



*Bridge to Opportunity*

*The Rural City of*  
**MURRAY  
BRIDGE**



*The Rural City of Murray Bridge*  
**Climate Change Adaptation Plan**

**2016-2021**



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## 1 Introduction

Climate change is a known fact with changing weather patterns causing significant weather events that appear to have not been recorded in the past, little known or understood. There is an extensive body of peer-reviewed scientific research that the Earth's climate is changing. Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising average sea level. Global greenhouse emissions have grown since pre-industrial times, with an increase of 70 percent between 1970 and 2004, and a very high confidence that this warming has occurred as a result of human activities.

Adaptation will be necessary to address impacts resulting from the warming which is already unavoidable due to past emissions. There is no alternative but to undertake adaptation planning, even in an environment of extensive mitigation. It is not a case of planning for a different stable climate future, but of building the capacity and flexibility to cope with whatever evolving climate may bring.

South Australia's social, economic and ecological systems are well adapted to climate variability, having had to adapt and respond to severe droughts in the past such as the Millennium Drought (1995–2009). Yet climate change will result in a long-term shift in the Region's climate, with conditions expected to be warmer and drier on average, the risk of bushfires greater, and ocean conditions changing, such as sea level rise.

Adaptation has the benefit of reducing damages and increasing community resilience. It is a sensible and attainable planning strategy that is based on an understanding of climate change science and on a rigorous assessment of the impacts various climate change variables will have on Local Government business.

The nature of Local Government, its services and functions, means it will feel the impacts of climate change considerably. Potential Strategic Risks to the Local Government Sector include:

- Increased public liability exposure exacerbated by climate change impacts;
- Inadequacy of land use planning, development assessment and building regulation;
- Increased costs associated with the management of assets;
- Public safety and health issues caused by extreme weather events and temperatures;
- Higher insurance costs as a result of increased claims;
- Poor reputation as a result of failing to manage community expectations;
- Increased Resource management issues to meet statutory responsibilities;



- Increase in communicable diseases by insect vectors; and
- Reduction of viable land for food production.

Risk management is an effective tool for dealing with climate change as it offers the flexibility and robustness to deal with levels of uncertainty.

## 1.1 Council Profile

The Rural City of Murray Bridge provides local government services and leadership to a community population of approximately 20,740 people, the majority of which are located in the main township of Murray Bridge. Other small towns include Mypolonga, Monarto, Jervois, Wellington and Callington.

The Rural City of Murray Bridge is located approximately 80 kilometres to the east of metropolitan Adelaide. A key feature of the Council area is the River Murray, which divides the area in two. The economy is principally driven by the agriculture sector (irrigated horticulture, dairy, cereal crops) and supported by a thriving tourism sector based around the river as a water sport destination and other iconic sites such as the Monarto Zoo.

The town of Murray Bridge is the Regional Centre of the Murraylands Region. In addition, Murray Bridge services parts of the Adelaide Hills and Fleurieu Regions. A bustling vibrant Regional Centre, Murray Bridge offers a wide range of facilities and services to the local and Regional community. The townships of Callington, Jervois, Monarto, Mypolonga and Wellington provide for a diversity of housing and community support services. The Monarto Zoological Park is a key tourist attraction, while water based activities and house boating on the River Murray are key attractions for locals and visitors to the area. Figure 1 illustrates the RCMB Council area.

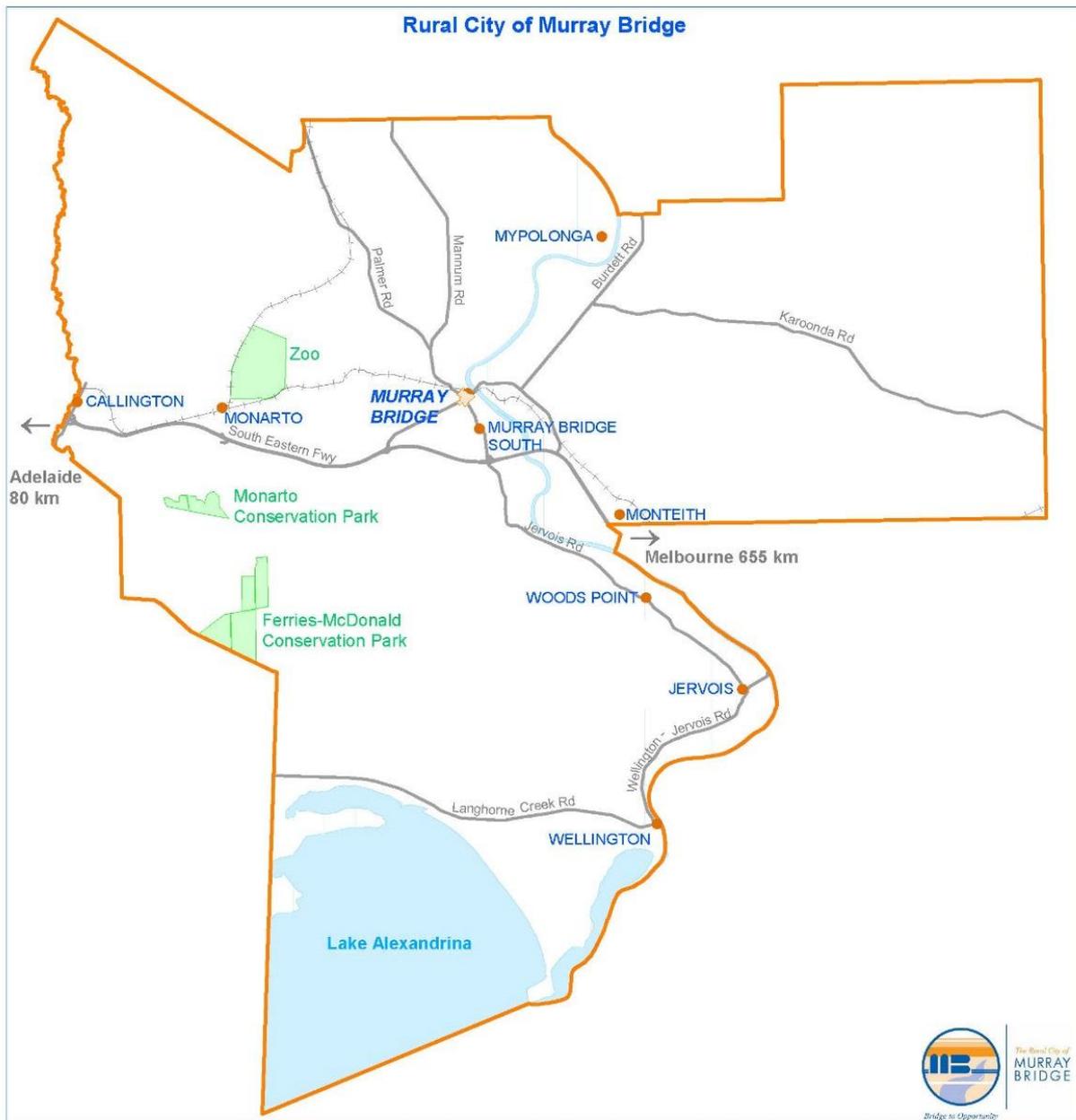


Figure 1. Murray Bridge Council Area



## 1.2 Background

The Rural City of Murray Bridge is part of the South Australian Murray-Darling Basin that contains a diverse range of natural and cultural landscapes and production systems which together sustain the communities of the Region. The Region is characterised by a highly variable climate. Hot and mostly dry summers are followed by cool winters with rainfall that can vary significantly from year to year. Flows in the River Murray are driven mostly by rainfall in upstream catchments that is highly variable between years. Together, this means that the environment and communities of the Region already have a high tolerance to a variable climate, and production systems have had to develop strategies to respond to this variability. The most extreme recent example of this variability was the Millennium Drought, which negatively affected the economy, environment, and communities of the Region as a result of locally low rainfall and record low inflows to the River Murray.

In responding to climate change the Region will need to respond to changing average conditions, like warmer summers and, most likely, warmer and drier winters. Planning for climate change is not new to South Australians and many sectors such as natural resource management, irrigation, and dryland farming have already invested in research to better understand impacts and response options.

## 1.3 The development of this plan

This Plan has been developed based on the '*Rural City of Murray Bridge Climate Change Adaptation Report (2013)*' developed for the Rural City of Murray Bridge by the South Australian Local Government Association Mutual Liability Scheme and the South Australian Murray-Darling Basin Natural Resources Management Board Regional Plan '*Building Resilience to a Changing Climate – A climate change adaptation plan for the South Australian Murray-Darling Basin (2014)*'.

The Plan has been developed with the philosophy that:

- We do not need to know everything to start planning and acting now;
- We must continue to build knowledge and fill gaps as new information becomes available; and
- Adaptation is a process and the Plan provides a pathway forward that must be monitored and reviewed in order to change our course if needed.

A goal outlined in the Rural City of Murray Bridge Strategic Plan (2016-2020) is the '*planned reduction of our environmental footprint*' by '*planning our response to climate change*'.

Linkages between the key strategic documents and this Climate Change Adaptation Plan can be found in Figure 2.

**Figure 2. Linkages between key strategic documents and the Climate Change Adaptation Plan.**





## 2 The South Australian Murray-Darling Basin

In 2014 the South Australian Murray-Darling Basin Natural Resources Management Board released a Regional Climate Change Adaptation Plan based on the results of a series of workshops of which the Rural City of Murray Bridge provided input.

The Plan '*Building Resilience to a Changing Climate – A climate change adaptation plan for the South Australian Murray-Darling Basin (2014)*' describes the Region as one of South Australia's most ecologically diverse and agriculturally productive Regions supporting a wide range of flora, fauna, natural environments and human activities.

The Region covers 56,703 square kilometres or about 7 per cent of South Australia. The River Murray is a dominant and influential feature of the Region due to the importance of its waters for irrigated agriculture and the environment and in meeting domestic, livestock, and industrial needs.

The Region's climate can be characterised as Mediterranean, characterised by hot dry summers and cool wet winters.

Primary production and value-adding manufacturing in the Region makes a considerable contribution to the state's food production particularly in the fruit, milk, vegetable, meat and grain production and processing areas. The Region is also South Australia's largest producer of wine grapes, potatoes and onions. Water use and quality are dominant issues in this Region, reflecting the importance of the Murray River to the Region for its water supply.

### 2.1 How will climate change affect the region?

The South Australian Murray-Darling Basin Region will be impacted by climate change through a warmer and, most likely, drier climate with increased risk of bushfires, reduced flows down the River Murray, and rising sea levels along the Coorong with higher temperatures and lower pH of marine waters.

### 2.2 Evidence of climate change

Climate change is a consequence of the release of greenhouse gases like carbon dioxide, methane and nitrous oxide into the Earth's atmosphere. These gases are produced from a range of natural sources as well as from human activities like energy production, transport, industrial processing, waste management, agriculture and land management. Greenhouse gases trap the sun's energy in the Earth's atmosphere, leading to changes in the global climate.



The earth's climate is changing. This is evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising sea levels. Greenhouse gas concentrations are increasing at an alarming rate and most of the human caused greenhouse gas emissions come from the combustion of fossil fuels.

South Australia is becoming warmer. In the last century the global surface temperature has increased by a 0.89°C in Australia and 0.96°C in South Australia. This is higher than the global increase of 0.7°C. South Australia has also experienced a long term reduction in autumn rainfall, particularly over southern agricultural areas that result in an overall reduction of inflows into dams and water storages. Although these changes are small, they can have a significant impact on already vulnerable ecological systems.

A CSIRO and Bureau of Meteorology report released in January 2015 predicts future climate impacts for Australia. Overarching findings include:

- Australia's average temperature will increase and we will experience more heat extremes and fewer cold extremes;
- Extreme rainfall events that lead to flooding are likely to become more intense;
- The number of tropical cyclones is projected to decrease but they may be more intense and reach further south;
- Southern and eastern Australia is projected to experience harsher fire weather;
- Sea levels will continue to rise throughout the 21st century and beyond; and
- Oceans around Australia will warm and become more acidic.

These predicted changes will have ramifications on the South Australian economy and the environment at National, State, Regional and Local Government levels.



### 3 RCMB LGA Climate Change Adaptation Program

In 2013 the Local Government Climate Change Adaptation Program was developed by the South Australian Local Government Association Mutual Liability Scheme.

The purpose of the Program was to enhance resilience through the development and integration of adaptation strategies and measures into Council's Strategic Management Plans. The Program was a Key Area of Focus defined in the South Australian Local Government Sector Agreement pursuant to the Climate Change and Greenhouse Emissions Reduction Act 2007, 4 June 2008.

The objectives of the program were to:

- Facilitate the climate change risk assessment process for Council, based on AS/NZS To integrate adaptation strategies and measures into Council's Strategic Management Plans;
- Undertake a climate change risk management process for Council, based on International Standard AS/NZS/ISO 31000:2009; and
- Provide Council with a Climate Change Risk Management and Adaptation Report.

The key recommendations of the program were to:

- Raise awareness of climate change risks with Council and the community to enhance decision-making and build community resilience as part of communication and consultation;
- Incorporate adaptation strategies and adaptation measures identified in Section 5 of the Report into Strategic Management planning, including defining the responsible officer and timeframes for completion;
- Include climate change risk management results into Council's risk management database; and
- Monitor and review risk management context with regard to changes to climate change variables, operating environment, key business drivers, strategic management, capacity, capabilities and other relevant factors to identify new climate change risks and reanalyse all existing risks.



## 4 Objectives, Strategies and Actions

This Plan has concentrated on the following themes that Council believes will be impacted on by Climate Change.

- Council Infrastructure;
- High Bushfire Risk;
- Land Use Planning;
- Vulnerable Members of the Community;
- Emergency Services; and
- Essential Services.

These themes are explored in detail in the sections below. All themes and subsequent actions require careful balancing between legislative requirements, community expectations and available resources.

### 4.1 Council Infrastructure

Climate change will affect Council infrastructure in many ways. With the predicted increase in volatility of weather patterns new methods in infrastructure maintenance and construction will need to be implemented.

Prolonged periods of drought will rapidly increase the degradation of road pavements as they dry out and crack. Drought reduces available water resources necessary to moisture condition pavements and the suppression of dust.

More frequent and intense storms will place pressure on existing stormwater infrastructure that may have been designed for less intense events. High volume, high velocity run-off causes erosion, damaging infrastructure and transporting silt, water and pollutants into water courses.

The Millennium Drought (1995–2009) resulted in damage to Council infrastructure, acidification of dairy swamps and riverbank collapse.

These issues must be addressed and considered as part of Council's ongoing design philosophy, construction methodology and maintenance practices to ensure value for money services can continue to be provided to Council's stakeholders.



Application of water-sensitive urban design (WSUD) principles should be considered, including stormwater, groundwater and wastewater management and water supply, into urban design to minimise environmental degradation and improve aesthetic and recreational appeal.

**Table 1 - Objectives, strategies and actions for Council Infrastructure**

<b>Objective 1:</b>		
Reduce the effect more frequent, high intensity storm events have on stormwater infrastructure including pipe and pit networks, detention/retention basins and wetlands		
<b>Strategies:</b>	<b>Actions:</b>	<b>Priority</b>
Reduce stormwater run-off by increasing permeable areas into the development and renewal of Open Space	Introduce Water Sensitive Urban Design (WSUD) principals into both 3rd party development and Council construction projects	Medium
	Develop a Water Sensitive Urban Design (WSUD) Policy	Medium
	Expand Council's Stormwater Management and Reuse Scheme to make better use of natural water resources	Medium



### Objective 2:

Reduce the maintenance cost of Council unsealed road network caused by extreme weather events

Strategies:	Actions:	Priority
Reduce maintenance cost of unsealed roads by increasing Council's sealed road network	Utilise funding sources such as Roads to Recovery to upgrade unsealed roads while reducing Council's baseline renewal expenditure	High
	Utilise harvested stormwater to moisture condition of unsealed road pavement during dry periods to reduce degradation	Low
	Trial synthetic polymers that enhance moisture retention in unsealed pavement to reduce maintenance costs	Medium

### Objective 3:

Improve Open Space amenity while reducing water usage

Strategies:	Actions:	Priority
Reduce irrigation requirements	Implement drought tolerance plant species to Open Space areas	High
	Implement new technology to improve irrigation efficiency	High



## 4.2 High Bushfire Risk

Fire is a natural occurrence in South Australia. Hotter, dryer climate conditions increase the bushfire threat resulting in more severe and extreme fire danger days and more days of heatwave conditions.

We are experiencing a longer bushfire season, starting earlier and finishing later. During recent years we have seen an increase in large bushfire events such as the Sampson Flat, Rockleigh, Eden Valley, Renmark and Pinery bushfires that resulted in some cases in the loss of life and a major loss of infrastructure such as houses and sheds.

Greater frequency of large scale bushfires will impact on emergency services and volunteers. Emergency services are, at times, under resourced. This has impacts on not only volunteers but the employers of the volunteers having to pay wages when their staff are absent during emergencies. Council should be a lead player in the community by promoting and supporting volunteerism in the emergency services.

Council recognises the need to have a transparent, practical, strategic and proactive approach to bushfire management. There is a need to constantly review and implement bushfire management, response and recovery plans.

The Local Government Association and the South Australian Fire and Emergency Management Commission (SAFECOM) developed the joint operating guidelines to assist Council in the support of the Emergency Services. Key members of Council staff have been trained in the i-Responda Framework which is outlined in the guidelines.



**Table 2 - Objective, strategies and actions for High Bushfire Risk**

<b>Objective:</b>		
Provide a safer environment against High Bushfire Risk events within our community		
<b>Strategies:</b>	<b>Actions:</b>	<b>Priority</b>
Undertake a proactive, strategic and practical program for bushfire management	Promote educational awareness of high bushfire risks	High
Establish and implement bushfire management, response and recovery plans	Provide training and education on bushfire awareness to Council staff	High
Promote and support volunteerism in the emergency services	Review Bushfire Management Plan	Medium



### 4.3 Land Use Planning

Proposals to develop land are subject to the requirements of the Development Act (1993) with applications for development assessed against the provisions contained within Council's Development Plan. The Rural City of Murray Bridge Development Plan includes a number of provisions that aim to improve the potential impacts associated with Climate Change. Whilst there are specific requirements relating to the assessment of an application that may be subject to bushfire or flood risk, the Development Plan also incorporates a number of provisions across the whole Council area which seek to protect against the impacts of flooding, bushfire, salinity and landslides.

From a land use planning perspective bushfire risk is managed via the Minister's Code for Undertaking Development in Bushfire Protection Areas 2009 (as amended October 2012). Council's Development Plan includes a number of maps of areas which have been identified as a Bushfire Protection Area. These protection areas are noted as three levels: High, Medium and General. Township areas are generally excluded from bushfire provisions.

The level of bushfire protection required was determined by Department of Planning Transport and Infrastructure, in discussion with the CFS and Council through a Ministerial Bushfire Management Plan Amendment Report in 2007. This process determined that there were no areas of high bushfire risk in the Murray Bridge, however a significant portion of the Council area is considered to be of medium bushfire risk.

The Minister's Code identifies a number of requirements that must be provided for new dwellings in areas identified as medium risk. In general these relate to the provision of an access track on the property to the dwelling which has a turning circle to allow for fire fighting vehicles to enter and exit in a forward direction. Additionally a rainwater tank with a minimum size of 5,000 litres if there is no mains water or 2,000 litres if the property is connected to mains water must be provided and this rainwater tank must be utilised solely for firefighting purposes.

Council's Development Plan identifies the 1956 Flood Level on all the relevant maps. There are also designated Flood Zones which contain provisions intended to mitigate potential flood risk. The Development Act works in parallel with the River Murray Act (2003), it is a requirement of the Development Act that certain prescribed types of development located within identified Flood prone areas are referred to the Department of Environment, Water and Natural Resources for assessment under the River Murray Act. With the Rural City of Murray Bridge Council area, properties fall within either the River Murray Flood Area or the River Murray Tributaries Area.

Council is in the final stages of its Integrated Water Management Development Plan Amendment which seeks to reinforce strategies within the plan based upon best practice water management. This DPA also includes the inclusion of 'Water Management Areas' maps into the Development Plan to assist in the assessment process.



**Table 3 - Objective, strategies and actions for Land Use Planning**

<b>Objective:</b>		
Ensure Council staff understands existing and future policies relating to climate change and how to best implement them		
Ensure such policies are relevant and conform to best practice climate change measures		
<b>Strategies:</b>	<b>Actions:</b>	<b>Priority</b>
Ensure Council's Development Plan contains appropriate climate change policies	Complete the Integrated Water Management DPA and work with Water Sensitive SA to ensure staff understand how to best implement these new policies	High
Encourage participation in appropriate bodies who are involved in gaining an understanding of the climate change process	Utilise the Water Sensitive SA On-Line stormwater assessment tool in the assessment process	High
Provide greater awareness of the roles and responsibilities of the Environmental Business Unit amongst Council planning staff	Investigate relevant staff becoming members of Stormwater SA. Encourage greater collaboration/ training for planning staff with engineering staff with stormwater expertise	Medium
	Establish stronger ties between Planning and Environmental Business Unit through regular meetings and information sessions	High



#### 4.4 Vulnerable members of the community

It is recognised that vulnerable members of our community will be have the least capacity to cope, adapt and recover from extreme weather events. Council will play an important role in supporting these members of our community.

Some areas where Council can assist are provision and dissemination of information, utilisation of its assets to provide refuge during extreme weather events, assisting and partnering with other agencies in their service delivery and re-directing capacity within existing services to assist in the management of emergencies.

Vulnerable people often need low cost options when trying to manage during extreme weather events. They may also lack social networks that could normally provide informal supports. Council can promote the availability of its facilities as potential refuges and have contingencies for longer opening hours if required. Council will promote networking and use existing services such as Community (aged) Care to identify and link identified vulnerable people.

The Council's Community Care program maintains a vulnerable client list which is activated at periods of sustained extreme weather and the program networks with other services working with vulnerable older people through the Murray Mallee Ageing Taskforce.

As a member of the Murray Mallee Zone Emergency Committee, Council should ensure vulnerable groups are specifically identified and targeted in disaster management and recovery plans. Community education packages can be made available to assist with heatwave and storm preparedness.



**Table 4 - Objective, strategies and actions for Vulnerable Members of the Community**

<b>Objective:</b>		
Assist vulnerable members of the community to be better prepared for extreme weather events and to provide opportunities for refuge, disaster support and recovery to these citizens		
<b>Strategies:</b>	<b>Actions:</b>	<b>Priority</b>
Provide refuge options	Identify and promote selected Council buildings as refuges during extreme heat or emergency events	High
	Investigate methods to increase accessibility to the swimming pool during extreme heat events	High
Provide information and awareness raising	Provide information on a range of issues related to climate adaption ensuring accessibility by the community	Medium
	Promote and provide access to Red Cross REDiPlan tool and Telecross for vulnerable older people	Medium
In future disaster management and recovery plans include measures related to vulnerable citizens	Ensure local area emergency management plans take into account the needs of vulnerable groups in relation to disaster management and recovery activities	High



## 4.5 Emergency services

There has recently been an increase in demand for our Emergency Services due to extreme climatic events.

Emergency Services within the Rural City of Murray Bridge include: South Australian Police (SAPOL), SA Ambulance Service, Metropolitan Fire Service (MFS), Country Fire Service (CFS) and State Emergency Service (SES). In an extreme emergency event such as bushfire or flood event SAPOL is the lead agency.

CFS and SES are highly reliant on their volunteer workforce. The volunteers are well trained and are covered by WorkCover. However the number of active volunteers are declining and therefore there is a need to increase volunteerism. Council should be a lead player in the community by promoting and supporting volunteerism in the emergency services and promoting awareness of all volunteer groups in its Council area.

The Local Government Association and the South Australian Fire and Emergency Management Commission (SAFECOM) developed the joint operating guidelines to assist Councils in planning and implementation of their response to emergency incidents. In 2015 key members of Council staff were trained in the i-Responda Framework which is outlined in the guidelines.

**Table 5 - Objective, strategies and actions for Emergency Services**

<b>Objective:</b>		
Council to provide support for the Emergency Services		
<b>Strategies:</b>	<b>Actions:</b>	<b>Priority</b>
Develop links with the emergency services  Support volunteerism in the emergency services.	Staff to be trained in the i-Responda Framework	High
	Provide support to staff who are volunteers with the Emergency Services	Medium
	Participate in Murray Mallee Zone Emergency Management Committee	High



## 4.6 Essential services

The South Australian Murray-Darling Basin Natural Resources Management Board Regional Climate Change Adaptation Plan highlighted the issues of climate change will have on the Region's Essential Services.

The Regional Plan stated the need to maintain our power, water and telecommunications infrastructure in the face of climate extremes such as increasing frequency of bushfires, that may physically damage infrastructure, and generally increasing temperatures which are likely to increase demand for services.

SA Power Networks has developed a Protocol for Vegetation Management near Powerlines. The report highlighted the need for greater communication between SA Power Networks, contactors employed by SA Power Networks, Council's and the general public.

SA Water has ageing infrastructure that has not been designed to cope with an increased capacity that may be encountered due to increased storm activity.

**Table 6 - Objective, strategies and actions for Essential Services**

<b>Objective:</b>		
Develop links with Essential Service providers to allow services to be delivered to our community		
<b>Strategies:</b>	<b>Actions:</b>	<b>Priority</b>
Develop links with service providers	Attend Local Government and SA Power Networks Working Group meetings	Medium



## 5 Implementing the Plan

The Rural City of Murray Bridge recognises the need to adapt to Climate Change.

This Climate Change Adaptation Plan has been developed in the context of adaptation in the Rural City of Murray Bridge based on information available at the present time. It is recognised that more information will become evident in the future and that this Plan needs to be periodically reviewed; it is recommended a review will be undertaken every five years.

It is recommended that the following documents be consulted in reference to adaptation to Climate Change at a Regional and State level:

- The South Australian Murray-Darling Basin Natural Resources Management Board Regional Plan '*Building Resilience to a Changing Climate – A climate change adaptation plan for the South Australian Murray-Darling Basin (2014)*'; and
- South Australian Government, 2015, '*South Australia's Climate Change Strategy 2015-2050 towards a low carbon economy*'.



## 6 REFERENCES

1. Siebentritt, MA, Halsey, N, Meyer, W and Williams, R 2014, *Building resilience to a changing climate in the South Australian Murray-Darling Basin: a climate change adaptation plan for the South Australian Murray-Darling Basin*, prepared for the South Australian Murray-Darling Basin Natural Resources Management Board.
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## 7 ACKNOWLEDGEMENTS

Mr Greg Lundstrom: formerly South Australian Murray-Darling Basin Natural Resources Management Board.