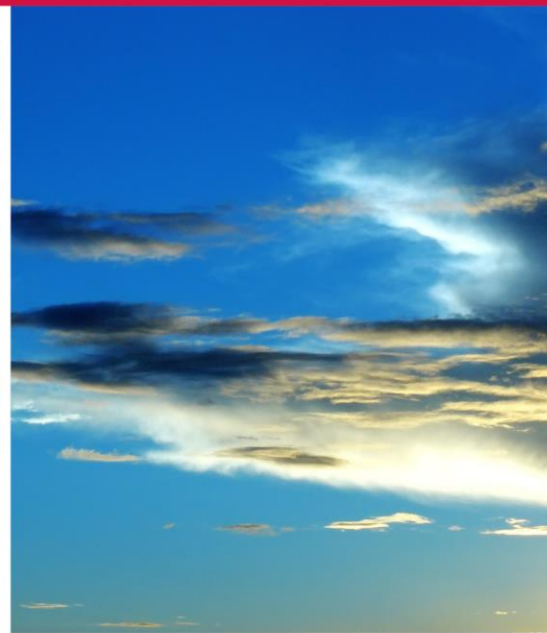


Climate Change Risk Assessment Adaptation Report

Goulburn Mulwaree Council



April 2010



Prepared for

Goulburn Mulwaree Council

Facilitated and Developed by

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Use of this Report

This report has been prepared for the Goulburn Mulwaree Council for the purpose of climate change risk management and adaptation planning.



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Executive Summary

In 2006, 2007 and 2008, Board Members of the Statewide Mutual Liability Scheme (Statewide) visited London Underwriters to expand on the risk management activities undertaken by Member Councils. During the 2008 visit, Statewide was asked to elaborate on these activities and Council's management of climate change. It was agreed that Local Government has an important 'climate change' role to play given its responsibility for a wide range of issues, such as planning and development, promotion of renewable energy, land use, transport planning, asset and infrastructure management, vegetation clearance and stormwater management to name but a few.

Most underwriters acknowledged that although the task of adapting to climate change will be complex, expensive and will require long term commitment from all Councils, it needs planning, direction and a sound framework to ensure that the potential insurable losses are within expectations.

At the June 2009 meeting of the Board of Statewide Mutual, the Board commissioned a Climate Change Adaptation Project to address the potential climate change impacts confronting member Councils. For the Financial Year ending 30 June 2010, 32 Councils were selected to participate in the Project

Echelon Australia Pty Ltd (Echelon) has responded to the Board's requirement by developing an adaptation planning process that uses CSIRO climate change data and adopts an approach that is consistent with national guidelines established by the Commonwealth Department of Climate Change and the AS/NZS4 360 risk assessment process.

To be truly representative of Councils' risk management activities and the broad range of their risk exposures, Echelon also felt it was important to ensure that Councils' operational stakeholders were identified and engaged. A series of meetings were held that targeted this group including, but not limited to, the following members:

- Council Executives
- Council Environmental, Planning, Engineering, Maintenance, Operational, Financial and Risk Management Officers
- Council's existing Environmental Management and Risk Management Committee.

The underlying basis of this project is risk management. It relies heavily on gathering information to produce qualitative risk assessments. The objectives of the project are to:

- Undertake a risk assessment process that aligns with the AS/NZS 4360 and ISO 31000
- Develop strategies that focus on adaptation to potential climate change impacts
- Provide Statewide with comprehensive Climate Change risk assessment and adaptation planning data
- Identify strategies that can be used for Councils' strategic and integrated planning.



The risk assessments were based on the CSRIO climate change scenarios. In New South Wales climate change has been considered in relation to:

- Temperature
- Hot Days
- Average Rainfall
- Wind
- Fire Weather

This report contains a description of all identified climate change impacts, including the risk level (extreme, high, medium, low). Extreme and High level climate change impacts and adaptation plans are compiled in the body of this report. All risks are listed in Appendix 3.

Adaptation planning for low and medium impacts is outside the scope of this Project, however Councils are encouraged to continuously monitor, review and manage climate change impacts at all levels and scenarios.

The following information provides an analysis of all impacts identified by Council.

Analysis of All Impacts

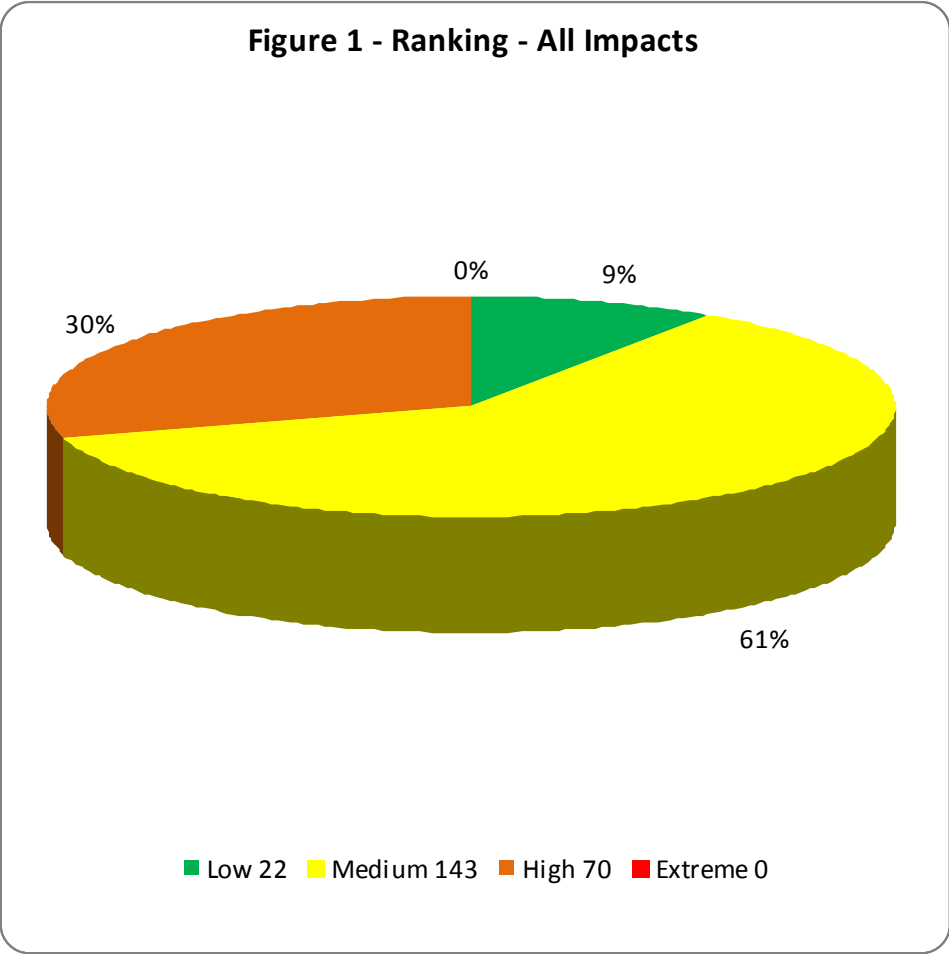


Table 1 - Impact Rankings by Scenario						Ranking All Impacts Total	
	Temperature	Hot Days	Rain	Wind	Fire Weather		
Low	10	8	3	0	1	Low	22
Medium	42	47	19	20	15	Medium	143
High	24	24	13	9	0	High	70
Extreme	0	0	0	0	0	Extreme	0
Total	76	79	35	29	16	Total	235

235 impacts were identified (Table 1 & Figure 1) with 70 ranking in the Extreme and High range. These 70 impacts are the subject of adaptation plan consideration in the report.

Figure 2 - Impact Ranking by Scenario

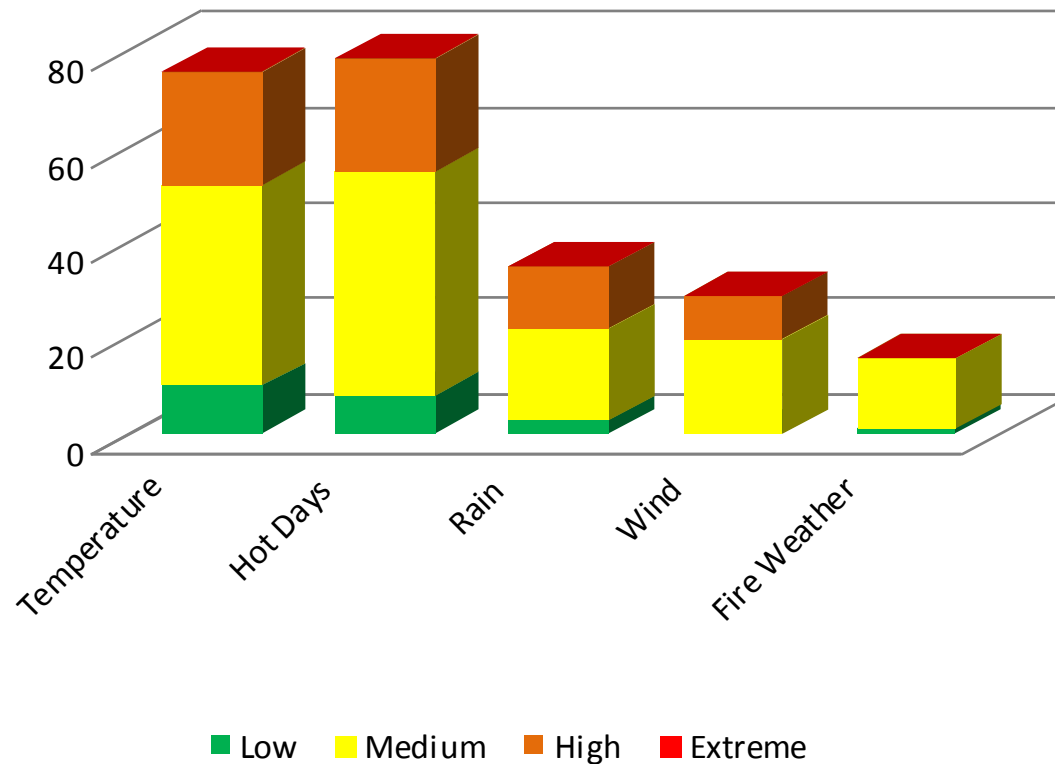


Figure 2 provides a scenario view of rankings. Medium & High impacts account for 91% of the total. While Medium impacts are not included in adaptation planning they form a significant proportion of the total impacts (61%). It is recommended that Council include all impacts in future reviews and re-evaluations of its climate change program.

It is of note that the Temperature scenario (76 impacts) and Hot Days (79 impacts) accounts for 66% of the total.

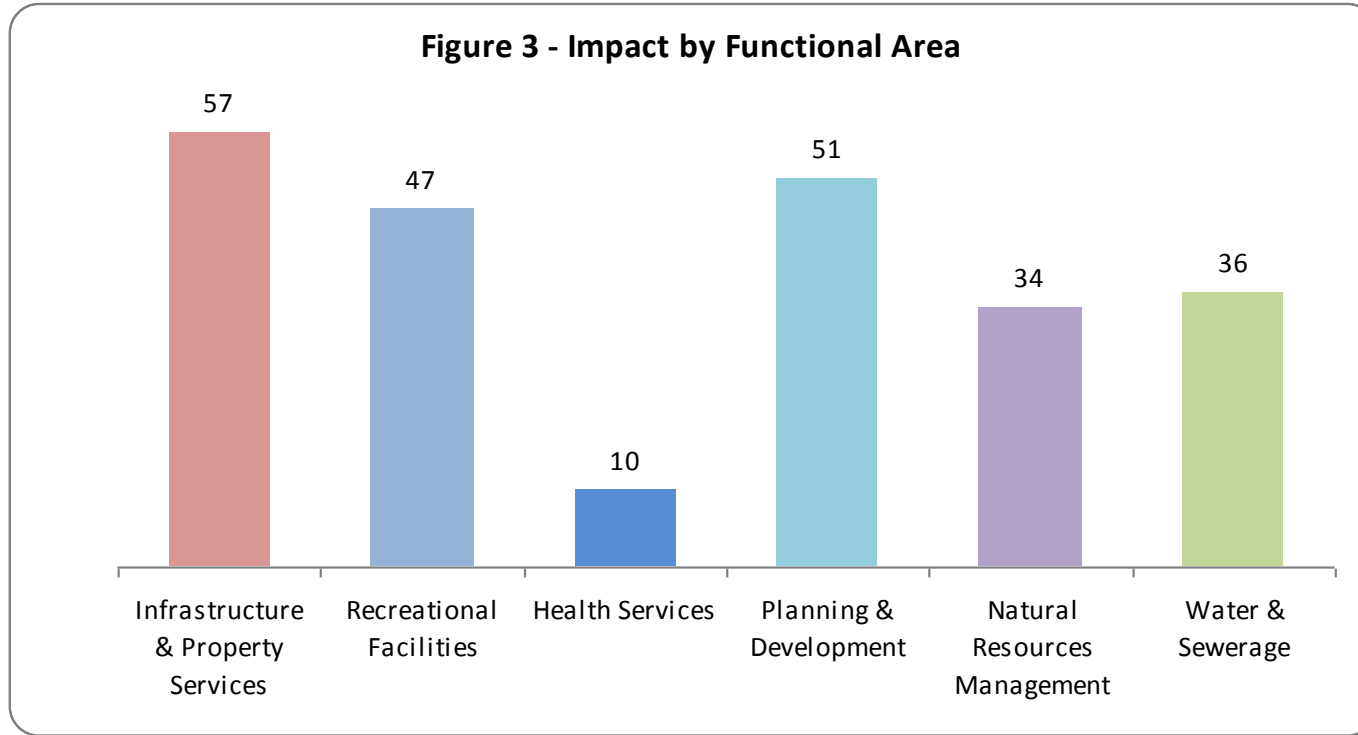


Figure 3 provides an overview of all impacts by Functional Area. The greatest number of impacts are attributed to Infrastructure and Property Services; representing 24% of the total with 57 potential impacts.

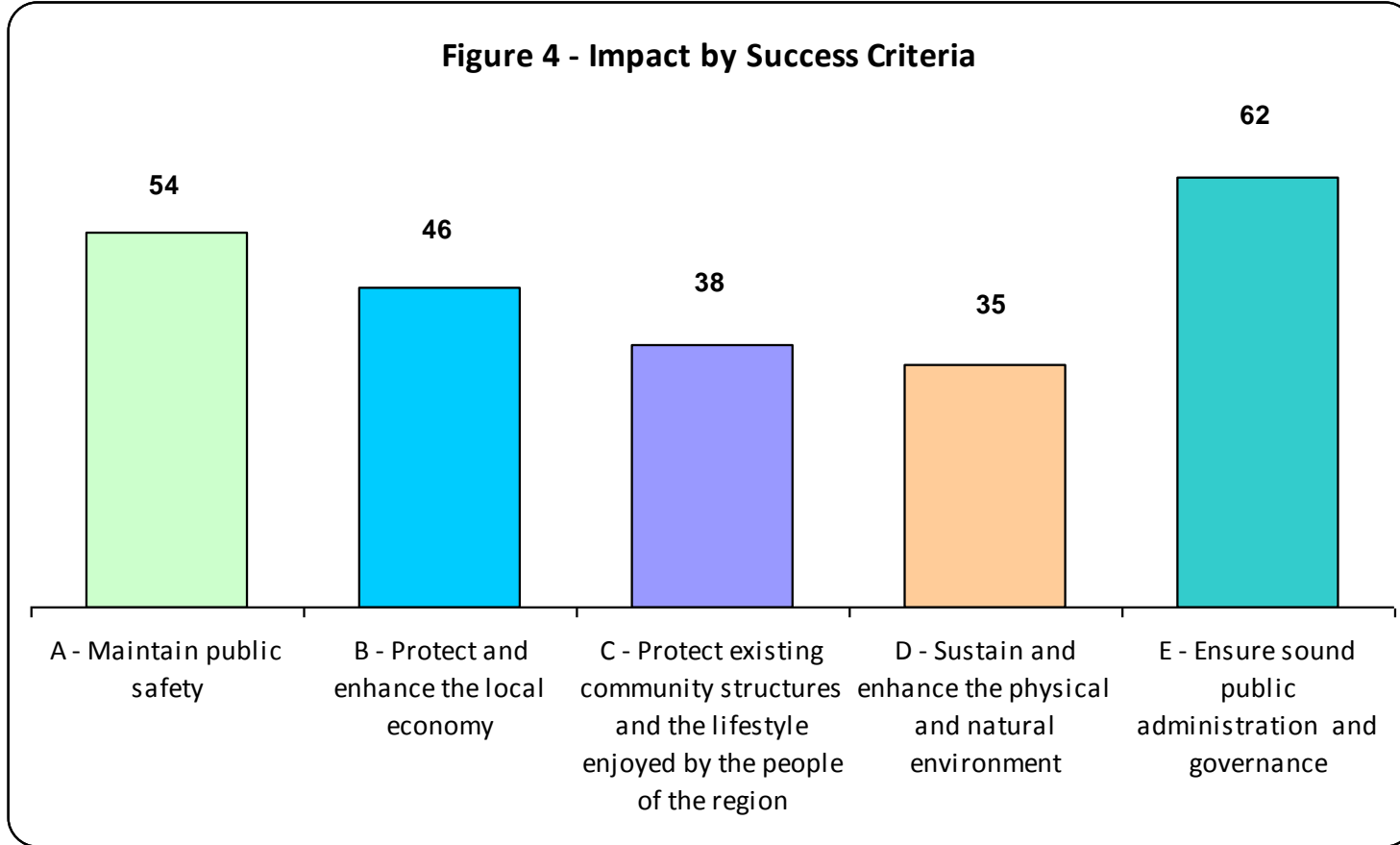


Figure 4 provides an overview of all impacts by Success Criteria. The greatest number of impacts are attributed to Ensure sound public administration and governance; representing 26% of the total with 62 potential impacts.

Climate Change Background

Climate change can be described as any significant, long-term change in weather patterns and is the result of an increase in the earth's average temperature. This temperature increase is believed to be caused by increased greenhouse gases in the earth's atmosphere. In 2007 the Intergovernmental Panel on Climate Change (IPCC) released its fourth Assessment Report on the state of knowledge on Climate Change. It concluded that global warming is now unequivocal and that most observed increases in temperatures since the 1950s are very likely due to increased concentrations of greenhouse gases, as a result of human activities (IPCC, 2007). Although there remains some scepticism, the debate has moved beyond the causes of climate change and evaluating the credibility of its science.

Consequently, the debate has largely shifted to methods of reducing our human influence and adapting to the inevitable effects of climate change. The causes of climate change (be it human activity or other phenomena) make little difference with regards to adapting to the impacts that we cannot avoid. Whether we are prepared for the exponential impacts of climate change in the future, depends on today's effective risk management.

Climate Change in NSW

The CSIRO has provided data in the form of climate change scenarios for the year 2030, relative to 1990 (CSIRO, 2006). By 2030, we can expect to see NSW experience the following:

- Become warmer, with more hot days and fewer cold nights
- Have an increased peak summer energy demand for cooling
- Reduced energy demand in winter for heating
- An increase in annual heat-related deaths in those aged over 65
- Potential increase in the spread of vector/water/food borne diseases
- Water resources are likely to be further stressed
- More frequent droughts
- Greater risk of fire

- Increase in flash flooding with a greater number of rain intensity events

Climate Change and the Impacts for Local Government

The nature of Local Government, its services and functions, means it will feel the impacts of climate change considerably. Many impacts of climate change present risks that require treatment at a 'local' level which is why Councils will be heavily involved in the nation's adaptation process. Echelon have identified a number of risks that climate change presents for Local Government. These include:

- Uncertainty over development and building approvals. The potential effects of climate change have been used in the Courts to prevent building in areas at risk of sea level rise.
- Increased public liability exposure as a result of risks exacerbated by climate change impacts. For example, development or building to standards that are subsequently rendered inappropriate due to impacts such as high wind levels, flooding or increased risk of bushfire.
- Public safety issues caused by extreme weather events and temperatures. For example an increase in accidents caused by bushfires/floods and an increased risk of heat stress and disease from vectors.
- Higher insurance costs as a result of increased claims.
- Responsibility for erosion, contamination, landslides, etc due to extreme weather events.
- Failure to preserve 'community' natural assets affected by climate change e.g. water resource availability.

Project Background

Statewide is aware that the short to medium effects of climate change may directly impact on the functionality of the Scheme. Potential increased claims in the area of property damage (physical damage to Council owned buildings, infrastructure and assets), professional indemnity (management of the development and building approvals, issuing of certificates, verbal advice) and corporate governance (failure to implement legislation, financial responsibility, strategic planning) have the potential to create adverse pressure. Statewide decided to assist member Councils prepare adaptation plans and use this data to advise the London Underwriters on the extent that Councils are preparing for climate change.

Goulburn Mulwaree Council was one of the Council's selected to participate in the Climate Change Adaptation Plan Project during the Financial Year ending 30 June 2010.

As well as the significance to Statewide, Local Government is also concerned with how to effectively identify climate change risks and adapt appropriately. Echelon has responded by designing and facilitating a Project that assists member Councils to address these concerns. Echelon's Climate Change Adaptation Planning Process uses CSIRO climate change data as assessment criteria and adopts an approach that is consistent with national guidelines established by the Australian government and other leading authorities.

The following guides and standards were used to establish the assessment framework and project methodology:

- *Climate Change Impacts & Risk Management A Guide for Business*, Australian Green house Office 2006
- *Government and Climate Change Adaptation Actions for Local Government* Australian Government Department of Climate Change 2009
- *Australian and New Zealand Standard for Risk Management AS/NZS 4360:2004*.
- *International Standard ISO31000, Risk Management – Principles and Guidelines*

- NSW Catchment Reports, CSIRO 2007
- *A framework for stakeholder engagement on climate adaptation*, Climate Adaptation CSIRO Climate Adaptation Flagship Working Paper No.3, 2009

Project Objectives

- Undertake a risk assessment process that aligns with AS/NZS 4360 and ISO 31000
- Develop strategies that focus on adaptation to potential climate change impacts
- Provide Statewide with comprehensive Climate Change risk assessment and adaptation planning data
- Identify strategies that can be used for Councils' strategic and integrated planning.

Acknowledgements

The Echelon facilitation team and the Board of Management of Statewide Mutual would like to thank the following Goulburn Mulwaree staff who participated in the project:

Glenn Walker	Marina Hollands
Jack Miller	Brenda Hollands
Terry Cooper	Wal Rhodes
Will Singleton	Rod Diacono
Andrew Galland	John Massey

Project Methodology

The Climate Change Adaptation Risk Assessment process is broken down into a number of sessions, facilitated by an Echelon Risk Consultant. The role of the facilitator is to guide attendees through the risk assessment and adaptation planning stages.

The Australian Standard for Risk Management, AS/NZS 4360:2004 (the Standard) was selected as the framework for assessing climate change impacts. This Standard meets or aligns with one that is typically mainstreamed within Council and has the flexibility to deal with new climate change information with efficiency.

Assessment criteria were based on likelihood and consequence descriptors provided by the Australian Greenhouse Office, which are located in Appendix 1 and 2. To evaluate the impacts, these criteria were combined with functional areas and 'Success Criteria' (or Council's objectives).

Figure 5 below represents the Standard's approach to the Climate Change Adaptation Risk Assessment process.

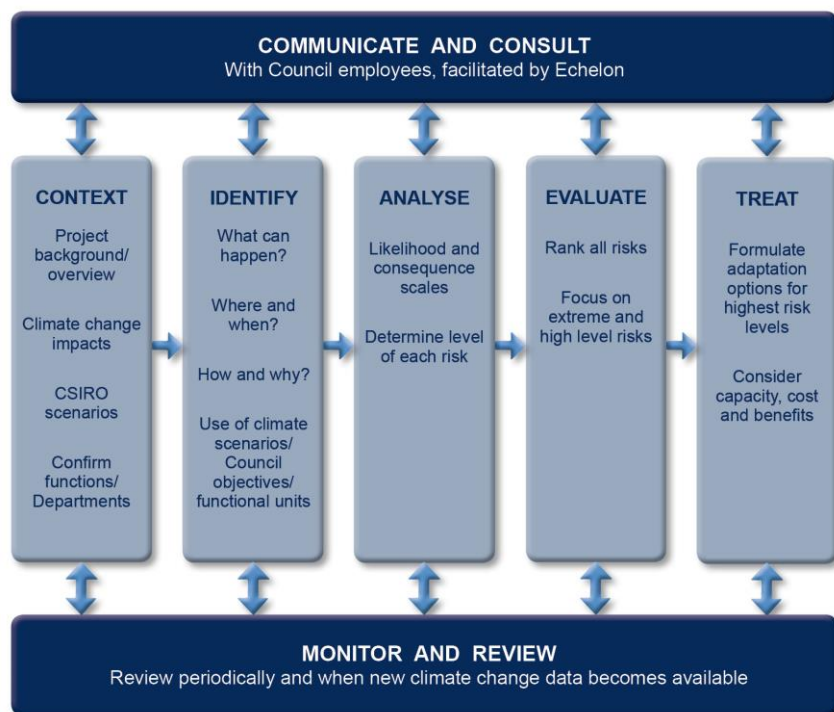


Figure 7. AS/NZS 4360 applied to climate change risk assessments

CSIRO Climate Change Scenarios

A key feature of the Risk Assessment process is the use of CSIRO climate change scenarios to identify risks. The following scenarios have been chosen. They represent the CSIRO scenarios available at the time of the assessments that are the closest to Goulburn Mulwaree Council's geographical location.

- T** There is a risk that the average annual temperature may increase between 0.2°C and 1.8°C by 2030.
- HD** There is a risk that there will be between 6 and 13 hot days by 2030.

- R** There is a risk that rainfall will change between -13% and +7% by 2030.
- W** There is a risk that there will be an increase in average wind speed between -2% and 7.5% by 2030.
- FW** There is a risk that the number of days annually when the Forest Fire Danger Index (FFDI) is very high or extreme will be between 26 and 29 days by 2020.

Functional Areas of Council

Potential Climate Change impacts were considered in relation to the following Council Functional Areas:

- I** Infrastructure and Property Services
- R** Recreational Facilities
- H** Health Services
- P** Planning and Development
- N** Natural Resources and Management
- W** Water and Sewage

Note: 'Functional Areas' are a summary of Council operations, as defined in the *Climate Change Adaptation Actions for Local Government*, Department of Climate Change 2009.

Success Criteria

The success criteria were defined as:

- A** Maintain public safety
- B** Protect and enhance the local economy
- C** Protect existing community structures and the lifestyle enjoyed by the people of the region
- D** Sustain and enhance the physical and natural environment
- E** Ensure sound public administration

Note: 'Success Criteria' are a summary of Council's long term objectives, as defined in *Climate Change Impacts & Risk Management A Guide for Business*, Australian Greenhouse Office 2006.

Recommendations

Echelon recommends that Council proceed with adoption of adaptation plans and ongoing review. It is recommended that the following key features be part of Council's ongoing climate change adaptation program:

1. Review of adaptation plans within review dates or earlier as necessary.
2. Review of all risk assessments including low and medium risks on a regular basis.
3. Consideration of new climate change risks when reviewing risk assessments, or as and when they arise.
4. Consideration of changes in relevant climate change data, operating environment, legislation, economy, demographics, and other relevant factors when reviewing adaptation plans and risk assessments.
5. Categorising of adaptation plans into e.g. short (< 1year), medium, (1-3 years) and long term (>3 years).
6. Inclusion of climate change risk management and adaptation plans into strategic and other management planning processes.
- 7.
- 8.
- 9.

Climate Change Impacts Data

The following information outlines the impacts, ratings, current controls and adaptation plans for extreme and high risks, for all scenarios.

Risk assessment results for all impacts are at Appendix 3.

Adaptation Plans Summary

Goulburn Mulwaree identified 70 high climate change risks. The risks and recommended adaptation plans are summarised in the tables below.

Scenario for Temperature (T)

There is a risk that the average annual temperature may increase between 0.2°C and 1.8°C by 2030.

Impact ID	Impact Description	Impact Rating	Current Controls	Future Adaptation Plans
TDI3	Degradation of green space may lead to increased urban fire hazards	High	<ul style="list-style-type: none"> Maintenance program performed to current internal standards 	<ul style="list-style-type: none"> Goulburn Mulwaree Council (GMC) is developing a Community Strategic Plan
TEI3	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Current programs are managed within agreed project budgets and according to project management framework 	<ul style="list-style-type: none"> Employ a full time grants officer to maximise the potential for external income
TAR1	Increased liability exposure due to an inability to maintain recreational facilities fit for purpose	High	<ul style="list-style-type: none"> Recreational Facilities Maintenance program 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan which may include the need to consider closing facilities
TAR4	There may an increased exposure to heat stress at Council recreational facilities – particularly children and elderly	High	<ul style="list-style-type: none"> Shade Sails provided at a number of facilities 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan which may include the need to consider alternatives to shade sail structures.
TAR5	Increased heat stress to trees may result in increased tree limb drop	High	<ul style="list-style-type: none"> Tree Maintenance Program 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan which may include the need to
TBR4	Maintenance of recreational facilities may be impacted negatively	High	<ul style="list-style-type: none"> Recreational Facilities Maintenance program 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan which may include the need to
TCR3	There may be increased demand for additional shade structures at its recreational facilities	High	<ul style="list-style-type: none"> Shade Sails are provided at a number of facilities 	<ul style="list-style-type: none"> Refer TAR4
TDR3	Degradation of green space may lead to increased urban fire hazards	High	<ul style="list-style-type: none"> Maintenance program performed to current internal standards 	<ul style="list-style-type: none"> Refer TDI3

Impact ID	Impact Description	Impact Rating	Current Controls	Future Adaptation Plans
TER3	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer TEI3 	<ul style="list-style-type: none"> Refer TEI3
TEH2	Diversion of existing funds may hinder the ability to maintain current service levels	High	<ul style="list-style-type: none"> Refer TEI3 	<ul style="list-style-type: none"> Refer TEI3
TAP1	Degradation of green space may lead to increased urban fire and vermin hazards	High	<ul style="list-style-type: none"> Refer TDI3 	<ul style="list-style-type: none"> Refer TDI3
TEP2	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer TEI3 	<ul style="list-style-type: none"> Refer TEI3
TAN1	Potential increase in fire events due to increased fire load, hotter temperatures and drier conditions	High	<ul style="list-style-type: none"> Maintenance of green space 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan
TEN2	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer TEI3 	<ul style="list-style-type: none"> Refer TEI3
TAW1	Increase in water temperature may increase potential for higher levels of bacteria and algae	High	<ul style="list-style-type: none"> Dam mixer currently in use, re-chlorination of water supply and monitoring of water temperature and bacteria levels 	<ul style="list-style-type: none"> Nil Identified
TAW2	Increase demand for water supply may have an impact on ability to maintain quality with particular risk to end users	High	<ul style="list-style-type: none"> Dropping of reservoir levels and manual chlorine dosing 	<ul style="list-style-type: none"> Capital works program for the development of re-chlorination plants
TBW1	Increase in evaporation has potential to reduce water availability which may require water restrictions	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Current controls are adequate with ongoing review
TBW2	Purchase of town water by rural land holders and water suppliers may place strain on town water supply capabilities	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Current controls are adequate with on going review

Impact ID	Impact Description	Impact Rating	Current Controls	Future Adaptation Plans
TBW3	Water restrictions will make the region less attractive to wet industries	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Current controls are adequate with on going review
TCW1	Reduced water availability may lead to some services and recreational facilities being restricted or offered at a reduced capacity	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Current controls are adequate with ongoing review
TCW2	Reduced water availability may lead to a reduced capability to maintain green spaces, and stop degradation occurring	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Current controls are adequate with ongoing review
TDW1	Reduced water availability may lead to Council not being able to meet environmental flow requirements	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Current controls are adequate with ongoing review
TEW1	Water restrictions may result in a levy for augmentation	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Current controls are adequate with ongoing review
TEW3	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer TDI3 	<ul style="list-style-type: none"> Refer TEI3

Scenario for Hot Days (HD)

There is a risk that there will be between 6 and 13 hot days by 2030

Impact ID	Impact Description	Impact Rating	Current Controls	Future Adaptation Plans
HDCI1	There may be an increased demand to provide air conditioning systems within Council buildings	High	<ul style="list-style-type: none"> Current program in place to replace/upgrade air-conditioning at all buildings where staff work as well as those leased by Council. 	<ul style="list-style-type: none"> Nil Identified
HDDI3	Degradation of green space may lead to increased urban fire hazards	High	<ul style="list-style-type: none"> Maintenance program performed to current internal standards 	<ul style="list-style-type: none"> Refer TDI3
HDEI3	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer TDI3 	<ul style="list-style-type: none"> Refer TDI3
HDAR1	Increased liability exposure due to an inability to maintain recreational facilities at a fit for purpose state	High	<ul style="list-style-type: none"> Recreational Facilities Maintenance program 	<ul style="list-style-type: none"> Refer
HDAR4	Exposure to heat stress at council recreational facilities – particularly children and elderly	High	<ul style="list-style-type: none"> Shade Sails provided at a number of facilities 	<ul style="list-style-type: none"> Refer TAR4
HDAR5	Additional heat stress to trees may result in higher levels of tree limb drop	High	<ul style="list-style-type: none"> Tree Maintenance Program 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan which may include the need to
HDCR2	Council may not be able to maintain recreational facilities to a standard that is currently enjoyed by the community	High	<ul style="list-style-type: none"> Recreational Facilities Maintenance program 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan which may include the need to
HDDR2	Council may need to adapt its planting selections to be more in line with the changes to climate and weather patterns	High	<ul style="list-style-type: none"> Planting selections are based on changes to climate and weather 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan which may include the need to
HDER2	Community expectations may impact on existing resources (staff & facilities)	High	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan which may include the need to

Impact ID	Impact Description	Impact Rating	Current Controls	Future Adaptation Plans
HDAH1	May result in a greater demand for resources to ensure inspection regime for public food venues, cooling towers, and public pools	High		<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan
HDEH1	Community expectations may impact on existing resources (staff & facilities)	High		<ul style="list-style-type: none"> Refer HDER2
HDAP1	Degradation of green space may lead to increased urban fire and vermin hazards	High	<ul style="list-style-type: none"> Maintenance program performed to current internal standards 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan which may include the need to
HDEP1	Community expectations may impact on existing resources (staff & facilities)	High	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan which may include the need to
HDEP2	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Current programs are managed within agreed project budgets and according to project management framework 	<ul style="list-style-type: none"> Employ a full time grants officer to maximise the potential for external income
HDEN1	Community expectations may impact on existing resources (staff & facilities)	High	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan which may include the need to
HDEN2	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer HDEP2 	<ul style="list-style-type: none"> Refer HDEP2
HDAW1	Increase in water temperature may increase potential for higher levels of bacteria and algae	High	<ul style="list-style-type: none"> Dam mixer currently in use, re-chlorination of water supply and monitoring of water temperature and bacteria levels 	<ul style="list-style-type: none"> Nil Identified
HDBW1	Increase in evaporation has potential to reduce water availability which may require water restrictions	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Nil Identified
HDBW2	Purchase of town water by rural land holders and water suppliers may place a strain on town water supply capabilities	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Nil Identified

Impact ID	Impact Description	Impact Rating	Current Controls	Future Adaptation Plans
HDBW3	Water restrictions will make the region less attractive to wet industries	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Nil Identified
HDCW1	Reduced water availability may lead to some services and recreational facilities being restricted or offered at a reduced capacity	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Nil Identified
HDDW1	Reduced water availability may lead to Council not being able to meet environmental flow requirements	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Nil Identified
HDEW2	Community expectations may impact on existing resources (staff & facilities)	High		<ul style="list-style-type: none"> Refer HDER2
HDEW3	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer HDEP2 	<ul style="list-style-type: none"> Refer HDEP2

Scenario for Rainfall (R)

There is a risk that rainfall will change between -13% and +7% by 2030.

Impact ID	Impact Description	Impact Rating	Current Controls	Future Adaptation Plans
RAI3	Increase in intense short duration rainfall may increase flooding events	High	<ul style="list-style-type: none"> Nil current controls 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan which may include the need to consider the introduction of a stormwater levee
RBI1	Increase in intense short duration rainfall may result in inundation of commercial premises	High	<ul style="list-style-type: none"> Nil current controls 	<ul style="list-style-type: none"> Refer RAI3
REI1	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Current programs are managed within agreed project budgets and according to project management framework 	<ul style="list-style-type: none"> Employ a full time grants officer to maximise the potential for external income
RER1	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer REI1 	<ul style="list-style-type: none"> Refer REI1
RAP1	Increased flooding of developed areas due to design of the storm water system	High	<ul style="list-style-type: none"> No current controls in place 	<ul style="list-style-type: none"> Council may need to consider the introduction of a stormwater levee. Council will review and possibly increase existing pipe system.
RCP1	Impact on city based industries and businesses due to reduced water availability	High	<ul style="list-style-type: none"> Being addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Nil Identified
REP1	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Current programs are managed within agreed project budgets and according to project management framework 	<ul style="list-style-type: none"> Employ a full time grants officer to maximise the potential for external income
RAN2	Increased fire risk caused by a reduction in rainfall will require further resources and mitigation strategies	High		<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan
RCN2	Increased cost of weeds reduction programs	High	<ul style="list-style-type: none"> Current programs are managed within agreed project budgets 	<ul style="list-style-type: none"> Weed Plan reviews as directed by DII

Impact ID	Impact Description	Impact Rating	Current Controls	Future Adaptation Plans
RDN3	Changing rain distribution may impact negatively on the management of lakes and waterway ecosystems	High		<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan
REN3	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer REI1 	<ul style="list-style-type: none"> Refer REI1
RCW1	Probable reduction in water supply will lead to an increase in supply restrictions	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Nil Identified
REW1	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer REI1 	<ul style="list-style-type: none"> Refer REI1

Scenario for Wind (W)

There is a risk that there will be an increase in average wind speed between -2% and 7.5% by 2030.

Impact ID	Impact Description	Impact Rating	Current Controls	Future Adaptation Plans
WEI1	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Current programs are managed within agreed project budgets and according to project management framework 	<ul style="list-style-type: none"> Employ a full time grants officer to maximise the potential for external income
WER1	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer WEI1 	<ul style="list-style-type: none"> Refer WEI1
WEP1	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer WEI1 	<ul style="list-style-type: none"> Refer WEI1
WAN4	Increased wind speed can increase the severity of bushfires in the region	High	<ul style="list-style-type: none"> Mitigation undertaken in council controlled green spaces 	<ul style="list-style-type: none"> GMC is developing a Community Strategic Plan
WEN1	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer WEI1 	<ul style="list-style-type: none"> Refer WEI1
WAW1	Increased evaporation may lead to reduced water storage levels	High	<ul style="list-style-type: none"> No controls in place 	<ul style="list-style-type: none"> Nil Identified
WAW2	Increased wind speed will reduce the number of days that aerosol spraying can occur at sewer farms	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Nil Identified
WCW1	Increase in water evaporation will result in increased demand for water supply	High	<ul style="list-style-type: none"> Currently addressed as part of development of Integrated Water Cycle Management Plan (35 years) 	<ul style="list-style-type: none"> Nil Identified
WEW1	Impacts of climate change may see diversion or redistribution of funds from current service budgets	High	<ul style="list-style-type: none"> Refer WEI1 	<ul style="list-style-type: none"> Refer WEI1

Appendices

Appendix 1: Likelihood Descriptors

Likelihood Rating	Recurrent Risks	Single Events
Almost Certain	Could occur several times per year	More likely than not - Probability greater than 50%
Likely	May arise about once a year	As likely as not - 50/50 chance
Possible	May arise once in ten years	Less likely than not but still appreciable - Probability less than 50% but still quite high
Unlikely	May arise once in ten to 25 years	Unlikely but not negligible - Probability low but noticeably greater than zero
Rare	Unlikely during the next 25 years	Negligible - Probability very small, close to zero

Appendix 2: Consequence Descriptors

Success Criteria	Consequence Rating				
	Insignificant	Minor	Moderate	Major	Catastrophic
A Maintain public safety	Appearance of a threat but no actual harm	Serious near misses or minor injuries	Small numbers of injuries	Isolated instances of serious injuries or loss of life	Large numbers of serious injuries or loss of lives
B Protect and enhance the local economy	Minor shortfall relative to current forecasts	Individually significant but isolated areas of reduction in economic performance relative to current forecasts	Significant general reduction in economic performance relative to current forecasts	Regional stagnation such that businesses are unable to thrive and employment does not keep pace with population growth	Regional decline leading to widespread business failure, loss of employment and hardship
C Protect existing community structures and the lifestyle enjoyed by the people of the region	There would be minor areas in which the region was unable to maintain its current services	Isolated but noticeable examples of decline in services	General appreciable decline in services	Severe and widespread decline in services and quality of life within the community	The region would be seen as very unattractive, moribund and unable to support its community
D Sustain and enhance the physical and natural environment	No environmental damage	Minor instances of environmental damage that could be reversed	Isolated but significant instances of environmental damage that might be reversed with intensive efforts	Severe loss of environmental amenity and a danger of continuing environmental damage	Major widespread loss of environmental amenity and progressive irrecoverable environmental damage
E Ensure sound public administration and governance	There would be minor instances of public administration being under more than usual stress but it could be managed	Isolated instances of public administration being under severe pressure	Public administration would be under severe pressure on several fronts	Public administration would struggle to remain effective and would be seen to be in danger of failing completely	Public administration would fall into decay and cease to be effective

Appendix 3: Risk Assessment Results

Scenario for Temperature (T)

T		Infrastructure and Property Services	Recreational Facilities	Health Services	Planning and Development	Natural Resources Management	Water and Sewage
		I	R	H	P	N	W
A	Maintain public safety	X	X	X	X	X	X
B	Protect and enhance the local economy	X	X	X	X	X	X
C	Protect existing community structures and the lifestyle enjoyed by the people of the region	X	X		X	X	X
D	Sustain and enhance the physical and natural environment	X	X		X	X	X
E	Ensure sound public administration and governance	X	X	X	X	X	X

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
TAI	1	The condition of the roads, footpaths, cycle ways, walkways and bridges may deteriorate more quickly over time requiring increased inspection and intervention regimes	Possible	Insignificant	Low
TAI	2	There may be increased occurrences of Bitumen bleeding on road surfaces	Possible	Insignificant	Low
TAI	3	There may be increased problems with dust control on gravel roads	Likely	Minor	Medium
TAI	4	There may be a need to provide more potable water supplies at Council assets	Unlikely	Insignificant	Low
TBI	1	Council's assets such as caravan parks may be need to relocate due to the impacts of climate change	Unlikely	Insignificant	Low
TBI	2	There may be a need to increase available shade at some of Council's assets	Likely	Minor	Medium
TBI	3	Increased temperature may inhibit Council's ability to develop and sell of industrial land	Unlikely	Insignificant	Low
TCI	1	There may be an increased demand to provide additional air conditioning systems within Council buildings	Likely	Minor	Medium
TCI	2	There may be a need to provide more potable water supplies at Council assets	Unlikely	Insignificant	Low
TCI	3	There may be an adverse effect on vegetation around Council assets which could diminish the aesthetics	Likely	Insignificant	Medium
TCI	4	Council assets such as caravan park cabins and amenity blocks could be hotter and may require additional cooling systems	Possible	Minor	Medium
TCI	5	Increasing temperature may result in demand to provide council infrastructure such as lighting at sporting ovals for longer and /or more frequent occasions	Possible	Minor	Medium
TDI	1	Higher temperatures may impact maintenance of green space and increase degradation due to ATR	Possible	Minor	Medium
TDI	2	Plant profiles may be impacted by changing temperatures	Possible	Minor	Medium
TDI	3	Degradation of green space may lead to increased urban fire hazards	Possible	Moderate	High

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
TEI	1	Increased demand for and usage of infrastructure and facilities may result in increased energy consumption and operational costs	Possible	Minor	Medium
TEI	2	Community expectations may impact on existing resources (staff & facilities)	Possible	Minor	Medium
TEI	3	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Likely	Moderate	High
TEI	4	Changes in usage patterns at facilities Council may impact on income streams	Likely	Minor	Medium
TAR	1	Increased liability exposure due to an inability to maintain recreational facilities fit for purpose	Likely	Moderate	High
TAR	4	There may an increased exposure to heat stress at Council recreational facilities – particularly children and elderly	Likely	Moderate	High
TAR	5	Increased heat stress to trees may result in increased tree limb drop	Likely	Moderate	High
TBR	1	Some sporting events using Council assets may need to be cancelled due to ground conditions	Possible	Minor	Medium
TBR	2	Higher temperatures may impact on usage patterns at swimming pools	Possible	Minor	Medium
TBR	3	Higher temperatures may impact on aesthetics of the area & attraction of visitors	Possible	Minor	Medium
TBR	4	Maintenance of recreational facilities may be impacted negatively	Possible	Moderate	High
TCR	2	Maintenance of recreational facilities to current standard may impacted	Possible	Minor	Medium
TCR	3	There may be increased demand for additional shade structures at its recreational facilities	Likely	Moderate	High
TDR	1	Higher temperatures may impact maintenance of green space and increase degradation due to ATR	Possible	Minor	Medium
TDR	2	Plant profiles may be impacted by changing temperatures	Likely	Minor	Medium
TDR	3	Degradation of green space may lead to increased urban fire hazards	Likely	Moderate	High
TDR	4	Loss of trees and plant species	Likely	Minor	Medium

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
TER	1	Impact of increased energy consumption and operational costs due to increased demand and usage for recreational facilities	Likely	Minor	Medium
TER	2	Community expectations may impact on existing resources (staff & facilities)	Likely	Minor	Medium
TER	3	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Likely	Moderate	High
TER	4	Changes in usage patterns at facilities Council may impact on income streams	Likely	Minor	Medium
TAH	1	May lead to an increase in resources required to ensure a consistent inspection regime for public food venues, cooling towers, and semi public pools	Likely	Minor	Medium
TBH	1	A public safety outbreak may lead to reputation damage to Council and the area resulting in fewer visitors to the region	Possible	Minor	Medium
TBH	2	Staff working conditions may result in the region being seen as less attractive to work/live making it difficult to attract and retain staff	Possible	Minor	Medium
TEH	1	Community expectations may impact on existing resources (staff & facilities)	Possible	Minor	Medium
TEH	2	Diversion of existing funds may hinder the ability to maintain current service levels	Possible	Moderate	High
TAP	1	Degradation of green space may lead to increased urban fire and vermin hazards	Likely	Moderate	High
TBP	1	Additional planning requirements on commercial premises may have an impact on attracting business / industry to the region	Possible	Minor	Medium
TBP	2	Annual temperature rise may result in milder winters making the region more appealing	Unlikely	Insignificant	Low
TBP	4	There may be increased expenses to retro fit improved design criteria and/or new standards	Possible	Insignificant	Low
TCP	1	May require a review of the existing planting guide for sub divisions	Possible	Insignificant	Low
TCP	2	May result in less opportunities to develop some areas within the region	Unlikely	Minor	Low
TDP	1	There will be a need for future land developments to considers climate change impacts on ecosystems	Possible	Minor	Medium
TDP	2	There will be a need to ensure future building designs consider Environmental Sustainable Development (ESD) principles	Likely	Minor	Medium

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
TEP	1	Community expectations may impact on existing resources (staff & facilities)	Possible	Minor	Medium
TEP	2	Impacts of climate change may see diversion or redistribution of funds from current service budgets	Possible	Moderate	High
TEP	3	Council will need to consider changes in design criteria for future DA's	Likely	Minor	Medium
TEP	4	A review of existing planning guidelines for sub divisions may be required	Possible	Minor	Medium
TAN	1	Potential increase in fire events due to increased fire load, hotter temperatures and drier conditions	Likely	Moderate	High
TAN	2	Increase in water borne bacteria in waterways – e.g. blue green algae	Likely	Minor	Medium
TBN	1	Perceptions of, or actual poor water quality may reduce visitor numbers to the region	Possible	Minor	Medium
TDN	1	Reduced water availability and or quality will impact on aquatic ecosystems	Possible	Minor	Medium
TDN	2	Changes in biodiversity could result in loss of plant and animal species	Possible	Minor	Medium
TEN	1	Community expectations may impact on existing resources (staff & facilities)	Possible	Minor	Medium
TEN	2	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Possible	Moderate	High
TEN	3	Increased temperature may impact on the sustainability of natural resources	Possible	Minor	Medium
TAW	1	Increase in water temperature may increase potential for higher levels of bacteria and algae	Likely	Major	High
TAW	2	Increase demand for water supply may have an impact on ability to maintain quality with particular risk to end users	Likely	Major	High
TAW	3	Reduced water availability may lead to a reduced capability to maintain gravel roads	Likely	Minor	Medium
TBW	1	Increase in evaporation has potential to reduce water availability which may require water restrictions	Likely	Moderate	High
TBW	2	Purchase of town water by rural land holders and water suppliers may place strain on town water supply capabilities	Likely	Moderate	High

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
TBW	3	Water restrictions will make the region less attractive to wet industries	Likely	Moderate	High
TCW	1	Reduced water availability may lead to some services and recreational facilities being restricted or offered at a reduced capacity	Possible	Moderate	High
TCW	2	Reduced water availability may lead to a reduced capability to maintain green spaces, and stop degradation occurring	Likely	Moderate	High
TCW	3	Domestic capture of grey water will lead to less water in the system, resulting in odour issues within sewer systems	Possible	Minor	Medium
TDW	1	Reduced water availability may lead to Council not being able to meet environmental flow requirements	Likely	Moderate	High
TEW	1	Water restrictions may result in a levy for augmentation	Likely	Moderate	High
TEW	2	Community expectations may impact on existing resources (staff & facilities)	Possible	Minor	Medium
TEW	3	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Possible	Moderate	High

Scenario for Hot Days (HD)

HD		Infrastructure and Property Services	Recreational Facilities	Health Services	Planning and Development	Natural Resources Management	Water and Sewage
		I	R	H	P	N	W
A	Maintain public safety	X	X	X	X	X	X
B	Protect and enhance the local economy	X	X	X	X	X	X
C	Protect existing community structures and the lifestyle enjoyed by the people of the region	X	X		X	X	X
D	Sustain and enhance the physical and natural environment	X	X		X	X	X
E	Ensure sound public administration and governance	X	X	X	X	X	X

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
HDAI	1	The condition of the roads, footpaths, cycle ways, walkways and bridges may deteriorate more quickly over time requiring increased inspection and intervention regimes	Possible	Minor	Medium
HDAI	2	There may be increased occurrences of Bitumen bleeding on road surfaces	Possible	Minor	Medium
HDAI	3	There may be increased problems with dust control on gravel roads	Possible	Minor	Medium
HDAI	4	Reduced ability to have staff work outdoors on these additional days may mean that less maintenance is able to be completed on Council assets	Possible	Minor	Medium
HDBI	1	May inhibit Council's ability to develop and dispose of industrial land	Unlikely	Insignificant	Low
HDCI	1	There may be an increased demand to provide air conditioning systems within Council buildings	Likely	Moderate	High
HDCI	2	There may be a need to provide more portable water supplies at Council assets	Unlikely	Insignificant	Low
HDCI	3	There could be an adverse effect on vegetation around Council assets which could diminish the aesthetics	Likely	Insignificant	Medium
HDCI	4	There may be a need to provide Council infrastructure such as lighting at sporting ovals for longer and/or more frequent occasions	Possible	Minor	Medium
HDCI	5	Additional shade structures may be required at Council facilities. E.g. the public swimming pool	Likely	Minor	Medium
HDCI	6	Signage may be required at Council facilities to advise people of the hazards caused by additional hot days	Likely	Minor	Medium
HDDI	1	Additional resources such as water and staff will be required to maintain green space and to stop degradation due to ATR	Possible	Minor	Medium
HDDI	2	Council may need to adapt its planting selections to be more in line with the changes to climate and weather patterns	Possible	Minor	Medium
HDDI	3	Degradation of green space may lead to increased urban fire hazards	Possible	Moderate	High
HDDI	4	Additional hot days will reduce the planting window and require a change of planting guides	Possible	Minor	Medium
HDEI	1	Council may see an impact of increased energy consumption and operational costs due to increased demand and usage of infrastructure and facilities	Possible	Minor	Medium

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
HDEI	2	Community expectations may impact on existing resources (staff & facilities)	Possible	Minor	Medium
HDEI	3	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Likely	Moderate	High
HDEI	4	Council may see fluctuations in income streams as usage patterns at facilities change line with differing climate and weather patterns	Likely	Minor	Medium
HDAR	1	Increased liability exposure due to an inability to maintain recreational facilities at a fit for purpose state	Likely	Moderate	High
HDAR	4	Exposure to heat stress at council recreational facilities – particularly children and elderly	Likely	Moderate	High
HDAR	5	Additional heat stress to trees may result in higher levels of tree limb drop	Likely	Moderate	High
HDBR	1	Some sporting events using Council assets may need to be cancelled due to ground conditions	Possible	Minor	Medium
HDBR	2	There may be a need to cater for a change in usage patterns at swimming pools	Possible	Minor	Medium
HDBR	3	Maintenance may need to be increased to maintain the aesthetics of the area and to continue to attract visitors to the area	Possible	Minor	Medium
HDBR	4	Council may not be able to maintain recreational facilities to a standard that will continue to attract visitors to town	Possible	Minor	Medium
HDCR	1	Increasing demand for use of the public pool may out strip the capability of the facility leading to periods of forced closures	Possible	Minor	Medium
HDCR	2	Council may not be able to maintain recreational facilities to a standard that is currently enjoyed by the community	Likely	Moderate	High
HDCR	3	Council may need additional shade structures at its recreational facilities	Likely	Minor	Medium
HDDR	1	Additional resources such as water and staff will be required to maintain green space and to stop degradation due to ATR	Likely	Minor	Medium
HDDR	2	Council may need to adapt its planting selections to be more in line with the changes to climate and weather patterns	Likely	Moderate	High
HDDR	3	Degradation of green space may lead to increased urban fire hazards	Likely	Minor	Medium
HDDR	4	Loss of trees and plant species	Possible	Minor	Medium

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
HDER	1	Council may see an impact of increased energy consumption and operational costs due to increased demand and/or usage for recreational facilities	Likely	Minor	Medium
HDER	2	Community expectations may impact on existing resources (staff & facilities)	Likely	Moderate	High
HDER	3	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Likely	Minor	Medium
HDER	4	Council may see fluctuations in income streams as usage patterns at facilities change in line with differing climate and weather patterns	Possible	Minor	Medium
HDER	5	Council may need to review its access policy to recreational facilities during hot days	Possible	Minor	Medium
HDAH	1	May result in a greater demand for resources to ensure inspection regime for public food venues, cooling towers, and public pools	Possible	Moderate	High
HDBH	1	A public safety outbreak may lead to reputation damage to Council and the area resulting in fewer visitors to the region	Possible	Minor	Medium
HDBH	2	Staff working conditions may result in the region being seen as less attractive to work/live making it difficult to attract and retain staff	Possible	Minor	Medium
HDEH	1	Community expectations may impact on existing resources (staff & facilities)	Possible	Moderate	High
HDEH	2	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Likely	Minor	Medium
HDAP	1	Degradation of green space may lead to increased urban fire and vermin hazards	Likely	Moderate	High
HDBP	1	Additional planning requirements on commercial premises may have an impact on attracting business / industry to the region	Unlikely	Insignificant	Low
HDBP	2	Annual temperature rise may result in milder winters making the region more appealing	Possible	Minor	Medium
HDBP	4	May be expensive to retro fit improved design criteria and/or new standards	Unlikely	Minor	Low
HDCP	1	May require a review of the existing planting guide for sub divisions	Possible	Insignificant	Low
HDCP	2	May result in less opportunities to develop areas within the region	Unlikely	Minor	Low
HDDP	1	There will be a need for future land developments to considers climate change impacts on ecosystems	Likely	Minor	Medium

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
HDDP	2	There will be a need to ensure future building designs consider Environmental Sustainable Development (ESD) principles	Likely	Minor	Medium
HDEP	1	Community expectations may impact on existing resources (staff & facilities)	Possible	Moderate	High
HDEP	2	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Likely	Moderate	High
HDEP	3	Council will need to consider changes in design criteria for future DA's	Likely	Minor	Medium
HDEP	4	May require a review of existing planning guidelines for sub divisions	Likely	Minor	Medium
HDAN	1	Potential increase in fire events – fire load, hotter temperatures and drier conditions	Possible	Minor	Medium
HDAN	2	Increase in water borne bacteria in waterways – e.g. blue green algae	Possible	Minor	Medium
HDBN	1	Perceptions of, or actual poor water quality may reduce visitor numbers to the region	Possible	Minor	Medium
HDBN	2	Council will need to ensure there is not a decrease in the sustainable management of natural resources	Unlikely	Minor	Low
HDDN	1	Reduced water availability and/or quality will impact on aquatic ecosystems	Possible	Minor	Medium
HDDN	2	Changes in biodiversity could result in loss of plant and animal species	Possible	Minor	Medium
HDEN	1	Community expectations may impact on existing resources (staff & facilities)	Possible	Moderate	High
HDEN	2	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Possible	Moderate	High
HDEN	3	Council will need to ensure strategies are developed to ensure there is not a decrease in the sustainable management of natural resources	Possible	Minor	Medium
HDAW	1	Increase in water temperature may increase potential for higher levels of bacteria and algae	Likely	Major	High
HDAW	2	Increased demand for water supply may have an impact on the ability to maintain quality with particular risk to end users	Likely	Minor	Medium
HDAW	3	Reduced water availability may lead to a reduced capability to maintain gravel roads	Possible	Minor	Medium

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
HDBW	1	Increase in evaporation has potential to reduce water availability which may require water restrictions	Possible	Moderate	High
HDBW	2	Purchase of town water by rural land holders and water suppliers may place a strain on town water supply capabilities	Likely	Moderate	High
HDBW	3	Water restrictions will make the region less attractive to wet industries	Likely	Moderate	High
HDCW	1	Reduced water availability may lead to some services and recreational facilities being restricted or offered at a reduced capacity	Likely	Moderate	High
HDCW	2	Reduced water availability may lead to a reduced capability to maintain green space, and to stop degradation occurring	Possible	Minor	Medium
HDCW	3	Domestic capture of grey water will lead to less water in the system, resulting in odour issues within sewer systems	Possible	Minor	Medium
HDDW	1	Reduced water availability may lead to Council not being able to meet environmental flow requirements	Possible	Moderate	High
HDEW	1	Water restrictions previously have required the introduction of a levy for augmentation, this may need to be addressed and adjusted in the future	Possible	Minor	Medium
HDEW	2	Community expectations may impact on existing resources (staff & facilities)	Possible	Moderate	High
HDEW	3	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Possible	Moderate	High

Scenario for Rainfall (R)

R		Infrastructure and Property Services	Recreational Facilities	Health Services	Planning and Development	Natural Resources Management	Water and Sewage
		I	R	H	P	N	W
A	Maintain public safety	X	X		X	X	X
B	Protect and enhance the local economy	X	X		X	X	X
C	Protect existing community structures and the lifestyle enjoyed by the people of the region	X			X	X	X
D	Sustain and enhance the physical and natural environment	X	X		X	X	X
E	Ensure sound public administration and governance	X	X		X	X	X

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
RAI	1	Reduced rainfall may increase issues with dust control on gravel roads.	Possible	Minor	Medium
RAI	2	Increase in intense short duration rainfall may impact on roads, drains and culverts'	Possible	Minor	Medium
RAI	3	Increase in intense short duration rainfall may increase flooding events	Possible	Moderate	High
RAI	5	Significant reduction in rainfall may lead to tree stress causing tree limb drops and/or loss of trees	Possible	Minor	Medium
RBI	1	Increase in intense short duration rainfall may result in inundation of commercial premises	Possible	Moderate	High
RCI	1	Reduced water availability may impact on gravel roads being graded & re-sheeted, as the process requires more water	Likely	Minor	Medium
RCI	2	Heritage buildings may have increased incidence of cracking due to reduced moisture in ground	Possible	Minor	Medium
RCI	3	Reduced water availability may lead to a reduced capability to maintain green space impacting on the aesthetics of the region	Possible	Minor	Medium
RDI	1	Loss/deterioration of native pastures will increase the potential for weed invasion	Possible	Minor	Medium
REI	1	Impacts of climate change may see diversion or redistribution of funds from current service budgets	Possible	Moderate	High
RAR	1	Some sporting events using Council assets may need to be cancelled if council is unable to maintain the facilities at a fit for purpose state	Possible	Insignificant	Low
RBR	1	Council may not be able to maintain recreational facilities to a standard that will continue to attract visitors to town	Possible	Minor	Medium
RDR	1	Maintenance may need to be increased to maintain the aesthetics of the area to continue to attract visitors to the area	Possible	Minor	Medium
RER	1	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Possible	Moderate	High
RAP	1	Increased flooding of developed areas due to design of the storm water system	Likely	Moderate	High
RBP	1	Increased cost to developers in meeting additional stormwater design criteria's	Likely	Minor	Medium

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
RBP	2	Increased frequency of flood studies may be required	Possible	Minor	Medium
RBP	3	If less rainfall becomes the pattern this may create development opportunities not previously available due to flooding	Possible	Minor	Medium
RCP	1	Impact on city based industries and businesses due to reduced water availability	Possible	Moderate	High
RDP	2	Impacts from climate change will need to be considered in future strategic planning for urban expansion	Likely	Minor	Medium
REP	1	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Possible	Moderate	High
RAN	2	Increased fire risk caused by a reduction in rainfall will require further resources and mitigation strategies	Possible	Moderate	High
RAN	3	Increases need for Risk Management strategies for natural areas under the care and control of Council	Likely	Minor	Medium
RCN	1	Management of the lakes ecosystems could come under threat due to decreased rainfall	Unlikely	Insignificant	Low
RCN	2	Increased cost of weeds reduction programs	Possible	Moderate	High
RDN	1	Loss/deterioration of native pastures will increase the potential for weed invasion	Possible	Minor	Medium
RDN	2	Increased pressure on landholders to manage weeds	Unlikely	Insignificant	Low
RDN	3	Changing rain distribution may impact negatively on the management of lakes and waterway ecosystems	Possible	Moderate	High
RDN	4	Erosion issues may need remedial works or mitigation actions	Possible	Minor	Medium
REN	3	Impacts of climate change may see diversion or redistribution of funds from current service budgets	Possible	Moderate	High
RCW	1	Probable reduction in water supply will lead to an increase in supply restrictions	Possible	Major	High
RCW	2	A reduction in water flow in the sewer system may result in odour issues	Possible	Minor	Medium
RCW	3	A reduction in water access may impact on Councils ability to maintain gravel roads	Possible	Minor	Medium

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
REW	1	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Possible	Moderate	High

Scenario for Wind (W)

		Infrastructure and Property Services	Recreational Facilities	Health Services	Planning and Development	Natural Resources Management	Water and Sewage
		I	R	H	P	N	W
A	Maintain public safety	X	X		X	X	X
B	Protect and enhance the local economy	X			X		X
C	Protect existing community structures and the lifestyle enjoyed by the people of the region				X		X
D	Sustain and enhance the physical and natural environment						X
E	Ensure sound public administration and governance	X	X		X	X	X

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
WAI	1	Council may loose a number of trees due to increased average wind speed	Likely	Minor	Medium
WAI	2	There may be damage to older building stock, e.g. sheds	Possible	Minor	Medium
WAI	3	There may be increased dust and a loss of fine materials from gravel roads	Possible	Minor	Medium
WAI	4	There may be increased incidents of tree limb drops, and resultant road hazards	Possible	Minor	Medium
WAI	5	Higher wind speeds may have an impact on the types of outdoor tasks that can be undertaken by Council	Possible	Minor	Medium
WAI	6	Maintenance of existing assets, buildings and infrastructure will need to consider the impacts of higher wind speeds	Possible	Minor	Medium
WBI	1	Increased wind speeds may have an impact on the farming community and consequently Council	Possible	Minor	Medium
WBI	2	Increased wind speeds may provide more opportunities for wind farming in the region	Likely	Minor	Medium
WEI	1	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Possible	Moderate	High
WAR	1	Council may loose a number of trees and assets due to increased average wind speed, requiring increased inspection and maintenance regime	Possible	Minor	Medium
WER	1	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Possible	Moderate	High
WAP	1	Hazards associated with illegal structures may require an increased inspection regime	Possible	Minor	Medium
WAP	2	An increase in significant wind events may lead to increased property damage	Possible	Minor	Medium
WBP	1	Design and construction of new assets, buildings and infrastructure will need to consider higher wind speeds, this will incur additional construction costs	Likely	Minor	Medium
WBP	2	Increased wind speeds may provide more opportunities for wind farming in the region	Possible	Minor	Medium
WCP	1	Increased wind speeds may impact on communities not previously impacted upon as noise & pollution plumes change in response to the increased wind	Possible	Minor	Medium

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
WCP	2	Wind speed increases will need to be considered in design criteria for future DA's	Likely	Minor	Medium
WEP	1	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Possible	Moderate	High
WEP	2	Changes in wind velocity may impact on BCA and other state planning instruments	Likely	Minor	Medium
WEP	3	Changes to wind design parameters may impact on Council's approvals processes	Likely	Minor	Medium
WAN	1	Potential for an increase in limbs falling from trees	Likely	Minor	Medium
WAN	2	An increase in average wind speeds may increase tree loss at natural reserves under the care and control of Council	Possible	Minor	Medium
WAN	3	Higher winds can effect chemical spraying undertaken by Council	Possible	Minor	Medium
WAN	4	Increased wind speed can increase the severity of bushfires in the region	Likely	Moderate	High
WEN	1	Impacts of climate change may see diversion or redistribution of funds from current service budgets.	Possible	Moderate	High
WAW	1	Increased evaporation may lead to reduced water storage levels	Likely	Major	High
WAW	2	Increased wind speed will reduce the number of days that aerosol spraying can occur at sewer farms	Likely	Moderate	High
WCW	1	Increase in water evaporation will result in increased demand for water supply	Likely	Major	High
WEW	1	Impacts of climate change may see diversion or redistribution of funds from current service budgets	Possible	Moderate	High

Scenario for Fire Weather (FW)

FW		Infrastructure and Property Services	Recreational Facilities	Health Services	Planning and Development	Natural Resources Management	Water and Sewage
		I	R	H	P	N	W
A	Maintain public safety				X		
B	Protect and enhance the local economy				X		
C	Protect existing community structures and the lifestyle enjoyed by the people of the region		X				X
D	Sustain and enhance the physical and natural environment				X		
E	Ensure sound public administration and governance		X		X	X	X

Impact ID	Impact Number	Impact Description	Likelihood	Consequence	Impact
FWAR	1	Council will need to inform users of recreational facilities of the increased fire risk at facilities under Council's care and control	Possible	Minor	Medium
FWCR	1	Community access to recreational facilities during increased fire risk danger periods may need to be reviewed commensurate with the risk	Possible	Minor	Medium
FWER	1	Community access to recreational facilities may need to be reviewed in light of potential climate change impacts	Possible	Minor	Medium
FWER	2	Users of recreational facilities may need to be warned of the increased fire risk at facilities under Council's care and control	Possible	Minor	Medium
FWAP	1	Increased risk may impact on fire regulation inspection and compliance activities	Possible	Minor	Medium
FWBP	1	Increase in fire risk zones may limit potential locations for industry by reducing land availability or requiring additional mitigation works	Possible	Minor	Medium
FWBP	2	A perception of greater bush fire risk may have an adverse impact on the local economy	Unlikely	Minor	Low
FWDP	1	Increase in fire risk may limit the opportunities (type and frequency of interaction) the community currently enjoys with natural environment	Possible	Minor	Medium
FWDP	2	Fire mitigation strategies may be impacted for areas under Council care and control	Possible	Minor	Medium
FWDP	3	Additional FFDI days may impact on bush fire mapping for Planning and Development activities	Likely	Minor	Medium
FWEP	1	Additional FFDI days may impact on urban/rural planning strategies	Likely	Minor	Medium
FWEP	2	Information recorded on certificates will need to take into account increased risk of fire	Likely	Minor	Medium
FWAN	1	Increase in fire risk may limit the opportunities (type and frequency of interaction) the community currently enjoys with natural environment	Possible	Minor	Medium
FWEN	1	Additional FFDI days may impact on urban/rural planning strategies	Likely	Minor	Medium
FEW	1	Council will need to confirm that it can continue to supply adequate fill points for emergency services	Possible	Minor	Medium
FEW	2	Impacts of climate change may see diversion or redistribution of funds from current service budgets	Possible	Minor	Medium

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