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**Gippsland Regional
Climate Change
Adaptation Strategy**

Acknowledgement

We acknowledge and respect Gippsland's Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it. We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

We are committed to genuinely partner, and meaningfully engage, with Gippsland's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.

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Introduction

Supporting regional climate change adaptation

The Supporting our Regions to Adapt (SORAd) program is a four-year program that provides support for regional communities to strengthen their resilience to climate change by building adaptive capacity and supporting the delivery of targeted adaptation action in Victoria's regions.

As part of the SORAd program, DELWP is supporting the development of Regional Climate Change Adaptation Strategies in each of its six regions – Loddon-Mallee, Hume, Gippsland, Port Phillip, Barwon South West and Grampians. The regional adaptation planning process will provide stakeholders with a framework to identify, prioritise and deliver strategic adaptation action within their region.

Implementation of this 5-year strategy will be supported by two Yearly Delivery Plans which will outline and directly support initiatives that create opportunities to build capacity and provide examples of adaptation action within the region.

Both the RAS and the Yearly Delivery Plans have been developed through the establishment of a Regional Climate Change Adaptation Stakeholder Working Group and supported by the DELWP regional project team.

Climate adaptation Vision for Gippsland

For Gippslanders to be aware of the effects of climate change on community and Country, be flexible to adapt and be supported in adapting.

Snapshot of the region

Gippsland, located in the south-east corner of Victoria, covers 4.1 million hectares, includes six local government areas and features the state's largest proportion of crown land, which makes up approximately 60% of the region's total area.

The region is known for its beautiful native forest, remote wilderness areas, major river systems, sea grass meadows and vast wetland areas including the Gippsland Lakes, which are internationally significant for their biodiversity values. Gippsland has over 700km of coastline and nationally important coastal attractions such as the Gippsland Lakes, Wilsons' Promontory and Phillip Island. The Gippsland coastal areas provide a diverse range of habitats that supports the high biodiversity values of the region, including a significant portion of the state's important habitat for migratory and native bird species. In addition, the region encompasses Mt Baw Baw, one of the five major Victorian snowfields, and part of the Alpine National Park.

These vast areas of crown land within the region are managed for a range of important community and biodiversity values including recreational, cultural, forestry, conservation and tourism.

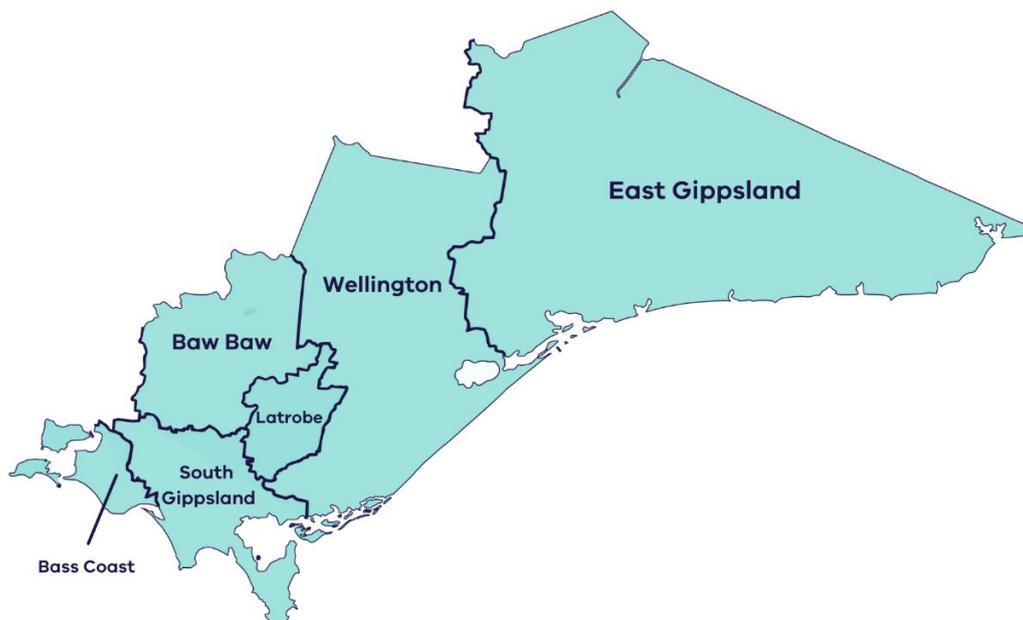
In addition to supplying its own water needs, catchments within Gippsland supply over half of Melbourne's water. The Thomson Reservoir is fundamental to Melbourne's water supply and the

desalination plant at Wonthaggi provides future water security for an expanding city and suburban population.

Gippsland is a major contributor to the state's food and fibre economy with the region's farms collectively producing billion dollar outputs annually. The region is also home to a well-established and high-value food processing sector that specialises in dairy, meat and vegetables.

Gippsland has a long and proud history in energy production with ready access to regional coal, gas and oil reserves. The energy and resources industry has provided employment opportunities and built up a skilled workforce since the early 20th century. The shift away from traditional sources of energy has already started within Gippsland and will continue over the coming decades.

Approximately 270,000 people live in Gippsland, with the population expected to grow to over 386,000 by 2041. Gippsland has a long-established trend of school leavers migrating out of region in search of education and employment; with young families and those close to retirement, moving into the region. This contributes to an aging population within the region. Currently, around 40% of the region's population live in towns and settlements of less than 500 people.



Map - Gippsland Region

Climate change has and will continue to pose challenges for the communities and landscapes of Gippsland, as well as present opportunities to innovate and collaborate as well as embrace practice and behavioural change.

The Gippsland Regional Climate Change Adaptation Strategy (RAS) outlines both short-term goals and initiatives that will support immediate adaptation action as well as planning that will setup the region beyond its 5-year timeframe.

Developing this draft strategy

With the impacts of climate change already evident across Gippsland and projected to increase and be more severe in the coming decades, the five year timeframe of this strategy is an important

opportunity to communicate these threats, build understanding, implement action and continue planning for the future.

In Gippsland the formation of the draft of the Regional Adaptation Strategy has been guided by the Gippsland Climate Change Adaptation Working Group. The Working Group has worked closely alongside a DELWP project team to develop both the draft of the Strategy and the first Yearly Delivery Plans. The Working Group and the project team have worked with current sector knowledge, priorities highlighted in the Regional Gap Analysis and stakeholder input from DELWP led Climate Change Adaptation Workshops to help shape the Regional Adaptation Strategy.

Further input from stakeholders and the community during the final consultation phases will help shape the strategy before it is finalised by June 2021.

Using this strategy

It is important to recognise that adaptation action is underway within the region and there are many champions of change who have been working on adapting to a changing climate for years. Many agencies and organisations have already implemented, or are currently developing, their own individual climate change adaptation action plans across the region. This strategy does not seek to replace those other plans. Instead, the aim is to support those existing plans by capturing the high level themes, directions and priorities in one document to aid knowledge sharing, networking, planning, collaboration and leveraging support.

The development of this strategy has provided the opportunity for the region to present current priorities and further adaptation directions and actions that will provide greater support to the people of Gippsland and help build their resilience to the impacts of climate change.

Some of the actions listed in this strategy are currently aspirational, with resources yet to be allocated and collaboration required between sectors and organisations to ensure successful implementation.

This strategy will also be used to:

- **Build knowledge**, capture, collate and share broad adaptation priorities
- **Support strategic engagement**, establishing networks across sectors, systems and organisations
- **Signpost**, guiding sectors and organisations to identify and connect with broader adaptation needs and actions
- **Foster collaboration**, on actions of shared interests and responsibility
- **Support business planning**, supporting the inclusion and implementation of adaptation action
- **Leverage**, secure support and resources required to plan for or implement action

Some of these Focus Areas within this strategy align directly with existing sectors within the region and others may involve the interests and priorities of multiple sectors. Throughout the strategy there are examples of priorities that apply to multiple sectors and Focus Areas. At times, priorities have been listed in multiple locations as they are important in establishing cross sector understanding, collaboration and action.

Please note that the focus areas nor the actions featured in this strategy have been listed in any order of priority.

The strategic directions and actions outlined in this strategy have been divided into the following 10 Focus Areas.

- Natural Environment
- Water
- Cultural Heritage
- Emergencies and Emergency Management
- Agriculture
- Health and Human Services
- Built Environment
- Community
- Knowledge
- Regional Economy

While the focus areas align closely with existing sectors and systems it is acknowledged that there are many crossover points. It is recommended that impacts, priorities and opportunities are not considered in isolation and consideration is given to connecting focus areas and other relevant sectors.

Mitigation and adaptation

Climate change action is typically divided into two categories: adaptation and mitigation.

Adaptation focuses on living and coping with the impacts of climate change.

Mitigation focuses on dealing with the causes of climate change by reducing global greenhouse gas emissions.

Importantly some climate change actions involve both adaptation and mitigation activities.

As an adaptation Strategy, this document focuses on those actions that will allow the community, business, industry and environment to adapt to the changing climate. Mitigation action is important, and it is recommended that both types of action occur simultaneously. However, as mitigation strategies (renewable energy and emissions reductions) are featured in other plans there will not be a focus on them within this strategy.

Where climate change actions can achieve both mitigation and adaptation outcomes they will be considered and incorporated into this strategy. Examples include improving thermal comfort in buildings, improving water conservation and increasing urban greening.

Emerging themes

Leadership

The need for strong leadership has been a strong and consistent theme in the development of this strategy. Feedback and input from stakeholders and the community has been clear in saying that leadership on climate adaptation action is necessary across the region, from government to business, industry, agencies and individuals.

Leadership on climate adaptation in Gippsland is seen as the willingness to recognise the risks, opportunities and priorities and then work with others to plan, act and empower others to build their capacity and resilience.

Collaboration

Collaboration has been highlighted as an important aspect of planning and implementing adaptation action. This collaboration will need to be across sectors and systems, as many risks and priorities are likely to have direct and indirect impacts on multiple sectors. Collaboration within sectors and across the region is seen as a way to prevent duplication of effort as well as avoid maladaptation¹.

While the strategy's directions and action have been divided into 10 focus areas, it is important that stakeholders, businesses and communities consider how those areas that they're not directly involved in will either impact them or provide opportunities to collaborate and work towards better and more effective ways to adapt.

Within this strategy it has been highlighted that there will be times when the adaptation priorities and objectives across multiple sectors may not align. As these circumstances emerge, cross sectoral consultation and collaboration will be essential to work through and explore how to reach collective benefit.

Planning for multiple possible futures

Planning for climate change involves exploring multiple possible futures, as it is difficult to know the exact scale and rate of climate change. This plan refers to and encourages planning on regional and local scales, by government, organisations and communities as well as across sectors to prepare for possible impacts and changes. There are numerous ways that adaptation planning can explore a range of potential futures and outcomes. These include methods such as adaptation pathways and scenario planning.

Adaptation pathways helps to address the challenges and uncertainty involved in climate change decision making. It allows the consideration of multiple possible futures and provides an opportunity to explore and analyse the strengths and flexibility of the various options within each possible future. Detailed information on the Adaptation Pathways concept can be found via the South West Climate Change Portal, http://www.swclimatechange.com.au/cb_pages/adaptation_pathways.php

Scenario planning can help to explore how different futures might look and identify and understand the local risks and/or vulnerabilities as well as explore the opportunities that could reduce them. The use of scenarios can also help to analyse current practices and decisions, identify assumptions about the future and explore 'what if' questions. There are multiple methods for conducting scenario planning, further information and references can be found via DELWP's Regional Climate Change Adaptation Strategy Guidance Note 5, https://www.climatechange.vic.gov.au/_data/assets/pdf_file/0041/489686/RAS-GN5_-_Exploring-Multiple-Futures-.pdf

Advocacy

This strategy captures and highlights the opportunities and actions across the region that will help Gippsland to adapt to climate change. However, not all adaptation action can be organised or

¹ Maladaptation is an action that is taken to reduce or avoid vulnerability to climate change that then negatively impacts or increases the vulnerability of other sectors and systems.

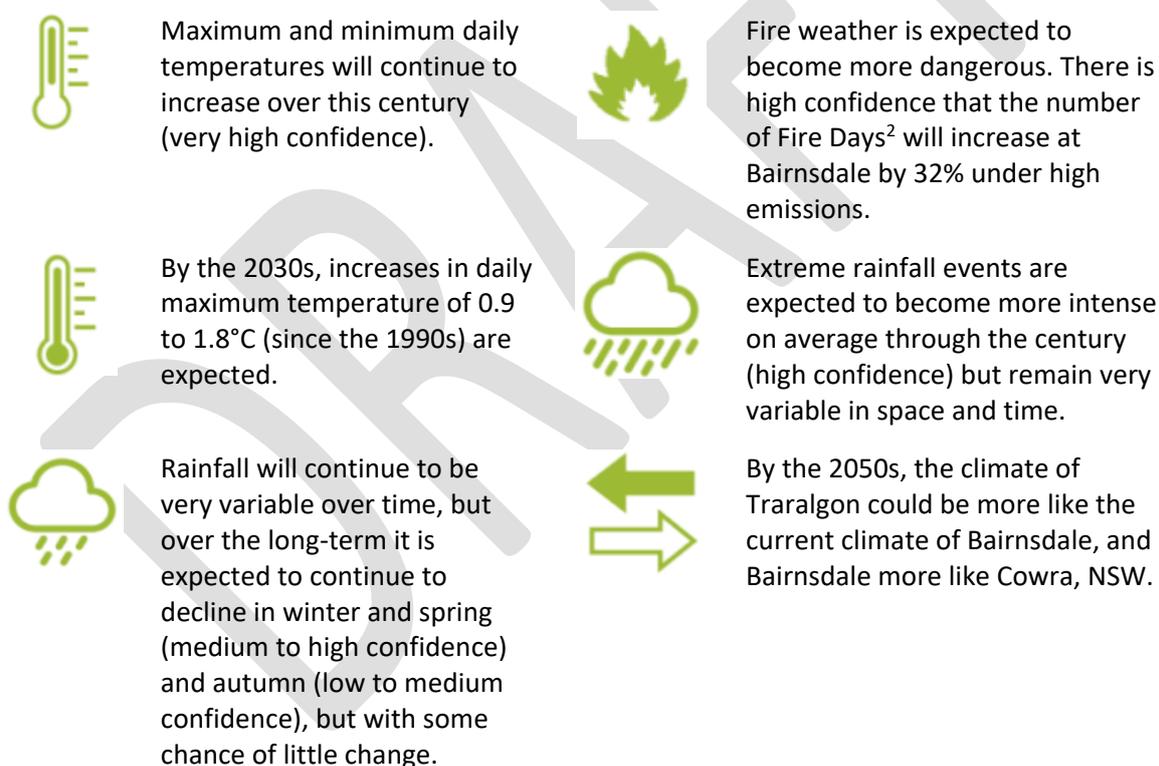
implemented at a regional level. Some responsibilities and authority sit at higher state or national levels. In these circumstances' advocacy will be necessary to influence and lead to action. Collaboration and cooperation across sectors and systems within the region will be necessary where decision making is out of our power.

Victorian Climate Projections 2019

The Victorian Climate Projections 2019 (VCP19) complements previous projections such as the Victorian Climate Initiative and provides results on 5km resolution downscaled climate simulations. The projections have been identified for two plausible climate scenarios of future greenhouse gas emissions: medium emissions (RCP4.5) and high emissions (RCP8.5).

A summary for Gippsland, taken from the VCP19 regional report is featured below. Further detail on the Gippsland Climate Projections 2019 and associated data is available online, please click on the link below.

https://www.climatechange.vic.gov.au/_data/assets/pdf_file/0035/429875/Gippsland-Climate-Projections-2019_20200219.pdf



² Fire days are defined in this report as days when the FFDI exceeds the 95th percentile of the FFDI for 1986–2005 (i.e. the worst 365 days of FFDI over the 20-year reference period).

Natural Environment

Gippsland's diverse landscapes host a range of significant ecosystems that includes native forest, major river systems, wetlands, alpine and coastal environments and sea grass meadows. This range of habitats support both high biodiversity values and Traditional Owner cultural values throughout the region.

The gradual changes to the climate can have various impacts on the natural environment including intensifying existing detrimental processes such as vegetation and soil loss, habitat fragmentation as well as increasing numbers of weeds and pest animals. Many of the impacts to flora and fauna are difficult to predict exactly, although it is expected that gradual changes may see changes in the composition of vegetation communities as more resilient species cope in a warmer and drier climate. Fauna species may experience changes in behaviour, abundance and distribution as well as potential shifts in regular cycles such as migration or breeding.

More dramatic events such as large-scale bushfires are likely to occur more frequently and with greater severity. These events have the potential to trigger devastating and long-term impacts on the natural environment, as well as local communities. Storms and flooding, in conjunction with fires can contribute to impacts on receiving waters such as our lakes, estuaries and wetlands. The expansive Gippsland coast has areas that are highly vulnerable to erosion triggered by sea level rise and storm surge events.

Reference is made within this focus area to helping the natural environment to build its adaptive capacity. This refers to the ability of a landscape or species to adjust to climate change, either taking advantage of opportunities or coping with the impacts. This can include the ability to modify behaviour or characteristics to adjust and better cope with changing climate conditions.

Traditional Owners seek to be embedded in the process of healing and caring for Country as they acknowledge that climate change will impact their tangible and intangible cultural heritage and wish to protect their cultural values. Cultural values include the health of waterways, place based dependency, cultural landscape considerations (such as spiritual connection, wellbeing, connectivity including aesthetically), obligations to care for Country, and Traditional Owner Community connection, including the historical and traditional past, and the present.

Strong interconnection occurs between the natural environment and other systems such as water management and the agriculture sector, which presents a range of cross cutting issues for climate adaptation. The natural environment space within the Gippsland region involves multiple land managers, as well as responsible authorities and agencies.

Most of the directions and actions within this strategy involve multiple partners and stakeholders. There will need to be strong collaboration between multiple land managers and other sectors to work towards providing best protection for natural environment values in adaptation.

Potential also exists for issues to emerge where multiple sector objectives may not be complementary. For example, clearing native vegetation to allow for expansion and development of the built environment, or to reduce fire risk, would not support ecosystems in building their resilience to climate change impacts. With projections of lower rainfall in future, it is expected that the competing demands for water use in a drier climate will become more critical. Collaboration will be essential for achieving collective benefit where these issues emerge.

An opportunity within this focus area is to encourage the community to increase their knowledge of climate change impacts on the natural environment. Part of this could include encouraging individuals and groups to join existing programs and initiatives that protect and enhance natural environment values on both private and public land. These would include programs such as Landcare, voluntary committees of management, citizen science, Friends of National Park groups and community gardens. This action would need to be accompanied by an assessment of the level of support required for these programs to ensure that they have the capacity to attract and manage additional volunteers and if they can deliver more activities.

Protection and preservation of the natural environment also has strong links to increasing and maintaining positive health and well-being within the community, as it provides space and opportunities for passive and active recreation, cultural connection and social engagement. This shows that the natural environment has strong links and cross over with the focus areas centring on Health, the Community and Regional Economy.

Steps toward adaptation

Strategic direction		Action	
1	Understand likely scenarios and associated risks that inform actions to minimise impacts	a	Improve knowledge, through research and investigation, to understand implications of climate change impacts on: <ul style="list-style-type: none"> • Groundwater dependent systems • Drought refuges • Wetlands • Key ecological vegetation classes • Traditional Owner cultural values, including significant species, and cultural landscapes • Alpine biodiversity
		b	Actively monitor and document the impacts of climate change on different ecosystems to understand how they respond and use to inform best management options.
2	Actively support and improve the adaptive capacity of landscapes & vegetation communities	a	Explore options to implement active restoration, threat management and future impact mitigation to support key environmental and Traditional Owner cultural landscape areas, including: <ul style="list-style-type: none"> • remnant vegetation • alpine peatlands • floodplain and fringing wetlands • coastal environments; seagrass and saltmarshes
		b	Improve vegetation connectivity between existing environmental areas to support landscape resilience and adaptation (with consideration given to future species migration needs).

3	Monitor and manage the impacts on coastal and estuarine environments	a	Establish short, medium and long-term goals for the understanding, and management, of coastal and estuarine impacts and, where applicable, include adaptation and mitigation programs that consider Traditional Owner, environmental and recreational expectations.
		b	Establish a knowledge sharing system for information gained from projects focussed on coastal and estuarine impacts including inundation mapping, impacts on sea walls, impacts on water quality, impacts on tangible and intangible cultural heritage and possible mitigation, considerations for future land use and coastal/waterway management planning.
		c	Support managers of coastal and marine areas to plan for and respond to areas to be impacted by sea level rise and storm surge events.
4	Empowering Traditional Owners to care for Country	a	Embed Traditional Owners in the policy, planning and implementation of healing and caring for Country.
5	Effectively resolving competing sector issues	a	Maintain effective collaboration between partner organisations to deliver positive climate change adaptation outcomes for natural environment values and resolve cross sector issues.
6	Maximising community participation and acceptance	a	Support increased community awareness and participation in climate change adaptation and mitigation programs on both private and public land.
		b	Determine capacity levels and support required for programs and groups that provide community participation opportunities.
7	Identify opportunities to protect Gippsland's natural environment from increased bushfire frequency and intensity	a	Determine opportunities and programs to protect vulnerable species. E.g. capture and release of vulnerable species ahead of areas to be impacted by fire.
		b	Identify implications on vulnerable habitat (rainforest, Ash forests) and the options to mitigate impacts.
		c	Assess implications of pest plants and animals on fire impacted areas and proactive opportunities in post fire recovery.
8	Increasing carbon sequestration within the landscape to build adaptive capacity	a	Support carbon sequestration through the establishment of targeted biodiverse plantings in areas that address priorities for biodiversity, land and waterway health.
		b	Support carbon sequestration through the protection and enhancement of blue carbon environments including saltmarsh, mangrove and seagrass habitats.

		c	Support carbon sequestration through the protection and enhancement of teal carbon ³ environments including freshwater and brackish wetlands.
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³ Teal carbon environments are known as freshwater (non- tidal) wetlands

Water

This focus area centres in on the water sector in the region, which includes the collection, storage, treatment, delivery and supply of water, as well as recycled water. Within Gippsland this involves our water storages, domestic, commercial and stock water supplies, irrigation, industry (including power generation) and recreational use. It has also been acknowledged, that since the Victorian Government released its 'Water for Victoria' policy in 2016, that water is integral to the cultural values and uses of Traditional Owners.

Research conducted by the Victorian Water and Climate Initiative (VicWaCI) shows that the large variability in rainfall and streamflow that we currently experience is expected to continue in the coming years and challenge our region's future water management. Other reports, such as *The Long-Term Water Resource Assessment for Southern Victoria* found that long-term surface water⁴ availability has already declined in all Gippsland water basins. The levels of decline vary between basins, however the continued reduction in stream flows and decrease in water availability will have broad impacts across the region and will be noticeable during periods of drought. Other impacts, such as the increased risk of storm events, flooding, rising sea levels and algal blooms will present additional challenges to both the water sector, the natural environment and local communities.

Further challenges posed by climate change will include an increase in user demand during longer and hotter periods and drought, vulnerability of water treatment and sewerage systems with higher intensity rainfall events, damage to critical infrastructure and built assets due to bushfires. There will also be added pressures on the ecosystems within critical water catchments with expected impacts including vegetation loss, habitat fragmentation, weeds and pest animals, damage to the environment and impacts of flooding following bushfire.

Water supply considerations such as security, quality and yield are reliant on the condition of the land and environment health within each of the catchments, as well as water-related infrastructure. Protecting infrastructure and building resilience to ensure the adaptive capacity of the ecosystems in our catchments is a high priority to secure future water quality and yield.

The risks that climate change poses to water quality will add pressure to the supply of water, with risks including blue green algal blooms, nutrient loads, pollution and emerging contaminants.

The security of a clean and readily available supply of water is critical during emergency events, not only for supporting emergency services in their response efforts, but for maintaining services to communities within the impacted areas during and after the event. Preparation and collaboration between sectors, as well as water corporations, has proved crucial in the past and will continue to have critical importance as the climate continues to change.

Multiple pieces of work, led at a state-wide level, are either in development or have been released to assist regional water management in a changing climate. The 2020 edition of the *Guidelines for Assessing the Impact of Climate Change on Water Availability in Victoria* includes updated climate projections and more tailored guidance on applying climate science to assist its primary audience of water corporations and other water resource managers. The guidelines are available at: <https://www.water.vic.gov.au/climate-change/adaptation/guidelines>.

⁴ Water found on the surface of the land in waterways (such as in rivers, wetlands and estuaries) and in bodies of water (such as lakes, dams and reservoirs).

Work is also progressing on developing the Central and Gippsland Sustainable Water Strategy, which will update and builds on the previous Gippsland strategy released in 2011. This strategy will be used to manage threats to the quality and supply of water resources to better protect environmental, economic, cultural and recreational values. Further information on the development of the strategy can be found via the following link, <https://www.water.vic.gov.au/planning/long-term-assessments-and-strategies/sws/central-gipps-sws>

Steps toward adaptation

Strategic direction		Action	
1	Determining water supply options for sectors and systems in a changing climate	a	Identify water availability in the region and how water supply and demand may change under future climate and population circumstances
		b	Determine needs and options, through existing planning processes, for achieving water security balance for domestic and industrial supply, the environment and Traditional Owner cultural values in Gippsland.
2	Secure environmental water for high-value waterways and wetlands	a	Identify priorities and develop plan of works to improve hydrological regime of floodplain wetlands and fringing wetlands
		b	Investigate alternate delivery methods such as the use of irrigation infrastructure to provide environmental water to high-value waterways and wetlands.
		c	Investigate partial re-engagement of old river meanders to increase riverine wetland habitat.
3	Enhance land health and ecosystem resilience within water supply catchments	a	Building the adaptive capacity and resilience of the natural ecosystems within catchments to secure future water quality and yield.
		b	Improve soil health and moisture-holding capacity on actively managed private land.
4	Protect critical catchment areas and water quality in the event of bushfires	a	Identify areas vulnerable to erosion and the control measures available to minimise the impacts of excess and contaminated water runoff. E.g. low impact, engineered solutions.
		b	Continue monitoring and evaluation research of protection measures following bushfires events to assess impacts and implement continual improvement.

5	Protecting water infrastructure in a changing climate	a	Identify critical infrastructure and assess its vulnerability to climate change impacts and significant events, including: <ul style="list-style-type: none"> • Bushfire • Flooding • Sea level rise • Algal blooms
		b	Develop strategic plans, involving collaboration between Gippsland water corporations, to mitigate climate change threats, including retro-fitting existing assets and decentralised back-up emergency systems.
6	Manage the impacts of flooding on waterways, floodplains and agricultural land	a	Explore opportunities across freehold and public land to manage and address the impacts of flooding.
7	Understanding the impacts of climate change and increased demand on recycled water options	a	Identify how climate change may impact on the use of recycled water for agriculture and industry. This would include possible effects on quality, availability, susceptibility to being impacted by other climate-related impacts.

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Cultural Heritage and Cultural Values

Climate change will impact on Traditional Owners' tangible and intangible cultural heritage. Impacts will include changes on Country to plants and wildlife, reduced stream flows, coastal impacts on cultural heritage sites of significance through inundation and erosion as well as significant and severe events such as fires and flooding.

Traditional Owners have a cultural obligation to care for Country, but do not feel empowered to properly care for Country through current legislative tools and instruments – in a changing climate this is particularly disempowering as the rate of change can mean irreversible outcomes.

A key challenge for Traditional Owners is having the resourcing and the authorising environment to assess, monitor and respond to climate change threats on Country. To work towards this, it will be critical for existing collaboration and partnerships between Traditional Owner groups and natural resource managers to continue and grow, as well as explore opportunities for ongoing employment, resourcing and empowerment to meet this need.

With threats to cultural sites including coastal inundation and other significant natural events there is a greater sense of urgency to identify, and record these sites, and examine possible mitigation. This process would also include capturing the stories that each of these sites can tell before they are impacted.

Traditional Owner groups have a deep obligation to care for and heal Country, and have traditional ecological knowledge and customs built over thousands of years of practice. These practices are critical in helping Traditional Owners to remain connected with Country and be empowered to care for Country, which will take on great importance during a changing climate.

Steps toward adaptation

Strategic direction		Action	
1	Understanding the impacts of climate change on Country, cultural values and cultural heritage	a	Build knowledge and awareness, for agencies and the community, of the impacts that a changing climate will have on cultural landscapes, and tangible and intangible cultural heritage.
		b	Monitor and respond to the impacts of climate change on Country through close collaboration between Traditional Owner groups and natural resource managers.
2	Understanding how to best care for Country within a changing climate	a	Identify and implement options to manage and protect cultural sites where possible.
		b	Secure resources to capture stories and archaeological information from sites that cannot be adequately protected.
		c	Implement traditional practices to care for Country, e.g. using cultural fire on Country.

Emergencies and Emergency Management

As a region, Gippsland has always been at significant risk from the impacts of emergency events due to its natural features and the spread of the built environment and population centres throughout the landscape.

The key areas of emergency response in Gippsland as we adapt to a changing climate are:

- Increasing risk of bushfires due to an increase in hot days, more days of severe fire weather and longer fire seasons
- Flooding caused by extreme rainfall events, sea level rise, storm surge and coastal inundation
- An increase in potential for algal blooms on waterways, which could be triggered by storm events, combined with nutrient release from fires and higher average temperatures.

The types of events already cause disruption within the region and pose significant risks to life and livelihoods of the Gippsland community. As well as causing devastation to the natural environment, these events also affect the region by:

- Damaging critical infrastructure including roads, bridges and buildings
- Isolating communities (from other communities, goods and services)
- Directly impacting catchments and water quality
- Damaging cultural heritage
- Decreasing agriculture production
- Impacting tourism during peak periods

The bushfires of summer 2019/20 serve as a recent example that our fire danger periods are projected to lengthen and start earlier. The devastation was widespread and had significant impact on both communities and the environment. More than 1.1 million hectares were burnt within the region; houses and lives were lost in multiple communities and major transport corridors were cut off for extended periods. The scale and spread of the fires placed a strain on our existing critical infrastructure such as roads, telecommunications and supply lines.

Many of the impacts that were felt within the region during the 2019/20 fires have been experienced during previous major fires and incidents. In a new circumstance for many, authorities took the step of ordering an evacuation of a large geographic area in East Gippsland prior to a day of extreme fire and weather conditions. With three significant fires already in the landscape and worsening conditions forecast, authorities advised both residents and holiday makers to leave the area as impacts were expected on communities, recreations sites and major transport routes. This decision was made in peak holiday period and was a sign of the measures required to protect communities and visitors during extreme conditions.

Adaptation is not a new practice to emergency service agencies within Gippsland and Victoria, as they have been adapting to the impacts of climate change for many years already. Over the last few decades various agency wide innovations and response measures have aided emergency service agencies to respond to events such as bushfires. However, with fire seasons that have been extending in length and responding to long-term fire campaigns that are more severe and happening more frequently there will be a continued need to adapt to future changes. These changes bring challenges to resourcing and fatigue management for personnel as well as the community. With fire seasons overlapping with other states and areas, it provides additional strain on receiving assistance, resources and equipment from external agencies.

Steps toward adaptation

Strategic direction		Action	
1	Analyse research and understand how climate change influence natural disasters in Gippsland	a	Identify the changing risk profiles across the region, including: <ul style="list-style-type: none"> • Landscapes (natural environment) • Built environment (towns and communities) • interface areas • Visitors to the region
		b	Determine the most appropriate fuel management techniques, accounting for vegetation communities, topography and proximity to interface areas.
		c	Further understand limitations on responders and support agencies (heat, extreme weather, no-go zones [remote areas])
2	Increasing critical infrastructure resilience to the impacts of significant events	a	Enhance protection and establish reliable back-ups for essential infrastructure in emergency situations, such as: <ul style="list-style-type: none"> • Transport and access (road) network (for responders and the community) • Water supplies • Communications • Community relief centres • Power/emergency generators
3	Increasing community resilience during significant events and emergencies	a	Identify the opportunities and requirements to establish self-sufficient community facilities to protect and support rural and remote communities if they become isolated
		b	Provide community/health service organisations with the resources to map vulnerability across the region and develop emergency plans with clients at risk or without the resources to adapt
4	Determine how to build back better following significant events	a	Where rebuilding, identify and maximise the opportunities to place with more resilient and fit for the risk
5	Gippsland emergency service agencies are prepared for response requirements in a changing climate	a	Understand and plan for longer duration events and fire danger periods and the impacts on responders and relevant agencies. <p>Including factors such as:</p> <ul style="list-style-type: none"> • Resource requirements • Fatigue Management

Agriculture

Gippsland's Agriculture sector is a key component of the region's economic and employment base. Farmers within Gippsland supply significant amounts of dairy, beef and vegetable produce to Victoria and is a multi-billion-dollar contributors to the region and state's economy. With an agriculture and food processing sector that is well renowned for high-quality and quality assured produce, Gippsland is also well-located to access Victoria's major export hubs.

The projected further changes to the climate have the potential to affect Gippsland agriculture in multiple ways. The increase in average temperature, coupled with reduced rainfall will greatly impact upon the cropping, pasture, vegetable and fruit varieties that farmers can produce. The Victorian Climate Projections 2019 also suggest that in the short term, there is an increased possibility of frosts in some areas with clearer night skies. Projected increases in severe weather events (heat, storms, wind) will also have a significant effect on horticulture and dairy production, as well as threats posed by bushfires.

Government Agriculture departments, at both State and Federal, recognise the impact that climate change will have on the sector and have adopted adaptation priorities into their respective plans. Ensuring that Gippsland's agricultural climate change response and actions are aligned with these plans and supporting programs is an important step in our region's successful adaptation. To view the current Agriculture Strategy for Victoria, please visit: <https://agriculture.vic.gov.au/about/our-role/agriculture-strategy>. This will be supported by the Victorian Primary Production Adaptation Action Plan that will be released in late 2021.

Primary production has many links with other sectors and systems throughout the region. Close relationships already exist between the systems and sectors of primary production, the natural environment, water and transport. The need for ongoing and effective collaboration between these sectors and all organisations, businesses and individuals is vital to ensure that primary producers can continue to be supported as well as provide for and support the region.

Gippsland's expansive geographic footprint poses challenges and opportunities when developing adaptation solutions. The various weather influencers and drivers across Gippsland will be affected differently by climate change and multiple solutions will be needed across the region, in both irrigated and dryland farming areas. This does offer opportunities to develop climate resilient diversification in the agricultural sector across Gippsland. Matching land capacity and capability with the pasture and cropping varieties that will suit current and future climate conditions will work towards identifying diversification and adaptation options for producers.

A part of increasing agricultural diversification opportunities will include improving and maximising land health for local producers. Land health includes farm planning, creating healthy soils, effective farm water management, soil conservation, grazing/ pasture management and sustainable cropping. Some of the elements of land health, such as minimum tillage, improving ground cover, increasing soil organic matter/carbon and water holding capacity are also commonly referred to as aspects of regenerative agriculture.

Work has been underway within the agricultural sector in Gippsland on adapting to climate change for many years. From previous research to early adopters of changed practices, there are some great existing examples of adaptation within the region. Gippsland is home to the Ellinbank SmartFarm, Australia's leading dairy innovation and research facility. Important and beneficial research into the impacts of extreme heat events on the dairy industry and trialling innovation and technology to

create a carbon-neutral farm is exciting work that is happening within the region. Existing regional adaptation examples also extend to the water savings that have been achieved through the Macalister Irrigation District Modernisation Project. This project has improved water delivery infrastructure providing greater efficiency and better supporting rural water supply needs. Further phases of the project aim to replace ageing assets with more efficient, modern and automated water delivery infrastructure.

The challenge is often finding the most effective way to share, support and encourage widespread uptake of adaptation methods and techniques. Ensuring that Gippsland farmers and producers can plan, prepare and respond to seasonal variability and further climate change is key for the successful adaptation of the agricultural industry within the region. Achieving this will rely heavily on farmers receiving the support of service providers and the agriculture industry. Staff with the appropriate levels of technical and practice change knowledge will be best placed to deliver this support effectively, as well as be available to interpret the range of existing information and how it can be implemented on individual farming properties.

Gippsland’s producers will be encouraged to embrace technology and innovation as well as research and development in their own individual adaptation planning and action. While new practices and technology will be useful, effective business management skills will be critical for producers to remain viable during the toughest years.

Steps toward adaptation

Strategic direction		Action	
1	Understanding the agricultural needs and potential of Gippsland in current and future climate scenarios	a	Collate and review existing research on climate change and primary production. Identify which gaps may exist for Gippsland produce and markets.
		b	Identify pasture and cropping species/varieties that will suit projected Gippsland climatic conditions.
		c	Matching land capability and capacity with land use and management (linking in with action 1b).
2	Utilise engaged networks and knowledge channels to upskill producers and provide them with critical adaptation practice information	a	Support the delivery of practice change and adaptation knowledge through: <ul style="list-style-type: none"> • producer level demonstration • training • education, and • coaching
		b	Work with producers to develop their Natural Resource Management skills and create individual farm plans implementing adaptation best management practice.

		c	Equip producers with business management information and practices to endure variable years & income.
		d	Provide capability development for the next generation of farm managers, ensuring that they have the adaptation skills required for the future.
3	Maximise profit and adaptation through innovation	a	Support primary producers to embrace innovative approaches by utilising modern technology (renewable energy) and Research and Development to maximise income.
4	Provide adaptation assistance by improving and maximising land and soil health	a	Support the adoption of land management practices that improve land and soil health and production outcomes.
		b	Provide adaptation support to producers and agricultural enterprises through extension, incentives and trials.
		c	Support initiatives that encourage the establishment of well-managed perennial pasture systems on grazing lands.
5	Recognising agriculture needs in land-use planning	a	Support strategic approaches to land-use planning that account for the needs of the agricultural sector; matching land capability, climate requirements and changing land-use under climate change.
6	Implementing best practice to protect environmental values	a	Greater enhancement and protection for riparian buffers and remnant vegetation on private land.
		b	Encourage increased reuse and recycling of water by agriculture and industry. <i>Linking in with Action 8A within the Water Focus Area.</i>
		c	Promote and encourage to landholders the integration of using local native species in plantings for shade and shelter.
		d	Encourage landholders in peri-urban areas to undertake biodiverse plantings and allow natural regeneration to occur (with consideration to fire risk).
7	Increasing carbon sequestration to improve land and soil health	a	Support carbon sequestration through the establishment of targeted biodiverse plantings in areas of private land that address priorities for biodiversity, land and waterway health.
		b	Support carbon sequestration through the establishment of targeted farm forestry plantings on private land.
		c	Support carbon sequestration through the protection and enhancement of teal carbon environments including freshwater and brackish wetlands on private land

Health and Human Services

Adaptation to the impacts of climate change in the areas of health and human services will be a critical factor in the continued health and well-being of the Gippsland community. The 2019 climate projections indicate that Victoria will experience increases in both intensity and frequency of extreme weather. Both outcomes will aggravate existing health risks and increase the pressure on our health services.

The combination of gradual climactic changes and extreme events will create both direct and indirect impacts on human health. The direct impacts on human health can include:

- Heat stress
- Trauma
- Negative mental health impacts
- Injury
- Death

Indirect impacts on human health can include:

- Water-borne diseases (affecting drinking water, water supplied for domestic and agricultural use and recreation water)
- Air pollution arising from bushfires
- Food-borne diseases arising from rising temperatures
- Airborne pollen impacting thunderstorm asthma risk
- Vector-borne diseases (e.g. transmitted from mosquitos to humans) arising from changes to mosquito breeding habitat and environmental conditions

These projected impacts will also affect our health system's ability to deliver services. Additional strain and pressure will be placed on multiple aspects of service and delivery, including:

- More frequent surges in client demand
- Disruption of supply chains
- Damage to infrastructure (from significant events such as fire, flood or storms)
- Disruption to service access or delivery. Including access to remotely located clients.

A common concern is that there is a gap in the community's knowledge and awareness of the health impacts of climate change, both current and into the future. Existing resources in the form of information and advice are readily available through the Better Health Channel website. The challenge is to effectively promote these messages and information to the community through all available options including health services and the established support networks within the region.

Further changes to the climate and the impacts of extreme events also have the potential to exacerbate existing health issues in the community as well as increase the risks to people's mental health. Preparing communities and individuals with the appropriate knowledge, skills and confidence is seen as an effective way of preparing people to respond to arising mental health challenges. Examples of how to achieve this is through formal training such as:

- Mental Health First Aid (MHFA) <https://mhfa.com.au/>
- Applied Suicide Intervention Skills Training (ASIST) <https://www.livingworks.com.au/>
- Minds Community Trauma Toolkit <https://emergingminds.com.au/resources/toolkits/community-trauma-toolkit/>

This training has been delivered in East Gippsland following the impacts of the fires in 2019/20, however local mental health practitioners strongly advocate for this training and preparation to be

more available for individuals and communities prior to extreme events. This would better equip communities with the ability to respond to mental health & psychological distress in a prepared and confident way.

Supporting the adaptation of Gippsland’s health and human services, and that of the community, will require collaboration and actions across a range of sectors. Responsibility and action will extend beyond regional health service providers. Examples include:

- Meeting the needs of the vulnerable and disadvantaged members of the community who are more likely to experience negative health affects due to climate change.
- Advocating to ensure public housing properties are thermally safe to protect vulnerable residents from the effects of extreme heat.
- Local Government Municipal Public Health and Wellbeing planning incorporating actions related to climate change and health, and the work to strengthen community connections.
- Owners of community social infrastructure in small towns such as halls, community centres and neighbourhood houses supporting work to ensure they can be places of refuge from extreme heat and smoke events.
- Residents and businesses taking action to improve the security and safety of private drinking water supplies (non-reticulated supplies such as rainwater, bores, dams etc.)
- communication and collaboration between health authorities, water corporations and other relevant authorities to address potential risks for water supplies. With planning to encompass identifying emerging risks and identifying future needs.

Steps toward Adaptation

Strategic direction		Action	
1	Health services vulnerability to climate change is understood and managed	a	Advise Health Service Boards to ensure they understand risk and consider vulnerability assessments in the development of Strategic Plans.
2	Health services understand climate change impacts on delivery and the community’s health	a	Share climate change information among regional health services and practitioners, with connections to necessary data sources.
		b	Source and disseminate existing examples of prevention strategies and communication tools among regional health services so that are readily and easily implemented.
3	Minimise heat-related illness and death	a	Support implementation of Victoria’s Heat Health Alert system by encouraging the general community to prepare for extreme heat to protect themselves and those in their care, particularly those most at risk.
		b	Utilise heatwave planning guides available for local government and residential aged care facilities to ensure heat health plans are in place.

4	Increase community awareness of how climate change can impact physical and mental health	a	Promote existing education materials ⁵ to the community, that translate broad climate change risks and threats into meaningful examples.
		b	Establish partnerships with the community sector to co-design and communicate this information due to organisations' understanding of local vulnerability.
		c	Explore options for communications to be accessible, translated, and communicated through a range of channels so all parts of the community can benefit.
5	Support collaboration between health services and non-health related sectors to prepare for climate change impacts	a	Collaboration between health services and Local government to incorporate climate change impacts and adaptation considerations into the Municipal Public Health and Wellbeing Plans (MPHWP).
		b	Ensure effective collaboration and information sharing between health services and non-health services providers (e.g. essential service providers) in the region to identify future needs and allow necessary planning.
6	Support and promote positive mental health and wellbeing within the Gippsland community	a	Support providing mental health training for communities and individuals to prepare them for the sudden and gradual impacts of climate change.
		b	Determine the best methods for providing mental health support for communities and individuals during and following the impacts of large scale events and impacts.
7	Support residences and businesses on private water supplies to adapt to climate change threats including security of supply and changing environmental water quality	a	Complete an assessment of: <ul style="list-style-type: none"> - the extent of reliance on private water supplies, and - the predicted impacts of climate change on private water supply security and quality.
		b	Develop proposals for Government consideration of how to address climate risks to private water supplies

⁵ Materials to cater for diverse and vulnerable groups and audiences within the community

Built Environment and Transport

Within this strategy, this Focus area incorporates both Built Environment and Transport. This includes domestic housing, public, commercial and industrial built assets, infrastructure for transport networks (roads & rail), utilities and broader residential/urban settings, commercial and private ports as well as fishing and boating infrastructure.

As with most of the focus areas in this strategy, the need for adaptation to the impacts of climate change within the built environment extends across multiple sectors. For instance: housing impacts on health; transport infrastructure on industry/regional economy; and utilities and critical infrastructure service multiple sectors.

Some specific challenges include high levels of poor quality private and public housing in the region which becomes thermally unsafe in extreme weather, and expensive to run for often lower income households; and increased number and severity of bushfires, storms and floods which can impact on community and health of built assets. Ongoing sea level rise and storms intensity, with associated coastal erosion and coastal inundation, will impact private and public assets including surf life-saving clubs, jetties as well as roads & transport networks, and utilities infrastructure such as for sewerage, water and gas.

The majority of the housing, public, educational and commercial building stock within Gippsland has not been designed or constructed to withstand the projected increase in temperatures or extreme heat. Many homes currently lack existing thermal comfort features which can create health and wellbeing issues during both winter and summer. Those most affected are the vulnerable and disadvantaged within the community who have less capability to address and resolve the issues.

The protection and integrity of our transport network is crucial to the region's connectivity. Significant natural events in the past 20 years have caused the closure of major highways, cutting off communities and blocking supply chains. These situations have potential to prevent people from accessing essential services as well as creating economic interruptions to the region.

Urban areas will face potential impacts from both increasing temperatures and intense rainfall events. Urban heat island affects in central business districts and residential areas have the potential to increase temperatures which can have a negative impact upon human health. Intense rain events have the potential to create localised flooding within urban areas which will add pressure to existing stormwater networks. While both pose challenges and risks, adaptation opportunities exist with the implementation of green-blue infrastructure which can either in part or fully mitigate the impacts. This type of design successfully incorporates natural systems that provide urban greening and cooling (trees, parks, gardens) as well as stormwater management to manage intense rain events (drainage areas, flood storage).

Key assets that provide services such as communications and supply of power can be cut during major incidents or impacted during extreme heat. Ensuring that the supply of these services can remain uninterrupted or ensure that back up options are in place is critical part of ensuring our successful adaptation.

Population and associated industry and services may grow in relation to other regions, as the relatively milder climate of Gippsland attracts those seeking refuge from harsher climates on mainland Australia.

Future financial implications include increased insurance costs associated and ultimately non-insurable building stock due to risk of fire, floods, storms and coastal inundation.

The overarching aim that applies is to prepare the built environment to deal with climate change impacts and provide ongoing adaptation functions. This applies to both modifying aspects of the

existing built environment as required as well as incorporating adaptation principles into new additions to the built environment.

Steps toward adaptation

Strategic direction		Action	
1	Assessment of key infrastructure vulnerability to inform adaptation planning	a	Responsible agencies and asset owners to assess vulnerability of key regional infrastructure and the impacts of failure.
		b	Collaboration between agencies to develop understanding of asset interdependence and the impacts of failure/s on surrounding and dependent infrastructure and systems.
		c	Responsible agencies develop a greater understanding of higher risk areas and implement adaptation measures to reduce risk.
2	Building understanding of coastal asset vulnerability	a	Assess the level of impacts likely on Gippsland coastal assets (ports, sea walls, jetties, boat ramps) to enable effective adaptation planning.
3	Provide connected and resilient transport networks	a	Assess where changes to transport networks will enable the provision of robust and efficient connection of industries, communities and markets into, within and out of Gippsland
4	Promote and encourage adaptation and resilience measures within urban environments	a	Investigate blue-green infrastructure opportunities, such as integrating urban forestry and stormwater management, to enhance and implement new green spaces and mitigate urban heat island effects.
		b	Support and encourage the improvement of thermal efficiency of public, rental and owner occupied current (retrofit) and new housing stock. Priority to be given to the vulnerable and disadvantaged members of the community.
		c	Investigate and support opportunities to provide climate safe spaces within the community.
5	Enable agents of change such as government, community groups, organisations and industry to implement effective adaptation	a	Define and clarify regional responsibilities and identify practicalities related to adaptations regarding responsibility for public and private spaces.
		b	Provide support for Local Government and community adaptation activities and projects.

Community

The increased reach of climate change influences on the community will be driven by the projected impacts on health and wellbeing, the economy and lifestyles. The current and further impacts of climate change are and will be felt differently across the region, as well as experienced differently according to each individual and their circumstances.

With such variation across the region adaptation at a community level will need to be place based. Preparing and informing communities will be essential in empowering them to take appropriate adaptation action. While the most severe of the scenarios listed above may not occur within the immediate decades, boosting awareness and making incremental changes, in line with local conditions and influences, will allow future generations to be better prepared. Providing communities with opportunities to implement adaptation on an individual and community level, as well as within the natural environment, could remove a sense of disempowerment or lack of control that can be associated with the enormity of climate change.

Health and social wellbeing is affected by the ability to move freely around the built and natural environment, as communities experience the exposure to heat, heat island in urban areas and other extremes, disrupted operation of public transport, and diminished access to roads that may be affected by fires, flood or storms. Increases in disease and disease vectors and water quality issues due to increased temperatures and potentially compromised water and waste infrastructure will add to stressors on communities.

The agricultural sector is at risk of further compounding financial hardship and a diminished ability to afford upgrades that would help to prepare for continued changes to the climate if farmers and primary producers cannot adapt or diversify fast enough. The flow on effects impact the rest of the community through less expenditure, job losses, and potentially food insecurity. A continued long-term decline in rainfall and increased variability during the seasons, crop pests and disease may also impact food production and security.

Lifestyle and leisure are fundamental influences on the overall health of communities, individuals and the visitor economy. Impacts are expected upon recreational and lifestyle opportunities as climate change will affect natural areas such as beaches and snow fields, and extreme weather also impacts on the use of recreational sites. Impacts to water quality will affect access to and the appeal of water-based sports. Water availability and use will affect surfaces such as playing fields, and extreme heat or flooding may damage constructed surfaces. Gradual increases to temperature, as well as extreme conditions, will also influence and impact play schedules for organised sports, and participation in informal sport and recreation.

Community and social service organisations are likely to experience a higher demand for services as they look to support clients who are further impacted by the effects of climate change. Organisations will need support to build their resilience as well as protect staff members and prevent disruptions to service delivery.

Possibility for changes in regional population, employment and business opportunities in the decades to come exist as people and businesses may elect to move to a more moderate climate, with southern Victoria the most likely option on mainland Australia. This may result in positive economic development; however timely, proactive and adaptation-aware planning will be needed to ensure that increased housing, industry and employment options are developed in ways that are adaptive to climate changes, and without loss to valuable natural and agricultural lands.

Adequate household insurance is widely accepted as a positive contributor to a household's and community's recovery after an emergency. Research⁶ has found that more than half of Victorian households either have no insurance or are have inadequate insurance. Home and contents insurance builds resilience to more frequent and more extreme emergency events occurring because of climate change. A continued focus is to lift the prevalence of home and contents insurance, particularly for low-income households living in high risk areas with little or no home and contents insurance.

Similar to the Natural Environment focus area, opportunities exist to encourage the public and communities to build their knowledge and awareness of the climate change impacts that will influence their lifestyles. As is suggested in the Natural Environment focus area this can include the opportunity to empower people to implement action at an individual or community level.

Steps toward adaptation

Strategic direction		Action	
1	Inform the community about the impacts of climate change on practical aspects of lifestyle	a	Provide community with relevant information on how climate change will impact lifestyles, health and wellbeing.
		b	Provide community with practical options on how to be involved and implement adaptation on an individual and community level.
		c	Determine how regional agencies and service providers can support the community with building adaptation capacity and resilience. As well as identify the best support network opportunities.
2	Protecting people from extreme heat in urbanised and rural areas	a	Prepare outdoor spaces in urban areas to be temperature proof for commuting, work and leisure.
		c	Gippsland employers to be supported with tools, options and examples to assist with preparing working environments suitable and safe in the event of extreme temperatures and adverse weather.
3	Community facilities are more resilient to a changing climate and safer during more frequent emergency events	a	Support the owners/managers of social community infrastructure to: <ul style="list-style-type: none"> - improve their thermal safety and comfort so they can provide respite during heatwaves, and - improved indoor air quality at the facilities when there is extremely poor air quality due to bushfire smoke
4	Enable communities to continue to participate in outdoor recreation within	a	Increase flexibility to conduct outdoor recreation outside of extreme temperatures.
		b	Prepare outdoor sporting fields and recreation areas with climate appropriate plantings and maintenance as well as utilise alternate

⁶ Essence Communications, DHHS Underinsurance Research, Topline Findings, October 2016

	natural landscapes and built sites		water sources where possible (reused stormwater or treated wastewater).
5	Future population changes will enhance or not detract from the natural and built environment	a	Provide for large population changes in planning new housing developments and individual builds.
		b	Plan for employment and new industry that supports a changed population to achieve positive impact on the wellbeing of the community, economy, and natural and built environments.
6	Maximising community action and acceptance	a	Support increased community awareness and participation in implementing climate change adaptation and mitigation actions at both individual and community levels.
7	Increase the proportion of households in high risk areas with adequate home and contents insurance	a	Promote the importance of adequately protecting and insuring personal assets and possessions through the 'Insure it, it's worth it' Toolkit ⁷ .
		b	Use a variety of regional and local communication channels to deliver the 'Insure it, it's worth it' campaign messages ⁸ .

⁷ <http://goodshepherdmicrofinance.org.au/researchreports/insurance-toolkit/>

⁸ <https://www.betterhealth.vic.gov.au/insure-it-its-worth-it>

Knowledge

The focus area of knowledge, which encompasses education, training, awareness and research, has priorities that differ slightly from the other areas within this strategy. The directions and actions within the area of knowledge focus on how to effectively reach into, and influence, communities and sectors to contribute towards effective regional adaptation.

Research is a critical part of the Knowledge focus area to increase understanding of needs, options and effectiveness of adaptation strategies and actions. Research impacts on all areas within this strategy including health, biodiversity, water management, social research on behaviour change, visitor economy, animal and human health, community and environmental education. Gippsland based researchers and institutions, as well as those outside the region, have provided expertise and have already been involved in climate-based research and projects. Opportunities exist to continue research of climate change impacts and adaptation opportunities within the region. The GAP analysis of 2018 emphasised the need for research institutions and their work to partner closely with local organisations and authorities to increase the level of influence of their work.

Building adaptation awareness and providing education for the community outside of the formal education structure is an opportunity within the knowledge focus area. Providing readily available regionally specific climate change adaptation information and resources will assist the community to better understand the concepts of adaptation. These would be complemented by providing examples of existing adaptation actions and research. Benefits to the community would include boosting knowledge of how climate change could impact people personally and the actions that individuals, the community, businesses and organisations can make to take ownership and adapt to climate change. This also relates well to the Community Focus Area within this strategy.

Through the education sector there is an opportunity to address the general lack of understanding between climate change, climate mitigation and climate adaptation. The advantage of increasing the profile of adaptation knowledge and opportunities is providing positive actions that can increase our resilience to changing circumstances and limit harmful impacts. To achieve this, it has been highlighted that educators would benefit from professional development opportunities as well as having educational materials focused on climate change adaptation.

Gippsland has a comprehensive network of formal and informal knowledge structures that could be used to deliver adaptation information to the broader community. With the development and increase in the capability of flexible, digital and remote learning opportunities during the 2020 COVID-19 pandemic, this has further increased the opportunities to reach the community through all available structures.

To support a broadly diverse informed community, the strategic directions are to support formal education programs, encourage research partnerships with industry business and academia, support industry and lifelong learning organisations to understand and educate about adaptation needs and options, and educate leaders to increase and diversify the knowledge base.

Steps toward adaptation

Strategic direction		Action	
1	Formal education curricula to engage and incorporate adaptation knowledge and actions	a	Develop and circulate educational materials about climate change adaptation (with Gippsland context) that align with current curricula.
		b	Provide climate change adaptation professional development for teachers and educators.
		c	Local tertiary education providers identify opportunities to develop and deliver courses or subjects to provide adaptation knowledge and skills for current and future requirements.
2	Promote and encourage interdisciplinary research and partnerships	a	Identify and encourage partnerships between research organisations and industry that combine industry insights and access with research expertise and methodology
		b	Promote data sharing and access to Intellectual Property across sectors and throughout the region to develop region-specific resource materials
		c	Establish evaluation frameworks for industry research partnerships to assure return on investment from any joint programs
3	Adaptation education and awareness is being actively shared within and through Industry, community educational and training networks	a	Develop resources (based on best management practices) that support non-formal education networks to present adaptation awareness and education. Including frameworks that assess vulnerabilities and suggest adaptation measures and practice change options.
		b	Utilise established networks to promote adaptation planning and climate change risk assessments within the community, industry and business.
4	Equipping and educating leaders with climate adaptation knowledge	a	Build upon the adaptation momentum created by the COVID-19 pandemic and explore the parallels with climate change impacts and adaptation opportunities.
		b	Identify existing and encourage new communities of practice to develop leadership in adaptation.
		c	Analyse and evaluate existing programs to adopt and translate successful models of leadership, action and education to other sectors.

Regional Economy

Gippsland's economy has been built upon the regions ready access to natural resources and fertile land which currently support industries such as power generation in the Latrobe Valley, agriculture, timber production and a visitor economy that benefits from our diverse landscapes, local produce and the hospitality industry. Supporting industries and sectors that provide major economic contribution or significant employment within the region include manufacturing, construction, health care, retail and education & training.

Potential threats to the regional economy are broad, including costs associated with installing, upgrading or adapting infrastructure to withstand climate change impacts, population relocation, loss of work capacity due to extreme heat, diminishing harvest yields and increases in the price of food items and consumer goods.

Although the most severe and full extent of these threats may be decades away, it will be important to communicate these threats, build understanding and commence appropriate planning over the five year timeframe of this strategy. Strong collaboration between all sectors will be essential in completing adequate adaptation planning and preparation.

The impacts of climate change threaten to impact the Gippsland economy in many of our places of current advantage. As one example, the bushfires during the summer of 2019/20 laid waste to significant tracts of forest, farmland and tourism assets. The bushfires also impacted local transport networks and with increased attention and warnings many people cancelled their visits to the region, even in areas unaffected by fire.

The tourism industry faces multiple challenges with a further changing climate. Tourism operators have experienced difficulty in attracting visitors following events such as bushfires have, even those areas that have not been impacted by fire. Days of higher fire danger also impact the tourism sector as some operators implement planned closures or visitors choose not to travel if it isn't essential.

Further changes in natural snowfall will affect snow based tourism within the region, with shorter seasons and a less reliable snow cover. The impacts of rising sea levels and destructive storms place the attractions and communities along our regions coastline at risk and could heavily affect visitation throughout holiday and summer periods. Many operators and communities that have previously relied heavily on seasonal visitation are working towards the opportunities available by making changes and planning to provide year round products and attractions. Further support and assistance will be required by many others for successful adaptation to be achieved.

Other economic risks from the changing climate include potential loss of infrastructure and interruptions to supply chains, challenges to transport and land-use changes. All which will occur as the region manages the transition from traditional industries and employment sources such as fossil fuel power generation and native timber harvesting.

Sectors will rely on receiving detailed information about successfully adapting to climate change impacts. This will need to be accompanied by details of the risks and costs of inaction. Business continuity planning will be crucial when preparing for potential impacts on infrastructure, services and supply chains during natural events. This will assist businesses to continue operating if there are ongoing delays in re-establishing services, supply chains or repairing infrastructure.

Both the COVID-19 pandemic and climate change increase the potential for people to consider a move from metropolitan areas to live, invest in and support businesses within the regions. Such

changes would create an opportunity for new businesses to be attuned to the need for and potential of climate change adaptations from the start, so leadership, information and education to new and existing businesses becomes an important focus. The ability to be agile and finding the most effective ways to continue to operate amidst interruptions or climate change impacts will be advantageous for Gippsland businesses and our regional economy.

Pursuing regional opportunities that can deliver both adaptation and mitigation outcomes provide a chance for innovation and economic diversification. This provides space to maximise existing and emerging opportunities, with examples including agroforestry, ecotourism and a circular economy.

Steps toward adaptation

Strategic direction		Action	
1	Equip all levels of business with the knowledge and skills to take adaptation action	a	Build business awareness of the local changes, impacts and risks associated with climate change. This would include identifying potential economic impacts and opportunities.
		b	Support and inform the business community enabling them to plan and maintain continuity during and following extreme events
2	Understand existing and likely future impacts on tourism products and attractions to guide flexibility and cross seasonal appeal	a	Support the tourism industry to plan and develop year-round, resilient tourism products and projects.
		b	Provide support for the tourism sector to plan for business continuity in extreme events
		c	Understand and factor impacts for seasonal tourism attractions (alpine/snow based, coastal) and plan for diversification by developing alternative all-seasons attractions.
		d	Embed climate change adaptation planning into new and existing tourism products and assets.
3	Enable communities to support regional economic activity	a	Prioritise and promote the rebuilding of businesses and garnering local support after a significant natural event (flood, fire)
		b	Anticipate any likely increased population growth in regions due to comparatively more attractive climate and conditions, which may result in a community positioned to create and support tourism enterprises
4	Develop industry readiness for impacts to supply chain security	a	Prepare and plan for potential interruptions to transport networks and connectivity.
		b	Prepare and plan for potential business/industry impacts due to climate change, including: <ul style="list-style-type: none"> • Changes to demand levels for products • Availability and supply of goods.