energy Target (RET)
National emissions reduction target
Rebate schemes for photovoltaic solar panels and home insulation
Minimum Energy Performance Standards (MEPS)

Climate change adaptation

COAG Working Group on Climate Change and Water
National Climate Change Adaptation Framework (NCCAF)
National Agriculture and Climate Action Plan
National Biodiversity and Climate Change Action Plan
Local Adaptation Pathways Program
National Coastal Vulnerability Assessment (NCVA) (incl. Pimpama River Catchment case study)
CSIRO Climate Change Adaptation Flagship
SEQ Climate Change Adaptation Research Initiative (SEQCARI)
National Climate Change Research Facility (NCCARF)

Queensland Government initiatives

Queensland Climate Change Strategy
Premier's Council on Climate Change
Climate change policies of regional plans incl. SEQ Regional Plan 2009–2031 and FNQ Regional Plan

Reducing greenhouse gas emissions


Toward Q2: Tomorrow's Queensland
ClimateSmart Homes Service
Queensland Solar Hot Water Program
Queensland Development Code
Queensland 18% Gas Scheme
Queensland Renewable Energy Plan
Queensland Climate Change Fund
TravelSmart

Natural hazards and climate change adaptation

New Queensland Coastal Plan
State Planning Policy 1/03—Mitigating the Adverse Impacts of Flood, Bushfire and Landslide

SEQ local government initiatives

Cities for Climate Protection (ICLEI)
Brisbane City Council—CitySmart and Climate Change and Energy Task Force, 2006
Gold Coast City Council—Climate Change Strategy 2009
Logan City Council—Climate Change Strategy and Action Plan
Moreton Bay Regional Council—former Pine Rivers Energy Management Plan
Council of Mayors—SEQ Regional Carbon Sink project



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