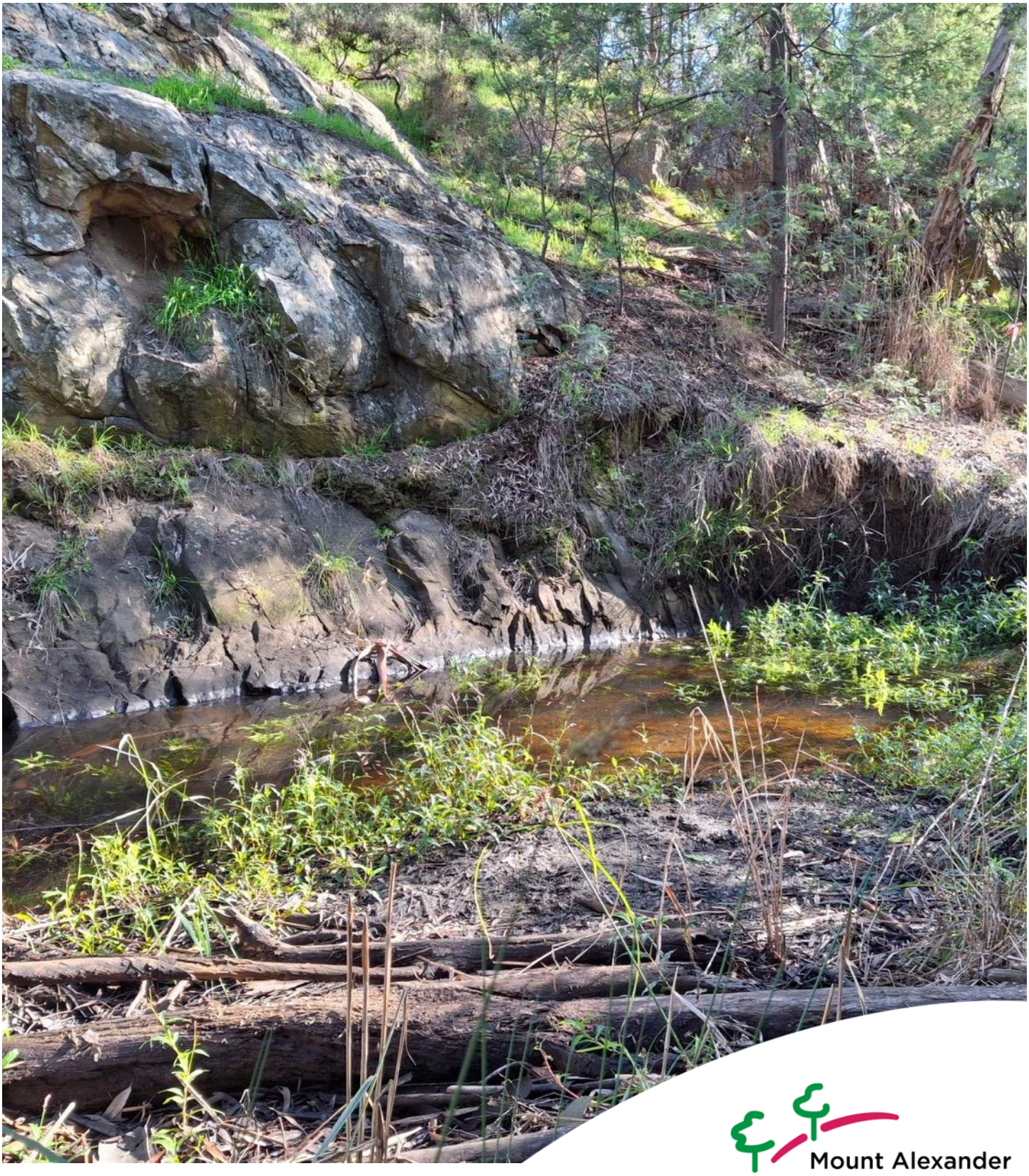
Mount Alexander Shire

Background paper

Biodiversity Strategy

Working together for a healthy, connected shire



Mount Alexander Shire Council

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1 Introduction

1.1 Project overview

Mount Alexander Shire Council engaged RMCG to develop a Biodiversity Strategy that provides clear direction for protecting and enhancing biodiversity in the shire. The strategy will replace the existing Environment Strategy and establishes a focused, stand-alone framework to guide future action.

This Strategy primarily guides Council's actions on Council-managed land and through Council operations, while identifying opportunities for Council to influence and advocate for broader landscape-scale biodiversity outcomes.

This Strategy brings together Council, Traditional Owners, the community and key stakeholders to define a shared vision and identify priority actions to improve biodiversity outcomes across urban and rural environments.

The key objectives for the development of the Biodiversity Strategy are to:

- Define a clear and shared vision for biodiversity protection and enhancement
- Identify priorities for Traditional Owner empowerment, community engagement and on-ground action
- Develop and implement a communications and engagement approach that keeps people informed and enables meaningful participation from community and stakeholders
- Align the strategy with relevant policies, plans and programs across agencies and organisations
- Establish an action plan with clear deliverables and a framework for implementation and review.

1.2 Purpose of this report

The purpose of this report is to provide an overview of:

- Our approach to developing the Biodiversity Strategy
- Policy and legislative context that guides how biodiversity is considered and managed
- Stakeholder overview
- Environment contextual information
- Biodiversity assets and values across the shire
- Pressures on biodiversity
- Recommendations for the Strategy.

This report, in conjunction with the community consultation report has informed the development of the Biodiversity Strategy for Mount Alexander Shire Council. It can also be used to inform annual implementation planning.

1.3 Definition of biodiversity

Biodiversity encompasses all components of the living world: the number and variety of plants, animals and other living things, including fungi and micro-organisms, across our land, rivers, coast and ocean. It includes the diversity of their genetic information, the habitats and ecosystems within which they live, and their connections with other life forms and the natural world (DELWP, 2017).

2 Approach to developing the Biodiversity Strategy

2.1 General overview

The Biodiversity Strategy has been developed through an evidence-based and collaborative process. The first stage involved preparing this Biodiversity Background Paper, which brings together available biodiversity data, mapping, policy and legislative context, and information on the key values, threats and opportunities across Mount Alexander Shire.

This evidence base supplements an extensive consultation process involving Traditional Owners, community members, environmental volunteer groups, schools, government agencies, Councillors and Council staff. Feedback from this engagement helped identify community values, priorities and aspirations for biodiversity and informed the development of the goals, outcomes and actions contained in the Biodiversity Strategy.

2.2 Guiding principles

The following principles were used to guide the development of the Biodiversity Strategy.

Biodiversity actions will be data driven and evidence-based

The Strategy will be guided by the best available ecological data and scientific evidence. It will align with relevant biodiversity and governance policy and legislative requirements (e.g. The Environment Protection and Biodiversity Conservation Act 1999).

The Strategy will align with the Community Vision

The Strategy will reflect the Community Vision 2021–2031. It will support a healthy environment, climate action and care for Country. The Community Vision is as follows:

> *In 2031, our community is connected to each other, and comes together to build and celebrate an inclusive, creative shire.*
>
> *We are a healthy community that values the natural beauty of the Djaara Country we live on.*
>
> *We also know that preserving our natural environment means living sustainably and caring for country.*
>
> *We are protecting our shire from the threat of climate change by working together at the local level.*
>
> *We are a welcoming community where everybody has access to services and supports, and opportunities for housing, education, employment and creative and social pursuits.*
>
> *We're known as a vibrant place which draws upon its creative spirit and shared heritage.*
>
> *We're building a place where everyone can enjoy the beauty, history and friendliness of the shire.*

It will recognise Traditional Owner knowledge

The process will respect and incorporate Traditional Owner knowledge, values and aspirations for caring for Country, in accordance with Indigenous Cultural and Intellectual Property (ICIP) protocols and consistent with Council Plan priorities.

The process will enable meaningful community input

Engagement will be clear, inclusive and accessible, in line with the MASC Community Engagement Policy and the community engagement principles of the Local Government Act 2020. The policy notes that Council may undertake community engagement on a variety of issues that are not specified in the Local Government Act 2020 where the community can influence a project or outcome. This may include the development of Council strategies that guide future decision-making and service delivery, where appropriate.

Open and transparent decision-making

The process will clearly explain how community input informs decisions, consistent with the Local Government Act 2020 requirement to communicate how engagement influences Council decision-making.

The Strategy will take an integrated approach

The Strategy will align with Council plans, policies and regional priorities, including the Council Plan and the integrated planning principles of the Local Government Act 2020.

We will prioritise feasible and impactful action

The Strategy will focus on realistic and achievable actions, prioritised based on ecological impact, feasibility, available resources and risks, consistent with the Local Government Act 2020 strategic planning principles.

The Strategy structure and design will support monitoring and adaptation

The Strategy will include mechanisms for monitoring, reporting and review, in line with the Local Government Act 2020 requirement for ongoing evaluation and adaptation.

2.3 Consultation

Mount Alexander Shire Council undertook an intensive engagement process throughout the development of the Strategy. The community's strong interest in and knowledge of biodiversity throughout the municipality was recognised, and the engagement process was designed to capture as much local knowledge and insight as possible. Despite multiple attempts, Parks Victoria and Taungurung Land and Waters Council were unable to be engaged during the Strategy's development.

Table 2-1: Summary of consultation to inform the draft Biodiversity Strategy

Engagement opportunities		Date (2026)
1	Councilor and Executive Team workshop	29 April
2	Nalderun	13 May
3	Council staff workshop	6 May
4	Agencies and authorities'	8 May
5	DJAARA and DJANDAK	21 May
5	Community event (open to the public)	22 May
6	Survey open throughout the draft development stage	May - June
7	Castlemaine drop-in session – Market Building	23 May
8	Castlemaine secondary school – Outdoor Environmental Studies class	26 May
9	Maldon drop-in sessions	30 May
10	Environmental volunteering group president / chair workshop	3 June

11	Council Youth Advisory Group	3 June
12	Online community workshop (for those who could not attend in person)	4 June
13	Council staff workshop	10 June
14	DJAARA and DJANDAK	22 July

In addition to the consultation listed above, DJAARA have been an active member on Council's Biodiversity Strategy Internal Working Group, which includes representation from relevant Council business units and has been overseeing the development of the Strategy.

A separate consultation report has been prepared to demonstrate what we heard and how the feedback has been considered in the Strategy development.

2.4 Spatial analysis

The Biodiversity Strategy used an evidence-based spatial prioritisation approach to identify areas of highest biodiversity value, greatest threat and strongest opportunity for conservation and restoration outcomes. The approach draws on the best available data, mapping and science to support transparent, consistent and practical decision-making across the municipality.

Spatial analysis was be used to assess biodiversity values, threats, and connectivity. This analysis helped to identify priority areas to inform the development of the Strategy, stakeholder engagement and future implementation planning.

The spatial analysis was supplemented with further data and qualitative input received throughout the consultation period. Detailed methodology, criteria, data layers and mapping outputs are provided in Appendix 5.

3 Legislation and policy context

3.1 Mount Alexander Policy Context

3.1.1 Local Government Act 2020

The development of this Strategy has been guided by the requirements of the Local Government Act 2020. The Act establishes principles for strategic planning and community engagement that ensure Council strategies are evidence-based, aligned with the Community Vision, supported by appropriate resources and implementation arrangements, and responsive to changing circumstances through monitoring and review. It also requires Council to undertake meaningful community engagement by providing clear information, defining the scope and purpose of engagement, supporting participation and being transparent about how community input will inform decision-making. The relevant principles of the Act are outlined below.

The strategic planning principles are as follows:

a) an integrated approach to planning, monitoring and performance reporting is to be adopted;
b) strategic planning must address the Community Vision;
c) strategic planning must take into account the resources needed for effective implementation;
d) strategic planning must identify and address the risks to effective implementation;
e) strategic planning must provide for ongoing monitoring of progress and regular reviews to identify and address changing circumstances.

The community engagement principles are as follows:

a) a community engagement process must have a clearly defined objective and scope;
b) participants in community engagement must have access to objective, relevant and timely information to inform their participation;
c) participants in community engagement must be representative of the persons and groups affected by the matter that is the subject of the community engagement;
d) participants in community engagement are entitled to reasonable support to enable meaningful and informed engagement;
e) participants in community engagement are informed of the ways in which the community engagement process will influence Council decision making.

3.1.2 Strategic plans and policies

Mount Alexander Shire Council has a broad range of strategies, plans and management documents that contribute to biodiversity outcomes across conservation management, open space planning, infrastructure delivery, climate resilience and community wellbeing.

These documents recognise the importance of biodiversity, natural assets and environmental resilience at different scales and for different purposes, ranging from site-specific ecological management through to operational service delivery and broader strategic planning. While their focus and level of detail vary, common themes emerge across the documents relating to habitat fragmentation, climate impacts, competing land uses, operational constraints and the need for improved connectivity and environmental stewardship.

Table 3-1 groups the documents into four broad strategy types and summarises the key biodiversity-related challenges and opportunities identified across each category.

Table 3-1: Summary of MASC strategic documentation

Relevant strategies	Key challenges	Key opportunities
Direct biodiversity and conservation documents		
• Environment Strategy 2015–2025 • Climate Change Strategy • Roadside Conservation Management Plan 2024–2029 • Castlemaine Urban Waterways Management Plan (2018) • Castlemaine Botanical Gardens Flora and Fauna Reserve • Environmental Management Plan (2020) • Honeycomb Bushland Reserve Environmental Management Plan	• Fragmented and degraded native vegetation and habitat • Weed invasion and pest animal impacts • Water pollution • Altered hydrology and historic landscape degradation • Balancing conservation outcomes with recreation, infrastructure, fire management and operational activities • Climate change impacts on ecosystems and species • Long-term monitoring, data and restoration requirements	• Protect and restore high-value habitat and ecological corridors • Improve landscape connectivity across roadsides, waterways and reserves • Strengthen ecological restoration, revegetation and adaptive management • Integrate biodiversity into operational procedures and land management practices • Increase community stewardship, education and partnerships • Use natural systems to support climate resilience and environmental outcomes
Open space, recreation and landscape management documents		
• Public Open Space Strategy (2016) • Open Space Asset Management Plan (2021) • Active Transport Strategy 2023–2033 • Castlemaine Botanical Gardens Tree Succession Plan • Castlemaine Botanical Gardens Living Collections Plan (2022) • Urban Tree Policy 2023-2028	• Balancing recreation, sport, public access and environmental outcomes • Managing ageing landscapes and vegetation assets • Weed control and vegetation management gaps • Climate impacts on parks, trees and open space assets • Financial and service level constraints • Limited ecological and asset data	• Improve habitat connectivity through parks, trails and open space networks • Integrate biodiversity into urban landscapes and recreation spaces • Use climate-resilient planting and water-sensitive design approaches • Enhance canopy cover, natural character and ecological function • Improve environmental outcomes through upgrades to existing open spaces • Strengthen education and interpretation opportunities within public landscapes
Infrastructure and operational documents		
• Road Management Plan 2025 • Electric Line Clearance Management Plan 2025–2026 • Asset Plan 2025–2029 • Waste Management Strategy 2023–2033 • Economic Development Strategy 2024 • Draft Rural Land Use Strategy 2026	• Balancing biodiversity protection with road safety, fire management and infrastructure maintenance • Legislative and compliance requirements relating to vegetation management • Financial and operational constraints • Managing environmental impacts during works and maintenance activities • Integrating biodiversity considerations into existing asset and operational systems	• Embed biodiversity considerations into infrastructure planning, maintenance and renewal • Improve operational procedures to minimise environmental impacts • Align asset management with climate resilience and environmental outcomes • Use infrastructure corridors to support habitat connectivity • Improve vegetation identification, mapping and environmental data systems • Support circular economy and reduced environmental impacts

		through improved waste and resource management • Protect, improve and promote the health of Country
Broader strategic and community documents		
• Council Plan 2025–2029 • Municipal Public Health and Wellbeing Plan 2025-2029 • Tarrangower Tomorrow Community Plan (2021) • Reconciliation Plan 2023–2026 • Rating Strategy 2022–2027	• Responding to climate change and biodiversity loss • Balancing growth, infrastructure and environmental protection • Financial constraints and competing Council priorities • Embedding environmental and cultural considerations consistently across Council decision-making • Reducing health risks associated with climate change	• Strong community support for biodiversity, climate action and green infrastructure • Integrate biodiversity into community wellbeing, resilience and liveability outcomes • Strengthen partnerships with Traditional Owners and community groups • Support community-led stewardship and environmental action • Embed environmental values more consistently into strategic planning and governance • Align biodiversity outcomes with broader social, cultural and economic priorities

3.2 Other government policy

In addition to the local policy context, the Mount Alexander Biodiversity Strategy is also nested within a broader international, national, state and regional legislative and strategic context. The legislation and strategies relevant to the Biodiversity Strategy are listed in Table 3-2.

Table 3-2: Relevant legislation and strategies

Level	Legislation	Strategy / framework
International		▪ United Nations Framework Conventions on Climate Change Paris Agreement 2015 ▪ United Nations Sustainable Development Goals
Federal	▪ *Environment Protection and Biodiversity Conservation Act 1999*[1]	▪ Australia's Strategy for Nature 2024–2030
Victorian	▪ *Aboriginal Heritage Act 2006* ▪ *Catchment and Land Protection Act 1994* ▪ *Climate Change Act 2017* ▪ *Environment Protection Act 2017* ▪ *Flora and Fauna Guarantee Act 1988 and Fauna Guarantee Amendment Act 2019* ▪ *Local Government Act 1989* ▪ *Native Title Act 1993* ▪ *Planning and Environment Act 1987* ▪ *Traditional Owner Settlement Act 2010* ▪ *Victoria Wildlife Act 1975* ▪ *Water Act 1989*	▪ Victorian Planning Provisions (Local Planning Policy Framework) ▪ Protecting Victoria's Environment – Biodiversity 2037 ▪ Victorian Waterway Management Strategy 2013[2] ▪ Victoria's Climate Change Strategy 2026–2030 ▪ Planning for Biodiversity – Guidance ▪ Parks Victoria Strategic Plan 2026-2029
Regional		▪ Dhelkunya Dja (Healing Country) Plan 2014-2034 ▪ Djandak Wi (Country Fire) Strategy 2024-2034 ▪ Galk-galk Dhelkunya, Forest Gardening Strategy 2022 -2034

1 Under reform

2 Under review and update

		▪ Taungurung Country Plan 2021 ▪ North Central Regional Catchment Strategy 2021–2027 ▪ North Central Waterway Strategy 2014–2022 ▪ Coliban Water Biodiversity Benefits Strategy

4 Partners and stakeholders

4.1 Working in partnership with Traditional Owners

Background

Mount Alexander Shire is located on the Country of the Dja Dja Wurrung and Taungurung peoples. DJAARA and Taungurung Land and Waters Council (TLaWC) represent the Traditional Owners of their respective Country.

DJAARA and Taungurung Land and Waters Council have respective Recognition and Settlement Agreements with the Victorian Government under the Traditional Owner Settlement Act 2010, which recognises their rights and interests in land and provides a framework for joint management and land use activity agreements.

These legal frameworks recognise Traditional Owners as rights holders with distinct interests in land, water and biodiversity management. They establish requirements for consultation, agreement-making and, in some cases, consent for activities that may affect Country. Council must work in accordance with these frameworks and respect the rights, responsibilities and cultural authority of Traditional Owners in biodiversity planning and management.

Dja Dja Wurrung

Dja Dja Wurrung people refer to their Country as “Djandak”. Djandak encompasses land, water, plants, animals, people and culture, and the relationships between them. Caring for Djandak is a cultural responsibility and is closely connected to the health and wellbeing of Dja Dja Wurrung people.

The Dhelkunya Dja – Dja Dja Wurrung Clans Country Plan 2014–2034 provides the overarching direction for DJAARA's work. Dhelkunya Dja means “healing Country”. The Plan sets out Dja Dja Wurrung aspirations and obligations to care for Country and their pathways for the future.

The Country Plan includes nine interconnected goals. These cover Dja Dja Wurrung people, culture, cultural heritage, food and fibre, water, Country, economic development and the health of people and Country. DJAARA has developed a suite of strategies to implement Dhelkunya Dja.

Key strategies relevant to biodiversity include:

- Galk-galk Dhelkunya (Forest Gardening) Strategy 2022–2034, which guides the restoration and management of forest Country
- Turning 'wrong way' climate, 'right way' Climate Change Strategy 2023–2034, which sets priorities for responding to climate change and healing Country
- Dhelkunya Wi (Healing Fire) – Djandak Wi Country Fire Strategy 2024–2034, which guides the return and expansion of cultural fire
- Gatjin (Water) strategies and programs, which support the healing and management of water and waterways including Dhelkunyangu Gatjin (Healing Water) – Djaara Gatjin Strategy
- Nyauwi Mutjeka Renewable Energy Strategy, which sets out Dja Dja Wurrung aspirations for renewable energy and the energy transition
- Dja Dja Wurrung Joint Management Plan, which guides the management of six parks and reserves held as Aboriginal title and jointly managed by Dja Dja Wurrung and the State.

These strategies connect the management of biodiversity, water, fire, climate, culture and people. They provide an important basis for understanding Dja Dja Wurrung priorities for Djandak and for identifying opportunities for Council to work with DJAARA.

Taungurung

Taungurung Country extends across a large area of central Victoria, including part of Mount Alexander Shire. Taungurung understand Country as encompassing the sentient and non-sentient parts of the world and the relationships between them. Country is connected to Taungurung lore, culture, knowledge and identity.

The Taungurung Country Plan – Taungurung buk dadbagi provides the overarching direction for Taungurung aspirations for Country, culture and people. It includes goals for recognition and rights, access to and management of Country, cultural heritage, natural resources and economic development. It also seeks greater Taungurung involvement in decisions affecting Country.

The Taungurung Cultural Land Management Strategy provides a framework for putting these aspirations into practice. It focuses on strengthening Taungurung knowledge and cultural land management and increasing Taungurung leadership in healing and managing Country.

Supporting strategies and plans relevant to biodiversity include:

- Biocultural Diversity Strategy 2023–2026
- Cultural Water Strategic Plan
- Cultural Fire and Forest Strategic Plan
- Cultural Landscapes Strategic Plan – Private Land Acquisition and Management
- Taungurung Parks Ranger Program Strategic Plan.

These documents provide a framework for Taungurung leadership and participation in the management of Country. They connect biodiversity with cultural knowledge, water, fire and landscape management.

What this means for Council

Djaara and Taungurung people are not stakeholders in the management of Country. They have Traditional Ownership, with cultural authority and legally recognised rights and interests. This creates a fundamentally different relationship from Council's engagement with community groups, agencies and other stakeholders. Council should engage DJAARA and TLaWC early in planning and decisions that affect Country. This is a key principle of the Biodiversity Strategy.

The Country Plans and supporting strategies provide an important basis for understanding Traditional Owner priorities and identifying areas where Council's biodiversity work can support these aspirations. This includes opportunities to work together on biodiversity management, water, cultural fire, climate adaptation, restoration, monitoring and landscape management. It also includes opportunities for Traditional Owner-led projects, cultural land management, knowledge sharing, procurement and employment. Council should embed this relationship into the way it plans and delivers biodiversity work. Traditional Owners should have opportunities to influence priorities, shape projects and lead work on Country where appropriate.

Council must also meet its legal responsibilities under the Dja Dja Wurrung and Taungurung settlement agreements. This includes following the relevant Land Use Activity Agreement processes where they apply to Council activities or decisions on public land.

The Biodiversity Strategy provides an opportunity to strengthen Council's relationship with DJAARA and TLaWC and support greater Traditional Owner involvement in the planning, management and healing of Country.

4.2 Working with Government and community stakeholders

Council works with government agencies, community organisations, Landcare and Friends groups, environmental organisations, landholders and the broader community to protect and enhance biodiversity across Mount Alexander Shire.

These groups bring different responsibilities, knowledge, resources and capacity to biodiversity management. Government agencies have statutory and land management responsibilities. Community and environmental groups contribute local knowledge, volunteer effort, monitoring and long-term stewardship of important places. Landholders manage much of the land that supports biodiversity across the Shire.

Council's approach to engagement is guided by the Local Government Act 2020, Council's Community Engagement Policy and established public participation practice. The Local Government Act 2020 establishes community engagement as a core governance principle and requires councils to maintain a Community Engagement Policy.

Council's Community Engagement Policy uses the IAP2 Public Participation Spectrum to determine the appropriate level of engagement. The level of participation can range from informing and consulting through to involving, collaborating and empowering. The approach depends on the issue, the people affected and the level of influence they can have over the decision.

The Victorian Government Public Engagement Framework provides further guidance for public engagement. It promotes engagement that is meaningful, inclusive, transparent, informed, accountable and valuable.

For the Biodiversity Strategy, engagement provides a way to draw on local and technical knowledge, understand different priorities, coordinate activities and identify opportunities to work together. The approach to engagement consideres the role of each stakeholder, the decisions they could influence and opportunities for ongoing collaboration.

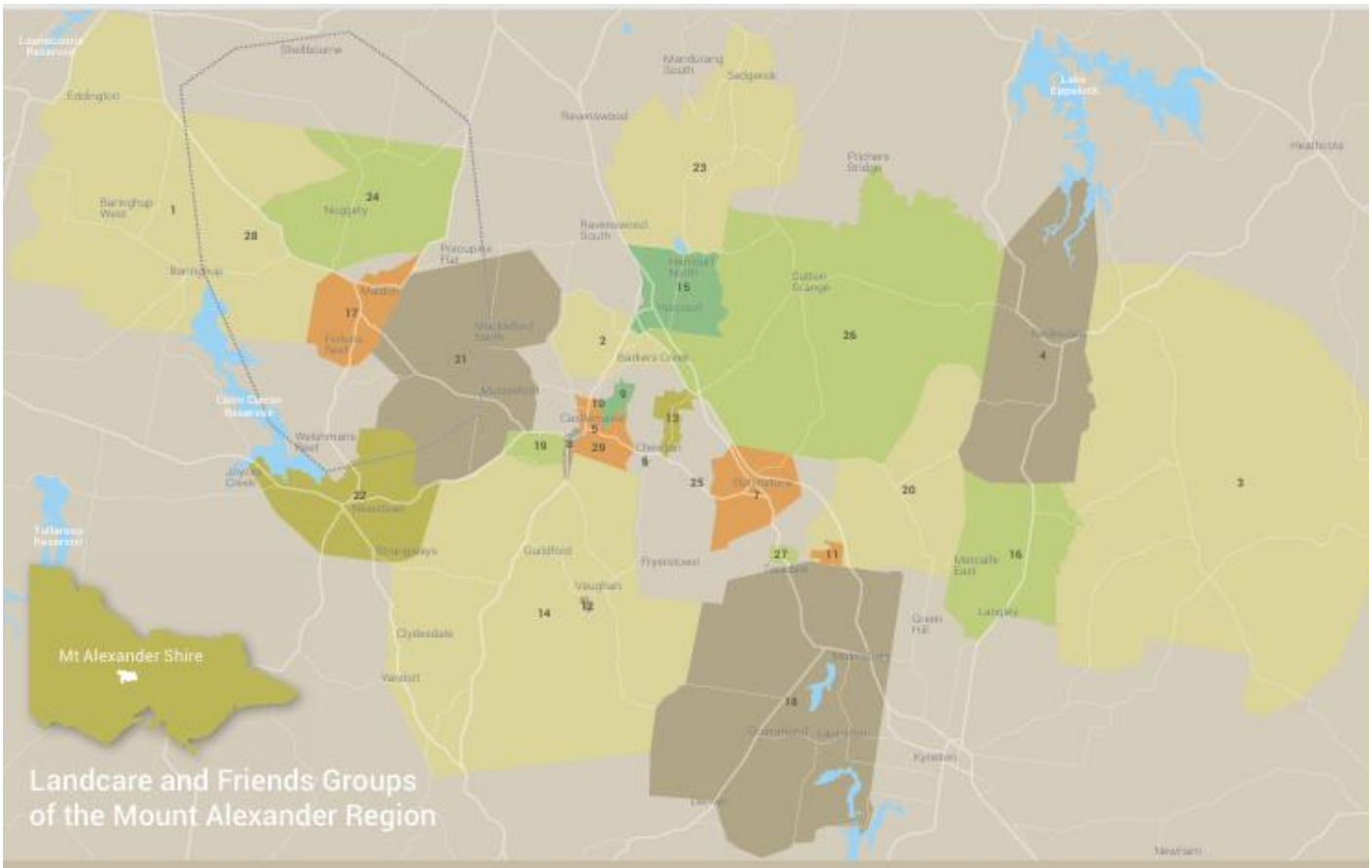
The following stakeholders have an important role in biodiversity management across Mount Alexander Shire:

Government agencies and public land managers

- Mount Alexander Shire Council and neighbouring councils
- Parks Victoria - Manages national parks, regional parks and conservation reserves within the shire. Responsible for protecting biodiversity values, managing threats such as weeds, pest animals and fire, and delivering conservation programs in parks and reserves.
- North Central Catchment Management Authority (North Central CMA) - Coordinates catchment-scale natural resource management and delivers projects that improve waterways, native vegetation and threatened species habitat. Current priorities in the shire include threatened fish recovery and habitat restoration projects.
- Coliban Water - Manages water supply infrastructure, including the Coliban Main Channel. Delivers environmental management works associated with water infrastructure and is increasingly exploring opportunities to improve habitat connectivity and biodiversity outcomes along the Main Channel corridor.
- Department of Energy, Environment and Climate Action (DEECA) - Responsible for statewide biodiversity policy, public land management, native vegetation regulation, threatened species conservation and bushfire management. Provides technical guidance, funding and regulatory oversight for biodiversity management.
- Goulburn-Murray Water (GMW) - Manages water storages, irrigation infrastructure and associated land. Biodiversity responsibilities relate primarily to the management of waterways, reservoirs and surrounding public land.
- V/Line - Manages rail infrastructure and associated land corridors. Rail reserves can provide important linear habitat and connectivity across the landscape and require ongoing vegetation management.
- VicTrack - Owns Victoria's rail land and has increasing involvement in biodiversity conservation, including biodiversity planning, vegetation management and data collection across transport corridors.
- Country Fire Authority (CFA) - Plays an important role in bushfire preparedness and recovery. Biodiversity considerations are increasingly being integrated into fuel management, fire recovery and ecological burning activities.
- Department of Transport and Planning (DTP) - Responsible for transport corridors and planning policy. Manages roadside vegetation along declared roads and influences biodiversity outcomes through transport planning and infrastructure delivery.

Community and non-government organisations

- Nalderun Education Aboriginal Corporation - A local Aboriginal organisation that supports cultural education, community connection and caring for Country initiatives, and provides an important local voice on environmental and cultural matters.
- Broad community and private landholders - Private landholders manage a significant proportion of native vegetation and habitat across the municipality and play a critical role in protecting and restoring biodiversity values.
- Community organisations and not-for-profit groups - A range of organisations contribute to biodiversity conservation through education, advocacy, restoration projects, citizen science and community stewardship activities.
- Connecting Country - A local environmental organisation that works with landholders, community groups and agencies to restore habitat, improve landscape connectivity and support community-led conservation initiatives.
- Biolinks Alliance - A regional partnership that focuses on large-scale habitat connectivity and ecological restoration across central Victoria through collaborative planning, mapping and on-ground projects.
- Trust for Nature - Works with private landholders to permanently protect important habitat through conservation covenants and stewardship support.
- Community Pest Management Groups - Support community-led and landscape-scale management of gorse, blackberries, serrated tussock and rabbits through advocacy, education and coordination.
- Landcare, Field Naturalists and Land Protection Groups - Mount Alexander Shire has more than 30 environmental volunteer groups that undertake on-ground conservation works, monitoring, education and advocacy. These groups play a vital role in biodiversity stewardship, contribute significant local knowledge and volunteer effort, and are important partners in the protection and enhancement of biodiversity across the municipality.



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Figure 4-1: Map of local Landcare and environmental volunteering groups. Source: Connecting Country

5 Environment context

5.1 Overview

Mount Alexander Shire sits within an ancient and diverse cultural landscape on Dja Dja Wurrung and Taungurung Country. For Djaara, Country is a living and interconnected system in which land, gatjin (water), plants, animals, people, Culture and ecological processes are connected. These landscapes have been actively cared for and managed by Traditional Owners over thousands of generations, shaping the ecosystems and biodiversity present today (DJAARA, 2022).

The Shire contains a diverse range of ecosystems, species and habitat types, including Box-Ironbark forests, grassy woodlands, native grasslands, waterways, roadside vegetation networks, urban bushland, remnant paddock trees and agricultural landscapes. Together, these environments support a rich diversity of native plants, animals and fungi and contribute to the ecological character and function of the region (MASC, 2020a; MASC, 2024).

These landscapes also hold significant biocultural values. Plants, animals, waterways and landscapes are connected to Traditional Owner knowledge, identity, cultural practices and responsibilities to care for Country. Culturally important plants provide food, medicine and materials, while healthy waterways, vegetation communities and animal populations support cultural practices and the continuation and transfer of knowledge. From this perspective, biodiversity conservation is connected to the health of Country and the ability of Traditional Owners to maintain and strengthen their cultural relationships with Country (DJAARA, 2022).

The landscape has been substantially modified since European colonisation through mining, clearing, agriculture, urban development and infrastructure, alongside the disruption of Traditional Owner land management. This has affected both ecological and biocultural values, including the abundance and distribution of culturally important species and opportunities to actively manage and care for Country. Many native vegetation communities now persist as fragmented remnants, increasing the importance of remaining forests and woodlands, waterways, roadsides, public reserves, scattered habitat trees and small patches of native vegetation as habitat, refuges and connections across the landscape (DJAARA, 2022; MASC, 2024).

Protecting and restoring biodiversity therefore involves consideration of both ecological and biocultural values. Maintaining healthy and connected ecosystems can support the recovery of native species and ecological processes while also creating opportunities for Traditional Owner knowledge, priorities and land management practices to contribute to healing and caring for Country.

5.2 Climate

5.2.1 Mount Alexander Shire's climate

Mount Alexander Shire has a temperate climate, characterised by warm summers and cool winters:

- The average annual maximum temperature is 19.9°C and the average annual minimum temperature is 7.8°C.
- During January and February, the average maximum temperature is approximately 28°C and the average minimum temperature is 13°C.
- During June and July, the average maximum temperature is approximately 12°C and the average minimum temperature is around 3°C[3].

Average annual rainfall is 599.4mm.

5.2.2 Climate change

Victoria's climate is already changing, with average temperatures increasing by around 1.2°C since 1910, and by around 1.4°C since the pre-industrial era. Cool season rainfall has declined across much of the state and the most extreme

[3] Based on data from the Castlemaine Prison, Bureau of Meteorology 2026

rainfall events have increased, especially short-duration extreme rainfall (DEECA, 2024). Heatwaves have become more intense, frequent and longer since 1950 and the number of hot days per decade has increased (Figure 5-1).

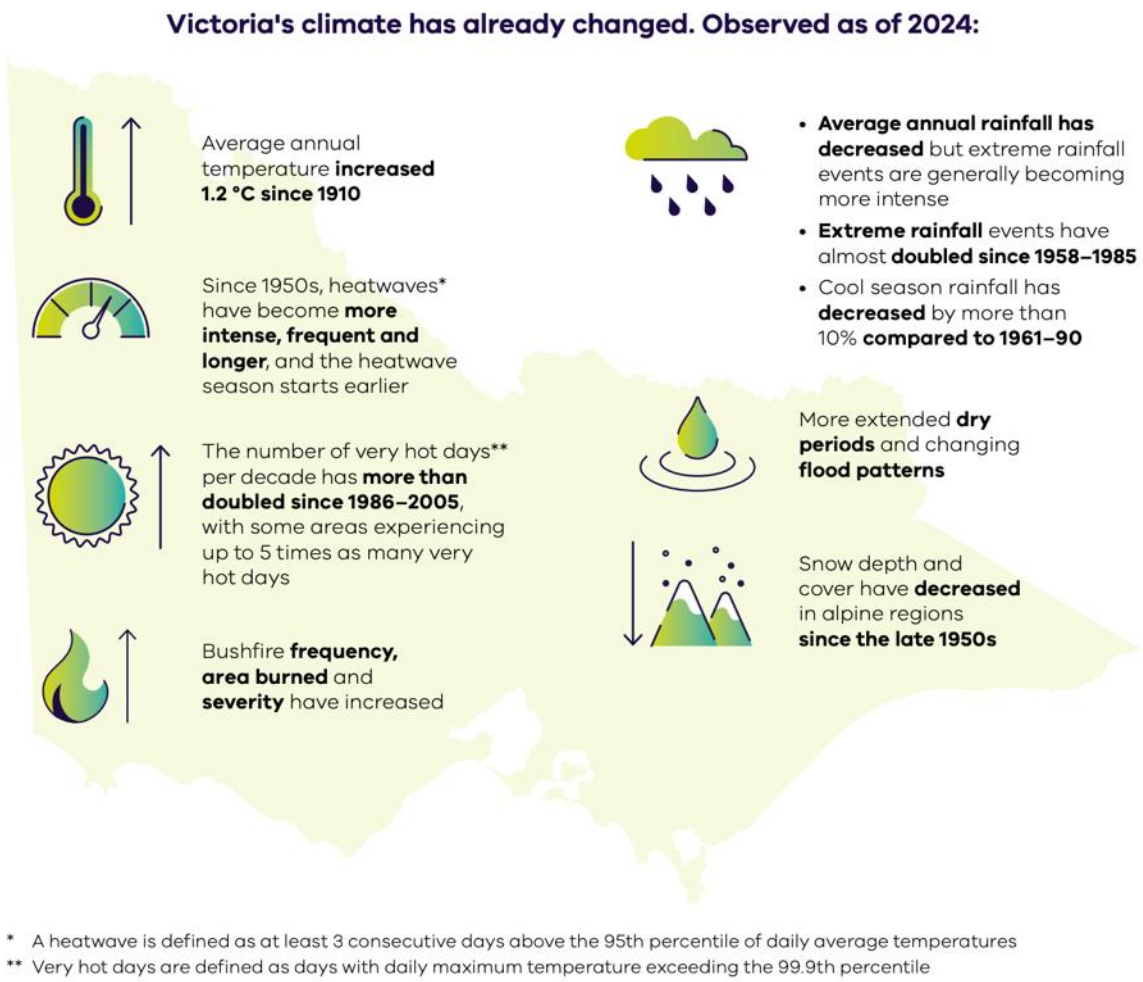


Figure 5-1: Observed changes in Victoria's climate (DEECA, 2024)

The changes that have already been experienced in Victoria's climate are predicted to continue and, in many cases, intensify in the future. Victoria's future climate will depend on the global emissions scenario. As climate science and modelling advances, the climate projections are improving. The projections for Victoria are based on the latest (sixth) generation of global climate modelling (CMIP6) under which the 'low emissions scenario' (SSP1-2.6) and 'high emissions scenario' (SSP3-7.0) have been prioritised to determine Victoria's future climate changes (DEECA, 2024). Under this modelling, key projected changes for Victoria include:

- Higher average temperatures in all seasons
- More frequent, longer and more intense heatwaves
- Fewer cool days and frost
- Reduced winter and spring rainfall and longer dry periods
- More intense short-duration rainfall events, increasing flash flood risk
- Increased bushfire weather and longer fire seasons
- Greater climate variability, with more frequent swings between drought, heat and flooding.

The projected changes in Victoria's climate under low and high emissions scenarios are summarised in Figure 5-2.

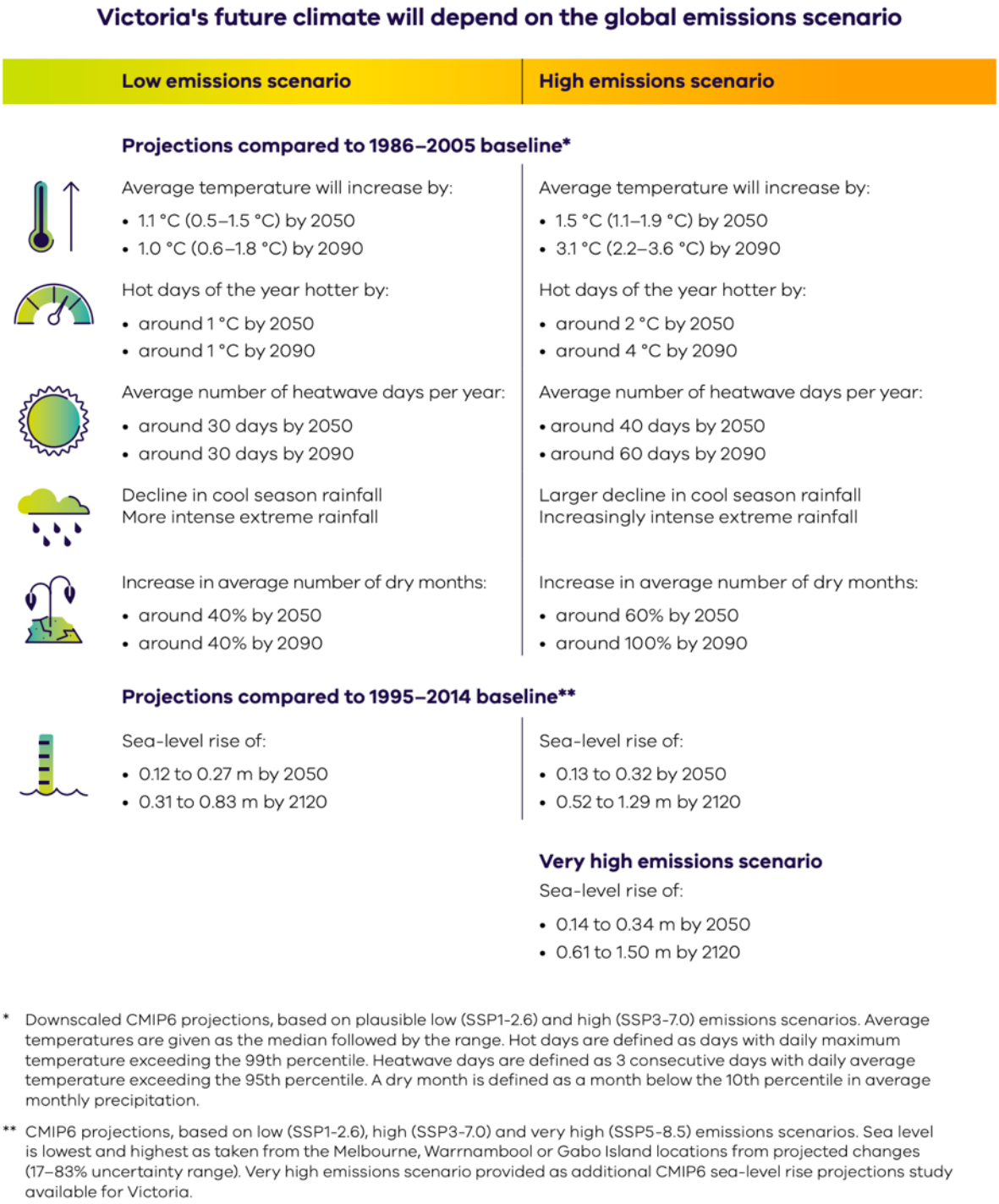


Figure 5-2: Victoria's future climate projections under low and high emissions scenarios (DEECA, 2024)

5.2.3 What this means for Mount Alexander Shire

Projected climate impacts are expected to be particularly evident in the Loddon Campaspe region through increasing heat, drying landscapes and heightened bushfire risk (Figure 5-3). By mid-century, Mount Alexander can expect:

- **Hotter conditions and more extreme heat**

  The region has already experienced an increase in temperatures since the 19th century and is projected to get warmer under all emissions scenarios. Heatwaves are projected to become more frequent, longer lasting and more intense. Bendigo has already experienced an average of 7.6 hot days (above 37.7°C) per year from 2003-2022, up from an average of 3-4 days per year from 1986-2005. The number of hot days for Bendigo (above 40.8°C) has increased more dramatically over the same period, from 4 to 25 days (CSIRO & DEECA, 2024).

More consistently warmer temperatures and heatwaves will place increasing pressure on natural ecosystems, water resources, agriculture and human health. Heat stress is expected to affect both native species and agricultural productivity.

- **Drier landscapes**

  Cool season rainfall (winter and spring) is expected to decline, reducing soil moisture and stream flows. Longer dry periods and more frequent drought conditions are likely to place stress on remnant vegetation, waterways and wetlands, particularly where ecosystems are already fragmented or degraded.

- **More intense rainfall and flooding**

  Even though total rainfall is expected to decrease, heavy rainfall events are projected to become more intense. This increases the risk of flash flooding, erosion and damage to infrastructure and natural assets.

These changes in climate will affect biodiversity in Mount Alexander Shire in several ways, such as through increased bushfire risk, changes in species distributions, increased pressure from pests and weeds and reduced resilience of already fragmented landscapes. The impacts to biodiversity associated with climate change are discussed in more detail in section 7.5.

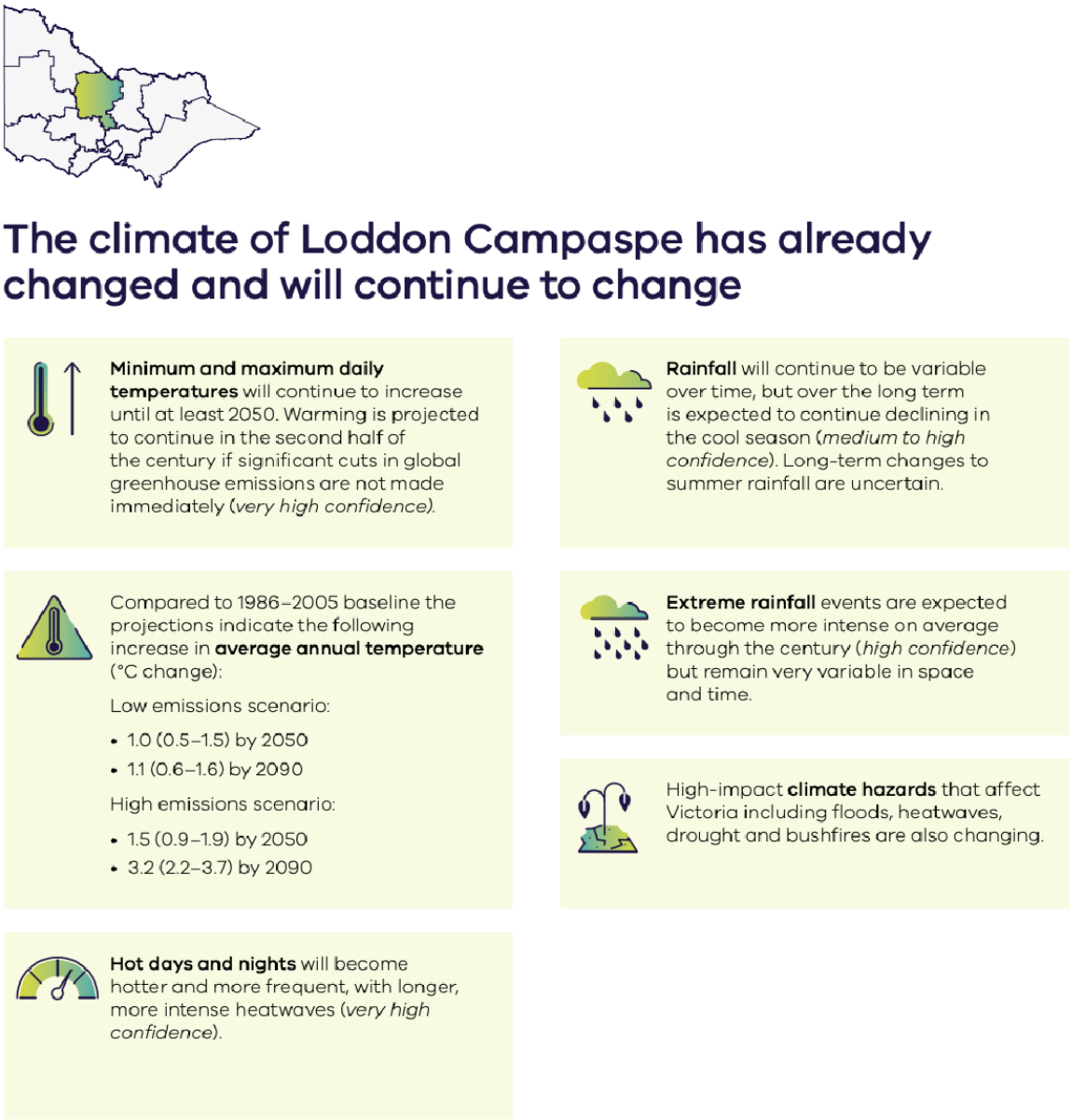


Figure 5-3: Projected climate projections for the Loddon Campaspe region (CSIRO & DEECA 2024)

5.3 Geology and soils

The distinctive landforms, soils, biodiversity and rich mining history of Mount Alexander Shire is underpinned by a geologically diverse landscape. Key geologies in the shire have been documented (MASC, 2026a; Connecting Country, 2026; NCCMA, 2021) and include:

- **Auriferous (gold bearing) sedimentary bedrock** – low sedimentary undulations and hills of the dissected uplands around Castlemaine. Features prominent sandstone/slate ridges and granitic intrusions.
- **Volcanic plains** – undulating and low rolling sedimentary hills occurring to the west and southwest of Castlemaine such as near Baringhup and on the Guildford Plateau. These are characterised by rocky low hills and gentler, rock-free slopes and depressions. Most of these areas have been cleared for grazing. Flat volcanic plains occur to the far west of the shire, at Moolort. This is some of the best agricultural land in central Victoria.
- **Large granitic incursion** – wraps as a band extending from Maldon in the northeast to Harcourt and Faraday. Mount Alexander forms a prominent granitic ridge rising 250 meters above the surrounding land. To the southeast, the Calder Highway follows the sedimentary terraces and floodplain of the Coliban River. To the north, the rolling sedimentary hills and valley slopes form fertile ground for the Harcourt apples orchards.
- **Alluvial deposits** – along major waterways such as Campbells and Muckleford Creeks and the Loddon River. Formed from unconsolidated sediments deposited by present-day rivers and their ancestral streams.

The health of the land is intimately linked to the health of the soil. The region has a great diversity of soil types that reflect differences in parent material, topography, climate, organic activity and age (e.g. degree of weathering). The different soil landscapes relevant to Mount Alexander Shire and their constraints and management responses are documented in Table 5-1.

Table 5-1: Soil landscapes of Mount Alexander Shire and their constraints and management responses (NCCMA, 2021)

Soil and landscape	Issues	Management responses
High relief uplands terrain Underpinned by auriferous sedimentary bedrock. Features prominent sandstone/slate ridges and granitic intrusions around Castlemaine.	Land degradation is prominent where excessive runoff induces gully erosion within adjacent valleys. This is exacerbated by excessive clearing of native vegetation, shallow soils with poor water holding capacity and soil acidity with attendant aluminum toxicity.	Erosion control structures, land retirement, perennial agriculture, careful grazing management, revegetation and farm forestry.
Undulating terrain Gently undulating terrain to the west and southwest of Castlemaine, characterised by the Volcanic Plains geology.	Dryland salinity can be very severe where salt stores are elevated in intensely weathered terrain. Salinity affects both farmland and water quality within streams. Soils sodicity is also commonplace and maintenance of soil structure remains an ongoing challenge.	Farming for sustainable soil management through the adoption of practices that include targeted farm forestry, saline agriculture, deep rooted perennial pastures, cover crops and conservation tillage. Adoption of erosion control structures can also be very important where gullies are severe.
Granitic terrain Characterised by large granitic incursions. Includes the northern band from Maldon to Faraday and the high relief terrain of the Mt Alexander complex.	Gully erosion, soil acidity, silicified hard pans and dryland salinity are all common in granitic terrain. Susceptibility to degrading processes is intimately linked to the physical nature of the terrain recognising a spectrum that extends from sandy outwash in steeper terrain through intense weathering in lower relief lands.	Management options must be tailored to local geomorphic circumstances. Options may include break of slope forestry, perennial agriculture, deep ripping, cover crops and manure injection. Options must be linked to local hydrologic circumstances.
Alluvial floodplains Extending along major waterways such as Campbells and Muckleford Creeks and the Loddon River.	Issues that require management for irrigated areas include the maintenance of soil structure and salinity. The dryland areas are susceptible to the loss of soil structure associated with widespread occurrence of sodosols. The plains also suffer from dryland salinity.	Key principles and practices are established in a range of specific salinity management plans and consolidated in the renewed Loddon Campaspe Irrigation Region, Land and Water Management Plan (North Central CMA, 2020). The management of the dryland areas is largely concerned with attaining healthy soils through practices that sustain ground cover to avoid wind erosion and the adoption of practices that sustain or increase soil organic matter in an effort to retain and improve soil structure through soil biology.

5.4 Water and catchments

Most of Mount Alexander Shire sits within the Loddon River catchment and the eastern portion within the Campaspe River catchment, including the Coliban River system. These catchments contain an interconnected system of rivers, creeks, wetlands and reservoirs that support biodiversity, supply water for towns and agriculture, sustain cultural values and provide important recreational opportunities. Major waterways within the shire include the Loddon River, Coliban River, Campaspe River, Campbells Creek, Forest Creek, Barkers Creek, Guildford Creek, Muckleford Creek and Tarilta Creek. A surface water hydrology map for Mount Alexander Shire is provided in Figure 5-4.

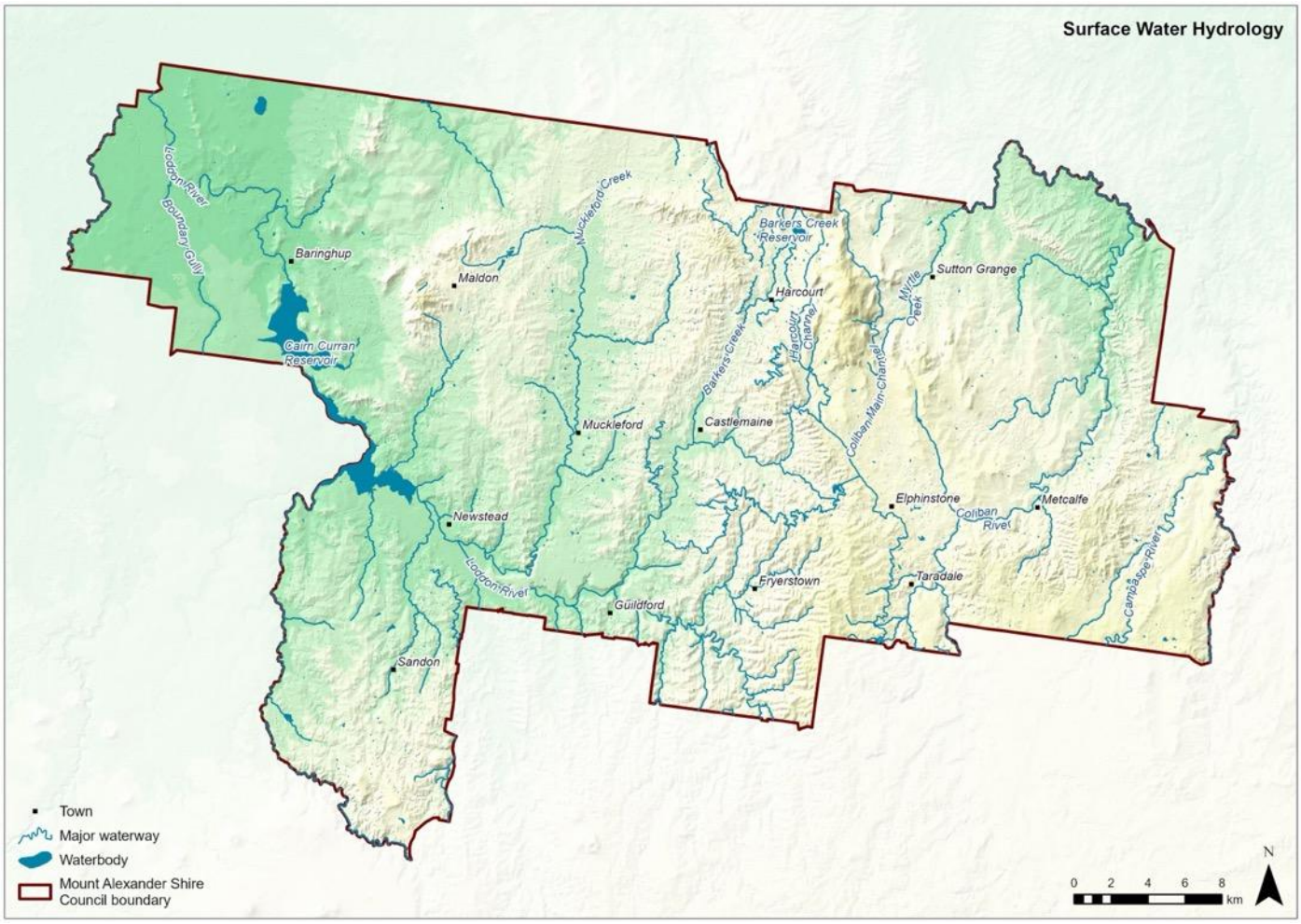


Figure 5-4: Surface water hydrology of Mount Alexander Shire

The health of waterways in Mount Alexander Shire has been influenced by land use change since European colonisation, including gold mining, vegetation clearing, agriculture, urban development, river regulation and altered flow regimes. These pressures have affected water quality, riparian vegetation, channel stability and aquatic habitat, reducing the ecological resilience of many waterways. Climate change is expected to further compound current pressures through increased temperatures, more frequent droughts, reduced streamflow and an increased frequency of intense rainfall events.

Waterways in Mount Alexander Shire are highly modified and in moderate to poor condition. This is evidenced by Victoria's Index of Stream Condition (ISC) which provides a comprehensive assessment of river health by evaluating hydrology, physical form, streamside vegetation, water quality and aquatic life. The most recent ISC assessment was conducted in 2010. It found that 41% of waterways in the Loddon River catchment are in moderate condition, 26% are in poor condition and 29% are in very poor condition. No waterways in the catchment were found to be in good or excellent condition (and there was insufficient data for 4% of waterways). Only 7% of waterways in the Campaspe catchment were in good condition, while 39% were in moderate condition, 33% in poor condition and 21% in very poor condition (DEPI, 2010).

Healthy waterways are fundamental to ecological function. They provide habitat and movement corridors for native flora and fauna, connect fragmented landscapes, support threatened species, maintain water quality and contribute to the resilience of ecosystems and communities in a changing climate. Protecting and restoring riparian vegetation, improving catchment condition and working across land tenures will be critical to maintaining the ecological function of waterways into the future.

6 Biodiversity values

6.1 Ecological vegetation classes

Ecological Vegetation Classes (EVCs) are the standard classification system used to categorise native vegetation across Victoria. They group floristic communities based on plant species, life forms, landscape position and shared ecological processes operating in similar environmental niches.

There are 24 EVCs represented in Mount Alexander Shire including Box-Ironbark Forest, grassy woodland communities, native grasslands, riparian vegetation and woodland remnants. These vegetation communities occur across public land, roadsides, waterways and private land (MASC, 2020a; MASC, 2024).

Many vegetation communities are highly modified or fragmented. Within Mount Alexander Shire, 13 EVCs are listed as endangered, five are depleted and another five are vulnerable. Only one EVC, Heathy Dry Forest, is listed as least concern. A complete list of EVCs that occur in Mount Alexander, and their conservation status, is included in Appendix 1.

Remaining examples of remnant EVCs often occur on roadsides, within public reserves and along waterways. Roadsides contain examples of most habitat types found across the shire and provide an important record of the vegetation that once covered the region (MASC, 2024). The Castlemaine Botanical Gardens Flora and Fauna Reserve also support a high-quality example of Box-Ironbark Forest and contains a diverse native understorey including daisies, lilies and orchids (MASC, 2020a).

The comparison between the modelled 1750 vegetation (**Figure 6-1**) and current vegetation (**Figure 6-2**) shows that Mount Alexander Shire has experienced substantial vegetation loss and fragmentation. A total of 49% of remnant native vegetation has been lost since European colonisation.

Grassy Woodland, Plains Woodland and Plains Grassy Woodland have undergone the greatest reductions in extent. These vegetation communities once covered large areas of the shire but now persist as scattered remnants, often on roadsides, public land and private properties. As a result, these communities are likely to support fewer species, have reduced ecological function and be more vulnerable to ongoing disturbance.

Ecosystem services

Ecosystem services refer to the direct and indirect benefits from ecosystems. This includes the services that communities rely on, including clean water, fertile soils, pollination, carbon storage, erosion control and opportunities for recreation and wellbeing.

The quality and reliability of ecosystem services may be reduced in ecosystems that have been reduced in extent, are fragmented and exposed to other disturbances, such as Grassy Woodland, Plains Woodland and Plains Grassy Woodland in Mount Alexander Shire. It is likely that climate change will further compromise the ability of these ecosystems to provide these services by increasing the frequency and intensity of heatwaves, droughts, bushfires and extreme rainfall events.

Protecting, restoring and connecting native vegetation and habitats will help maintain ecosystem function, support biodiversity and strengthen the resilience of ecosystem services.

While significant areas of Box-Ironbark Forest and Heathy Dry Forest remain, much of the native vegetation across the shire is now fragmented. Large, continuous areas of habitat have been broken into smaller and more isolated patches, reducing opportunities for species movement, dispersal and genetic exchange. Fragmentation also makes ecosystems less resilient to threats such as climate change, weeds, pest animals and bushfire.

Waterways, roadsides and remnant vegetation patches now play a critical role in maintaining habitat connectivity across the landscape. These areas provide important links between larger habitat remnants and support the movement of plants and animals throughout the shire.

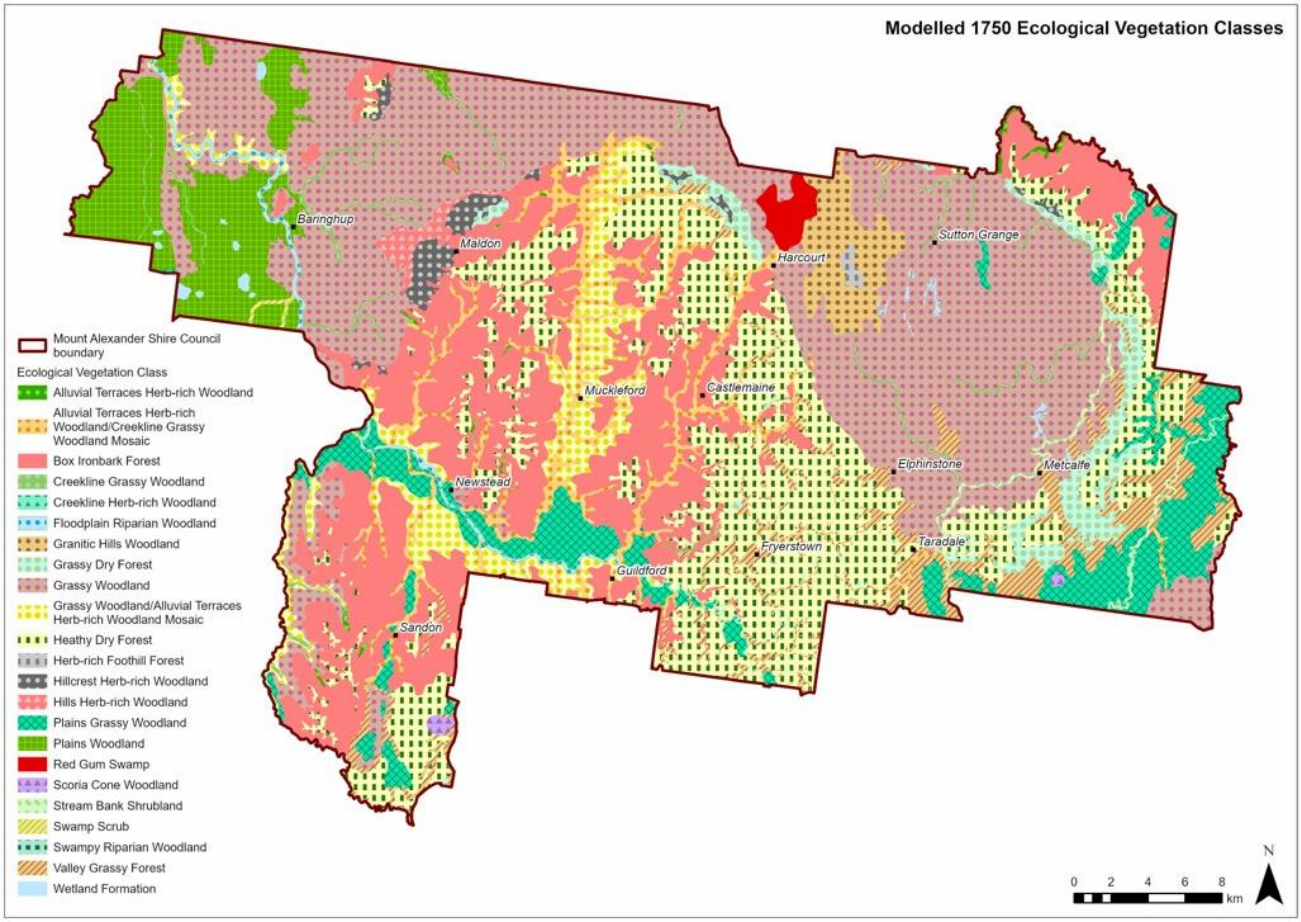


Figure 6-1: Modelled Ecological Vegetation Classes 1750

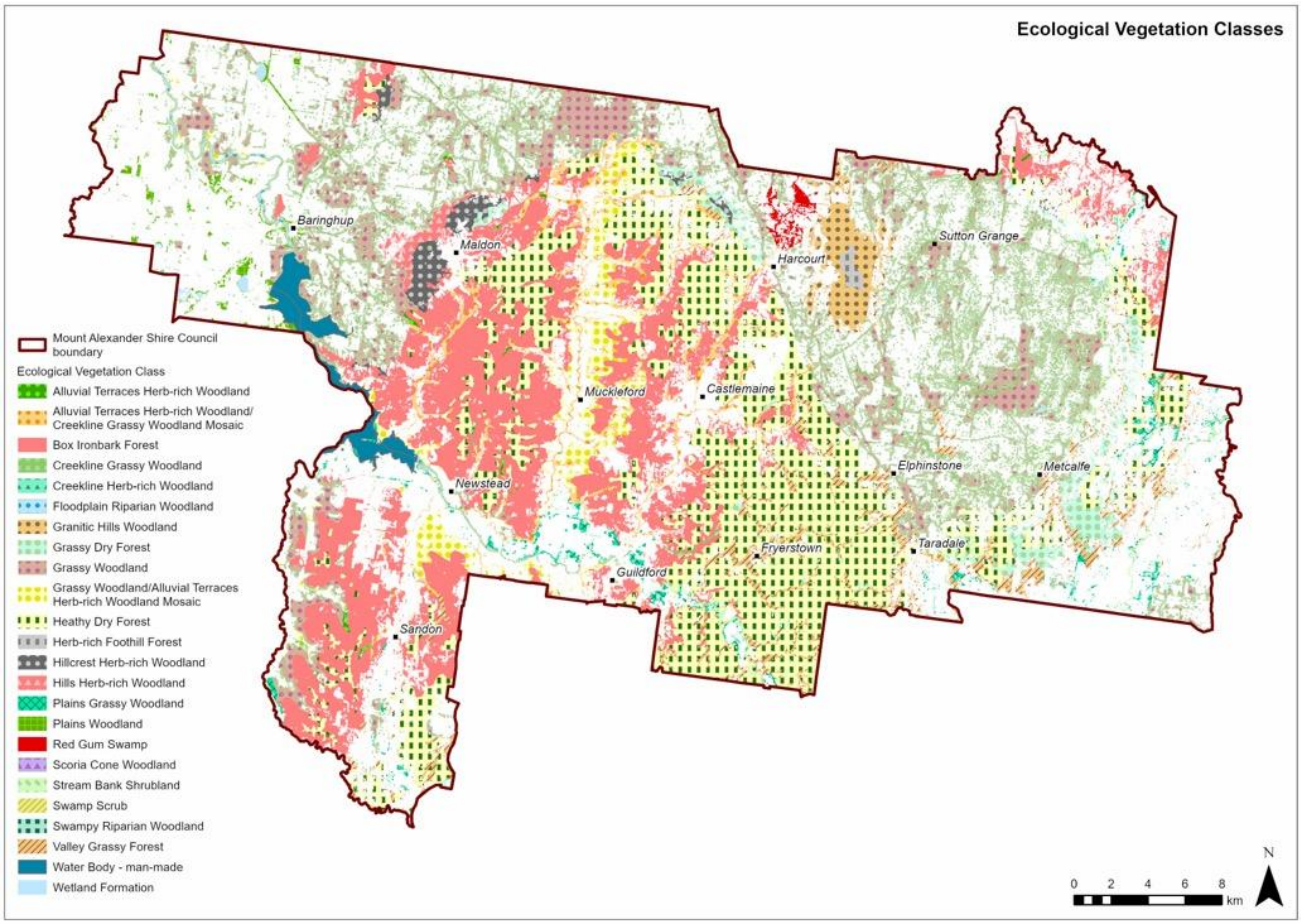


Figure 6-2: Present day modelled Ecological Vegetation Classes

The conservation status map (Figure 6-3) highlights the consequences of this decline. Much of the remaining native vegetation across the shire is now classified as Endangered, Vulnerable or Depleted at the bioregional scale. Endangered and Vulnerable EVCs occur across much of the northern, central and eastern parts of the municipality, while areas of Least Concern are largely concentrated within the more extensive forested landscapes in the south and central-west.

Some of the most threatened vegetation communities occur as relatively small and fragmented remnants. These remnants often represent the last examples of formerly widespread ecosystems. Larger, more intact areas of native vegetation remain important, but smaller remnants of Endangered and Vulnerable EVCs are equally significant because they represent vegetation communities that have been largely lost from the landscape.

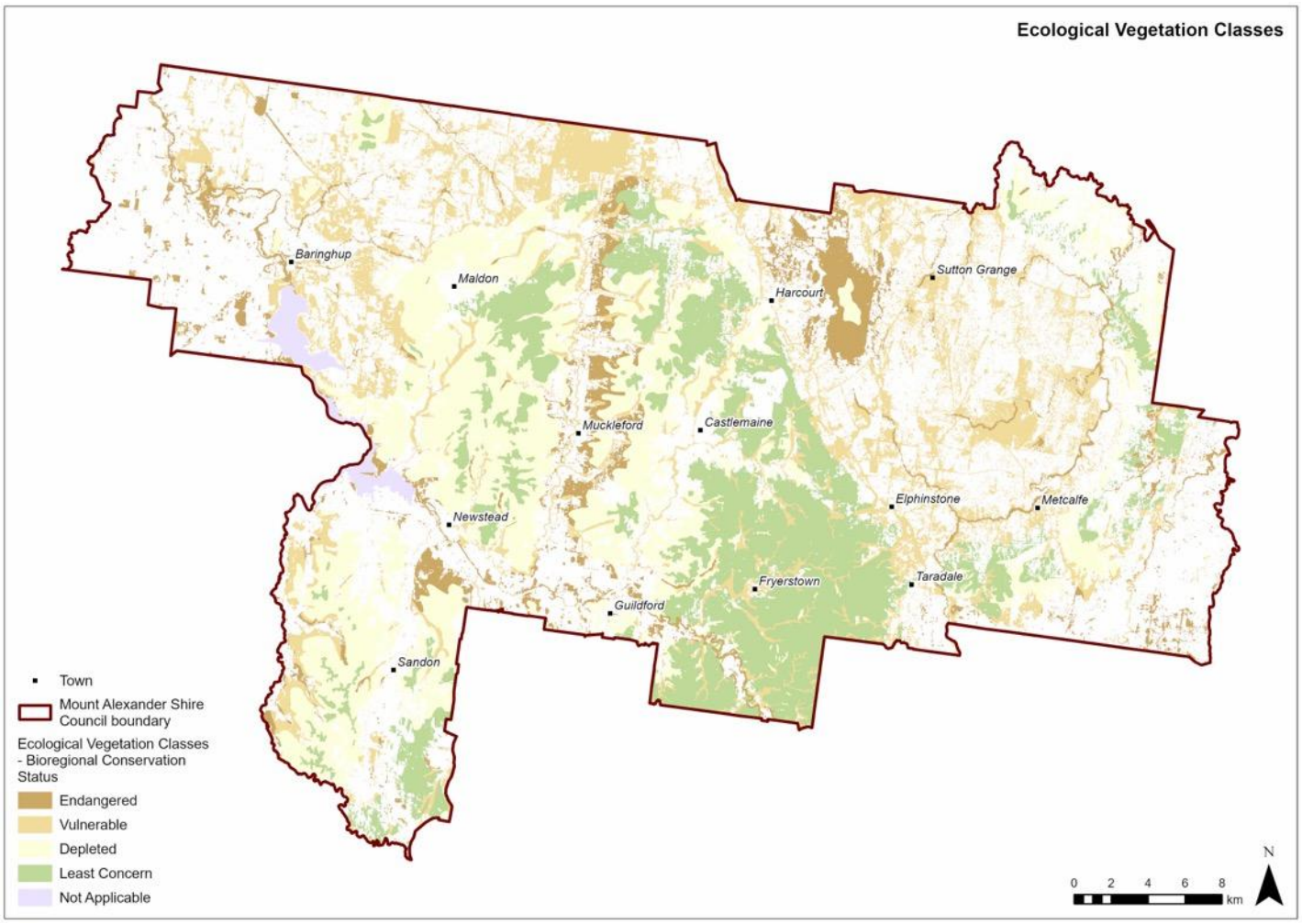


Figure 6-3: Bioregional Conservation Status of Ecological Vegetation Classes across Mount Alexander

6.2 Native flora

The shire supports a rich diversity of native plant species, including many threatened species, that are associated with Box-Ironbark forests, woodlands, grasslands and waterways. The remnant patches of habitat, such as along the roadsides, waterway corridors and in public land reserves are critically important in supporting populations of threatened flora species and contain important genetic resources that link current vegetation with the ecosystems that once occurred across the region (MASC, 2024). The Castlemaine Botanical Gardens Flora and Fauna Reserve alone supports a diverse range of native wildflowers, orchids, lilies and shrub species (MASC, 2020a).

Within the Shire, there are 15 flora species listed under the federal *Environment Protection and Biodiversity Conservation (EPBC) Act (1999)* including two that are listed as critically endangered:

- Spiny Rice Flower (*Pimelea* spinescens subsp. spinescens)
- Robust Greenhood (*Pterostylis valida*).

A total of 82 flora species are listed as either vulnerable, endangered or critically endangered under the Victorian *Flora and Fauna Guarantee (FFG) Act (1988)*. A complete list of threatened flora species and their conservation status under the *FFG Act (1998)* and the *EPBC Act (1999)* is provided in Appendix 2. The Castlemaine District Plant List (Castlemaine Field Naturalists, 2026a) has a total of 1,607 flora species and was used as a validation dataset during the prioritisation process outlined later in this document (see Section 8.2.1).

6.3 Native fauna

The shire supports a diverse range of native fauna associated with forests, woodlands, waterways and remnant vegetation. Large old trees, hollow-bearing trees, waterways and connected vegetation corridors provide important habitat resources for a range of mammals, birds, reptiles, amphibians and invertebrates (MASC, 2020a; MASC, 2024).

Within Mount Alexander Shire there are several species of conservation significance, which are known to occur across the diversity of habitats – both within protected areas and on private property. Roadside vegetation in particular is known to support populations of threatened fauna and provides refuge habitat in an otherwise fragmented landscape (MASC, 2024). The Castlemaine Botanical Gardens Flora and Fauna Reserve (the Reserve) is also a critically important habitat for a number of threatened species, including the:

- Eltham Copper Butterfly (*Paralucia pyrodiscus lucida)* – the Reserve is nationally significant because it supports a population of the state and federally endangered Eltham Copper Butterfly. The species is known to occur in only a small number of locations across Victoria, making the reserve an important site for its conservation (MASC, 2020a).
- Powerful Owl (*Ninox strenua*) – the Reserve supports habitat for the threatened Powerful Owl, one of Victoria's largest forest owls. The species relies on mature woodland and forest habitats containing large trees and nesting opportunities (MASC, 2020a). The Powerful Owl is listed as vulnerable in Victoria.
- Brush-tailed Phascogale (*Phascogale tapoatafa*) – the Reserve contains habitat for the threatened Brush-tailed Phascogale, a species strongly associated with mature woodland and forest environments containing large trees and hollows (MASC, 2020a) (Lawtom et al. 2021). The Brush-tailed Phascogale is listed as vulnerable in Victoria.

In total, there are 26 fauna species, including birds, mammals, fish, reptiles, amphibians and invertebrates that are listed under the *EPBC Act (1999)*. This includes four species that are critically endangered:

- Swift parrot *(Lathamus discolor)*
- Plains-wanderer *(Pedionomus torquatus)*
- Regent honeyeater *(Anthochaera phyrgia)*
- Flat-headed Galaxia *(Galaxias rostratus).*

Sixty-seven species are listed as either vulnerable, endangered or critically endangered under the Victorian *FFG Act (1988).* A complete list of state and federally threatened fauna species is provided in Appendix 3.

Despite the differences in threatened fauna within the shire, many depend on a common suite of structural habitat attributes. This typically includes:

- Large, connected areas of native vegetation
- Diversity of native vegetation species and habitat types
- Large old, hollow-bearing trees and standing dead trees
- Structurally diverse understorey, with native shrubs, grasses and ground layer vegetation
- Healthy waterways, wetlands and riparian vegetation
- Minimal impacts from pest plants and animals, inappropriate recreation and landuse, and frequent fire.

Rather than focusing on individual species, there is a role for Council to play at the habitat scale ensuring priority is given to protecting and restoring areas of high habitat value, enhancing connectivity and reducing threats. This is

consistent with the landscape-scale approach adopted in *Biodiversity 2037* (DEECA, 2017) which focusses on improving habitat condition, connectivity and ecological processes to benefit multiple species simultaneously. Evidence-based habitat models for all threatened species are available from within DEECA's Strategic Management Prospects (SMP) tool. The analysis of these models ensures the incorporation of a multi-species approach to conservation by emphasising areas where co-occurring threatened species are located.

6.4 Fungi

Fungi are a critical but often overlooked component of biodiversity in Mount Alexander Shire. Within Mount Alexander Shire, autumn and early winter is the time of greatest diversity and abundance of fungi. As highlighted by Pouliot & Chétlat (2020), fungi are a fundamental component of biodiversity, connecting above and below ground ecological processes and supporting the long-term health of natural systems. Fungi provide habitat and a source of food for a range of animals including mammals such as wallabies and potoroos, and invertebrates.

Beneath the soil vast networks of fungal mycelium play a fundamental role in ecosystem function. Fungi are nature's recyclers, breaking down organic matter and returning nutrients to the soil, while also forming symbiotic relationships with plants that help them access water and nutrients. Through these processes, fungi contribute to soil health, nutrient cycling, plant growth and ecosystem resilience.

Organic matter provides critical habitat for fungi, including dead trees. This further emphasises the need to conserve dead trees as part of broader conservation management (Pouliot & Chétlat, 2020). Recognising and conserving fungal diversity can play an important role in protecting the ecological integrity and long-term resilience of the shire's natural environments.

6.5 Key biodiversity assets

6.5.1 Habitat corridors

Habitat connectivity is a critical biodiversity value across the shire. The landscape is highly fragmented and many species depend on connected habitat networks to move through the landscape (MASC, 2024).

Important connectivity features include:

- Roadside vegetation
- Creek and river corridors
- Public reserves
- Woodland remnants
- Remnant paddock trees
- Urban bushland
- Native vegetation on private land (MASC, 2024; MASC, 2023b).

Roadsides are particularly important because they connect larger habitat patches and facilitate the movement of plants and animals across the landscape (MASC, 2024), especially in areas where historical vegetation clearing for grazing and cropping has occurred.

Habitat connectivity and biolinks are widely accepted as being fundamental in supporting dispersal, migration and other large landscape processes and in maintaining viable populations of species. They will also become increasingly important in accommodating species distribution shifts in response to climate changes.

The CSIRO's Functional Connectivity Model (Figure 6-4) defines the characteristics of functionally connected landscapes based on studies of the movement patterns and habitat requirements of birds and mammals, including tree dwelling species and many ground dwelling species such as Antechinus. The model indicates that functional connectivity is most likely to be achieved where habitat patches are at least 10ha in size, are located within 1.1km of one another to enable dispersal, and are linked by corridors or scattered trees with gaps of less than 100 m between stepping stones (presentation by Dr. V. Doerr, 2017b).

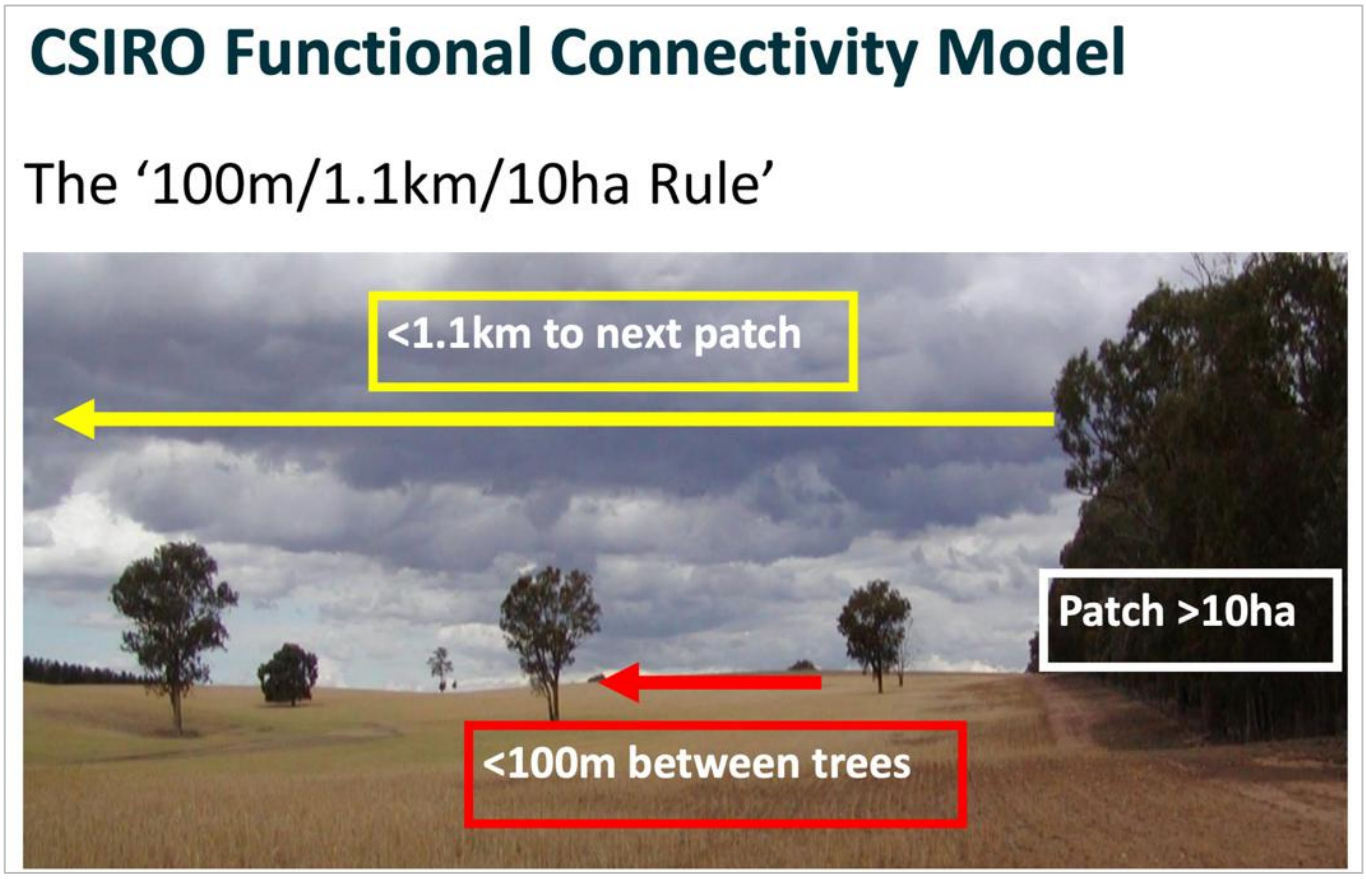


Figure 6-4: The CSIRO Functional Connectivity Model (presentation by Dr. V. Doerr, 2017b)

This model is supported by studies of woodland birds, which show that they maintain core habitat areas for foraging and breeding while also making exploratory movements in search of additional suitable habitat. During these movements, birds use scattered trees and corridors to move through the landscape (presentation by Dr. V. Doerr, 2017b).

Recognising the importance of scattered trees shifts the concept of connectivity beyond linear corridors to broader biolinks comprising a diversity of habitat features, including forest and woodland patches, corridors and scattered trees. These interconnected elements support specialist species moving between habitat patches, while also providing resources for more generalist species in open woodland landscapes. This broader biolink approach also creates opportunities to enhance habitat diversity through native grasses and forbs in open areas, rocky habitat for reptiles, and other complementary features, resulting in a more resilient and functionally connected landscape mosaic (Doerr, 2017a).

Research on woodland birds provides practical guidance for designing connected landscapes, indicating that birds are more likely to move between habitat patches where patch separation is **less than 1.3km** and the distance between stepping stones, such as scattered trees, is **less than 150m** (Doerr, 2017b).

These findings provide a useful evidence base for Council, other public land managers and private landholders when designing, restoring and protecting biolinks. Recognising scattered trees as integral components of biolinks also supports connectivity across larger landscapes, helping species disperse and adapt to changing climatic conditions.

Figure 6-5 identifies potential biolink opportunities across Mount Alexander Shire by showing where public conservation land, endangered and vulnerable EVCs, modelled threatened species habitat and high-value roadside vegetation intersect. This map also informs the draft Mount Alexander Rural Land Use Strategy (RLUS). The mapping shows potential biolink opportunities running north to south across the Shire, such as from Maldon, east of Muckleford, Newstead to Eberys, and south from Castlemaine to Guildford in the west and Taradale in the East through Fryerstown. Phascogales have been included on this map as an indicator for threatened species occupation, as Council has recent sightings data available. There is potential to map other species in the municipality in the future.

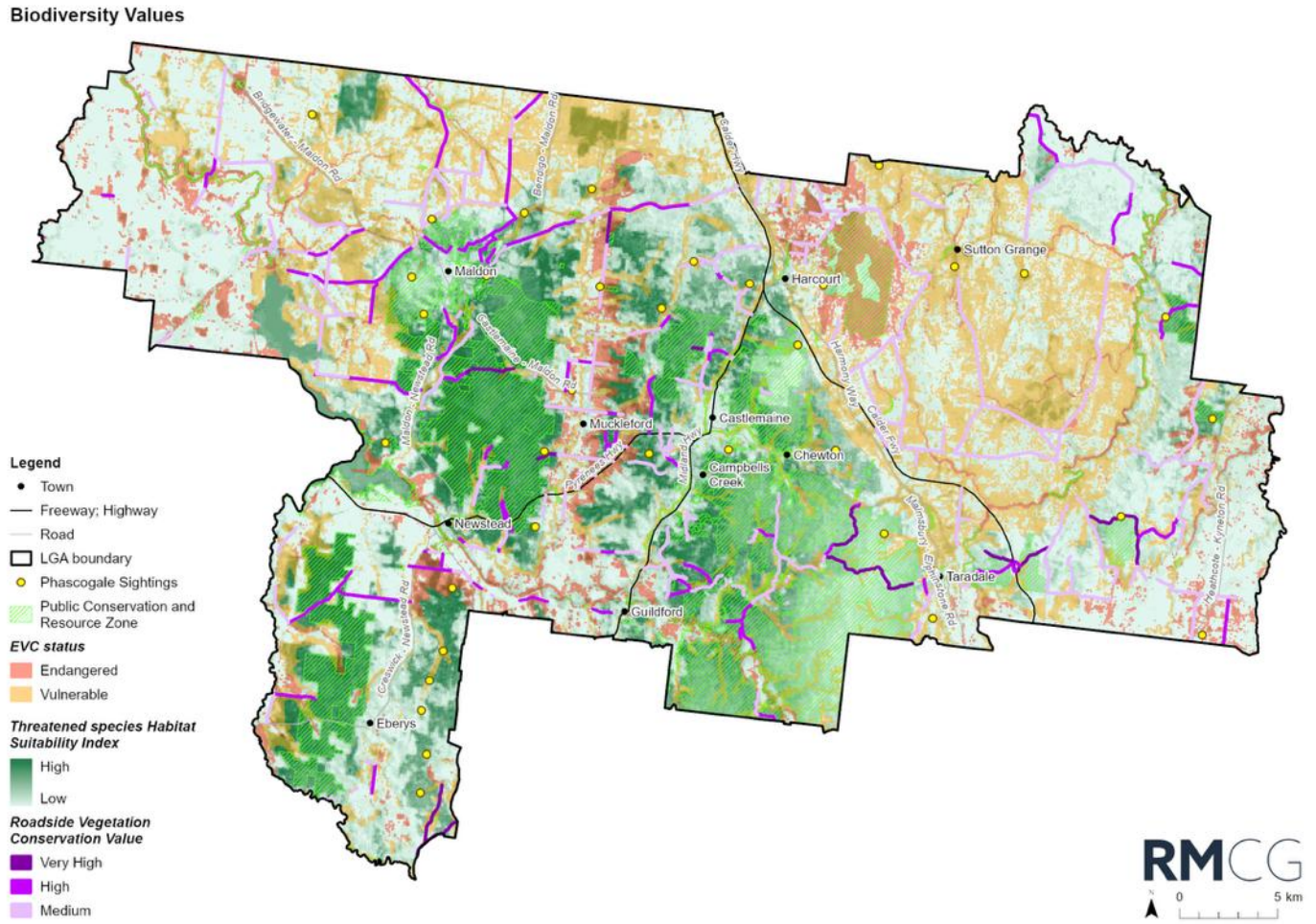


Figure 6-5: Public land and biodiversity values of Mount Alexander Shire

6.5.2 Roadsides

Roadsides are among the most significant biodiversity assets in Mount Alexander Shire. Council manages approximately 1,188 kilometres of rural roads, representing around 2,376 kilometres of roadside vegetation (MASC, 2024).

Roadsides:

- Contain examples of most habitat types found across the shire
- Support common and threatened species
- Provide habitat connectivity
- Retain remnant vegetation communities that have disappeared from surrounding landscapes
- Preserve important genetic diversity
- Function as refuges within a fragmented landscape (MASC, 2024a).

Council has mapped the conservation value of roadside vegetation on some Council managed roadsides across the municipality. This is shown in Figure 6-6, alongside the Biodiversity-Threat Index which highlights areas where threatened species habitat is concentrated and under the greatest pressure. Protecting and improving habitat in these landscapes is likely to deliver the greatest benefit for threatened species and biodiversity more broadly. As Figure 6-6 shows, in the east of the Shire (especially in the north around Maldon) high conservation value roadsides generally exist around areas of higher biodiversity-threat risk.

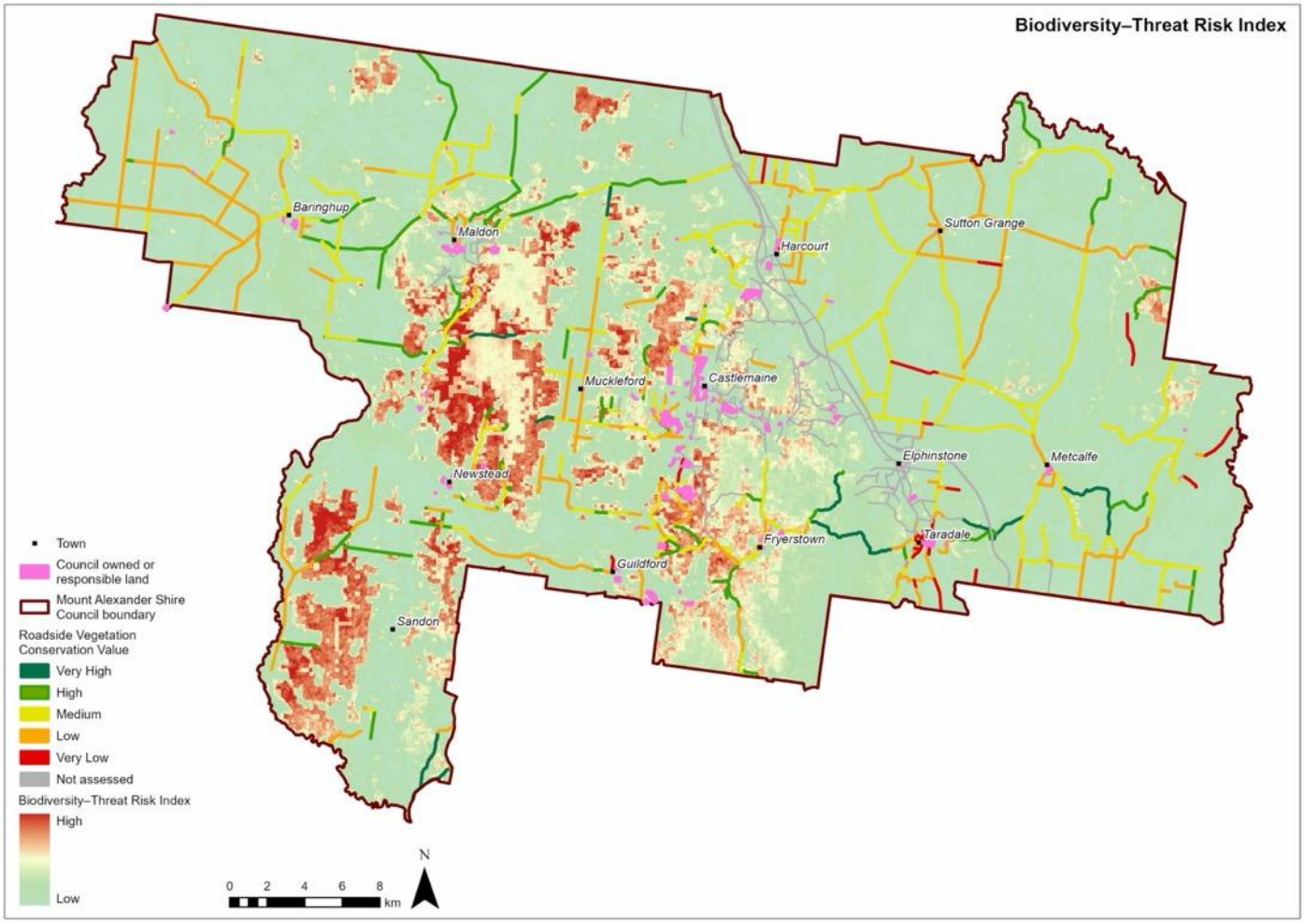


Figure 6-6: Biodiversity-Threat Risk Index and roadside vegetation conservation value

6.5.3 Large old trees

Large, old trees and standing dead trees, are unique and irreplaceable features of the landscape. Often termed ‘habitat trees’, they provide several important features and resources for animals and plants, such as:

- Cracks, crevices, notches and hollows that provide breeding sites, shelter, refuge and living quarters for a wide range of wildlife species
- Nesting sites in high branches for birds such as eagles, kites and other raptors
- Dead branches above the canopy that are utilised by some birds for roosting, sunning, preening and to watch for prey
- A reliable and plentiful seasonal food supply such as nectar, pollen, sap, fruit, seeds, leaves, wood and litter for animals of many kinds
- Large surface areas of trunks and branches that provide extensive hunting sites for animals that feed on organisms that live on and under the bark[4].

Large trees are defined by the Victorian Government as being “a native canopy tree with a Diameter at Breast Height (DBH) greater than or equal to the large tree benchmark for the relevant bioregional EVC”. Where an EVC does not list a large tree DBH, “a large tree DBH benchmark of 40cm (equivalent to a circumference of 126cm) determines whether a tree is large”[5].

[4] Land for Wildlife (date n/a) *The Value of Habitat Trees*. Land for Wildlife Queensland: Note V7 URL: https://www.lfwseq.org.au/wp-content/uploads/2016/11/The-Value-of-Habitat-Trees.pdf (Accessed 25 June 2026)

[5] Department of Energy, Environment and Climate Action (DEECA) (2025) *Guidelines for the removal, destruction or lopping of native vegetation*. Victorian State Government, Melbourne.

Mount Alexander Shire currently recognises significant trees within the Castlemaine Botanic Gardens based on their age, rarity, provenance or historical significance. These trees are not indigenous to the Shire, but rather are recognised for their botanical, aesthetic and/or historical importance.

There is opportunity to expand the significant tree register to recognise isolated and stands of large, old remnant trees on Council managed land, based on their ecological importance. This is aligned with Council's Urban Tree Policy (2023-2028) which commits to protecting trees of botanical, historical, cultural, aesthetic and ecological significance on Council managed land. Council could also further investigate options for Vegetation Protection Overlays across the municipality.

6.5.4 Public reserves

There are several public land reserves managed by Council that have significant ecological value. Of note are:

- Castlemaine Botanical Gardens Flora and Fauna Reserve - The reserve is recognised as an area of national conservation significance due to its population of the endangered Eltham Copper Butterfly, the presence of Box-Ironbark Forest vegetation, habitat for threatened fauna species and diverse native flora communities (MASC, 2020a). Council has an active conservation management plan for this site which specifies the required actions for biodiversity conservation.
- Urban waterways network - Forest Creek, Barkers Creek and Campbells Creek provide important ecological values within the urban landscape and represent significant examples of ecological restoration and recovery (MASC, 2023b). Council has an active management plan for these sites.
- Open space network - Council's open space network contributes to biodiversity conservation through natural area protection, habitat provision, ecological corridors and waterway management. Public open space plays an important role in supporting ecological function across the shire (MASC, 2016).
- Honeycomb Bushland Reserve - located in Campbells Creek south of Castlemaine, forms part of an important network of remnant native vegetation in the local area. Council has an active conservation management plan for this site which specifies the required actions for biodiversity conservation. The Reserve is connected to significant habitat along Campbells Creek and adjoining bushland to the west, providing valuable habitat and movement corridors for native fauna. Council has previously managed the site in partnership with the Friends of Campbells Creek Landcare Group and the McKenzies Hill Action and Landcare Group through a Memorandum of Understanding. Council has an active environmental management plan for this site which specifies the required actions for biodiversity conservation.

There are several other sites that Council has some level of responsibility for, in addition to roadsides, that are characterised as:

- Small parcels of vacant land
- Old Landfill sites near Barkers Creek, Welshmans Reef and Campbells Creek
- Recreation reserves.

Not all sites have specific management plans. Where a management plan is not in place, actions should be guided by the site's ecological values, with a focus on enhancing the likely Ecological Vegetation Class (EVC) and managing key threats. A rapid on-ground assessment will be required to inform management actions at these sites.

7 Pressures on biodiversity

7.1 Overview

Several key threats to biodiversity occur across Mount Alexander Shire, such as:

- Habitat loss and fragmentation - Historical clearing, urban development, infrastructure development and landscape fragmentation have reduced the extent and connectivity of native vegetation communities (MASC, 2024; MASC, 2023b)
- Waterway degradation - Changes to hydrology, pollution and urban development have affected the condition of waterways and riparian habitats in parts of the shire (MASC, 2023b)
- Human disturbance - Illegal dumping, firewood collection, unauthorised access, recreation impacts and vegetation modification can affect biodiversity values, particularly within roadsides and public reserves (MASC, 2024; MASC, 2020a)
- Invasive species - Environmental weeds, pest animals and invasive grasses continue to affect the condition of native vegetation and habitat quality across the shire (MASC, 2020a; MASC, 2024)
- Climate change - Climate change is expected to increase the frequency and severity of drought, bushfire and extreme weather events, placing additional pressure on ecosystems and species (MASC, 2015; MASC, 2023a).

This section discusses the key pressures to biodiversity in Mount Alexander Shire.

7.2 Land use, development and habitat modification

Land use and development pressures occur across both urban and rural landscapes in Mount Alexander Shire and include residential growth, rural-residential development, infrastructure upgrades, agricultural land use, vegetation removal and the gradual modification of remnant habitat. While some impacts occur through formal development processes, others are incremental and cumulative, such as the removal of scattered paddock trees, loss of fallen timber, modification of understory vegetation, drainage works, fencing, slashing, track creation and changes to grazing or land management practices.

Growth and housing pressures are being experienced around Castlemaine, Campbells Creek and Chewton (MASC, 2026b). In these locations, development pressure can intersect with areas of high biodiversity value. The biodiversity impacts of development can include the direct loss of native vegetation, fragmentation of habitat, removal of hollow-bearing trees and mature canopy trees, disturbance to riparian areas, increased edge effects and reduced landscape connectivity. Of note is Harcourt which has been identified as a settlement where growth needs to be carefully planned alongside biodiversity protection (MASC, 2024). This could also be extended to McKenzie Hill and Campbells Creek.

The North Central Regional Catchment Strategy (2021) identifies native vegetation and habitat loss, fragmentation and degradation as continuing threats across the region driven by pressures including residential development, agricultural intensification, removal of paddock trees, firewood collection and clearing to reduce perceived wildfire risk.

Planning controls have an important role in managing these impacts. The Mount Alexander Planning Scheme includes provisions to protect biodiversity, native vegetation and environmental values. A planning permit is generally required to remove native vegetation, with overlays often adding further restrictions. The Mount Alexander Planning Scheme provides a generally sound policy framework, however, as identified through the development of the Draft Rural Land Use Strategy, there are opportunities to strengthened the framework, particularly through greater use of planning controls such as overlays and the Rural Conservation Zone.

7.3 Erosion and poor water quality

Erosion and poor water quality reduce biodiversity values by smothering aquatic habitat, destabilising banks, reducing water clarity, increasing nutrient loads, degrading pools and riffles and reducing habitat quality for aquatic plants, macroinvertebrates, frogs, fish and water-dependent birds.

Waterways in the shire are exposed to threats such as instream barriers, exotic flora and fauna, stock access, altered flows, runoff from hard surface areas, poor water quality and degraded riparian vegetation. These issues also interact, for example degraded riparian vegetation and stock access can exacerbate bank erosion and sediment loads, while weeds, pest animals and altered flows can reduce habitat complexity.

Extreme weather events can further exacerbate erosion and water quality pressures. The North Central Waterway Strategy (2014) notes that floods and bushfire can significantly affect waterway health, particularly when high-intensity bushfire is followed by flooding. This combination can move large volumes of sediment and nutrients from burnt catchments into waterways, while floods can accelerate channel erosion, infill pools with sediment, damage riparian vegetation and spread invasive species.

7.4 Invasive species

Pest animals

Pest animals are a major threat to biodiversity in Mount Alexander Shire. Introduced species can cause widespread environmental damage through activities such as overgrazing, trampling, soil disturbance and degradation of waterways. They also place significant pressure on native wildlife through predation, habitat destruction and competition for food and shelter.

There are many feral animals present in the shire, ranging from mammals and fish to birds and invertebrates. This includes:

- Rabbits and hares
- Deer
- Foxes
- Cats
- Birds – Feral Pigeon, Common Myna, Common Blackbird, Common Starling and European Goldfinch
- Fish – Mosquito Fish, European Carp, Redfin, Brown and Rainbow Trout
- Invertebrates – European Honeybees, European Wasps, Red-legged Earth Mites, Portugese Millipedes
- Mice and rats
- Goats.

The presence of pest animals reduces the health and resilience of local ecosystems and can undermine conservation and land management efforts. Coordinated control programs, habitat restoration and community awareness are essential for reducing their impact, and supporting the recovery of native species and ecosystems (Mount Alexander Shire, 2026c).

Invasive plants and weeds

Invasive plants, pest plants, or weeds, have attributes that enable them to out-compete other species. They are plants that are not valued where they are growing and usually grow vigorously. They may produce prolific amounts of seed, spread vegetatively and grow rapidly, and are often unpalatable to livestock or wildlife. These characteristics often allow them to dominate and displace indigenous and crop plants, contributing to a decline in biodiversity and loss of agricultural productivity.

Common invasive plants and weeds in Mount Alexander Shire include (Castlemaine Field Naturalists, 2026b):

- Chilean Needle Grass
- Gorse
- Cape Broom and Flax-leaf Broom
- Blackberry
- Caltrop

- African Weed Orchid
- Cape Tulips
- Spiny Rush.

Under the *Victorian Catchment and Land Protection Act 1994 (CaLP Act)* certain invasive plants are classified as noxious weeds, such as Chilean Needle Grass. Land owners and managers have responsibilities to control these weeds.

Environmental weeds are plant species that are particularly invasive in natural bushland, completing with or choking out native plants. Not all environmental weeds are listed as noxious weeds in the *CaLP Act* (Connecting Country, 2026). The Cootamundra Wattle is an example of an environmental weed in Mount Alexander Shire (Castlemaine Field Naturalists, 2026b).

7.5 Climate change

Climate change is recognised as a significant challenge for biodiversity across Mount Alexander Shire. Increasing temperatures, drought, bushfire and extreme weather events are already placing additional pressure on ecosystems and species (MASC, 2015; MASC, 2023a). This is supported by the most recent climate science and modelling for Victoria (DEECA, 2024) which predicts increased temperatures and heatwaves, reduced rainfall, more extreme floods and drought and increased bushfire risk for the state (Figure 7-1).

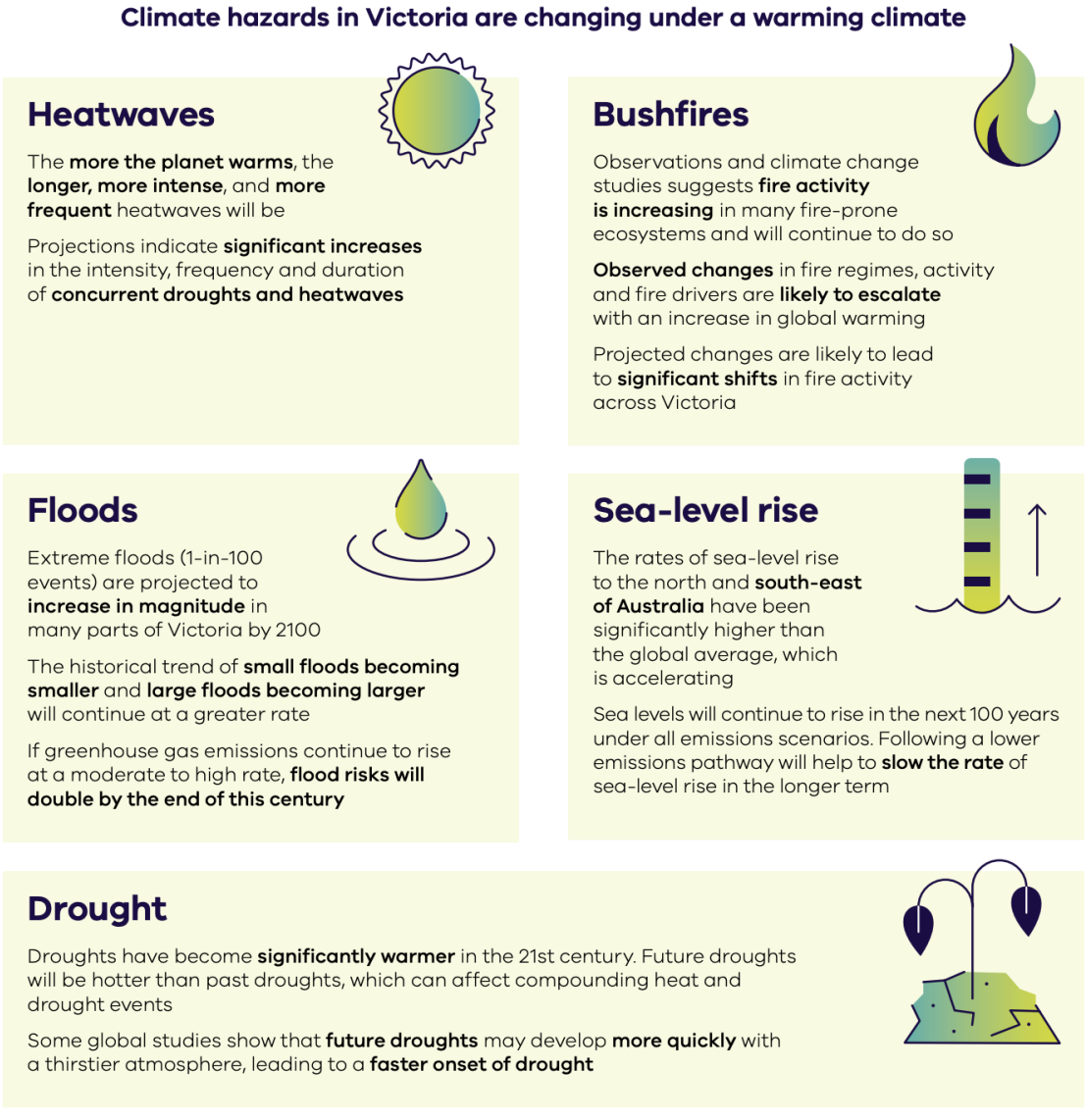


Figure 7-1: Predicted impacts arising from climate change in Victoria (DEECA, 2024)

The impacts of climate change to the natural environment are likely to play out in different ways and in different locations. Some changes to the natural environment will occur slowly while others will be more sudden. This may include the loss of species from certain places, the introduction of new species (including weeds and pests) and the emergence of new types of landscapes. Climate change will result in changes to the distribution, composition, structure and function of ecosystems (Figure 7-2), however knowing which ecosystems will be affected, when and how is difficult to determine (DEECA, 2023).

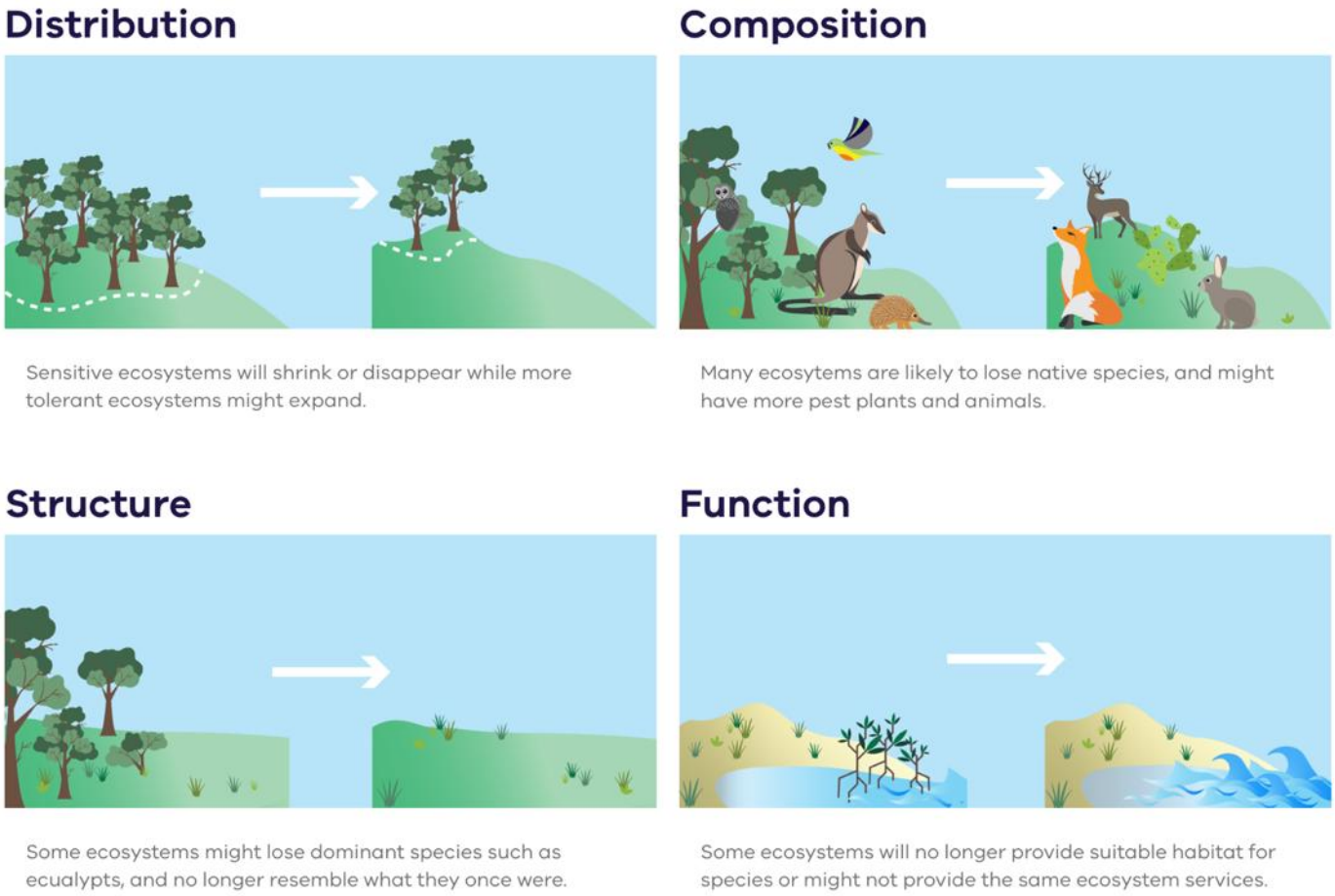


Figure 7-2: Potential climate change impacts to ecosystem distribution, composition, structure and function (DEECA, 2023)

Ecosystems have already been, and will continue to be affected by stressors, such as habitat loss, invasive species and resource use. The degree of impact will differ, even within the same ecosystem type. Climate change will compound the impact but this will vary across locations.

Despite there being uncertainty around where and how the impacts will eventuate, there is strong consensus about the types of impacts to biodiversity we can expect in Mount Alexander Shire (DEECA 2024; DEECA 2023). This includes:

- **Tree dieback:** Large scale canopy dieback in native forests has been increasing and is likely to continue as the climate warms. This is likely to result in landscapes with fewer trees and permanent shifts to species more tolerant of hot and dry conditions.
- **Frequent fire impact to sensitive plants and animals:** Some plant species are adapted to regular bushfires, but others may not be able to regenerate if there is not enough time between fires. Fire and weather are also strong drivers of small mammal abundance. Some small mammal species require habitat that hasn't been burnt for decades. As fires become more frequent due to climate change, these mammal species are likely to decline in abundance.
- **Reduced river flows:** Projected declines in cool-season rainfall and higher potential evapotranspiration are expected to reduce runoff to waterways. What may seem like small changes in rainfall can have a big impact on streamflow. Generally, a 10 per cent reduction in rainfall might lead to a 20 to 30 per cent reduction in

streamflow. As the amount of water in rivers and wetlands decreases, water temperatures rise and dissolved oxygen levels decrease. Under these conditions, the risk of toxic algal blooms and fish death increases.

- **Wetland drying:** Many Victorian wetlands are adapted to dry periods but do require regular flows of water and flooding. Without regular flows and floods, wetlands can be lost and replaced by dryland vegetation.
- **Increased invasive species:** Overall, warmer drier conditions are expected to benefit weeds and pests when compared with native species. The characteristics that make many weeds and pests invasive, for instance that they can tolerate a broad range of environmental conditions and can breed quickly, will help them exploit new opportunities. Introduced plants species that are currently not considered to be weeds could become problems in the future as the environment changes.
- **Increased spread of plant diseases:** Increased heat and decreased water availability have altered the composition of forests and the spread and impact of pathogens, disease and pests. These conditions are likely to continue to worsen, promoting increased spread of plant diseases.
- **Changes to terrestrial species' distribution and abundance:** Climate change will impact the distribution and abundance of species. This can be hard to predict, but species with limited dispersal abilities, small geographic ranges, or confined to specialised habitats are likely to be particularly vulnerable.
- **Changes to timing of life-cycle events:** Many species rely on the timing of life-cycle stages to ensure optimal environmental conditions for growth and breeding, such as abundant food for raising young or flowering to coincide with pollinator emergence. Changes to the timing of life-cycle events within one species can have flow-on effects to the other species that depend on it.

Protecting and restoring biodiversity will play an important role in helping landscapes and communities adapt to future climate conditions (MASC, 2015; MASC, 2023a). Healthy, diverse and well-connected ecosystems are better able to withstand and recover from climate-related disturbances such as drought, bushfire, extreme heat and flooding, while also providing habitat that enables plants and animals to adapt and move in response to changing environmental conditions.

7.6 Bushfire and fire regimes

Successive major bushfires in Victoria have shaped a distinctly Western approach to fire management, centred on emergency response, legislation and fire suppression to protect lives and property. The recent 2026 Harcourt fires destroyed homes and livelihoods and left deep emotional scars in the community. In the aftermath of such events, there is often a strong instinct to clear, burn and tidy the landscape in pursuit of safety. This response is understandable, particularly around homes, infrastructure and evacuation routes. However, it highlights a significant and ongoing tension between bushfire risk to life and property, and biodiversity protection. The same fire that threatens human life can also erase critical ecological habitat in a landscape that is already highly fragmented and under pressure.

7.6.1 Fire management for fuel reduction

For decades, bushfire management in Australia has been strongly focussed on fuel reduction, through slashing, burning and clearing. While these approaches can reduce fire intensity in the short term, fuel reduction is not a "panacea" (McCormick & May, 2021) and the evidence on long-term effectiveness is more variable (Zylstra & Lindenmayer, 2025). There is increasing recognition that fuel reduction strategies may involve trade-offs and that maximising outcomes for one objective (such as short-term asset protection) can, in some circumstances, compromise others (such as long-term ecosystem resilience) (Commonwealth of Australia, 2020).

Some research suggests that frequent burning or disturbance (including clearing and slashing) may increase long-term flammability by stimulating dense regrowth and can be associated with poorer biodiversity outcomes (Zylstra & Lindenmayer, 2025). Clearing vegetation can also unintentionally encourage grass growth, create more open and exposed conditions, and in some cases contribute to increased flammability over time (Zylstra & Lindenmayer, 2025). For example, grasses, can burn faster and quicker than forest and bushland (CFA, 2026). This challenges the common perception that "less vegetation equals less fire risk".

When it comes to fuel reduction burning, the environment effects are complex and no single fire regime suits all ecological communities (McCormick & May, 2021). The literature indicates there are local nuances and greater consideration should be given to factors such as timing, frequency, size and smoke (McCormick & May, 2021), and consideration between the desired short-term risk reduction and long-term landscape resilience (Zylstra & Lindenmayer, 2025).

Studies have also demonstrated that the scale of fuel reduction is an important consideration. Gibbons et. al. (2025) found that prescribed burning is generally conducted too far from houses to prevent house losses and is only likely to be effective within 3km of a house. This questions the appropriateness of broadscale prescribed burning that is routinely practiced in southern Australia (Gibbons et. al. 2025).

Extreme weather and climate conditions also play a dominant role in bushfire behaviour (DEECA, 2024). As climate change drives more frequent and severe fire weather, traditional fuel management approaches alone are unlikely to prevent large-scale or catastrophic fires. Traditional fuel reduction methods are most effective when conditions are moderate and is of diminishing effectiveness when conditions worsen (McCormick & May, 2021). This highlights the need for a broader approach to risk reduction, including land-use planning, settlement patterns, building design and community preparedness (DELWP, 2020).

In this context there is a strong rationale for concentrating intensive bushfire risk management efforts around key settlements and infrastructure (Gibbons et. al. 2025), while protecting and enhancing biodiversity values in less densely populated parts of the municipality. This is reflected within the strategic directions of the draft Mount Alexander Rural Land Use Strategy [Drafting note: this will need to be re-checked before this paper is published once the RLUS is finalised].

7.6.2 The role of Djandak Wi (Country Fire)

Djaara have been using fire to actively shape and manage the landscape for tens of thousands of years and recognise that Country depends on fire for rejuvenation and growth. Djandak Wi season begins after rain, usually in autumn when the weather becomes cooler, seeds drop, plants begin to turn green and the dew point rises.

Djandak Wi is important at this time to reduce leaf litter and dead growth and promote the germination and regrowth of culturally important plants including food and fibre, medicine, and ceremony species. The season continues into early spring when there's the opportunity to control weeds before flowering (Djandak Wi (Country Fire) Strategy, 2024-2034).

Catastrophic bushfires have highlighted the need for a broader approach to bushfire management that extends beyond fire suppression and emergency response. For thousands of years, Aboriginal people actively managed Australian landscapes using cultural burning practices that applied low-intensity, seasonal fire to care for Country, maintain ecosystem health and reduce the risk of large, destructive fires.

Following colonisation, these practices were largely excluded from land management, while European approaches focused on fire exclusion, suppression and altered patterns of land use. Combined with extensive landscape modification and climate change, this disruption has contributed to increasingly severe and catastrophic bushfires (Atkinson and Montiel-Molina, 2023).

There is growing recognition that responding to contemporary fire risk requires bringing together Aboriginal and Western knowledge systems. Rather than replacing one approach with another, this convergence recognises the value of combining Traditional Ecological Knowledge, cultural burning practices and contemporary science to better understand fire behaviour, support healthy ecosystems and improve landscape resilience (Atkinson and Montiel-Molina, 2023).

While fuel reduction burning is well outside of the Mount Alexander Shire Council remit and sphere of influence, Council can facilitate opportunities for Djandak Wi. DJAARA has a Djandak Wi (Country Fire) Strategy in place. This Strategy is focussed on the goal:

> *Djaara are empowered to conduct Djandak Wi at the right time, in the right way, and in the right place according to what Djandak needs.*

Council can work in partnership with DJAARA (the Corporation) and DJANDAK (the enterprise) to support cultural burning on Council-managed land, embed Djaara knowledge into reserve management and build organisational and community understanding of cultural fire.

Similarly, it is a core goal of Taungurung Land and Waters Council to care for Country, and part of that is focussed on being contracted to undertake public land management, be a leader in the monitoring of threatened species, and to have a role in policy, planning and budget priorities for caring for Country. Taungurung Country is a small part of the Shire's region, but there are still opportunities that can be pursued through a partnership agreement.

7.7 Ecological threat exposure

Threat models, generated as a core component of DEECA's SMP tool, show where an ecological threat is likely to be present across Victoria by taking into account the known distribution of threats to biodiversity and the characteristics of the environment. Twelve ecological threats were identified within MASC, including ecological processes such as fire frequency and land clearing to introduced species such as foxes, cats and rabbits. From the analysis, nine cluster regions were identified as areas with the highest number of coinciding threats. Across the nine cluster regions, the most widespread threats identified were foxes, weeds, and noisy miners, which were present in all regions (see Appendix 4). Cats, kangaroos, and rabbits were also common threats. Deer and goats were more spatially restricted, with these threats occurring in only some of the cluster regions (Figure 7-3).

In 2019, an assessment by Kearney et al estimated that 82% of our EPBC Act listed threatened species were affected by invasive species. Ecosystem modification (e.g. fire) affected 74% of listed species, and agriculture affected 57% of threatened species. Other causes of habitat change needed further investigation. The review found that threatened species conservation is often fragmented, with information, management actions and investment spread across many organisations and land tenures. It recommends a more coordinated approach that brings together data, local knowledge and on-ground actions to align priorities, share information, target investment and deliver more effective conservation outcomes.

For Council, a coordinated approach is essential to effectively manage pest animals. Council cannot address pest animal impacts on its land in isolation, as the home ranges of many pest species extend well beyond individual Council-managed parcels. To achieve meaningful and lasting outcomes, Council's investment must form part of a coordinated, landscape-scale program involving neighbouring landholders, agencies and other land managers across the region.

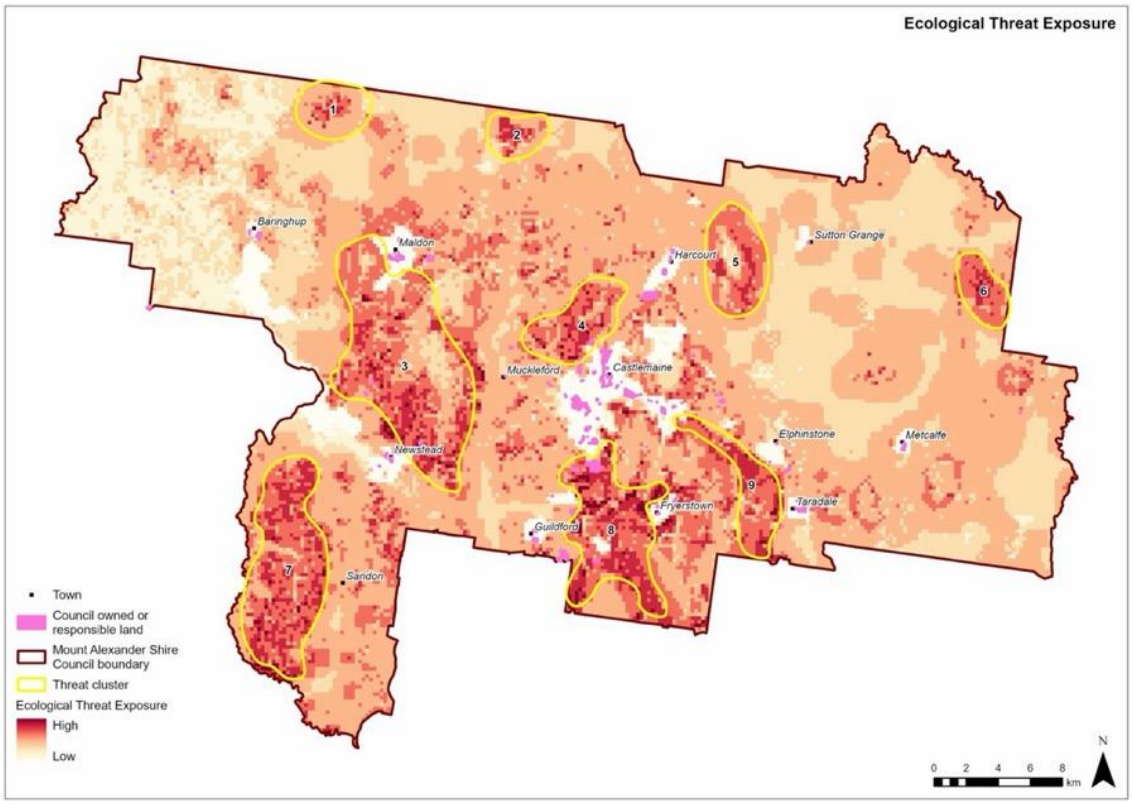


Figure 7-3: Ecological threat exposure across Mount Alexander Shire

8 Recommendations for the Strategy

8.1 Conclusions

The evidence demonstrates that biodiversity values and threats are not evenly distributed across the municipality and that the greatest opportunities for investment occur where high ecological value, significant threats and opportunities for effective action intersect. Remaining biodiversity values are increasingly concentrated within a fragmented network of remnant vegetation, roadsides, waterways and public reserves that play a critical role in supporting habitat connectivity and ecosystem resilience, particularly as climate change intensifies existing pressures.

The evidence also highlights that Council directly manages only a small proportion of the landscape and cannot achieve landscape-scale biodiversity outcomes through on-ground works on Council land alone. Meaningful change will require biodiversity to be embedded across Council's operations and decision-making and delivered in partnership with Traditional Owners, community groups, agencies and private landholders. Collectively, these findings support a Strategy that is evidence-based, spatially explicit and partnership-driven, with a focus on targeted investment, coordinated action and long-term resilience.

8.2 Recommendations

The scope for this Strategy is to guide Council's actions on Council-managed land and through Council operations, while identifying opportunities for Council to influence, partner and advocate for broader landscape-scale biodiversity outcomes.

Given the scope, there are five broad recommendations for the structure of the Strategy. This should be considered alongside the consultation findings.

8.2.1 Take a strategic approach to managing Council managed land

Council manages a diverse portfolio of bushland reserves, roadsides, waterways and open spaces. The scale of biodiversity values and the resources available to manage them means that it is not possible to undertake all works, everywhere, at once. To help direct investment where it will achieve the greatest benefit, this Strategy sets out a prioritisation framework to identify locations where actions are likely to deliver the greatest long-term biodiversity outcomes.

Recommended priority setting framework

Overview

Council manages a diverse portfolio of bushland reserves, roadsides, waterways and open spaces. The scale of biodiversity values and the resources available to manage them means that it is not possible to undertake all works, everywhere, at once. To help direct investment where it will achieve the greatest benefit, this Strategy sets out a prioritisation framework to identify locations where actions are likely to deliver the greatest long-term biodiversity outcomes.

This section outlines:

- Recommended priority setting framework. This outlines how future priorities will be assessed throughout the implementation of this Strategy.
- Preliminary desktop assessment of priority locations based on available data. We have undertaken a desktop assessment using some of the criteria during the development of this Strategy.
- Implementation process outlining how priorities will be confirmed before investment.

Recommended priority setting framework

Priorities are identified using a multi-criteria framework that considers ecological value, level of threat, landscape function and opportunities for effective action. These factors are considered together rather than in isolation, alongside Traditional Owner knowledge, local knowledge, site assessments, feasibility and available resources. This framework is intended to support transparent, evidence-based decision-making and investment throughout the delivery of the Strategy.

Priority locations are identified through five interrelated criteria:

Ecological value

- Habitat value – areas supporting high species richness, rare species, culturally important and diverse ecological communities
- Threatened species habitat – modelled and known habitat for threatened species
- Irreplaceable habitat features – including large old trees, hollow-bearing trees, biocultural values, rocky outcrops

Landscape function

- Landscape connectivity potential (proximity to protected areas) – areas that link larger patches of vegetation and protected areas, supporting wildlife movement, gene flow and climate adaptation
- Climate refugia and water dependent ecosystems (proximity to waterways and wetlands) – waterways, wetlands and other areas that retain moisture that provide important refuges for biodiversity during drought, heatwaves and fire.

Cultural significance

- Cultural significance - opportunities for practicing culture and opportunities for Caring for Country

Level of threat

- Areas subject to habitat loss, fragmentation, invasive species pressure or development impacts.

Opportunity for effective action

- Build on previous investment - Maintain prior investment through Council's on-ground environmental works program by continuing to remove threats and increase indigenous vegetation quality at previously identified priority locations
- Strategic opportunities - areas where there is existing volunteer enthusiasm, funding, or work being undertaken by others presents an opportunity to build on that existing investment and increase the likelihood of successful long-term outcomes
- Feasibility – practical feasibility of management actions (resourcing, cost of interventions, nature of the work required, type of the threat)

Analysis is undertaken spatially (where data is available), then complemented by Council's existing information, further ground truthing, and biocultural and ecological knowledge to confirm on-ground conditions and refine priority locations.

Preliminary desktop assessment of priority locations based on available data

Based on the data available at the time of writing, (habitat value, threatened species habitat, landscape connectivity potential climate refugia, and threats) this framework identified several initial priority areas for Council investment where ecological value, threat and opportunity intersect:

- Roadsides within the Maldon to Newstead corridor and within proximity to Fryerstown
  - Roadside vegetation (where assessments have been completed) is considered very high to high quality
  - An area with likelihood of a high number of threatened species habitat under significant threat
  - These areas have the potential to provide connection to the Wombat State Forest beyond the boundary, as well as close proximity to other protected areas.
- Former tip sites (Barkers Creek, Campbells Creek, Welshmans Reef, Chewton, McKenzie Hill) and other council managed land/reserves nearby to Fryerstown, Guildford, Tarilta and Newstead
  - Areas of very high habitat value and likely habitat for a high number of threatened species
  - These areas are closely connected to other areas of biodiversity significance which enhances the potential for landscape connectivity.

These initial priority areas reflect current available data and understanding. They will be refined over time as new information becomes available (e.g. comprehensive survey data), ground-thruthing is completed and as opportunities, resources and partnerships evolve. Initial priority council-managed areas are spatially represented in Figure 6.

Please refer to our *Biodiversity Background paper* for further information on how priority locations were identified.

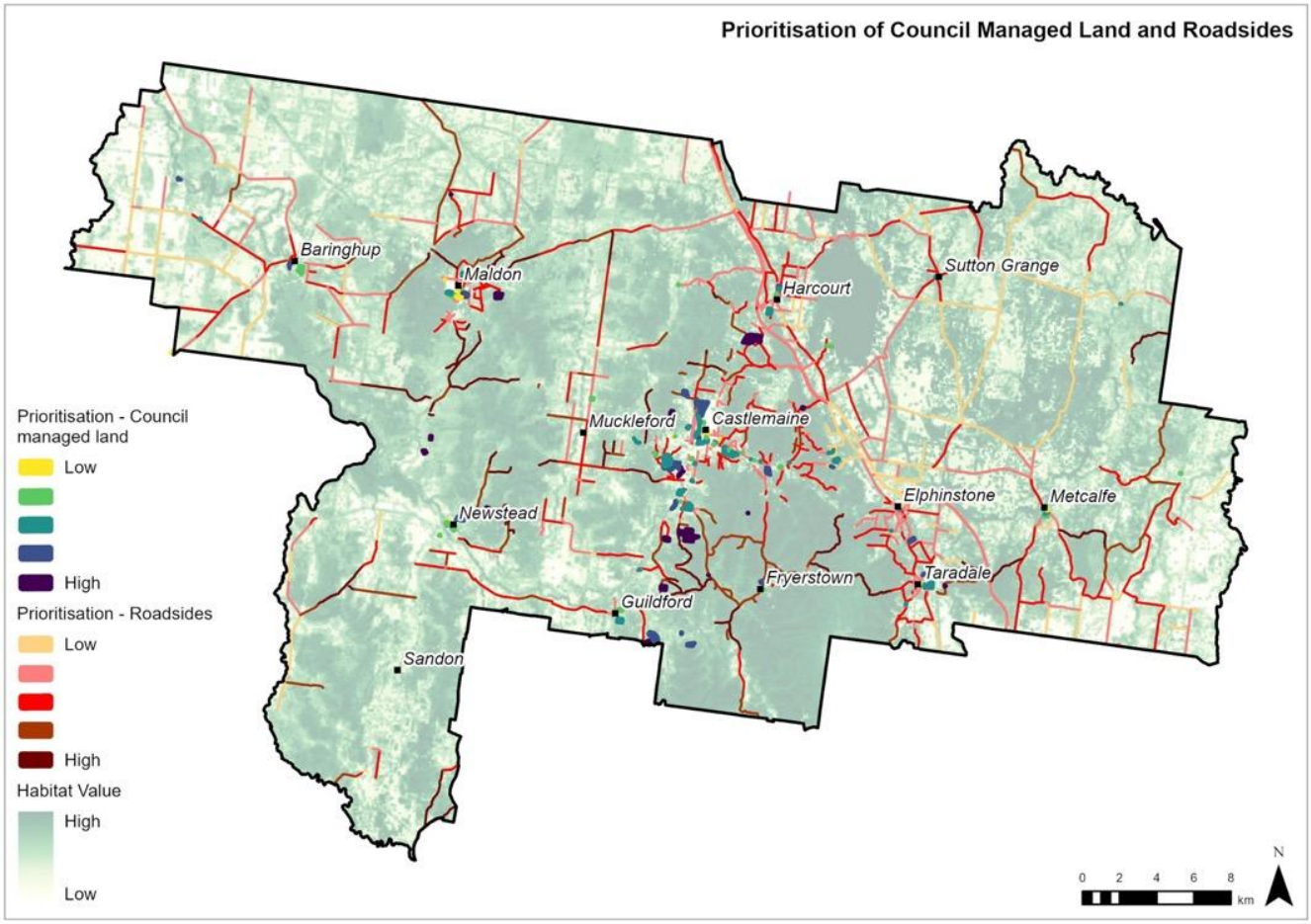


Figure 6. Prioritisation of council managed land and roadsides.

8.2.2 Partner with Traditional Owners

The Victorian Government recognises the rights of Traditional Owners and Aboriginal communities to make decisions about matters that affect their people and Country. This includes a commitment to genuine engagement and partnership, recognising Traditional Owner knowledge and cultural authority, and supporting opportunities for Aboriginal people to lead and participate in the planning and management of land, water and natural resources.

The Traditional Owners of Country throughout the Mount Alexander Shire are the Dja Dja Wurrung and the Taungurung People. The aspirations of both DJAARA and Taungurung are centred on healthy Country, self-determination and increasing opportunities for Traditional Owners to care for and make decisions about Country. Their plans emphasise protecting and restoring native vegetation, waterways and culturally significant species, revitalising cultural practices such as cultural burning, and embedding Traditional Owner knowledge in land management.

While Council manages only a small proportion of land within the municipality, it can support these aspirations on Council-managed land by partnering with Traditional Owners in planning and on-ground works, enabling cultural land management practices, protecting and restoring biodiversity values, incorporating cultural knowledge into decision-making, and identifying opportunities to align Council investment with broader Traditional Owner priorities for caring for Country. A significant body of work has been completed to identify cultural values in a publicly available format. This mapping should be considered in any future planning for on-ground works throughout the municipality.

The interactive map can be accessed using the Aboriginal Cultural Heritage Register and Information System (First Peoples – State Relations, 2025).

8.2.3 Embed biodiversity in Council decisions

Council delivers a number of services across its business units. At various times, they intersect or can influence the natural environment. Biodiversity should be a key consideration at the scoping and design phase of council works to influence the outcome of the project. Key areas of influence are:

- Open space and parks management – site selection, protection of native vegetation during works, tree protection, indigenous plant selection, habitat creation and reserve management
- Engineering and capital works – project scoping and design, avoiding and minimising impacts on native vegetation and waterways, stormwater management, erosion control and considering biodiversity early in project planning
- Statutory and strategic planning – application of planning controls, consideration of native vegetation and waterways, and embedding biodiversity considerations into the planning scheme, policies and decision-making
- Asset management and maintenance – roadside management, vegetation maintenance, slashing and spraying practices, and managing works within existing disturbance footprints
- Environment and biodiversity functions – biodiversity data management, mapping, monitoring, advice to other business units and identifying priority areas for investment
- Heritage and cultural heritage – consideration of endemic species, dark sky principles and opportunities to align biodiversity and cultural outcomes
- Community and recreation planning – balancing biodiversity outcomes with community expectations, sporting requirements and open space needs.

8.2.4 Partner with other agencies

Compared to other agencies, Council directly manages very little land.

Within Mount Alexander Shire, the North Central Catchment Management Authority's (North Central CMA) current biodiversity priorities are strongly focussed on threatened aquatic species recovery and habitat restoration, particularly for small-bodied native fish. Projects include recovery actions for the Southern Pygmy Perch, as well as work on Southern Pygmy Perch, Flat-headed Galaxias and Bibron's Toadlet, involving habitat restoration, monitoring, captive breeding and reintroductions to suitable habitats across the region. These projects aim to improve the resilience of remnant populations and restore self-sustaining populations within the Campaspe and Loddon catchments. Mount Alexander Shire Council and North Central CMA are already collaborating on joint funded projects for the Eltham Copper Butterfly, Forest Creek Revitalisation, and Platy Patch.

Coliban Water's biodiversity activities are primarily associated with the Coliban Main Channel and associated water infrastructure. Current priorities include maintenance and environmental management along the Main Channel corridor between Malmsbury and Bendigo, including investigations into fauna crossings and opportunities to improve habitat connectivity associated with water infrastructure. The Main Channel corridor represents an important linear habitat and connectivity asset across the landscape, creating opportunities for biodiversity enhancement alongside water delivery functions.

Parks Victoria also contributes to the delivery of the Victorian Government’s Biodiversity 2037 Strategy, alongside the Department of Energy Environment and Climate Action (DEECA). VicTrack and VLine also have land management responsibilities within the Shire.

Council should coordinate on-ground works with other land managers to leverage investment and drive coordinated action to achieve landscape scale outcomes over the next 10 years.

8.2.5 Support the community

Mount Alexander Shire region has the highest concentration of Landcare and environmental volunteering groups in Victoria (~30 groups). Connecting Country works with Landcare and Friends groups, landholders, volunteers and partner organisations across the Mount Alexander region to protect and restore biodiversity. Since 2007, this collective effort

has supported restoration across more than 13,000 hectares, including revegetation, protection of remnant vegetation and invasive plant management. Long-term monitoring programs have also improved knowledge of local biodiversity, including monitoring of Brush-tailed Phascogales and woodland birds.

Connecting Country also plays an important role in supporting the region's community environmental network, including hosting the local Landcare Facilitator, who supports Landcare and Friends groups across the Mount Alexander region. These achievements reflect the sustained contribution of many local groups, landholders and volunteers who undertake restoration, monitoring and stewardship across the landscape (Connecting Country, 2026).

There is high level of enthusiasm, motivation and on ground work happening across the Shire as a result of these groups and many individuals with significant ecological expertise and experience. Council can support this further by providing information to private landholders and coordinating joint projects with local Landcare facilitators (Connecting Country and Mid Loddon Landcare Network), especially on Council managed land.

9 References

Atkinson A, Montiel-Molina C. Reconnecting Fire Culture of Aboriginal Communities with Contemporary Wildfire Risk Management. Fire. 2023; 6(8):296. https://doi.org/10.3390/fire6080296

Bureau of Meteorology, 2026, Climate Statistics for Australian locations, summary statistics for Castlemaine Prison, URL: https://www.bom.gov.au/climate/averages/tables/cw_088110.shtml

Castlemaine Field Naturalists Club (2026a) *Castlemaine District Plant List*.

Castlemaine Field Naturalists Club (2026b) *Important Weeds.* URL: https://castlemainefieldnaturalists.org.au/important-weeds/ (Accessed 28 June 2026)

Country Fire Association (CF) (2026) *Grassfires – Rural*. URL: https://www.cfa.vic.gov.au/plan-prepare/bushfire-basics/grassfires-rural (Accessed 29 June 2026)

Commonwealth of Australia (2020). *Background Paper: Land management – hazard reduction: a literature review.* Royal Commission into National Natural Disaster Arrangements. Australian Government, Canberra.

Connecting Country (2026) *About us, URL: https://connectingcountry.org.au/about/our-achievements/*

Connecting Country (2026) *Geology and soils*. URL: https://connectingcountry.org.au/education-resources/understand-your-land/geology-and-soils (Accessed 25 June 2026)

Connecting Country (2026) *Invasive plant information.* URL: https://connectingcountry.org.au/invasive-plant-information/ (Accessed 28 Juen 2026)

CSIRO & Department of Energy, Environment and Climate Action (DEECA). (2024). Loddon Campaspe Climate Projections 2024. https://www.climatechange.vic.gov.au/victorias-changing-climate

Department of Energy, Environment and Climate Action (DEECA) (2023). *Climate change impacts.* URL: https://www.environment.vic.gov.au/natural-environment-adaptation-action-plan/climate-change-impacts (Accessed 24 June 2026)

Department of Energy, Environment and Climate Action (DEECA) (2024) *Victoria's Climate Science Report 2024*. Victorian State Government, Melbourne.

Department of Energy, Environment and Climate Action (DEECA) (2025) *Guidelines for the removal, destruction or lopping of native vegetation*. Victorian State Government, Melbourne.

Department of Environment, Land, Water and Planning. (2020). Design guidelines: Settlement planning at the bushfire interface. State Government of Victoria. https://www.planning.vic.gov.au/__data/assets/pdf_file/0032/639509/Design-guidelines-for-settlement-planning-at-the-bushfire-interface.pdf

Department of Environment, Land, Water and Planning (DELWP) (2017) *Protecting Victoria's Environment – Biodiversity 2037*. Victorian State Government, Melbourne.

Department of Environment and Primary Industries (DEPI) (2010) *Index of Stream Condition. The third benchmark of Victorian River Condition (ISC3)*. *North Central Region*. Victorian State Government, Melbourne.

Dja Dja Wurrung Clans Aboriginal Corporation, 2024, Djandak Wi (Country Fire) Strategy, 2024-2034, URL: https://gg-wordpress-offload.s3.ap-southeast-2.amazonaws.com/djadjawurrung.com.au/wp-content/uploads/2024/05/Djandak-Wi-Strategy.pdf

Doerr, V. (2017a) *The hope of biolinks and practical guidelines for making the dream a reality*. Linking Lanscapes Symposium. Biolinks Alliance – Connecting Central Victoria, Bendigo. URL: https://static1.squarespace.com/static/59374e666a4963c6df22569f/t/5a17616cf9619afa6ade55c1/1511481711590/Doerr+V3_Formated.pdf (Accessed 26 June 2026)

Doerr, V. (2017b) *The hope of biolinks and practical guidelines for making the dream a reality* – presentation by Dr. Veronica Doerr, Senior Research Scientists, CSIRO. URL: https://static1.squarespace.com/static/59374e666a4963c6df22569f/t/5a178c1a53450a9c54ea2d86/1511492650046/Doerr_VicBiolinks_May2017.pdf (Accessed 26 June 2026)

First Peoples – State Relations. (2025, November 10). Mapping platform for strategic planning. State Government of Victoria, https://ichl.achris.vic.gov.au/stratplan.html

Gibbons, P., Gale, M., Moritz, M. and Cary, G. (2025) *The effectiveness of prescribed burning for protecting houses during wildfires in Australia*. Fire Ecology, Vol. 21.

Kearney, S. G., Carwardine, J., Reside, A. E., Fisher, D. O., Maron, M., Doherty, T. S., Legge, S., Silcock, J., Woinarski, J. C. Z., Garnett, S. T., Wintle, B. A., & Watson, J. E. M. (2019). The threats to Australia's imperilled species and implications for a national conservation response. Pacific Conservation Biology, 25(3), 231–244. https://doi.org/10.1071/PC18024

Land for Wildlife (date n/a) The Value of Habitat Trees. Land for Wildlife Queensland: Note V7 URL: https://www.lfwseq.org.au/wp-content/uploads/2016/11/The-Value-of-Habitat-Trees.pdf (Accessed 25 June 2026)

Lawton, J. A., Holland, G. J., & Bennett, A. F. (2021). What determines the distribution of a threatened species, the brush-tailed phascogale *Phascogale tapoatafa* (Marsupialia: Dasyuridae), in a highly modified region? *Austral Ecology*. https://doi.org/10.1111/aec.13094

Mount Alexander Shire Council. (2015). *Environment strategy 2015–2025*. Mount Alexander Shire Council.

Mount Alexander Shire Council. (2016). *Public open space strategy: Final report*. Mount Alexander Shire Council.

Mount Alexander Shire Council. (2020a). *Castlemaine Botanical Gardens Flora and Fauna Reserve environmental management plan*. Mount Alexander Shire Council.

Mount Alexander Shire Council. (2023a). *Climate change strategy: Working together for a healthy, connected shire*. Mount Alexander Shire Council.

Mount Alexander Shire Council. (2023b). *Urban waterways management plan*. Mount Alexander Shire Council.

Mount Alexander Shire Council. (2024a). *Roadside conservation management plan 2024–2029*. Mount Alexander Shire Council.

Mount Alexander Shire Council (2024b) *Council commits to protect biodiversity in Harcourt.* URL: https://www.mountalexander.vic.gov.au/Council/News-and-updates/Council-commits-to-protect-biodiversity-in-Harcourt (Accessed 28 June 2026)

Mount Alexander Shire (2026a). *Landscape: geology*. URL: https://www.mountalexander.vic.gov.au/Community-and-Wellbeing/Environment-and-climate/Natural-environment/Land-of-Mount-Alexander-Shire/Landscape (Accessed 25 June 2026)

Mount Alexander Shire Council (2026b) *Housing and Neighbourhood Character Strategy* URL: https://www.mountalexander.vic.gov.au/Building-and-Planning/Planning-for-the-future/Strategic-planning-projects/Housing-and-Neighbourhood-Character-Strategy (Accessed 28 June 2026)

Mount Alexander Shire (2026c). *Pest animals.* URL: https://www.mountalexander.vic.gov.au/Community-and-Wellbeing/Environment-and-climate/Natural-environment/Animals/Pest-animals (Accessed 28 June 2026)

North Central Catchment Management Authority (2014). *Regional Waterway Strategy*. North Central Catchment Management Authority, Huntly, Victoria.

North Central Catchment Management Authority (2021). *Regional Catchment Strategy – Land*. URL: https://northcentral.rcs.vic.gov.au/themes/land/ (Accessed 25 June 2026)

McCormick, B. & May, D. (2021). *Bushfires and fuel reduction burning*. Parliament of Australia. URL: https://www.aph.gov.au/About_Parliament/Parliamentary_departments/Parliamentary_Library/Research/Research_Papers/2021-22/FuelReductionBurning (Accessed 29 June 2026)

Pouliot, A. & Chételat, V. (2020) *The Kingdom of Fungi* (Film). Produced and edited by Alison Pouliot and Valérie Chételat, Central Victoria. URL: https://connectingcountry.org.au/the-importance-of-fungi-with-alison-pouliot/

Zylstra, P. and Lindenmayer, D. (2025) *In 1939, a Royal Commission found burning forests leads to more bushfires. But this cycle of destruction can be stopped*. The Conversation, 2 December 2025. URL: https://theconversation.com/in-1939-a-royal-commission-found-burning-forests-leads-to-more-bushfires-but-this-cycle-of-destruction-can-be-stopped-269099

Appendix 1: Conservation status of Ecological Vegetation Classes in Mount Alexander Shire

Table A-1: Bioregional conservation status of Ecological Vegetation Classes (EVCs) in Mount Alexander Shire

EVC #	NAME	STATUS
61	Box Ironbark Forest	Depleted
22	Grassy Dry Forest	Depleted
23	Herb-rich Foothill Forest	Depleted
70	Hillcrest Herb-rich Woodland	Depleted
71	Hills Herb-rich Woodland	Depleted
67	Alluvial Terraces Herb-rich Woodland	Endangered
68	Creekline Grassy Woodland	Endangered
56	Floodplain Riparian Woodland	Endangered
72	Granitic Hills Woodland	Endangered
76	Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic	Endangered
55	Plains Grassy Woodland	Endangered
803	Plains Woodland	Endangered
292	Red Gum Swamp	Endangered
894	Scoria Cone Woodland	Endangered
19	Stream Bank Shrubland	Endangered
53	Swamp Scrub	Endangered
83	Swampy Riparian Woodland	Endangered
74	Wetland Formation	Endangered
20	Heathy Dry Forest	Least Concern
81	Alluvial Terraces Herb-rich Woodland/Creekline Grassy Woodland Mosaic	Vulnerable
164	Creekline Herb-rich Woodland	Vulnerable
175	Grassy Woodland	Vulnerable
19	Stream Bank Shrubland	Vulnerable
47	Valley Grassy Forest	Vulnerable

Appendix 2: Threatened flora species

Table A-2: Flora species in Mount Alexander Shire listed under the Victorian *Flora and Fauna Guarantee (FFG) Act (1988)* and the federal *Environment Protection and Biodiversity Conservation (EPBC) Act (1999)*

COMMON NAME	SPECIES NAME	FFG STATUS	EPBC STATUS
Ausfeld's Wattle	*Acacia ausfeldii*	Endangered	
Sticky Wattle	*Acacia howittii*	Vulnerable	
Pale Hickory-wattle	*Acacia sporadica*	Critically Endangered	
Whirrakee Wattle	*Acacia williamsonii*	Vulnerable	
Buloke	*Allocasuarina luehmannii*	Critically Endangered	
River Swamp Wallaby-grass	*Amphibromus fluitans*	Vulnerable	Vulnerable
Plump Swamp Wallaby-grass	*Amphibromus pithogastrus*	Critically Endangered	
Buloke Mistletoe	*Amyema linophylla* subsp. *orientalis*	Critically Endangered	
Tall Vanilla-lily	*Arthropodium sp. 1 (robust glaucous)*	Endangered	
Narrow-leaf Star-hair	*Astrotricha linearis subsp. 1*	Endangered	
Cane Spear-grass	*Austrostipa breviglumis*	Endangered	
Half-bearded Spear-grass	*Austrostipa hemipogon*	Vulnerable	
Spear-grass	*Austrostipa trichophylla*	Endangered	
Southern Shepherd's Purse	*Ballantinia antipoda*	Critically Endangered	Endangered
Charming Spider-orchid	*Caladenia amoena*	Critically Endangered	Endangered
Castlemaine Spider-orchid	*Caladenia clavescens*	Critically Endangered	
Crimson Spider-orchid	*Caladenia concolor*	Endangered	Vulnerable
Ornate Pink-fingers	*Caladenia ornata*	Endangered	Vulnerable
Veined Spider-orchid	*Caladenia reticulata s.s.*	Endangered	
Little Pink Spider-orchid	*Caladenia rosella*	Critically Endangered	Endangered
Naked Beard-orchid	*Calochilus imberbis*	Critically Endangered	
Cut-leaf Burr-daisy	*Calotis anthemoides*	Critically Endangered	
Forest Bitter-cress	*Cardamine papillata*	Endangered	
Dwarf Cassinia	*Cassinia diminuta*	Endangered	
Cottony Cassinia	*Cassinia ozothamnoides*	Endangered	
Small Milkwort	*Comesperma polygaloides*	Critically Endangered	
Tough Scurf-pea	*Cullen tenax*	Endangered	
Goldfield Boronia	*Cyanothamnus anemonifolius* subsp. *aurifodinus*	Endangered	
Tufted Hair-grass	*Deschampsia cespitosa*	Endangered	
Matted Flax-lily	*Dianella amoena*	Critically Endangered	Endangered
Swamp Flax-lily	*Dianella callicarpa*	Endangered	
Glaucous Flax-lily	*Dianella longifolia var. grandis s.l.*	Critically Endangered	
Late-flower Flax-lily	*Dianella tarda*	Critically Endangered	
Australian Anchor Plant	*Discaria pubescens*	Critically Endangered	
Golden Cowslips	*Diuris behrii*	Endangered	

COMMON NAME	SPECIES NAME	FFG STATUS	EPBC STATUS
Swamp Diuris	*Diuris palustris*	Endangered	
Purple Diuris	*Diuris punctata*	Endangered	
Trailing Hop-bush	*Dodonaea procumbens*		Vulnerable
Spiny Lignum	*Duma horrida* subsp. *horrida*	Critically Endangered	
Small Monkey-flower	*Elacholoma prostrata*	Endangered	
Pale Pipewort	*Eriocaulon scariosum*	Endangered	
Long Eryngium	*Eryngium paludosum*	Endangered	
Purple Eyebright	*Euphrasia collina* subsp. *muelleri*	Endangered	Endangered
Rough Eyebright	*Euphrasia scabra*	Endangered	
Austral Crane's-bill	*Geranium solanderi var. solanderi s.s.*	Endangered	
Pale-flower Crane's-bill	*Geranium sp. 3*	Endangered	
Clover Glycine	*Glycine latrobeana*	Vulnerable	Vulnerable
Cobberas Grevillea	*Grevillea brevifolia*	Endangered	
Goldfields Grevillea	*Grevillea dryophylla*	Endangered	
Small-flower Grevillea	*Grevillea micrantha*	Critically Endangered	
Fryerstown Grevillea	*Grevillea obtecta*	Endangered	
Smooth Grevillea	*Grevillea rosmarinifolia* subsp. *glabella*	Endangered	
Slender Club-sedge	*Isolepis congrua*	Endangered	
Prince-of-Wales Feather-moss	*Leptodon smithii*	Critically Endangered	
Lanky Buttons	*Leptorhynchos elongatus*	Endangered	
Striped Water-milfoil	*Myriophyllum striatum*	Endangered	
Spiny Rice-flower	*Pimelea spinescens subsp. spinescens*	Critically Endangered	Critically Endangered
Maroon Leek-orchid	*Prasophyllum frenchii*	Endangered	Endangered
Woodland Leek-orchid	*Prasophyllum sp. aff. validum*	Endangered	
Slender Mint-bush	*Prostanthera saxicola var. bracteolata*	Endangered	
Sutton Grange Greenhood	*Pterostylis agrestis*	Critically Endangered	
Large Rustyhood	*Pterostylis maxima*	Critically Endangered	
Inland Red-tip Greenhood	*Pterostylis rubescens*	Endangered	
Emerald-lip Greenhood	*Pterostylis smaragdyna*	Endangered	
Robust Greenhood	*Pterostylis valida*	Endangered	Critically Endangered
Hairy Tails	*Ptilotus erubescens*	Critically Endangered	
Scented Bush-pea	*Pultenaea graveolens*	Endangered	
Flat-leaf Bush-pea	*Pultenaea platyphylla*	Endangered	
Fragrant Saltbush	*Rhagodia parabolica*	Vulnerable	
Small-flower Wallaby-grass	*Rytidosperma monticola*	Endangered	
Branching Groundsel	*Senecio cunninghamii var. cunninghamii*	Endangered	
Large-headed Fireweed	*Senecio macrocarpus*	Critically Endangered	Vulnerable
Yakka Grass	*Sporobolus caroli*	Endangered	

COMMON NAME	SPECIES NAME	FFG STATUS	EPBC STATUS
Southern Swainson-pea	*Swainsona behriana*	Endangered	
Silky Swainson-pea	*Swainsona sericea*	Endangered	
Fringed Sun-orchid	*Thelymitra luteocilium*	Vulnerable	
Globe-hood Sun-orchid	*Thelymitra X chasmogama*	Endangered	
Crimson Sun-orchid	*Thelymitra X macmillanii*	Vulnerable	
Austral Toad-flax	*Thesium australe*	Endangered	Vulnerable
Six-point Arrowgrass	*Triglochin hexagona*	Endangered	
Rye Beetle-grass	*Tripogonella loliiformis*	Endangered	
Glandular Early Nancy	*Wurmbea biglandulosa* subsp. *biglandulosa*	Endangered	
Whorled Zieria	*Zieria aspalathoides* subsp. *aspalathoides*	Endangered	

Appendix 3: Threatened fauna species

Table A-3: Flora species in Mount Alexander Shire listed under the Victorian *Flora and Fauna Guarantee (FFG) Act (1988)* and the federal *Environment Protection and Biodiversity Conservation (EPBC) Act (1999)*

COMMON NAME	SPECIES NAME	FFG STATUS	EPBC STATUS
Birds			
Grey Goshawk	*Accipiter novaehollandiae*	Endangered	
Brolga	*Antigone rubicunda*	Endangered	
Southern Whiteface	*Aphelocephala leucopsis*	Vulnerable	Vulnerable
Eastern Great Egret	*Ardea alba modesta*	Vulnerable	
Plumed Egret	*Ardea intermedia plumifera*	Critically Endangered	
Musk Duck	*Biziura lobata*	Vulnerable	
Australasian Bittern	*Botaurus poiciloptilus*	Critically Endangered	Endangered
Bush Stone-curlew	*Burhinus grallarius*	Critically Endangered	
Chestnut-rumped Heathwren	*Calamanthus pyrrhopygius*	Vulnerable	
Sharp-tailed Sandpiper	*Calidris acuminata*	Vulnerable	Vulnerable
Gang-gang Cockatoo	*Callocephalon fimbriatum*	Endangered	Endangered
Brown Treecreeper	*Climacteris picumnus*	Vulnerable	Vulnerable
Ground Cuckoo-shrike	*Coracina maxima*	Endangered	
Little Egret	*Egretta garzetta*	Endangered	
Grey Falcon	*Falco hypoleucos*	Vulnerable	Vulnerable
Black Falcon	*Falco subniger*	Critically Endangered	
Latham's Snipe	*Gallinago hardwickii*	Vulnerable	Vulnerable
Diamond Dove	*Geopelia cuneata*	Vulnerable	
Painted Honeyeater	*Grantiella picta*	Vulnerable	Vulnerable
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Endangered	
Little Eagle	*Hieraaetus morphnoides*	Vulnerable	
White-throated Needletail	*Hirundapus caudacutus*	Vulnerable	Vulnerable
Caspian Tern	*Hydroprogne caspia*	Vulnerable	
Australian Little Bittern	*Ixobrychus dubius*	Endangered	
Swift Parrot	*Lathamus discolor*	Critically Endangered	Critically Endangered
Lewin's Rail	*Lewinia pectoralis*	Vulnerable	
Purple-gaped Honeyeater	*Lichenostomus cratitius*	Vulnerable	
Major Mitchell's Cockatoo	*Lophochroa leadbeateri*	Endangered	Endangered
Square-tailed Kite	*Lophoictinia isura*	Vulnerable	
Hooded Robin	*Melanodryas cucullata*	Endangered	Endangered
Blue-winged Parrot	*Neophema chrysostoma*	Vulnerable	Vulnerable
Turquoise Parrot	*Neophema pulchella*	Vulnerable	
Barking Owl	*Ninox connivens*	Critically Endangered	
Powerful Owl	*Ninox strenua*	Vulnerable	
Crested Bellbird	*Oreoica gutturalis*	Endangered	
Blue-billed Duck	*Oxyura australis*	Vulnerable	

COMMON NAME	SPECIES NAME	FFG STATUS	EPBC STATUS
Plains-wanderer	*Pedionomus torquatus*	Critically Endangered	Critically Endangered
Superb Parrot	*Polytelis swainsonii*	Endangered	Vulnerable
Grey-crowned Babbler	*Pomatostomus temporalis*	Vulnerable	
Speckled Warbler	*Pyrrholaemus sagittatus*	Endangered	
Australasian Shoveler	*Spatula rhynchotis*	Vulnerable	
Diamond Firetail	*Stagonopleura guttata*	Vulnerable	Vulnerable
Freckled Duck	*Stictonetta naevosa*	Endangered	
Masked Owl	*Tyto novaehollandiae*	Critically Endangered	
Regent Honeyeater	*Anthochaera phrygia*	Critically Endangered	Critically Endangered
Mammals			
Eastern Bent-winged Bat	*Miniopterus orianae oceanensis*	Critically Endangered	
Platypus	*Ornithorhynchus anatinus*	Vulnerable	
Brush-tailed Phascogale	*Phascogale tapoatafa*	Vulnerable	
Grey-headed Flying-fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable
Fat-tailed Dunnart	*Sminthopsis crassicaudata*	Vulnerable	
Common Dunnart	*Sminthopsis murina murina*	Vulnerable	
Fish			
Flat-headed Galaxias	*Galaxias rostratus*	Critically Endangered	Critically Endangered
Trout Cod	*Maccullochella macquariensis*	Endangered	Endangered
Murray Cod	*Maccullochella peelii*	Endangered	Vulnerable
Macquarie Perch	*Macquaria australasica*	Endangered	Endangered
Southern Purple-spotted Gudgeon	*Mogurnda adspersa*	Critically Endangered	
Reptiles			
Striped Legless Lizard	*Delma impar*	Endangered	Vulnerable
Murray River Turtle	*Emydura macquarii*	Critically Endangered	
Bearded Dragon	*Pogona barbata*	Vulnerable	
Lace Monitor	*Varanus varius*	Endangered	
Amphibians			
Growling Grass Frog	*Litoria raniformis*	Vulnerable	Vulnerable
Brown Toadlet	*Pseudophryne bibronii*	Endangered	
Invertebrates			
Eltham Copper Butterfly	*Paralucia pyrodiscus lucida*	Endangered	Endangered
Golden Sun Moth	*Synemon plana*	Vulnerable	Vulnerable
Cryptic Sun Moth	*Synemon theresa*	Extinct	
Jewel Beetle	*Temognatha flavocincta*	Vulnerable	
Yellow Ochre Butterfly	*Trapezites luteus luteus*	Endangered	

Appendix 4: Threat cluster by sub-region

Table A-4: Cluster of threats by sub-region (based on map presented in Figure 7-3)

SMP THREAT LAYER	CATS	CLEARING	DEER	FOXES	FREQUENT FRB	GOATS	GRAZING	HARVESTING	KANGAROOS	NOISY MINERS	RABBITS	WEEDS
Cluster Region												
Region 1	N	Y	N	Y	N	N	Y	Y	N	Y	Y	Y
Region 2	N	Y	N	Y	N	N	Y	Y	Y	Y	Y	Y
Region 3	Y	N	N	Y	Y	N	N	Y	Y	Y	Y	Y
Region 4	Y	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y
Region 5	Y	N	Y	Y	Y	N	N	N	Y	Y	N	Y
Region 6	Y	N	N	Y	Y	Y	Y	N	Y	Y	Y	Y
Region 7	Y	N	N	Y	Y	N	N	Y	Y	Y	Y	Y
Region 8	Y	N	N	Y	Y	Y	Y	N	Y	Y	Y	Y
Region 9	N	Y	N	Y	N	N	Y	Y	N	Y	Y	Y

Appendix 5. Methodology for preliminary prioritisation

Purpose

Council manages a diverse portfolio of bushland reserves, roadsides, waterways and open spaces. The scale of biodiversity values and the resources available to manage them means that it is not possible to undertake all works, everywhere, at once. To help direct investment where it will achieve the greatest benefit, this Strategy sets out a prioritisation framework to identify locations where actions are likely to deliver the greatest long-term biodiversity outcomes.

One of the key principles underpinning the development of the Biodiversity Strategy is to draw on the best available data and science to underpin the priorities. This section outlines the evidence-based approach used to identify priority areas. While Council holds some biodiversity data, including roadside rapid habitat assessments, existing datasets are spatially incomplete. The prioritisation framework therefore provides a transparent, repeatable desktop methodology that draws on the best publicly available spatial data to consistently identify priority Council-managed land and roadsides for biodiversity investment.

Priortisation Principles

- **Evidence-based and spatially explicit** — use the best available spatial data and analysis to ensure decisions are transparent, consistent and repeatable across the region
- **Target areas of highest threat and opportunity** — prioritise places where spatial data identifies significant threats or strong potential for impact.

Method

Step 1 – Develop a set of criteria for identifying key biodiversity assets:

A set of criteria was developed to identify key biodiversity assets and guide the selection of datasets for the analysis. The criteria defined the rationale behind the identification of biodiversity assets, and considered:

- Whether assets are protected by state or federal legislation
- Whether assets were identified within relevant council documentation (e.g., Phascogale sightings)
- Practical nature of data, including its currency, scale, quality, underlying attributes that support prioritisation (e.g. that differentiate value and threat distribution across the municipality).

Step 2 – Identify biodiversity assets based on criteria

Database searches were undertaken to determine the presence of biodiversity assets within the municipality including the Victorian Biodiversity Atlas, Protected Matters Search Tool) to determine the presence of biodiversity assets. The best available spatial data for identified assets (base data layers) was then obtained, as well as complementary biodiversity-related data (contextual layers). These included: Strategic Management Prospects (SMP) - Habitat Distribution Models, Victorian Biodiversity Atlas species observations and Ecological Vegetation Classes.

Step 3 – Identify significant threats to biodiversity assets

The best available spatial data for identified threats was collated including relevant Strategic Management Prospects (SMP) threat layers and other available information on threatening processes within the municipality.

Step 4 – Spatial analysis

Using the selected datasets (see below) for the identified criteria, raster analysis was undertaken to generate threatened species and threat hotspots.

Data layers

A summary of the base layers that underpinned the prioritisation analysis is provided in Table A-5.

Table A-5: Summary of base layers underpinning priortisation analysis

Criteria	Ecological Value		Level of Threat	Landscape Function	
Base layer	Threatened species Habitat Distribution Models	Habitat Value	Threat layer (Strategic Management Prospects)	Public Land Management (PLM25)	Waterways and Wetlands
Source	Strategic Management Prospects, DEECA - https://www.environment.vic.gov.au/biodiversity/choosing-actions-for-nature	Strategic Management Prospects, DEECA - https://www.environment.vic.gov.au/biodiversity/habitat-value	Strategic Management Prospects, DEECA - https://www.environment.vic.gov.au/biodiversity/choosing-actions-for-nature	DataVic - https://discover.data.vic.gov.au/dataset/public-land-management-plm25	DataVic - https://discover.data.vic.gov.au/dataset/vicmap-hydro
What it contains	Habitat distribution models predict where suitable habitat may exist for a species, based in part on verified (e.g., Victorian Biodiversity Atlas) observations of the species in their natural environments.	The Habitat Value dataset combines information on thousands of species habitats to show the relative biodiversity value of landscapes in Victoria. This can help to identify priority areas for protection and harm avoidance.	The Threat layer shows where action-related landscape-scale threats are likely to occur across Victoria, represented through spatial models of threat likelihood and expressed on a scale of 1 to 100.	This dataset maps public land management for the State of Victoria, where Public Land is defined as land held by/vested in/or owned by DEECA and other government departments, public authorities, Commonwealth government and municipalities.	A subset (features representing waterways and wetlands) of the Vicmap Hydro data series was selected.

Criteria	Ecological Value		Level of Threat	Landscape Function	
Assumptions	The modelling process helps to highlight potential suitable habitat for species, but due to threatening processes not all suitable habitat will be currently occupied by that species. SMP helps identify threats and cost-effective actions that, if implemented, may assist with increasing the extent of occupied habitat for a species. HDMs can be viewed alongside recent robust records to better understand whether a species likely occupies a site (remembering not all areas have been adequately surveyed and there is always a risk of false absences with areas that have been surveyed).	A location modelled as habitat for a species does not mean the species is present at that location. There may be a range of factors, including competition and threats from introduced species, that may impact on a species' occupancy at a location even where the habitat is modelled as suitable.	Threat layers are treated as independent, such that any potential compounding or alleviating impacts occurring between different threats are not measured. All threat layers to be used in the analysis are deemed to be of the same importance and are weighted equally.	PLM areas are assumed to be afforded higher levels of environmental protection compared to private land. As such, the proximity of PLM areas was used as a proxy for determining the landscape connectivity potential between council managed land and roadsides. PLM does not measure ecological condition or actual connectivity. Some public land may be highly modified or isolated, while some private land may provide important habitat corridors. Plantation PLM areas were removed from the analysis.	Waterways and wetlands are important refuges for biodiversity during drought, heatwaves and fire. These datasets do not measure ecological condition or actual connectivity.
Currency	SMP is updated regularly with advances in conservation knowledge, species records, and land management activities. SMP version 4 was released in July 2023 and includes: ▪ New weed modelling with improved consideration of weed types and control methods ▪ New management action for wetland hydrology restoration ▪ Improved consideration of aquatic species and habitats ▪ Updated Habitat Distribution Models for over 100 species ▪ Updated threat models for wild deer, feral goats and feral pigs. New Biodiversity 2037 priority area maps for pest predator control, pest herbivore control, weed control and revegetation.				
Scale	Habitat distribution models are most suitable for landscape scale (LGA) assessments. The models consist of a 75 m grid across Victoria and will be assessed for only the MASC area.	The Habitat Value dataset is provided at 75 m grid across Victoria and will be assessed for only the MASC area.	SMP threat layers are modelled at 225 m grids across Victoria. This provides a suitable scale for landscape scale assessments.	Victorian statewide coverage.	Victorian statewide coverage.

Criteria	Ecological Value	Level of Threat	Landscape Function	
Quality	Habitat Value, HDMs and Threat models use the best scientific information available to DEECA. Models are developed from species and threat observations and extrapolated by incorporating environmental and physical attributes. The models are reviewed and updated regularly to incorporate new data and species records. The methodology underpinning the development of the models is detailed in a peer-reviewed journal (https://www.sciencedirect.com/science/article/abs/pii/S000632072030793X?via%3Dihub).		Polygons are derived from multiple sources at a scale of 1:2 500 - 1:25 000.	Vicmap Hydro provides an accurate representation of natural and man made Hydrographic features across Victoria, at a capture scale of 1:25,000.
Replicability	Raster spatial analysis provides a computationally and time-effective method of analysis. Regular updates of the models allow for the analysis to be re-run in future years if required. All threatened species within Victoria have a HDM, meaning in the future if additional species are listed as threatened, they can be incorporated into the threatened species hotspot mapping analysis.		The dataset is publicly available which allows for renewed prioritisation.	The dataset is publicly available which allows for renewed prioritisation.

Prioritisation Outputs

To support the prioritisation approach, the following mapping outputs were created to support analysis of biodiversity assets and threats across the municipality:

- A “Threatened Species Richness Index” map using habitat distribution models for threatened species that could occur in the municipality (based on the Victorian Biodiversity Atlas (VBA) records)
- A “Threat Risk Index” map based on the threat layers from the Strategic Management Prospects datasets. This includes threats such as weeds and pest animals.
- A “Biodiversity-Threat Index” map to see where the biodiversity assets could be under the highest levels of threat. This will result in a heatmap showing areas of overlap between assets and threats.

Each area of council owned or managed land was scored against the following four metrics, derived from the spatial analysis:

- Mean Habitat Value score
- Mean Biodiversity-Threat Index score
- Proximity to a protected area
- Proximity to a waterway or wetland.

Each metric was scored out of a possible five points, with a maximum possible total score of 20. The council owned or managed areas were then prioritised based on their total score. The scoring system is outline in Table A-6.

Table A-6: Scoring system for council owned or managed land

Mean Habitat Value	Mean Biodiversity-Threat Index	Proximity to a protected area	Proximity to a waterway or wetland
0 – 20 = 1 21 – 40 = 2 41 – 60 = 3 61 – 80 = 4 81 – 100 = 5	1 – 4 = 1 5 – 8 = 2 9 – 12 = 3 13 – 16 = 4 > 16 = 5	> 1000 m = 1 500 – 1000 m = 2 250 – 500 m = 3 100 – 250 m = 4 < 100 m = 5	> 1000 m = 1 500 – 1000 m = 2 250 – 500 m = 3 100 – 250 m = 4 < 100 m = 5

Each area of council managed roadside was then scored against the following three metrics:

- Conservation Value (from the roadside habitat assessments)
- Mean Biodiversity-Threat Index score
- Proximity to a protected area.

Each metric was scored out of a possible five points, with a maximum possible total score of 15. The council managed roadsides were then prioritised based on their total score. The scoring system is outline in Table A-7.

Table A-7: Scoring system for council managed roadsides

Conservation Value	Mean Biodiversity-Threat Index	Proximity to a protected area
Very Low or Not Ranked = 1 Low = 2 Medium = 3 High = 4 Very High = 5	1 – 5 = 1 6 - 10 = 2 11 – 15 = 3 16 – 20 = 4 > 20 = 5	> 1000 m = 1 500 – 1000 m = 2 250 – 500 m = 3 100 – 250 m = 4 < 100 m = 5