REGIONAL COUNCILS
CLIMATE ADAPTATION PROJECT

SOUTHERN MIDLANDS COUNCIL

Southern Midlands Council

Climate Change Adaptation Plan 2020

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Acknowledgements

This Plan is an updated version of the Corporate Adaptation Plan developed between 2010 and 2013 as a component of the Regional Climate Change Project undertaken with the 12 Councils of southern Tasmania.

Technical input into this Plan was provided by:

Michael Grose Municipal-scale climate change modelling projections from Climate Futures Tasmania.

David Taylor Bushfire modelling based BRAM model (P&WS) augmented with Climate Futures data.

Shaun McElwaine Legal comment

Stakeholders engaged through consultation

Summary

There is an expansive and growing body of scientific evidence that the global climate is changing and that extreme weather events and sea level rise will increase in the 21st century. Local Government is well positioned to work with communities in managing and preparing for the impacts of climate change for a number of reasons, particularly its local knowledge and experience, its understanding of community needs and vulnerabilities, and its key role in responding to emergencies.

Key climate change risks for the Southern Midlands municipality (by 2100) include the following:

- The temperature of very hot days to increase by up to 4°C.
- The number of hot days over 30°C is expected to increase by 200%.
- Frost risk days are likely to decline significantly (implications for agricultural enterprises requiring chill hours).
- Extended heat waves and extreme temperatures is expected to enhance the occurrence of bushfire and result in more prevalent water stress and drought occurrence.
- Rainfall is expected to trend towards heavier events interspersed by longer dry periods. Rainfall volume in a 200-year average recurrence interval event is expected to increase by up to 25%.

Key vulnerabilities for the Southern Midlands municipal area in relation to the climate change risks include the following:

- **Infrastructure & Works** - increased damage to roads, culverts, stormwater infrastructure and bridges from larger flood events.
- **Development & Environmental Services** - lack of modelled data for flooding (and wildfire) in relation to guidance of planning decisions.
- **Community & Corporate Development** - impact on the regional economy due to stresses on the agricultural sector – from drying, soil erosion, heat stress, and new weed & pathogen impact.
- **Emergency Management** – capacity to efficiently deliver bushfire and flooding disaster support to the community. Reduced availability of water for firefighting.
- **Natural Resource Management** - impact on local vegetation communities and species due to heat & drought; drying of natural water bodies; changes in seasonal rainfall; and impact from new weeds & pathogens.

In taking action to address Southern Midlands Council's vulnerabilities a key overarching consideration is the potential liability exposure in relation to an adopted action, or inaction in particular circumstances. Advice to the Regional Climate Change Adaptation Project overall is that councils will not be liable for existing use or development, nor will liability be incurred for 'no action' in response to climate impacts. Should Council take action there could be liability if that action causes harm or damage. Council may also be found liable for operational advice such as in the assessment of planning applications and new developments.

This Adaptation Plan presents adaptation actions for each of Council's business areas. The actions were identified by Council staff in relation to Southern Midland's specific climate change risks.

In regard to **Infrastructure & Works**, assets are vulnerable in relation to flood and bushfire, and there is need to review design standards to determine the adequacy of infrastructure to cope with extreme events.

For **Development & Environmental Services**, the need for flood modelling was recognised in order to define high-risk areas for flood impact. Understanding risk is a key consideration in making well informed planning decisions.

In terms of **Community & Corporate Development**, action in relation to building community resilience in the face of drought was seen as important, together with encouraging innovation and diversification in the agricultural sector.

Natural Resource Management is an important area in which adaptation will be necessary. There is likely to be increasing impact on the agricultural sector and natural environment from more frequent extreme temperatures, more intense flood events, more frequent drought, and introduced species (those favoured by changing environmental conditions). Natural assets such as Lake Dulverton may require more resources to maintain water levels due to the drying trend in the Midlands. It was recognised that there is still opportunity to build resilience in the environment through fencing of important vegetation remnants, trialling of pasture species that are resilient to drought and protection of riparian areas vulnerable to flood erosion. It is recognised that these issues are larger than council's capacity to address, hence, regional collaboration is required, together with accessing grant funds.

The area of **Emergency Management** procedure was also viewed as an important area for Council to review in light of: potential increasing demand for emergency response; and Council's lack of recent experience in having to deal with a natural disaster. Access to sufficient volumes of water for firefighting was also highlighted as an emerging issue.

Aside from proposing actions to minimise the impact of climate change on Council business, the Adaptation Plan also recognises work being undertaken by Council's 'stakeholders'. The Plan identifies stakeholder linkages to assist in identifying collaborative opportunities, resource sharing and to avoid duplication of efforts wherever possible.

The Adaptation Plan incorporates an approach to implementation, key components of which include: incorporation of key risks and adaptation actions into established council documents and processes (e.g. risk register, strategic plan, asset management plan); and identification of a mechanism to implement sub-regional and regional adaptation actions through advocacy or collaboration.

Climate Change Summary for the Southern Midlands

Tasmania has had some of the highest resolution climate modelling conducted in Australia. The Climate Futures for Tasmania project, revised and updated in 2020, provides a sound knowledge base for identifying climate related risks at a local level, to a 10 km^2 grid resolution. The information below is a summary of updated Climate Futures for Tasmania data relevant to the Southern Midlands municipal area.

More detailed information on climate change projections for the Southern Midlands is available in the document 'Climate Change Information for Decision Making' viewable on the Southern Midlands Council website.

Current climate and recent trends

- Southern Midlands has a temperate, maritime climate across the southeast half of the municipality with inland and elevated areas experiencing very cold winters and numerous frosts. Long-term average temperatures have risen in the decades since the 1950s, at a rate of up to 0.1 °C per decade.
- The average annual rainfall across the municipality is highly variable ranging from as low as 450 mm in the rain-shadow area through the centre of the municipality to greater than 700 mm towards the east coast and the highlands in the west. There has been a decline in average annual rainfall since the mid 1970s, and this decline has been strongest in autumn.
- Tasmania is not immune from the influence of large-scale climate drivers on the local climate e.g: the extended dry spell of 1995-2009 coincided with an 'El Nino' pattern; the dry spell of 2018-20 coincided with an Indian Ocean Dipole event; and extended wet spells coinciding with a 'La Nina' pattern. It is expected that climate change will exacerbate the impact of these broader scale patterns.

Projected change in the Southern Midlands by 2100 (Climate Futures for Tasmania)

	Change	**Relative change**
Temperature (annual average)	+ 3.4°C	+ 32%
Hot days (>30°C)	+ 21 days	+ 200%
Heat waves (days)	5 days longer	+ 100%
Hottest day of the year	+ 4.2°C	+ 12%
Frost risk days/year	- 43 days	- 84%
Rainfall (annual average)	- 36 mm	Seasonal variation away from observed trends prior to 1990
Rainfall (wettest day of the year)	+ 21 mm	+ 27%
Evaporation		+ 33%

Extreme events

The changes to extremes will have significant consequences. Extreme rain and heat are most likely to impact upon council's infrastructure, roads, the local community, and environment. Projected impacts on Southern Midlands by 2100 are as follows:

- The temperature of very hot days to increase by up to 4°C. Heat waves (days in a row where temperatures are in their top 5%) currently last around 5 days and will increase by up to 5 days.
- Extended heat waves and more extreme temperatures will lead to more rapid drying across the landscape and increase the frequency and intensity of bushfires.
- Rainfall will trend towards heavier events interspersed by longer dry periods. High daily runoff events are likely to increase, including those that may lead to erosion or flooding. Rainfall volume in a 200-year average recurrence interval (ARI) event will increase by up to 25 %.

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1.0 Introduction

1.1 Project Background

The Regional Councils Climate Adaptation Project 2010-2013 was initiated by the Southern Tasmanian Councils Authority's Regional Climate Change Initiative, a working group with representatives from each of the 12 southern councils. The project aimed to improve the capability and resilience of Tasmanian councils to manage the risks of climate change. The initial phase of the project was conducted in Tasmania's Southern Region. The project's key outputs were:

- Council (corporate) Climate Change Adaptation Plans for each of the 12 southern councils;
- a Regional Climate Change Adaptation Strategy covering themes common to all councils; and
- a Climate Adaptation Toolkit for review of Council's Adaptation Plans and extension to Cradle Coast and Northern Councils.

The Project was funded by the Australian Government's Local Government Reform Fund (LGRF), administered by the Department of Regional Australia, Local Government, Arts and Sport. The project was delivered by the Southern Tasmanian Councils Authority (STCA) in partnership with the Tasmanian Climate Change Office and the Local Government Association of Tasmania.

This document is an internal review of Southern Midlands Council's corporate adaptation plan initially produced through the Regional Councils Climate Adaptation Project.

1.2 Project Context

There is a growing body of scientific evidence that the global climate is changing and as a consequence extreme weather events and sea level rise is increasing[1]. There are a range of potential future climate scenarios which are dependent upon the scale of effort achieved in reducing greenhouse gas emissions. Even if the composition of today's atmosphere was fixed (which would imply a dramatic reduction in current emissions), surface air temperatures would continue to warm by up to 0.9 ºC[2]. Under a 'best case scenario' where significant reductions in greenhouse gas

[1] IPCC, 2011: Summary for Policymakers. In: Intergovernmental Panel on Climate Change Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Field, C. B., Barros, V., Stocker, T.F., Qin, D., Dokken, D., Ebi, K.L., Mastrandrea, M. D., Mach, K. J., Plattner, G.-K., Allen, S., Tignor, M. and P. M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[2] IPCC, 2007: Climate Change, 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning (eds.)].

emissions are achieved it is still pertinent to initiate an adaptation response in order to minimise climate change impacts on infrastructure, economy, community and the environment.

In Australia, it is recognised by all tiers of government that it is appropriate and effective to manage climate change at a 'local' scale. The Australian Government recognises that Local Government will be key players in adapting to the local impacts of climate change and their engagement will be a critical part of any national reform agenda[3]. It has produced publications aimed at assisting local government manage climate change risk[4] and implement adaptation actions[5].

Scope is also afforded to Tasmanian councils to address climate change under the *Local Government Act* (Tas) 1993, which describes the role of councils to provide for the health, safety and welfare of the community; as well as represent and promote the interests of the community; and provide for the peace, order and good government of its municipal area.[6]

In managing and preparing for the impacts of climate change, Local Government is well positioned to work with communities due to its:

- core function to directly support and assist local communities;
- local knowledge and experience;
- understanding of community needs and vulnerabilities;
- key role in responding to emergencies;
- role in infrastructure design, construction and maintenance;
- role in review and update of planning schemes (in relation to identified local impacts and threats); and
- ability to effectively disseminate information and provide support to the community.

Local experience, in combination with relevant scientific data and technical expertise, provides the key inputs for undertaking a well informed 'risk management' approach to climate change. Effective adaptation requires a portfolio of actions, ranging from fortifying infrastructure to advocacy and collaboration. There is also an appreciation that managing current and future risks in relation to climate change can have benefits (such as improving human well-being and protecting biodiversity) regardless of the magnitude of climate change that occurs.

[3] Department of Climate Change, 2010: Adapting to climate change in Australia, an Australian Government Position Paper

[4] Australian Greenhouse Office, 2006: Climate Change Impacts and Risk Management – a Guide for Business and Government.

[5] Department of Climate Change, 2009: Climate Change Adaptation Actions for Local Government.

[6] *Local Government Act* (Tas) 1993.Section 20 Function and Powers.

1.3 Purpose and scope

This adaptation plan aims to improve the capability of Southern Midlands Council to manage the risks associated with climate change.

The development of this plan was based upon council-specific, climate projection data provided by the Antarctic Climate and Ecosystems Cooperative Research Centre (ACE CRC) 'Climate Futures for Tasmania' program. The plan identifies potential climate change risks within the context of currently available climate change data. Scientific research and modelling of climate change is continually evolving. Therefore, there is a potential that future climate change projection data may require reassessment of the risks, actions and timeframes identified in this Plan.

Specific outputs from the modelled climate scenario for Southern Midlands, such as future rainfall patterns, extreme events, and bushfire likelihood formed the basis of 'risk management' and 'adaptation action' workshops held with council staff in development of the original plan on which this updated version was based. Workshops were conducted in a manner consistent with the International Organisation for Standardisation (ISO) 31000:2009 Standard for Risk Management as well as the Australian Government publication *Climate Change Impacts and Risk Management: A Guide for Business and Government*.

The plan also presents adaptation actions to manage risks that are within council's sphere of influence, but are the responsibility, to some degree, of other organisations (such as State Government Agencies, Community Groups and Private Corporations). The primary purpose of the 'stakeholder' section of this plan is to ensure there is: understanding of roles and responsibilities; clarity as to where partner organisations are at in managing climate change risk; and identification of collaborative opportunities for managing risks that are relevant to local communities.

This adaptation plan incorporates an 'implementation plan' to ensure there is:

- a logical way for incorporation of key local risks and adaptation actions into council documents and processes such as risk registers, strategic plans, annual plans or asset management plans; and
- an appropriate mechanism to implement sub-regional and regional adaptation actions either through advocacy or collaboration.

2.0 Overarching Corporate Considerations

Corporate climate change adaptation considerations are those that fall across all Council service areas. Success of such actions is dependent on senior management support and will provide Council with a solid framework in climate change adaptation and minimise risk to council business.

2.1 Legal Liability

Councils are at the forefront of responding to climate change impacts and increasingly local communities are looking to their councils to provide solutions to adapt to, manage, transfer or share the risks associated with climate change impacts[7]. A key consideration of councils in the face of climate change is potential liability that they are exposed to through their various statutory roles, powers and functions.

To this end, the Regional Climate Change Adaptation Project engaged Shaun McElwaine + Associates (SMA) to provide advice on the legal context within the impacts of climate change reside and how they relate to local government as a whole. Councils are encouraged to consider the advice in full which is included in the package of supporting documents provided to Council with this Plan.
Overall the advice is consistent with the legal comments provided to the Australian Local Government Authority:

- Local Councils Risk of Liability in the Face of Climate Change Resolving Uncertainties; a report for the Australian Local Government Association, Baker and McKenzie, 22 July 2011.

A key consideration of councils in the face of climate change is potential liability that they are exposed to through their various statutory roles, powers and functions. The main 'legal' concern for councils is the potential liability that they are exposed to through their adopted action or inaction in particular circumstances. The advice established is that overall councils will not be liable for existing use or development, nor will they incur liability for 'no action' in response to climate impacts, however should they take action they could be liable should that action cause harm or damage. It also considered that councils may be found liable for operational advice such as the assessment of planning applications and new developments. Legal advice to this Project contained options for councils to pursue, with the State Government and in their own capacity to reduce their exposure and potential liability, bearing in mind that these actions may be more appropriately pursued through a regional approach.

[7] Baker and McKenzie; 22 July 2011, 'Local Council Risk of Liability in the Face of Climate Change – Resolving uncertainties' A report for the Australian Local Government Association

Table: Potential corporate actions for Council to pursue in relation to legal liability

Amendment to *Local Government Act* (Tas) 1996, by the State Government, to insert an equivalent section to s733 *Local Government Act* (NSW) that exempts local governments for civil liability for the impacts of climate change where statutory powers, planning scheme provisions and assessment of development applications are done in good faith and in accordance with manual/s prepared by the State Government.
Formulation of State-wide codes to deal with climate change impacts to achieve a uniform set of provisions across the State that: contain specific development controls; removes decision making from planning authorities; does not require risk analysis; and sets prescribed levels for sea level rise in developed coastal regions throughout the State.

2.2 Emergency Management

As the closest level of government to the community, together with having a responsibility for the wellbeing of their community, councils have an important role in emergency management. Although councils are not a provider of emergency services, council functions in relation to emergency management include:

- provision of recovery centres and relief services during emergencies or disasters;
- provision of resources and information to emergency service teams such as Tasmania Fire Service and the SES;
- informing the community of the current situation, developments and ongoing prognosis during emergency events; and
- local emergency planning and development of mitigation options using risk analysis, prioritisation and treatment approaches.

Emergency management planning may be coordinated through a special council committee who have the role of preparing and reviewing a municipal emergency management plan.

For Southern Midlands Council, Climate Futures for Tasmania modelling defined extreme events in relation to heat waves, extreme rainfall and flooding as being of particular relevance to the municipal area. Extreme events and associated emergencies are likely to increase as a result of climate change resulting in resources for emergency management being stretched. Implications of climate change in relation to council's emergency management role are expanded upon later in this document.

3.0 Climate Change Risks & Vulnerabilities

3.1 Heat & Bushfire

Rising average temperatures and more frequent extreme temperatures have the potential to contribute to a variety of impacts including: more rapid drying of the landscape than traditionally experienced; longer bushfire seasons; enhanced wildfire intensity; heatwave related illness and mortality (particularly in vulnerable demographics such as the elderly). Impacts may also be incurred on council's infrastructure and property, on agricultural industries that are important to the region's economy, and natural resources.

Climate Change Projections
HEAT & BUSHFIRE

By 2100 in the Southern Midlands:

- **Average annual temperatures are projected to increase by 3.4°C.**
- **The number of days over 30°C is expected to increase by 200% - the summer season is lengthening.**
- **Frost risk days are likely to decline by more than 50 days/year.**
- **The temperature of very hot days to increase by up to 4°C.**
- **Warm spells (days in a row where temperatures are in their top 5%) currently lasting around 5 days will increase by up to 5 days.**
- **Extended heat waves and more extreme temperatures will enhance the occurrence and intensity of bushfires. Twice the danger – twice the area – twice as often.**

(Antarctic Climate and Ecosystems, RCP6 scenario)

Key vulnerabilities in the Southern Midlands community and environment to an increase in temperature, heatwaves and bushfire are:

Vulnerabilities
HEAT & BUSHFIRE

Increasing temperatures and longer heatwaves in the Southern Midlands may result in:

- **Greater frequency and intensity of drought and bushfire.**
- **Difficulty in accessing sufficient water resources for fire-fighting, farming and the environment.**
- **Reach of irrigation schemes no longer sufficient to support viability of the agricultural sector.**
- **An increase in heat related illness and mortality, particularly in vulnerable demographics such as the elderly.**
- **New invasive weed and pathogen species impacting on agricultural production and natural habitats.**
- **Higher temperatures and reduced 'chill hours' will create both benefits & setbacks for agricultural enterprises.**

Changes to bushfire likelihood & behaviour may result in:

- **Emergency services response capacity challenges – particularly as internal procedures have not been tested by a major event for some time.**
- **An increase in maintenance and replacement costs of Council and community infrastructure.**
- **Significant community disruption leading to a range of public health and safety issues.**
- **Exposure of shortcomings in the communications network i.e. mobile phone black-spots and/or damage to communications infrastructure.**

RISKS associated with increasing temperature and heatwaves

Risk Code	Risk Statement	Likelihood	Consequence	Risk Level	Council services affected	Other stakeholders
	EMERGENCY MANAGEMENT					
H1	Diminished water resources due to extended dry spells having implications for capacity to fight fires	Likely	Moderate	High	Emergency Management	SES; Tas Fire Service
	NATURAL RESOURCE MANAGEMENT					
H2	Increased prevalence of weeds and pests resulting in biodiversity decline - leading to reprioritising of Council's NRM on-ground management priorities and requiring funds to enable resourcing of new challenges.	Likely	Moderate	High	NRM	DPIPWE; NRM South
H3	Impacts on the extent and distribution of threatened species and high value vegetation communities triggering biodiversity decline - leading to reprioritising of Council's NRM on-ground management priorities requiring funds to enable resourcing of new challenges.	Likely	Moderate	High	NRM	DPIPWE; NRM South
	COMMUNITY & CORPORATE DEVELOPMENT					
H4	Heat and longer dry spells increasing the demand for and necessity of irrigation water. Water may be required to ensure viability of farming and to support diversification into new enterprises.	Likely	Moderate	High	Community Development	Other tiers of Government; Irrigation Tasmania

RISKS associated with increasing bushfire likelihood

Risk Code	Risk Statement	Likelihood	Consequence	Risk Level	Council services affected	Other stakeholders
	COMMUNITY & CORPORATE DEVELOPMENT					
B1	Increased bushfire frequency causing damage to property and loss of pastures, crops, and livestock - leading to adverse impacts on the community.	Likely	Moderate	High	Community Health, Community Development	Rural Support Networks, Tas Fire Service
	INFRASTRUCTURE & WORKS					
B2	Increased frequency of bushfire events may result in increased maintenance and replacement costs for council assets located in bushfire prone areas.	Likely	Moderate	High	Asset Management	

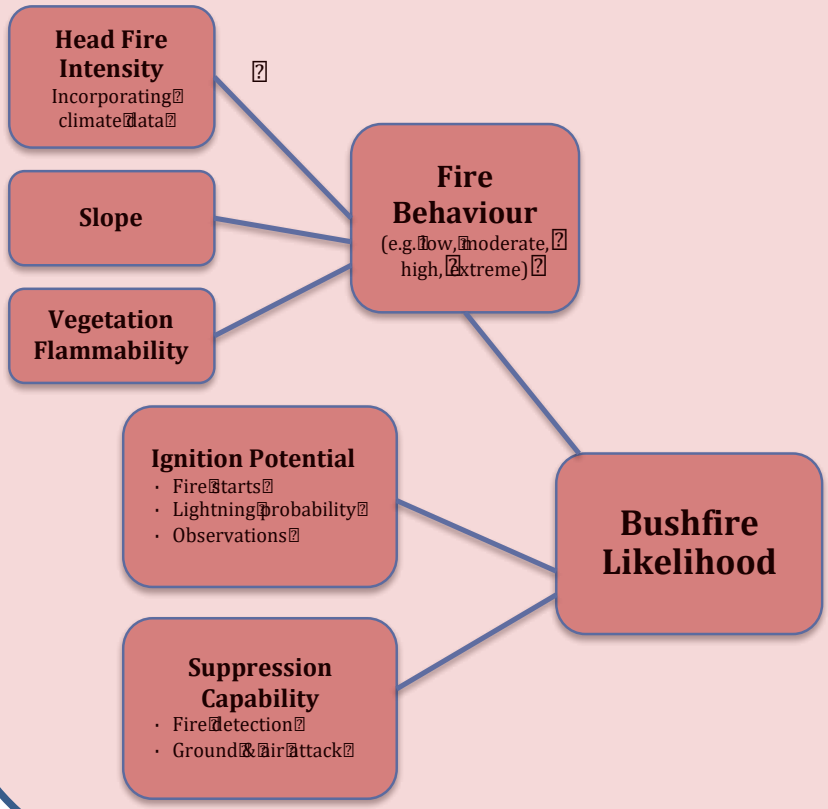
Risk Code	Risk Statement	Likelihood	Consequence	Risk Level	Council services affected	Other stakeholders
	EMERGENCY MANAGEMENT					
B3	Increased bushfire frequency & severity, testing council's capacity and ability to efficiently set up a recovery centre & initiate appropriate response actions – particularly as Council has not been required to fulfil this role recently.	Likely	Moderate	High	Emergency Management	SES; Tas Fire Service
B4	Increased bushfire frequency and severity testing the adequacy of communications resources – in relation to mobile phone black-spots or the potential of fire damage to mobile phone infrastructure.	Almost certain	Minor	High	Risk management; Community Development	Other tiers of Govt; Telstra
	DEVELOPMENT & ENVIRONMENTAL SERVICES					
B5	Increasing bushfire likelihood and intensity resulting in planning conditions and public information being inadequate for protection of people and property	Possible	Moderate	High	Planning; Risk Management	

Case Study - Bushfire Modelling

Preliminary assessment of bushfire risk in Southern Midlands municipality in relation to climate change was assessed using the Tasmanian Bushfire Risk Assessment Model (BRAM), developed by the Tasmanian Parks and Wildlife Service. Weather data from the Climate Futures for Tasmania Project (A2 scenario) was entered into the BRAM to enable modelling of a variety of bushfire scenarios.

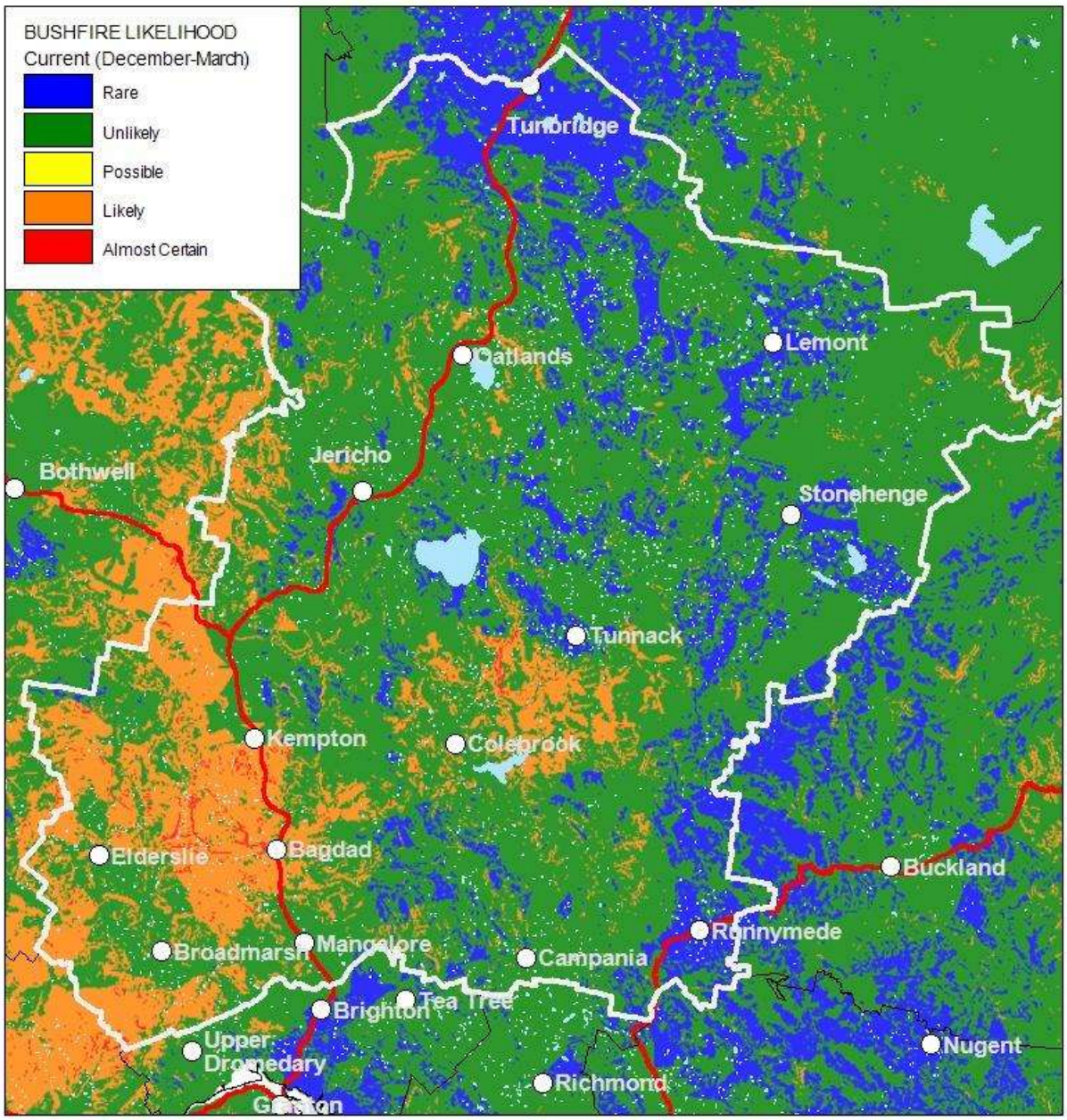
A summary of the key inputs and outputs of the BRAM model for the Regional Climate Change Adaptation Project is provided in the following diagram:

Figure: Inputs and outputs of BRAM bushfire model



The modelled near future (2010-2039) 'bushfire likelihood' output for the Southern Midlands municipal area is shown in the following figure:

Figure: Modelled near future (2010-2039) 'bushfire likelihood' output for the Southern Midlands municipal area



It was concluded that more work is required on the BRAM Model for reliable outputs in relation to climate change to be achieved. It is considered that small increases in 'likelihood' may be sufficient to trigger a major bushfire event. For example, projected increases to peak temperatures, and longer dry spells will have an impact on the likelihood of a bushfire igniting.

3.2 Rainfall & Flooding Risks

Increased rainfall variability, primarily increased rainfall intensity and flooding, is an impact of concern for Southern Midlands Council. Under climate change, rainfall events and flooding of a magnitude & frequency not experienced before have the potential to be devastating for infrastructure, agriculture, public safety and the regional economy.

Climate Change Projections
RAINFALL & FLOODING

By 2100 in Southern Midlands:

- **Rainfall is expected to trend towards heavier events interspersed by longer dry periods.**
- **Rainfall on the wettest day of the year to increase by about 20%.**
- **Rainfall volume in a 200-year average recurrence interval event will increase by up to 25%.**

(Antarctic Climate and Ecosystems, 2011 – RCP6 scenario)

Vulnerabilities
RAINFALL & FLOODING

Increased extreme rainfall events in Southern Midlands may result in:

- **Increased damage to infrastructure (roads & bridges);**
- **Flooding in developing areas e.g. along Bagdad Rivulet;**
- **Testing of emergency services capacity, i.e. ability to efficiently implement an emergency response and set up a recovery centre - particularly as procedures have not been tested for some time;**
- **Impact on the regional economy due to agricultural impacts such as soil erosion and crop damage**

RISKS associated with rainfall variability & flooding

Risk Code	Risk Statement	Likelihood	Consequence	Risk Level	Council services primarily affected	Other stakeholders
	INFRASTRUCTURE & WORKS					
F1	Increased maintenance and replacement costs triggered by flooding impacts on council infrastructure (roads, bridges, buildings, property).	Almost certain	Moderate	Extreme	Asset Management	
F2	Road and bridge network disruptions or failures associated with flood events causing shut down and increased costs associated with maintenance, retrofitting or replacement.	Likely	Moderate	High	Asset Management, Emergency Management	
F3	Reduced water security resulting in lower water supply for fire-fighting leading to increased council asset damage resulting in increased maintenance and replacement costs.	Possible	Moderate	High	Asset Management	Tas Fire Service
	COMMUNITY & CORPORATE DEVELOPMENT					
F4	Increased flood severity, testing council's capacity and ability to efficiently set up a recovery centre & initiate appropriate response actions – particularly as Council has not been required to fulfil this role recently.	Almost certain	Minor	High	Emergency Management	SES; Tas Fire Service
F5	Increased frequency and intensity of drought, placing stress on financial capacity of residents having flow-on effects for council income and budgets	Likely	Minor	Moderate	Corporate Services, Finance	Industry Groups - Agriculture
	EMERGENCY MANAGEMENT					
F6	Reduced water security resulting in lack of water for fire-fighting leading to increased risk of property and infrastructure destruction and public safety issues.	Likely	Moderate	High	Community Health, Emergency management	Tas Fire Service
F7	Road and bridge network failures having implications for public safety.	Possible	Moderate	High	Community Health, Emergency Management	
	NATURAL RESOURCE MANAGEMENT					
F8	Declining rainfall leading to increasing stress on environmental assets such as Lake Dulverton resulting in pressure on Council to fund environmental water contributions.	Almost certain	Minor	High	NRM	DPIPWE, P&WS

Risk Code	Risk Statement	Likelihood	Consequence	Risk Level	Council services primarily affected	Other stakeholders
F9	Declining rainfall leading to less soil moisture and associated challenges such as ground cover issues, crop failure & wind erosion - resulting in pressure to reprioritise NRM on-ground management priorities in order to support the community.	Likely	Minor	Moderate	NRM	DPIPWE, NRM South
F10	Increased flood flows resulting in riparian erosion and loss of habitat and water quality issues having implications for NRM unit priorities and project work.	Likely	Minor	Moderate	NRM	DPIPWE, NRM South
F11	Changes in species composition in natural areas resulting in dieback of some species (e.g. white gum) leading to reprioritising of Council's NRM on-ground management priorities.	Likely	Minor	Moderate	NRM	DPIPWE, NRM South
F12	Increasing prevalence of new pests, diseases and weeds due to rainfall variability resulting in impacts on agricultural productivity and profitability impacting upon council's NRM unit program priorities and resources.	Likely	Minor	Moderate	NRM	DPIPWE, NRM South
	DEVELOPMENT & ENVIRONMENTAL SERVICES					
F13	Inadequacies in 'Flood-prone Hazard Area' overlay resulting in inadvertent damage to approved developments leaving Council open to litigation.	Unlikely	Major	High	Planning; Finance	Tasmanian Planning Commission
F14	Extreme rainfall combined with willows choking Bagdad Rivulet resulting in inundation of properties along the river flats.	Possible	Minor	Moderate	Planning; NRM	

Case Study - Flooding in the Jordan River- Major flooding events in the Jordan River catchment can be a problem in the Southern Midlands municipality. Previous flood events have resulted in impacts on roads, bridges and fencing. Flood events are projected to increase in frequency and severity as a result of climate change.

4.0 Climate Change Adaptation Actions

4.1 Infrastructure & Works

Council's Infrastructure and Works team is responsible for overseeing the construction, maintenance and replacement of property and infrastructure assets, including roads, drains and culverts, bridges, stormwater infrastructure, council owned buildings and recreational infrastructure such as walking tracks. For councils, effective asset management is about understanding the required level of service and delivering it in the most cost effective manner. Managing this objective is core business for local government and is key to ensuring council sustainability. The projected impacts of climate change threaten conventional asset management both in terms of financial modelling, as well as the level of service that is acceptable or even achievable.

Projected increases in the intensity and frequency of extreme events directly impact on council asset base with significant and unpredictable financial and service delivery implications. Council's stormwater system for example is designed for historical climate and with projected climate change, will possibly become under-capacity in places. Council will therefore need to consider the additional cost of managing stormwater at the current acceptable level of service and either fund that cost or accept that a greater frequency of inundation events is likely. Acknowledging this, public inconvenience and safety issues have been identified as a recurring risk theme in relation to the impact of extreme events on council infrastructure.

Further to the projected increases in extreme events, incremental changes to the climate such as increasing average temperatures or reduced average rainfall will also have implications to council's capacity to deliver its infrastructure based services. Such changes may result in accelerated structural fatigue in council's infrastructure. Design standards based upon past climate data and patterns may need to be reconsidered for new or replacement infrastructure to account for incremental climate change projections.

Infrastructure & Works adaptation actions and treatments

Risk code link	Adaptation Action	Responsibility	Relevant Council document	Original risk level	Treated risk level
F1	**Investigate mechanisms to reduce the impact of peak flows during extreme rainfall events.**	Works Manager	Emergency Management Plan, Council & Community Newsletter, Risk Register	Extreme	High
F2	**Install safety signage at appropriate locations to inform community of flood risk and water depth.**	Works Manager	Strategic Plan, Operational Plan, Risk Register	High	Moderate
F1	**Incorporate climate change projections, particularly extreme rainfall, into asset design (bridges, culverts, stormwater).**	Municipal Engineer	Asset Register, Risk Register	Extreme	High
B2	**Gradually replace timber bridges with concrete bridges.**	Works Manager	Asset Register, Risk Register	High	Moderate
F1	**Seal roads (strategically prioritised) to reduce maintenance requirements in relation to rainfall variability.**	Works Manager	Asset Register	Extreme	Moderate
F3 B2	**Improve the extent & reliability of water resources for fire management**	Works Manager	Asset Register; Operational Plan	High	Moderate

4.2 Community & Corporate Development

Southern Midlands Council has an important role in community and economic development, particularly through encouraging investment and job growth, and enhancing liveability and environmental attributes which may influence individual's decisions to live in the municipal area. Climate change has significant potential, as evidenced by experience from past droughts, to impact upon the basis of the economy - the agricultural sector. If the Southern Midlands community is not prepared for the impacts of climate change then Council may be required to invest increasing resources in community support to assist residents through tough times, particularly extended dry periods and the increasing prevalence of extreme events.

There is also potential opportunity associated with climate change. Warming temperatures, changing seasonal rainfall, increased evaporation and reduced frost days not only present challenges, but new opportunities for innovative farmers. There is a potential role for council in disseminating specific information to the community in relation to

these opportunities. An initial part of this work has already been conducted through the Climate Futures Tasmania Project 'Impacts on Agriculture' technical report[8].

Southern Midland's priority adaptation actions, and identified treatments, in relation to community/economic development are presented below

Community & Corporate Development adaptation actions and treatments

Risk code link	Adaptation Action	Responsibility	Relevant Council document	Original risk level	Treated risk level
H4	**Encourage diversification of economic opportunities within the community in relation to envisaged hardship on traditional industries due to weather extremes.**	Manager Community Services	Strategic Plan – Community & Lifestyle, Risk Register	High	Moderate
F5	**Increasing awareness of agricultural enterprises suited by changing conditions that will sustain ongoing economic production within the agricultural sector.**	NRM Unit, Manager Community Development	Annual plan when conditions warrant, Risk Register	Moderate	Moderate
B1	**Work in collaboration with rural financial & mental health advisory services to assist landowners during drought or natural disasters.**	Manager Community Services	Risk Register	High	Moderate
F5	**Build element of contingency into council's forward financial management plan to allow for reduced revenue during drought.**	General Manager, Finance Officer	Forward Financial Management Strategy, Risk Register	Moderate	Low
B1	**Lobby Commonwealth and State government agencies to provide adequate funding for relief to farmers during periods of drought.**	Manager Community Services, General Manager, elected members	Strategic Plan, Risk Register	High	Moderate
H4	**Lobby higher tiers of government and Irrigation Tasmania to investigate extending the irrigation network to assist in building confidence and resilience in the agricultural industries of the Midlands.**	Manager Community Services, General Manager, elected members	Strategic Plan, Risk Register	High	Moderate

[8] Holz GK *et al.* (2010). Climate Futures of Tasmania: impacts on agriculture technical report. Antarctic Climate & Ecosystems Cooperative Research Centre, Hobart, Tasmania.

Case Study – Impacts on agriculture

Grazing - The yields from extensive grazing systems are affected by the prevailing temperature, rainfall, evaporation and radiation conditions, as well as the concentration of carbon dioxide in the air. Simulations of extensive grazing systems using phalaris or sub-clover pasture at Tunbridge under the high emissions scenario show that yields are projected to increase until mid-century due to warmer temperatures, then plateau. The increase in yields occurs mainly in spring and a small increase in autumn, with a decrease in summer yields. Changes to feed quality are also likely, with a decrease in protein content due to elevated carbon dioxide concentrations. These changes would affect farming practices such as the choice of species and cultivar and timing of operations by the second half of the century.

Wheat - Simulations of wheat cropping at Tunbridge (assuming the Tennant cultivar is grown, fertilizer is applied using current practice and no new technology is developed) suggest that yields could be expected to decrease slightly from now until the end of the century (by less than 10%). This is at least partly due to an increase in nitrogen stress, placing a larger demand for fertilizer. Given adequate irrigation and nutrient management, there is a potential for a 10-15% increase in yields. There is also a shorter time to maturity meaning less growth prior to flowering.

Berries, fruits & nuts - Chilling affects the growth and flowering of berries, fruits and nuts. Accumulated chill hours decrease given the warming under the two future climate scenarios. Under the A2 scenario, accumulated chill hours at Campania reduce from around 2500 hours annually, to around 1700 hours by the end of the century.

(Antarctic Climate and Ecosystems, 2011 – A2 emission scenario)

4.3 Development & Environmental Services

Climate change risks have implications for council's role in planning and development approval, particularly in relation to possible litigation if risk to property from climate change related disasters are not adequately identified or communicated.

In relation to changes in flood and bushfire risk from a warming climate, planning scheme overlays should be developed to incorporate scientific data and modelling to appropriately guide development in flood prone areas and in areas with high fire likelihood.

In the current planning scheme, the Bushfire-Prone Areas Code overlay covers the majority of the municipal area. It ensures that use and development is appropriately designed, located, serviced (by water supply) and constructed to reduce risk to human life, property and cost to the community. The overlay does however lack detail. It is limited by lack of specific data and modelling for bushfire likelihood and behaviour in relation to conditions expected due to climate change. For informed decisions to be made, modelling input data could include: vegetation flammability; projected fire season length; slope; ignition potential; and suppression capability.

In terms of flood risk, the Flood Prone Hazard Areas Code overlay in the current planning scheme is based upon historic known flood inundation data. Identified areas at risk of flooding occur along the Jordan, Coal and Blackman Rivers, however, smaller waterways in proximity to development areas e.g. Bagdad Rivulet, should be considered in terms of potential risk to property in relation to planning decisions made by Council staff.

There is currently no state-wide mapping of areas potentially susceptible to flooding risks, and no flood modelling specific to the rivers and waterways of the Southern Midlands has been undertaken. This leaves council in a vulnerable situation, because according to climate change scenarios, previously unforeseen inundation events are likely to occur.

This situation will be addressed by the Tasmanian Flood Map Project, a 3 year project that began in October 2018, jointly funded by the Australian and Tasmanian governments. This project will:

- ensure that most communities will have access to a high resolution digital terrain model through the collection of light detection and ranging (LiDAR);
- develop the Tasmanian Flood Map to support a flood risk assessment, and the development of land use planning and building controls;
- partner with local governments to undertake detailed flood studies and evacuation planning for the communities most at risk of flooding.

The project was developed following severe floods in 2016, which made it clear that it is critical to have an understanding of flood risks to enable investment in recovery and increase community resilience to future flood events.

Development & Environmental Services adaptation actions and treatments

Risk code link	Adaptation Action	Responsibility	Relevant Council document	Original risk level	Treated risk level
F13	**Stay engaged with the Tasmanian Flood Map Project in relation to outputs specifically relevant to the Southern Midlands to improve the flood-prone areas mapping overlay.**	DES staff	Planning Scheme, Risk Register	High	Moderate
F14	**In order to reduce flooding risk to properties along Bagdad Rivulet, seek grant funds to remove willows from the rivulet and to revegetate with natives.**	DES & NRM staff	Risk Register	Moderate	Low
B5	**Push for bushfire modelling in relation to climate change projections to achieve higher resolution to the bushfire prone areas overlay to assist in making better informed planning decisions, to minimise risk to life and property.**	DES staff	Planning Scheme, Risk Register	High	Moderate
B5	**Education/advocacy - increasing awareness on the importance of fuel reduction at the appropriate time of the year or when conditions are favourable.**	Emergency Management Committee	Emergency Management Plan, Council & Community Newsletter, Abatement Notice Provisions, Risk Register	High	Moderate
B5	**Become more proactive in issuing hazard abatement notices in relation to longer dry spells and bushfire risk.**	Emergency Management Committee, Works Manager	Emergency Management Plan, Council & Community Newsletter, Abatement Notice Provisions, Risk Register	High	Moderate
B5	**Control bushfire prone vegetation around council & community assets.**	Works Manager	Emergency Management Plan, Risk Register	High	Moderate

4.3.1 Environmental Health

Council's role in regard to environmental health may include: aged care, child health, special needs care, supported accommodation and counselling and support services. Climate change has many implications for community health. Gradual shifts over time in temperature, humidity and rainfall patterns can create ideal conditions for disease vectors, such as mosquitos, in areas where there was no previous exposure. Direct impact of extreme events such as bushfire

and heatwaves can result in emergency services and community support services being stretched beyond their capacity. There is now an established link between extreme heatwaves and an increase in mortality in vulnerable sectors of the community.

Severe seasonal conditions such as drought lead to tough environmental and economic situations for farmers, which can result in more widespread mental illness, depression and suicide. Councils have an important community role in promoting and maintaining links to relevant support services in times of hardship.

4.4 Natural Resource Management

The natural resource management (NRM) role at Southern Midlands Council is focused on management of local reserves, protecting local biodiversity, managing threats such as weeds, and running community programs e.g. revegetation through the Midlands Tree Committee.

The natural environment of the Southern Midlands is under pressure as evidenced by the obvious signs of tree dieback, soil erosion and saline affected areas. Pressures on the environment are being exacerbated by a shifting climate. This is supported by weather data demonstrating that average annual rainfall is in decline. Long spells with little or no rain are becoming common which, at times, stretches water resources for farming and the environment to breaking point. The high prevalence of threatened vegetation communities and threatened species listings in the Southern Midlands also suggest that land use, fragmentation of natural vegetation, and environmental change are taking a toll.

The climate change we are now experiencing is occurring relatively rapidly. In natural vegetation communities this change is likely to favour some species and disadvantage others. A possible outcome is loss of vulnerable species and changes in structure, function and composition of vegetation communities. Additionally, exacerbated threat to vegetation communities may occur through proliferation of weeds which may be favoured by changing temperature and rainfall conditions. Direct physical impacts on natural systems may also be exacerbated under climate change, for example, rivers and streams are likely to experience flood flows at levels not seen before, creating vulnerability to erosion in riparian areas.

There may be a need to refocus NRM activities in the future away from addressing issues in isolation to a strategic approach that is well informed about landscape-scale ecological processes. This approach will enable limited resources to be deployed wisely and in ways that address several issues, for example, revegetation in conjunction with landscape connectivity priorities.

Southern Midland's priority adaptation actions, and identified treatments, in relation to natural resource management are presented in the table below.

NRM adaptation options & treatments

Risk code link	Adaptation Action	Responsibility	Relevant Council document	Original risk level	Treated risk level
H2	**Increase resourcing for recognition, mapping & treatment of existing & new weed incursions, including review of which herbicide is used.**	NRM	Southern Midlands Weed Management Strategy, Risk Register	High	Moderate
H3	**Work in collaboration with key stakeholders to ensure that Council is well positioned to access funding to protect and maintain high priority vegetation communities and threatened species.**	NRM	Natural Resource Management Strategy	High	High
H3	**Undertake natural values assessments for landowners and provide advice on management options in regard to important conservation values and environmental threats.**	NRM	Natural Resource Management Strategy	High	Moderate
F10	**Raise awareness amongst riparian landholders on the likelihood of more significant floods and options for minimising riparian erosion (e.g. riparian revegetation).**	NRM	Natural Resource Management Strategy	Moderate	Moderate
F11	**Provide advice to landowners and recommendations on drought tolerant native plant species.**	NRM	Natural Resource Management Strategy	Moderate	Low
F9	**Work in collaboration with relevant stakeholders to understand emerging climate change impacts on agriculture and how they can be managed. For example, workshops of regenerative agriculture techniques, and drought tolerant (or hardy) species.**	NRM	Natural Resource Management Strategy	Moderate	Low
H3	**Obtain funding to continue the work of the Midlands Tree Committee.**	NRM	Natural Resource Management Strategy	High	Moderate
F8	**Obtain funding to continue to supplement the water level in Lake Dulverton as this is critical habitat for a range of species, particularly threatened migratory birds.**	Lake Dulverton Committee	Strategic Plan	High	Low
H3 F11	**Continue work to protect environmental values and understand issues affecting wildlife living at Chauncy Vale Wildlife Sanctuary.**	Chauncy Vale Management Committee	Chauncy Vale Joint Management Plan	High	Moderate

Case Study – Climate change and natural values

Wetlands - Wetlands and marshes in the municipality provide refuge for many species, including migratory birds. Lake Dulverton is home to the Greater Crested Grebe, a wetland bird whose numbers have declined significantly in recent years. Without intervention, its lake habitat is vulnerable to drying up.

Threatened species - One of the strongholds of the threatened Ptunarra Brown Butterfly is silver tussock grassland patches in the Southern Midlands. Mild winters enable the European wasp to overwinter, whereas in the past, winter conditions killed off this predatory species. These wasps pose additional pressure on this species. This is an example of the indirect effects of changing climatic conditions on biodiversity.

Grasslands – Areas of lowland temperate grasslands are present in the municipality, forming important native pastures and habitat to a range of species, many of them threatened with extinction. Some of the best remaining lowland temperate grasslands areas in Australia are found in the midlands. Climate change and increased CO_2 levels are predicted to change the species composition and nutritional values of grasslands for native species of mammals and invertebrates (as well as for livestock), including favoring the invasion of invasive species.

Source: Department of Primary Industries, Parks, Water and Environment, Resource Management and Conservation Division (2010).Vulnerability of Tasmania's Natural Environment to Climate Change: An Overview. Unpublished report. Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania. Image: tasmanianplants.com

4.5 Emergency Management

As the closest level of government to the community, together with having a responsibility for the wellbeing of their community, councils have an important role in emergency management. Although councils are not a provider of emergency services, council functions in relation to emergency management include:

- provision of recovery centres and relief services during emergencies or disasters;
- provision of resources and information to emergency service teams such as Tasmania Fire Service and the SES;
- informing the community of the current situation, developments and ongoing prognosis during emergency events; and
- local emergency planning and development of mitigation options using risk analysis, prioritisation and treatment approaches.

Emergency management planning may be coordinated through a special council committee who have the role of preparing and reviewing a municipal emergency management plan. For Southern Midlands Council, Climate Futures for Tasmania defined extreme events in relation to heat waves, extended dry spells, extreme rainfall and flooding as being of particular relevance to the municipal area. Extreme events and associated emergencies are likely to increase due to climate change resulting in resources for emergency management being stretched.

Of particular relevance in relation to increasing bushfire threat is council's, and the community's, capacity to fight fires in the face of diminished water resources. Water stress is becoming commonplace in the Midlands due to rising average temperatures, declining annual rainfall and greater evaporation.

The likely increasing call on emergency management capacity highlights the importance of regular review of council's risk register in relation to updated scientific projections on climate change trends and the associated implications at a local level.

Emergency Management adaptation actions & treatments

Risk code link	Adaptation Action	Responsibility	Relevant Council document	Original risk level	Treated risk level
	Develop and/or review and Action Document that spells out clearly all the procedures necessary to efficiently set up a recovery centre and subsequent emergency response actions.	Emergency Management Committee	Action Document – Establishment of Recovery Centres in Southern Midlands; Emergency Management Plan	High	Low
	Increase fire-fighting units and infrastructure in relation to increasing fire risk.	Emergency Management Committee	Emergency Management Plan, Risk Register	High	Moderate
	Task each fire brigade to undertake an assessment of water resource availability - to ensure there is adequate capacity to deal with large bushfires during dry spells.	Emergency Management Committee; fire brigades	Emergency Management Plan, Risk Register	High	Moderate
	Collaborate with Tas Fire Service and other organisations (including other councils) to review the adequacy of bushfire management plans.	Emergency Management Committee	Annual Plan, Risk Register	High	Moderate
	Advocate to both Telstra and higher tiers of government the necessity to eliminate mobile phone black-spots in areas vulnerable to bushfire to ensure communications reliability during a crisis.	Emergency Management Committee; elected members	Emergency Management Plan, Risk Register	High	Low

5.0 Stakeholder Involvement & collaboration

Climate change projections are likely to impact either directly or indirectly on all aspects of council function. Further to this, impacts are likely to be felt throughout the community affecting other organisations that council has involvement with. A collaborative adaptation response between all stakeholders is therefore essential for council to maintain its service level in a changing climate. It is important that linkages between organisations are identified, that there is awareness of what each other is working on, and that duplication of efforts is avoided wherever possible.

In order for there to be clear understanding of roles and responsibilities in relation to management of the identified climate change risks, together with recognition of opportunities to develop or strengthen existing collaborations, the stakeholders listed below are considered to be important.

5.1 Department of State Growth

State Growth provides infrastructure and related services for the social and economic development of Tasmania. By providing a strategic approach to the provision of both physical infrastructure and regulatory frameworks, State Growth aims to:

- Enhance infrastructure decision-making across Government;
- Facilitate a safe, sustainable and efficient transport system that enhances economic and social development, in the context of the challenges of climate change, and
- Promote reliable, efficient, safe and sustainable energy systems.

State Growth acknowledges that the impacts of a changing climate are highly varied, but notes there are impacts more likely to affect the serviceability of the state road network, the key threatening impacts being: increased intensity of rainfall events; sea level rise; and storm surge. State Growth is considering a whole-of-asset risk assessment to identify those sections of the road network more at risk from the effects of climate change over the next 20-40 years for road infrastructure, and 100 years for bridges.

State Growth will continue to support and sponsor collaborative research and the development of tools and applications. In terms of projects, State Growth has co-funded several climate change related projects, including:

- Climate Futures Tasmania – Infrastructure (CFT-I);
- Greenhouse Gas Assessment Workbook for Road Projects – Transport Authorities Greenhouse Group (TAGG), and
- 'Carbon Gauge – Calculating the Greenhouse Footprint of Roads'.

5.2 Dept. Primary Industries, Parks, Water & Environment (DPIPWE)

DPIPWE have several programs in relation to climate change adaptation, the one most relevant to the Midlands is 'The Natural Systems Resilient to Climate Change Project'. Key elements of the Project are:

- Vulnerability of Tasmania's Natural Environment to Climate Change, DPIPWE (2010);
- spatial layer predicting spread/occurrence of WONS (weeds of national significance) in the future;
- spatial layer predicting areas that are not vulnerable to the root-rot fungus (*Phytophthora cinnamomi*);
- spatial layer as a predictor of biosecurity and disease issues related to the natural environment;
- spatial layer identifying fire 'refugia' i.e. areas in the landscape with low vulnerability to wildfire; and
- spatial layer highlighting past glacial 'refugia', i.e. where vegetation communities have contracted to in the past during changing climate.

5.3 MAV Insurance Liability Mutual Insurance (LMI)

MAV Insurance Liability Mutual Insurance (LMI) is the primary insurer for all of the councils in Southern Tasmania. Many of the Councils have identified LMI as their most critical risk management framework that should be considered in climate change risk management and adaptation planning.

LMI does not have a statutory obligation to manage climate risks. They do however have a general commitment to assist member councils in effectively managing their risks with a focus on continuous improvement. LMI has developed a broad range of manuals and guidance documents for its members, although not specific and limited to climate change. These documents and support materials may be made available on request.

LMI conducts a biennial audit on all its members, part of which is an Organisational Risk Management section. As part of this section we examine the comprehensiveness of risk assessments for 4 risk areas of council in some detail, one of which is climate change.

LMI also has an internal risk register that includes risks to the scheme from a key claims driver view as well as unusual, new and emerging risks. Climate Change is one of the risks, and is being monitored by the Risk Committee. LMI is unable to provide this risk register to Councils, as it is an internal document only.

LMI does not dictate to members about how they manage their risks. Recommendations and suggestions for improvements may be made, however they have neither the power nor the inclination to 'demand' changes.

5.4 Taswater

Taswater is the council owned water and wastewater corporation and is responsible for delivering water and wastewater services to the community and managing the associated asset base.

Taswater is beginning to actively manage climate change in its operations and strategic planning. This is primarily being driven by a recognition that climate change may compromise achieving level of service standards and since a commitment has been made to achieving service level provisions, the organisation must therefore adopt an adaptation response. The following actions have been implemented:

- Desktop risk register;
- Climate change strategy (mitigation and adaptation) with a view to develop precinct plans; and
- Policy to include climate change as a key part of corporate plan goals and actions.

In terms of collaboration in climate change adaptation and effective service delivery, Taswater has raised the following points:

- Loss of critical infrastructure around coast lines due to inundation as a result of sea level rise and storm surge is identified as a key climate change risk. Better consideration needs to be made when approving a development adjacent to the coast or creek where adequate setback for water and sewer infrastructure may not be provided to ensure protection from erosion/inundation.
- Reduced water availability is identified as a key climate change risk and better collaboration needs to be achieved in setting growth boundaries around towns so that population limitations are set within the sustainable yield profile of the drinking water catchment and/or reservations are put in place for additional drinking water catchments.
- Better management of bushfire risk needs to be achieved, allowing for approval of critical asset protection measures (e.g. creating buffers around pump stations) within council planning.
- Bushfire management is a key strategic risk as it has huge effects upon drinking water catchments, service provision, abnormal demand management spikes, hydrant performance, and power outages to water and wastewater infrastructure. Council and TFS could jointly help manage these risks with Taswater in a number of ways.

5.5 State Emergency Services (SES)

The State Emergency Services is the statutory authority that coordinates emergency management responses state-wide. It is a division of the Department of Police and Emergency Management and is comprised of both paid staff and volunteers. It has four core functions that are set out in the Emergency Management Act (Tas) 2006 s.26 as follows:

- The provision of advice and services relating to emergency management in accordance with emergency management plans or as otherwise authorised by the State Controller or Minister in writing provided to the Director SES, other than the provision of a service provided by another statutory service.
- The provision of services relating to rescue and retrieval operations as authorised by the Minister or State Controller.
- The provision of administrative services for the State Committee and each Regional Committee, including support in the preparation and review of emergency management plans as required by the State Committee and Regional Committees.
- The recruitment, training and support of volunteer members of the State Emergency Service.

Local Government is an important stakeholder in the delivery of emergency management responses and planning. It is identified in key SES documents and plans that set out the key roles and responsibilities of stakeholders. Pursuant to section 34 of the EMA each Council must: prepare an Emergency Management Plan: review the EMP every 2 years; appoint an emergency management coordinator and establish and maintain voluntary units.

The SES's response to climate change, through the 'Natural Disaster Resilience Program and other funding programs, has been to fund and engage in research initiatives that identify and seek to quantify key climate risks as they apply across Tasmania, including:

- Climate Futures Tasmania – Bushfire.
- Climate Futures Tasmania - Extreme Events.
- Clarence City Council study into the effect of sea level rise – this was the precursor to the current work that CCC has undertaken.
- Tasmanian Extreme Wind Hazards Stand-alone Tool (TEWHST).
- State Framework for natural hazards and Land Use Planning Project.

The SES is the custodian of a significant body of climate change data as a result of its involvement in the Climate Futures Tasmania project and collaboration with Geoscience Australia (Extreme Wind Hazard Project). Opportunities exist for the utilisation of this data to inform local, regional and state emergency management planning.

5.6 Tasmania Fire Service (TFS)

Tasmania Fire Service (TFS) is participating in research and modelling for bushfire. The research being conducted includes, looking at current bushfire risks and assessing current prediction tools to determine modelling for the future. This research will have a bearing on issues such as:

- resource to risk modelling;
- community protection planning;
- bushfire prediction tools;
- bushfire weather modelling;
- prescribed burning modelling; and
- fire management planning.

TFS also participated in the Climate Futures for Tasmania Project, especially the 'Extreme Events' component. TFS will use this to map a pathway forward for future strategic planning.

Currently, TFS is reviewing the State Fire Protection Plan in which the above issues are called up. Additionally, as part of another review process, TFS is incorporating these developed strategies into its operational corporate plan.

From TFS's perspective the relationship with local government will be important, if not critical for future directions in climate change. Through the State Fire Management Council (SFMC), TFS will engage with local government to ensure they are consulted regarding climate change and bushfire risk into the future. SFMC is currently lobbying State Government for funding to assist with additional programs to develop strategies for vegetation management for the mitigation of bushfires. This also includes legislative changes. This program will include climate change contingencies as part of the planning process. LGAT are an identified key stakeholder in this program and will be consulted throughout the development of this strategy. SFMC provides a forum for local government to work with TFS and other land management agencies in relation to climate change and bushfire mitigation.

TFS will need to work closely with local government for the development of fire management planning, prescribed burning programs and development planning, especially in bushfire prone areas.

6.0 Adaptation Plan Implementation

The implementation of this Plan requires a co-ordinated approach, both across council business, in partnership with other councils, and with external stakeholders. Key components of implementation include:

- a consistent process for adaptation plan endorsement by all councils of the region;
- a logical way for incorporation of key local risks and adaptation actions into council documents and processes such as risk registers, strategic plans, annual plans or asset management plans; and
- an appropriate mechanism to implement sub-regional and regional adaptation actions either through advocacy or collaboration.

Implementation of the adaptation actions in this plan may provide Southern Midlands Council with a buffer to the challenges posed by climate change. Effective implementation does not mean 're-inventing the wheel', to the contrary many of Council's current activities/operational practices can be modified to assist in managing future climate variability. To this end, it is that outcomes from the risk assessment process used to support the development of this Plan are integrated with other Southern Midlands Council risk management and planning activities.

It is important that management play a role in Plan implementation by remaining engaged and assuming responsibility for implementing adaptation actions.

6.1 Financial & resource requirements

Financial and resource availability are critical factors for enabling implementation of adaptation actions. The adaptation options identified in this Plan will come at varying degrees of cost and resource requirement. It is likely that Southern Midlands Council will initially support implementation of those adaptation actions which are cost effective and align with current resource capacity and availability. Implementation of these actions will enable Council to gain some initial momentum in responding to impacts posed by climate change.

It is important to recognise that not all climate change action within Council will require its own funding, but will become embedded in the operational business of Council through appropriate governance arrangements, planning and policy. Notwithstanding this, some of the more complex adaptation options will require substantial financial support and resources. For these actions, pursuing grant funding and establishing partnerships for collaborative or common actions can be effective in reducing the overall cost of action for Council, enabling the full cost of action to be offset.

6.2 Strategic Priorities – incorporation into other documents & processes

Strategic priorities are broad level climate change adaptation actions that do not specifically address a particular area or risk and fall across numerous Council service areas. Success of such actions is dependent on management support. Implementation of strategic actions will provide Council with a solid framework in climate change adaptation and will build an internal culture that supports the implementation of the more specific adaptation actions described earlier. Strategic priority examples are provided in the following Table:

Broad level climate change adaptation actions that may be implemented across Council (Strategic Priorities)

Strategic Priority Description	Reasoning
Integrate climate change risk management into existing Council wide risk assessment framework.	Climate change risks should be incorporated into Council's existing risk management processes. From a process point of view this will ensure that climate change risks continue to be properly addressed.
Assign a climate change officer to oversee implementation of this Plan.	A representative from Council is recommended to be assigned to oversee the implementation of actions outlined in the Plan.
Consideration of climate change risks and impacts during the development of other Council strategies, policies and plans.	The climate change impacts and risk process outlined throughout this adaptation action plan should be considered in the development of future plans, policies and strategies to ensure that these issues are incorporated throughout all of Council's service areas. This will also ensure there are mechanisms for actions to be implemented.
Support the STCA in engaging with relevant State Government departments to identify and address gaps in planning instruments, policies, funding and legislation.	State Government has a significant influence over planning and policy at the local Government level. By engaging state government and establishing clear lines of communication, Southern Midlands Council, in partnership with the STCA, may be able to inform and influence relevant State Government departments to assist in local climate change impact adaptation.
Integration of adaptation action plan and greenhouse gas mitigation measures to prioritise projects that have dual benefits.	Ensure that future emissions are considered in the decision making process of prioritising adaptation actions. Often dual benefits can be achieved for climate change mitigation and adaptation.
Report on climate change adaptation progress into any future publicly available documents or reports.	Reporting on climate change adaptation progress will assist in engaging the community and informing other Councils on Southern Midlands Council's progress.
Consider developing climate change related KPI's which would be reported on through Council's annual report.	Consider developing climate change related Key Performance Indicators (KPI's) which would be reported on through Council's annual report.
Ensure that the projected impacts of climate change are properly considered in Council's emergency management planning.	Emergency response plans should be investigated, developed and implemented considering the best available climate change projections. Up to date emergency response procedures can minimise consequences when extreme events occur.
Where required, support the implementation of the Regional Councils Climate Change Adaptation Strategy.	Administered through the STCA, the Regional Councils Climate Change Adaptation Strategy aims to drive adaptation in local government for the region and deliver on a number of common actions that are relevant to its member councils. The success of this strategy is dependent on a high level of buy in from each of the Councils across Southern Tasmania.