

Murrindindi Shire Council Environment Strategy

2011–2015



Acknowledgements

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Murrindindi Shire Environment Advisory Committee

Terry Hubbard	(Chair, community representative)
Ann Jelinek	(community representative)
David Wakefield	(community representative)
Hugh Sullivan	(community representative)
Michael Dexter	(community representative)
Steve Meacher	(community representative)
Robyn Rattray-Wood	(Department of Sustainability and Environment)
Bruce Radford	(Department of Primary Industries)
Rhiannon Apted	(Goulburn Broken Catchment Management Authority)
Cr Sally Abbott Smith	(Councillor, Murrindindi Shire)

Report writing by Rita Seethaler PhD, The Urban Transport Institute.

Editing by Kate Hawkins PhD (Science) Accredited Editor, TwoFoot Words Consultancy.

Cover image by Tony Richardson.

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Foreword

Murrindindi Shire has a high quality, diverse environment that contributes in many ways to a lifestyle that is attractive to those who live in the Shire. The environment has been affected in many ways, in particular by long-term drought and the February 2009 bushfires.

Council has a responsibility to protect and enhance the environment. Council does this by making corporate actions more sustainable and supporting the community to develop more sustainable practices, importantly by adapting to a changing climate.

Council has already been actively engaged in environmental protection, like enforcing local environmental laws (e.g. noise control and waste water management), implementing a waste management and recycling program and actively promoting environmentally sustainable practices like residential grey-water treatment.

In April 2008 the Murrindindi Shire Council released an Environment Policy to guide Council's decision making and management practices. The Environment Policy aims to achieve environmentally responsible and sustainable outcomes throughout the Shire. Within the context of this Policy, Council recognises the need to address potential adverse effects of climate change and opportunities that may result from it.

The Murrindindi Shire Council Environment Policy identifies four key directions and related core objectives. The four key directions are

1. Protect what we have
2. Reduce what we take
3. Minimise what we leave
4. Share what we learn.

The Murrindindi Shire Council Environment Strategy presented here is based on the four key directions and core objectives of the Environment Policy. The Strategy is made up of lists of actions that are grouped under the following six themes

1. Natural environment
2. Waterway and catchment protection
3. Land management
4. Resource use
5. Waste management
6. Sustainable built environment.

Specific actions for each theme vary. Actions include measuring and monitoring the progress of environmental development or outcomes, adapting the planning process and related policy decisions, changing operational procedures, educating people about environmentally sustainable lifestyle choices and promoting this behaviour.

To lead as a role model, Council needs to make its own operations as sustainable as possible while also providing assistance to the wider community to take up more sustainable practices.

In implementing the Environment Strategy, Council will work in close partnership with all parts of the community including businesses, residents and agencies involved in natural resource management and environmental protection.

Together we will make a real difference.

A handwritten signature in black ink, appearing to read 'Peter Beales', with a long horizontal flourish extending to the right.

Peter Beales
Mayor

January 2011

Executive Summary

Introduction

In April 2008 the Murrindindi Shire Council released its Environment Policy to guide Council's decision making and management practices towards achieving environmentally responsible and sustainable outcomes for the Shire. The Murrindindi Shire Council Environment Policy identified four key directions and related core objectives

1. **Protect what we have**—To protect and enhance the natural environment
2. **Reduce what we take**—To reduce the consumption of natural resources
3. **Minimise what we leave**—To minimise the adverse impacts of the Council's and the community's activities on the environment
4. **Share what we learn**—To encourage the adoption of sound environmental practices within Council and the broader community.

The Murrindindi Shire Council Environment Strategy 2011–2015 presented here is based on these four key directions and core objectives of the Environment Policy. It sets out strategies for achieving the objectives of the Environment Policy with actions grouped under the following six themes

- | | |
|----------------|--|
| Theme 1 | Natural environment |
| Theme 2 | Waterway and catchment protection |
| Theme 3 | Land management |
| Theme 4 | Resource use |
| Theme 5 | Waste management |
| Theme 6 | Sustainable built environment. |

Implementing the Environment Strategy will provide a way for Council to respond to emerging community expectations and to meet its responsibilities set out in numerous Commonwealth and State Acts and related policies, which are presented in Appendix 1.

The actions of the Environment Strategy are prioritised (high, medium, low) and assigned a timeframe (first, second, third, fourth year). Performance indicators for each action will allow the quantification of outcomes in a three-yearly review cycle.

Theme 1 Natural environment

In Victoria, the *Environment Protection Act 1970*, *Planning and Environment Act 1987*, *Flora and Fauna Guarantee Act 1988* and *Catchment and Land Protection Act 1994* together form the legal framework for the protection of flora, fauna, ecological communities and biodiversity.

Within this legal framework it is Council's obligation to use the strategic and statutory instruments of the municipal planning scheme in a way that is aligned with the environmental, conservation and resource management objectives and goals at State, regional and municipal levels. One example is the Native Vegetation Retention controls of the planning scheme, which requires a planning permit for the removal of native vegetation. In combination with a Net Gain approach, these instruments can be used to avoid negative impacts of vegetation clearance by providing for offset options.

A particular area of municipal responsibility is the management of municipal roads including roadsides, whereby the *Planning and Environment Act 1987* enables the Shire to help protect environmental conservation values along municipal roadsides. State funding currently allows Council to assist with the management of regionally controlled weeds along municipal roads and on Council-managed land.

To meet these obligations, the Environment Strategy includes actions to

- Identify and map high conservation values on municipal roads and Council-managed land and pest plants and animals that threaten the environment
- Equip the Council's outdoor workforce and contractors with training and protocols to better consider and manage the environment
- Employ and where necessary, adapt planning instruments and local laws to protect the environment.

Theme 2 Waterway and catchment protection

The State Planning Policy Framework and State Environment Protection Policies on surface and groundwater and stormwater management set out guidelines to protect the water quality of surface waterways and their riparian and aquatic habitats. These guidelines aim to minimise the volume and retard the flow of stormwater runoff from developed areas, and to filter sediments and waste from stormwater prior to its discharge into waterways. Under the *Environment Protection Act 1970* and the *Health Act 1958* the Victorian Environment Protection Authority regulates the on-site management of domestic wastewater in a series of environmental management guidelines. To align itself with State legislation and policy and its statutory duties, Murrindindi Shire Council has established a Stormwater Management Plan and is currently developing a Domestic Wastewater Management plan.

Based on the Victorian *Water (Irrigation Farm Dams) Act 2002*, the Local Planning Policy requires that the siting and construction of dams in rural and non-urban areas should not lead to problems with stream flow and erosion. While farm dams constructed for irrigation and commercial purposes require a license, farm dams for stock and domestic purposes do not.

The Murrindindi Shire Rural Living Development Guidelines specify means of taking the environment and downstream users into account to prevent farm dams from having negative impacts.

To meet these obligations, the Environment Strategy includes actions to

- Complete and implement the Domestic Waste Water Management Plan and implement the Stormwater Management Plan
- Implement best practice waterway management in all of Council's operations and to promote practices that improve water quality and protect and enhance riparian and aquatic habitats
- Incorporate principles of water-sensitive urban design in new developments in urban and rural settlements.

Theme 3 Land management

In accordance with the *Victorian Planning and Environment Act 1987*, it is the duty of local government to establish a system of planning schemes as the main instrument to set out objectives, policies and controls for the use, development and protection of land.

Thus, land care and catchment management practices, retention of tree cover, repair of land degradation, and improvement and retention of agricultural land and productive soils are addressed in various documents. These documents include the Shire's Municipal Strategic Statement, Local Planning Scheme, in particular in zones relating to rural land use and overlays relating to environmental constraints, and in Local Environmental Laws.

To meet strategic and statutory obligations, the Environment Strategy includes actions to

- Assess land capability and identify environmental constraints to inform land use planning, including Local Laws and guidelines to ensure that natural resource constraints are taken into account
- Provide information and training in sustainable land use practices combined with regulations and incentives to repair land degradation and prevent further environmental damage
- Strengthen Council's cooperation with agencies, Landcare and community groups as well as individual landholders to tackle pest plant and animal infestations and to address different forms of land degradation.

Theme 4 Resource use

Water and energy are key resources used in Murrindindi Shire. Associated with the use of energy based on fossil fuels are emissions, and greenhouse gas emissions in particular.

Under the *Victorian Water Act 1989*, Goulburn Valley Water (GVW) along with other water corporations is required to establish a Water Demand Supply Strategy and drought response plans. Reductions in demand through increased customer advice, incentives and restrictions and voluntary onsite measures for rainwater harvesting and grey-water treatment are based on GVW's Conservation By-Law (No. 511) and its Water conservation strategy 2008–2013.

As a contribution to the Commonwealth Government's national renewable energy target of 20% renewable energy in Australia's electricity supply by 2020, the *Victorian Renewable Energy Act 2006* and the *Victorian Energy Efficiency Act 2007* focus on increasing renewable energy generation, increasing energy efficiency and reducing greenhouse gas emissions. The objective of energy efficiency is also taken up in the State Planning Policy Framework. Federal and State Governments have initiated a number of financial incentives, assessment and education programs to promote renewable energy and energy efficiency measures at household, business and community levels.

To meet these objectives, the Environment Strategy includes actions to

- Monitor Council's corporate use of water and energy, and to identify and implement resource conservation and efficiency measures
- Promote conservation and efficient use of natural resources within the community and encourage greater use of renewable energy resources and related technologies
- Promote and implement measures to reduce greenhouse gas emissions.

Theme 5 Waste management

The overarching legislation addressing waste management is the *Victorian Environment Protection Act 1970*. Under this Act the Environment Protection Authority (EPA Victoria) is responsible for developing and implementing Victoria's statutory framework for waste including municipal, commercial and industrial, construction and demolition, and prescribed wastes.

Relevant to local government, environmental objectives are specified under the *EP Act 1970* in the Waste Management Policy for management of landfills including siting and design. Industrial waste management policy provisions are set up regarding waste minimisation, control of ozone-depleting substances, waste acid sulphate soils and a pollutant inventory. At a municipal level, Murrindindi Shire's Local Environmental Laws specify the rules for transport and disposal of waste, the use of transfer stations and related permits, fees and penalties.

The Victorian Solid Waste Strategy 'Towards Zero Waste' (2005) provides directions regarding local government's role in maximising the rate of resource recovery by reducing the amount of waste going to landfill through its ability to influence communities and local industries. Working closely with the Goulburn Valley Regional Waste Management Group to achieve the 'Towards Zero Waste' goals, Murrindindi Shire Council's kerbside recycling program makes an important contribution to this strategy.

To meet its obligations, the Environment Strategy includes actions to

- Establish a municipal Waste Management Strategy including roadside collection of household waste, recyclables and hard waste; drum muster programs and household chemical collections; disposal of agricultural plastics; and minimisation and management of litter
- Minimise waste from Council's corporate operations through reducing, reusing and recycling materials and through participating in a green procurement program
- Establish and implement protocols to avoid and mitigate negative impacts of waste management at transfer stations and landfill sites and handling of chemicals at depots
- Engage community and businesses in education programs and events on waste minimisation, recycling and green procurement.

Theme 6 Sustainable built environment

Human settlements within or outside townships need to provide a high quality of life while minimising their impact on the natural environment and climate. An important objective of the *Victorian Planning and Environment Act 1987* is to 'secure a pleasant, efficient and safe working, living and recreational environment for all Victorians and for visitors to Victoria'. There is an increasing trend to addressing environmental problems related to human settlement with innovative urban design strategies to minimise natural resource use, and to reduce impacts on landscape values and the natural environment.

Protection from wildfire is another important concern for human settlements. The State Planning Policy Framework and the Municipal Strategic Statement both address the minimisation of risk to life, property, natural environment and community infrastructure from wildfire.

Complementary to Local Fire Brigade Plans and Public Authority Plans, Murrindindi Shire Council has established a Municipal Fire Prevention Strategy that addresses risk identification, responsibilities and resource allocation of fire prevention works within the Shire and the dissemination of information to landowners. Under the *Country Fire Authority Act 1958*, the implementation of the Municipal Fire Prevention Strategy is overseen by the Country Fire Authority. Landowner responsibilities for preventing fire and minimising the risk of the spread of fire are also covered in the Environmental Local Laws.

To meet these obligations, the Environment Strategy includes actions to

- Establish urban design frameworks for all townships, including environmental design principles to improve quality of life and to increase environmental performance
- Establish and promote sustainable living guidelines, including aspects of fire risk prevention and management, for the design and construction of human settlements within and outside townships
- Form partnerships with other agencies and community groups to inform and promote sustainable technologies and materials within the community and businesses.

Section I Introduction

Local government and the environment

Environmental management and protection is regulated under state and national policies, which assign an important role to local government.

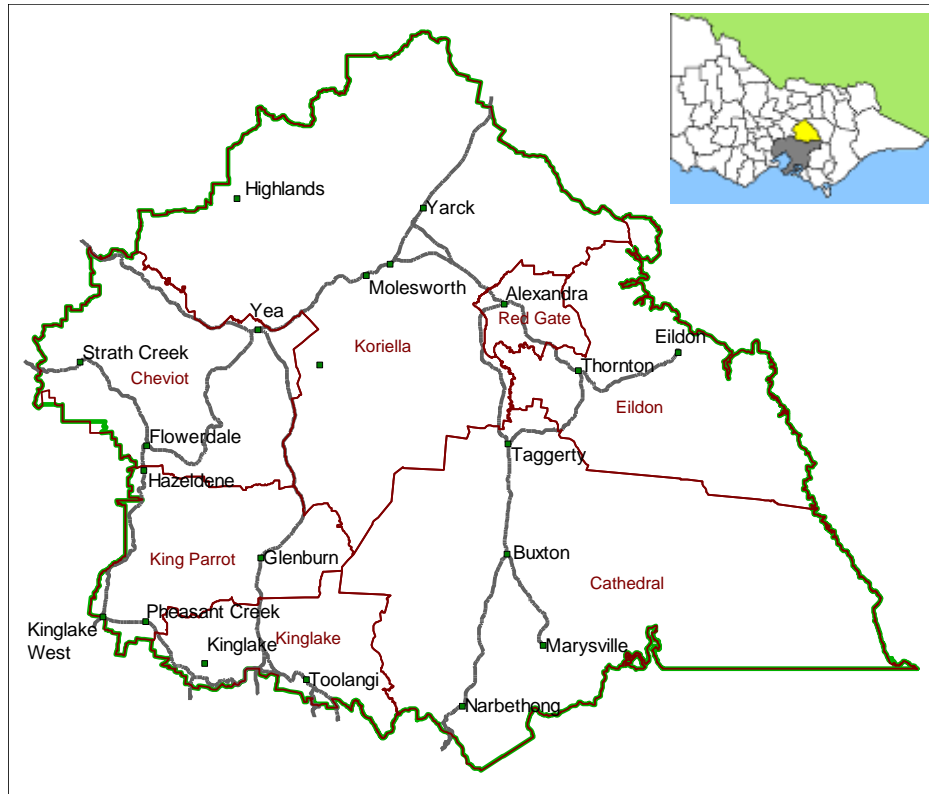
Murrindindi Shire Council is committed to environmental sustainability and recognises its responsibility for addressing the potential adverse impacts of climate change. In a joint effort with the community and many other agencies that cooperate at local, regional, state and national levels, Council will start in its own backyard to put its intention to 'think globally, act locally' into practice.

In the transition from contributing to problems to becoming part of the solution, Council recognises that many changes are needed within its own corporate organization. All decisions need to take into account how they will impact on the natural environment and climate. Procedures and processes of Council and subcontracted operators need to be adapted accordingly.

As a service provider for the Murrindindi community, Council also recognises its role in promoting the adoption of environmentally sustainable practices within the municipality. This includes Council's role in regulating land use, development and amenity within the Shire on the one hand, and community engagement, education and advocacy for environmental and climate-friendly practices on the other. This strategy provides a detailed implementation plan that allows Council to put concrete actions in place to address the objectives laid down in its Environment Policy (Murrindindi Shire Council 2008).

Murrindindi Shire profile

Murrindindi Shire covers an area of 3,887 square kilometres and is located on the north fall of the eastern section of the Victorian highlands (DPCD 2006 Murrindindi Planning Scheme cl. 21.01-1). Seven wards make up the Shire, as shown in the map below. With the exception of a small area south of Kinglake, most of the Shire lies in the upper part of the Goulburn River Catchment.



Source: Murrindindi Shire Council

Figure 1 Map of towns (black) and wards (maroon) in Murrindindi Shire

This catchment drains to the north via a network of waterways, as explained further in Theme 2. These waterways include the Rubicon River, Acheron River, Taggerty River, Steavenson River, Little Steavenson River, Yea River, Murrindindi River and the King Parrot Creek, which are tributaries to the heritage-listed Goulburn River. Although the Goulburn Broken Catchment only extends over 2% of the Murray Darling Basin's land area, it generates 11% of the basin's water. Lake Eildon, situated on the border of Murrindindi and Mansfield Shires, is one of Victoria's principal water storages. Via the Goulburn River it provides for irrigation, stock and domestic water supply, power generation and recreation.

Landscapes and bioregions

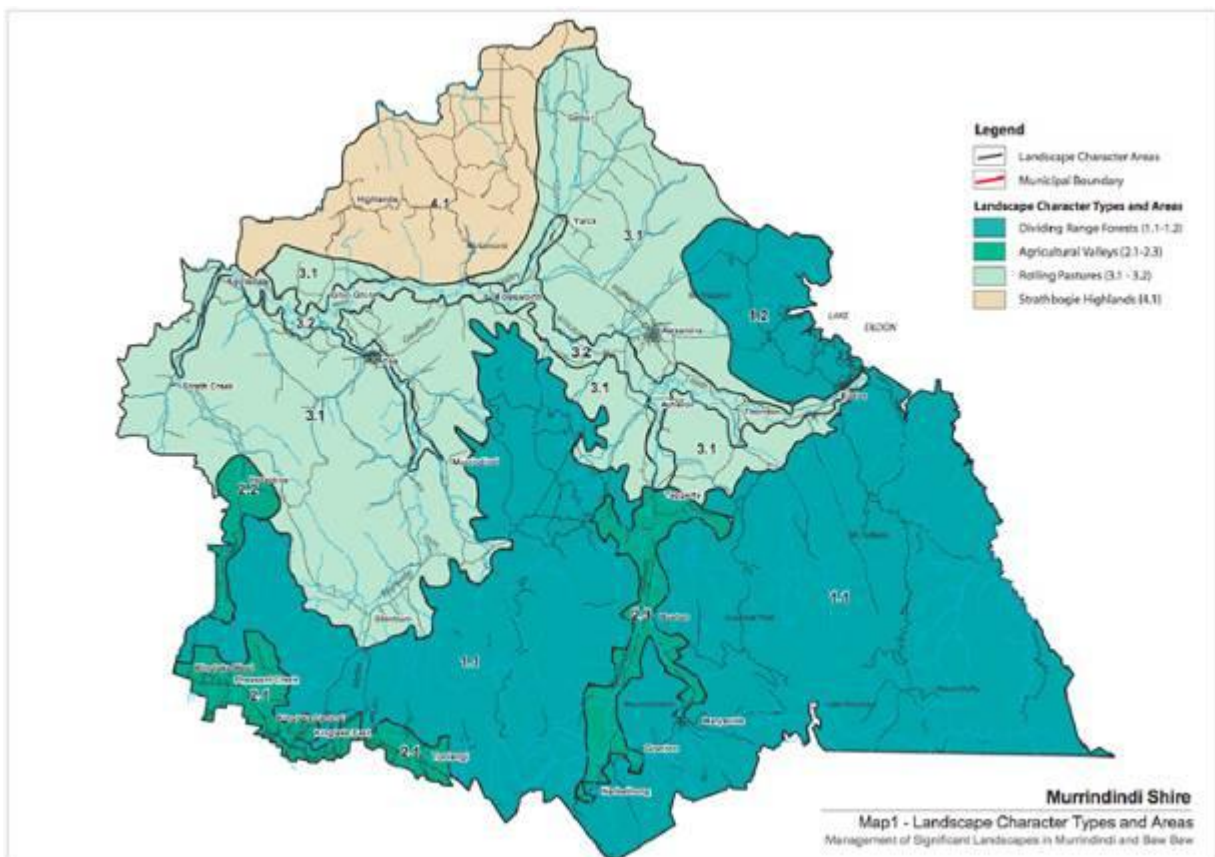
The valleys of the Goulburn River, its tributaries and their flood plains offer high-quality soils with opportunities for varied agriculture. However, since European settlement the flood plains, grasslands and foothill valleys have been changed extensively through land clearing. In these areas, the remnant vegetation is decreasing as a consequence of grazing, soil compaction, weed infestation and clearing. However, these areas of remnant vegetation, many of which can be found on private land, are vital for local biodiversity and for ecosystem services that underpin the future health of the farming landscape (DNRE 2001, DPCD 2006 Murrindindi Planning Scheme cl. 21.01-1). Ecosystem services consist of many important functions including forming soils, filtering and breaking down pollutants, and storing and providing essential nutrients at all levels of the food chain.

Protection and revegetation efforts are therefore essential for supporting and improving biodiversity and farm productivity. Three bioregions are present in the Murrindindi Shire: Highlands–Northern Fall, Victorian Alps and Central Victorian Uplands (Appendix 2, Figure A 3). Each bioregion has distinct topographic and geological characteristics, annual rainfall patterns and vegetation communities that form Ecological Vegetation Classes.

Much of Murrindindi Shire is forested, with significant conservation reserves in the Kinglake, Yarra Ranges and Lake Eildon National Parks and Cathedral Range State Park. A large area of the south-eastern part of Murrindindi Shire is part of the Central Forest Management Area, in which 600–700 ha of hardwood is harvested each year in clearfell and seedtree operations. Here, pre-1990 old-growth areas are protected in special protection zones (DSE 2008).

Murrindindi Shire offers a great variety of landscapes, which are divided into four distinct Landscape Character Types and Areas as shown in Figure 2 (Murrindindi Shire 2005)

1. Dividing Range Forests
2. Agricultural Valleys and Rises
3. Rolling Pastures
4. Strathbogie Highlands.



Source: Murrindindi Shire Council (2005) p. 8

Figure 2 Landscape Character Types and Areas in Murrindindi Shire

Industry

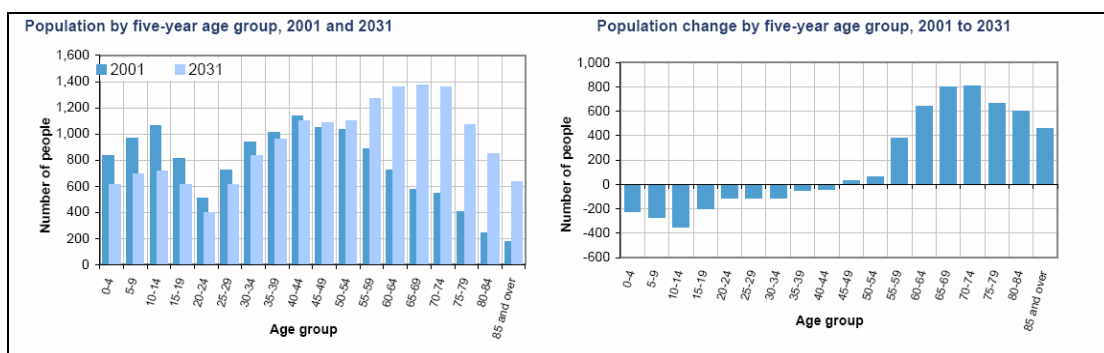
Murrindindi mainly has a rural economy based on agriculture and timber with an increasing importance of the tourism sector. About 48% of the Shire is Crown land. The main industries include primary production (broad-acre and intensive agriculture), forestry, electricity supply, tourism, light manufacturing and services (RMIT 2008). Agriculture, forestry and fishing employ 12% of the workforce, followed by manufacturing (10%), health and community services (10%), construction (10%), retail trade (9%), education (9%), accommodation, restaurants and cafes (9 %) (ABS Census Data 2006, Employment by Industry Sector).

In recent years, low commodity prices have forced farmers to diversify into farm forestry, horticulture and off-farm income sources (DPCD 2006 Murrindindi Shire Planning Scheme cl. 21.01-2).

People and population growth

The 2006 Census showed the total population (without overseas visitors) was 13,673 with 29% under 25 years of age, 41% between 25 and 54 years and around 30% 55 years and above (ABS 2008). The data presented are from before the February 2009 bushfires. Although the population has changed since then, more recent statistics are not yet available.

Most (56%) of Murrindindi's residents live in the main towns and 44% live in rural areas or smaller towns. Murrindindi Shire's growth forecast is expected to remain low, despite the Victorian State Government's programs to attract employment and investment to regional areas during the past decade. Murrindindi is not located on a regional transport corridor. Partly as a result of this, the population in Murrindindi grew at a slow annual rate of 0.8% between 2002 and 2007, with a higher annual growth rate of 1.0% in Murrindindi West compared to 0.5% in Murrindindi East (Murrindindi Shire Council 2009). The strongest growth is expected with people between 65 and 75 years old, as shown below in Figure 3.



Source: Murrindindi Shire Council (2009)

Figure 3 Expected population growth by age group 2001–2031

In the 2006 Socio Economic Indices for Areas (SEIFA), Murrindindi was ranked 44th of 80 local government areas in Victoria and in terms of advantage or disadvantage it is situated around the middle of the field (ABS 2008).

In the Hume Region, Murrindindi was ranked 10th of the 12 local government areas. The indicator of 'food stress' measured by Community Indicators Victoria reported that 11.5% of residents in Murrindindi ran out of food in the previous 12 months and were unable to buy supplies. Murrindindi scored highest on this indicator in the Hume Region (7.4%) and second highest for Victoria (6.1%) (Murrindindi Shire Council 2009).

Murrindindi residents scored a positive result for community involvement in 2007, as 73.8% of people reported participating in civic engagement activities over the past 12 months. This participation rate is much higher than the overall Victorian average (53.8%) and the average for rural Victoria (65.9%) (Murrindindi Shire Council 2009).

The demographic composition and socio-economic status of Murrindindi's population is an important factor for successfully implementing the environment strategy, as it determines the available financial and human resources of both Council and landholders for environmental action. Promoting and implementing pro-environmental policies relies heavily on participation and input from residents, community groups and businesses. Environmental education and engagement strategies need to be tailored with these socio-demographic characteristics in mind.

February 2009 bushfires

Murrindindi Shire is not the same following 7 February 2009. These bushfires had catastrophic impacts on Murrindindi's communities, businesses, tourism and natural environment. The following statistics provide only a glimpse of the profound changes to Murrindindi Shire (Table 1).

Table 1 Impacts of the February 2009 bushfires on Murrindindi Shire

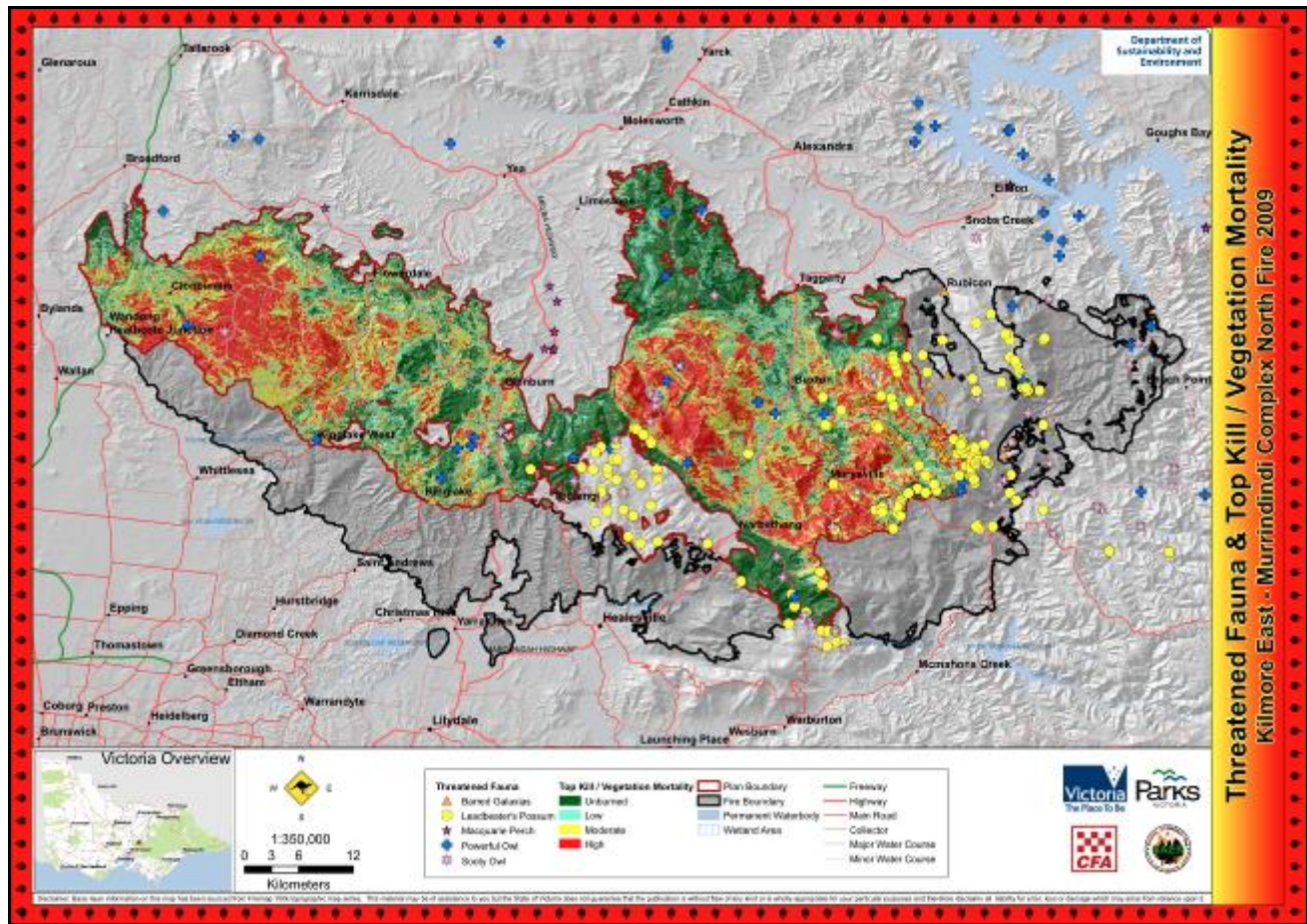
Deaths within Murrindindi Shire	106			
Area burnt	1,539 km ² or 40% of Shire area			
Structures destroyed	Businesses and shops		75	
	Community and Council facilities		18	
Houses	Buxton	84	Murrindindi township	9
	Castella	13	Narbethong/Granton	75
	Flowerdale	10	Pheasant Creek	18
	Glenburn	13	Strath Creek	10
	Hazeldene	215	Taggerty	43
	Kinglake	357	Toolangi	2
	Kinglake West	128	Yea	1
	Limestone	1		
	Marysville	418	Total houses	1,397
	Fencing destroyed	3,533 km (a straight line from Alexandra to Perth)		

In accordance with the Code of Practice for Fire Management on Public Land (DSE 2006), the Victorian Interagency Rehabilitation Group (including staff from the Department of Sustainability and Environment and Parks Victoria) and the Burned Area Emergency Response (BAER) Team (visiting from the USA) conducted an assessment. The assessment provided recommendations for emergency stabilisation of lands managed by the DSE based in Alexandra.

It also provided recommendations for how to rehabilitate land within the burned area with the objectives to stabilise and prevent further degradation of affected catchments and soils, prevent permanent loss or degradation of threatened species populations ('permanent impairment of threatened species') and deter the establishment and spread of noxious and invasive species (DSE 2009).

In summary the recommendations include

- Catchments—Over 49% of the burnt area was rated moderate to high soil burn severity, and 52% had steep slopes and therefore increased risk of erosion and runoff. Recommendations for treatment include posting public warnings, removing debris from channels and infrastructure, developing debris basins, maintaining roads and monitoring water quality.
- Forests—126,000 ha of forested Ecological Vegetation Classes were affected with 54% of total land burned to moderate to high levels. Twenty thousand hectares of high-value mountain ash and alpine ash forest were affected. Recommendations include selected salvage logging on slopes that are less than 30° inclination, are outside Leadbeater's possum habitats and 50 m from rainforest stands; reforestation of alpine ash stands younger than 20 years; examination of over 800 km of roads and walking trails; and removal of tree hazards.
- Flora—Noxious and environmental weeds are present within and adjacent to the burnt area, with the risk that weeds will invade areas not yet infested. Burning of mountain ash and alpine ash before seed maturity results in changes of vegetation types and structure, with immediate post-fire dominance by Acacias. Plants vary in their responses to particular fire regimes and fire suppression activities. Recommendations include protection of sphagnum bog areas, installation of straw tubes to stabilise the ground against erosion and survey and detection of environmental weeds.
- Fauna—Many rare and threatened species were affected by the fires, as shown by Figure 4. Five species listed under the Victorian *Flora and Fauna Guarantee Act 1988* occur within the burnt areas: Leadbeater's possum *Gymnobelideus leadbeateri*, Macquarie perch *Macquaria australasica*, barred galaxias *Galaxias olidus* var. *fuscus*, powerful owl *Ninox strenua* and sooty owl *Tyto tenebricosa*. Leadbeater's possum, barred galaxia and Macquarie perch are also listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Specifications for emergency stabilisation included assessing water quality, removing barred galaxias and Macquarie perch from creeks if necessary, and installing trout barriers in barred galaxias streams. One specification included monitoring the distribution, abundance and habitat use of Leadbeater's possum. General recommendations included future research, a review of fuel reduction and fire management programs, the preservation of large hollow-bearing trees and habitat corridors, trout removal and riparian revegetation (DSE 2009).



Source: DSE (2009), p. 233

Figure 4 Threatened fauna and top-kill or vegetation mortality from the February 2009 bushfires

Implications for the Murrindindi Shire Environment Strategy

Ongoing socio-demographic and economic changes in Murrindindi Shire have an indirect effect on the environment. To address the challenges of negative effects, for example from population growth, drought and bushfires, the Murrindindi Shire Environment Strategy needs to

- Further promote sustainable farming practices
- Promote alternative income sources sought by the farming community that also achieve high standards of sustainability, e.g. ecotourism or the green technology sector
- Help all residents including disadvantaged access healthy food, clean water and recreational opportunities in a healthy environment
- Support and promote education and communication activities that are accessible to all people and businesses in Murrindindi Shire to engage them in making environmentally sustainable lifestyle choices.

Importance of environmental stewardship

The natural environment is an intricate and complex network of interactions that cannot be considered in isolation of one another. Natural elements such as landscape topography, climatic conditions, soils, surface and groundwater, ecological communities of flora and fauna and microbiological processes shape the characteristics and processes of balanced ecosystems. Ecosystem services like clean water, pollination of crops and native vegetation and the natural build-up of fertile soil maintain the health of the ecosystems. These processes create an environment that supports a diversity of life essential for human health, economic prosperity and social wellbeing.

However, human interference with the natural environment has consequences. Since European settlement in the 19th century, pressures from population growth and associated land use have severely affected landscapes and natural processes, causing major changes in biodiversity, vegetation, types and structure, ground and surface water systems and soil quality. Increasing use of fossil fuel-based energy has led to human-induced increases in carbon dioxide emissions and their accumulation in the atmosphere (IPCC 2007). The sharp increase in greenhouse gas concentrations is likely to cause changes in climate at continental levels, bringing about increases in average temperatures and extreme weather events (DSE 2008).

Scientists acknowledge that communities and species have already been affected by changes in climate, and those that are stressed are less likely to adapt to extreme changes in climate (Brereton et al. 1995, Umina et al. 2005, Mansergh et al. 2008).

International, national, state and local agencies recognise that there is an urgent need for actions to protect the environment and climate. Various policies and strategies have been set up or are evolving to address these concerns.

At a regional level, Murrindindi Shire is working with neighbouring local governments several agencies and community groups to achieve environmentally responsible and sustainable management practices. Agencies include the Department of Sustainability and Environment (DSE) and the Department of Primary Industries (DPI), Parks Victoria, the Goulburn Broken Catchment Management Authority (GBCMA), water authorities Goulburn Murray Water and Goulburn Valley Water.

The Upper Goulburn Landcare Network with its 12 Landcare groups actively undertakes environmentally sustainable natural resource management. In addition, the Murrindindi Climate Network (MCN) is an environmental group formed in 2007 to promote sustainable and climate-friendly lifestyle choices and business practices. The MCN cooperates with the Murrindindi Shire Council under a joint Memorandum of Understanding.

Framework of Murrindindi Shire Environment Strategy

The Murrindindi Shire Environment Strategy builds on existing plans, policies, local laws and strategies, including the Council Plan incorporating a Strategic Resource Plan 2009–10 to 2019–20, the Municipal Strategic Statement (DPCD 2006) and Council’s Environment Policy (Murrindindi Shire Council 2008). The Murrindindi Shire Environment Strategy will ensure that existing and future strategies, plans and actions are consistent with Council’s overall environmental goals and objectives and that Council will meet its legislative obligations for environmental matters. The Murrindindi Shire Environment Strategy is part of an overall framework, as shown below.

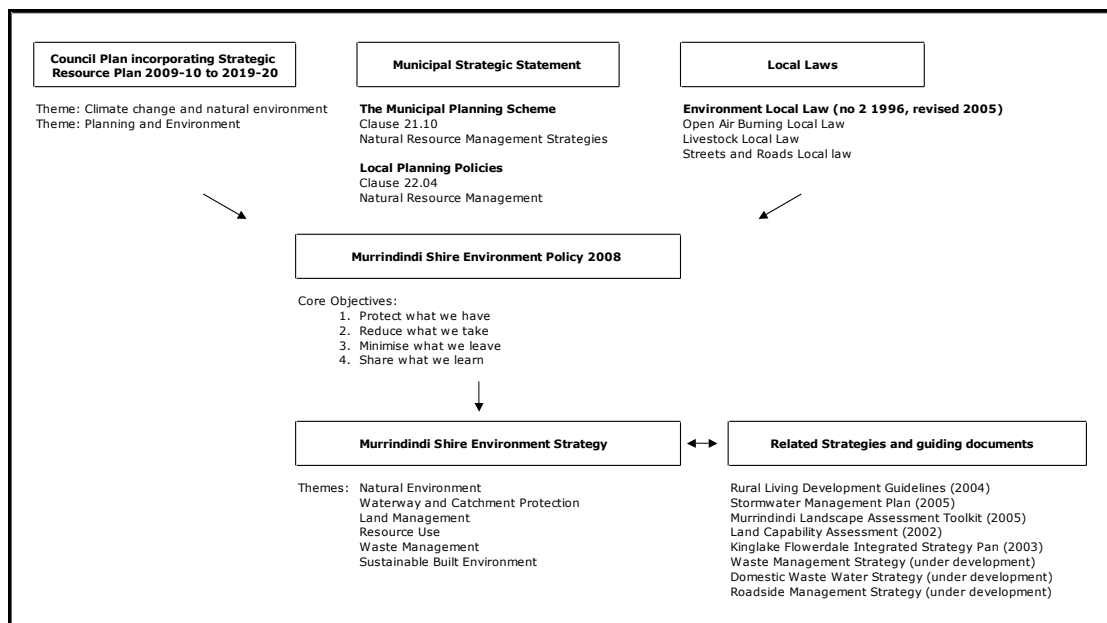


Figure 5 Strategic framework of the Murrindindi Shire Environment Strategy

The Murrindindi Shire Environment Strategy is guided by the Council Plan, specifically with its strategic objective of ‘a natural environment that is diverse, healthy and cared for’.

The Council Plan contains the following strategies

- Facilitate and support environmental recovery within fire-affected communities
- Promote and advocate sustainable living, business practice and land use
- Reduce generation of waste by Council and the community
- Integrate environmental resource and land management across Council operations
- Reduce Council and community carbon footprints
- Encourage the community to mitigate and to adapt to climate change.

In Victoria, all planning schemes include the State and the Local Planning Policy Frameworks.

The **State Planning Policy Framework** (SPPF) includes issues of strategic importance to Victoria, which must be considered in local government decisions. Many sections and clauses of the SPPF directly and indirectly influence environmental management, as shown in Table 2.

Table 2 Aspects included in clause 15 Environment of the SPPF

15.01	Protection of catchments, waterways and groundwater
15.02	Floodplain management
15.03	Salinity
15.04	Air quality
15.05	Noise abatement
15.06	Soil contamination
15.07	Protection from wildfire
15.09	Conservation of native flora and fauna
15.10	Open spaces
15.11	Heritage
15.12	Energy efficiency
15.14	Renewable Energy

The **Local Planning Policy Framework** (LPPF) identifies long-term strategic directions and also forms the statutory basis for land use and development in the Shire. It includes the Municipal Strategic Statement (MSS) and the Local Planning Policies (LPP), Zones, Overlays, Particular Provisions and Incorporated Documents.

In addition to the State and Local Planning Frameworks other documents that inform the Murrindindi Shire Environment Strategy include similar strategies from other rural municipalities, Victorian and Federal Government policies and strategies as well as research reports from agencies, universities and institutes containing environmental and climate-related information. A more detailed description of local, regional, State and Commonwealth Laws, Policies and Strategies as well as International Treaties with relevance to the Murrindindi Shire Environment Strategy is provided in Appendix 1.

Development and format of the Strategy

Following the completion of Council's Environment Policy (Murrindindi Shire Council 2008), development of the Environment Strategy began in 2009. Work on the Environment Strategy is part of the Victorian Local Sustainability Accord between Murrindindi Shire Council and the Department of Sustainability and Environment following a protocol of specific milestones. Because of the bushfires of February 2009, timelines were adapted and some procedural steps related to expert and public involvement rescheduled to better reflect the availability of stakeholders consulted. Thus, a first draft developed from desk research served as basis for expert and community feedback.

In addition to the Victorian Local Sustainability Accord, Murrindindi Shire Council has also entered into an agreement with the International Council for Local Environmental Initiatives– Oceania (ICLEI–Oceania) to participate in their Cities for Climate Protection (CCP) Program aimed at mitigating and adapting to climate change.

Because climate change and environmental protection are inextricably linked, both projects—the environment strategy under the Sustainability Accord and the climate strategy under the Cities for Climate Protection Program—are combined into one document as the Murrindindi Shire Environment Strategy. This approach eliminates redundancies that would arise in two documents. Further, activities and resources can be better integrated in order to use synergies between environment- and climate-related strategies.

Environment and climate protection cover many issues. The consultation process therefore involved a range of internal Council staff, and external scientific and professional expertise and practical knowledge from many different stakeholders. Appendix 5 lists stakeholders that were consulted. The environment strategy is structured into the following six Themes

- Theme 1 Natural environment
- Theme 2 Waterway and catchment protection
- Theme 3 Land management
- Theme 4 Resource use
- Theme 5 Waste management
- Theme 6 Sustainable built environment.

Each Theme is further structured into five sections

Section 1 Introduction

Section 2 Legal basis

Section 3 Council's past and current activities

Section 4 Goals and strategic objectives

Section 5 Action Plan for Council.

For each action, performance indicators have been linked to specific targets of the Murrindindi Shire Environment Strategy.

Monitoring, evaluation and reporting

The performance indicators are quantitative data to be collected for each action. Performance indicators and actions are under the direct control of Council; for example, where Council's own operations are improved to better meet environmental standards or where Council can influence the way development is carried out.

The actions together with the performance indicators build the implementation and assessment plan that will help Council check if targets are effectively met. For each Theme, Council will review the Action Plans annually in line with usual budgetary processes. Council's General Manager Sustainability will prepare a report to Council annually that outlines progress of the Action Plans.

Every three years, the Strategy will be comprehensively reviewed, with the first review due in 2013. Before each review of the Strategy an 'Evaluation of the Environment Strategy Implementation' report based on the environmental performance indicators will be prepared. The report will include

- A discussion of socio-demographic and economic trends and related land-use patterns and natural resource management practices in the Shire
- A review of the strategy objectives of each Theme
- The status of performance indicators for each Theme
- Recommendations to Council to guide the Murrindindi Shire Environment Strategy review process.

As part of the review, the suitability of the monitoring and evaluation process will be assessed along with the implementation of the Strategy.

Implementation mechanisms

A management structure will be set within Council to implement the Murrindindi Shire Environment Strategy. This management structure will ensure that the environment is considered in all Council operations, as shown by Figure 6.

Two internal Ecoteams will be formed to focus on specific programs and environmental themes relating to the Murrindindi Shire Environment Strategy. Ecoteam 1 will be an internal committee tasked to improve Council's performance in waste, energy and water use management and its procurement process. Ecoteam 2 will be an internal committee tasked to improve natural resource management, land use and the environmental performance of Council infrastructure and asset management.

An Environment Advisory Committee composed of agency and community members advises Council regarding key environmental issues, the implementation and effectiveness of the Strategy and the suitability of the assessment process.

Communication protocols for the Murrindindi Environment Strategy will be developed to keep the community up to date and informed about its implementation.

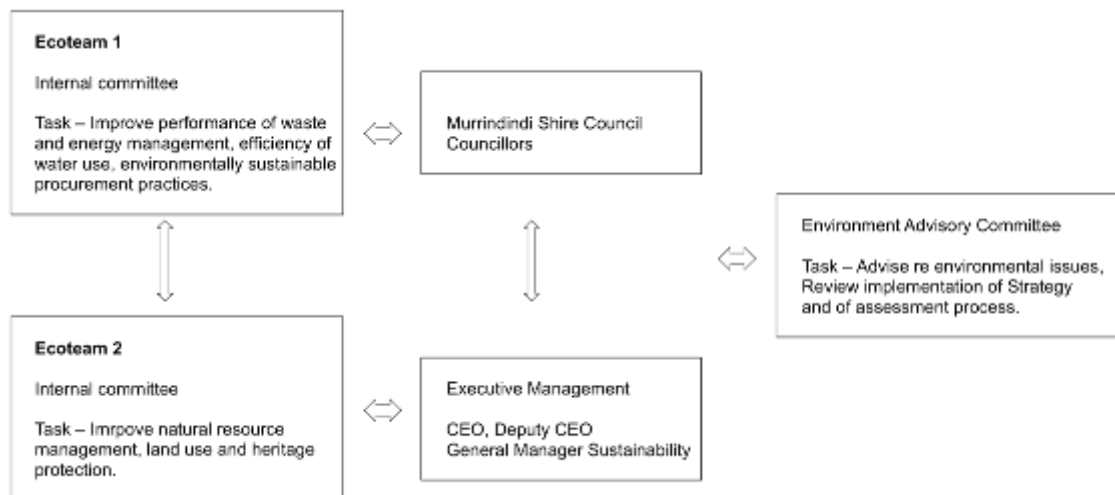


Figure 6 Murrindindi Shire Environment Strategy management structure

Section II Themes

Theme 1 Natural environment

Introduction

To protect, restore and enhance the natural environment means to secure biological diversity or 'biodiversity'. Biodiversity can be considered at three levels (DEST 1993)

1. Genetic diversity—variation of genetic information contained in organisms
2. Species diversity—variety of species
3. Ecosystem diversity—variety of habitats and ecological communities.

Within the context of biodiversity, pattern refers to the range and distribution of species, communities and habitats in an area, while process refers to how they interact with each other and with the environment (DSE 2010). Securing biodiversity means protecting, restoring and enhancing the natural environment. The aim is to maintain the essential functions occurring in natural systems. These are, for example, providing clean water and clean air, formation of soils, filtering and breaking down of pollutants, storing and providing essential nutrients at all levels of the food chain, maintaining of liveable climates, pollination and maintaining of renewable resources such as timber, fibres and renewable energy.

According to the Australian Local Government Association

'The sustainable management of biodiversity is critical to the future of agriculture, fishing, clean air and water, lifestyles and recreation and ultimately, life on the planet' (ALGA 1989).

Murrindindi Shire contains 18 distinct Ecological Vegetation Classes (EVCs) (DPI 2008). EVCs are basic mapping units used for biodiversity planning and conservation assessment and are based on information describing

- Plant communities and forest types, including species and structural information
- Ecological information relevant to the species that comprise the communities, including life-form and reproductive strategies
- Variations in the physical environment including aspect, elevation, geology and soils, landforms, rainfall, salinity and climatic zones (DPI 2008).

Appendix 2 includes a list and map of all Ecological Vegetation Classes present in Murrindindi Shire.

Murrindindi Shire includes some 2,168 recorded native plant species of which eight are listed as threatened under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act 1988). Two of these threatened species are also listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999). Similarly, 393 recorded native fauna species occur in

Murrindindi Shire, of which 42 are listed as threatened under the *FFG Act 1988* with 14 also listed under the *EPBC Act 1999*. Appendix 2 lists flora and fauna species of Murrindindi Shire.

Biodiversity Action Plans (BAP) have been developed in a partnership project between the Department of Sustainability and Environment, the Department of Primary Industries, the Catchment Management Authorities, local government and non-government organizations. These plans aim to identify the most significant biodiversity assets and to determine those activities with the highest return on investment for native biodiversity across the State. The Goulburn Broken catchment area has been divided into 20 'BAP zones' with corresponding conservation plans, of which five apply to the Murrindindi Shire area. The BAP maps and conservation plans are available to all land managers and agencies and will be used to guide Council's actions contributing to the conservation of high biodiversity values and the establishment of biolinks.

Legal basis

In Victoria, the *Environment Protection Act 1970 (EP Act 1970)*, *Planning and Environment Act 1987 (PE Act 1987)*, *Flora and Fauna Guarantee Act 1988* and *Catchment and Land Protection Act 1994 (CaLP Act 1994)* together create a legal framework for the protection of flora, fauna, ecological communities and biodiversity.

Within this legal framework local government has a shared responsibility with 'all levels of Government and industry, business, communities and the people of Victoria' (*Environment Protection Act 1970*, s. 1G). The aim is to follow an integrated approach to

'...enable land use and development planning and policy to be easily integrated with environmental, social, economic, conservation and resources management policies at State, regional and municipal levels' (*Planning and Environment Act 1987*, s. 4(2)(c)).

Based on the *PE Act 1987*, the Victorian State Planning Policy Framework (VPPF) (DPCD 2006) has aims for

'...the protection and conservation of biodiversity, including the native vegetation, retention and provision of habitats for native plants and animals and control of pest plants and animals' (VPPF, cl.15.09).

Furthermore, Victoria's Biodiversity Strategy (DNRE 1997), Victoria's White Paper for Land and Biodiversity at a Time of Climate Change (DSE 2009) and the Goulburn Broken Catchment Management Authority's Draft Biodiversity Strategy 2010–2015 (GBCMA 2010) and other relevant Strategies of the Goulburn Broken Catchment Management Authorities (Appendix 1) further determine the strategic tools available to achieve these goals.

At a municipal level, the Local Planning Policy Framework (LPPF), State Planning Policy Framework (SPPF) and the Victorian Planning Provisions (VPP) constitute the Murrindindi Planning Scheme. The Scheme provides local government with a range of strategic and statutory planning instruments.

These include the Municipal Strategic Statement (MSS) (s. 21.01) (DPCD 2006) and the Local Planning Policy Framework (s. 22.04) (DPCD 2006) on natural resource management, Rural Conservation Zone (s. 35.06) (DPCD 2009), Environmental Significance Overlay (s. 42.01) (DPCD 2008), Vegetation Protection Overlay (s. 42.02) (DPCD 2008) and Significant Landscape Overlay (s. 42.03) (DPCD 2008). These instruments assist Council to fulfil its strategic and statutory roles of implementing the State and Local Planning Policy Frameworks and thus, effectively manage natural resources and protect and enhance biodiversity, flora, fauna and ecological communities. In addition to the Murrindindi Planning Scheme, Council has further determined environmental objectives in its Environment Policy (Murrindindi Shire Council 2008) and specific guidelines to protect biodiversity and natural assets in its Rural Living Development Guidelines (Murrindindi Shire Council 2004).

State-wide Native Vegetation Retention controls introduced in all planning schemes are set out in Particular Provision cl. 52.17, requiring a planning permit for the removal, destruction or lopping of native vegetation. They are further specified in the Native Vegetation Retention Controls Regional Guidelines and form part of the Goulburn Broken Native Vegetation Management Strategy (GBCMA 2003). In the context of Council developments or private developments, Council will follow a Net Gain approach to protection and clearance decisions as laid out in Victoria's Native Vegetation Management Framework for Action (DNRE 2002). Council will do this primarily by avoiding adverse impacts through vegetation clearance, and where they cannot be avoided, by minimising impacts and identifying offset options.

A particular area of municipal responsibility is the management of municipal roads including roadsides under the *Road Management Act 2004*. Roadsides provide habitat for native flora and fauna supporting in many instances high levels of biological diversity in areas of high conservation value, including threatened species and ecological communities. Depleted native vegetation and habitat quality in other land tenures increases the importance of roadsides as they often provide the only connection to other remnants and support revegetation and restoration efforts on other land tenures (GBCMA 2007). The challenge for local government is to balance the protection of high conservation values on its roadsides with its obligations to provide safe passage on roads and address municipal fire prevention and road safety issues associated with native vegetation.

The *Planning and Environment Act 1987* enables the Shire to help protect environmental conservation values on municipal roadsides. In a joint project between the Goulburn Broken Catchment Management Authority and local government the Roadside Biodiversity Risk Management Protocols (RBRMP) were developed offering an excellent tool for local government to assess, avoid and mitigate environmental effects of a range of road maintenance works and activities impacting on natural values of municipal roadsides. The Net Gain approach under Victoria's Native Vegetation Management (DSE 2002) requires impact minimisation and offset goals. Consistent with Net Gain, these Roadside Biodiversity Risk Management Protocols and related training schedules together with DSE's Local Government Roadside Maintenance Agreement and DSE's Native Vegetation Assessment tools (DSE 2004) will form an integral part of a municipal road management plan for Murrindindi Shire.

State funding under the 'Future Farming Initiative—Building the Capacity of Local Government to Respond to Pests' is currently enabling Council to perform pest management on roadsides whilst an independently chaired working party commissioned by the Minister for Agriculture determines the complex issues surrounding pest management on roadsides, including the question of responsibilities. Council thus participates in the joint efforts of public and private land managers and agencies to implement its obligations further specified in the Victorian State Government's Invasive Plants and Animals Policy Framework (2010) and the Goulburn Broken Weed Action Plan (GBCMA 2001) and by setting up its own weed management strategy.

Council's past and current activities

Council's achievements and current activities related to the natural environment include

- Conducting the Murrindindi Shire Land Capability Analysis and Environmental Values study in 2002
- Establishing Rural Living Development Guidelines in 2004
- Since 2009, mapping weeds and natural assets along those roadsides for which Council is responsible
- Since 2009, establishing a protection program for the threatened round-leaf pomaderris *Pomaderris vacciniifolia* (listed under the *FFG Act 1988*) with signs and education programs for staff and contractors.

Goal

Protect and enhance the natural environment.

Strategy objectives

1. Protect and enhance native flora, fauna, ecological communities and their habitats and pursue Net Gain goals as set out in Victoria's Native Vegetation Management Framework for Action
2. Reduce and minimise the impacts of pest plants and animals
3. Support and improve partnerships and coordination between stakeholders involved in environmental protection and enhancement
4. Educate Council staff, subcontractors and the community about the importance of biodiversity, healthy functioning ecosystems and the protection of threatened flora, fauna and ecological communities.

Action Plan—Natural environment

(Key for the Action Tables on page 79)

I Mapping and assessment of significant natural values and threats on Council-managed land						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
1.1.1	Complete maps, based on existing DSE biodiversity mapping, of significant flora, fauna and ecological communities along roadsides and on other council-managed land (listed under <i>FFG Act 1988</i> , DSE Threatened Species Advisory Lists and/or <i>EPBC Act 1999</i>) on Council's GIS. Define the conservation value of each roadside as a guide for setting priorities for action (e.g. high, medium, low conservation value determined by State wide recognised methodologies)	Environment, IT	Completed GIS map and related data base	1	High	OT
1.1.2	Map regionally controlled weeds and other weeds as deemed appropriate (e.g. environmental weeds, new and emerging weeds) along roadsides and on other council managed land on Council's GIS. Record other threats to conservation values	Environment, IT	Completed GIS map and related data base	1	High	OT

II Biodiversity management plan for Council-managed roadsides						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
1.2.1	<p>Develop and implement a Biodiversity Management Plan based on conservation priorities for Council-managed roadsides (using the Goulburn-Broken Catchment Roadside Biodiversity Risk Management Protocols and DSE's Local Government Roadside Management Agreement) to define</p> <ul style="list-style-type: none"> -Type and frequency of weed control -Type and frequency of mowing or slashing operations -Type and frequency of fire management actions -Protection and promotion of natural regeneration of local indigenous vegetation (trees, understory) - Protocols for removal of trees -Actions to protect threatened flora and ecological communities (protective fencing, signage "significant roadside vegetation", etc.) 	<p>Environment</p> <p>Construction</p> <p>Outdoor Crews (responsible for roadsides)</p>	<p>Completed environmental management plan (EMP) with set priorities and related operational guidelines</p> <p>Biodiversity management plan implemented on 60% of Council-managed roadsides with high conservation value and on 20% of medium conservation value by 2014</p>	<p>1</p> <p>Ongoing</p>	High	\$\$\$ E

III Biodiversity management plan for Council-managed land other than roadsides						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
1.3.1	<p>Develop and implement a Biodiversity Management Plan for council-managed land other than roadsides along with priority indicators (e.g. high, medium, low conservation value) determined by State-wide recognised methodologies, defining</p> <ul style="list-style-type: none"> -Type and frequency of weed control -Type and frequency of mowing or slashing operations maintenance -Type and frequency of fire management actions - – Standard “rapid habitat assessment” and use of permanent photo points of important sites -Actions to protect threatened flora, fauna and ecological communities 	<p>Environment</p> <p>Construction</p> <p>Outdoor Crews (responsible for parks and gardens required under Section 86 Committees of Management)</p>	<p>Completed environmental management plan (EMP) and related operational guidelines</p> <p>Biodiversity management plan implemented on 60% of Council-managed land with high conservation value and on 20% of medium conservation value by 2014</p>	<p>3</p> <p>Ongoing</p>	Medium	\$\$\$ E

IV Weed and pest control strategy and action plan for Council-managed land						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
1.4.1	Establish a weed and pest control strategy and related action plans for Council-managed land, based on priorities that reflect the level of conservation value and degree of threat posed by particular weeds	Environment	Weed and pest control strategy with related action plans established	1	High	OT
1.4.2	Train Council staff and contractors in weed identification and in identification of significant indigenous plants	Environment, Construction Outdoor Crews (responsible roads and for parks and gardens)	Number of training sessions Number (%) of staff and contractors who have completed training	1	High	\$\$\$ OT
1.4.3	Train Council staff and contractors in weed control measures	Environment, Construction Outdoor Crews (responsible roads and for parks and gardens)	Number of training sessions Number (%) of staff and contractors who have completed training	1	High	\$\$\$ OT
1.4.4	Seek for grant funding to conduct weed control and pest animal control along council-managed roadsides and council-managed land	Environment	60% of high priority weed control areas controlled by 2014; 20% of medium priority areas controlled by 2014	Ongoing	High	\$\$\$\$ E

V Local Environmental Law for weed control and pest animal control on private land						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
1.5.1	Determine and promote obligations of landholders for weed control on private land	Environment	Landholder guidelines established and disseminated to all landholders in priority areas.	2	Medium	OT
1.5.2	Determine and promote obligations of landholders for pest animal control on private land	Local Laws	Amended Local Environmental Law	2	Medium	OT
1.5.3	Introduce a Section on weed and pest animal control into Local Environmental Law	Local Laws	Amended Local Environmental Law	2	Medium	\$\$\$ OT
1.5.4	As part of Council's Communication Strategy, develop an Environment Communication Plan to ensure effective and ongoing communication of actions implemented with the Environment Strategy.	Environment, Communications	Completed Environment Communication Plan	ongoing	High	OT

VI Environmental Impact Assessment (EIA) and Risk Assessment for Council projects						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
1.6.1	Develop an EIA guide for Council infrastructure and development projects	Infrastructure & Assets, Construction, Environmental Health, Environment	Completed risk assessment guide	3	Medium	\$\$ E
1.6.2	Conduct EIA on all new Council infrastructure and development projects	Environment Environmental Health, Building	Completed EIA for Council projects including environmental mitigation plans (EMP)	3	Medium	OT
1.6.3	Ensure (e.g. through tendering process) that new Council infrastructure and development projects do not threaten listed flora, fauna and ecological communities (listed under <i>FFG Act 1988</i> and/or <i>EPBC Act 1999</i>), effectively mitigate impacts on conservation values, habitat values and landscape integrity, or contribute towards land degradation.	Environment, Construction, Infrastructure & Assets	Environmental protection requirements incorporated into Council tendering processes	1	High	OT
VII Environmentally sustainable outdoor works						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
1.7.1	Develop and implement an environmental best practice code for outdoor works	Environment, Construction, Outdoor Crews	Completed code of practice for outdoor works	2	High	OT
1.7.2	Prepare a related training plan and training materials for Council staff and contractors (including legal obligations under <i>FFG Act 1988</i> and/or <i>EPBC Act 1999</i> , species identification, maintenance practices)	Environment, Construction, Outdoor Crews	Completed training materials Number (%) of staff and contractors with completed training Number of outdoor operations conducted in accordance with code	2	High	\$\$\$ OT, E
1.7.3	Employ contractors who have participated in the training	Construction, Infrastructure & Assets	Number (%) of contractors employed who have completed training	2	High	OT

VIII Environment protection under the Planning and Environment Act 1987 through Planning Scheme, Local Laws and Development Guidelines						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
1.8.1	Reinforce environment protection strategies for vegetation, natural habitats of flora and fauna, landscape, soil, water in MSS (cl 21.10) and LPPF (cl 22.04)	Environment, Planning	Amended MSS (cl. 21.10), LPPF (cl 22.04)	3	Medium	\$\$\$ OT, E
1.8.2	Develop a GIS overlay of all Council land, integrated with Crown land and permanently reserved land such as Trust for Nature covenants by level of conservation value (including information from DSE and GBCMA) to inform the creation of revegetation links, offset planting and planning decisions.	Environment, Planning, IT	Integrated GIS overlay by conservation value established. Amended overlay coverage and local environmental laws	2	High	OT
1.8.3	Conduct a detailed strategic analysis of the areas of high environmental value, based on assessments of high environmental value carried out by GBCMA, DSE and other agencies. Consider the use of zoning, Environment Significance Overlay and Vegetation Protection Overlay to reinforce environment protection	Environment, Planning	Reviewed Murrindindi planning scheme	3	Medium	\$\$\$ OT, E
1.8.4	Improve Local Environmental Laws and related development guidelines (e.g. rural residential development guidelines, new farming zone guidelines) to effectively mitigate impacts on native vegetation, natural habitat of flora and fauna, landscape, soil and water and incorporate into Murrindindi planning scheme, given the competing land use activities occurring.	Environment, Planning, Environmental Health, Local Laws	New Farming Zone Guidelines established and submitted for incorporation into the Murrindindi planning scheme	3	High	\$\$\$ OT, E
1.8.5	Incorporate environmental management principles into Council's Infrastructure Development Guidelines for use by Council and private developers	Environment, Environmental Health	Environmental guidelines for construction and development established	3	Medium	OT

1.8.6	Adapt protocols and permit conditions for developers and builders, based on Environmental Procedures and Guidelines, e.g. of the Civil Contractors Federation, to the local context to protect the environment (waterways, existing remnant vegetation, landscape, soil) during construction	Environment, Environmental Health, Construction, Infrastructure & Assets	Protocols and permit conditions established	3	Medium	\$ OT
1.8.7	Require Net Gain principles to be applied where native vegetation has to be removed for a council development or private development, based on recommendations of referral agency	Planning, Environment	Number of habitat hectares offset under Net Gain implementation, GIS mapped by location, EVC, level of conservation status & significance	Ongoing	High	OT
1.8.8	Promote, encourage and monitor compliance with Murrindindi planning scheme permit conditions related to environmental controls (vegetation retention, protection of riparian zone, protection of waterways, weed control, revegetation and offset planting etc.)	Planning, Construction Environment, Environmental Health	Number of applicants complying with environmental requirements.	Ongoing	Medium	OT
1.8.9	Provide information kits on environmental guidelines and Local Environmental Laws to Council staff (by intranet), the community and especially new residents and residents with planning permit applications. Offer officer support on request	Environment, Local Laws, Planning, Corporate Services, Communications	Environmental information kit completed Number of environmental information kits distributed	2	High	\$\$\$ OT, E

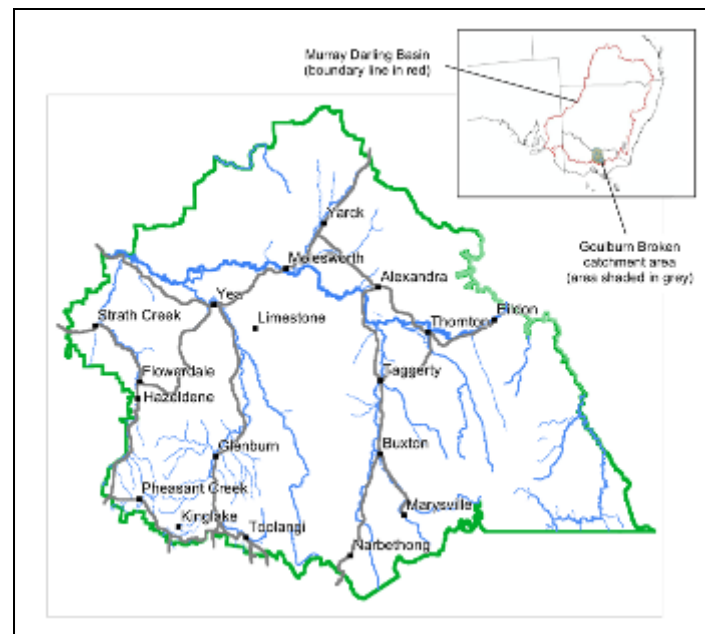
IX Fire and emergency management						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
1.9.1	Ensure consideration is given to the protection of significant natural assets and biolinks in Council fire management plans for Council-managed land (roadside and other) consistent with DSE/CFA guidelines.	Executive Team, Emergency Management, Environment, Local Laws	Completed fire management plans for public land endorsed by DSE, GBCMA and CFA	2	High	OT
1.9.2	Incorporate environmental impact considerations into the municipal fire prevention plan	Executive Team, Emergency Management, Environment	Completed municipal fire prevention plan and emergency management plan	2	High	OT
X Incentives for biodiversity and land management						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
1.10.1	Investigate the use of biodiversity and land management incentives for land holders, to complement the Biodiversity Management Plan of Council-managed land (action 1.2.1 and 1.3.1), including					
	-Rate rebate system linked to predefined and prioritised biodiversity conservation and enhancement works on properties	Environment, Corporate Services	Number of rebate systems of other Councils assessed	3	Medium	OT
	-Collaborate with DPI, DSE and GBCMA to establish works program for participating private landholders	Environment	Number of possible collaborative projects with other agencies identified	3	Medium	OT
	-Rate rebate system for properties with conservation covenant	Environment, Corporate Services	Number of possible environmental covenants for private land identified	3	Medium	OT

XI Promotion of local indigenous plants						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
1.11.1	Encourage planting of local indigenous flora (with reference to reference documents (e.g. the GBCMA Revegetation Guide and information available from DSE and Parks Victoria)	Environment	Number of local indigenous revegetation sites	2	Medium	\$ OT, E
1.11.2	Create 'Live local—plant local' brochure for residents and developers to promote local indigenous species, especially water-wise plants.	Environment, Communications	Completed brochure	2	Medium	\$\$ OT
1.11.3	Establish, where appropriate, demonstration landscape sites throughout the Shire at public places and around public buildings using water wise plants, if possible in conjunction with community input	Environment, Infrastructure & Assets, Outdoor Crews (parks and gardens)	Number of demonstration sites	Ongoing	Medium	CAP, OT, E
1.11.4	Support local nurseries, gardening businesses, garden clubs with the promotion of local indigenous species, and environmental weed control	Environment	Number of joint activities with local nurseries	Ongoing	Medium	OT

Theme 2 Waterway and catchment protection

Introduction

Murrindindi Shire is situated in the upper catchment of the Goulburn River. With its tributaries the Goulburn River forms a sub-catchment of the Murray River. Figure 7 shows the main rivers of Murrindindi Shire and the Murray Darling Basin with the Goulburn Broken Catchment area.



Sources: Goulburn Broken Catchment Management Authority and Murrindindi Shire Council

Figure 7 Murrindindi Shire as part of the Goulburn and Murray River Catchments

Located north of the Great Divide, the headwaters of the Goulburn and its tributaries originate in steep alpine forest composed mainly of the following Environmental Vegetation Classes

- Herb-rich Foothill Forest and Shrubby Dry Forest ecosystems that dominate large areas of lower slopes
- Montane Dry Woodland and Heathy Dry Forest ecosystems on the upper slopes and plateau
- Grassy Dry Forest and Valley Grassy Forest ecosystems associated with major river valleys (DSE 2008).

The Upper Goulburn Catchment plays an important ecological role in terms of water storage and quality. It also serves as habitat for terrestrial and aquatic species including endangered flora and fauna (Theme 1). The principal tributaries (permanent waterways) of the Goulburn River are the Acheron River, Big River, Rubicon River, Snobs Creek, Taggerty River, Stevenson River, Little Stevenson River, Little River, Yea River, Murrindindi River, Home Creek, Spring Creek, King Parrot Creek, Strath Creek, Pheasant Creek and tributaries flowing south from the Strathbogie slopes. Together with the Goulburn River, they form 298 km of permanent and 2831 km of ephemeral surface waterways within Murrindindi Shire.

From its headwaters, the Goulburn reaches Lake Eildon, one of Victoria's largest water storage reservoirs. Lake Eildon Dam was constructed in 1956 then further reinforced and renovated in 2007. Its storage capacity amounts to some 3,334,158 ML. However, the drought has caused reduced inflows over the past decade with annual storage levels at times reaching minimums of less than 10% (e.g. 9% at 288,286.3 ML in May 2007) (Goulburn Murray Water 2007).

Goulburn Murray Water is responsible for the two groundwater management areas of Alexandra and Kinglake. Goulburn Murray Water also issues groundwater licenses for purposes other than stock and domestic. A valuable source of water for towns, agriculture, stock and domestic animals, groundwater is recharged from rainfall. As this process takes time, it is important that the rate of extraction does not exceed the rate of recharge.

Hydrological assessments indicate that surface water and groundwater are strongly interconnected (Finlayson et al. 2008, Nevill 2009). The numbers of farm dams and new bores have rapidly increased over the past few decades. They lower the groundwater tables, reduce subterranean inflow into surface waterways, and thus impose additional strain on the water availability of a catchment. Water authorities have recognised the link between groundwater harvesting and surface water flows and research is underway to measure this interaction.

Legal basis

Water use and allocation is regulated under the Victorian *Water Act 1989*. The Local Planning Policy (cl. 22.04–4) (DPCD 2006) requires that the siting and construction of dams in rural and non-urban areas should not lead to problems with stream flow and erosion. Farm dams constructed for irrigation and commercial purposes require a licence.

However, farm dams for stock and domestic purposes do not require a licence and therefore their number, location and volume are not recorded. As these dams capture water before it flows into rivers, reservoirs and aquifers, they affect the amount of water available for the environment and downstream users (DSE 2006). Based on the Victorian *Water (Irrigation Farm Dams) Act 2002*, the Murrindindi Shire Rural Living Development Guidelines (2004) specify Council's contribution to achieving the competing objectives of water available for stock, domestic and other uses while taking the environment and downstream users into account (Guideline 8).

Surface waterways are important as habitat corridors. The State Planning Policy Framework (cl. 15.01 Protection of catchments, waterways and groundwater) (DPCD 2009) establishes guidelines to minimise the volume and retard the flow of stormwater runoff from developed areas and to filter sediments and wastes from stormwater prior to its discharge into waterways. It is important for the Shire to meet these requirements by minimising contaminated runoff or wastes from entering into waterways. Surface waterways form an important riparian habitat corridor with significant conservation and recreational values in Murrindindi. Drought-related low inflows; water use for stock, domestic, irrigation and industrial purposes; inappropriate land management; vegetation clearance; litter; and sewage adversely affect water quality and the health of the rivers.

In Victoria, several water policies, related action plans, codes of practice and guidelines specify the obligations for the protection of waterways and groundwater. These include the State Environment Protection Policy (Waters of Victoria) (EPA 1988), State Environment Protection Policy (Groundwaters of Victoria) (EPA 2002), Victorian Storm Water Action Plan (EPA 2007) as well as environmental management guidelines related to urban stormwater, septic tanks and land capability assessments for on-site domestic wastewater management. To align itself with the State legislation and to meet its statutory duties under the *Environment Protection Act 1970* and the *Health Act 1958*, Murrindindi Shire has established Guideline 9 in the Rural Living Development Guidelines (2004) for on-site waste water management, a Stormwater Management Plan (2005) and is currently developing a Waste Water Management Plan (Murrindindi Shire Council, unpublished draft).

Council's past and current activities

Council's achievements and current activities related to waterway and catchment protection include

- Establishing water conservation measures for Council operations (underway)
- Establishing a Stormwater Management Plan in 2005
- Currently developing a domestic wastewater management plan.

Goal

Protect and enhance our catchments and waterways from discharges and sediment.

Strategy objectives

1. Promote practices that improve the quality of water within aquatic and riparian habitats and to protect and enhance these habitats
2. Incorporate the principles of water-sensitive urban design in new developments in urban and rural settlements.

Action Plan—Waterway and catchment protection

I Domestic waste water management						
Actions	Council department(s)	Performance indicator(s)	Time frame	Priority	Resources	
2.1.1	Adopt and implement a Domestic Waste Water Management Plan, including	Environmental Health	Completed domestic waste water management plan	1	High	OT
	-Map domestic waste water treatment systems (septic tanks by type of discharge, type of zone, proximity to waterways etc.)	Environmental Health	Completed maps of septic tanks, grey-water recycling systems	1 Ongoing	High	OT
	-Adapt Environmental Local Law to reflect EPA requirements and standards for new and existing septic tanks and grey-water recycling systems	Environmental Health, IT	Amended Local Environmental Law	1	High	OT
	-Monitor compliance with permit conditions of new domestic waste water management systems (septic tanks and grey-water recycling systems)	Environmental Health, Local Laws	Number of septic tanks and grey-water systems assessed	1 Ongoing	High	OT
	-Assess impacts of existing domestic waste water systems and stormwater drainage on waterways	Environmental Health	Number and location of water tests taken	1	Medium	\$\$ OT, E
	-Provide information and advice to landholders about the EPA codes of practice (Appendix1) and compliance with Local Environmental Laws about domestic waste water	Environmental Health, Local Laws	Completed fact sheet on domestic waste water management and Local Law requirements	1 Ongoing	Medium	\$ OT
	-Provide information and advice to landholders about alternative effluent treatment systems (composting toilets, transpiration beds, etc.) as part of the planning permit process	Environmental Health, Communications	Completed fact sheet on alternative domestic waste water systems and water quality; numbers of residents receiving each fact sheet	1 Ongoing	Medium	\$ OT

II Stormwater management						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
2.2.1	Review and implement a Stormwater Management Plan, covering the use of	Planning, Infrastructure & Assets	Completed Stormwater Management Plan	3	Medium	\$\$\$\$ E
	-Adopt Water Sensitive Urban Design (WSUD) principles for the upgrading of existing developments	Construction, Infrastructure & Assets, Outdoor Crews	Number of existing developments upgraded with WSUD principles	3	Medium	OT
	-Adopt WSUD principles for new developments	Environmental Health, Infrastructure & Assets, Construction	Number of new developments abiding by WSUD principles	3	Medium	OT
	-Install line traps in residential areas to prevent litter from reaching waterways	Environmental Health, Infrastructure & Assets	Number of line traps installed	3	Medium	E, CAP
	-Apply water-sensitive site management during construction of Council infrastructure	Environmental Health, Infrastructure & Assets, Construction	Number of Environmental Management Plan reports on construction sites and audits completed	3	Medium	OT
	-Identify high-risk discharge areas that require continuous monitoring of stormwater quality and discharge into waterways. Cooperate with Waterwatch for monitoring purposes	Environmental Health, Infrastructure & Assets, Construction	Number of discharge areas monitored	3	Medium	\$\$ OT, E

	-Manage and re-use waste water in Council operations (e.g. Council parks and gardens)	Environmental Health, Infrastructure & Assets	Volume of recycled water used each year	3	Medium	CAP
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III Waterways protection—operational means						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
2.3.1	Implement best practice waterway management (EPA 1991, 1996 best practice environmental management guidelines; DSE technical guidelines 2007) in all Council operations (e.g. road maintenance)	Infrastructure & Assets, Construction, Outdoor Crews	Number of water management plans and protocols established for relevant projects	3	High	OT
2.3.2	Minimise disturbance and pollution to waterways (e.g. using sediment traps for unsealed roads, grass swales)	Environment, Infrastructure & Assets, Construction, Outdoor Crews	Number of specific measures in place (sediment traps etc.)	2	High	\$\$\$ OT, E
2.3.3	Protect riparian vegetation during Council works by taking protective measures (e.g. fencing, siltation traps, protective signs)	Infrastructure & Assets, Construction, Outdoor Crews	Number of protective measures undertaken in riparian zone; area covered	3	High	CAP, OT, E
2.3.4	Prepare a prioritised list of Council-managed roads near waterways where there is a need to reduce sediment load through use of waterway protection measures (e.g. sealing or other measures).	Infrastructure & Assets, Construction, Outdoor Crews	Priority list of road-based waterway protection measures integrated into the Capital Works Plan	1	Medium	CAP
2.3.5	Inform and train Council staff and contractors on sustainable water use, water management practices and WSUD principles	Environmental Health, Infrastructure & Assets, Construction, Outdoor Crews	Completed training materials Number of training sessions and participants	3	Medium	\$\$\$ OT, E

IV Waterways protection—regulatory and statutory means						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
2.4.1	Link Municipal Strategic Statement (MSS) with GBCMA Regional Catchment Strategy and Regional River Health Strategy and highlight common elements in the next revision of the Environment Strategy.	Environment, Planning	Completed MSS update with GBCMA input and endorsement	4	Medium	OT
2.4.2	Cooperate with GBCMA to integrate priorities and actions for river restoration and catchment management into the statutory planning process	Environment, Planning	Number of coordination meetings per year; number of joint projects between Council and GBCMA	2 ongoing	Medium	E
2.4.3	Develop local planning policy to increase protection of riparian zones and wetlands, including areas zoned for farming	Environment, Planning	Area of riparian zone, length of rivers protected by Environmental Significance Overlay	3	High	\$\$\$ OT
2.4.4	Support GBCMA, DSE and water authorities, where consistent with Council policy, to implement water-related plans and strategies (e.g. GBCMA's Regional River Health Strategy)	Environment, Infrastructure & Assets, Outdoor Crews	Number of projects managed with either input or endorsement from GBCMA and DSE	ongoing	Medium	OT

Theme 3 Land management

Introduction

Although Murrindindi Shire is located in a peri-urban zone close to Melbourne, it is predominantly rural in character. In the southern parts of the Shire, with its forested alpine areas and proximity to the Yarra Valley and outer Melbourne, small rural lifestyle properties are gradually replacing traditional farms. Small-scale primary industries co-exist or are often combined with tourism.

In the northern part of the Shire, average property size is larger and traditional farming activities are dominant. Dairy farming used to be an important sector but has been gradually replaced by sheep and cattle grazing, livestock breeding, pasture cropping and other dryland farming activities. The river plains support irrigated crops such as stone fruit, berries and potatoes. The temperate climate lends itself to the cultivation of olives, grapes and lavender.

Excessive land clearing and overstocking, especially in steep-hill country, combined with pest plants and animals plus drought have led to soil erosion, degradation of soil fertility and waterways, and loss of agricultural productivity. There has been further pressure from the expansion of residential developments that subdivide high-quality agricultural land.

Lifestyle properties as well as traditional farms can be detrimental to the natural environment when managed inappropriately. Problems include weed infestations from invasive garden plants, habitat fragmentation, impacts on native fauna and their habitats by domestic pets like cats and dogs, soil and water pollution from inappropriate sewage systems, and cumulative water take-off from waterways. These inappropriate land use and land management practices can have serious cumulative effects on the environment and agricultural productivity, leading to environmental, economic and social costs. A mix of measures is necessary to reverse these effects, including

- Land capability and water availability assessments need to direct land use planning to ensure that natural resource constraints are taken into account.
- Information and training in sustainable land use practices must be combined with regulations and incentives to prevent further environmental damage.
- Cooperation between agencies, Landcare and community groups and individual landholders needs to be promoted to tackle pest plant and animal infestations, repair erosion and degraded soil, reverse deforestation and mitigate impacts on water quality and flows in waterways.

Legal basis

The Victorian *Planning and Environment Act 1987*, s. 4(2)(b) outlines municipal councils' statutory duties to establish a system of planning schemes as the main method to set out objectives, policies and controls for the use, development and protection of land. These planning schemes will ensure that land use and development planning are integrated with environmental, social, economic, conservation and resource management policies (s. 4(2)(c)) and that the effects on the environment are considered (s. 4(2)(d)).

Consequently, the Shire's Municipal Strategic Statement (MSS) (cl. 21.10) (DPCD 2006) and the Local Planning Policies (cl. 22.04) (DPCD 2006) directly address the issue of natural resource management by formulating objectives and policies about land care and catchment management practices, retention of tree cover, repair of land degradation, improvement of agricultural land and retention of productive soils for agriculture, to name a few.

An important strategy in the MSS includes the identification of environmental constraints such as areas subject to high fire hazard, soil erosion and flooding (MSS, cl. 21.10–3). There are specific zones relating to rural land use (Rural Living Zone RLZ, Rural Conservation Zone RCZ, Farming Zone FZ). Overlays used by the municipal planning scheme to determine the treatment of these areas of environmental constraints include the Environmental Significance Overlay (ESO), Significant Landscape Overlay (SLO), Erosion Management Overlay (EMO), Land Subject to Inundation Overlay (LSIO) and Wildfire Management Overlay (WMO) (DPCD 2008, 2009).

To implement its policies related to sustainable management of land resources, Council relies on its Environmental Local Law (Local Law No. 2, 2005) and on related guidelines such as the Rural Living Development Guidelines (2004) and the Significant Landscape Assessment Toolkit (2005).

Council's past and current activities

Council's achievements and current activities related to land management include

- Distributing Rural Living Development Guidelines (2004) to landholders as part of the permit application process
- Ongoing use of zoning and overlays to protect land resources
- Ongoing implementation of local environmental law.

Goal

Protect land resources by avoiding or reducing threatening processes, and rehabilitate degraded land wherever possible.

Strategy objectives

1. Ensure land use is compatible with land capability; and minimise and mitigate against land degradation
2. Promote sustainable land management practices
3. Support local environmental community group and agency initiatives.

Action Plan—Land management

I Land capability and land reparation strategies						
Actions	Council department(s)	Performance indicator(s)	Time frame	Priority	Resources	
3.1.1	Update and refine existing land capability studies, including most serious land degradation issues (erosion, bare hills and deforestation, salinity, pest plant and animal infestation); where possible introduce the related information into Council's GIS system	Planning, Environment, IT	Completed land capability assessment	2	High	\$\$\$\$ OT, E
3.1.2	Update and refine overlays and establish guidelines for the Farming Zone to reflect land capability and address land degradation issues	Planning, Environment,	Total area (km ²) protected by overlays Completed guidelines for Farming Zone Completed adapted planning process guidelines and related fact sheet	3	Medium	\$\$\$ OT, E
3.1.3	As part of the planning permit application process, require a land management plan to address degradation issues on private land	Planning, Environment,	Number of completed environmental management plans that include land degradation issues	3	Medium	OT
3.1.4	Incorporate land degradation issues (e.g. erosion) into biodiversity management plans and pest animal and plant assessment for Council-managed land	Environment, Infrastructure & Assets, Outdoor crews	Number of management plans for Council-managed land	3	Medium	OT

II Whole Farm Planning for landholders						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
3.2.1	Promote courses on Whole Farm Planning (WFP) and sustainable property management with landholders, especially new landholders.	Environment, Planning, Communications	Number of WFP fact sheets distributed to landholders	Ongoing	Medium	OT
3.2.2	Investigate the use of WFP courses or shorter land management introduction sessions as part of the planning approval process	Planning	Assessment of planning approvals completed that include outcomes that refer to WFP practices	2	Medium	\$ OT, E
3.2.3	Develop information materials on WFP (including vegetation management, pest plant and animal management), based on related DPI programs and information materials, for Council's planning staff to assist in assessing development proposals	Environment, Communications	Completed information kit on WFP available for Council staff	1	Medium	\$ OT

III Environmental sustainability considered in Economic Development Strategy						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
3.3.1	Include environmental sustainability principles in Council's Economic Development Strategy	Environment, Tourism & Economic Development	Principles of environmental sustainability integrated into Economic Development Strategy	Ongoing	High	OT
3.3.2	Develop environmental sustainability assessment guidelines for future tourism projects, industrial and primary industry projects.	Environment, Tourism & Economic Development	Guidelines for environmental impact assessments (including environment, economic and social aspects) of tourism or economic development projects	4	Medium	OT
IV Assistance to Landcare and environmental groups including Sect 86 Committees of Management						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
3.4.1	Subject to Council's available resources support Landcare and environmental groups by providing -Assistance with grant applications -Material support and advice -Access to GIS maps and other information	Environment, Grants, IT	Number of groups assisted recorded by type of assistance provided	2	Medium	OT

Theme 4 Resource use

Introduction

Water and energy are key resources used in Murrindindi Shire. Associated with the use of energy based on fossil fuels are emissions, and greenhouse gas emissions in particular. Council critically evaluates its environmental responsibilities by considering the use of resources by Murrindindi residents as well as its own corporate processes.

Water is a critical resource. Three CSIRO climate change scenarios of weak, medium and strong impact levels and a fourth, more severe scenario based on the past 11 drought years, indicate reduced inflows to the Murray River system and Goulburn Broken Catchment, of which Murrindindi Shire is part (DSE 2009). As a consequence, urban water authorities are working with customers and the community to increase efficiencies in water use, improve water conservation and lower water demand. Thus, Goulburn Valley Water, through their Water Conservation Strategy 2008–13 (GVW 2007) is pursuing the objective to reduce overall water consumption by 8% below 2002 levels by 2020 despite a 20% increase in population.

Murrindindi Shire Council's annual water consumption amounts to some 47,122,000 litres or 47 ML (financial period 2008–09). As a consequence of the February 2009 bushfires, Council operations and staff numbers have increased considerably. While this will translate to a net increase in water consumption, Council continues to save water and increase water efficiency.

Energy consumption and related greenhouse gas emissions are also the focus of Council's strategies to reduce resource use. Tables 3 and 4 show the energy consumption and related greenhouse gas emissions of Council's corporate operations (2007–08) and of the community (2006) by economic sector. For a more detailed explanation of human-induced climate change see Appendix 4.

Table 3 Annual corporate energy consumption and greenhouse gas emissions by sector (2007–08)

Sector	Energy (GJ)	CO ₂ equivalents (tonnes)	CO ₂ equivalents (%)
Buildings	2,848	1,049	35.3
Vehicle fleet	16,304	1,125	37.9
Streetlights	1,393	528	17.8
Waste ¹⁾		269	9.0
Total	20,545	2,971	100.0

Note: 1) Greenhouse gas emissions from landfill only. Emissions from transport related to corporate waste collection are counted in the Transport sector (Vehicle fleet) emissions.

Table 4 Annual community energy consumption and greenhouse gas emissions by sector (2006)

Sector	Energy (GJ)	CO ₂ equivalents (tonnes)	CO ₂ equivalents (%)
Residential	383,484	137,313	23.8
Commercial	108,095	38,619	6.7
Industrial	418,048	97,790	17.0
Agricultural ¹⁾		232,982	40.5
Transport	921,383	62,200	10.8
Waste ²⁾		6,935	1.2
Total	1,831,010	575,839	100.0

Notes: 1) Greenhouse gas emissions from livestock only.

2) Greenhouse gas emissions from landfill only. Emissions from transport related to community waste collection are counted in the Transport sector (Vehicle fleet) of corporate greenhouse gas emissions in Table 3.

To address the problem of greenhouse gas emissions at a municipal level, Murrindindi Shire Council joined the Cities for Climate Protection (CCP) Program in September 2007 to reduce corporate greenhouse gas emissions. The CCP Program was delivered by the International Council for Local Environmental Initiatives (ICLEI)—Local Governments for Sustainability in collaboration with the Australian Government through the Australian Greenhouse Office (AGO) (ICLEI 2009).

The CCP program operates on a five-milestone framework. The milestones enable councils to strategically identify sources and levels of greenhouse gases produced within their corporate operations and the community. Once completed, Murrindindi Shire Council can then use the program to prioritise actions to reduce greenhouse gas emissions that are locally relevant. The five milestones to complete the CCP Program are

1. Conduct an inventory and forecast for community and corporate greenhouse gas emissions
2. Establish an emissions reduction goal
3. Develop and adopt a Local Action Plan
4. Implement the Local Action Plan
5. Monitor and report on implementation of the Local Action Plan.

Council has completed milestones 1 and 2. After having established an inventory of CO₂-equivalent emissions of Council operations and community across all sectors, Council has proceeded to formulate concrete reduction targets. (The term 'CO₂-equivalent emissions' is defined in Appendix 4.)

To reverse an increase in corporate and community based greenhouse gas emissions and to contribute to the national reduction of greenhouse gas emissions, Murrindindi Shire Council has committed to reducing Council’s corporate emissions by 25% of 2007–08 levels by 2020–2021 with an interim target of 10% reduction by 2011–12. Council has also committed to seeking a reduction in community-based emissions of 15% of 2006 levels by 2020.

In the agricultural sector the minimisation of livestock related greenhouse gas emissions rests on sustainable farming practices, including offset strategies. Council joins the Department of Primary Industries and other agencies in promoting these strategies throughout the Shire.

To reduce greenhouse gas emissions and fuel costs in the transport sector, Council is setting up a vehicle fleet management policy that forms the basis for a replacement program. Over the past three years, significant efforts have already been made to convert the 14 vehicles of the large car fleet from unleaded petrol to LPG and four unleaded petrol vehicles from 6- to 4-cylinder motors.

For example, consider a 6-cylinder, large, unleaded petrol vehicle (e.g. Commodore Omega) and an average annual 40,000 vehicle kilometres as the ‘base case’. Replacing this vehicle with a 6-cylinder, large, LPG vehicle reduces greenhouse gases by up to 16% (or 1.5 tonnes of CO₂-e) per year. (CO₂-e is explained in Appendix 4.) Similarly, replacing the 6-cylinder, large, unleaded petrol vehicle by a 4-cylinder, large, unleaded petrol vehicle reduces greenhouse gases by up to 10% (or 900 kg of CO₂-e) per year. Fluctuations in fuel prices make it difficult to forecast cost savings. However, replacing unleaded petrol by LPG cars, or 6-cylinder unleaded petrol by 4-cylinder unleaded petrol cars in the fleet are expected to save \$1500–\$2000 per vehicle each year. Figure 8 presents these details.

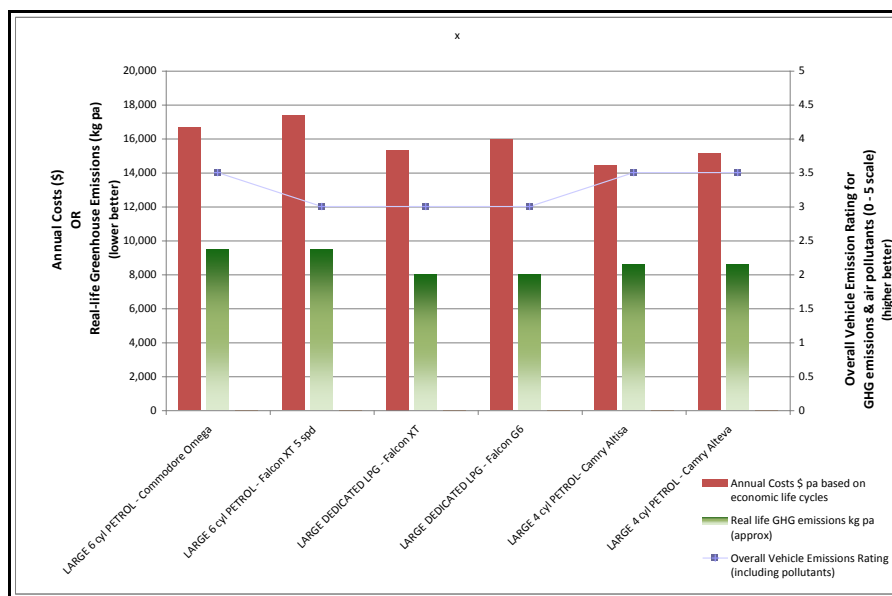


Figure 8 Vehicle annual costs and greenhouse emissions for 40,000 km per year use

Legal basis

Goulburn Valley Water, along with other water corporations in Victoria, is required to establish and update a Water Supply Demand Strategy every five years in order to balance demand and supply of water over a 50-year period. In addition, drought response plans prepared for each water supply system are also updated every 5 years and manage drought-related temporary supply shortages. Reductions in demand through increased customer advice, incentives and restrictions, as well as self-reliant households that use rainwater tanks and grey-water systems are important for reducing water consumption. These measures are based on the Goulburn Valley Water Restriction By-Law (No. 511) in operation since November 2008 and superseding previous By-Laws (Goulburn Valley Water 2008), and the Water Conservation Strategy 2008–13 established in 2007 under the Victorian *Water Act 1989* s. 171.

Water conservation measures are also supported by the national Water Efficiency Labelling and Standards Scheme (WELS) for indoor appliances under the Commonwealth *Water Efficiency Labelling and Standards Act 2005* and by the Victorian Five Star Home standard for new homes in operation since July 2006 and currently under revision (Sustainability Victoria 2008).

Established by the Commonwealth Government in 2001, the national renewable energy target aims to achieve a 20% renewable energy in Australia's electricity supply by 2020. As a contribution at State level, legislation intended to increase energy efficiency and renewable energy as well as reduce greenhouse gas emissions is given in the Victorian *Renewable Energy Act 2006* and the Victorian *Energy Efficiency Act 2007*. Energy efficiency as an objective is also taken up in the State Planning Policy Framework (cls 16.01-1, 16.02-1). To promote energy efficiency measures and the uptake of renewable energy technologies at a household and community level, Federal and State Governments have initiated financial incentives that include the Green Loans Program, solar hot water grants, renewable energy certificates for solar hot water and photovoltaic cells, as well as other incentives.

Based on the Victorian Greenhouse Strategies (2002, 2005), in June 2009 the Victorian Government issued the Victorian Climate Change Green Paper. After extensive consultation, including concerning adaptation and mitigation measures to be taken by different stakeholders, this document will be further developed into a White Paper on Climate Change. In addition, the Victorian Government is drafting a Climate Change Bill to complement policies and actions included in the White Paper.

Council's past and current activities

Council's achievements and current activities related to resource use include

- Achieving milestones 1 and 2 of the Cities of Climate Protection Program, including the establishment of a greenhouse gas emissions inventory and targets
- Setting up and implementing a vehicle fleet management policy to reduce energy consumption and greenhouse gas emissions
- Installing solar panels on some Council buildings.

Goal

Reduce natural resource use, increase resource use efficiency and avoid and mitigate against negative consequences related to resource use.

Strategy objectives

1. Promote conservation and efficient use of natural resources
2. Encourage greater use of renewable energy resources and related technologies
3. Reduce per capita emissions of air pollutants including greenhouse gas emissions.

Action Plan—Resource use

I Water use by Council						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
4.1.1	Establish database to monitor Council's water use	Corporate Services	Database established	1	High	OT
4.1.2	Specify water use targets for Council and monitor progress	Executive Team, Infrastructure & Assets, Construction	Water use targets and reduction program established	1	High	OT
4.1.3	Prepare and implement a water use reduction program for Council (water wise appliances, use of recycled water for parks and gardens, rainwater harvesting, etc.)	Infrastructure & Assets, Construction, Outdoor Crews (parks and gardens)	Water-related requirements established with related fact sheet for contractors	2	High	\$\$\$ OT, E
4.1.4	Introduce water use targets and water-wise requirements into Council's tendering process	Infrastructure & Assets, Construction	Number of tenders including water use targets and water-wise requirements	3	Medium	OT
4.1.5	Cooperate with water authorities and GBCMA to identify and implement opportunities to use secondary treated waste water from reticulated sewage systems	Infrastructure & Assets, Construction, Environmental Health	Number of Council sites or operations that use secondary treated waste water	Ongoing	Medium	CAP, OT, E

II Water use and public health issues						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
4.2.1	Examine public health issues associated with access to untreated water, understanding waterways and people's access and right to water use from waterways	Environmental Health, Infrastructure & Assets	Drinking water quality monitoring plan established	2 Ongoing	Medium	\$\$ OT
III Greenhouse gas emissions from Council and community						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
4.3.1	Update data and estimate the community's energy consumption and greenhouse gas emissions by sector (using format of ICLEI CCP Program)	Corporate Services	Database on energy use and greenhouse gases completed	2	Medium	\$\$ OT, E
4.3.2	Engage community (residents, businesses, schools) in a carbon accounting initiative (carbon calculator) and use these data to calibrate CCP Program estimates	Environment, Communications	Design of carbon accounting initiative completed and implementation started	2	Medium	\$\$ OT
4.3.3	Gather annual data and estimate the Council's energy consumption and greenhouse gas emissions by sector (using format of ICLEI CCP Program)	Corporate Services, Construction	Energy database updated annually	1	Medium	\$ OT, E
4.3.4	Conduct carbon accounting for Council's operations, use these data to calibrate CCP Program estimates	Corporate Services	Carbon accounting for Council operations started by staff trained in Lifecycle Assessment, Staff trained in Lifecycle Assessment	2	Medium	\$ OT, E

4.3.5	Develop a plan for Council's operations to reduce greenhouse gas emissions and to become carbon neutral using the CCP Program framework (as in Theme 4, Boxes IV–VI)	Executive Team, Environment, Infrastructure & Assets Construction	Carbon accounting for Council operations completed; greenhouse gas reduction plan completed	1	Medium	OT
4.3.6	Support DPI in promoting an understanding within the community of the full agricultural carbon cycle.	Environment,	Information material on agricultural carbon cycle disseminated	2	High	OT
IV Energy efficiency and renewable energy use of Council						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
4.4.1	Establish and implement a Resource and Energy Efficiency Program for all Council buildings and public facilities, including energy efficiency requirements for renovation and/or extension to existing Council buildings and public facilities (e.g. passive solar, insulation, energy efficient appliances)	Infrastructure & Assets, Corporate Services	Energy and resource efficiency plan or guidelines for public facilities completed Energy use identified for all corporate buildings and public facilities	3	Medium	\$\$\$\$ E
4.4.2	Consider generation of renewable energy for Council's energy demand, if necessary in partnership with other stakeholders (solar, wind, bioenergy producers)	Infrastructure & Assets	Feasibility study for renewable energy for Council's energy consumption completed	3	Medium	\$\$\$\$ E
4.4.3	Develop and implement a sustainable public lighting plan (using energy efficient lighting technology and/or renewable energy)	Infrastructure & Assets, Construction	Public lighting plan completed	3	Medium	CAP, E
4.4.4	Work with Council's Section 86 Committee of Management (CoM) to encourage implementation of energy efficiency strategies and/or the generation renewable energy	Infrastructure & Assets	Number of meetings with Section 86 CoM about resource efficiency conducted; individual plans drafted.	2	Medium	OT

4.4.5	Apply for grant funding to establish demonstration sites of renewable energy technologies at Council buildings or other publicly accessible buildings	Infrastructure & Assets, Grants	Grant application(s) submitted	4	Medium	CAP, E
4.4.6	Consider purchase of green power for Council buildings and public facilities	Executive Team, Corporate Services	Financial feasibility study into purchase of green power conducted	3	Medium	\$ OT, E
V Carbon offset						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
4.5.1	As part of the plan to achieve carbon neutrality, identify opportunities to engage in revegetation works on Council-managed land (in coordination with action 1.8.7) to deliver outcomes for biodiversity and carbon abatement	Environment	Revegetation sites identified	2	High	OT, E
4.5.2	Manage revegetation work on Council-managed land and register carbon credits generated by plantings with an accredited carbon offset provider	Environment, Corporate Services. (Finance)	Landcare and other groups lined up for onsite work New carbon credits registered annually	2	Medium	OT
4.5.3	Report on and promote carbon offset measures within the community (private landowners, businesses)	Environment, Communications	Fact sheet completed Information sessions on carbon offsetting conducted	3	Medium	\$ OT

VI Council transport						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
4.6.1	Reduce carbon footprint of Council transport by	Construction, Infrastructure & Assets, Outdoor Crews	Opportunities for improved car fleet use identified	2	High	OT
	-Increasing efficiency of use of Council's car fleet (e.g. better route planning, car pooling system)		Council car pool system established			
	-Aiming to change to smaller and/or low emission vehicles (e.g. different vehicle types)	Construction; Infrastructure & Asset Construction,	Fleet adaptations made	2	Medium	CAP, E
	-Aiming to change to low emission fuels (e.g. LPG, biodiesel, compressed natural gas)	Infrastructure & Assets	Fleet adaptations made	2	Medium	CAP, E
	-Using non-transport options where appropriate (e.g. teleconferencing, working from home)	Executive Team	Information on non-transport options disseminated to staff	2	Medium	OT

VII Community transport						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
4.7.1	<p>Achieve more sustainable transport in the community by investigating and implementing</p> <ul style="list-style-type: none"> -Community transport solutions (e.g. car-pooling, and community buses) -Behaviour change initiatives to reduce private car use within townships -Reports on and promotion of low emission vehicles and fuels -Planning for the development of walkable connections within towns 	<p>Community Services</p> <p>Environment, Communications</p> <p>Environment, Communications</p> <p>Planning, Infrastructure & Assets, Community Services</p>	<p>Transport connections program implemented</p> <p>Information materials and actions prepared and disseminated</p> <p>Information materials and actions prepared and disseminated</p> <p>Incorporation of walkable connections in all Urban Design Frameworks</p>	3	Medium	OT, E
VIII Energy production from waste						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
4.8.1	Investigate capture of methane from landfill as a potential fuel source	Waste Management, Infrastructure & Assets	Feasibility study conducted	4	Medium	\$\$\$ OT
4.8.2	Investigate bioenergy production from dry woody waste (e.g. gasification, pyrolysis) or from wet green waste (biodigestion)	Waste Management, Infrastructure & Assets	<p>Feasibility study conducted</p> <p>Contacts with private operators established</p>	4	High	\$\$\$\$ E

Theme 5 Waste management

Introduction

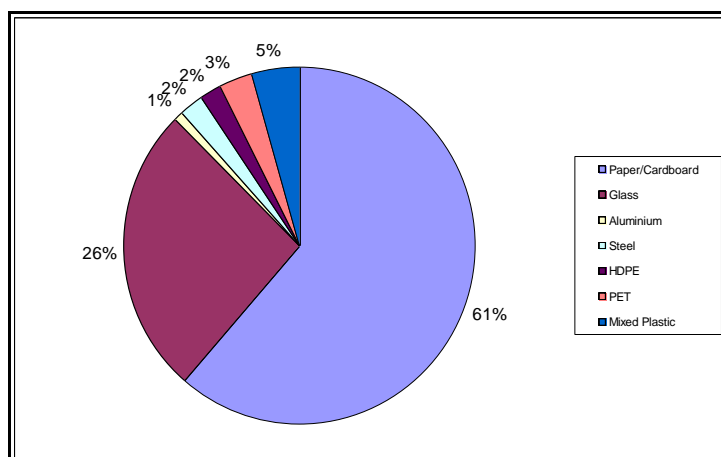
In 2005 the Victorian Government launched its Solid Waste Strategy 'Towards Zero Waste' (2005) to minimise the amount of waste Victorians generate and to maximise opportunities for recovering materials.

Waste management is an area where local government can make a significant difference for the environment. Murrindindi Shire Council is working closely with the Goulburn Valley Regional Waste Management Group (GVRWMG) to establish and implement a municipal Waste Management Strategy for Council's waste management services. The overarching objective is to achieve environmental sustainability and zero waste by 2014 through best practice waste management, including strategies to reduce, reuse and recycle waste. The municipal Waste Management Strategy includes

- Roadside collection of household waste (garbage), recyclables and hard waste
- Drum muster programs to collect containers of paints, fertilisers and other chemical liquids
- Household chemical collections and electronic waste recycling
- Disposal of agricultural plastics and organic waste
- Minimisation and management of litter.

Council's kerbside waste recycling service has produced impressive results since it started in 2005. Now more than 100 tonnes of material is collected every month, of which over 60% is paper and cardboard products and 26% glass. As an example, Figure 9 shows the composition of recycled products for September 2009, where 108 tonnes of materials was collected.

Using the Environmental Benefits of Recycling Calculator developed by the NSW Department of Environment and Climate Change, these recycled materials translate to 292 cubic metres of landfill space saved, 66 tonnes of CO₂ emissions avoided and 858 trees saved (SKM 2009).



Notes: PET, polyethylene terephthalate (mostly found in soft drink bottles); HDPE, high-density polyethylene (laundry detergent and household cleaning product bottles)

Figure 9 Materials recycled in Murrindindi Shire in September 2009

Legal basis

The overarching legislation addressing waste management is the Victorian *Environment Protection Act 1970*.

The Environment Protection Authority (EPA Victoria) is a statutory body established under the *Environment Protection Act 1970 (EP Act 1970)* in response to community concern about pollution. EPA Victoria is responsible for developing and implementing Victoria's statutory framework for waste including municipal, commercial and industrial, construction and demolition, and prescribed wastes. EPA Victoria works in partnership with Sustainability Victoria to reduce waste and facilitate product stewardship programs.

Relevant to local government is EPA Victoria's role in regulating landfills and transporting waste, regulating alternative waste treatment facilities, enforcing the *EP Act 1970* including littering, and distributing landfill levy funds.

Under the *EP Act 1970*, environmental objectives are set out at State level in the Waste Management Policy for management of landfills (Siting, Design and Management of Landfills, EPA 2004). Also, provisions are made for Industrial Waste Management Policies (IWMPs). These statutory instruments relevant to Murrindindi Shire Council are provisions regarding waste minimisation, control of ozone-depleting substances, waste acid sulphate soils and a national pollutant inventory. Further, regulations are established to provide more detail for these policies. Regulations are in force for issues including

- Control of ozone-depleting substances
- Fees
- Landfill levies
- Prescribed waste.

The Victorian Solid Waste Strategy 'Towards Zero Waste' (2005) provides directions regarding local government's important role in maximising the rate of resource recovery, as well as in reducing the amount of waste going to landfill through its ability to influence communities and local industry. Murrindindi Shire Council's kerbside recycling program is an example of the response to this strategy.

At a municipal level, Murrindindi Shire's Environment Local Laws (Local Law No. 2 Part 5 Disposal of Waste) specify the rules for disposal of waste, transport of waste and the use of transfer stations including related permits, fees and penalties.

Council's past and current activities

Council's achievements and current activities related to waste management include

- Establishing and implementing a Municipal Waste Management Strategy (unpublished draft)
- Implementing a municipal recycling program under the Victorian Solid Waste Strategy 'Towards Zero Waste'.

Goal

Community and Council work towards the goals of the Victorian Solid Waste Strategy 'Towards Zero Waste'.

Strategy objectives

1. Minimise waste through reducing, reusing and recycling materials
2. Avoid and mitigate negative impacts of waste management
3. Engage the community in education programs and events that inform about waste minimisation.

Action Plan—Waste management

I Environmental management in tendering process						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
5.1.1	Integrate environmental management criteria into tendering process, such as -Minimise and manage waste -Minimise and manage dust, air pollution and greenhouse gas emissions -Minimise and manage noise emissions -Minimise natural resource use (e.g. water, soil, fuels) -Minimise environmental impacts	Waste Management, Infrastructure & Assets, Environmental Health	Guidelines for construction contractors established	3	Medium	OT
II Green procurement programs for Council						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
5.2.1	Participate in green procurement programs of Municipal Association of Victoria (MAV), Sustainability Victoria or other agencies (e.g. Local Government Buy Recycled Alliance, EcoBuy)	Corporate Services, Construction, Infrastructure & Assets	Membership of green procurement programs established	1	High	\$\$ OT
5.2.2	Identify and purchase eco-friendly products and materials within available resources	Corporate Services, Construction, Infrastructure & Assets	Number of purchase items replaced by green alternatives	1	High	OT

III Waste minimisation and recycling by Council						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
5.3.1	Develop a Waste Minimisation Plan for Council operations with targets for each department and regular monitoring of waste volumes and types	Waste Management	Waste Management Plan established	1	High	OT
5.3.2	Monitor and minimise Council's paper consumption (e.g. double-sided printing, paperless information dissemination)	Corporate Services	Paper consumption established by unit or office location	1	High	OT
5.3.3	Apply waste-wise principles for design and construction of new Council facilities (i.e. reduce, reuse, recycle). Keep renewing and upgrading Resource Smart accreditation	Infrastructure & Assets, Waste Management	Waste streams by unit, office location or project established	1	Medium	OT

IV Waste minimisation and recycling by community						
Action		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
5.4.1	Finalise and implement Council's Waste Management Strategy	Waste Management	Waste Management Strategy established	1	High	OT
5.4.2	Introduce recycling facilities in key public places. Explore expansion of resource recovery facilities and services at transfer stations to increase recycling and re-use, for example, electronic items.	Infrastructure & Assets, Waste Management	Key locations identified and public recycling bins trialled Feasibility study to expand resource recovery and recycling services, including one trial, completed	1	High	CAP, E
5.4.3	Investigate forms of decentralised green waste collection and treatment	Waste Management	Feasibility study in forms of decentralised green waste collection and trial completed	3	Medium	\$\$\$ OT, E

V Management of chemicals at depots, transfer stations and landfill sites						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
5.5.1	Ensure compliance and reporting on best practice management (EPA Waste Management Policy 2004 & guidelines 2001) of landfill sites and Council's depots	Waste Management, Construction	Best Practice checklist established; quarterly reporting using checklist	Ongoing	High	OT
5.5.2	Ensure controls are in place for introduction, storage and use of chemicals	Waste Management, Construction	Control protocols and related forms completed	2	High	OT
5.5.3	Develop chemical use and management policy for Council operations covering cleaning agents, herbicides, pesticides, fuels, fertilizers, oils and other chemicals	Waste Management	Guidelines for use of chemicals in Council operations and training material completed	2	Medium	OT
5.5.4	Develop chemical disposal practices for Council operations to avoid contamination of soil and water	Waste Management	Training manuals created and training of staff and outdoor crew and contractors in chemical disposal completed	2	High	OT
5.5.5	Promote 'Detox Your Home' initiatives of Sustainability Victoria	Waste Management Communications	Annual Detox promotion conducted	Ongoing	Medium	OT

VI Waste education programs and events						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
5.6.1	Support and promote Council's, Goulburn Valley Region Waste Management Group's and other organisations' waste education programs and events for the community, schools and businesses	Waste Management Communications	Number of waste reduction education or promotion activities per year and per stakeholder group	Ongoing	Medium	OT
5.6.2	Promote Sustainability Victoria's Resource Smart Program for businesses, corporate organisations, schools and the community	Waste Management Communications	Number of Resource Smart Promotion activities conducted per year	Ongoing	Medium	OT
5.6.3	Raise community awareness of waste streams and progress on diverting waste from landfill (resource recovery and recycling)	Waste Management, Communications	Number of community education activities by stakeholder group	3	Medium	OT
5.6.4	Support the community (schools, community groups, etc.) to participate in Waste Reduction Programs and related events (Clean-up Australia Day, Waste Award programs, etc.)	Waste Management, Communications	Number of supporting activities by type of support (e.g. grant, communication or advertising, staff presence)	Ongoing	Medium	OT
VII Environmental aspects of Municipal Emergency Recovery Plan						
Council		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
5.7.1	Introduce environmental targets and guidelines into the Municipal Emergency Recovery Plan	Emergency Management, Environment,	Environmental targets and guidelines established and Municipal Emergency Recovery Plan completed Checklist for training purposes established	3	Medium	OT

Theme 6 Sustainable built environment

Introduction

As part of the Murrindindi Shire Environment Strategy, it is important to consider places where people live. While they create an environment for residents, human settlements directly and indirectly affect the natural environment and climate.

The Murrindindi local government area (LGA) has a population of more than 13,000 permanent residents living in separate houses, semi-detached (terrace, row, town) houses and flats or apartments (2006 figures). As shown in the table below, there are slightly more people and occupied private dwellings in the Local Government Area of Murrindindi West than in Murrindindi East.

Table 5 Number of people and occupied private dwellings

Population	1996 Census			2001 Census			2006 Census			Tot. Pop. Increase	
	Males	Females	Persons	Males	Females	Persons	Males	Females	Persons	1996-2006	in %
Murrindindi LGA	6,252	6,199	12,451	6,589	6,520	13,109	6,792	6,591	13,383	932	7.5%
Murrindindi East	3,014	3,048	6,062	3,060	3,157	6,217	3,030	3,007	6,037	-25	-0.4%
Murrindindi West	3,238	3,151	6,389	3,529	3,363	6,892	3,763	3,585	7,348	959	15.0%

Occupied private dwellings	1996					2006					% increase of total dwellings
	separate house	Semi-detached, terrace or row house	Flat, unit, apartment	other	Total	separate house	Semi-detached, terrace or row house	Flat, unit, apartment	other	Total	
Murrindindi LGA	4,237	38	125	221	4,621	4,973	34	137	172	5,316	15.0%
Murrindindi East	2,001	28	107	131	2,267	2,240	28	113	110	2,491	9.9%
Murrindindi West	2,236	3	23	85	2,347	2,734	5	20	65	2,824	20.3%

Source: Australian Bureau of Statistics (2008) 2006 Census Community Profile Series for Murrindindi

Most permanent residents (about 6,500) lived in one of the larger towns of Alexandra, Yea, Kinglake West/Pheasant Creek, Kinglake, Eildon and Marysville. The rest either lived in one of 25 smaller towns or hamlets (Acheron, Buxton, Cathkin, Castella, Flowerdale, Glenburn, Gobur, Highlands, Homewood, Kanumbra, Kinglake, Kinglake West, Koriella, Limestone, Molesworth, Murrindindi, Narbethong, Rubicon, Strath Creek, Taggerty, Terip Terip, Thornton, Toolangi, Woodbourne and Yarck) or on residential properties outside towns.

Human settlements within or outside urban townships need to provide a high quality of life while minimising their impact on the natural environment and climate. A healthy and safe environment is as important for residents as equitable access to services, housing, open space and transport.

There is an increasing trend to addressing environmental problems related to human settlement with innovative urban design. This includes minimising natural resource consumption, managing waste effectively, achieving energy efficiencies and reducing negative impacts on biodiversity, water, soil, air quality and landscape values. Issued in 2004, the Murrindindi Shire Rural Living Guidelines provide environmental directions for residential properties outside urban townships.

Similar guidelines for urban townships can be integrated into Urban Design Frameworks, both for buildings and infrastructures owned and managed by Council and for private property.

Legal basis

An important objective of the Victorian *Planning and Environment Act 1987* is 'to secure a pleasant, efficient and safe working, living and recreational environment for all Victorians and for visitors of Victoria' (s. 4.(1)(c)). The *Environment Protection Act 1970* addresses many areas relevant to quality of life and to the environment. Examples are the control and management of waste and litter, and the sustainable uses of resources according to best practice standards.

Protection from wildfire is another important concern for human settlements. The State Planning Policy Framework (cl. 15.07-1) aims to assist the minimisation of risk to life, property, natural environment and community infrastructure from wildfire. This objective is also reflected in the Municipal Strategic Statement (cl. 21.10-3).

In Victoria, under the *Country Fire Authority Act 1958 (CFA Act 1958)* the CFA is responsible for fire safety planning and fire suppression in areas not covered by the Metropolitan Fire Brigade and Fire Protected Areas (State Forests, National Parks, other protected public land). According to its responsibility under the *CFA Act 1958* (s. 55A) and complementary to Local Fire Brigade Plans and Public Authority Plans, Murrindindi Shire Council has established a Municipal Fire Prevention Strategy. This strategy is to be updated annually. The *CFA Act 1958* requires the CFA to oversee its implementation, operation and auditing.

The Municipal Fire Prevention Strategy determines the responsibilities, risk identification and resource allocation that form the basis of a Municipal Works Program for fire prevention works within the Shire. In addition, the Municipal Fire Prevention Strategy informs landholders about the problems and requirements associated with fire risks in relation to personal safety, water resources, topography, firebreaks and road access. The strategy encourages landholders and residents to take responsibility for fire safety on their own property.

This aspect of landowner responsibility is also pursued in the Environment Local Laws (Part 2, no. 6. Fire Hazards), which require the owner or occupier of land in a built-up area to ensure that all necessary steps are taken to prevent fire and minimise the possibility of the spread of fire. However, in the aftermath of the February 2009 bushfires, the legal frameworks, policies and strategies will undergo a systematic review to reflect the lessons learned.

Council's past and current activities

Council's achievements and current activities related to sustainable built environment include

- Establishing urban design frameworks for most townships, including environmental design principles (2000s)
- Establishing and implementing a Municipal Fire Prevention Strategy (revised version 2007).

Goal

Provide a sustainable, healthy and safe living environment in human settlements within and outside of urban townships.

Strategy objectives

1. Improve the quality of life in human settlements while reducing their environmental footprints
2. Establish local and regional partnerships to promote sustainable lifestyle choices within the community.

Action Plan—Sustainable built environment

I Sustainable urban neighbourhood planning						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
6.1.1	<p>Use planning instruments to achieve sustainable urban neighbourhood planning through</p> <ul style="list-style-type: none"> -Incorporating sustainable development principles (e.g. promotion of walking and cycling networks, environmentally sensitive landscaping, environmentally friendly stormwater management) into new urban development proposals -Consolidating urban development within existing townships to prevent urban sprawl while protecting neighbourhood character 	<p>Planning, Infrastructure & Assets</p> <p>Planning</p>	<p>Amendment of existing urban design frameworks (UDFs) and creation of new UDFs with sustainability features</p> <p>Zoning with clear township boundaries established</p>	4	Medium	\$\$\$ OT, E

II Sustainable living guidelines for residential development						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
6.2.1	Establish and promote sustainable living guidelines for residential developments in and outside townships to encourage -High energy ratings through passive solar design and energy efficiency measures -Use of renewable energy -Water sensitive development -Walking and cycling facilities -Good connection to public transport	Planning, Building, Infrastructure & Assets Construction, Environmental Health, Community Services (Transport Connections Program Officer)	Establishment of sustainable living guidelines for residential developments	3	Medium	\$\$ E
III Promoting sustainable materials and technologies						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
6.3.1	Support and promote Council's or other agencies' education programs (e.g. exhibitions, fairs, workshops) on sustainable materials, technologies and services	Environment, Environmental Health, Planning, Communications	Number of support activities by type and stakeholder group	Ongoing	Medium	OT
6.3.2	Support and/or conduct information sessions on State and Federal incentive programs for sustainable technologies (e.g. related to renewable energy, water efficiency)	Environment	Number of information sessions conducted	Ongoing	Medium	\$ OT

IV Building environmental and climate partnerships						
Actions		Council department(s)	Performance indicator(s)	Time frame	Priority	Resources
6.4.1	Establish regional partnerships with environmental- and climate-related stakeholder groups and agencies	Environment, Waste Management	Number of partnerships formed by level of cooperation	Ongoing	Medium	OT
6.4.2	Participate actively in the Goulburn Broken Greenhouse Alliance (GBGA)	Environment, Waste Management	Number of joint activities and programs with GBGA	Ongoing	Medium	\$\$\$ OT
6.4.3	In partnership with the Goulburn Broken Greenhouse Alliance, other relevant agencies and the local government sector, participate in joint initiatives to assess the likely impacts of climate change on Council's operations, the community and the Shire's natural and built environments.	Environment, Infrastructure, Community Services, Planning	Completed climate change risk assessment on Council's operations	2	Medium	\$\$ OT E

Key for the Action Tables

Murrindindi Shire Council department(s) responsible for Actions

Executive Team	Executive Team (CEO, Deputy CEO and team)
Infrastructure & Assets	Infrastructure and Assets
Emergency Management	Emergency Management
Waste Management	Waste Management Officer
Construction	Murrindindi Construction
Outdoor Crews	Murrindindi Construction outdoor crews
Planning	Planning officers
Environmental Health	Environmental Health Officer
Environment	Environmental Officer
Local Laws	Local Laws Officers
Building	Building Department
Communications	Communications Team
Corporate Services	Corporate Services (Finance, Accounting, Rates, Procurement)
IT	Information Technology Department
Grants officer	Grants Officer
Tourism & Economic Development	Tourism and Economic Development Department
Community Services	Transport Connections Program Officer

Time frame

Year 1 (2010-11), Year 2 (2011-12), Year 3 (2012-13), Year 4 (2013-14)
Ongoing

Priority

High
Medium
Low

Resources

\$ < \$1000
 \$\$ \$1000–\$5000
 \$\$\$ \$5000–\$10,000
 \$\$\$\$ > \$10,000
 OT Officer Time
 E External funding sources may be sought
 CAP Requires further scoping and assessment as part of Council's capital budget

Abbreviations

AAV	Aboriginal Affairs Victoria
ABS	Australian Bureau of Statistics
AGO	Australian Greenhouse Office (Commonwealth)
ATA	Alternative Technology Association
BAER	Burned Area Emergency Response (USA)
CCP	Cities for Climate Protection Program
CFA	Country Fire Authority
CoM	Committee of Management under s. 86 of <i>Local Government Act 1989</i>
CSD	Commission on Sustainable Development (UN)
CSIRO	Australian Commonwealth Scientific and Research Organisation
DEWHA	Department of the Environment, Water, Heritage and the Arts
DNRE	Department of Natural Resources and Environment
DOI	Department of Infrastructure (Victoria)
DPI	Department of Primary Industries (Victoria)
DSE	Department of Sustainability and Environment (Victoria)
EIA	Environmental Impact and Risk Assessment
EMO	Erosion Management Overlay
EMP	Environmental Management Plan
EPA	Environment Protection Authority
ERV	EcoRecycle Victoria
ESO	Environmental Significance Overlay
FCCC	Framework Convention on Climate Change (UN)
GBCMA	Goulburn Broken Catchment Management Authority
GBGA	Goulburn Broken Greenhouse Alliance
GIS	Geographic Information System
GL	Gigalitre; 1 GL equals one billion litres (1,000,000,000 litres)
GMW	Goulburn Murray Water
GVRWMG	Goulburn Valley Regional Waste Management Group
GVW	Goulburn Valley Water
ICCP	International Panel on Climate Change
ICLEI	International Council for Local Environmental Initiatives
IWMP	Industrial Waste Management Policies
LGA	Local Government Area
LPPF	Local Planning Policy Framework
LSIO	Land Subject to Inundation Overlay
MAV	Municipal Association of Victoria
MCN	Murrindindi Climate Network
MEFL	Moreland Energy Foundation Limited
ML	Megalitre; 1 ML equals one million litres (1,000,000 litres)
MSS	Municipal Strategic Statement (Murrindindi Shire Council)
MW	Melbourne Water
PV	Parks Victoria
RCAC	Roadside Conservation Advisory Committee
SLO	Significant Landscape Overlay
TFN	Trust for Nature
TSN	Threatened Species Network

UDF	Urban Design Framework
UGLN	Upper Goulburn Landcare Network
UNCED	United Nations Conference on Environment and Development
VR	VicRoads
WELS	Water Efficiency Labelling and Standards Scheme (Federal)
WFP	Whole Farm Planning
WMO	Wildfire Management Overlay
WSUD	Water sensitive urban design

Glossary

Biodiversity

The variety of all life forms, including plants, animals and microorganisms, the genes they contain, and the ecosystems of which they form a part.

Source: National Strategy for the Conservation of Australia's Biological Diversity, 1996

Bioregion

A broad-scale mapping unit that captures the patterns and ecological characteristics in the landscape.

Source: DSE Victoria, Biodiversity White Paper, 2009

Catchment

An area of land that drains to its lowest point.

Source: Yarra Ranges Shire Environment Strategy, 2008

Carbon dioxide equivalent (CO₂-e) and global warming potential

A measure of the effect a specific greenhouse gas has relative to carbon dioxide (CO₂). It is calculated by multiplying the tonnes of greenhouse gas by its global warming potential. The global warming potential is a measure of how much a given mass of greenhouse gas is estimated to contribute to global warming. It is a relative scale where the global warming potential of CO₂ has been set to one by definition. The global warming potential is calculated over a specific time interval and depends on the absorption of infrared radiation and the atmospheric lifetime of the gas. Thus, a high global warming potential correlates with a large infrared absorption and a long atmospheric lifetime.

Source: EPA Victoria, 2009

Carbon footprint

A form of carbon calculation that measures the amount of carbon dioxide equivalent (CO₂-e) that a country, business, industry or individual produces or is responsible for. The footprint calculates the direct and indirect level of CO₂-e emissions. Direct emissions include the burning of fossil fuels for energy and transport; indirect emissions focus on the whole lifecycle of products from procuring raw materials to waste management.

Source: EPA Victoria, 2008

Carbon neutral

A voluntary mechanism where an activity, event, household, business or organisation is responsible to generate no net emissions of greenhouse gases and can therefore be declared carbon neutral in that specific area. Carbon neutrality can be achieved by reducing emissions as far as possible (e.g. energy efficiency, purchasing renewable energy) and then purchasing offsets for any residual emissions in order to achieve zero net emissions.

Source: EPA Victoria, 2008

Carbon offset

A carbon offset is a monetary investment in a project or activity at a different location from a business or individual that is generating greenhouse gas emissions. The project or activity either decreases greenhouse gas emissions or sequesters carbon from the atmosphere. Business or individuals can buy carbon offsets in the voluntary market or within a trading scheme. A carbon offset usually represents one tonne of CO₂-e.

Source: EPA Victoria, 2009

Ecologically sustainable development

Using, conserving and enhancing community resources so that ecological processes, on which life depends, are maintained and the total quality of life, now and in the future, can be increased.

Source: National Strategy for Ecologically Sustainable Development, 1992

Ecological Vegetation Classes (EVCs)

A grouping of vegetation communities based on botanical, structural and ecological features.

Source: Yarra Ranges Shire Environment Strategy, 2008

Ecosystem

A dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit.

Source: Yarra Ranges Shire Environment Strategy, 2008

Greenhouse effect

A term that describes how gases in the earth's atmosphere allow infrared radiation from the sun to warm the earth's surface, but that the gases also prevent much of the heat escaping from the earth's atmosphere. Human actions are increasing the concentrations of these gases, and are therefore contributing to global climate change.

Source: EPA Victoria, 2008

Greenhouse gases

Gases in the atmosphere that absorb and emit radiation within the thermal infrared range, thus affecting the temperature of the Earth's surface. Without the greenhouse effect the Earth's average temperature would be about 33°C cooler than it is. The main greenhouse gases in the Earth's atmosphere are water vapour, carbon dioxide, methane, nitrous oxide and ozone.

Source: EPA Victoria, 2009

Habitat hectare

A theoretical method for assessing native vegetation quality. One habitat hectare equals one hectare of native vegetation that retains the average characteristics of a mature and apparently long-undisturbed stand of the same vegetation type.

Source: Yarra Ranges Shire Environment Strategy, 2008

Indigenous

Native, specific to a local area, and the particular environmental conditions of that area.

Source: Yarra Catchment Action Plan, 1999

Invertebrate Rating

Sampling of small animals without backbones living in waterways, which provides a history of previous environmental conditions for an extended time. The Invertebrate Rating is sensitive to pollution and changes in the ecosystem.

Source: Melbourne Water Healthy Waterways Report, 1998

Lifecycle assessment

Lifecycle assessment evaluates the environmental impacts of a product or a process from the start to the end of its 'life', including all upstream and downstream processes necessary for its production, operation, maintenance and discharge. The cradle-to-grave lifecycle assessment takes a global point of view because it includes all impacts related to a product or process, independently of when and where they occurred. Most of the time, the results of a lifecycle assessment are used to compare different product or process designs against one another.

Source: Seethaler R, 2008

Net gain

A term used in the Victorian Government's Native Vegetation Framework to describe a situation where overall gains in native vegetation are greater than overall losses and where individual losses are avoided where possible.

Source: Yarra Ranges Shire Environment Strategy, 2008

Open space

Parks owned and/or managed by the Shire or Crown and land with ecological value that is owned and/or managed by the Shire or the Crown or in private ownership.

Source: Nillumbik Shire Council Open Space Strategy (in progress), 2005

Radiative forcing

In general terms, radiative forcing refers to an imbalance between incoming solar radiation and outgoing infrared radiation that causes the Earth's radiative balance to stray away from its normal state. This straying causes changes in global temperatures

Source: Department of Atmospheric and Oceanic Sciences, University Colorado (2008)

Recharge zone

The area in which surface water from irrigation, rainfall or streams infiltrates the soil or surface rock and is added to the groundwater.

Source: Land Management Series Discussion Paper No.1 Salinity in the Yarra Catchment, 1994

Remanent vegetation

The remaining part of the natural vegetation, or the remaining vegetation left after a major change in the environment (sometimes referred to as 'remnant' vegetation).

Source: A Guide to Dryland Salinity in the North-West Yarra Catchment, 1995

Renewable energy

Energy generated from resources that can be renewed or are in limitless supply, such as solar, wind or hydroelectric power or biofuels.

Source: Yarra Ranges Shire Environment Strategy, 2008

Riparian

Of or on the bank of a river.

Source: Collins English Dictionary and Thesaurus, 2010

Section 86 Committee of Management

Committees under Section 86 of the Local Government Act are appointed to look after the halls and reserves in each township. The Committees are based on volunteer involvement in each township.

Source: Victorian Local Government Act 1989

Sediment Quality Rating

Surveys of metals including arsenic in sediments within waterways. The rating shows risk to the ecosystem.

Source: Melbourne Water Healthy Waterways Report, 1998

Water Quality Rating

Waterway analysis based on a water quality index and surrounding land use. Water samples are tested for water quality indicators including temperature, dissolved oxygen, salinity, pH, water clarity, nutrients, faecal contamination and metals. The index provides an overall single rating for each site.

Source: Melbourne Water Healthy Waterways Report, 1998

Waterway

River, creek, stream or watercourse or a natural channel in which water regularly flows, whether or not the flow is continuous or passes through a dam, lake, lagoon, swamp or marsh.

Source: Schedule F7 Waters of the Yarra Catchment, 1999

Section III Appendices

Appendix 1 Relevant Local, Regional, State and Commonwealth Legislation, Strategies and Policies; and International Agreements

Local Planning Policy Framework

The Local Planning Policy Framework identifies long-term strategic directions and also forms the statutory basis for land use and development in the Shire.

It provides the rationale for zone and overlay requirements and particular provisions in the scheme. Elements with particular relevance to the Murrindindi Environment Strategy are

- Municipal Planning Scheme—cl. 21.10 Natural resource management strategies deals with floodplain management (21.10-1) and other issues (21.10-2) like native vegetation removal on private land, soil erosion and soil structure degradation, protection of watercourses from pollution, and decrease in biodiversity and protection of natural heritage values of the Goulburn River.
- Local Planning Policies—cl. 22.04 Natural resource management deals with issues of catchment management and land care (cl. 22.04-1), use and development of land for conservation purposes (cl. 22.04-2), remnant vegetation and grasses (cl. 22.04-3) and dams (cl. 22.04-4).
- Zones—clauses 30–37 with their related schedules contain a table of land uses and the controls over these.

Overlays with relevance to the environment

Overlays in cls 40–45 that have relevance to the environment include

Clause 42 Environmental and Landscape Overlays, with
42.01 Environmental Significance Overlay
42.02 Vegetation Protection Overlay
42.03 Significant Landscape Overlay

Clause 43 Heritage and Built Form Overlay

Clause 44 Land Management Overlay, with
44.01 Erosion Management Overlay
44.02 Salinity Management Overlay
44.03 Floodway Overlay
44.04 Land Subject to Inundation Overlay
44.05 Wildfire Management Overlay

Clause 45 Other Overlays
45.03 Environmental Audit Overlay

Particular Provisions with relevance to the environment

Particular Provisions in clauses 50–52

- 52.17 Native Vegetation
- 52.18 Timber Production
- 52.26 Cattle Feedlot
- 52.31 Broiler Farm
- 52.32 Wind Energy Facility

Incorporated Documents in the Local Planning Policy Framework

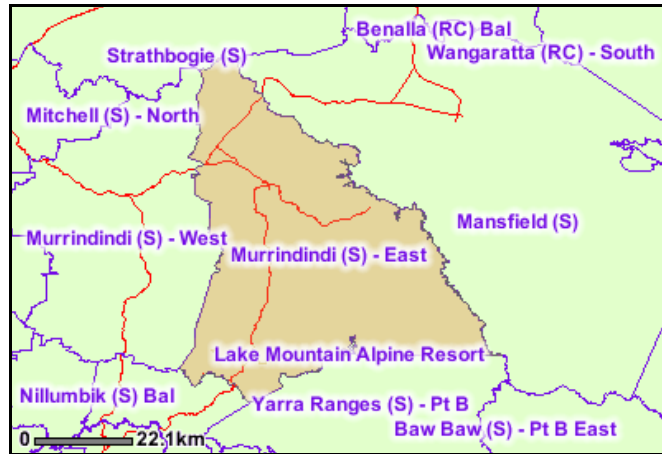
Incorporated Documents in the Local Planning Policy Framework cl. 80 with relevance to the environment are

- Code of Practice for Timber Production 2007
- Victorian Code for Cattle Feedlots, August 1995
- Guidelines for Environmental Management—Septic Tanks Code of Practice, Publication 891, Environment Protection Authority, March 2003
- Private Tennis Court Development Code of Practice—Revision 1, March 1999
- Code of Practice for Fire Management on Public Land (Department of Sustainability and Environment, Revision No. 1, 2006)
- Code of Practice, Piggeries (Department of Planning and Housing and Department of Food and Agriculture, 1992)
- Building in bushfire-prone areas (CSIRO and Standards Australia—SAA HB36-1993, May 1993)
- Local Government Planning Guide for Dry Land Salinity (Department Conservation and Natural Resources, 1995)
- Construction Techniques for Sediment Pollution Control (EPA May 1991)
- Apiary Code of Practice, May 1997.

In addition to the State and Local Planning Frameworks, many other documents inform the Murrindindi Environment Strategy. These include similar strategies from other rural municipalities, policies and strategies of the Victorian State and Federal governments and research reports from agencies and university institutes involved in environmental and climate related topics.

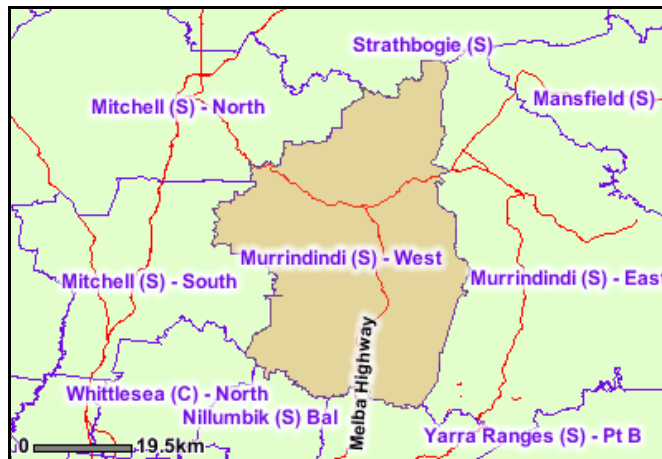
Murrindindi East and West defined by Statistical Local Areas

The Statistical Local Area as defined by the Australian Bureau of Statistics is relevant to the Local Planning Policy Framework. Therefore, maps of these areas in Murrindindi Shire are given in Figures A1 and A2.



Source: ABS Census 2006

Figure A 1 Area of Murrindindi East



Source: ABS Census 2006

Figure A 2 Area of Murrindindi West

Summaries of major Regional Strategies relevant to the Murrindindi Environment Strategy

Goulburn Broken Regional Catchment Strategy (2003)

The Goulburn Broken Regional Catchment Strategy is a statutory document under the *Catchment and Land Protection Act 1994* that was prepared by the Goulburn Broken Catchment Management Authority. The Strategy provides a framework for the development and implementation of initiatives, which will improve the condition of the Region's catchments. The vision for the region is

'A Catchment recognised locally, nationally and internationally for quality agricultural produce and where community values contribute to the benefits of abundant and well-maintained environmental assets used for tourism and recreational activities.

'The environmental footprint of irrigation and dryland farming will be significantly reduced, with farmers occupying less land and using less water whilst managing their resources more sustainably. New opportunities will arise for increasing the ecosystem services provided by the land retired from agriculture and by improved environmental flows.

'The region's economy will be robust, with much of the agricultural produce processed within the region, generating employment and wealth creation opportunities for a regional community actively engaging in natural resource management programs.' (GBCMA 2003)

The Goulburn Broken Regional Catchment Strategy identifies key issues, sets the vision and directions for sub-strategies and identifies assets and management options for the regional catchment investment plan and five-year works programs. Related sub-strategies and plans that have been established are

- Regional River Health Strategy (GBCMA 2005), addressing water quality, flood plains, waterways, riparian and in-stream native flora and fauna, recreation and wetlands
- Salinity Management Plan in irrigation (Goulburn Murray Water 2009) and dryland (GBCMA 2002) areas
- Biodiversity strategies including the Goulburn-Broken draft biodiversity strategy 2010-2015 (GBCMA 2010), a biodiversity integration strategy, a native vegetation strategy, plans for the management of threatened and non-threatened flora and fauna, and plans for the management and protection of non-vascular plants and invertebrates
- Pest plant and animal strategies, including a Weed Action Plan 2001–2005 (DNRE 2001) and a Rabbit Management Action Plan 2000–2005 (DNRE 2000)
- Goulburn Broken Draft Soil Health Strategy (2002) and a Soil Health Action Plan (GBCMA 2006)
- Goulburn Broken Climate Change Position Paper (GBCMA 2007).

For the Upper Goulburn Catchment, which covers the Murrindindi Shire area, the Dryland Landscape Strategy (2009–2011) further specifies the objectives and key actions to be undertaken in these related sub-strategies and plans over the next three years.

Other regional strategies relevant to the Murrindindi Environment Strategy

Strategies for water

- Waterways Water Quality Strategy (Melbourne Water 2008)
- Northern Region Sustainable Water Strategy (DSE 2009)
- Goulburn Broken Regional River Health Strategy 2005–2015 (GBCMA 2005)
- Upper Goulburn Recreational Waterway Strategy (GBCMA undated)
- Investigation of nutrients from urban stormwater and local water quality issues in the Goulburn Broken Catchment (GBCMA 1995).

Strategies for conservation and revegetation

- Revegetation Guide for the Goulburn Broken Catchment (DNRE 2001)
- Draft Conservation Plan for the South West Goulburn Landscape Zone (DSE 2006).

Strategies for Landcare, climate and communities

- Local Government and Landcare Action Plan for Nature Conservation in the Goulburn Broken Catchment (Raven 1997)
- Climate Change in the Goulburn Broken (DSE 2008)
- The Hume Strategy for Sustainable Communities (DPCD in preparation).

Summaries of major Victorian State Acts, Strategies and Policies relevant to the Murrindindi Environment Strategy

Catchment and Land Protection Act 1994

The *Catchment and Land Protection Act 1994* (CaLP Act 1994) exists to

- Provide a framework for integrated management and protection of catchments, including Catchment Management Strategies, assessment of resources and establishing Catchment Management Authorities (CMAs) and other bodies
- Encourage community participation in management of land and water
- Control noxious weeds and pest animals.

The *CaLP Act 1994* states that landowners must take all reasonable steps to

- Avoid land degradation causing damage to the land of another owner
- Conserve soil
- Protect water resources
- Eradicate prohibited weeds
- Prevent growth and spread of controlled weeds (including on neighbouring roadsides, with some exceptions)
- Prevent the spread of (and where possible eradicate) pest animals.

Landowners can, by written consent, pass these responsibilities to lessees or occupiers. A CMA or Regional Catchment and Land Protection Board (Board) may recommend planning scheme amendments to a planning authority. A CMA or Board may recommend declaration of Special Areas to the relevant Minister. Special area plans deal with specific land management issues and may specify binding land use conditions for landowners.

A public authority must have regard to any regional catchment strategy and any special area plans applying to the land. Failure to comply with directions of the Secretary of that authority can result in land management notices, which it is an offence to disobey.

With respect to extractive activity, with certain exceptions the *CaLP Act 1994* provides that it is an offence to carry out extractive activity without authority.

With respect to weeds and pests the relevant Minister (such as the Minister for the Environment and Climate Change) can recommend declaration of plants as weeds (classified either as state prohibited, regionally prohibited, regionally controlled or restricted) and animals (excluding fish and invertebrates) as pests (classified either as prohibited, controlled regulated or established).

The *CaLP Act 1994* also makes provisions for

- Serving instruments on landowners for controlling noxious weeds and established pest animals
- Preventing spread of noxious weeds
- Destroying noxious weeds
- Banning import, keeping or selling of pest animals
- Granting authority to keep pest animals
- Issuing permits.

Flora and Fauna Guarantee Act 1988

The *Flora and Fauna Guarantee Act 1988* (*FFG Act 1988*) exists to conserve fauna and flora at genetic, species and community levels by

- Managing threats
- Ensuring sustainable wildlife use
- Providing community education
- Encouraging cooperative management
- Encouraging community endeavours
- Assisting and providing incentives to landholders
- Administering a public authority.

It also requires the Secretary to prepare the Fauna and Flora Guarantee Strategy. The *FFG Act 1988* also lists

- Species exempt from its provisions (Schedule 1 Human disease organisms)
- Threatened species and communities (Schedule 2—See Appendix 2)
- Potentially threatening processes (Schedule 3); for example, the alteration to natural flow regimes of rivers and streams, input of toxic substances or increase in sediment input through human activity, and the degradation of native vegetation along rivers and streams.

The *FFG Act 1988* provides regulations that set out (among other things) the criteria used to determine eligibility for listing as a threatened species, and describes how new taxa, communities or processes may be nominated for inclusion. The Department of Sustainability and Environment (DSE) is required to prepare action statements for any listed taxon, community of flora or fauna or potentially threatening process, and may make a management plan. The Secretary may enter into an agreement with one or more public authorities to provide for management of any taxon, community or process.

The relevant Minister, such as the Minister for Environment and Climate Change, may make interim conservation orders to conserve critical habitat (including on private land) and must notify the planning authority and any responsible authority appointed under the *Planning and Environment Act 1987* for the relevant area. Certain activities within the habitat then require permits.

Taking, keeping, moving or processing protected flora is banned unless authorised by license. A similar provision applies to fish. Before an interim conservation order expires (usually two years), the Minister and DSE must take all reasonable steps to ensure the long-term conservation of the taxon, community or critical habitat. Where there is any conflict between an interim conservation order and a planning scheme, the order prevails. Compensation is available to landholders affected by interim conservation orders.

There are presently no critical habitats declared under the *FFG Act 1988* across Victoria including the Murrindindi Shire that would require an interim conservation order.

Planning and Environment Act 1987

The *Planning and Environment Act 1987 (PE Act 1987)* establishes a framework for integrating policies and environmental considerations into planning decisions affecting private land. It sets out detailed provisions for the establishment of planning schemes and permit arrangements within these schemes. The *PE Act 1987* requires local governments to administer and enforce these planning schemes. The *PE Act 1987* lists the objectives of planning in Victoria, which include

- Ensuring the sustainable use and development of land
- Protecting natural and artificially created resources and maintaining ecological processes and genetic diversity
- Conserving and enhancing those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest or otherwise of special cultural value.

All planning schemes in Victoria include a State and a Local Planning Policy Framework incorporating a Municipal Strategic Statement. Environmental protection is thus integrated into the Murrindindi Planning Scheme, as it is the main instrument of planning control that sets out policies and controls for the use, development and protection of land.

The State Planning Policy Framework policies cover

- Protection of catchments, waterways and groundwater
- Floodplain management
- Salinity
- Air quality
- Noise abatement
- Soil contamination
- Protection from wildfire
- Conservation of native flora and fauna
- Open space
- Heritage
- Energy efficiency.

State-wide Particular Provisions also exist for a wide range of issues including subdivision, easements and restrictions, advertising signs, native vegetation and timber production.

Conservation, Forests and Lands Act 1987

The *Conservation, Forests and Lands Act 1987 (CFL Act 1987)* exists to enable conservation and use of the State's lands, waters, flora and fauna by

- Creating the Directorate General of Conservation Forests and Land (now Natural Resources and Environment, NRE)
- Providing a framework for management of State land
- Establishing land management cooperative agreements.

The *CFL Act 1987* gives DSE the power to purchase or compulsorily acquire land or interest in land for the purposes of this *Act* and others including the *Catchment and Land Protection Act 1994*, *Flora and Fauna Guarantee Act 1988* and *Crown Land (Reserves) Act 1978*.

The *CFL Act 1987* enables the Minister to establish codes of practice such as avoiding or minimising soil deterioration, eradication or control of pests and chemical spray application. Only two codes of practice have been established under the *CFL Act 1987*, which are the Code of Practice for Timber Production and the Code of Practice for Fire Management on Public Land in Victoria. The Secretary of the DSE must give notice of the preparation of a draft code of practice to public authorities and under Section 67 of the *CFL Act 1987*, a public authority must not act contrary to a code of practice.

DSE can enter into a Land Management Cooperative Agreement with any landowner relating to the management, use, development, preservation or conservation of land and (with the Minister's approval) make grants or loans accordingly. Agreements can be binding on future owners of the land.

Crown Land (Reserves) Act 1978

The *Crown Land (Reserves) Act 1978 (CLR Act 1978)* gives powers to reserve Crown lands and manage reserves on Crown land. Land can be reserved for a wide range of specific purposes including protection of watersheds, waterways, areas of ecological significance, flora, wildlife, habitat, parks and gardens. Murrindindi Shire Council can have responsibilities for Crown Land in two main ways.

First, where Council is appointed as Committee of Management for an area of Crown Land, Council is responsible for

- The day-to-day management of reserves, but requires approval from DSE for any substantive development (not defined by the *CLR Act 1978*), as well as fire prevention works or procuring forest produce
- Providing annual reports to the trustees of the land and to the Minister, describing its operations and a statement of receipts and expenditure
- Resolving potential issues of conflict or confusion between these provisions and the *Local Government Act 1989* according to provisions set out in s. 14 (7–9)

- Taking advantage of becoming a corporation according to provisions set out for Committees of Management.

DSE, not Council, is responsible for

- Providing public liability insurance
- Possibly making grants available, especially for management planning.

Second, where Crown land is vested in Council, the normal legal obligations as a landholder apply.

In both of these two cases, Council cannot sell, lease or license the land. The *CLR Act 1978* gives the Minister power to purchase land either by agreement or compulsorily for purposes including conservation of fauna and flora.

Environment Protection Act 1970

The *Environment Protection Act 1970 (EP Act 1970)* was the first legislation to bring together environmental management of air, water and land into a single statute. The *EP Act 1970* establishes the Environment Protection Authority (EPA) and is designed to prevent and abate pollution by

- Promoting sustainable use of the environment
- Promoting consideration of the impacts of any activity on all parts of the environment
- Promoting adoption of community input to goals and programs
- Encouraging cooperation in environmental protection.

Objectives Under the *EP Act 1970*, environmental objectives are set out in State Environment Protection Policies (SEPPs), which are legally enforced statutory instruments. SEPPs relevant to Murrindindi Shire are

- Air Quality Management
- Control of Noise from Commerce, Industry and Trade
- Control of Music Noise from Public Premises
- Siting and Management of Landfills Receiving Municipal Wastes
- Waters of Victoria
- Groundwaters of Victoria.

Provisions are made for Industrial Waste Management Policies (IWMPs), which are statutory instruments. As of July 2009, the Industrial Waste Management Policies have been replaced by the new Environment Protection (Industrial Waste Resource) Regulations 2009, including industrial wastes, dangerous goods, clinical and related wastes and vehicles.

Regulations have also been established, in some cases to provide more detail for these policies. Regulations are in force for a number of issues including

- Control of ozone-depleting substances
- Fees
- Landfill levy
- Advertisements
- Prescribed waste
- Transport
- Residential noise
- Scheduled premises and exemptions
- Vehicle emissions.

Scheduled Premises that have the potential to significantly influence the environment are listed in the Environment Protection Scheduled Premises and Exemptions Regulations 2007. Such premises are required to obtain works approvals and/or to hold a license. Scheduled premises include facilities for storage, treatment and reprocessing of waste, landfills, premises for aerobic or anaerobic composting, facilities for the treatment of sewerage, livestock saleyards and holding pens and fish farms.

The *EP Act 1970* deals with waste and waste recovery with the intention to foster environmentally sustainable uses of resources and best practices in waste management. The *EP Act 1970* establishes EcoRecycle Victoria to further these aims. In addition, the *EP Act 1970* makes provisions for the establishment of Regional Waste Management Groups, which must establish Regional Waste Management Plans and which Councils within a waste management region must comply with. Murrindindi Shire Council is a member of the Goulburn Valley Regional Waste Management Group (GVRWVG).

In relation to septic tanks, the *EP Act 1970* ss 53 (subss J–O) sets out in detail the obligations of Councils with respect to permitting, inspection, certification and reporting of septic tanks.

To further guide the implementation of the *Act*, the Environment Protection Authority has published diverse detailed Policies, Guidelines and Codes of Practice including those listed below.

Relating to water

- *Pollution of Waters by Oils and Noxious Substances Act 1986*
- State Environment Protection Policies (such as SEPP Waters of Victoria, Groundwaters of Victoria)
- Technical Guidelines for Waterway Management (DSE 2007)
- Pollution of Waters by Oils and Noxious Substances Regulations 2002
- Code of Practice for Small Wastewater Treatment Plants
- Code of Practice for Septic Tanks: On-site Domestic Waste Water Management
- Code of Practice for On-site Wastewater Management
- Urban Stormwater Best Management Environmental Guidelines
- Guidelines for Wastewater Reuse
- Guidelines for Managing Sewage Discharges to Inland Waters
- Guidelines for Environmental Management: Use of Reclaimed Water
- Guidelines for Environmental Management: Guidelines for Aerated On-site Wastewater Treatment Systems
- Guidelines for Environmental Management: Disinfection of treated wastewater
- Preliminary Nutrient Guidelines for Victorian Inland Streams.

Relating to waste

- Environment Protection (Industrial Waste Resource) Regulations
- Waste Management Policy (Siting, Design and Management of Landfills) and (Used Packaging Materials) dealing with recycling
- Best Practice Environmental Guidelines for Composting and Other Organic Recycling Facilities
- Best Practice Waste Control at Motor Vehicle Repair/Services Premises
- Best Practice Environmental Guidelines for Major Construction Sites.

Relating to noise

- Noise Control Guidelines
- Interim Guidelines for Control of Noise from Industry in Country Victoria.

Relating to incidents involving hazardous materials

- Guidelines for Emergency Services at Hazmat Incidents.

Victoria's Towards Zero Waste Strategy (2005)

In line with the Our Environment, Our Future: Victoria's Environmental Sustainability Framework and the Victorian Greenhouse Strategy, Victoria's 'Towards Zero Waste Strategy' (2005) is an important part of Victoria's environment plans.

The Towards Zero Waste Strategy proposes a considerable increase in recycling; high environmental standards in landfills; the reduction of solid waste, and linked with it, use of non-renewable resources; and a decisionmaking process that uses a full lifecycle approach to processes and materials.

For the municipal sector, priority materials and products include garden organics, food organics, paper and cardboard, timber, electrical and electronic appliances, computer and peripheral IT equipment, tyres, consumer packaging, paint, mercury-containing lamps (including fluorescent lamps), treated timber, batteries, plastic shopping bags and motor vehicles.

Regional Waste Management Groups assist municipalities to effectively manage waste and recycling programs, including diverting organics. As principal target for the municipal sector, the Strategy defines a 65% recovery rate (by weight) of municipal solid waste for reuse and recycling by 2014, with an interim target of 45% for 2008–09.

Victorian Greenhouse Strategy (2002, update 2005)

Recognising the need for an effective response to climate change at global, national and local levels, the Victorian Greenhouse Strategy pursues four goals.

1. Build awareness and understanding of greenhouse issues
2. Limit Victoria's greenhouse gas emissions and enhance greenhouse sinks
3. Position Victoria to prosper in a future carbon constrained economy, including by creating an environment in which Victorian industry can take advantage of business opportunities in greenhouse gas mitigation
4. Develop a greater understanding of climate change impacts and, where appropriate, initiate adaptation actions relevant to Victoria.

Greenhouse Response Actions have been defined for the areas of

- Government leadership—including greenhouse gas emissions from government operations and considering greenhouse gas emissions in government decisionmaking.
- Energy supply—improving the emissions performance of electricity generation; increasing renewable energy generation and the use of cogeneration; improving the energy market to offer consumers cost-effective choices between sustainable green energy and brown-coal based energy; efficient end use and energy conservation

- Greenhouse best practice in industry and commerce—increasing business sustainability and taking advantage of business opportunities related to emerging green technologies and increasing efficiency of commercial buildings.
- Waste management—decreasing greenhouse gas emissions through improved management of wastes.
- Working with local government and the community—strengthening local government leadership including in regional and rural Victoria, and engaging in community information and education.
- Greenhouse friendly households—improving the energy efficiency of new homes, promoting greenhouse friendly appliances, conducting household based behaviour change programs, and ensuring access to energy efficiency for all Victorian households.
- Travel choices and travel behaviour—influencing travel choices and travel behaviour through integrated decisionmaking in transport policy and strategies, reducing the need for motorised travel, promoting environmentally friendly driver behaviour, promoting public transport, and improving emission performance and fuel economy of motor vehicles.
- Greenhouse sinks and natural resource management—establishing programs to enhance Victoria’s greenhouse sinks and improve carbon accounting.
- Climate change adaptation—establishing programs for the community, business and industry to adapt to impacts of climate change.

Victorian Biodiversity Strategy (1997)

The Victorian Government has produced three documents under the title ‘Victoria’s Biodiversity’: *Our Living Wealth*, *Sustaining Our Living Wealth*, and *Directions in Management*. Together they provide a strategic approach to biodiversity conservation in the State and build on the Draft Flora and Fauna Guarantee Strategy (1992). The Strategy (1997) pays direct attention to urban areas and urban fringes and states three key management approaches for these areas, which are to

1. Assist local government, developers, communities and urban infrastructure providers to protect and manage sites of significance
2. Promote and facilitate urban community involvement in the stewardship of biodiversity values
3. Focus resources on the more ecologically viable remnant habitats in urban and urban fringe areas that are highly valued by the community and vital for biodiversity.

Victoria's Biodiversity Strategy 2010-2015 Biodiversity is Everybody's Business (DSE 2010) has been released for public consultation. In renewing the 1997 Biodiversity Strategy, this document addresses emerging issues and priorities such as climate change, marine biodiversity, fire management, indigenous values and capacity and focuses on improving implementation and effective monitoring, evaluation and reporting.

Further plans, guidelines and practice fact sheets on biodiversity related issues include

- Biodiversity Action planning for native biodiversity at multiple scales—catchment, bioregional, landscape, local (2002)
- Victorian Planning Provision Practice Notes (2002)
- Biodiversity Status and conditions report (2007)
- On Borrowed Time—Australia's environmental crisis and what we must do about it (2007)
- Actions for Biodiversity Conservation (2009)
- Securing our Natural Future, White Paper for Land and Biodiversity at a Time of Climate Change (2009).

Further guidelines on the management of native vegetation include

- Revegetation Guide for the Goulburn Broken (2001)
- Managing native vegetation in the planning system (2008)
- Native vegetation offsets (2008)
- Buildings and native vegetation removal (2009)
- Farming and native vegetation removal (2009).

Other Victorian Government Acts and Strategies relevant to the Murrindindi Environment Strategy

Acts

- *Country Fire Authority Act 1958*
- *Wildlife Act 1975*
- *Water Act 1989*
- *Heritage Rivers Act 1992*
- *Environment Protection (Enforcement and Penalties) Act 2000*
- *Water (Irrigation Farm Dams) Act 2002*
- *Victorian Renewable Energy Act 2006*
- *Energy Efficiency Target Act 2007.*

Strategies, regulations and plans

- SEPP Control of Music Noise from Public Premises (1989)
- SEPP Ambient Air Quality (1999)
- SEPP Air Quality Management (2001)
- Victorian Stormwater Action Program (Final Report) (2007)
- Environmental Protection (Residential Noise) Regulations (2008)
- Victorian Climate Change Green Paper (2009).

Summaries of major Commonwealth Acts, Strategies and Policies relevant to the Murrindindi Environment Strategy

Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999) provides protection for matters of national environmental significance including

- World Heritage properties
- Wetlands of international importance identified by the Ramsar Convention on Wetlands (1971)
- Nationally threatened animal and plant species and ecological communities
- Internationally protected migratory species
- Commonwealth marine areas
- Nuclear actions.

The *EPBC Act 1999* also protects the environment on Commonwealth land and regulates those actions of Commonwealth departments and agencies that may have a significant impact on the environment. It aims to establish a streamlined environmental assessment process by

- Clarifying Commonwealth Government involvement
- Developing bilateral agreements, which will accredit State assessment processes and decisions
- Allowing a person or organisation responsible for a project to trigger the assessment process early in the planning phase and confirm if the *Act* is applicable
- Setting clear time frames for decisionmaking.

The *EPBC Act 1999* also formally requires the relevant Minister or Ministers to take into account the need to integrate environmental, economic and social considerations when considering project proposals.

National Local Government Biodiversity Strategy (1999)

The Australian Local Government Association prepared the National Local Government Biodiversity Strategy in 1999. The Strategy represents an agreed local government position at the national level on the management of our biodiversity. The National Local Government Biodiversity Strategy addresses and identifies relevant actions for five key issues including

1. Awareness, training and education
2. Local government resourcing
3. Regional partnerships and planning
4. Legislative frameworks
5. Information and monitoring.

The National Local Government Biodiversity Strategy recognises that local government can play roles in

- Conservation of native vegetation, including off-reserve conservation
- Implementation of national policies at a local level
- Local planning and environmental management
- Pollution control
- Rehabilitation of degraded areas
- Standards of land management
- Urban conservation
- Weed eradication.

National Weeds Strategy (1999, 2006)

This strategy has eight objectives.

1. Prevent the introduction of new plant species with weed potential.
2. Ensure early detection of, and rapid action against, new weed problems.
3. Reduce weed spread to new areas within Australia.
4. Facilitate the identification and assessment of weed problems of national significance.
5. Deal with established weed problems of national significance through integrated and cost-effective weed management.
6. Strengthen the national research, education and training capacity to ensure ongoing cost-effective, efficient and sustainable weed management.
7. Encourage the development of strategic plans for weed management at all levels, with input from all stakeholders.
8. Establish institutional arrangements to ensure ongoing coordinated management of weed problems of national significance.

The environmental, social and economic impacts of weeds are further examined in the Australian Weeds Strategy 2006, and a national weed awareness action plan further determines the detailed goals and actions to prevent further weed spread and new weed problems.

National Greenhouse Strategy (1998)

Australia established a National Greenhouse Strategy in 1998. The Australian Greenhouse Program aims to restrict growth in emissions to 8% for the first reporting phase of the Kyoto Protocol (2008–2012). A number of 'Early Actions' have been developed. These include

- Greenhouse Challenge—a voluntary industry program
- Greenhouse Allies—a small business partnership program
- Cities for Climate Protection—part of an international voluntary local government program)
- Household Greenhouse Action—sustainable partnerships in the household area.

Murrindindi Shire Council is a participant in the Cities for Climate Protection (CCP) and has completed the first two milestones, as described in the Introduction of this Murrindindi Environment Strategy.

National Soil Conservation Strategy (1998)

The aim of the National Soil Conservation Strategy is to conserve soil resources to prevent further soil loss and land degradation and sustain economic and environmental utility. The main elements are developing community support; resource evaluation; land use planning; research and extension; encouraging cooperation and coordination; developing appropriate organisations, remedial and preventive programs; and introduction of legislation and policies.

Priority actions within the strategy include

- Establish coordinating mechanisms between soil conservation and land use planning agencies, including local government, to ensure that land capability assessment is used as a basis for planning the use of land and water resources, including farm planning
- Encourage land use planning agencies to recognise the interdependence of land use and catchment management
- Incorporate soil conservation principles, including property and catchment planning, into all advice provided to land users regarding the use and management of land
- Encourage the retention of native vegetation, selective tree planting, natural regeneration and afforestation of land
- Improve coordination between government departments and tiers to address the potential land degradation impacts of new policies and programs at the planning stage.

Wetlands Policy of the Commonwealth Government of Australia (1997)

This policy was established in response to the Ramsar Convention on Wetlands (1971). It includes strategies in six main areas.

1. Managing wetlands
2. Implementing policies and legislation and delivering programs
3. Involving the Australian people
4. Working in partnership with State, Territory and local governments
5. Science
6. International actions.

The *Environment Protection and Biodiversity Conservation Act 1999* provides legislative protection for wetlands identified by the Ramsar Convention on Wetlands (1971), and migratory species. A set of criteria for determining nationally important wetlands has also been established.

National Strategy for the Conservation of Australia's Biological Diversity (1996)

This strategy considers biological diversity at genetic, species and ecosystem levels. Under the overall goal to protect biological diversity and maintain ecological processes and systems, the strategy lays out principles and objectives including

- Biological diversity is best conserved in situ.
- Although all levels of government have clear responsibility, the cooperation of conservation groups, resource users, Indigenous peoples and the community in general is critical to the conservation of biological diversity.
- It is vital to anticipate, prevent and attack at source the causes of significant reduction or loss of biological diversity.
- Lack of full knowledge should not be an excuse for postponing action to conserve biological diversity.

National Strategy for Ecologically Sustainable Development (1992)

This strategy defined ecologically sustainable development as using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained; and the total quality of life, now and in the future, can be increased. The strategy established seven guiding principles.

1. Decisionmaking processes should effectively integrate both long- and short-term economic, environmental, social and equity considerations.
2. Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
3. The global dimension of environmental impacts of actions and policies should be recognised and considered.
4. The need to develop a strong, growing and diversified economy that can enhance the capacity for environmental protection should be recognised.
5. The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised.
6. Cost-effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms.
7. Decisions and actions should provide for broad community involvement on issues that affect them.

Building Code of Australia (2006)

The Australian Federal Government, in agreement with the building sector, has resolved to eliminate the worst energy performance practices through a national standard approach to minimum performance requirements for buildings. First introduced in 1990 (BCA90) and further refined to a performance-based code in 1996, the national Building Code of Australia (BCA) is the natural place to recommend minimum energy requirements of new buildings and major refurbishments. Following extensive consultation, energy efficiency measures were introduced in January 2003, and the BCA has now been amended to include energy efficiency measures for all building classifications. This inclusion of energy efficiency measures is part of a comprehensive strategy being undertaken by the Australian, State and Territory governments to reduce greenhouse gas emissions. New energy efficiency measures to the Building Code were introduced in 2006 for buildings of classes 5 to 9.

On 11 March 2009, Victoria adopted Australian Standard AS 3959-2009 through amendments to its Building Regulations 2006 (Part I, s. 114) introducing bushfire construction requirements for residential buildings. According to this standard, Bushfire Attack Level (BAL) categories are now defined for each site ranging from low to extreme along with increasing construction requirements ranging from ember protection to direct flame contact protection.

Summaries of major International Conventions, Protocols and Agreements relevant to the Murrindindi Environment Strategy

Dates given on the protocols are when Australia ratified them, and are not necessarily the dates the protocols were framed.

Convention on Biological Diversity (1993)

The primary aims of the Convention on Biological Diversity (1993) are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising from the use of genetic resources.

The Convention emphasises in situ conservation measures, complemented by ex situ conservation. It contains measures on the identification and monitoring of important components of biological diversity, the establishment and management of protected areas and sustainable management of biological resources both within and outside protected areas.

In addition, the Convention addresses the rehabilitation and restoration of degraded ecosystems, recovery of threatened species, control of pest species, control of threatening processes and activities, involvement of Indigenous and local communities, sustainable customary use of biological resources and research and training.

Australia ratified the Convention on Biological Diversity in 1993 and established the National Strategy for the Conservation of Australia's Biological Diversity in 1996.

United Nations Framework Convention on Climate Change (1992)

The objective of the Framework Convention on Climate Change (FCCC) is to stabilise greenhouse gas concentrations in the atmosphere at levels that would prevent dangerous human-induced interference with the climate system.

The FCCC's Inter-governmental Panel on Climate Change has advised that emission levels need to be reduced by 50–60% on 1990 levels. However, the FCCC's Kyoto Protocol in December 1997 provided a commitment by developed countries to reduce their collective emissions by an average of 5.2% on 1990 levels by 2008–12.

Australia signed the FCCC in June 1992 and ratified it in December 1992. Uniquely within the Kyoto Protocol, Australia negotiated an 8% increase in emissions. Australia ratified the Kyoto Protocol in December 2008.

Agenda 21 (1992)

At its 1992 meeting in Rio de Janeiro, Brazil, the United Nations Conference on Environment and Development (UNCED) adopted the Agenda 21 program of action, which called for the establishment of the Commission on Sustainable Development (CSD). In June 1997, the United Nations General Assembly reviewed the overall progress achieved in the implementation of Agenda 21 and produced a second five-year work program for the CSD, focusing on gaps in the current international environmental agenda.

Australia participated actively at Rio de Janeiro and was a member of the CSD from its inception in 1993 until 1998. As a functional commission of the UN Economic and Social Council (ECOSOC), the CSD has 53 member States, whereby about one third of the members are elected each year. Currently, Australia is a member until 2012.

Montreal Protocol on Substances that Deplete the Ozone Layer (1987, amended version of 1990)

In March 1985, the Vienna Convention for the Protection of the Ozone Layer was adopted. Following agreement that phase-out targets were necessary to curb the increasing use of ozone-depleting substances, the Montreal Protocol on Substances that Deplete the Ozone Layer was finalised in September 1987. The Montreal Protocol set out a mandatory timetable for phasing out ozone depleting substances. This timetable has been under constant revision, with phase-out dates accelerated along with scientific understanding and technological advances.

Scientific evidence indicates that the controls set out in the Protocol are starting to slow the rate of ozone-depleting substances entering the atmosphere. If parties continue to meet their obligations under the Protocol, it is hoped that the upper atmosphere ozone depletion will stabilise by about the 2000 and recover by about 2040. However, recent research has shown that effects of global climate change on the upper atmosphere may be interfering with restoration of the ozone layer.

The Montreal Protocol is one of the most successful multilateral environment agreements in force. Australia is a party to the Montreal Protocol. The Australian Environment Council produced the Strategy for Ozone Protection in 1989 that intended to phase out all ozone-depleting substances by 1998.

Bonn Convention on Conservation of Migratory Species of Wild Animals (1979)

The Convention on the Conservation of Migratory Species of Wild Animals (CMS), or the Bonn Convention, aims to conserve terrestrial, marine and avian migratory species throughout their ranges.

Parties to the Bonn Convention work together to conserve migratory species and their habitats. Parties provide strict protection for the endangered migratory species listed in appendix I of the Convention, conclude multilateral agreements for the conservation and management of migratory species listed in appendix II of the Convention and undertake cooperative research activities.

Ramsar Convention (1971, amended version 1994)

The Convention on Wetlands of International Importance, or the Ramsar Convention, established criteria for identifying whether a wetland is of international importance and guidelines for applying the criteria and for 'Wise Use' of wetlands. Party countries to the Convention promote wetland conservation through actions such as

- Completing wetland inventories and promoting the wise use of all wetlands within their territory
- Nominating specific sites to the List of Wetlands of International Importance, and managing these sites to ensure that they retain their special ecological characteristics
- Promoting capacity building and technology transfer through the training of wetland managers
- Consulting among each other, particularly in the case of shared wetlands, water systems and resources such as migratory waterbirds.

Australia was the first country to sign the Ramsar Convention, which now has 118 contracting parties.

Japan–Australia (1981) and China–Australia (1988) Migratory Birds Agreements

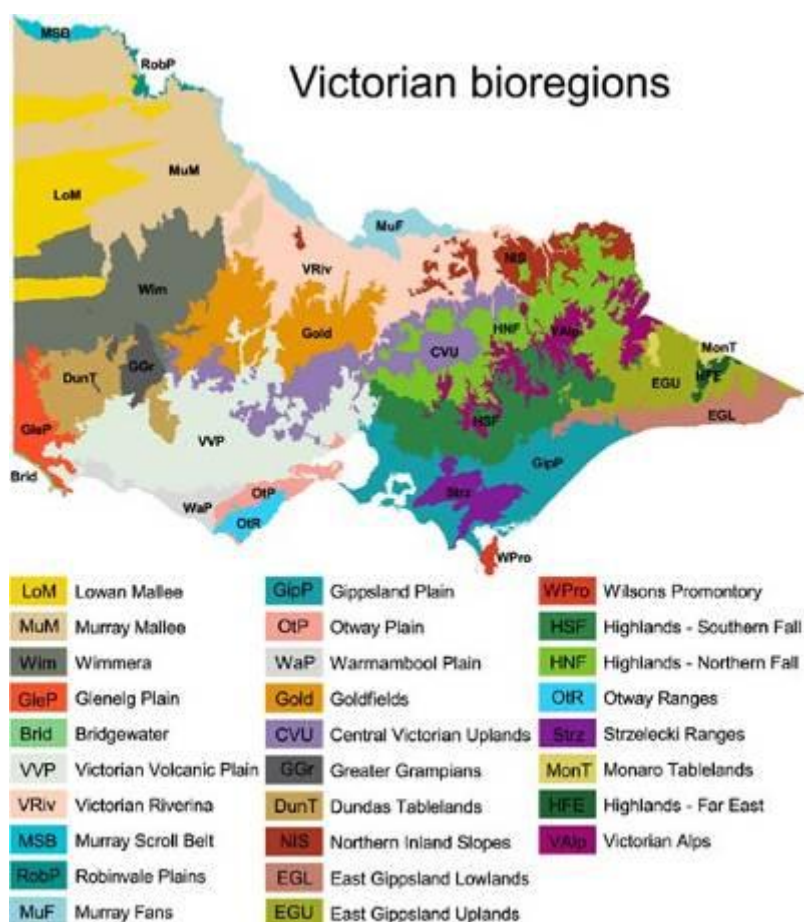
Australia has established bilateral agreements with Japan (JAMBA, 1981) and China (CAMBA, 1988) for the protection of bird species that migrate to and from these countries.

Appendix 2 Biodiversity-related background information

Bioregions and Ecological Vegetation Classes in Murrindindi Shire

Bioregions in Victoria

The State of Victoria includes the following 28 bioregions, as presented in Figure A3.



Source: Department of Sustainability and Environment (2008)

Figure A 3 Bioregions of Victoria

Murrindindi Shire is comprised of four Bioregions (DSE 2008).

1. Central Victorian Uplands are dominated by Lower Palaeozoic deposits, giving rise to dissected uplands at higher elevations. Low-lying corridors of valleys and plains are dominated by Plains Grassy Woodland and Valley Grassy Forest ecosystems (families of EVCs) on the fertile plains. Grassy Woodland and Floodplain Riparian Woodland ecosystems dominate on the river courses and Herb-rich Foothill Forest and Shrubby Foothill Forest dominate ecosystems on the more fertile slopes with outwash. Granitic and sedimentary (with Tertiary colluvial aprons) terrains, along with metamorphic and old volcanic rocks have formed steeply sloped peaks and ridges.

These less fertile hills support Grassy Dry Forest and Heathy Dry Forest ecosystems. Cainozoic deposits from the newer volcanic flows have infilled some of the old long valley floors. Relatively poor soils on the non-volcanic material are dominated by yellow texture contrast soils (Chromosols and Kurosols) and a mixture of texture contrast soils (Chromosols) and red friable earths (Ferrosols) on the volcanic terrain.

2. Highlands–Northern Fall is the northerly aspect of the Great Dividing Range. These dissected uplands have moderate to steep slopes, high plateaus and alluvial flats along the main valleys. The geology predominantly consists of Palaeozoic sediments, intrusive volcanics (granitic material) and extrusive volcanics (acid volcanics such as rhyolite). Brown and red porous earths (Dermosols) occur in the upper reaches and yellow and red texture contrast soils (Chromosols and Kurosols) graduate down the valleys.

The vegetation is a mosaic of Herb-rich Foothill Forest and Shrubby Dry ecosystems dominating large areas of lower slopes, Montane Dry Woodland and Heathy Dry Forest ecosystems on the upper slopes and plateaus and Grassy Dry Forest and Valley Grassy Forest ecosystems associated with major river valleys.

3. Highlands–Southern Fall is a bioregion comprising the southerly aspect of the Great Dividing Range. These dissected uplands have moderate to steep slopes, high plateaus and alluvial flats along the main valleys. The geology predominantly consists of Palaeozoic sediments, intrusive volcanics and extrusive volcanics. Dermosols occur in the upper reaches and Chromosols and Kurosols graduate down the valleys.

The dominant vegetation is Shrubby Dry Forest and Damp Forest on the upper slopes; Wet Forest ecosystems in the valleys; and Montane Dry Woodland, Montane Damp Forest and Montane Wet Forest ecosystems at higher altitudes.

4. Victorian Alps is a bioregion consisting of high plateaus and peaks along the Great Dividing Range. The Palaeozoic deposits predominantly of granitic and basaltic origin give rise to friable leached earths, loams and peaty soils (Tenosols and Organosols).

The vegetation associated with the subalpine plateaus is comprised of Sub-alpine Woodland, Treeless Sub-alpine Mosaic and Sub-alpine Grassland ecosystems. The upper slopes and surrounding sub-alpine areas are dominated by Montane Dry Woodland, Montane Damp Forest, Montane Wet Forest and Montane Grassy Woodland ecosystems.

Ecological Vegetation Classes in Murrindindi Shire

Murrindindi Shire contains seventeen Ecological Vegetation Classes, each with an identifying number. For simplicity, the EVCs are grouped in Figure A4.

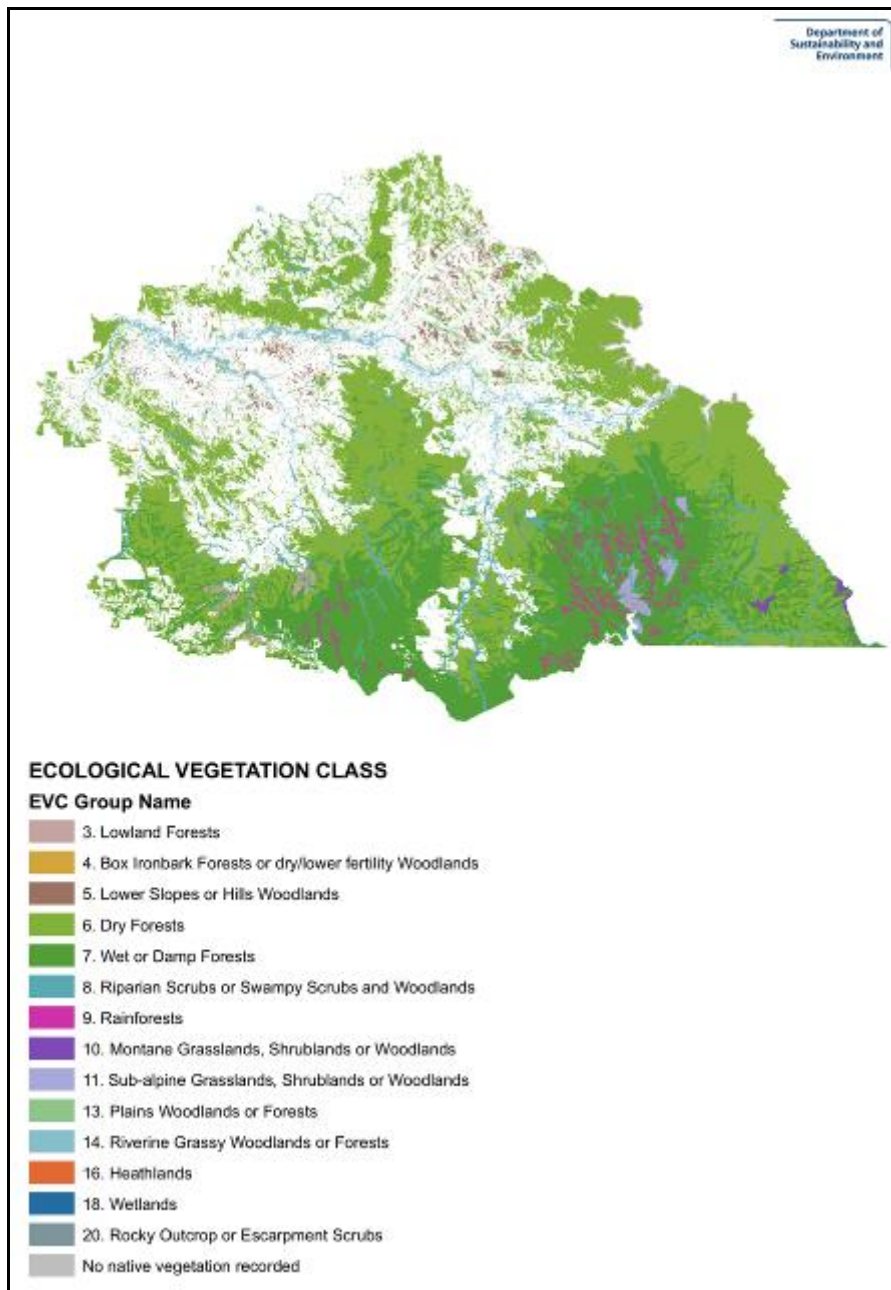


Figure A 4 Groups of Ecological Vegetation Classes in Murrindindi Shire

Ecological Communities listed under the EPBC Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999) lists communities for protection.

Alpine Sphagnum Bogs and Associated Fens

Listed as endangered effective 7 January 2009, Alpine Sphagnum Bogs and Associated Fens is an ecological community usually defined by the presence of *Sphagnum* spp. covering more than 30% of the ground. Bogs form with a good supply of groundwater and an impeded drainage system, keeping the water table at or near the surface. In bogs the decomposition of organic material is incomplete, forming the peat that underlies the Alpine Sphagnum Bogs and Associated Fens ecological community. Found in alpine, subalpine and montane environments, Alpine Sphagnum Bogs and Associated Fens are often located above the climatic tree line (at 10°C isotherm, average summer temperatures). In Victoria, Alpine Sphagnum Bogs and Associated Fens ecological communities exist at 1200 m above sea level.

Under the Victorian *Flora and Fauna Guarantee Act 1988* the Alpine Bog Community and Fen (Bog Pool) Community have been listed as two components of the Alpine Sphagnum Bogs and Associated Fens ecological community (DEWHA 2008).

Sphagnum contributes greatly to peat formation; both have significant water-holding capacities. The gradual release of water from melting spring snow allows many other ecological communities to survive, and the water-holding capacity of sphagnum and peat also reduces the risk of soil erosion. Similarly, sphagnum acts as a filter of nutrients, pathogens and sediments, thus maintaining high downstream water quality. The biggest threats to these ecological communities are fire and impacts drought and climate change, exotic weed invasion, grazing and trampling by non-native animals, tourism and related human infrastructure (Threatened Species Scientific Committee 2008).

White Box–Yellow Box–Blakely’s Red Gum grassy woodlands and derived native grasslands

This ecological community occurs either as woodland or derived grassland, which is grassy woodland from which the trees have been removed. Where tree layer still occurs, white box *Eucalyptus albens*, yellow box *E. melliodora* or Blakely’s red gum *E. blakelyi* are the dominating species. Over 400 plant species have been recorded in this ecological community. The ground layer consists of native tussock grasses and herbs such as sedges, pea plants, daisies and lilies. Kangaroo Grass *Themeda triandra* and snow grass *Poa siberiana* were originally the dominant grasses. Although these grasses were formerly widespread from Southern Queensland through western New South Wales, the Australian Capital Territory and Victoria, less than 5% remain in good condition, mostly in small isolated patches. Clearing, overgrazing and weed invasion are a continuous threat to this ecological community (DEWHA 2006).

Listed flora and fauna in Murrindindi Shire

Threatened species are listed under various legislations as a step toward protecting them.

Listed flora

National Conservation Status *EPBC Act 1999* listing

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act 1999*) lists threatened species and threatened ecological communities. The assessment of threatened species under the *EPBC Act 1999* is the first step to promoting their recovery under Commonwealth law. Once a species is listed under the *EPBC Act 1999* their recovery is promoted using Recovery and Threat Abatement Plans. The sub-categories are

X—Considered to be extinct

CE—Critically endangered

E—Endangered

V—Vulnerable

Victorian Conservation Status (VCS)

DSE botanists record whether species are rare or threatened within Victoria. There are five initial subcategories in this list.

x—The species is considered to be **extinct** in Victoria. The species has not been recorded in Victoria for many years, despite searches in areas where they were known to grow.

e—The species is considered to be **endangered** in Victoria. The species is at risk of disappearing from the wild if present land-use and other causes continue.

v—The species is considered to be **vulnerable** in Victoria. The species is not presently endangered but likely to become so soon because of continued depletion, or it occurs mainly on sites likely to experience changes in land-use which could threaten its survival in the wild, or its total populations are so low that recovery from local disturbance would be unlikely.

r—The species is considered to be **rare** in Victoria but not considered otherwise threatened. The species is not necessarily substantially threatened, but there are relatively few known stands.

k—The status of the species is **poorly known** in Victoria. The species is suspected, but not definitely known, to belong to categories r, v or e.

Flora and Fauna Guarantee Act 1998 listing

All indigenous species are protected under Victoria's *Flora and Fauna Guarantee Act 1988 (FFG Act 1988)*. The *FFG Act 1988* is the main legislation in Victoria for protecting threatened species. Under this *Act* species, ecological communities and potentially threatening processes are listed on Schedules by the Governor in Council (who is the decision maker) after a process of nomination, assessment and recommendation by an independent Scientific Advisory Committee.

Listing under the *FFG Act 1988* provides at least some legally enforceable control over removing or damaging populations of species, and that there will be a plan of management prepared by DSE for their long-term conservation. A further classification is added.

f—The species is listed under the *Flora and Fauna Guarantee Act 1988*.

The DSE lists the Victorian Conservation Status (VCS) for the flora grouped by class and family in the following table.

Table A 1 Flora recorded in Murrindindi by status of threat (DSE 2007)

FFG ¹	EPBC ²	VCS ³	Scientific name	Common name
DYCOTYLEDONS				
Alseuosmiaceae				
		r	<i>Wittsteinia vacciniacea</i>	Baw berry
Apiaceae				
		r	<i>Xanthosia leiophylla</i>	Parsley xanthosia
Asteraceae				
		r	<i>Argyrotegium fordianum</i>	Alpine cudweed
		r	<i>Brachyscome obovata</i>	Baw Baw daisy
		r	<i>Brachyscome ptychocarpa</i>	Tiny daisy
		r	<i>Euchiton umbricola</i>	Cliff cudweed
		k	<i>Olearia speciosa</i>	Netted daisy-bush
Brassicaceae				
		v	<i>Cardamine lilacina</i> ssp.	Lilac bitter-cress
Campanulaceae				
		k	<i>Hypsela tridens</i>	Hypsela
Elaeocarpaceae				
		r	<i>Tetratheca stenocarpa</i>	Long pink-bells
Ericaceae				
		r	<i>Epacris microphylla</i> var. <i>rhombofolia</i>	Mountain coral heath
		r	<i>Epacris petrophila</i>	Snow heath
f		e	<i>Gaultheria hispida</i>	Snow berry
		r	<i>Richea victoriana</i>	Serpent heath
		r	<i>Trochocarpa clarkei</i>	Lilac berry
Fabaceae				
		r	<i>Bossiaea cordigera</i>	Wiry bossiaea
		r	<i>Bossiaea riparia</i>	River leafless bossiaea
		k	<i>Desmodium varians</i>	Slender tick-trefoil
		r	<i>Goodia lotifolia</i> var. <i>pubescens</i>	Silky golden-tip
		r	<i>Goodia medicaginea</i>	Western golden-tip
		k	<i>Lotus australis</i> var. <i>australis</i>	Austral trefoil
		r	<i>Pultenaea fasciculata</i>	Alpine bush-pea
		r	<i>Pultenaea weindorferi</i>	Swamp bush-pea
		r	<i>Pultenaea williamsonii</i>	Highland bush-pea

Mimosaceae				
		r	<i>Acacia alpina</i>	Alpine wattle
		r	<i>Acacia leprosa</i> (large phyllode variant)	Large-leaf cinnamon wattle
		r	<i>Acacia nano-dealbata</i>	Dwarf silver wattle
Myrtaceae				
		r	<i>Baeckea latifolia</i>	Subalpine baeckea
		v	<i>Corymbia maculata</i>	Spotted gum
		r	<i>Eucalyptus alligatrix</i>	Silver stringybark
		r	<i>Eucalyptus alligatrix</i> ssp. <i>alligatrix</i>	Silver stringybark
f	E	e	<i>Eucalyptus crenulata</i>	Buxton gum
		r	<i>Eucalyptus fulgens</i>	Green scentbark
		r	<i>Eucalyptus neglecta</i>	Omeo gum
		r	<i>Eucalyptus perriniana</i>	Spinning gum
		r	<i>Eucalyptus yarraensis</i>	Yarra gum
Onagraceae				
		r	<i>Epilobium curtisiae</i>	Bald-seeded willow-herb
Oxalidaceae				
		r	<i>Oxalis magellanica</i>	Snowdrop wood-sorrel
Proteaceae				
		r	<i>Grevillea monslacana</i>	Lake Mountain grevillea
		r	<i>Grevillea repens</i>	Creeping grevillea
		r	<i>Grevillea victoriae</i> ss	Royal grevillea
		r	<i>Grevillea victoriae</i> ssp. <i>victoriae</i>	Royal grevillea
MOSESSES				
Dicranaceae				
		r	<i>Dicranoloma platycaulon</i>	Fork moss
Fissidentaceae				
		k	<i>Fissidens integerrimus</i>	Pocket-moss
		r	<i>Fissidens strictus</i>	Water pocket-moss
Grimmiaceae				
		k	<i>Racomitrium pruinosum</i>	Hoary fringe-moss
Hookeriaceae				
		r	<i>Calyptrochaeta brownii</i>	Brown's mitre-moss
		r	<i>Distichophyllum crispulum</i>	Crisped mitre-moss
Leucobryaceae				
		k	<i>Campylopus fragilis</i>	Swan-neck moss
Ptychomniaceae				
		r	<i>Hampeella alaris</i>	Arc moss
		r	<i>Hampeella pallens</i>	Arc moss
Trachylomataceae				
		r	<i>Trachyloma planifolium</i>	Trachyloma
LIVERWORTS				
Metzgeriaceae				
		k	<i>Metzgeria fauriana</i>	Fringed veilwort
Plagiochilaceae				
f		v	<i>Pedinophyllum monoicum</i>	Southern pedinophyllum
FERNS AND ALLIES				
Adiantaceae				
		k	<i>Pellaea calidirupium</i>	Inland sickle-fern
		r	<i>Pellaea nana</i>	Dwarf sickle-fern
Lycopodiaceae				
		r	<i>Huperzia australiana</i>	Fir clubmoss
Ophioglossaceae				
f		v	<i>Botrychium australe</i>	Austral moonwort
Pteridaceae				
		r	<i>Pteris comans</i>	Netted brake

MONOCOTYLEDONS				
Cyperaceae				
		k	<i>Bolboschoenus fluviatilis</i>	Tall club-sedge
		r	<i>Carex alsophila</i>	Forest sedge
		r	<i>Carex blakei</i>	Alpine sedge
		k	<i>Fimbristylis aestivalis</i>	Summer fringe-sedge
		r	<i>Oreobolus oxycarpus</i> ssp. <i>oxycarpus</i>	Tuft-rush
Eriocaulaceae				
		r	<i>Eriocaulon scariosum</i>	Common pipewort
Hemerocallidaceae				
		r	<i>Herpolirion novae-zelandiae</i>	Sky lily
Hypoxidaceae				
		k	<i>Hypoxis vaginata</i> var. <i>brevistigmata</i>	Yellow star
Orchidaceae				
f	V	e	<i>Caladenia concolor</i>	Crimson spider-orchid
		v	<i>Caladenia oenochila</i>	Wine-lipped spider-orchid
		k	<i>Calochilus therophilus</i>	Slender beard-orchid
		r	<i>Chiloglottis</i> × <i>pescottiana</i>	Bronze bird-orchid
f		v	<i>Diuris punctata</i> var. <i>punctata</i>	Purple diuris
		r	<i>Diuris</i> × <i>palachila</i>	Broad-lip diuris
		v	<i>Prasophyllum lindleyanum</i>	Green leek-orchid
Poaceae				
		k	<i>Poa siberiana</i> var. <i>cyanophylla</i>	Blue-leaf tussock-grass
		r	<i>Tetrarrhena turfosa</i>	Smooth rice-grass
Proteaceae				
		v	<i>Persoonia arborea</i>	Tree geebung
Ranunculaceae				
		r	<i>Ranunculus collinus</i>	Strawberry buttercup
Rhamnaceae				
F		r	<i>Discaria pubescens</i>	Australian anchor plant
		r	<i>Pomaderris aurea</i>	Golden pomaderris
		r	<i>Pomaderris helianthemifolia</i> ssp. <i>minor</i>	Blunt-leaf pomaderris
		v	<i>Pomaderris vacciniifolia</i>	Round-leaf pomaderris
Rutaceae				
		r	<i>Leionema bilobum</i> ssp. 3 (<i>West Gippsland</i>)	Toothed leionema
		r	<i>Phebalium squamulosum</i> ssp. <i>ozothamnoides</i>	Mountain phebalium
Veronicaceae				
		r	<i>Derwentia nivea</i>	Milfoil speedwell
Winteraceae				
		r	<i>Tasmania vickeriana</i>	Baw Baw pepper

¹FFG, listing under the Victorian *Flora and Fauna Guarantee Act 1988*

²EBPC, listing under the Victorian *Environment Protection Act 1970*

³VCS, Victorian Conservation Status listing.

Listed fauna

Threatened species are listed under various legislations as a step toward protecting them.

National Conservation Status *EPBC Act 1999* listing

The *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act 1999*) lists threatened species and threatened ecological communities. The assessment of threatened species under the *EPBC Act 1999* is the first step to promoting their recovery under Commonwealth law. Once a species is listed under the *Act* their recovery is promoted using Recovery and Threat Abatement Plans. Species are classified according to

CE—Critically endangered

E—Endangered

V—Vulnerable

Victorian Conservation Status

DSE zoologists record whether species are rare or threatened within Victoria. Sub-categories in this list are

x—The species is considered to be **extinct** in Victoria. The species has not been recorded in Victoria for many years, despite searches in areas where they were known to exist.

c—The species is considered to be **critically endangered** in Victoria. The species is rare and at immediate risk of disappearing from the wild if present land-use and other causes continue.

e—The species is considered to be **endangered** in Victoria. The species is rare and at risk of disappearing from the wild if present land-use and other causes continue.

v—The species is considered to be **vulnerable** in Victoria. The species is not presently endangered but likely to become so soon due to continued depletion, or it occurs mainly on sites likely to experience changes in land-use which could threaten the survival of the species in the wild, or its total populations are so low that recovery from local disturbance would be unlikely.

n—The species is considered to be **near threatened** in Victoria. The species is rare in Victoria and at a lower risk than vulnerable but still of concern. It may move into a higher category if its numbers decline.

d—The status of the species is uncertain and is thus categorised as **data deficient** in Victoria. The species is thought to be at risk but its ecology and distribution are not well-enough known for it to be placed in any of the above categories.

Flora and Fauna Guarantee Act 1998 listing

All indigenous species are protected under Victoria's *Flora and Fauna Guarantee Act 1988 (FFG Act 1988)*. The *FFG Act 1988* is the main legislation in Victoria for protecting threatened species. Under this *Act*, species, ecological communities and potentially threatening processes are listed on Schedules by the Governor in Council (who is the decisionmaker) after a process of nomination, assessment and recommendation by an independent Scientific Advisory Committee. A further classification is added.

f—The species is listed under *Flora and Fauna Guarantee Act 1988* s. 2.

The DSE lists the Victorian Conservation Status for the fauna grouped by class and family in the following table.

Table A 2 Fauna recorded in Murrindindi by status of threat (DSE 2007)

FFG ¹	EPBC ²	VCS ³	Scientific name	Common name
MAMMALS				
Burramyidae				
		n	<i>Cercartetus nanus</i>	Eastern pigmy possum
Dasyuridae				
F		v	<i>Phascogale tapoatafa</i>	Brush-tailed phascogale
F	E	e	<i>Dasyurus maculatus</i>	Spotted-tailed quoll
F		n	<i>Sminthopsis leucopus</i>	White-footed dunnart
Muridae				
		d	<i>Mastacomys fuscus</i>	Broad-toothed rat
F	E	c	<i>Pseudomys fumeus</i>	Smokey mouse
Petauridae				
F	E	E	<i>Gymnobelideus leadbeateri</i>	Leadbeater's possum
Rhinolophidae				
F		v	<i>Rhinolophus megaphyllus</i>	Eastern horseshoe bat
Vespertilionidae				
F			<i>Miniopterus schreibersii</i> (group)	Common bent-wing Bat
		n	<i>Myotis macropus</i>	Southern myotis
BIRDS				
Accipitridae				
F		v	<i>Accipiter novaehollandiae</i>	Grey goshawk
		n	<i>Circus assimilis</i>	Spotted harrier
F		v	<i>Lophoictinia isura</i>	Square-tailed kite
F		v	<i>Haliaeetus leucogaster</i>	White-bellied sea-eagle
Alcedinidae				
		n	<i>Alcedo azurea</i>	Azure kingfisher
Anatidae				
		v	<i>Anas rhynchotis</i>	Australasian shoveler
F		e	<i>Oxyura australis</i>	Blue-billed duck
		v	<i>Aythya australis</i>	Hardhead
		v	<i>Biziura lobata</i>	Musk duck
Anseranatidae				
F		n	<i>Anseranas semipalmata</i>	Magpie goose
Apodidae				
			<i>Apus pacificus</i>	Fork-tailed swift
			<i>Hirundapus caudacutus</i>	White-throated needletail
Ardeidae				
			<i>Ardea ibis</i>	Cattle egret

F		v	<i>Ardea modesta</i>	Eastern great egret
F		e	<i>Ixobrychus minutus</i>	Little bittern
F		e	<i>Egretta garzetta</i>	Little egret
		n	<i>Nycticorax caledonicus</i>	Nankeen night heron
Cinclosomatidae				
		n	<i>Cinclosoma punctatum</i>	Spotted quail-thrush
Climacteridae				
		n	<i>Climacteris picumnus victoriae</i>	Brown treecreeper (south-eastern ssp.)
Cuculidae				
		n	<i>Chrysococcyx osculans</i>	Black-eared cuckoo
Meliphagidae				
		n	<i>Melithreptus gularis</i>	Black-chinned honeyeater
F	E	c	<i>Lichenostomus melanops cassidix</i>	Helmeted honeyeater
F	E	c	<i>Anthochaera phrygia</i>	Regent honeyeater
Pardalotidae				
F		v	<i>Calamanthus pyrrhopygius</i>	Chestnut-rumped heath wren
F		v	<i>Pyrrholaemus sagittatus</i>	Speckled warbler
Passeridae				
F		v	<i>Stagonopleura guttata</i>	Diamond firetail
Petroicidae				
F		n	<i>Melanodryas cucullata</i>	Hooded robin
Phalacrocoracidae				
		n	<i>Phalacrocorax varius</i>	Pied cormorant
Phasianidae				
		n	<i>Coturnix ypsilophora</i>	Brown quail
Psittacidae				
F	E	e	<i>Lathamus discolor</i>	Swift parrot
F		n	<i>Neophema pulchella</i>	Turquoise parrot
Rallidae				
F		v	<i>Lewinia pectoralis</i>	Lewin's rail
Scolopacidae				
			<i>Limosa lapponica</i>	Bar-tailed godwit
		n	<i>Gallinago hardwickii</i>	Latham's snipe
Strigidae				
F		e	<i>Ninox connivens</i>	Barking owl
F		v	<i>Ninox strenua</i>	Powerful owl
Threskiornithidae				
		n	<i>Plegadis falcinellus</i>	Glossy ibis
		v	<i>Platalea regia</i>	Royal spoonbill
Turnicidae				
		N	<i>Turnix velox</i>	Little button-quail
Tytonidae				
F		e	<i>Tyto novaehollandiae</i>	Masked owl
F		e	<i>Tyto tenebricosa</i>	Sooty owl
REPTILES				
Agamidae				
		d	<i>Pogona barbata</i>	Bearded dragon
Chelidae				
F		d	<i>Emydura macquarii</i>	Murray River turtle
Pygopodidae				
F	V	e	<i>Delma impar</i>	Striped legless lizard
Scincidae				
F		e	<i>Pseudemoia cryodroma</i>	Alpine bog skink
		n	<i>Pseudemoia rawlinsoni</i>	Glossy grass skink
Varanidae				
		v	<i>Varanus varius</i>	Lace goanna
FROGS				

Hylidae				
F	V	c	<i>Litoria verreauxii alpina</i>	Alpine tree frog
F	V	e	<i>Litoria raniformis</i>	Growling grass frog
F	E	c	<i>Litoria spenceri</i>	Spotted tree frog
Myobatrachidae				
F		e	<i>Pseudophryne bibronii</i>	Brown toadlet
		d	<i>Pseudophryne dendyi</i>	Dendy's toadlet
		v	<i>Pseudophryne semimarmorata</i>	Southern toadlet
FISHES				
Gadopsidae				
		d	<i>Gadopsis marmoratus</i>	River blackfish
Galaxiidae				
F	E	c	<i>Galaxias fuscus</i>	Barred galaxia
Percichthyidae				
		v	<i>Macquaria ambigua</i>	Golden perch
F	E	e	<i>Macquaria australasica</i>	Macquarie perch
F	V	e	<i>Maccullochella peelii peelii</i>	Murray cod
INSECTS				
Hemiphlebiidae				
F	e		<i>Hemiphlebia mirabilis</i>	Damselfly
Limnephilidae				
F		r	<i>Archaeophylax canarus</i>	Caddisfly
Plectrotarsidae				
		d	<i>Plectrotarsus gravenhorstii</i>	Caddisfly
Unknown insect				
F	C	e	<i>Synemon plana</i>	Golden sunmoth
CRUSTACEANS				
Canthocamptidae				
		d	<i>Canthocamptus dedeckeri</i>	Harpacticoid copepod
		d	<i>Canthocamptus mammillifurca</i>	Harpacticoid copepod
Parastacidae				
F		d	<i>Euastacus armatus</i>	Murray spiny cray

¹FFG, listing under the Victorian *Flora and Fauna Guarantee Act 1988*

²EBPC, listing under the Victorian *Environment Protection Act 1970*

³VCS, Victorian Conservation Status listing.

Appendix 3 Water-related background information

Index of Stream Conditions

The Index of Stream Conditions (ISC) is an integrated measure of river health and is composed of five components (sub-indices)

1. Hydrology
2. Physical form
3. Streamside zone
4. Water quality
5. Aquatic life.

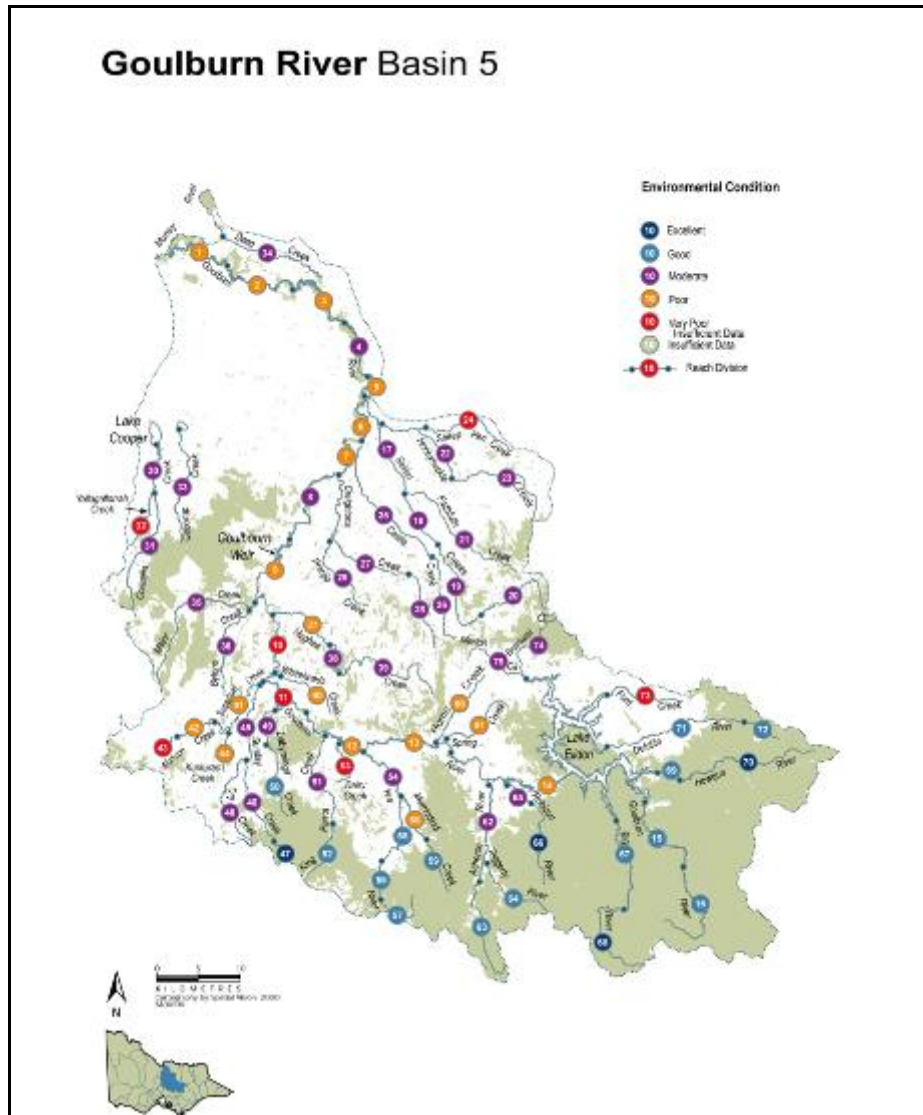
Each component (sub-index) is scored between 0 and 10 based on these indicators.

The sub-index scores are added to calculate the overall ISC score between 0 and 50. Higher scores indicate better conditions. It is not always possible to calculate the overall ISC score for each sub-index if data are incomplete. When a sub-index score is not available, it is not included and the overall ISC score is calculated based on a pro rata basis. At least three sub-index scores are required to allow the pro rata scores to be calculated (DSE, 2005). Table A 3 presents the sub-indices and overall ISC for waterways in the Shire of Murrindindi.

Table A 3 Index of Stream Condition for waterways in Murrindindi

Reach	Stream Name	Physical Form	Streamside Zone	Hydrology	Water Quality	Aquatic Life	Total	Condition
12	Goulburn River	5	6	0		3	13	poor
13	Goulburn River	5	5	0	9+	3+	15	poor
14	Goulburn River	3	4	1	9		16	poor
39	Hughes Creek	4	4	5			21	moderate
51	King Parrot Creek	3	5	7			22	moderate
52	King Parrot Creek	4	8	7	8	9	32	good
53	Dairy Creek	3	4	0			9	v poor
54	Yea River	4	5	5		6	24	moderate
55	Yea River	5	7	5		8	29	good
56	Yea River	5	9	5		10	32	good
57	Yea River	7	8	5			31	good
58	Murrindindi River	2	4	3			14	poor
59	Murrindindi River	6	7	3	9	10	29	good
60	Home Creek	2	3	4		9	17	poor
61	Spring Creek	3	3	4			16	poor
62	Archeron River	4	7	6		6	27	moderate
63	Archeron River	6	9	6			33	good
64	Taggerty River	6	8	7		10	36	good
65	Rubicon River	4	5	8		9	28	moderate
66	Rubicon River	8	8	8		10	41	excellent
67	Big River	5	7	10		10	36	good
68	Big River	6	10	10	10	9	42	excellent

Source: Victorian Water Resources (2004), excerpt of freely available Basin 5 Database ISC recordings for monitoring locations situated in Murrindindi Shire
Figure A 5 shows the stream conditions in the Goulburn River Basin according to a colour scheme. The numbering system refers to the reaches assessed.



Source: Victorian Water Resources (2004), excerpt of freely available Data Warehouse, Map Basin 5 Goulburn River

Figure A 5 Stream conditions in the Goulburn River Basin

Appendix 4 Human-induced climate change

This appendix summarises some issues surrounding greenhouse gases and climate change.

Earth's atmosphere

The Earth is surrounded by a thin atmosphere that allows light from the sun to pass through to the surface. Light is absorbed and converted to heat energy. This heat energy is then radiated back towards space. The atmosphere is made up of 78% nitrogen and 21% oxygen, which allow the heat to pass through. But the remaining 1% of the atmosphere contains a mixture of gases that absorb heat.

This effect warms the atmosphere, the Earth, and us. Because of this warming, the effect has become known as the greenhouse effect and the gases that absorb heat are called greenhouse gases. This is an analogy to greenhouses that are built to generate a warmer internal climate for growing plants.

Although less than 1% of the atmosphere is greenhouse gases, this small amount makes a big difference. The natural greenhouse effect raises the Earth's average temperature more than 30° to around 14° C and making life as we know it possible.

Atmospheric greenhouse gases

The most important greenhouse gases related to human activity are carbon dioxide, methane, nitrous oxide and halocarbons (EPA 2008). Water vapour and ozone are also greenhouse gases. Some of these greenhouse gases also occur naturally, and some are introduced only by human activity.

- Carbon dioxide (CO₂)—emitted when fossil fuels are burnt. Sources include burning coal for electricity generation, gas heating in industry and homes and burning oil-based fuels in transport. Emissions of CO₂ also occur when land is cleared because cleared vegetation is burnt and organic matter in the soil oxidises.
- Methane (CH₄)—emitted by agricultural activities including rice cultivation and the digestive processes of ruminant livestock like cattle; emitted during coal, oil and gas production as 'fugitive' emissions from mines and gas leakage from pipelines; and emitted from landfills and wastewater treatment.
- Nitrous oxide (N₂O)—emitted when fossil fuels and vegetation are burnt, and from agricultural activities related to the application of fertilisers and animal waste to soils.
- Sulphur hexafluoride (SF₆)—emitted by electricity transmission and distribution industries.

- Hydrofluorocarbons (HFCs), chlorofluorocarbons (CFCs) and perfluorocarbons (PFCs). HFCs and CFCs are emitted by the refrigeration and air conditioning industries. HFCs are replacements for CFCs in these industries because HFCs do not cause depletion of the ozone layer. CFCs are being phased out because they deplete the ozone layer in the stratosphere. (CFCs are separately controlled by the Montreal Protocol). Perfluorocarbons (PFCs) are emitted during aluminium production.
- Water vapour (H₂O)
- Ozone (O₃) in the troposphere, the lowest atmospheric layer.

Of most concern are carbon dioxide (because it takes more than 100 years to be removed from the atmosphere), methane and nitrous oxide.

Quantifying the heat trapping by greenhouse gases

Different greenhouse gases vary in how effectively they trap heat. The Global Warming Potential (GWP) quantifies the effectiveness of each gas relative to CO₂. Thus, the GWP for a 100-year horizon for carbon dioxide is set equal to one:

$$\text{GWP}(\text{CO}_2) = 1.$$

Some GWP values are methane, GWP = 21 and nitrous oxide, GWP = 310. For PFCs, GWP ranges from 6,500 to 9,200, and SF₆ is high at GWP = 23,900.

The GWP provides a way to compare and combine emissions of different greenhouse gases and to calculate total emissions in terms of CO₂ equivalent emissions.

For example, 100 tonnes of CO₂ and 1 tonne of CH₄ yield a total of 121 tonnes of CO₂-equivalent emissions where $[\text{CO}_2\text{-e} = (100 \times 1) + (1 \times 21) = 121]$.

Effects of increasing greenhouse gases

There is a body of scientific evidence that increasing the concentrations of greenhouse gases is leading to an increase in the world's average temperature, which will affect the climate.

Summaries from the CSIRO and the Australian Bureau of Meteorology for different catchments in Australia provide projections of climate-change related impacts for the Goulburn Broken Catchment (DSE 2008). Long-term temperature increases depend on how much and how quickly greenhouse gases accumulate in the atmosphere and how the climate system responds to the increased concentrations. For this report, three emissions scenarios have been used to calculate climate projections (DSE 2008).

1. The **B1** scenario is a **lower emissions growth scenario**—assumes that there is a rapid shift to less fossil-fuel intensive industries. Under this scenario, it is expected that there will be a weak growth in CO₂ emissions until 2040 and then decline. CO₂ concentrations will approximately double, relative

to pre-industrial levels, by 2100. A global temperature increase relative to 1990 of 1.8°C (1.1–2.9°C) is likely.

2. The **A1B** scenario is a **medium emissions growth scenario**—assumes there is a balanced use of different energy sources, not just fossil fuels. CO₂ emissions increase moderately until 2030 but decline by the middle of the 21st century. By 2100 a global temperature increase of 2.8°C (1.7–4.4°C) is likely.
3. The **A1FI** is a **higher emissions growth scenario**—assumes continuing strong economic growth based on continued dependence on fossil fuels. CO₂ concentrations more than triple relative to pre-industrial levels by 2100. A global temperature increase of 4.0°C (2.4–6.4°C) is likely. This scenario represents the highest level of late 21st-century emissions that were thought to be plausible back in 2000. However, recent evidence indicates that CO₂ emissions have been growing at a more rapid rate.

Climate scientists have warned that rising temperatures will affect the environment, humans, plants and animals. Predicted scenarios include the melting of polar ice caps, higher sea levels, increased intensity and frequency of storms and changed weather patterns that will alter agricultural productivity as well as affect snowfall and associated recreational and tourism activities (EPA 2008).

The A1, A1B and A1FI projections indicate fewer days with frost, more days above 30°C, less average annual rainfall, fewer rainy days but at the same time higher intensity, heavy rainfall events. A consequence for Murrindindi Shire is that annual runoff into the Goulburn Broken Catchment is expected to decrease by up to 35% by 2030, with impacts on water quality (e.g. algal bloom) because of lower flows and higher water temperatures (DSE 2008).

Stabilising and reducing atmospheric CO₂

Carbon dioxide is concerning because it takes a long time to be removed from the atmosphere (more than 100 years).

During photosynthesis, plants absorb CO₂ to make sugars for energy. Growing trees and plants are therefore referred to as providing 'carbon sinks'. However, land clearing removes these carbon sinks and releases the carbon previously stored. Comparing the levels of emission and absorption of CO₂ allows net greenhouse gas emissions to be determined.

According to climate scientists CO₂ concentrations in the atmosphere need to be stabilised below 350 parts per million (ppm) to prevent severe climate change (Hansen et al. 2008, Tans 2008). The mid-2009 concentration of CO₂ is 387 ppm (WMO 2008). This translates to a reduction of 80–95% of per capita greenhouse gas emissions in developed nations relative to 2000 levels by 2050 in order to avoid an average temperature increase above 2° Celsius, where irreversible effects are to be expected (Allison et al. 2009).

Since 1970 annual human induced greenhouse gas emissions have grown from 28.7 gigatonnes (Gt) CO₂-e to 49.0 Gt CO₂-e in 2004. The rate of annual growth was much higher in 1995–2004 (0.92 Gt CO₂-e increase each year) than in 1970–1994 (0.43 Gt CO₂-e increase each year) (IPCC 2007). According to the NOAA Annual Greenhouse Gas Index (AGGI), the total radiative forcing by all long-lived greenhouse gases has increased by 26.2% since 1990 and by 1.3% from 2007 to 2008.

In Australia, annual CO₂-e emissions across all sectors amounted to 597 million tonnes in 2007 (Department of Climate Change and Energy Efficiency 2009). The Kyoto Protocol (1997), ratified by Australia on 3 December 2007, aims to achieve a global reduction of greenhouse gas emissions below 1990 levels of at least 5% in 2008–2012. Taking account of differing capacities and costs for each country, under the Kyoto Protocol Australia is required to limit its growth in greenhouse gas emissions in 2008–2012 to no more than 8% above 1990 levels. Over the past decades, Australia's greenhouse gas emissions have been steadily increasing from 547.1 million tonnes (Mt) CO₂-e in 1990, to 551.5 Mt CO₂-e in 2000 to today's levels (EPA Victoria 2008).

Appendix 5 Stakeholder consultation

In May 2010, the first draft of the Murrindindi Shire Council Environment Strategy was sent to the following organisations for consultation.

Community groups and professional associations

3717 Watch Inc.
Alexandra & District Open Gardens
Alexandra Pastoral and Agricultural Association Inc.
Alternative Technology Association
KANDO
Mid-Goulburn Waterwatch Network
Moreland Energy Foundation Limited
Murrindindi Climate Network
Murrindindi River Project
Rubicon Outdoor Centre
The Outdoor Education Group
Upper Goulburn Field Naturalists
UT Creek Enhancement Community Group
Victorian Farmers Federation Alexandra branch
Victorian Farmers Federation Yea branch
Yea Agricultural, Pastoral & Horticultural Association
Yea Wetlands Steering Committee

Landcare

Eildon Lower Pondage Landcare
Home Creek/Spring Creek Landcare
Kinglake Landcare Group
Molesworth Landcare
Strath Creek Landcare Group
Upper Goulburn Landcare Network
UT Creek Valley Landcare
Yea River Landcare
Yellow Creek/Dairy Creek Landcare

Committee of Management (under Sect. 86 of the Local Government Act)

Bollygum Park Reserve Committee of Management
Buxton Recreation Reserve Committee of Management
Gallipoli Park Committee of Management
Moores Road Reserve Committee of Management
Mt Pleasant Committee of Management
Stevenson Falls & Beauty Spot Reserve Committee of Management
Toolangi Recreation Reserve Committee

Agencies

Broken Goulburn Implementation Committee of GBCMA
CFA, Region 12 Operational Manager
Department of Primary Industries
Department of Sustainability and Environment
Goulburn Broken Catchment Management Authority
Goulburn Valley Regional Waste Management Group
Goulburn Valley Water
Goulburn–Murray Water
Parks Victoria

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