



ADAPTING TO CHANGE

REGIONAL CLIMATE ADAPTATION REPORT

Southern Loddon
Mallee Region

This report details the shared regional risks and vulnerabilities applicable to the Southern Loddon Mallee and the Shire of Buloke's economy and community as a result of a changing climate. Adaptation options are evaluated, prioritised and themed to produce a set of priority action options relevant to the entire region.

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Introduction

The Adapting to Change project has sought to clearly present the current and potential future climate-related vulnerability for the Southern Loddon Mallee Region. The project has informed the actions documented in this Regional Climate Adaptation Plan (the Plan) to improve the region's resilience to a changing climate.

The Southern Loddon Mallee region covers six municipalities including Greater Bendigo, Central Goldfields Shire, Loddon Shire, Macedon Ranges Shire, Mount Alexander Shire and Buloke Shire. While the local government area of Buloke falls outside of the Southern Loddon Mallee Region, it has been included in this project.

This Plan presents actions for the region as a whole, rather than the individual local government organisations. It is acknowledged that local governments, community, and other stakeholders will need to collaborate to build the region's resilience to climate change impacts.

The Adapting to Change project has been funded through the Victorian Adaptation and Sustainability Partnership, administered by the Department of Environment and Primary Industries, and is identified in the State Government's Victorian Climate Change Adaptation Plan. The key project stages for the Adapting to Change project are presented in Figure 1.



Figure 1 Overview of the Adapting to Change project approach.

Regional actions

Priority adaptation actions for the Southern Loddon Mallee region have been identified based on the common regional risks and vulnerabilities identified throughout the Adapting to Change project. The priority actions are intended to respond to the region's extreme and high climate related vulnerabilities for 2030.

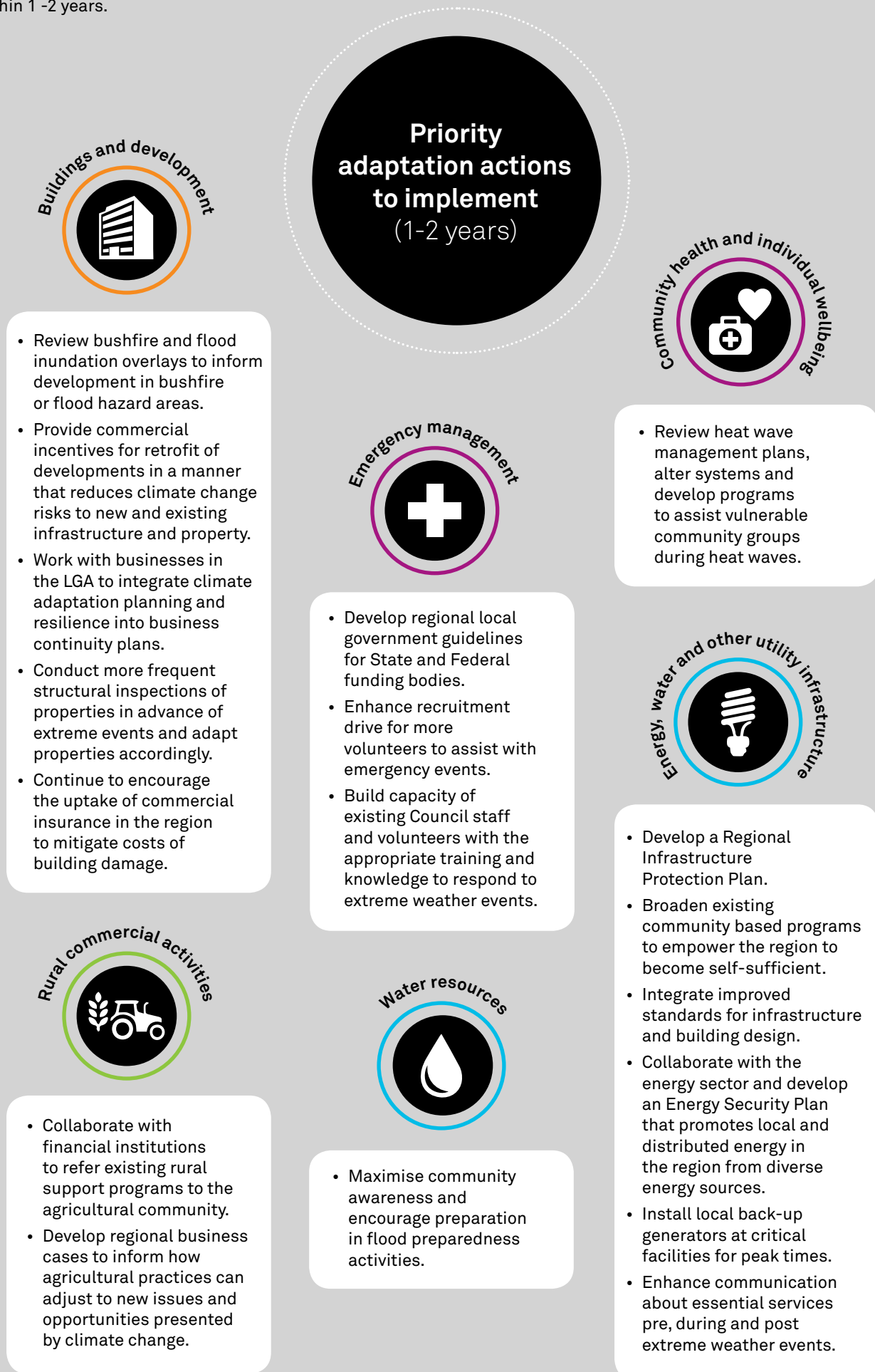
Shared regional vulnerabilities have been identified under the following themes:

- Community health and individual wellbeing
- Energy, water and other utility infrastructure
- Emergency management
- Water resources
- Buildings and development
- Rural commercial activities

This Plan identifies actions for the region to address the identified climate vulnerabilities. Further detail setting out how each of these areas will be impacted by climate change in the Southern Loddon Mallee region is included in Appendix B.

The prioritised adaptation actions, best progressed in the next 1 to 2 years, are presented in Figure 2. Each prioritised adaptation option is then explained further noting the level of authority required to implement the action and the role Council can play to advance the actions for the Southern Loddon Mallee region as a whole. The full list of identified and evaluated adaptation options, for the region, including their timeframe for implementation, is presented in Appendix C.

Figure 2. Priority adaptation options identified for implementation in the Southern Loddon Mallee region within 1-2 years.



Action	Description	Level of responsibility for implementation	Role for Council
Buildings and development			
Review bushfire and flood inundation overlays to inform development in bushfire or flood hazard areas.	<p>This adaptation option predominantly focuses on building resilience in future development for the region. Council can advocate for the review of planning overlays and design standards to ensure adequate climate change tolerances have been considered. A review of overlays or producing guidelines for development applications in flood or bushfire hazard areas for developers may also be alternative measures of integrating adaptation measures into future development.</p>	Federal and State e.g. DTPLI	Lead - climate adaptation can be considered when Council undertake their planning scheme reviews and/or develop new policies that form part of the Local Planning Policy Framework in individual planning schemes. Advocate federal and state government authorities for reviews of broader planning policies to guide direction for adaptation measures.
Provide commercial incentives for retrofit of developments in a manner that reduces climate change risks to new and existing infrastructure and property.	<p>In 2009, Victorian building regulations prescribed that all new homes must be designed, construction and located with improved bushfire protection. While these regulations do not include mandatory retrofitting, organisations in the region may incentivise building and asset owners to implement measures that improve resilience.</p> <p>This adaptation option can be tested at one of the regional LGAs. Financial institutions such as banks may also be involved to facilitate this option by financing retrofit works that will improve resilience in existing and new buildings located in the Southern Loddon Mallee region. Examples of retrofitting measures may include:</p> <ul style="list-style-type: none"> - Construction of private or community bushfire shelters - Installing a sprinkler system - Replacing parts of the building with non-combustible or bushfire materials - Relocating or raising property out of floodplain areas to higher group - Construction of flood walls or levees around properties to hold back flood water <p>Further guidance can be provided by the CFA in their 'A guide to retrofit your home for better protection from a bushfire'. Grant funding may aid in the implementation of this option.</p>	Local governments and commercial developers	Lead – through policy development in the planning scheme and/or implementation of measures in community areas.
Work with businesses in the LGA to integrate climate adaptation planning and resilience into business continuity plans.	<p>Climate change is likely to impact businesses and organisations in the Southern Loddon Mallee region and all businesses have an interest in managing potential risks. Business planning should include measures to mitigate or avoid impacts to business from extreme weather events. Examples of this may include:</p>	Local government area and the private business sector	Influence and encourage forward planning in the private sector so businesses and dominant industry sectors are prepared for disaster events and can continue business while the

Action	Description	Level of responsibility for implementation	Role for Council
	<ul style="list-style-type: none"> - Developing disaster management plan e.g. for flood or bushfire events - Moving critical operations/equipment/facilities in advance of flood warnings - During extreme heat, reducing the use of heat generating equipment and energy demand - Taking out appropriate insurance policies that cover for physical damage, income loss etc. - Establishing procedures for workforce, customer or supply chain impacted by extreme weather events e.g. health/welfare and transport. - Protective measures for building/operations <p>An engaging way to involve businesses may be to hold regional forums and invite small township leaders together to network and share successes, challenges, approaches, case studies and provide training and coaching.</p>		region recovers.
Conduct more frequent structural inspections of properties in advance of extreme events and adapt properties accordingly.	Regular maintenance and structural inspections of building stock can identify weaknesses in assets in advance of extreme weather events. Homeowners can maintain residential properties proactively and government and commercial property owners can integrate additional inspections in maintenance procedures. Existing building practices and maintenance regimes should be reviewed to ensure that climate change adaptation is considered.	State e.g. DEPI	Advocate state government authorities to manage assets strategically and play an education role in encouraging households to inspect their own properties.
Continue to encourage the uptake of commercial insurance in the region to mitigate costs of building damage.	Damage to buildings and development is an insurable risk. Given the climate hazards in the Southern Loddon Mallee region, encouragement of commercial insurance should continue. This may be in the form of an education or communication campaign.	State e.g. Chamber of Commerce and the private business sector	Lead – through development of a communication program to assist commercial sectors to take up insurance in the region.

Action	Description	Level of responsibility for implementation	Role for Council
Energy, water and other utility infrastructure			
Develop a Regional Infrastructure Protection Plan.	<p>Road and rail networks, telecommunication, drainage, water and power assets in the region is particularly vulnerable to extreme weather events, such as flash flooding and bush fires. The quality of the infrastructure varies across the region, with some infrastructure being quite poor and others relatively new due to recent repair and recovery works or project upgrades. The thresholds of key infrastructure such as drainage in flood hazard areas, needs to be reviewed and upgraded to withstand the more frequent and intense rainfall events that are already experienced and projected for the region.</p> <p>It should be noted that the 'Critical Infrastructure Resilience Interim Strategy' (December 2013) currently sets out new management arrangements for critical infrastructure resilience in Victoria. This strategy encourages local governments to identify their local critical infrastructure and then develop necessary plans to protect and build resilience for these identified assets. A regional approach may be ideal given the interdependencies and vulnerabilities identified for the Southern Loddon Mallee region. This would also identify further adaptation solutions for implementation.</p>	State e.g. DTPLI	Advocate for strategic planning and management of infrastructure assets at state level.
Broaden existing community based programs to empower the region to become self-sufficient.	<p>The focus of this adaptation option is for the region to be less dependent on the state for food and essential services (such as energy and water) and to shorten supply chains for food and power. DEPI is currently supporting Moira Shire, through the VASP funding program as well, in identifying self-sufficiency initiatives for the LGA. Examples of community based programs that may address this include:</p> <ul style="list-style-type: none"> - The concept of a virtual renewable power station that is hosted by regional community owned assets is being investigated to drive adaptation to and investment in decentralised electricity generation and distribution infrastructure. Experiences from this initiative can be shared throughout the Southern Loddon Mallee LGAs to build resilience. - Providing useful local and regional context information sheets and case studies to small townships to inform community planning processes. - Tools, training and capacity building for community leaders, community planning groups (or LGA staff supporting these groups). <p>Tools/checklists that allow community planning groups to check if their plans are supporting adaptation and how they can strengthen adaptation in their community plans (including case studies).</p>	Local government area	Lead – through program development of community based programs and events.

Action	Description	Level of responsibility for implementation	Role for Council
Integrate improved standards for infrastructure and building design.	<p>This adaptation option relates to integrating resilience during the design phase for a range of infrastructure and building types. However, it is important to address all aspects of the asset life cycle. There are already developments in policy that will progress this adaptation option for the state. The Victorian Critical Infrastructure Resilience Interim Strategy' (December 2013) will drive this adaptation and resilience initiatives. Industry will be developing (voluntarily) best practice standards for vital and critical infrastructure. This may cover critical infrastructure for the Southern Loddon Mallee region. Other resilience measures that may influence asset design include:</p> <ul style="list-style-type: none"> - Elevating assets above defined flood levels - Providing access to and incorporating resilience for generator connection at key facilities to temporarily provide power supply - Using bushfire or flood resistant materials <p>Integrating protective measures such as expandable or portable design fittings</p>	State e.g. DPC	Advocate for strategic planning and management of infrastructure assets at state level.
Collaborate with the energy sector and develop an Energy Security Plan that promotes local and distributed energy in the region from diverse energy sources.	<p>The adaptive capacity of the region can be enhanced by decreasing stress on the centralized power generation system. Councils in the region can collaborate with power suppliers and industry associations (e.g. clean energy council, energy efficiency council) to develop a business model for local and distributed energy generation. Working with power suppliers can help understand barriers and challenges for the region. The feasibility and practicality of this option can be trailed at one LGA and once evaluated for their effectiveness, be rolled out to the rest of LGAs in the region.</p>	Private – power sector	Advocate the energy sector to develop an Energy Security Plan. Council may play more a management/coordinator role once any distributed energy generation initiatives are piloted.
Install local back-up generators at critical facilities for peak times.	<p>A first pass assessment of this option may include undertaking an energy needs analysis to help understand the energy demand and critical locations across the region. Securing power supply to critical services and facilities e.g. hospitals and town halls can alleviate the community's impact when power supply is disrupted from extreme weather events. Knowing where the critical points are can prioritise installation and size of secondary power sources, which may also address emergency management risks.</p>	Private – power sector	Lead strategic actions such as the energy needs analysis for the region. This adaptation option would also require LGAs to collaborate with the power sector to arrange back up power supplies in areas that do not yet have them.

Action	Description	Level of responsibility for implementation	Role for Council
Enhance communication about essential services pre, during and post extreme weather events.	<p>The regional community is most vulnerable in the event of a natural disaster and with limited or no essential services. The region needs to be informed about the length of service disruptions such as power blackouts, road closures, and disconnected telecommunication. This adaptation involves enhancing communications about such events and engaging key stakeholders. Examples may include:</p> <ul style="list-style-type: none"> - Developing an agreed communication process with stakeholders such as VicRoads, Telstra, Powercor etc and the community during the natural disaster events. - Continuing to conduct debriefs and post-event reviews following events to improve management of essential services during extreme weather events. The reviews should consider the following: <ul style="list-style-type: none"> – Identification of lessons learned – Communication of lessons across the council organisation, and more widely amongst local and regional stakeholders. <p>Identification of requirements for procedures/systems to be updated.</p>	Private – utility sector and emergency management organisations.	Influence utility suppliers to improve communication during extreme weather events
Rural commercial activities			
Collaborate with financial institutions to refer existing rural support programs to the agricultural community.	<p>This adaptation option involves developing a rural support program for the agricultural community that relies on financial institutions such as banks referring community members that may be at risk or likely to benefit from the program. This program can be piloted by Bendigo Bank in one of the LGAs.</p> <p>Collaboration with LGAs on support programs would also build resilience in the region. For example, Macedon Ranges has shared resources such as psychologists to support affected farming individuals and communities.</p>	State e.g. DEPI and private e.g. Bendigo Bank	Influence – through development of a program targeted at the agricultural sector and in collaboration with financial institutions that cross promotes rural support programs and services across the region.

Action	Description	Level of responsibility for implementation	Role for Council
Develop regional business cases to inform how agricultural practices can adjust to new issues and opportunities presented by climate change.	<p>Rural production is a significant contributor to the regional economy, although the nature of agriculture is changing. The region's agricultural sector is continually adapting to the changing climate in the Southern Loddon Mallee. Climate change may impact on the agricultural sector, potentially changing the mix of agricultural enterprises in the region. There is a need for broader sector wide response to maintain the region's economic viability.</p> <p>Developing regional business cases focused on the agricultural sector's risks and vulnerabilities, protection and constraints to growth such as flood, bushfire hazard, native vegetation, and strategically important agricultural land may further enhance the region's adaptive capacity and resilience. The regional business cases may explore:</p> <ul style="list-style-type: none"> - Policy development - Regional practices to adjusting sowing and harvesting practices/dates - Changing regional crop patterns and locations - Collaboration with stakeholders e.g. continuing to engage and collaborate with regional farmers, research and development (R&D), and government organisations, such as CSIRO and DEPI. - Promoting the uptake of insurance for farmers and businesses in the region - Knowledge transfer e.g. continuing to support and communicate R&D into adaptation and new crop and pasture varieties that withstand changing climate conditions. <p>Identifying new land use opportunities for the region in response to a changing climate.</p>	State e.g. DEPI and private e.g. farmers	Lead – through the development of a various policies, programs and initiatives that builds adaptation capacity in the agricultural sector.
Emergency management			
Develop regional local government guidelines for State and Federal funding bodies.	Regional LGAs face unique challenges when applying for State and Federal funding, particularly for repair funding to assist with disaster recovery works. Developing guidelines unique for the Southern Loddon Mallee region would support activities around funding design, collaboration, and provide tips on leveraging off other funds and make it easier for regional local government agencies to secure and effectively use State and Federal funding that is available. These guidelines would need to be reviewed and updated regularly to keep them relevant and current for the region.	Federal and state funding departments	Lead – the development of guidelines for LGAs in the region.

Action	Description	Level of responsibility for implementation	Role for Council
Enhance recruitment drive for more volunteers to assist with emergency events.	<p>This adaptation option focuses on increasing volunteer resources in the region for emergency events. Examples of this may include:</p> <ul style="list-style-type: none"> - Assessing constraints and opportunities for recruiting and maintaining volunteers for the region - Developing a recruitment campaign using a range of communications e.g. social media and networks e.g. universities. This was done successfully following the Christchurch earthquakes in 2010 and 2011. - Collaborating with stakeholders e.g. SES and CFA and existing volunteer programs e.g. Blazeaid and building partnerships with other regions to support volunteers. - Providing incentives for new CFA/SES volunteer members/response groups e.g. business recognition, tax breaks, superannuation benefits. <p>A potential funding source for this adaptation solution is the state fire service levy.</p>	State e.g. CFA, SES	Influence and support relevant authorities recruit volunteers and raise awareness.
Build capacity of existing Council staff and volunteers with the appropriate training and knowledge to respond to extreme weather events.	<p>The region's close and connected communities form a key part of the region's ability to adapt, respond and recover from emergency and extreme weather events. Building emergency response capacity for Council staff and volunteers and extending it beyond the community will help improve the region's resilience.</p> <p>Five of the six LGAs are signatories of the voluntary Municipal Emergency Management Enhancement Group (MEMEG), which is an agreement between council's to provide resources to other LGAs to assist with response and recovery tasks during and after emergencies. The region should continue to draw on this network to build capacity and resilience</p> <p>Another example of driving this change in Council is incorporating emergency management responsibilities into Position Descriptions/KPIs.</p>	Local government area and MAV	Collaborate with MAV in using the MEMEG to build capacity.

Action	Description	Level of responsibility for implementation	Role for Council
Community health and individual wellbeing			
Review heat wave management plans, alter systems and develop programs to assist vulnerable community groups during heat waves.	<p>All LGAs have a heat wave management plan to manage heat stress / illness and vulnerable population groups during heat wave events. This adaptation solution focuses on reviewing barriers, challenges and opportunities from the experiences so far. Some examples of gaps and areas for improvement include:</p> <ul style="list-style-type: none"> - Enhanced communication and education for vulnerable groups - Developing a heat stress reduction program for businesses/industries working outdoors - Consideration of social media and/or other communication methods to communicate use of public facilities (e.g. library, cinemas, churches or Community Houses) as refuge/relief during heatwaves. <p>Developing a 'Good Neighbour' program in townships across the region to encourage the community to check on vulnerable neighbours during heatwaves.</p>	State e.g. Department of Health	Support DoH in reviewing the relevant heat wave plans in the region. The regional Councils can lead development and communication of programs that reduce heat stress on vulnerable groups.
Water resources			
Maximise community awareness and encourage preparation in flood preparedness activities.	<p>Enhancing the ability for region's and community's to prepare for flood events in the region is essential for effective risk communication and awareness as emergency services may not be able to respond in time. Building community capacity and helping them make informed decisions about responding to extreme weather events can improve the region's resilience and ability to recover. Examples of guidance include:</p> <ul style="list-style-type: none"> - Review of current processes and identify gaps for improvement. - Advising residents on how they can provide their own flood protection e.g. having their own sand bags and evacuation plan. <p>Printed materials e.g. guidance pamphlet on how to be prepared and protect properties in flood events.</p>	State e.g. CFA, SES	Influence by collaborating with emergency management organisations.

Implementation

An important action to ensure implementing of this Regional Adaptation Plan for the Southern Loddon Mallee region relates to the governance and endorsement of this Plan. There will be a need to collaborate to deliver on the key actions and to monitor progress and update the plan over time.

Partnerships and Collaboration

LGAs in the Southern Loddon Mallee region are already engaging the community and building their capacity for community leadership on climate change adaptation. This Plan acknowledges that the community, and other levels of government, will need to continue being engaged in building the Southern Loddon Mallee region's resilience to climate change impacts. For example, the Community Resilience Mentoring Initiative (CRMI) initiated by the Central Goldfields Shire is a flood recovery initiative that leveraged the experience and capacity of towns to support disaster-affected communities and prioritise efforts. Framing climate change adaptation as being about building resilience is important for engaging members of the community in recovery rather than the issue of climate change. Another example in the City of Greater Bendigo is how the Community Houses received a grant to undertake emergency preparedness projects in the community.

A key recommendation of implementing this plan is to assign responsibility for this Plan and further driving adaptation throughout the region. Endorsing this Plan can be incorporated into an existing committee's role such as the Adapting to Change Project Control Group (PCG). Alternatively, a new committee could be established that includes representatives from government agencies. The role of this group could be to evaluate and manage climate change risks and vulnerabilities and to develop approaches that are compatible with the agencies and reinforce climate change adaptation. The committee would also have a strong role in communication and building partnerships in the region. Examples of this can include:

- Developing partnerships with industry, investment, and insurance networks to understand their potential role in climate change risk mitigation and in enhancing the region's economic viability.
- Enhancing communication strategies to engage stakeholders.
- Disseminating critical information to stakeholders, promoting resilience and building awareness of climate risk.

Monitoring and Review

This plan is a living document and will continue to be revised as climate change risks and associated opportunities change over time. As this is the first adaptation plan for the Southern Loddon Mallee Region, many of the proposed actions focus on improving our understanding of climate risks and integrating climate change into existing activities.

To ensure that the region's adaptation responses and approaches remain valid and relevant to local priorities and climatic conditions, a possible recommendation could be to review and update the Plan every five years and/or review the risks identified in this plan annually, as per standard risk management practices.

These reviews may re-assess each LGA's risk profile in consideration of changes to climate change information, policy, assets and activities. Consideration should also be given to the potential opportunities and benefits that may arise as a result of the changing climate and policy environment (e.g. new funding sources, opportunities for the development of renewable energy or green business precincts). Reviews may also cover monitoring on the progress of adaptation actions.

Regular and ongoing reporting of the region's climate change adaptation performance is critical to inform decision making and motivate changes in behaviour. Consideration in annual budgets, internal reporting and communication to the general public is recommended to ensure that decision-makers, staff and the community are aware of progress in implementing the adaptation actions outlined in this Plan.





















Regional Profile and Climate Projections

The Southern Loddon Mallee Region is located in the geographic centre of Victoria. The region is 50km away from the centre of Melbourne at its closest point. The participating municipalities for the project are Greater Bendigo, Central Goldfields Shire, Loddon Shire, Macedon Ranges Shire, Mount Alexander Shire and Buloke Shire. Additional information about each LGA has been collated and presented in the Municipality Overviews and Regional Theming Report.

Community and agricultural activities in the Southern Loddon Mallee region that dominate the local economy have historically faced many challenges from extreme weather events including drought and flooding. With climate change, the region is expected to be warmer and drier in the future, facing increasingly variable weather, particularly with regards to rainfall. The changing climate will act as a 'threat multiplier' making existing issues worse (e.g. more frequent or intense flood events).

Figure 4 presents the current and future climate conditions in the Southern Loddon Mallee Region for the following climate hazards: average temperature, extreme temperature, average rainfall, extreme rainfall and storms and wildfires. All of the current climate variables are based on data covering 1961 – 1990, except for very high or extreme fire risk days, which is based on a 1973 – 2006 period. The future climate projections are based on the catchment management authority (CMA) areas in the Southern Loddon Mallee region. Projections are based on a medium emissions growth scenario with a global temperature increase of 2.8°C (+1.7 to +4.4°C) likely by 2100.

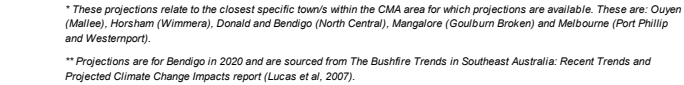
Climate projections and impacts that each climate hazard may contribute has been collated and presented in the Risk and Vulnerability Reports for each LGA.

Average temperature		Average rainfall		Frosts <small>* Days where minimum temperature falls below 2°C or less</small>	
(Annual) Current (1961-1990)	Projected changes 2030	(Annual) Current (1961-1990)	Projected changes 2030	(Annual) Current (1961-1990)	Projected changes 2030
14.6°C	+0.5 to +1.1°C (+0.8°C)	490mm	-9 to +7% (-4 %)	35 days	-8 to -15 days (-12 days)
					
NOW	2030	NOW	2030	NOW	2030
Extreme temperature*		Rainfall intensity <small>(90th percentile)</small>		No. of rainy days <small>(10mm)*</small>	
(Annual) Current (1961-1990)	Projected changes 2030	(Annual) Current (1961-1990)	Projected changes 2030	(Annual) Current (1961-1990)	Projected changes 2030
17 days	+2 to +6 days (+4 days)		-8.8% to +14.8% (-0.6%)	88 days	-19% to -1% (-6%)
					
NOW	2030	NOW	2030	NOW	2030
Change in runoff		Relative humidity (%)		Potential evaporation (%)	
(Annual) Current (1961-1990)	Projected changes 2030	(Annual) Current (1961-1990)	Projected changes 2030	(Annual) Current (1961-1990)	Projected changes 2030
	Up to -20% for Wimmera-Avon River		-1.4% to -0.1% (-0.7%)		+1 to +5% (+2%)
					
NOW	2030	NOW	2030	NOW	2030
Very high or extreme fire risk days**					
(Annual) Current (1973-2006)	Projected changes 2030				
13 – 14 days	18 – 19 days				
					
NOW	2030				





















* These projections relate to Horsham, the closest specific town within the Catchment Management Authority area for which projections are available.

** Projections are for Bendigo in 2020 and are sourced from The Bushfire Trends in Southeast Australia: Recent Trends and Projected Climate Change Impacts report (Lucas et al, 2007).

* These projections relate to the closest specific town/s within the CMA area for which projections are available. These are: Ouyen (Mallee), Horsham (Wimmera), Donald and Bendigo (North Central), Mangalore (Goulburn Broken) and Melbourne (Port Phillip and Westport).



The map displays the five regions of Victoria, Australia, each with a distinct color and a dashed black border. The regions are: Greater Bendigo (dark red), Mount Alexander (light red), Goulburn Broken (yellow), Macdon Ranges (light blue), and Port Phillip and Westernport (dark red). Major towns are marked with black dots and labeled: Bendigo, Castlemaine, Kyneton, Lancefield, Romsey, Gisborne, and Heathcote. A yellow line highlights a route that starts in the Goulburn Broken region, passes through the Macdon Ranges, and ends in the Port Phillip and Westernport region. A grey line with a dot points to the Goulburn Broken region, and another grey line with a dot points to the Port Phillip and Westernport region.

Average temperature		Average rainfall		Frosts*	
(Annual) Current (1961-1990)	Projected changes 2030	(Annual) Current (1961-1990)	Projected changes 2030	(Annual) Current (1961-1990)	Projected changes 2030
13.5°C	+0.6 to +1.1°C (+0.8°C)	864mm	-8 to no change (-4%)	3 days	-1 to -2 days (-1 day)
					
NOW	2030	NOW	2030	NOW	2030
Extreme temperature*		Rainfall intensity <small>(30+ > 2000-1980)</small>		No. of rainy days <small>(1961-1990)</small>	
(Annual) Current (1961-1990)	Projected changes 2030	(Annual) Current (1961-1990)	Projected changes 2030	(Annual) Current (1961-1990)	Projected changes 2030
9 days	+1 to +4 days (+2 days)		-7.7% to +15.2% (+0.0%)	135 days	-1.7% to -1% (-6%)
					
NOW	2030	NOW	2030	NOW	2030
Change in runoff		Relative humidity (%)		Potential evaporation (%)	
(Annual) Current (1961-1990)	Projected changes 2030	(Annual) Current (1961-1990)	Projected changes 2030	(Annual) Current (1961-1990)	Projected changes 2030
Between -5 to -30% for Maribyrnong, Wombie and Bunyip Rivers			-1.5% to -0.2% (-1%)		+1 to +5% (+3%)
					
NOW	2030	NOW	2030	NOW	2030
Very high or extreme fire risk days**					
(Annual) Current (1973-2000)	Projected changes 2030				
13 – 14 days	18 – 19 days				
					
NOW	2030				

* These projections relate to Melbourne, the closest specific town within the Catchment Management Authority area for which projections are available.

** Projections are for Benligio in 2020 and are sourced from *The Bushfire Trends in Southeast Australia: Recent Trends and Projected Climate Change Impacts* report (Lucas et al, 2007).

Acronyms

CCAP	Climate change adaptation plan
CFA	Country Fire Authority
CGSC	Central Goldfields Shire Council
CMA	Catchment Management Authorities
CRMI	Community Resilience Mentoring Initiative
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CVGA	Central Victorian Greenhouse Alliance
DEPI	Victorian Department of Environment and Primary Industries
DoH	Victorian Department of Health
DPC	Victorian Department of Premier and Cabinet
DTPLI	Victorian Department of Transport Planning and Local Infrastructure
KPI	Key performance indicator
LGA	Local government area
MAV	Municipal Association of Victoria
MEMEG	Municipal Emergency Management Enhancement Group
NVIRP	Northern Victorian Irrigation Renewal Project
PCG	Project Control Group
R&D	Research and development
RDV	Regional Development Victoria
SES	Victoria State Emergency Service
VASP	Victorian Adaptation and Sustainability Partnership

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