

ClimateChange

Risk Assessment



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City of
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Australian Government

Department of Climate Change

INTRODUCTION

There is little doubt that the global climate is changing. Over the past couple of decades public debate has largely shifted focus from a question of ‘is climate change really happening?’ to ‘how can we as humans respond to climate change?’.

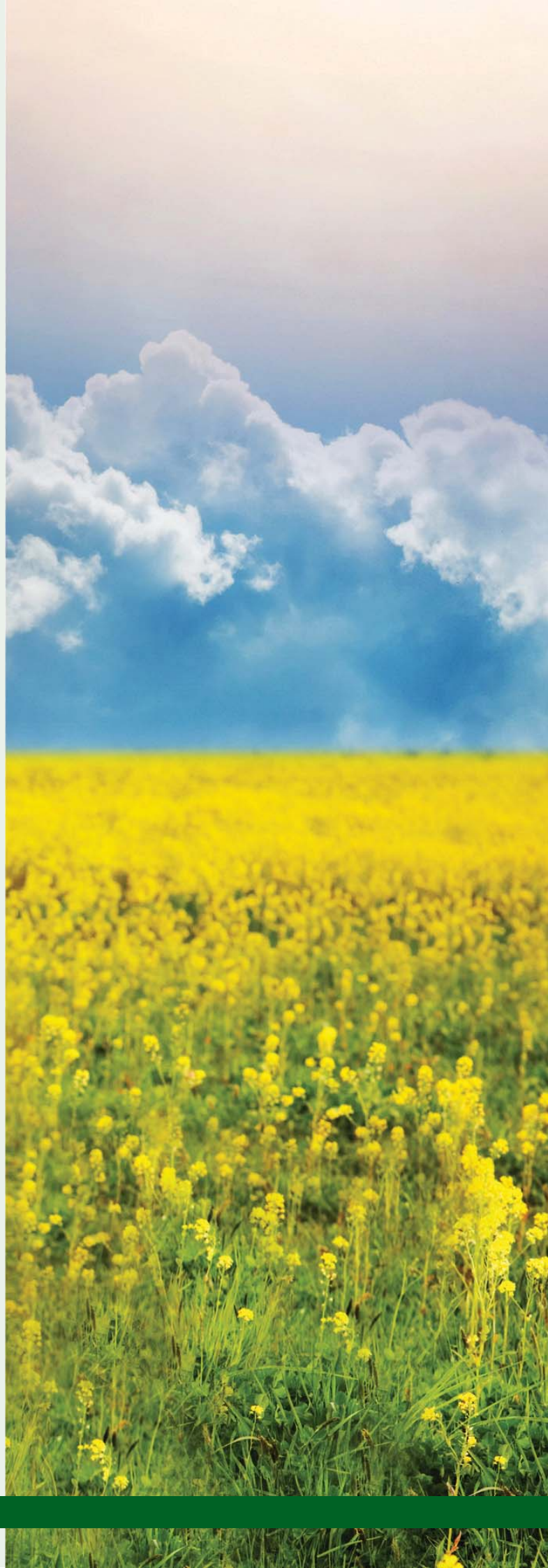
There are two main ways that humans can respond to climate change, namely to work towards minimising future climate change (reducing emissions), and to work towards making it easier to cope with the impacts of climate change (adapting to climate change).

As part of initial work to adapt to climate change, Ipswich City Council in partnership with Toowoomba Regional Council, Somerset Regional Council and Lockyer Valley Regional Council commissioned the consulting firm GHD to conduct a risk assessment for the potential impacts of climate change. Funding for the project was provided by the Australian Government.

EXPECTED CHANGES IN CLIMATE

The climate variables considered for the climate change risk assessment included reduced rainfall, increased temperature and extreme weather events (storms, flooding, bushfire).

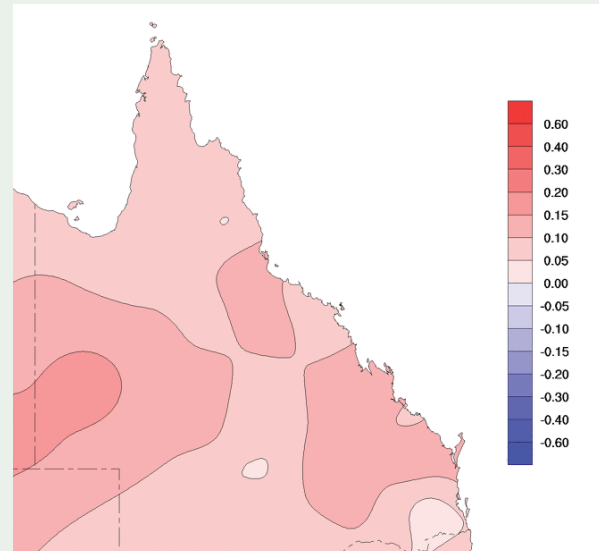
The data available for rainfall and temperature has a long history of good quality data and is reasonably easily modelled into the future. Data relating to extreme weather events is more difficult to define and obtain and is also more difficult to model.





The following maps show changes in annual average temperature and rainfall across Queensland over the past 100 years

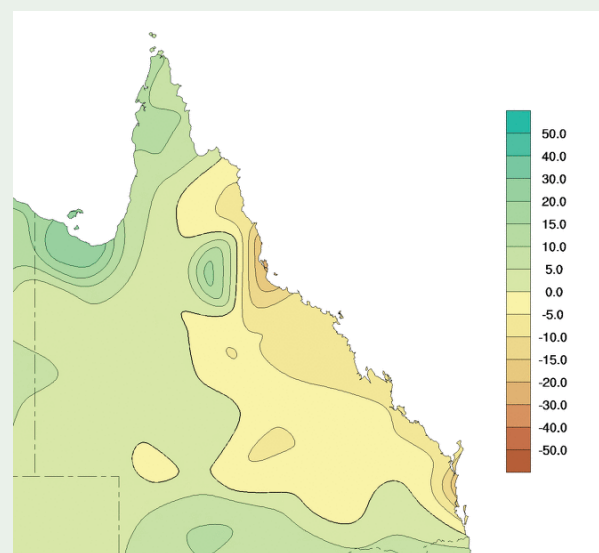
Trend in Mean Temperature 1910-2008 (°C/10yrs)



Source: www.bom.gov.au

Figure 1 above shows a statewide trend of warming, with South East Queensland warming less than central and western Queensland.

Trend in Annual Total Rainfall 1900-2008 (mm/10yrs)



Source: www.bom.gov.au

Figure 2 above shows a trend of reduced rainfall in coastal parts of Queensland, while inland Queensland has shown a trend towards increased rainfall.

CLIMATE PROJECTIONS

Table 1 below shows climate change projections for locations within Ipswich City Council, Toowoomba Regional Council, Lockyer Valley Regional Council and Somerset Regional Council areas for the years 2030, 2050 and 2070.

Climate Variable			Current Average #	2030		2050		2070									
				Estimate of Change - Mid Range	Low, High Range	Estimate of Change - Mid Range	Low, High Range	Estimate of Change - Mid Range	Low, High Range								
Temperature	Annual Average Temperature (°C)	Ipswich (Amberley)	Max: 26.7 Min: 13.1	+1.2	(0.8, 1.3)	+2.5	(1.6, 2.7)	+4.2	(1.6, 4.6)								
		Toowoomba	Max: 22.6 Min: 11.4														
		Lockyer Valley (Gatton)	Max: 26.8 Min: 13														
		Somerset (Somerset Dam)	Max: 26 Min: 13.5														
		Extreme Temperature	Annual Average Number of Hot Days (over 35°C)							Ipswich (Amberley)	12	+8.1*	(4.5, 8.7)	N/A	N/A	+51*	(24, 59)
										Toowoomba	2.7						
										Lockyer Valley (Gatton)	17						
										Somerset (Somerset Dam)	10						
Rainfall	Annual Average Rainfall	Ipswich (Amberley)	840.8mm	-4%	(-10.2, +2.9)	-8.8%	(-21.9, +6.3)	-15%	(-36, +10.6)								
		Toowoomba	944mm														
		Lockyer Valley (Gatton)	767.8mm														
		Somerset (Somerset Dam)	986mm														
	Average Summer Monthly Rainfall	Ipswich (Amberley)	118mm	-0.5%	(-3.3, +9.3)	-1%	(-7.2, +20)	-1.7%	(-12, +33.6)								
		Toowoomba	124.4mm														
		Lockyer Valley (Gatton)	103.8mm														
		Somerset (Somerset Dam)	134mm														
	Average Winter Monthly Rainfall	Ipswich (Amberley)	38.4mm	-9%	(-18.8, -6.1)	-19.5%	(-40.5, -13)	-32.8%	(-68, -22)								
		Toowoomba	49.4mm														
		Lockyer Valley (Gatton)	35.8mm														
		Somerset (Somerset Dam)	43.6mm														

Values extracted CSIRO (2007) OzClim averages except * from Dunlop & Brown (2008) Ipswich data, # from BoM (2008)

Table 1: Climate Change projections for locations in Ipswich, Lockyer Valley, Toowoomba and Somerset local government areas.

The climate change projections for the study area show temperatures increasing on average by around 1.2 degrees up to 2030 and by around 4.2 degrees on average by 2070. This increase in average temperature will result in the average number of hot days (over 35°C) increasing by around 8 days for the Ipswich area in 2030. Similar increases would also be expected for the Lockyer Valley and Somerset regions, however, Toowoomba, given its current lower temperatures, would probably not be affected as significantly in terms of the number of days above 35°C.

Warming, combined with population growth is expected to lead to an increase in the number of heat related deaths over Queensland. Deaths are projected to be as high as 5800 per year for the whole state by 2100, under a business as usual, high emissions climate change scenario. Projected changes in rainfall for the study area are slightly more variable, but with the overall trend being for less average annual rainfall than is currently experienced for the region.

Studies have shown a tendency for daily rainfall extremes to increase under enhanced greenhouse conditions in the Australian region, even in areas where the average rainfall is projected to decrease. Hail days in South East Queensland are projected to increase by up to 2 days by 2030 and 4 days by 2070.

As well as severe wet weather events, drought is also considered an extreme event. Prolonged drought conditions are expected to increase with 20% more drought months by 2030 and 40% by 2070. These conditions will place an even higher level of pressure on water resources required for industry, agriculture, urban areas and ecosystems.



RISKS IDENTIFIED

The risk assessment identified just over 40 risks, which are presented in table 2 below.

Hazards Identified	Risk Level (2030)	General Risk Category
(3) Decline in vulnerable native species (note that vulnerable is used in the colloquial sense)	High	RC1 - Change in pests and weeds
(4) Migration of weeds not previously found in region leading to loss of native vegetation	High	
(5) Migration of weeds not previously found in region leading to financial impacts on rural sector	Medium	
(36) Reduced rainfall leading to change in distribution, number of species and abundance of weeds and pests leading to loss of biodiversity	Medium	
(6) Reduced productivity for outdoor Council staff	Medium	RC2 - Health physical safety and well-being of increased temperature
(7) Increased incidents of heat stress for community members in public spaces and private dwellings	Medium	
(7a) Potential heat stress at major public events	High	
(8) Reduced social interaction and physical activity due to reduced use of outdoor areas, or changed patterns and costs of use	Extreme	
(9) Changed demand patterns for sporting facilities (which can have cost implications for Council and for facilities users)	Extreme	
(13) Potential relocation of residents to cooler climate	High	RC3 - Increase in energy use
(12) Increased consumption and unit cost of power for Council facilities	High	
(14) Local Council buildings and facilities not functioning efficiently in a warmer climate	Low	RC4 - Public health impacts
(15) Increased susceptibility to food borne public health outbreaks	Low	
(16) More humans exposed to tropical diseases due to disease migration into South East Queensland.	High	
(17) Livestock being exposed to more vector borne diseases	High	
(20) Increased susceptibility of water borne public health outbreaks from private water tanks due to increase in numbers of disease vectors, particularly in context of increased prevalence of domestic water tanks.	Medium	
(21) Increased susceptibility of water borne public health outbreaks from main water supply	Medium	
(22) Follow-on reputation and financial risk to Councils from water quality reduction	Low	
* In flood event, direct exposure to contaminated water (eg sewage overflows, septic tank discharge, etc) and potential for stagnant water to breed disease vectors.		
(10) Increased lifecycle costs for playground equipment construction/maintenance/replacement	Medium	RC5 - Reduced life/ increased maintenance costs for Council assets
(11) Increased lifecycle costs for public and private infrastructure including roads - construction/maintenance/replacement	High	
* Changed suitability of materials (some existing materials may become unsuitable. Some materials not currently used may become more suitable)		RC6 - Trees/crops no longer suitable under changed climate conditions
(1) Some street, parkland, and turf species may not be suitable due to change in climate	High	
(2) Changed crop productivity	High	
*Carbon sequestration trees may also be effected		

Hazards Identified	Risk Level (2030)	General Risk Category
(28) Increased damage to property/Loss of life	High	RC7 - Changed bushfire intensity and frequency
(29) Loss of vulnerable species	High	
(30) Increased cost for management of fire response	Medium	
(31) Impacts on local businesses/tourism	Medium	
(32) Fires on Council land leading to reputation damage	Medium	
(18) Reduced water for urban water needs	Medium	RC8 - Changed water availability and demand patterns
(19) Reduced water for agriculture	High	
(23) Reduced water available for potable water consumption	High	
(24) Reduced water for open and public space and active playing surfaces (recreation areas, street trees, etc)	High	
(25) Flow on effects from reduced agriculture for local businesses	High	
(26) Reduced water for industrial use and for road works and construction	High	
(27) Ecosystem and ecosystem services impact	High	
* Carbon sequestration plantings may also be affected		
(33) Financial loss associated with increased maintenance/reduced life for Council owned buildings	Medium	RC9 - Ground movement as a result of changed soil wetting and drying cycles
(34) Increased installation, maintenance and repair costs for underground services	High	
(35) Reputation damage for Councils associated with increased maintenance/reduced life for public and private infrastructure, including buildings, roads and drainage	Medium	
(35a) Increases maintenance and repair costs for roads and drainage	Extreme	
* Trip hazard on footpaths laid on moving soils		
(37) Financial impact of increased hail damage to council assets	Medium	RC10 - Increased storm/ flash flooding risk
(38) Increased maintenance, emergency response, and recovery costs due to damage to public and private infrastructure and assets in a flood event	High	
(39) Increased risk of facilities or serious injury	High	
(40) Reduced service delivery due to inundation of low lying areas causing damage to infrastructure	High	
(41) Environmental impacts of floods (eg damage to riparian zone, erosion, fish kills, etc)	High	
(42) Increased costs due to inundation of low lying areas causing damage to infrastructure	Medium	
*Public health risks associated with flood events * Landfill impacts as a result of need to remove storm or flood damaged items from affected area. *Flood impacts on domestic animals		

Table 2: Climate Change Hazards identified

* = risk level not assessed at risk assessment workshop



There were 10 different categories of risk identified from the risks in table 2 above.

The categories identified were as follows (not in any particular order):

- Change in pest & weed distribution;
- Health, physical safety and wellbeing impacts of increased temperature;
- Increase in energy use;
- Public health impacts;
- Reduced life/increased maintenance costs for Council assets;
- Trees/crops no longer suitable under changed climatic conditions;
- Changed bushfire intensity and frequency;
- Changed water availability and demand patterns;
- Ground movement as a result of changed soil moisture cycles; and
- Increased storm/flash flooding.

There were three specific hazards identified that were assigned an 'extreme' risk level for 2030 based on climate change predictions for 2030. These were:

- Increased maintenance and repair costs for roads and drainage assets;
- Reduced social interaction and physical activity due to reduced use of outdoor areas, or changed patterns and costs of use; and
- Changed demand patterns for sporting facilities.

CONCLUSIONS

A climate change risk assessment was conducted for the Ipswich, Lockyer Valley, Somerset and Toowoomba local government areas under the Australian Government's Local Adaptation Pathways Program (LAPP), using methodologies consistent with the document Climate Change Impacts and Risk Management (Australian Greenhouse Office, 2006) and Australian Standard for Risk Management (AS/NZ 4360:2004).

Approximately 40 hazards were identified through a facilitated workshop process and follow on work relating to potential changes in temperature, rainfall and severe weather as a result of climate change.

Ten general risk categories were identified that contained each of the specific hazards. Hazards were assessed based on likelihood and consequence in terms of public safety, local economy and growth, community lifestyle, environment and sustainability, and public administration (financial and legal liability). The hazards that were assigned a 'high' or 'extreme' risk level were identified. Based on the Australian Greenhouse Office risk priority framework, these risks are deemed to require attention at senior operational management level.

As climate change projections are approximate by nature it is recommended that ongoing assessments and monitoring be conducted to ensure early detection of important indications of change and to respond to increasingly accurate and detailed scientific information.



FEEDBACK

Council encourages your feedback on the climate change risk assessment which has been undertaken. While general comments are welcome, here are some questions to structure your feedback:

Are there any risks which were particularly interesting to you?

Are there any risks which you are particularly concerned about?

Are there any risks which have been identified which you are not concerned about?

Are there any important risks which you believe Council and the community faces that have not been identified?

Do you have any suggestions on appropriate responses to some of the risks identified?

Please send your feedback to:

climatechange@ipswich.qld.gov.au

or

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