Attachment 2

MOORABOOL
SHIRE COUNCIL

Moorabool Shire Sustainable Environment Strategy 2016 - 26

Moorabool Shire Council

rustybrown

RMCG
Environment | Water | Agriculture
Policy | Economics | Communities

Contents

Executive Summary

Moorabool Shire contains some of Victoria's best environmental assets including the Long Forest Nature Conservation Reserve, Brisbane Ranges National Park and the Lerderderg State Park. In addition to these large reserves, within the municipality there are smaller areas of significant remnant vegetation and species, streetscapes and roadsides, forested mountains, rural valleys and waterways.

Council has a role in maintaining these significant and valued areas for the community and encouraging the community to experience these places. This occurs through Council directly managing its own land, influencing private land management through its planning responsibilities and partnering with other public land managers.

Much of the work undertaken by Council, Landcare and other land owners focuses on the threats to our local environmental and agricultural assets. These include: weed invasion; declining water quality; urban development; urban stormwater; climate change; and bushfire.

By understanding what the threats are and what the community values, Council is able to make better decisions that strengthen our environment. A healthy environment provides an enormous range of benefits to the community. Some of these benefits are economic and are linked to our productive agricultural sector. There are also social and cultural benefits that encourage physical activity; allow for social interaction; and create a stronger community identity.

The Moorabool Sustainable Environment Strategy (MSES) aims to provide a framework for environmental program planning and decision making for the next ten years. To achieve this the MSES is organised into the following four strategic directions, which arose through the Strategy consultation process:

1. ENVIRONMENTAL STEWARDSHIP
2. SUSTAINABLE COUNCIL
3. SUSTAINABLE BUILT ENVIRONMENT
4. LIVE AND WORK SUSTAINABLY

This Environment Strategy aligns with Council's other high level strategies and sets the direction for Council's diverse range of activities and services.

1 INTRODUCTION

Protecting the natural environment and reducing our environmental impacts can only be achieved through partnership. The Strategyôs success depends on the combined efforts of the regionôs many local conservation and sustainability groups, households, businesses, industry and other government and non-government organisations. The intent of the Strategy is to support, complement and promote these efforts.

The Moorabool Shire Sustainable Environment Strategy sets the framework for Council to work towards improving the natural environment and community resilience through to 2041. It is the guiding document for Council planning, decision-making and activities that impact on the Moorabool Shire environment.

The natural environment in Moorabool Shire provides the foundation for diverse social, cultural and economic values. Council recognises the intrinsic value of the natural environment in Moorabool Shire and thus the importance of taking a considered management approach. This is particularly important in the context of climate change, population growth and land use changes.

Moorabool Shire Council has a history of environmental planning and management, developing its first Environment Policy in 2004. This Strategy is the next iteration and builds on existing work by Council, State Government agencies and the community. It is the result of an extensive process of research and consultation to develop a shared vision that will guide Councilôs work. Research included an examination of Councilôs previous efforts and a review of the trends and issues influencing Moorabool Shireôs future.

This Strategy sets directions to work with other agencies and stakeholders to ensure the protection and enhancement of the natural environment. Council recognises that protecting the natural environment and making the built environment more liveable is important to enhancing community wellbeing and resilience.

The Strategy has been developed in consideration of the Council Plan 2013 - 17, states and will assist to achieve the overall vision of ñvibrant and resilient communitiesò. The Strategy is also supported by other Council documents such as the Integrated Planning Framework, Urban Growth Strategy, Rural Growth Strategy and Waste Strategy.

The Strategy is organised into the following four strategic directions, which arose through the Strategy consultation process:

1. ENVIRONMENTAL STEWARDSHIP
2. SUSTAINABLE COUNCIL
3. SUSTAINABLE BUILT ENVIRONMENT
4. LIVE AND WORK SUSTAINABLY

Within each of these themes a number of priority areas are identified for Council action. The activities that Council will undertake within each of the priority areas are identified in the Implementation Plan. The Implementation Plan should therefore be read in conjunction with this Strategy. The Implementation Plan will be reviewed after five years, and a new Implementation Plan developed for the period.

The Strategy acknowledges that Council can only have direct control over some issues, for example its own resource efficiency. It can indirectly influence other issues where its partners share or have greater responsibility and there are some issues it cannot influence and so can only take an advocacy role. As such, the actions in the Implementation Plan are identified as Control, Influence, or Advocacy actions.

Mt Egerton Photo: Allen Moore

1.1 Strategy Vision

Moorabool Shire Council will work in partnership to ensure healthy ecosystems, productive landscapes, sustainable communities and the capacity to adapt to future environmental challenges.

The Strategy assists in delivering a number of the strategic objectives identified within the Moorabool Shire Council Plan 2013-17 (Table 1).

Table 1. Strategic objectives identified for key result areas in the Moorabool Shire Council Plan 2013-17 that are relevant to the Sustainable Environment Strategy

Key Results Areas	Strategic objectives
Community Wellbeing	Community self-reliance and resilience.
Enhanced Infrastructure and Natural and Built Environment	Effective and integrated strategic planning in place to create sustainable communities. Ensure current and future infrastructure meets the needs of the community. Enhance and protect the long-term integrity and biodiversity of the natural environment. Promote and enhance places of heritage, landscape and environmental significance. Effective and efficient land use planning and building controls.

1.2 Purpose of the Strategy

The purpose of this Strategy is to demonstrate how Council will work over the next ten years to protect and enhance the environment for 2041. It also considers the interaction between community well-being and the natural environment, with a focus on the sustainability of the built environment and community resilience.

The Strategy is the key document for guiding Council planning, decision-making and activities that impact on the natural environment and sustainability in the Moorabool Shire.

1.3 Strategy development

1.3.1 Scope & implementation

The Strategy considers the natural values and assets of the Shire, the threats to these values and the actions Council can take to protect and enhance the natural environment (both directly and by working with others). The Strategy also sets directions and priorities to ensure community wellbeing and resilience through making the built environment more liveable and protecting the natural environment.

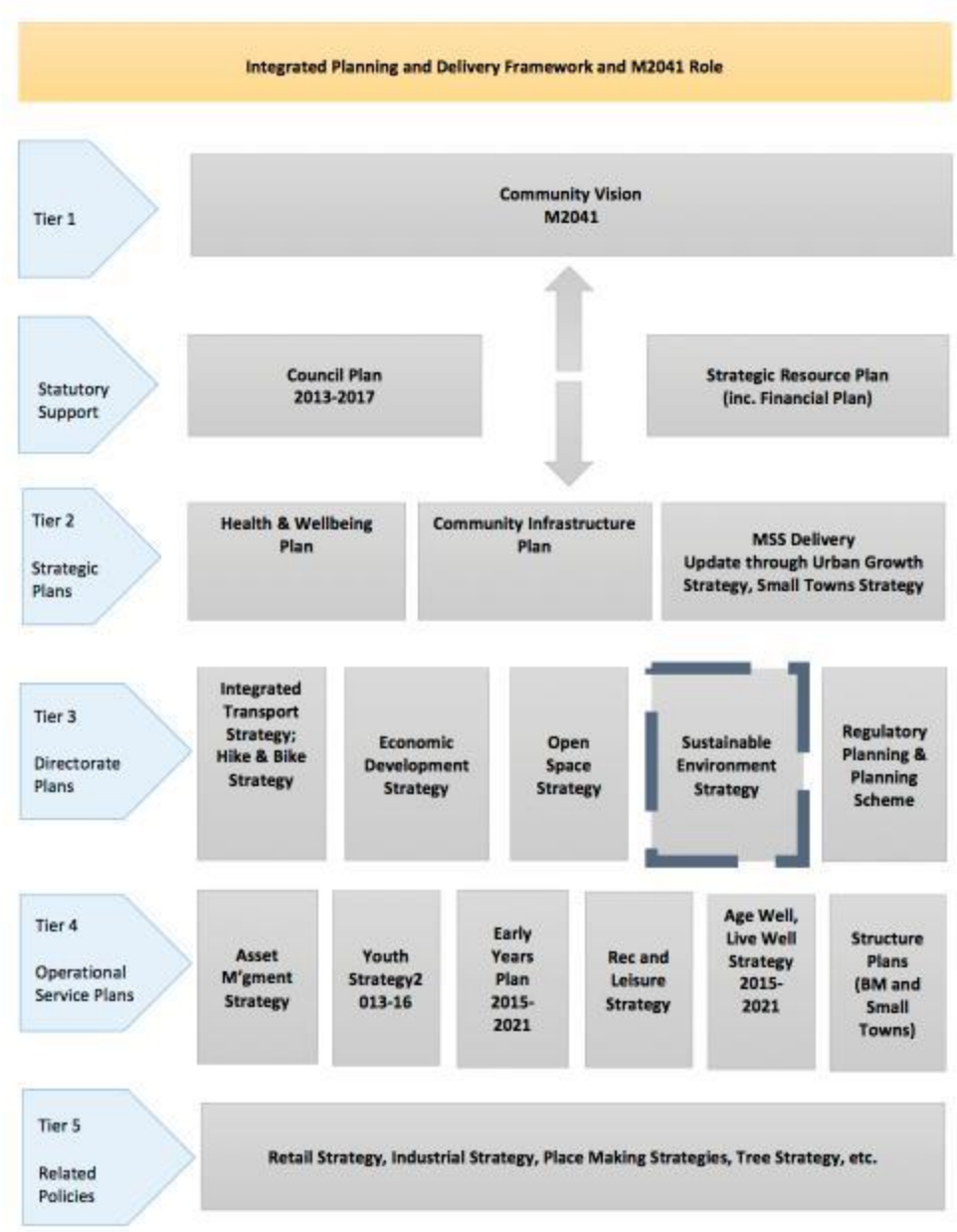
The Strategy will be one of the main guiding documents for other Council plans and strategies. Figure 1 shows where the Strategy fits with other council policies, plans and strategies. Waste is a key issue that Council manages for its community. Waste issues are not covered in this document as they have been recently addressed through the Moorabool Shire Waste Strategy.

The Environment Unit at Moorabool Shire will drive implementation of this Strategy as outlined in the Implementation Plan, however many of the actions will be the responsibility of other areas of Council. Indeed, the success of the Strategy will depend on the contribution of all areas of Council as part of a whole-of-Council approach to sustainability.

There will be a mid-term review of the Strategy after five years (2021) to determine progress against measurable targets and desired outcomes and to identify areas for improvement and adaptation. This review will coincide with a review of the first Implementation Plan 2016 - 21 and the development of a new Implementation Plan for the period 2021 - 26.

Review of the Strategy will be completed in 2021 and 2031 to ensure that it is still in alignment with Council and community expectations and State and Federal legislation.

Figure 1. The Sustainable Environment Strategy in the context of other Council plans and strategies



1.3.2 Methodology

The Strategy was developed over a series of steps, as described in Figure 2.

Figure 2. Stages of Strategy development

Consultation was undertaken with the community, agency stakeholders, and Council staff. This ensured that the strategy has been developed within a local context, and is relevant and practical.

Consultation activities included a stakeholder and Council staff workshop, stakeholder and staff interviews, a community workshop at Gordon, a *Moorabool 2041* listening post in Bacchus Marsh, two workshops with the Moorabool Landcare Advisory Committee at Ballan and a meeting of the Moorabool Environment Group committee.

The strategy does not address issues relating to waste and waste recovery. For more information please refer to:

- Moorabool Waste Management and Resource Recovery Strategy
- Grampians Central West Waste and Resource Recovery Group Implementation Plan (draft)

1.3.3 Policy and legislative context

State and Federal government policies related to the natural environment, agriculture, economy, urban growth, transport and tourism are likely to have the most impact on the future of the local environment.

Victoria has more than 25 pieces of legislation and over 30 strategies that relate to environmental management. In addition, there are a large number of applicable federal laws (in particular the *Environment Protection and Biodiversity Conservation Act 1999*) and programs as well as international frameworks and conventions to consider. The main Victorian environmental legislative and planning instruments include:

- *Environment Protection Act 1970 and subordinate (State Environment Protection Policies)*
- *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999*
- *Victorian Local Government Act 1989*
- *Victorian Flora and Fauna Guarantee Act 1988*
- *Victorian Catchment and Land Protection Act 1994*
- *Climate Change and Environment Protection Amendment Act 2012 and Victorian Climate Change Adaptation Plan 2013*
- *Pollution of Waters by Oils and Noxious Substances Act 1986*
- *Planning and Environment Act 1987 and Planning and Environment Amendment (General) Act 2013*
- *Victorian Waste and Resource Recovery Policy 2014*
- *Invasive Plants and Animals Policy Framework*
- *Victorian Waterway Management Strategy 2013.*

A more detailed overview of relevant policy and legislation is provided in Appendix 1.

There are also local plans and strategies that have relevance to this Strategy and include:

- Regional Catchment Strategies (RCS) for the Corangamite and Port Phillip and Westernport CMA regions. These RCS were released in early 2013 and identify each regionôs key assets and threats and set priorities for environmental investment.
- Melbourne Waterôs Healthy Waterways Strategy. This Strategy outlines the role Melbourne Water will play in managing these waterways to improve waterway health over the next five years.
- Corangamite Waterway Strategy 2014-2022, which provides a new plan for managing the regionôs waterways for the next eight years.

- Grow West Implementation Plan 2013, which outlines the process of revegetating land in the Bacchus Marsh to Ballan area to create biolinks between the Brisbane Ranges National Park, Lerderderg State Park and Werribee Gorge State Park.
- Western Alliance for Greenhouse Action (WAGA) (2012), *Climate Change Adaptation Strategy 2013-2020*, which assesses the risks to the region west of Melbourne (including Mooorabool) of climate change impacts and proposes strategies to prepare for and adapt to them.
- Western Alliance for Greenhouse Action (WAGA) (2014), *Low Carbon West: A Strategy for a Transition to a Low Carbon Economy in the WAGA Region,* which assesses the greenhouse emissions of the region west of Melbourne (including Mooorabool) and provides a strategy to reduce emissions by 2020.

Environmental policy and associated funding opportunities are impacted by changes occurring at all levels of government. This Strategy will be flexible in responding and accommodating these changes.

1.3.4 Significant stakeholders

Effective implementation of the Strategy will require a partnership between Council and other natural resource management organisations and groups, as well as the broader community. Table 2 identifies the main stakeholders that Council will work with in delivering this Strategy.

Table 2. Main stakeholders Council will work with in delivering the Sustainable Environment Strategy

Stakeholder group	Stakeholder name
1 Catchment Management Authorities	Corangamite Catchment Management Authority (CCMA) Port Phillip and Westernport Catchment Management Authority (PPWCMA) North Central Catchment Management Authority (NCCMA)
2 Government departments and agencies	Department of Environment, Land, Water and Planning (DELWP)[1] Parks Victoria Environment Protection Agency VicRoads VicRail VicTrack Sustainability Victoria
3 Water authorities	Melbourne Water Central Highlands Water Barwon Water Goulburn Murray Water Southern Rural Water Western Water
4 Indigenous community	Dja Dja Wurrung Clans Aboriginal Corporation Wathaurung Aboriginal Corporation Wurundjeri Tribe Land and Compensation Cultural Heritage Council

[1] Formerly the Department of Environment and Primary Industries (DEPI)

Stakeholder group	Stakeholder name
5 Community-based groups and organisations	Moorabool Landcare Advisory Committee Moorabool Environment Group Moorabool Landcare Catchment Network Landcare Groups Community and Friends Of Groups Victorian Farmers Federation Country Fire Authority Community Garden Groups
6 Community & Business	Residents Small to large businesses

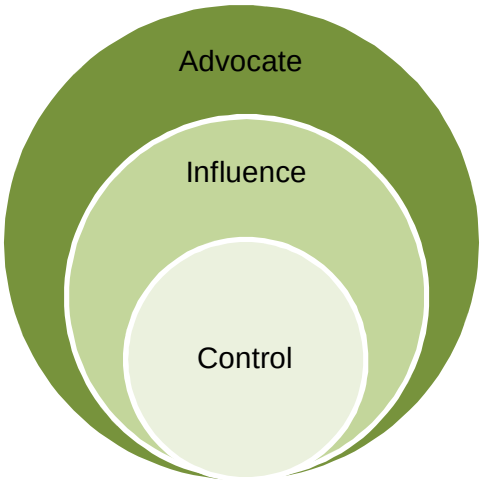
2 COUNCIL'S ROLES AND RESPONSIBILITIES

Mt Egerton, Photo: Allen Moore

2.1 Sphere of influence

Councilôs ability to directly control or influence environmental and sustainability outcomes varies. In some cases Council has direct accountability, or control over an issue. In other cases Council may have limited ability to directly control or positively change a situation. This varying ability to control, influence or advocate for a situation or issue is referred to as Councilôs ñsphere of influenceòand is demonstrated in Figure 3.

Figure 3: Council's sphere of influence



In developing the Environment Strategy, actions have been identified that reflect where Council can control, influence or advocate for positive action for the natural environment within the Shire.

Control

Council has direct responsibility for (or control over) a range of activities relating to the management of the natural environment. Activities within Councilôs sphere of control include developing and implementing planning policy (in alignment with State Planning Policy) ensuring sustainable development in the Shire, managing Council reserves in a way that protects and enhances biodiversity values, undertaking community education and delivering support to specific environmental programs that will protect and enhance environmental assets.

Influence

In many cases, direct responsibility for the use and management of the natural environment sits with State and Federal agencies and organisations. Organisations such as the Department of Environment, Land, Water and Planning (DELWP), the Catchment Management Authorities (CMAs), Melbourne Water, Parks Victoria and VicRoads have primary responsibility for administering environmental legislation, developing strategies and plans and managing large areas of land with high environmental significance within the Shire. In these cases, Council has an important role in influencing all relevant national, state, regional, local and non-government agencies to achieve the best environmental outcomes for Moorabool Shire.

Council can influence sustainable land management through developing and administering planning policy that seeks to protect the Shireôs natural environment, such as managing development near waterways and vegetation management controls. Council can also influence land management practices of private land managers such as assisting landowners to develop and implement land and farm management plans.

Advocate

Council can also play the role of advocate. This includes sharing information about and promoting the programs of other government organisations and community groups, for example CMAs, Melbourne Water and Landcare to the general community. Collaboration and coordination with other stakeholders can increase the reach of these programs. Council can offer resource efficiencies and through combined effort can result in outcomes that contribute to the vision of this Strategy, and those of other organisations and groups and the needs of the community. Council can also advocate to State Government agencies for increased funding and on ground action that lead to improved outcomes for the local community.

2.1.1 Tools and resources available to achieve desired outcomes

Council has a range of tools and resources to achieve its desired outcomes in environmental management. These include:

- Moorabool Shire Council Plan 2013 ï 2017 (Revised 2014)
- Various State, Regional and Council strategic plans, management plans and policies
- Planning and Environment Act 1987
- The Moorabool Planning Scheme
- The ability to source and provide resources and funds
- Skilled staff to prepare and implement suitable projects and programs
- Leading by example in its own management of the natural environment
- Support of local community and volunteer groups including Landcare, ôFriends Ofôgroups and other local community groups.

3 SETTING THE SCENE

Looking South over Bacchus Marsh towards the You Yangs, Photo: Allen Moore

3.1 Moorabool Shire

Moorabool Shire is a fast-growing, peri-urban municipality covering a geographical area of 2,112 sq. km. The Shire is centrally located with easy access to Melbourne, Ballarat and Geelong. There are 64 localities, hamlets and towns across the municipality, including the townships of Bacchus Marsh, Ballan, Gordon and Blackwood (Figure 4).

More than 74% of the Shire is protected within national and state parks and water supply catchments. Some of the major national and state parks in the Shire include:

- Brisbane Ranges National Park
- Lerderderg State Park
- Wombat State Forest
- Werribee Gorge State Park
- Long Forest Nature Conservation Reserve
- Lal Lal State Forest.

Three major rivers traverse the Shire: the Lerderderg River, Moorabool River (East and West Branches) and Werribee River. Providing tributaries such as Parwan Creek, Korkuperrimul Creek, Granite Creek, Tea Tree Creek, Lal Lal Creek and Williamsons Creek provide social, ecological and agricultural benefits.

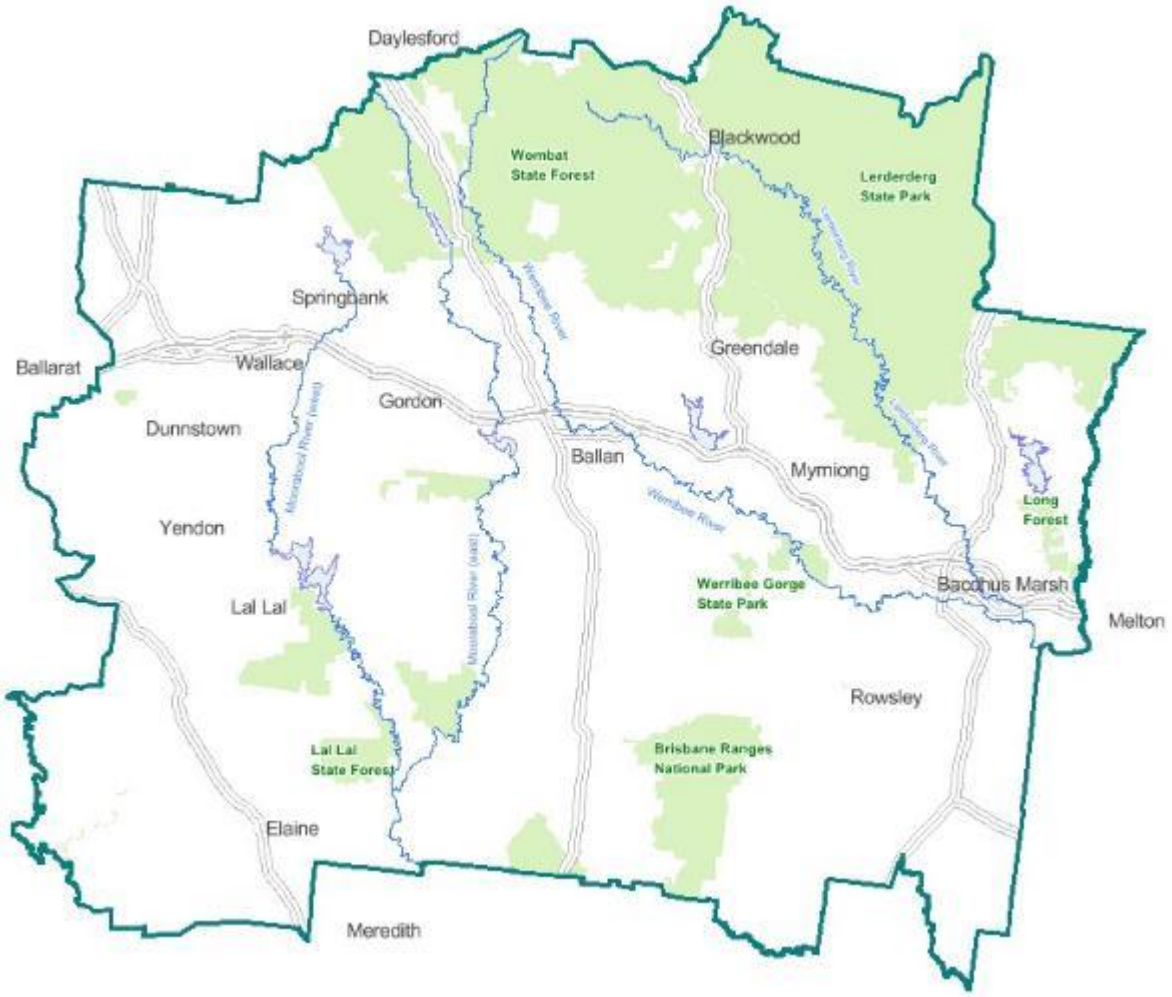


Figure 4: Moorabool Shire

Outside the main townships and the protected natural areas, much of the rural area is used for agriculture, including horticulture, sheep and beef farming, cropping, timber production, and more recently, viticulture (ABS 2011). There is also some clay, mineral and coal mining undertaken in the Shire. Grazing and cropping dominate large areas and intensive horticulture occurs where there is access to irrigation water and fertile soils, such as the alluvial soils on the floodplain of the Lerderderg and Werribee Rivers at Bacchus Marsh. There are also potato growing areas in the western region of the Shire.

The rivers are also an important source of potable water. Subsequently significant areas of the shire are in Special Water Supply Catchments that supply water for the residents of Moorabool Shire as well as surrounding areas. Large reservoirs in the Shire include Lal Lal, Pykes, Moorabool, Bolwarrah and Merrimu.

Moorabool Shire is predominately located within two catchment management areas. The Port Phillip and Westernport catchment extends across the eastern half of the municipality, and the Corangamite catchment occupies the western half. A small area in the northeast of the shire is within the North Central catchment.

3.2 Challenges and drivers of change

Several ódrivers of changeôwill influence the natural environment in Moorabool Shire. A fast growing urban and semi-rural population, a changing demographic, rural land uses and an increasing demand for natural resources will all shape the natural environment, creating challenges, as well as opportunities.

There are also other drivers that have the potential to influence change to the natural environment in Moorabool. Some of these drivers are outside Councilôs direct control, such as changes in government priorities and legislation and larger influences like climate change.

The major drivers of change and the macro-context for Councilôs response include:

Climate Change

Climate impacts such as extreme heat waves, bushfires and drought are becoming more frequent and dangerous. Council needs to plan for this in the following ways:

- Understand the climate risks to council and its community and plan and mitigate for these
- Reduce Councilôs corporate greenhouse emissions to reduce its own climate impacts (and costs) and utilise renewable energy production at Council owned facilities to reduce emissions and ongoing costs
- Assist the community and business to cut their emissions and energy costs and access renewable energy
- Reduce its water consumption and improve efficiency and alternative sources of water to mitigate for future drought and low water supplies
- Ensure a more localised food supply including households growing some of their own food.

Peak Oil

Peak oil is where the cost of oil becomes more expensive as oil reserves diminish, resulting in the cost of oil-based fuels and products rising sharply. This has major implications for the cost of transport, which will drive change for people and businesses to shift to less fuel-intensive transport (such as public transport, walking, cycling) or to find more efficient ways to transport goods and people. For example, when petrol prices spiked above $1.80 per litre in the mid 2000s, public transport patronage rapidly increased, leaving transport services struggling to respond[2]. Inevitable fuel price rises need to be planned for. Currently for Moorabool residents, 90% of the daily work commute is by car either as a driver or passenger[3].

Food costs and supplies would also be impacted, as the cost of fertilisers, which are derived from oil, would increase. Fuel costs for machinery and freight would also increase, which may then be passed on to consumers.

Population

Population is a major driver of environmental impacts, both positive and negative. At the local level this is mainly due to increased urban development for housing, services, recreation, transport and employment. Moorabool Shireôs population has grown from 25,197 in 2003 to 30,926 in 2014[4] and in 2041 it is estimated

[2] http://economicdevelopment.vic.gov.au/__data/assets/word_doc/0017/1094120/Changes-in-travel-demand-in-Melbourne-Is-it-time-for-a-new-paradigm.doc
[3] 2011 Census of Population and Housing, Basic Community Profile - Moorabool
[4] http://profile.id.com.au/moorabool/population-estimate

that the total population of the Shire will grow to 54,418[5] with Bacchus Marsh alone predicted to have a population of over 37,000.

To accommodate this population growth, development is likely to impact upon significant agricultural and environmental assets.

Lifestyles

Another main driver related to population growth is consumption of resources through the way we live. This is both a local and global issue. The impacts of resource extraction, production and trade in goods and services are the result of a complex array of local and global inputs (such as water, energy, minerals, land etc.). Our material consumption results in waste; a local issue managed by Council who must supply landfill and recycling facilities. Waste generation can be seen as a proxy for how much we are consuming: over the past decade waste generation has increased more rapidly than population growth across Victoria[6].

The standard measure of the impact of our lifestyles is the ecological footprint, that is, the measure of the amount of land required to provide for all the needs of a human life. The amount of land required by the average Victorian equates to one and a half times the land area available in Victoria. It is also four times more than that which would enable all humans to live sustainably on the planet.

Our energy consumption patterns are the biggest contributor to this footprint, largely due to our reliance on fossil fuel-intensive electricity generation.

Economic Model

The way we currently live and run our economy is turning natural resources into waste at a faster rate than nature can turn waste back into natural resources. This basic equation threatens the viability of our environment, and in turn undermines the sustainability of the economy and human well-being.

Our challenge is to better understand and value natureôs services, consume in less impactful ways, and to ódecoupleô economic activity from environmental degradation. Business and jobs growth needs to be achieved while reducing our per capita fossil fuel and material consumption and waste.

Combined, these macro influences create a number of challenges, as well as some opportunities, for the natural environment.

3.3 Achievements to date

Moorabool Shire has achieved much over the past decade in the area of environment and sustainability. This includes working with the community and other stakeholders to achieve positive environmental management outcomes such as the Grow West and Moorabool River Recovery projects. Achievements have also been made in reducing Councilôs resource use in the areas of energy, water and transport. Table 3 includes some of the achievements made by Moorabool Shire over the past decade.

[5] http://forecast.id.com.au/moorabool

[6] http://www.sustainability.vic.gov.au/~/media/resources/documents/publications%20and%20research/publications/a%20-%20b/publications%20annual%20survey%202010-11%20report%20victorian%20local%20government.pdf

Table 3: Achievements by Moorabool Shire in the area of environment and sustainability

Area	Achievements
Environmental Management	▪ Grow West. Now in its eleventh year, Grow West is a multi-partner collaboration that aims to protect and enhance indigenous vegetation, control pest plants and animals and create biolinks. Moorabool Shire Council was a founding member and continues to have an active role in Grow West. ▪ The Moorabool River Recovery Project. This is a joint project between Moorabool Shire Council, Barwon Water and the Moorabool Catchment Landcare Group that is improving the health of the Moorabool River through on-ground action to reduce weed cover, rabbit populations and increase native vegetation cover. ▪ The ongoing contribution made by Landcare and environment groups to promote improved land management practices, protect key environmental assets on public and private land and provide opportunities for local communities to meet and work together. Currently there are 12 Landcare and 6 õFriends ofô groups operating within the Shire, with total membership exceeding 300 members. ▪ An updated Environment Page on the Council website highlights local biodiversity, including what can be found in residential backyards, and encouraging residents and visitors to explore the Shireôs natural environment.
Energy Saving & Renewable Energy	▪ CBUS sensor lighting, delamping (e.g. removing lights) and use of energy efficient lights (e.g. T5 fluro lights) at Darley and Lerderderg Library has reduced energy use and costs. ▪ Ballan Council office 'informal' green team has encouraged energy saving through behavioural 'green' actions (e.g. turning computers off). ▪ Blackout blinds on west facing windows in the Darley Council office to reduce energy consumption. ▪ Bulk purchase of solar panels for the community in 2009 with good uptake. ▪ Cost benefit analysis undertaken on upgrading streetlights from Mercury vapour to more energy efficient options (T5, T8, LED) ï installation still required. ▪ Major sporting clubs are now paying their power bills (previously paid by Council), encouraging energy and water saving measures. One football club saved over $4000 in the first year. ▪ Council involvement in Victorian Government Ecolinc Building ï green demonstration and education centre.
Reducing Council Potable Water	▪ 75% reduction in open space water consumption by using drought tolerant turf species, water tanks, automated irrigation and other efficiencies in open space areas. The use of ground water via bores has been reduced as a result and there are energy savings from the reduced pumping. ▪ Water and energy savings through efficient showerheads installed at recreation reserves. ▪ The current planning system includes water sensitive urban design (WSUD) and water reuse and harvesting; and there are controls to ensure efficiencies in new urban developments e.g. Darley stormwater retarding basin. ▪ Currently working with Melbourne Water to investigate WSUD options in existing urban areas of Ballan and Bacchus Marsh.
Sustainable Transport	▪ Reuse of road materials for maintenance works has reduced vehicle movements, fuel and operational costs. ▪ Council fleet policy encourages more efficient vehicles. ▪ Trial purchase of an electric car. ▪ Video conferencing between Darley & Ballan Council offices has reduced staff vehicle travel. ▪ The Hike & Bike Strategy was developed in 2014 to increase cycling and walking in the Shire through better infrastructure and education.

Food & Community Engagement	▪ Development of community gardens has worked well to this point with Council supporting positive community action ï three community gardens are in operation. ▪ Moorabool Matters Mag has spread information about Council actions. ▪ Community grants program has provided many grants for positive community action including some environment-related projects. ▪ Commencement of a greenwaste collection service at Bacchus Marsh and Ballan.

4 STRATEGIC DIRECTIONS

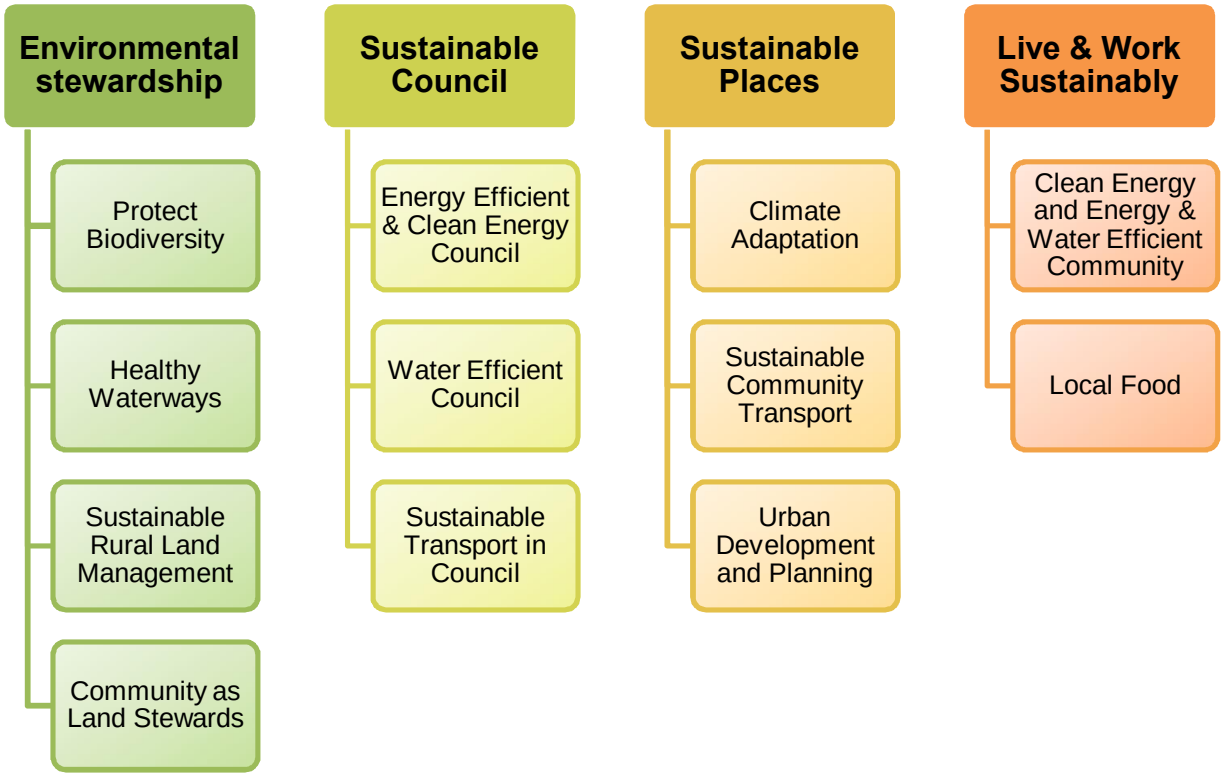
Greendale, Photo: Allen Moore

Four main strategic directions have been identified through the consultation process to guide Moorabool Shireôs work in delivering a more sustainable environment over the next ten years. The four strategic directions are:

- ENVIRONMENTAL STEWARDSHIP
- SUSTAINABLE COUNCIL
- SUSTAINABLE PLACES
- LIVE AND WORK SUSTAINABLY.

A number of priority areas have been identified within each strategic direction. There are twelve priority areas in total (Figure 5).

Figure 5. Strategic directions and priority areas for the Moorabool Shire Sustainable Environment Strategy



The following sections present the priority areas in detail within each strategic direction.

4.1 ENVIRONMENTAL STEWARDSHIP

Lerderderg State Park, Photo: Allen Moore

Common Rice Flower (Pimelea humilis), Photo: Moorabool Shire

4.1.1 Protect Biodiversity

At a glance

- More than 74% of the Moorabool Shire comprises national parks, state forests, reserves and protected water catchment areas. Some of the important protected areas include the Long Forest Nature Conservation Reserve, Brisbane Ranges National Park, Lerderderg State Park, Werribee Gorge State Park and the Wombat State Forest.
- The Shire spans two bioregions: the Victorian Plains and the Central Victorian Uplands.
- There are 17 threatened fauna species, such as the Golden Sun Moth (*Synemon plana*), listed under the Australia *Environment Protection and Biodiversity Conservation (EPBC) Act 1999.*
- There are 15 threatened flora species including the Plains Rice-flower (*Pimelea spinescens subsp. spinescens*).
- Five Ecological Vegetation Communities (EVCs) are listed as either critically endangered or endangered under the *EPBC Act 1999.* These are Grassy Eucalyptus Woodland of the Victorian Volcanic Plain, Natural Temperate Grassland of the Victorian Volcanic Plain, Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains, White Box-Yellow Box-Blakelyôs Red Gum Grassy Woodland and Derived Native Grassland and the Grey Box Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.
- There are 25 Council managed environmental and bushland reserves, including Lal Lal Falls, Bald Hill, Hopetoun Park Conservation Reserves, Ballan Mineral Reserve, Spargo Creek Mineral Reserve and Werribee River at Bacchus Marsh and Ballan.

Source: DoE 2014, Moorabool Shire Council 2004

Grey Box (Eucalyptus macrocarpa) Woodland Photo, Moorabool Shire

Protect Biodiversity vision

There is a measurable improvement in the condition of the natural environment in Moorabool Shire over the next ten years

Context

Moorabool Shire is characterised by ranges, plains and rugged river gorges providing a diverse and spectacular landscape. The municipality spans two bioregions: the Victorian Plains Bioregion occurs predominately in the south where there is highly productive agricultural land, which also contains highly valuable grasslands and grassy woodlands. The Central Victorian Uplands Bioregion extends across the north of the Shire and includes grassy woodlands and forests. Appendix 2 provides more detail on the bioregions and ecological communities found in Moorabool Shire.

The large areas of protected native vegetation provide highly significant natural resources and nationally important flora and fauna habitat values. They are also important assets for tourism and recreation. Roadside vegetation also comprises high biodiversity values, providing flora and fauna movement corridors between State and National Parks or Forests (DTPLI 2011). In particular, Council roadsides support excellent stands of Victorian Volcanic Plains vegetation (Moorabool Shire Council 2004).

Outside the protected areas and roadsides, much of the remnant vegetation occurs on private land. Much of this has been greatly modified from their pre-European condition through agricultural and urban development and expansion. This is particularly true for grassland communities, the majority of which occur on private agricultural land and in areas of urban development. Council has an important role to play in ensuring that land use planning decisions protect natural resources and areas of high conservation significance.

There are a number of factors which continue to threaten biodiversity values in the Shire, including:

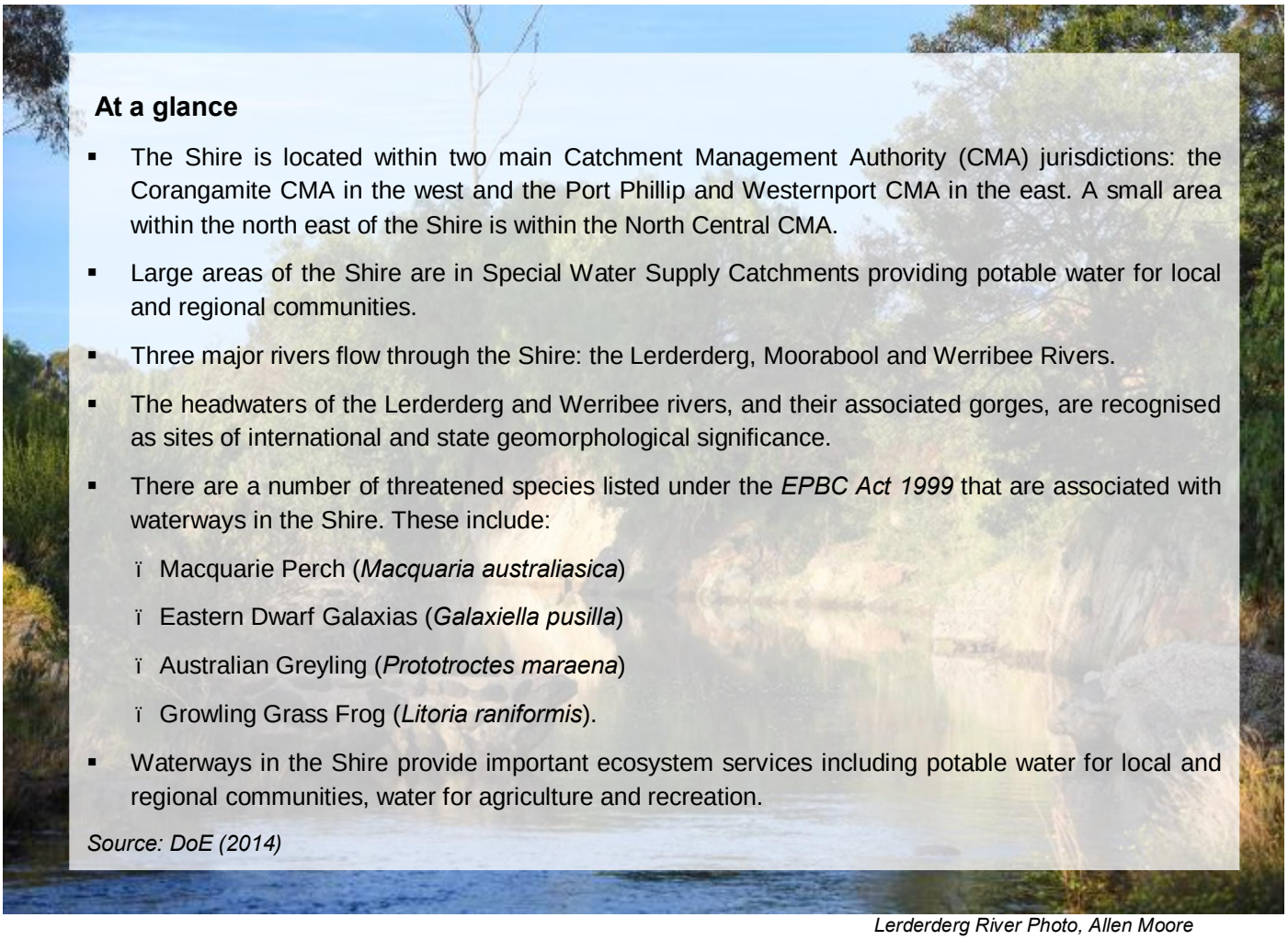
- Pest plants and animals
- Climate change
- Bushfire
- Urban growth
- Other development pressure
- Inappropriate land use and/or land management practices
- Modification and fragmentation of habitat
- Vegetation clearing
- Unsustainable resource use e.g. timber, quarrying, water
- Edge effects around the perimeter of protected areas.

A considerable challenge exists for Council to manage land and biodiversity values and the associated threats in order to sustain healthy, connected ecosystems.

Strategic objectives for protecting biodiversity

1. Increased landscape scale connectivity of remnant and other native vegetation.
2. An increased knowledge of natural assets including understanding and monitoring changes in condition on Council managed reserves and roadsides.
3. Strengthened local planning policy that recognises and protects existing natural values.
4. Increased monitoring and control of the impacts of pest plants and animals on native vegetation.

4.1.2 Healthy Waterways



At a glance

- The Shire is located within two main Catchment Management Authority (CMA) jurisdictions: the Corangamite CMA in the west and the Port Phillip and Westernport CMA in the east. A small area within the north east of the Shire is within the North Central CMA.
- Large areas of the Shire are in Special Water Supply Catchments providing potable water for local and regional communities.
- Three major rivers flow through the Shire: the Lerderderg, Moorabool and Werribee Rivers.
- The headwaters of the Lerderderg and Werribee rivers, and their associated gorges, are recognised as sites of international and state geomorphological significance.
- There are a number of threatened species listed under the *EPBC Act 1999* that are associated with waterways in the Shire. These include:
  - Macquarie Perch (*Macquaria australiasica*)
  - Eastern Dwarf Galaxias (*Galaxiella pusilla*)
  - Australian Greyling (*Prototroctes maraena*)
  - Growling Grass Frog (*Litoria raniformis*).
- Waterways in the Shire provide important ecosystem services including potable water for local and regional communities, water for agriculture and recreation.

Source: DoE (2014)

Lerderderg River Photo, Allen Moore

Healthy Waterways vision

There is a measurable improvement in the condition of waterways and the quality of water across Moorabool Shire over the next ten years.

Context

The three major rivers, Moorabool, Lerderderg and Werribee, which intersect the Shire and their tributaries are recognised for their important ecological values, supporting an array of aquatic flora and fauna, many of which are endangered.

The rugged and steep landscapes around the headwaters of the Lerderderg and Werribee Rivers provide breeding habitat for Peregrine Falcons and Wedge-tailed Eagles and house significant species like the Powerful Owl, Common Bentwing Bat and Brush-tailed Phascogale (Melbourne Water 2015). The Moorabool River is recognised for its important habitat values for native fish including river blackfish, Australian smelt, common galaxias and southern pigmy perch (CCMA 2015), as well as other aquatic flora and fauna.

The waterways also provide important cultural Indigenous heritage sites, recreational opportunities, amenity value and economic values for the local community. Agriculture across the Shire is underpinned by access to freshwater and the fertile floodplains at the confluence of the Lerderderg and Werribee Rivers at Bacchus Marsh support productive horticultural enterprises. Large areas of the Shire are in Special Water Supply Catchments providing potable water for local and regional populations. Much of the Special Water Supply Catchment areas contain towns, communities and productive farms (DTPLI 2011). Large reservoirs in the shire include the Lal Lal, Pykes Creek and Merrimu Reservoirs.

The condition of the rivers varies across the Shire. The general trend is that the upper reaches of the river basins are in good condition due to their occurrence in relatively undisturbed environments such as protected water catchments and forested parks and reserves. However the lower reaches show deterioration as they are exposed to more intensive land uses such as agriculture, horticulture and urban development (Moorabool Shire 2004). According to the Corangamite CMA (2009) the Moorabool River is one of the most flow stressed rivers in the State and the lower Moorabool River is in very poor ecological health. Waterways, especially those in the lower reaches, are subject to a number of threats including, but not limited to:

- Altered natural flow regimes
- Barriers to fish migration
- Poor quality streamside vegetation
- Weeds and pest animals
- Litter and rubbish dumping
- Stream bank erosion.
- Soil and nutrient runoff
- Salinity
- Increased stormwater inflows from urban development
- Stock access
- Altered flood and flow paths

Steps are being taken to improve the condition of waterways in the lower reaches. Council has played a supporting role to organisations such as CMAs and Landcare who work with private landholders on riparian protection and rehabilitation works. The Corangamite CMA is also delivering an environmental watering plan on the Moorabool River to restore some of the riverôs original ecological function (CCMA 2015). Even though Council has limited ability to take direct action on water related issues, it does have an important function in:

- Stormwater and wastewater management within townships,
- Managing Council reserves with waterways,
- Demonstrating leadership and action on conserving water use in all areas of Council operations,
- Advocating to State Government and local water authorities on behalf of the community on water related issues,
- Partnering with relevant organisations, such as water authorities and CMAs to promote best practice in Council and the community.

Strategic objectives for healthy waterways

1. Better protected and healthier riparian vegetation within the shire.
2. Increased connectivity of riparian vegetation across the shire.
3. Improved quality of stormwater runoff.

4.1.3 Sustainable Rural Land Management

At a glance

- The natural resources and rural areas of Moorabool Shire support approximately $80 million worth of agricultural production annually.
- The highest quality agricultural land is associated with the floodplain areas at the confluence of the Werribee and Lerderderg Rivers. There are also rich soils in the west of the Shire used for potato production.
- The main primary production enterprises are horticulture, sheep and beef, cropping and timber production.

Orchard in Bacchus Marsh, Photo: Allen Moore

Sustainable Rural Land Management vision

We will develop agricultural land for agricultural production and preserve rural landscape values and amenity.

Context

Even though there has been a 65% decline in the total workforce employed in agriculture from 2006 to 2011, agriculture remains one of the Shireôs biggest industries, employing approximately 10% of the total working population (ABS 2011). In 2011, agriculture in Moorabool was valued at an estimated $80.4 million (Phillips Agribusiness 2014) and the value of production per hectare is around $760 (Neil Clark & Associates 2010). The rural base of the Shire is also central to attracting people to live and work in the municipality, supporting tourism and maintaining the lifestyle appeal of the area (DTPLI 2009).

Urban and rural lifestyle development poses a number of threats to agriculture and horticulture in the Shire. This includes the loss and fragmentation of land for primary production and an increase in land prices for primary production, driven by urban growth and the demand for residential development.

Residential development within proximity to rural zones can create conflict at the urban / rural interface raising issues such as odour and noise associated with agricultural and horticultural activities. The increase in órural lifestylersôand hobby farmers occupying small rural blocks also has the potential to create tensions at the interface with primary production land. This occurs where new residents have limited rural experience.

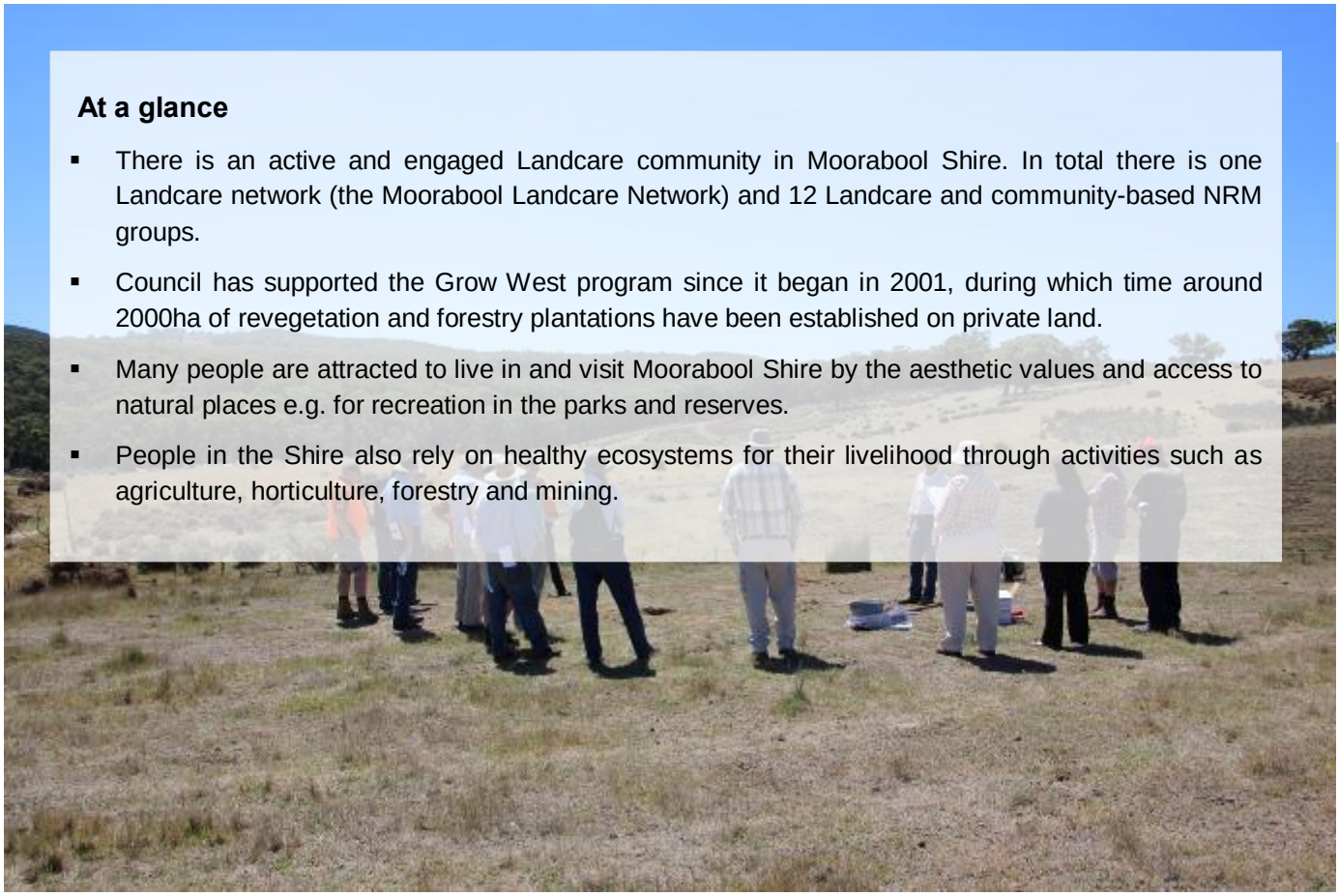
Over time, the intensification of agriculture and horticulture has contributed to the decline in the quality and quantity of native vegetation, land and waterway conditions across the Shire (Moorabool Shire 2004). Specific issues include the loss and fragmentation of native vegetation habitat, species loss, decreasing water quantity and quality, soil erosion, salinity and pest plants and animals. There are projects such as Grow West and various river health and biodiversity programs administered by CMAs and Melbourne Water that aim to improve land management and protect high value natural assets on private property in the Shire. There is also an active and engaged Landcare community that is working on improving land management on private land across the Shire.

Council has an important role to play in ensuring planning solutions are implemented that effectively integrate rural living and farming activities, enabling farm businesses to operate as agricultural enterprises. It is also important that Council supports urban and rural development where it does not compromise the long-term productive use of rural land for agriculture and horticulture, or the Shireôs natural resources (DTPLI 2009).

Strategic objectives for sustainable rural land management

1. Adopt planning policies that support increased agricultural development of productive farmland.
2. Plan for land use that is respectful of rural landscape values and amenity.

4.1.4 Community as Land Stewards



At a glance

- There is an active and engaged Landcare community in Moorabool Shire. In total there is one Landcare network (the Moorabool Landcare Network) and 12 Landcare and community-based NRM groups.
- Council has supported the Grow West program since it began in 2001, during which time around 2000ha of revegetation and forestry plantations have been established on private land.
- Many people are attracted to live in and visit Moorabool Shire by the aesthetic values and access to natural places e.g. for recreation in the parks and reserves.
- People in the Shire also rely on healthy ecosystems for their livelihood through activities such as agriculture, horticulture, forestry and mining.

Moorabool Catchment Landcare Group Rabbit Fumigation Day, Photo: Moorabool Shire

Community as Land Stewards vision

There is a measurable increase in community awareness of the natural environment and participation in NRM based activities in the Shire.

Context

The Shire has an active and engaged Landcare community, demonstrated through the recent and continued growth of the Moorabool Landcare Network. Even though there is a robust network of community based NRM groups. The increase in urban growth has seen a rise in young families who are likely to be ótime poorô and have priorities other than connecting with nature. Nearly 19% of the working population commute more than two hours per day (Department of Health 2013) and therefore are unlikely to have time to engage with the environment in which they live.

Local councils are the layer of government that are most closely connected to local communities. Moorabool Shire Council is well positioned to broaden and strengthen community connection to the local natural environment through building on the existing network of community-based NRM groups and other community organisations. There is also an opportunity for Council to increase partnerships with other agencies such as the CMAs and water authorities that deliver community education programs and incentives for land management.

Council can also promote incentives, such as Landcare grant programs, for the implementation of best practice land management activities. According to a recent study by the Corangamite (CMA 2013b), Moorabool Shire has the highest proportion of rural landholders who cite cost as the main barrier to doing more to protect and enhance the natural environment. The implementation of financial incentives may increase the uptake of private land conservation activities.

The study also found that pest plants and animals is the environmental issues of most concern for rural landholders in Moorabool (CCMA 2013b).

Strengthening community connection to the natural environment is also important in developing resilient communities that are prepared for adaptable to climate related impacts. Climate change presents complex challenges for communities. With the potential to generate impacts to livelihoods that are dependent on natural resources such as agriculture, horticulture, forestry and tourism, as well as impacts to health and well-being.

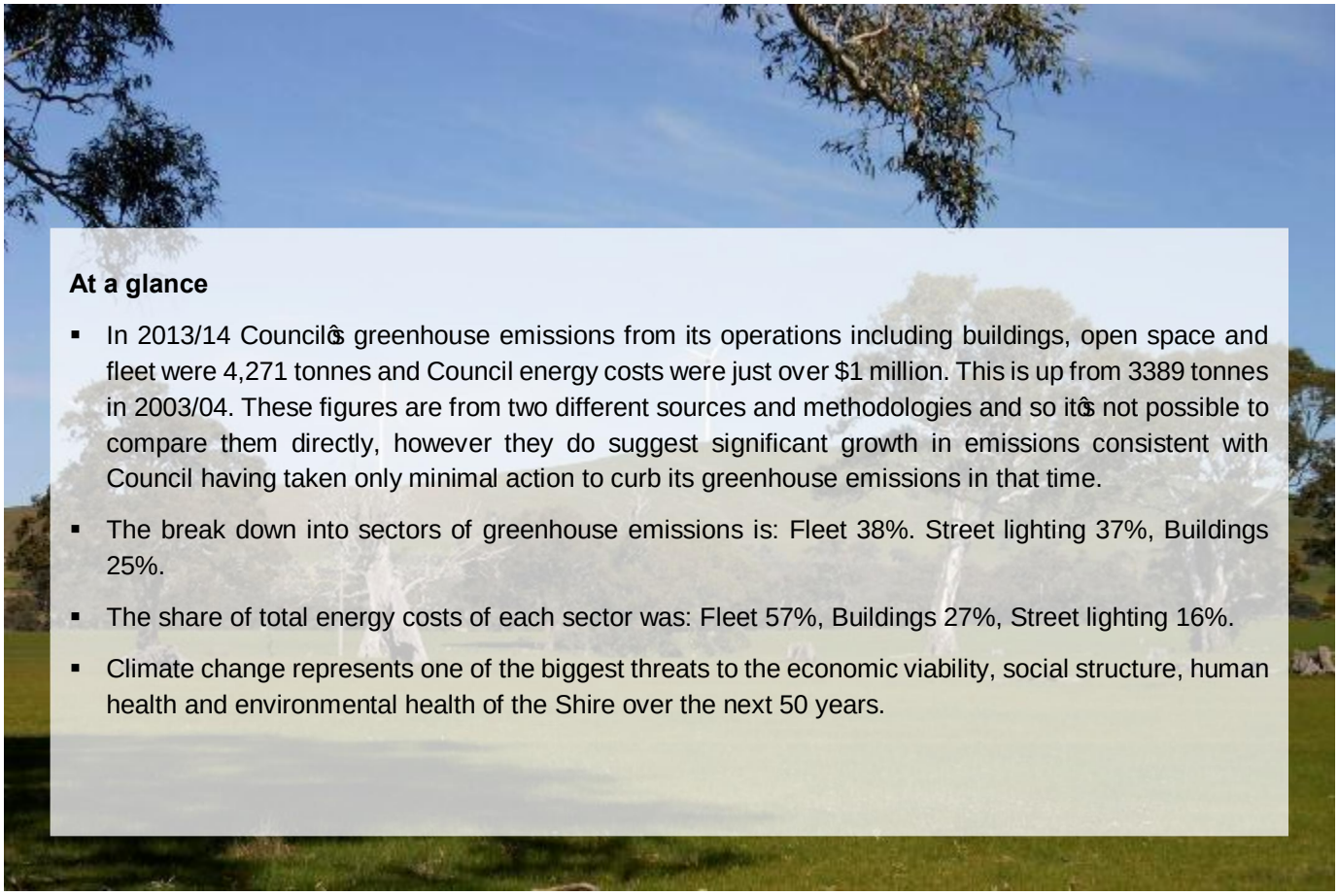
Strategic objectives for community as land stewards

1. Increased community awareness of the local natural values in Moorabool Shire.
2. Participation in community based NRM groups and activities is encouraged and supported by Council.
3. Increased engagement with new rural and semi-rural landholders on best practice NRM activities.

4.2 SUSTAINABLE COUNCIL

Lerderderg Library, Photo: Moorabool Shire Council

4.2.1 Energy Efficient & Clean Energy Council



At a glance

- In 2013/14 Councilôs greenhouse emissions from its operations including buildings, open space and fleet were 4,271 tonnes and Council energy costs were just over $1 million. This is up from 3389 tonnes in 2003/04. These figures are from two different sources and methodologies and so itôs not possible to compare them directly, however they do suggest significant growth in emissions consistent with Council having taken only minimal action to curb its greenhouse emissions in that time.
- The break down into sectors of greenhouse emissions is: Fleet 38%. Street lighting 37%, Buildings 25%.
- The share of total energy costs of each sector was: Fleet 57%, Buildings 27%, Street lighting 16%.
- Climate change represents one of the biggest threats to the economic viability, social structure, human health and environmental health of the Shire over the next 50 years.

River Red Gums (Eucalyptus camaldelensis), Photo: RMCG

Energy Efficient and Clean Energy Council vision

There is a measureable improvement in energy efficiency of Council operations and an increase in clean energy use in order to achieve a carbon neutral council by 2031.

Context

In 2012, the Victorian Government published its first biennial report on climate change and greenhouses gases, *Report on Climate Change and Greenhouse Gas Emissions in Victoria*. The report noted that ñthe overall warming of the climate in Victoria over the past century has been linked to GHG-related climate change. The recent decline in autumn rainfall and the southward shift in some rain-bearing weather systems may also be partially caused by greenhouse-gas related climate change. Continued global GHG emissions, depending on their level, are likely to lead to warmer conditions in Victoria, reduced rainfall in some seasons, and sea level rise.ò

The relationship between GHG emissions and climate change was further reinforced in 2013 when the Intergovernmental Panel on Climate Change (IPCC) released its latest global assessment of climate change science, *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change* (Climate Change 2013: The Physical Science Basis). AR5 stated that warming of the climate system is unequivocal, and many of the changes observed since the 1950s are unprecedented over decades to millennia.

Source: Western Alliance for Greenhouse Action *Low Carbon West, A Strategy for a Transition to a Low Carbon Economy in the WAGA Region,* p.3.

There is clearly a need for action to reduce greenhouse emissions at all levels of government. Moorabool Shire has the opportunity to contribute to reducing Victoriaôs and global greenhouse emissions whilst reducing its cost overheads from the carbon-intensive aspects of council operations including buildings, open space, street lighting, fleet and waste. It can also support local businesses and the community to reduce their greenhouse emissions.

The Shire has previously done some work to reduce its and the communityôs greenhouse emissions through its *Greenhouse Local Action Plan 2007* which aims to reduce the Shireôs emissions by 20% and the communityôs emissions by 10% on 2003/04 levels. A clear assessment of that program has not yet been undertaken.

As part of the Sustainable Environment Strategy project, Ironbark Sustainability has undertaken an Energy and Water assessment of Councilôs operations (Ironbark Sustainability 2015). The inventory enables Council to benchmark its current use and expenditure of electricity, gas, transport fuel and water. It also shows the greenhouse emissions associated with Council energy use.

The inventory shows that in 2013/14 Councilôs greenhouse emissions from its operations including buildings, open space and fleet were 4,271 tonnes and council energy costs were just over $1 million. This is up from 3,389 tonnes in 2003/04, as calculated for the *Greenhouse Local Action Plan 2007* (part of the ICLEI Cities for Climate Protection Program). As these figures are derived from two different sources and methodologies itôs not possible to compare them directly, however they do suggest significant growth in emissions consistent with Council having taken only minimal action to curb its greenhouse emissions in that time.

In addition, in 2014 Council engaged Ironbark Sustainability to undertake an assessment of costs and greenhouse emissions of street lighting in the Shire, including a business case for switching to low emission globes (Ironbark Sustainability 2014a). This report presents a compelling case for the financial and environmental savings that can be achieved by investing to low energy street lighting. In total, the projects considered in the analysis are expected to cost between $0.66 million and $1.13 million. Net lifetime cost savings (after project costs are removed) are projected to be between $3.86 million and $5.05 million, depending on technology type and increase in electricity and maintenance costs. Project costs include materials (eg. globes) labour (installation) project management, potential expertise and/or consultants, Written Down Value (WDV) and net Avoided Cost (AC) and does not include community education or

Council staffing costs. The project becomes cash flow positive in 5 to 7 years depending on which technology and implementation timeframe is adopted.

The Energy & Water inventory includes a street lighting summary (figure 6) as well as the energy and water used in Council buildings, open space and Council fleet for the financial year 2013/14. (Please note that not all utility bills were available and some smaller facilities were not included, therefore these figures are likely to be under-estimated.)

For the 2013/14 financial year, the inventory showed the breakdown of the Shire's greenhouse emissions by sector in 2013/14 was: Fleet 38%, Street lighting 37%, Buildings 25%. The share of total energy costs of each sector was: Fleet 57%, Buildings 27%, Street lighting 16% (

Figure 7). This shows that Fleet was the largest proportion of Shire energy costs and reductions in fleet energy use will bring substantial cost savings.

Figure 6. Energy consumption costs (2013/14)

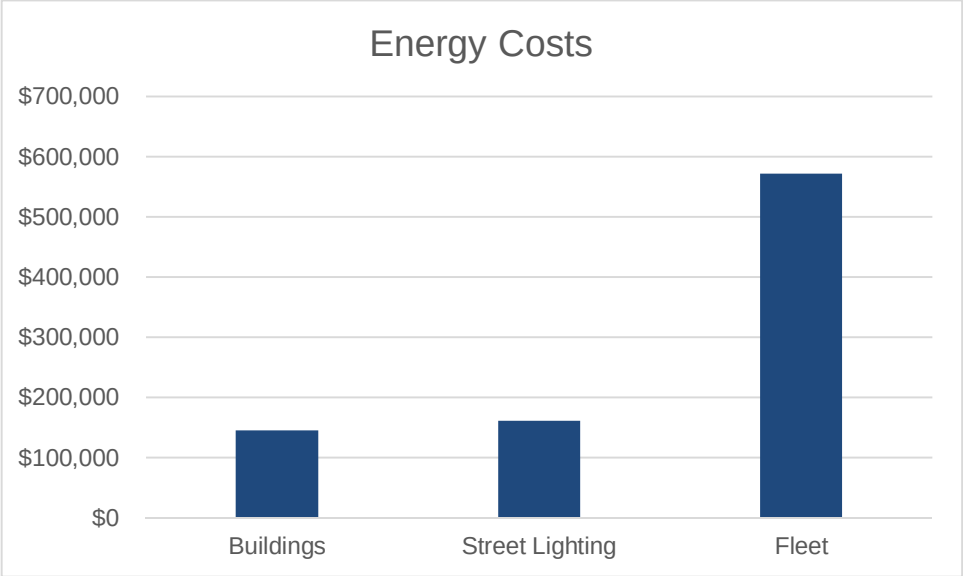
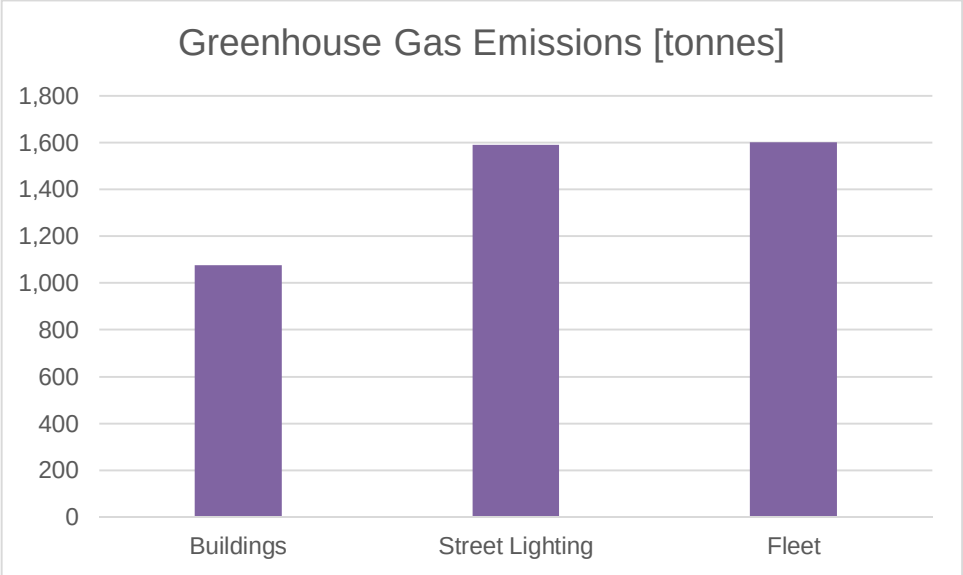
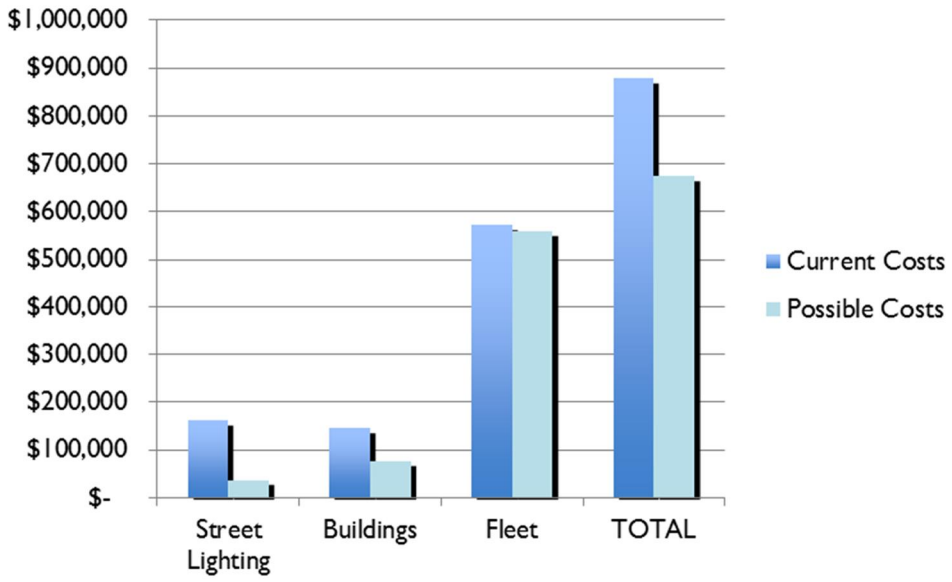


Figure 7. Greenhouse gas emissions (2013/14)



The inventory shows that significant financial and greenhouse savings could be achieved if Council were to undertake a range of retrofit actions to buildings and open space and made changes to the Council fleet. If the Shire were to undertake all actions listed to bring its standard to that of a ñbest practiceò Council, the financial savings would be around **$204,098 per annum** in combined energy and water savings after costs (most of this relates to energy saving rather than water). The majority of cost savings would be from building improvements, followed by energy efficient street lighting and fleet adjustments (Figure 8).

Figure 8. Current vs. Possible Costs if Moorabool Shire achieved Best Practice in Energy & Water

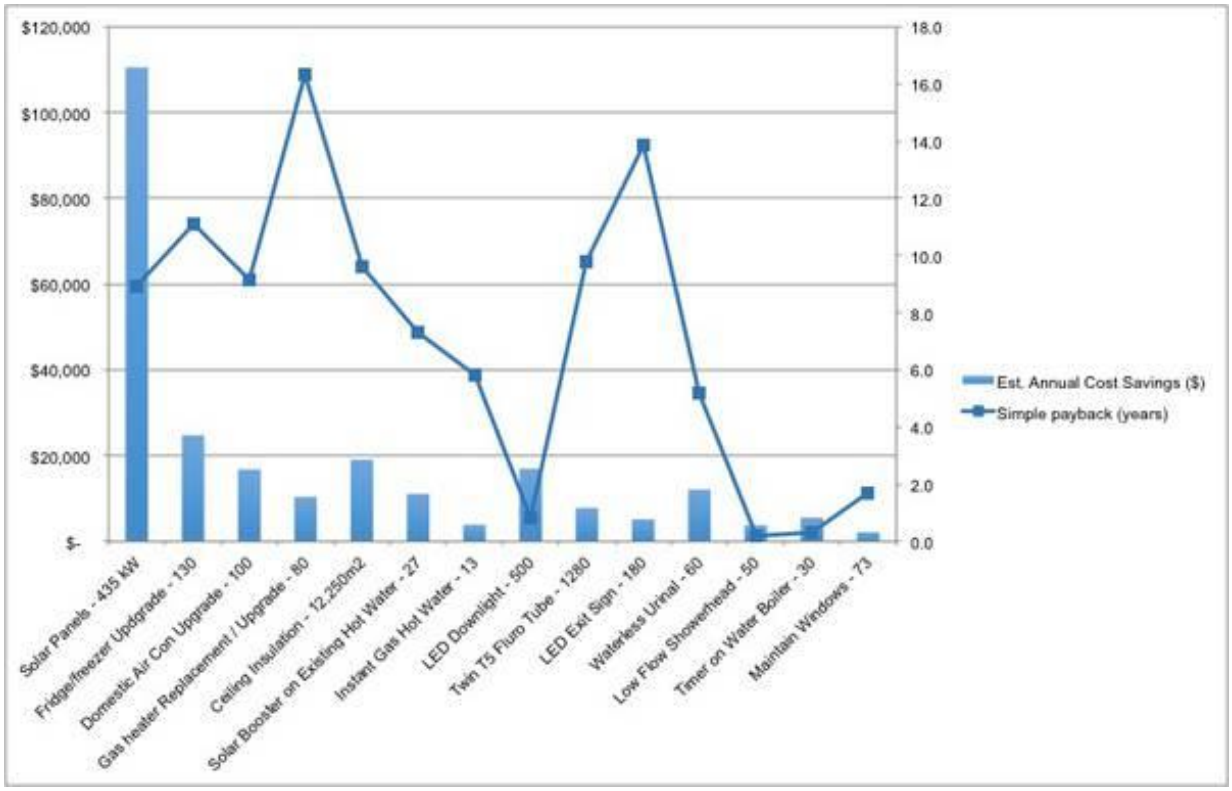


If the Shire were to implement all of the identified actions to bring it to current ñbest practiceò, the greenhouse savings would be significant ï a total reduction of approximately 1,800 tonnes of greenhouse emissions per year, which is a 42% reduction on 2013-14 emissions. If existing streetlight globes were replaced with energy efficient LEDs it is projected that the greenhouse emissions from street lighting could be cut by up to 77%. If efficiency measures for buildings were introduced, the greenhouse emissions savings for building energy use could be up to 47%. For fleet changes, the greenhouse emissions savings for running Councilôs fleet could be up to 2%.

When comparing Moorabool Shire to current best practice, the majority of energy saving actions are yet to be implemented at Moorabool. This presents an enormous opportunity to the Shire to upgrade its building stock, open space, street lighting and fleet to achieve both major cost savings as well as benefiting the environment by cutting its greenhouse emissions.

In terms of prioritising which actions to take in retrofitting buildings and open space, Ironbark has calculated the greatest cost savings and payback periods ï see Figure 9 below. It shows that solar photovoltaic panels would provide the largest annual savings with the investment being returned within 9 years. Smaller, lower cost actions such as LED light globes and low flow showerheads have shorter payback periods but over the long term would not achieve as large total savings. There are clearly numerous building efficiency upgrades to save energy and/or water that would save the Shire significant costs with a payback period of less than 15 years.

Figure 9. Average annual per site cost savings compared to simple payback for a selection of actions (Ironbark Sustainability 2014b)

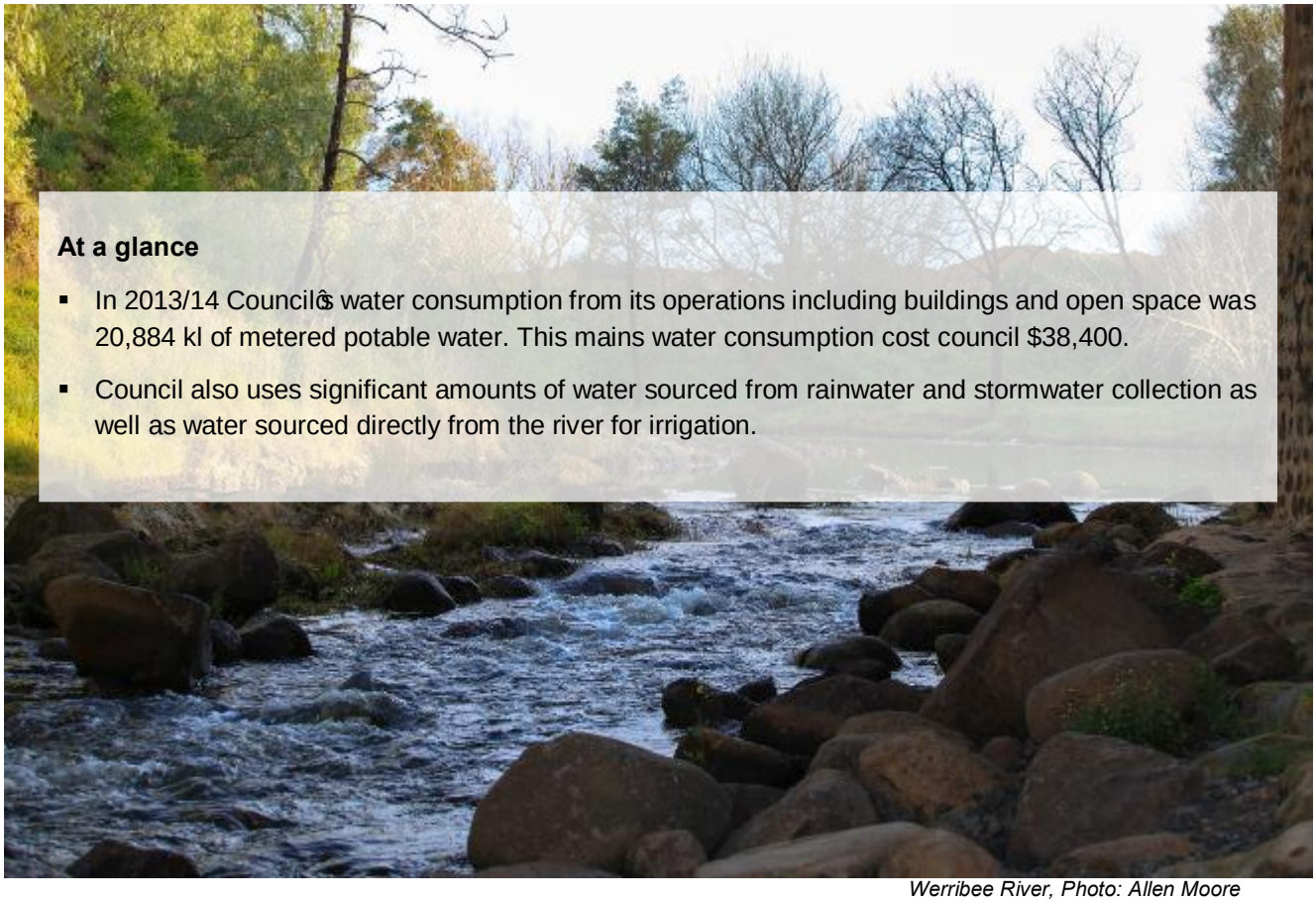


The Western Alliance for Greenhouse Action (WAGA), of which Moorabool Shire is a member council, launched its strategy Low Carbon West: A Strategy for a Transition to a Low Carbon Economy in the WAGA Region in 2014. This strategy provides a range of pathways and actions for member councils to deliver in partnership with all sectors including residential and non-residential buildings, freight, residential transport, waste, and agriculture to improve energy efficiency and cut greenhouse emissions. The actions identified would reduce greenhouse emissions from the region by 14% compared to business as usual. It presents numerous opportunities for Moorabool to partner with larger councils to benefit from initiatives to reduce Moorabool greenhouse emissions, for example bulk purchasing of solar photovoltaic panels to offer to its community.

Strategic objectives for Energy Efficiency & Clean Energy

1. To reduce the amount of electricity and gas used, and the associated greenhouse emissions, for Council operations per dollar spent by Council.
2. To increase the proportion of renewable energy used in Councilõs operations.
3. To shift Councilõs procurement towards low emissions products and services.

4.2.2 Water Efficient Council



At a glance

- In 2013/14 Councilôs water consumption from its operations including buildings and open space was 20,884 kl of metered potable water. This mains water consumption cost council $38,400.
- Council also uses significant amounts of water sourced from rainwater and stormwater collection as well as water sourced directly from the river for irrigation.

Werribee River, Photo: Allen Moore

Water Efficient Council vision

There is less water used in the operations of Council with a transition away from potable mains water use to rainwater, stormwater and recycled water.

Context

Mains water supply in Moorabool can be quite variable due to regular droughts experienced in the region ï the most intense recent drought being the Millennium drought from 1995 to 2009 which was associated with a hot and dry El Nino weather pattern. The impacts of that drought were felt for many years, with government drought assistance continuing until 2012.

During drought periods water supply reservoirs dip to extremely low levels and all sections of the community are placed on water restrictions to ration consumption in order to maintain supply. Ground water is also depleted due to increased usage of bore water in the face of water restrictions.

However future projections for rainfall for the region are that temperature rises associated with human-induced climate change are almost certain to result in decreased rainfall in Victoria and so future droughts and water shortages are very likely. Therefore Council needs to prepare for the inevitable future droughts by delivering its operations much more efficiently in terms of water use.

Council has already taken steps over the years to reduce its water consumption and to find more sustainable sources. Open space irrigation has been reduced by using more drought tolerant (low-water) turf and landscaping. Alternative sources such as storm water retention and rainwater tanks have also been used, with many buildings in the Shire now having rainwater tanks.

As part of the Sustainable Environment Strategy project, Ironbark Sustainability has undertaken an Energy and Water assessment of Councilôs operations (Ironbark Sustainability 2015). The inventory enables Council to benchmark its current use of mains potable water as captured by water bills for Council buildings and open space.

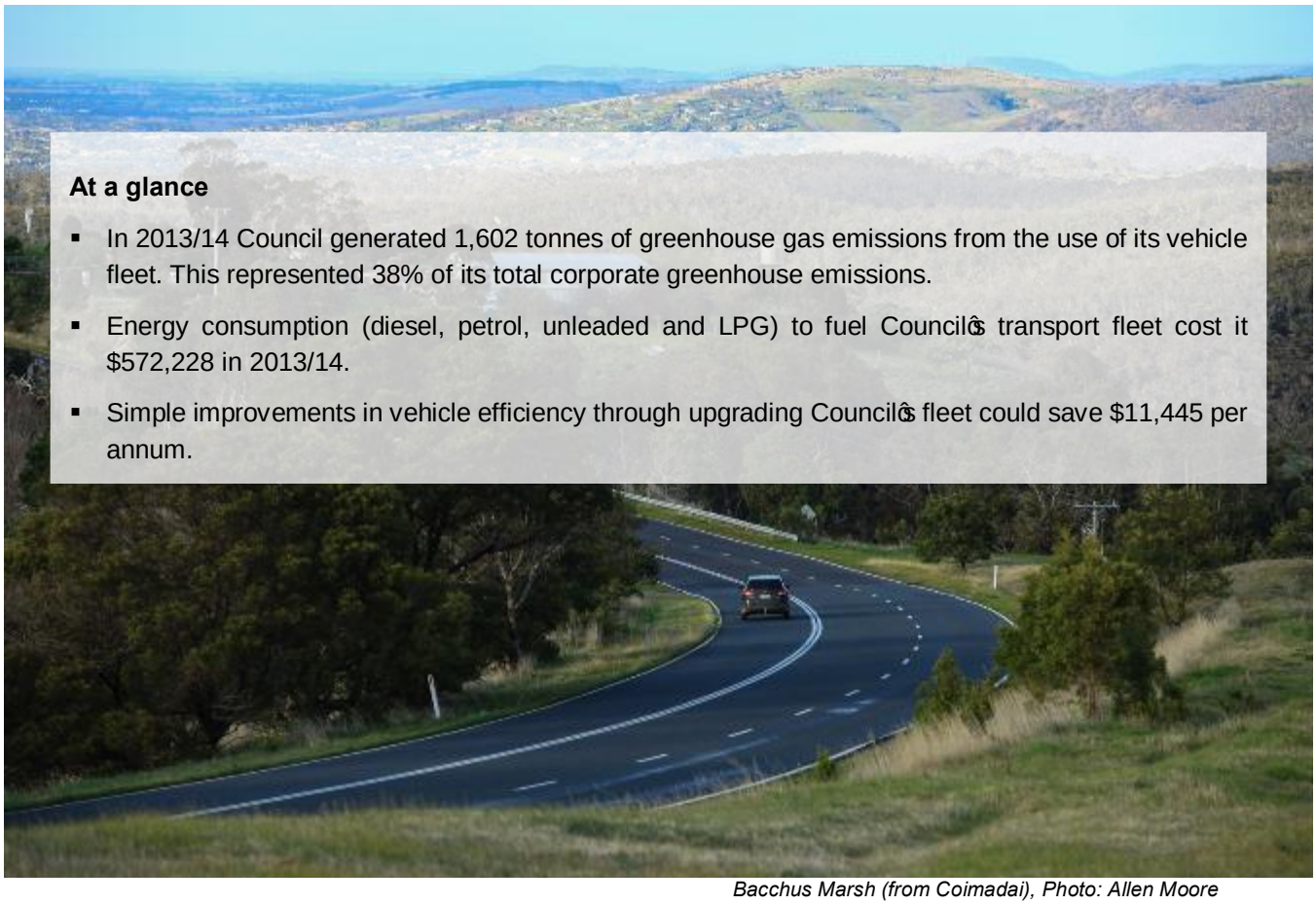
The Water inventory for financial year 2013/14 shows that Council used 20,884 kl of mains water for buildings and open space from available water bills (some small facilities did not have bills available). This represented a total water bill cost of $38,400. This does not include any water sourced from rainwater tanks or stormwater retention or pumped from the river for irrigation, of which an unknown but sizeable proportion is sourced for open space irrigation and facilities.

Significant water savings could be achieved if Council were to undertake a range of retrofit actions to buildings and open space to reduce water consumption and use of mains potable water. However exact cost and water saving estimates through such actions are difficult to provide until a detailed building and open space water assessment and plan is developed.

Strategic objectives for a Water Efficient Council

1. Improve water efficiency of Council buildings and operations.
2. Transition from using potable water to using recycled water or stormwater for Council operations and facilities.

4.2.3 Sustainable Transport in Council



At a glance

- In 2013/14 Council generated 1,602 tonnes of greenhouse gas emissions from the use of its vehicle fleet. This represented 38% of its total corporate greenhouse emissions.
- Energy consumption (diesel, petrol, unleaded and LPG) to fuel Councilôs transport fleet cost it $572,228 in 2013/14.
- Simple improvements in vehicle efficiency through upgrading Councilôs fleet could save $11,445 per annum.

Bacchus Marsh (from Coimadai), Photo: Allen Moore

Sustainable Transport Council vision

We will reduce the greenhouse emissions from the transport used for Council operations.

Context

The direct greenhouse emissions and fuel costs associated with Councils transport are predominantly from:

- Heavy equipment for Council works, particularly the backhoe, large trucks and tippers.
- Staff use of fleet passenger cars to travel to work meetings.

Greenhouse emissions from fleet is the largest sector of Councilõs emissions profile, according to Ironbarkõs inventory, being 38% of emissions from energy in 2013/14 ï greater than buildings, open space or street lighting (see Figure 7 and 8 in Energy Efficient Council). Fleet is also a larger total cost than these other energy use sectors, representing 57% of Councilõs energy costs. Therefore any action that Council can take to reduce its fuel consumption for fleet will save it significant operating costs and greenhouse emissions.

Ironbark has estimated that actions to improve the efficiency of vehicles, largely by using more fuel-efficient vehicles, could save 2% of these costs and emissions (based on best practice comparisons). However if more behaviour change was achieved to reduce and avoid staff usage of fleet vehicles or to drive more efficiently, greater gains could be achieved.

Councilõs Fleet Policy was updated in 2015 with the aim of progress towards a more fuel efficient fleet by 2021. In addition, options to improve the existing fleet booking system are being considered.

Another related transport impact is staff travel to work. Although the greenhouse emissions associated with this are not considered the direct ownership of Council, this is an area that Council can have an influence. As an employer, it is also the responsibility of Council to assist its staff to travel in the most cost effective, healthy and sustainable method possible.

Strategic objectives for sustainable transport in Council

1. Reduce greenhouse emissions from vehicle usage for Council operations.
2. Reduce greenhouse emissions from staff travel to and from work through supporting a reduction in car trips.

4.3 SUSTAINABLE PLACES

Residential development, Photo: Suzie Brown

4.3.1 Climate Adaptation

At a glance

- Climate change projections show the most serious impacts in Moorabool Shire are very likely to occur from as early as 2030 including: extreme bushfire and extreme heat, with associated drying of the land, and reduction in rainfall and increased risk of drought.
- The risks of climatic change on the operations of Council and the community are very serious and include numerous issues such as: financial costs of replacing damaged assets and maintaining stressed assets, inadequate building standards to cope with extreme weather, poor planning for the impacts of climate change and the slowing of the regional economy.

Photo: Sustainability.com

Climate Adaptation vision

We will support and deliver activities to reduce the impact of and vulnerability to future climate change on the Moorabool Shire community.

Context

As part of current operations, significant work has been undertaken to ensure that Council is ready to respond to natural events, such as flood and fire, through the Community Emergency Risk Assessment (CERA) process.

With the forecast increase in average temperatures and fire and flood events resulting from climate change over the next 40 years, it is important that Council considers actions to manage for this eventuality.

The Western Alliance for Greenhouse Action (WAGA) developed the *Climate Change Adaptation Strategy 2013-2020* and *Action Plan 2013-30* which set out the key risks and a plan of action for its member councils to respond to the priority climate change risks for the region (as described in the *WAGA Climate Change Risk Assessment 2011).*.

These documents show that the greatest risks to Moorabool Shire from climate change are extreme bushfire and extreme heat risks, with associated drying of the land and reduction in rainfall and increased risk of drought.

A summary of the climate impacts and risks for Melbourneõs west as outlined in the WAGA reports is as follows:

1. **Higher average temperatures and solar radiation**
    - Increasing average temperatures over time with a high degree of certainty.
    - By 2030, average daily maximum temperatures are likely to rise by 0.5 to 1.5°C over most of Victoria; by 2070, they are likely to rise by 0.7 to 5.0°C compared to 1990. There will be more hot days and fewer cold days. Widespread decreases in atmospheric moisture are likely.
2. **Reduced rainfall, but heavier rainfall during rain events**
    - Although average annual and seasonal total rainfall is expected to decline, the intensity of heavy daily rainfall is likely to rise in most seasons. However, fewer rain days are anticipated, along with more droughts. These heavy rains could contribute to soil erosion and movement.
    - Reductions in the total average annual rainfall of around four per cent are expected, with the greatest percentage reductions occurring in spring (7%) compared with 1990 figures. In Melbourne, the average long-term stream flow into water supply catchments could be reduced by up to 11 per cent by 2020, and as much as 35 per cent by 2050. Projections suggest that annual runoff to the Maribyrnong and Werribee Rivers could reduce by five to 30 per cent by 2030.
3. **Increasing intensity and frequency of extreme weather events**
    - Without global action to reduce emissions, by 2070 Melbourneõs average number of days above 35°C are likely to increase from 9 to 26. An increase in the frequency, intensity and duration of heat waves may also amplify the risk of heat-related health problems, particularly in urban areas. Higher temperatures may also shift energy use from winter heating to summer cooling.
    - ñExtremeò fire danger days are expected to increase by 12 to 38 per cent by 2020, and by 20 to 135 per cent by 2050. Between 2000 and 2007, Victoria experienced a 62 per cent increase in fire weather warnings. By 2020, they may occur twice as often, and by 2050 four to five times as often. This means the Melbourne region would experience catastrophic fire days once every 2.4 years on average, instead of the current average of once every 33 years.

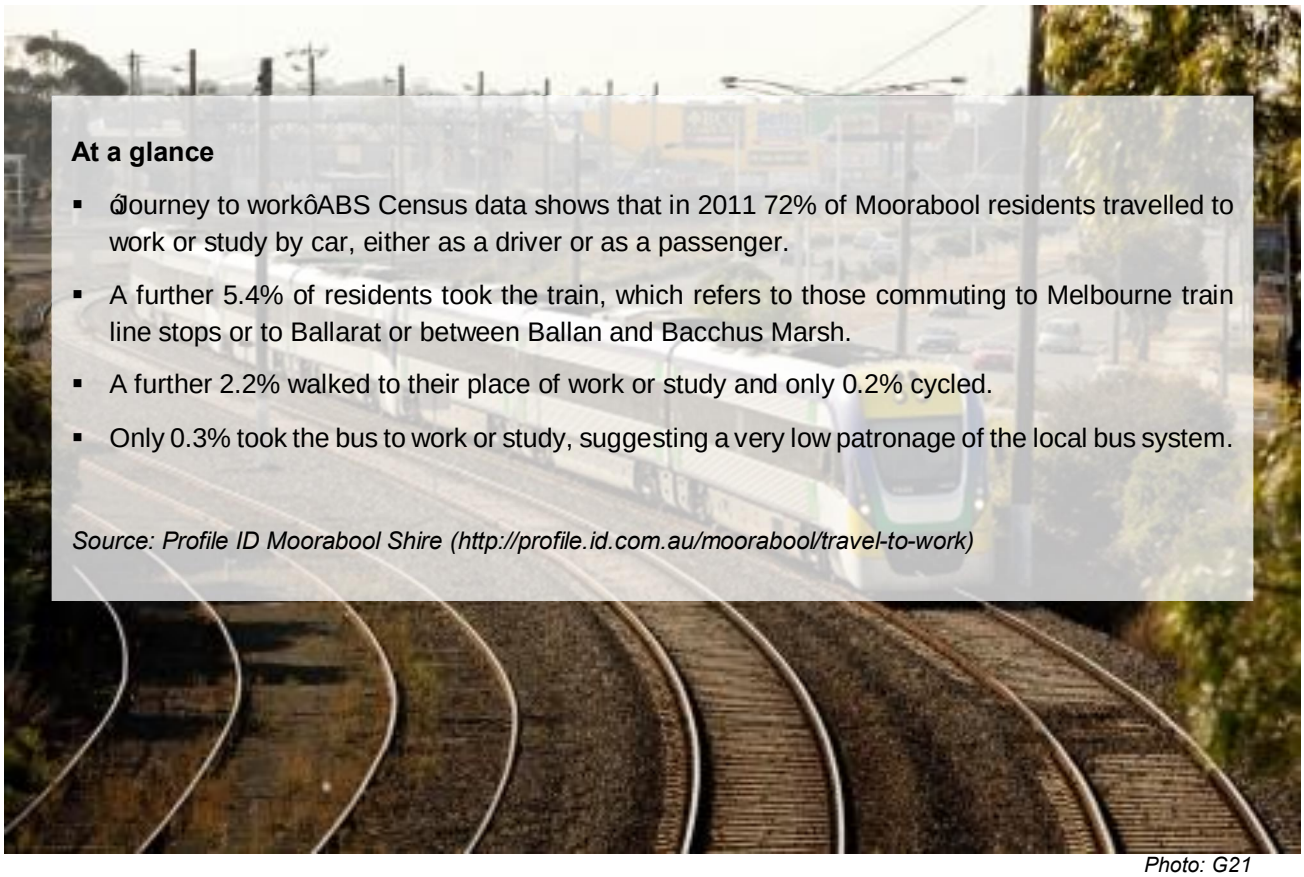
The WAGA climate adaptation work also involved identifying major risks or threats to the region that each council needs to plan for and mitigate the impact of. It is important to note that WAGA only included risks that were applicable to entire WAGA region or multiple councils. There are likely to be other risks unique to

Moorabool and not shared by other councils in the WAGA region. Therefore Council needs to consider additional possible risks when doing its climate adaptation planning.

Strategic objectives for climate adaptation

1. To ensure that Moorabool Shire has understood the risks of climate change on Council operations and takes actions to prepare for and mitigate these risks.
2. To ensure that Council has understood the risks of climate change to the community and is working with the community to help prepare for and mitigate the risks.

4.3.2 Sustainable Community Transport



At a glance

- ôJourney to workôABS Census data shows that in 2011 72% of Moorabool residents travelled to work or study by car, either as a driver or as a passenger.
- A further 5.4% of residents took the train, which refers to those commuting to Melbourne train line stops or to Ballarat or between Ballan and Bacchus Marsh.
- A further 2.2% walked to their place of work or study and only 0.2% cycled.
- Only 0.3% took the bus to work or study, suggesting a very low patronage of the local bus system.

Source: Profile ID Moorabool Shire (http://profile.id.com.au/moorabool/travel-to-work)

Photo: G21

Sustainable Transport Infrastructure & Engagement vision

There is a reduction in vehicle trips in the Shire as a result of Council's provision, promotion and advocacy for community transport infrastructure and programs to support cycling, walking and public transport.

Context

Transport behaviour in Moorabool Shire is heavily car dependent, which is not unusual for a peri-urban shire. ABS Census data on residentsô mode of traveling to work (Journey to Work data) shows that in 2011 72% of Moorabool residents travelled to work or study by car, either as a driver or a passenger. A further 5.4% took the train, which refers to those commuting to Melbourne train line stops or to Ballarat or between Ballan and Bacchus Marsh. A further 2.2% walked to their place of work or study and only 0.2% cycled. Only 0.3% took the bus to work or study, suggesting a very low patronage of the local bus system[7].

In Moorabool Shire there are affordable and direct connections by train from Ballan and Bacchus Marsh to Melbourne and Ballarat, however community feedback suggests more frequent services would be desired. The bus network is quite limited with services mainly in Bacchus Marsh. Community feedback also suggests better coordination between bus and train services would assist increased uptake of public transport use.

Cycling and walking are well-utilised within townships and Council continues to work to improve cycling and walking access particularly in Bacchus Marsh.

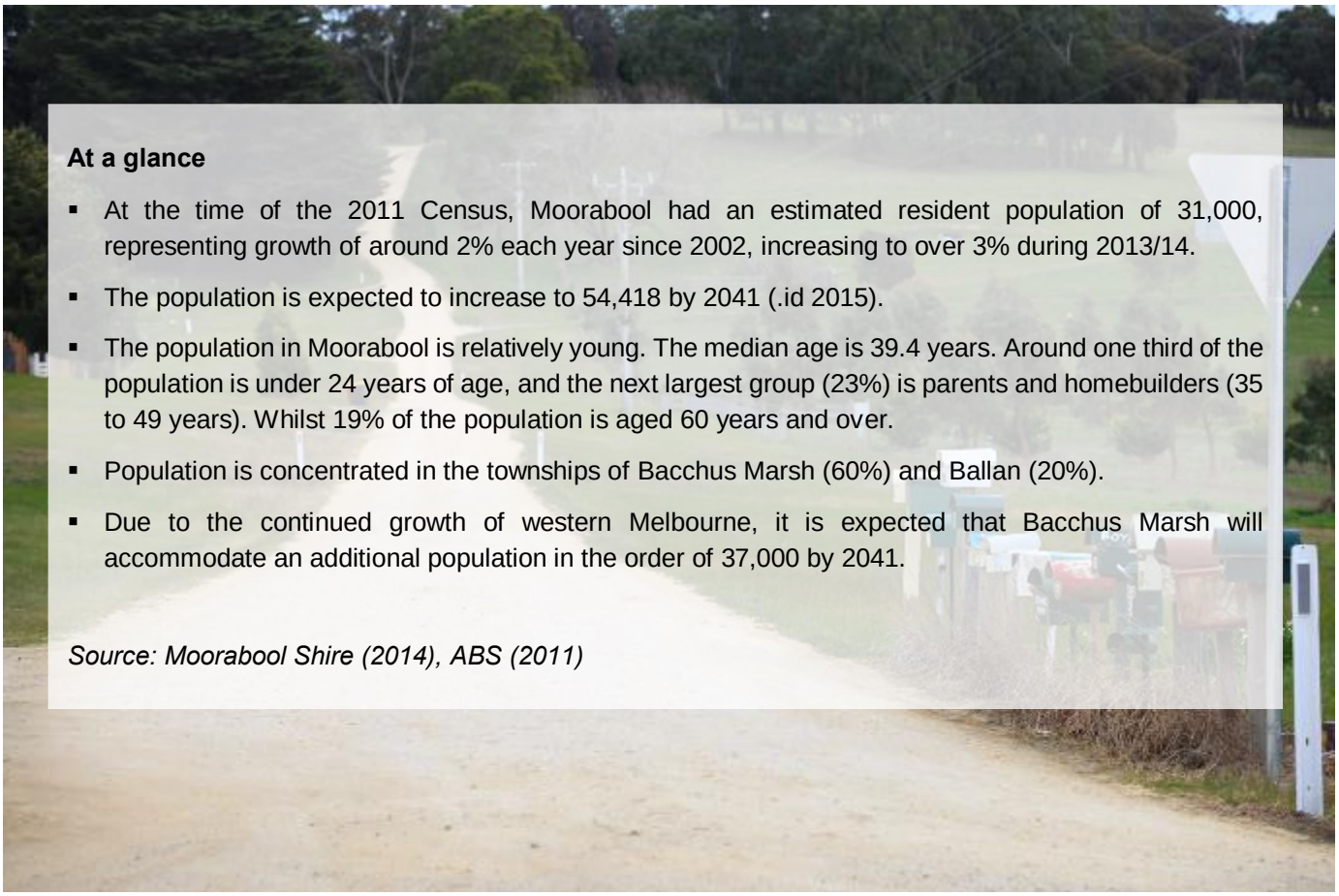
In 2014 and 2015 Council completed the Moorabool Hike & Bike Strategy and Bacchus Marsh Integrated Transport Strategies which aim to improve the connectivity of existing road networks and promote greater cycling and walking, by constructing interconnected cycling and walking paths to link key destinations.

Strategic objectives for Sustainable Transport infrastructure and engagement

1. Ensure transport infrastructure in Bacchus Marsh and Ballan is integrated to support greater linked use between modes and better planning for active transport modes.
2. Provide cycling and walking infrastructure to support increased use of these modes instead of driving.
3. Support the increased use of public transport in the Shire in place of car travel.

[7] Source: Profile ID Moorabool Shire http://profile.id.com.au/moorabool/travel-to-work

4.3.3 Urban development and planning



At a glance

- At the time of the 2011 Census, Moorabool had an estimated resident population of 31,000, representing growth of around 2% each year since 2002, increasing to over 3% during 2013/14.
- The population is expected to increase to 54,418 by 2041 (.id 2015).
- The population in Moorabool is relatively young. The median age is 39.4 years. Around one third of the population is under 24 years of age, and the next largest group (23%) is parents and homebuilders (35 to 49 years). Whilst 19% of the population is aged 60 years and over.
- Population is concentrated in the townships of Bacchus Marsh (60%) and Ballan (20%).
- Due to the continued growth of western Melbourne, it is expected that Bacchus Marsh will accommodate an additional population in the order of 37,000 by 2041.

Source: Moorabool Shire (2014), ABS (2011)

Mt Egerton, Photo: Allen Moore

Urban development and planning vision

We will support development that respects and conserves Moorabool Shire's natural environment and reduces future environmental impacts from increased population growth and new development.

Context

Moorabool Shire is centrally located between Melbourne and Ballarat with easy access to Geelong and Bendigo via highways and transport, making it an attractive destination for those seeking affordable housing, a rural lifestyle and access to employment and services in major cities.

Population growth since 2002 has been at about the state average and is projected to be considerably higher than average to 2022 (Department of Health 2013). This is reflected in the most recent population data, showing that during the 2013/14 year the growth rate was 3.3% (a 36% increase on the average annual growth rate of 2.1%). The population is expected to grow from the current population of 31,000 to approximately 49,000 by 2036 however given the recent increased rate of growth this projected figure may be reached sooner (Moorabool Shire 2014).

Moorabool is a young community with approximately one third of the population aged 24 years or younger. The next highest group are those in the ópparent and homebuilderô demographicõ aged 35 ï 49 years (accounting for approximately 23% of the total population). Approximately 19% of the population is aged 60 years and over (ABS 2011).

Most of the growth in the Shire is concentrated in the east, around Bacchus Marsh. Currently, more than half the Shireôs population lives in Bacchus Marsh and surrounds (approximately 19,032), followed by Ballan (6,534). The remaining population is distributed across a number of small towns, hamlets and farming areas within the Shire. Council has identified Bacchus Marsh and Ballan as the main locations for future growth, as they already have established infrastructure to accommodate new growth (Moorabool Shire 2014).

Moorabool Shire is currently developing an Urban Growth Strategy and a Rural Growth Strategy in response to population growth pressures and other land use issues such as the preservation of significant natural environments and agricultural land. Central to these strategies is the *Moorabool 2041 Strategy,* which will guide planning and future decision making in the Shire over the coming decades to 2041. Moorabool Shire is also a member of the Peri-Urban Group of Rural Councils, which aims to promote a comprehensive vision for the peri-urban region of the Melbourne metropolitan fringe.

The increasing population means that now more than ever, it is imperative that a balance is struck between accommodating this present growth and protecting the natural environmental values and the needs of future generations. Council is well placed to demonstrate leadership in environmentally sensitive and sustainable development. This can be achieved through land use planning decisions that protect natural resources, productive agricultural land and landscape aesthetics. Council can also influence new residential and commercial development to ensure higher environmental standards for new buildings as well as water, renewable energy and biodiversity-sensitive urban streetscapes.

There will be challenges for Council in achieving sustainable development. These include, but are not limited to:

- Managing and restricting development pressure in areas of high biodiversity and landscape values (particularly in areas that have high conservation significance, but are not well understood by the community such as grasslands).
- Early identification of biolink and connectivity opportunities and protecting these areas from development.
- Protecting productive agricultural land from development.
- Advocating for and engaging the community in more sustainable, environmentally sensitive urban developments and settlements.

Strategic objectives for urban development and planning

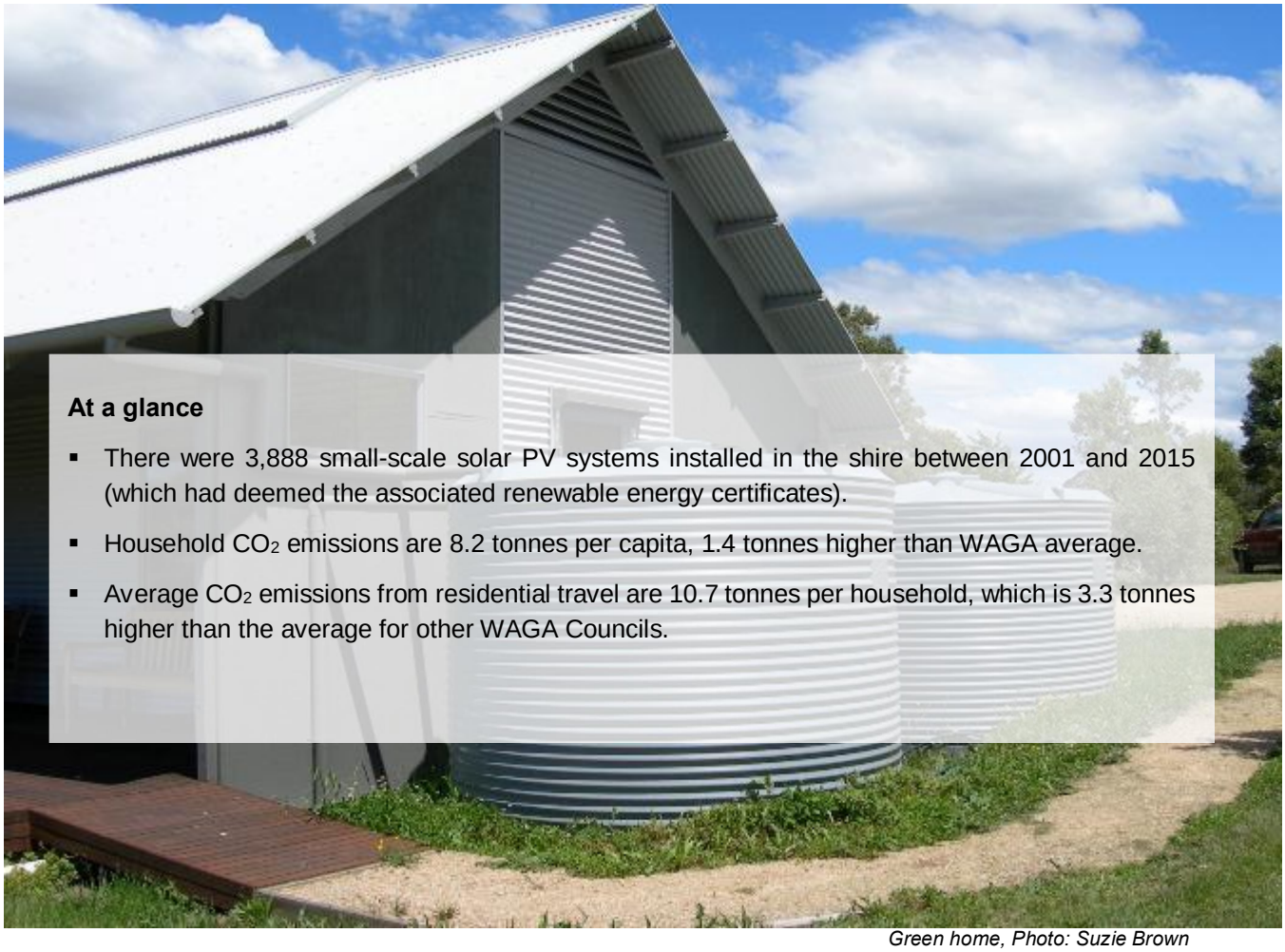
1. To ensure that attention to natural values are embedded within structure planning processes to allow for protection of natural assets.
2. Access and collate the most up-to-date data sets to support strengthened environmental policies within Mooraboolôs planning scheme aimed at protecting natural assets.
3. Improve access to and connectivity between residents and open space and natural reserve areas.
4. Use the planning process to improve the standard of new residential or commercial buildings or renovations in the Shire.
5. New residential or mixed use precincts are designed with sustainability at the core of their structure plan including support for cycling/walking/public transport, abundant recreation space, greenspaces and biodiversity, shops or services within walking distance, water sensitive urban design, stormwater reuse and design for passive solar or solar panels.

4.4 LIVE & WORK SUSTAINABLY

Blackwood, Photo: Allen Moore

Bacchus Marsh, Photo: Moorabool Visitor Information

4.4.1 Clean Energy and Energy & Water Efficient Community



At a glance

- There were 3,888 small-scale solar PV systems installed in the shire between 2001 and 2015 (which had deemed the associated renewable energy certificates).
- Household CO_2 emissions are 8.2 tonnes per capita, 1.4 tonnes higher than WAGA average.
- Average CO_2 emissions from residential travel are 10.7 tonnes per household, which is 3.3 tonnes higher than the average for other WAGA Councils.

Green home, Photo: Suzie Brown

Clean Energy & Energy & Water Efficient Community vision

There is a measurable decrease in greenhouse emissions and potable water use in the Moorabool business and residential community.

Context

As outlined in the Climate Adaptation section, the impacts of climate change are likely to be severe, and have already been felt in the last two decades in the form of heatwaves, drought and extreme bushfire. It is crucial that the whole community be informed about climate change and be engaged to play their role in reducing its impacts. One of the main actions households and businesses can take is to reduce their greenhouse emissions from their home energy, transport or business energy needs.

In 2006 a SGS Economic and Planning report found that, when compared to the 7 Councils in the Western Alliance for Greenhouse Action (WAGA) CO_2 emissions per capita from Moorabool residents were 1.4 tonnes above the average for all WAGA Councils. The report found that this was largely as a result of higher than average emissions resulting from residential travel.[8]

In addition, to handle the increased incidence of heatwaves it benefits residentsôhealth and safety if their homes are retrofitted to keep them cooler in summer (and warmer in winter) ï vulnerable groups such as the elderly and families with infants need priority for this assistance.

These actions often also cut household energy bills, and many energy efficiency actions have a very short payback period (see Figure 1 in the Energy Efficient Council section). In addition solar PV has become a very good investment as panel prices have come down whilst energy bills have risen. Therefore the payback period is now quite short for installing panels.

Due to limited resources, Council currently does very little work in the energy efficiency and clean energy engagement area, other than provide information on its website. In 2009 Council ran a well-received bulk buy program of solar photovoltaic (PV) systems, which allowed residents to buy a discounted rooftop solar system which was pre-arranged with a reputable supplier.

Between 2001 and May 2015 there were 3,888 small-scale solar systems installed in the Shire[9] ï these were the systems for which the renewable energy certificates were deemed via the Federal Clean Energy Regulator, so it is possible there were more systems than this, as well as the systems that were installed prior to 2001.

Currently there are very few Victorian Government programs for the community on energy efficiency or renewable energy as a result of the recent change of government. Previous government programs have mostly ceased and were very few anyway. The new government has stated that climate action is a priority therefore it is likely that funding and programs for councils and communities will arise in the 2015-19 period. Council needs to maintain close communications with Sustainability Victoria and the Department of Environment, Land, Water and Planning (DELWP) to seek out opportunities to offer its community.

As outlined in the sections on Water Efficient Council and Climate Adaptation, Victoria experienced regular droughts and these are becoming more severe as a result of climate change. The 1995-2009 drought was probably Australiaôs worst ever drought and resulted in water supply reservoirs reaching dangerously low levels and some drying up completely. The community were put on high-level water restrictions to reduce consumption, whilst water saving measures such as rainwater tanks and efficient showerheads and toilets were well implemented.

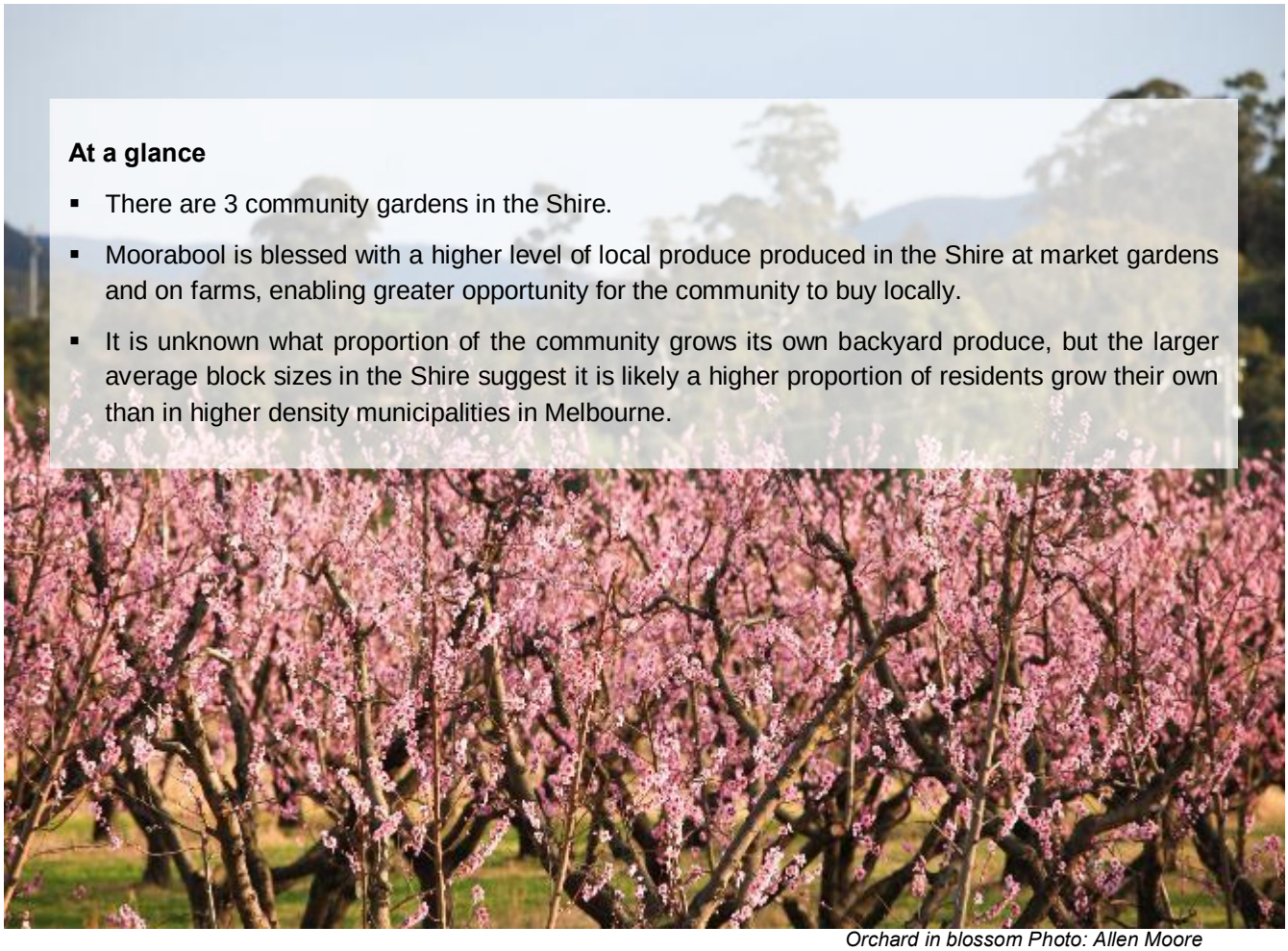
[8] Source: https://www.acfonline.org.au/sites/default/files/resources/Werribee-Plains-ACF-WAGA-Energy-Research-Study.pdf
[9] Source: http://ret.cleanenergyregulator.gov.au/REC-Registry/Data-reports#Latest-data

As the likelihood of future drought is high, continued action to increase household water efficiency and increase the use of rainwater collection is needed to ôfuture-proofô our water supplies. This is more difficult during the current period of higher water levels and few water restrictions, but Council and water authorities can continue to play a key role in supporting action.

Strategic objectives for Clean Energy and Water & Energy Efficient Community

1. Council to advocate to other levels of government to reduce the cost burden on residents of energy through funded energy and water efficiency and renewable energy programs.
2. Council to work with water authorities and energy retailers to gather data about community water and energy usage and opportunities for greater efficiency.
3. Council to develop a Water & Energy Efficient Communities engagement strategy to promote existing State Government programs that assist the community to:
    a) Reduce greenhouse emissions from electricity and gas use.
    b) Increase the proportion of energy coming from renewable energy sources for community power needs.
    c) Improve water efficiency of businesses and residences in Moorabool.
    d) Increase the use of greywater, rainwater tanks and stormwater harvesting methods to replace the use of potable mains water in businesses and residences.

4.4.2 Local Food



At a glance

- There are 3 community gardens in the Shire.
- Moorabool is blessed with a higher level of local produce produced in the Shire at market gardens and on farms, enabling greater opportunity for the community to buy locally.
- It is unknown what proportion of the community grows its own backyard produce, but the larger average block sizes in the Shire suggest it is likely a higher proportion of residents grow their own than in higher density municipalities in Melbourne.

Orchard in blossom Photo: Allen Moore

Local Food vision

There is a measurable increase in the community growing their own food and buying more of their food from local food producers.

Context

As the impacts of climate change are felt, there are a number of climate impacts which threaten our food supply including:

- Water shortages due to drought reducing rainfall and water storages
- Heatwaves causing the loss or drop in quality of produce
- Bushfire causing the loss of crops, livestock and grazing land
- Unpredictable impacts of pests such as insects damaging food production.

Peak oil (where the cost of oil becomes more and more expensive as extraction becomes more difficult) could result in the cost of food increasing dramatically since many inputs to large-scale food production rely on oil (transport, fertilizer, machinery etc.).

Moorabool Shire has a large supply of local food, with the presence of market gardens as well as small to large-scale agricultural production on farms. Supporting this local food production, connecting it to local residents, and also supporting local residents to grow some of their own food are all important actions.

Council has put some energy into supporting the development of community gardens in the Shire in recent times and there are now at least three community gardens: Darley Community Art Garden, Hospital Garden Ballan, Friendship Garden at Ballan.

Moorabool Environment Group does a range of activities to support people growing their own food, buying locally and growing in the community gardens. The Bacchus Marsh Produce Swap is one example, where residents are invited once a month to meet to exchange or offer excess produce.

Strategic objectives for Local Food

Moorabool Shire to promote activities that:

1. Increase local production of food by residents and businesses in Moorabool Shire.
2. Increase local sales and consumption of locally produced food in Moorabool Shire.
3. Increase participation in community food production activities including community gardens, food swaps and local farmers markets.

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Appendix 1: Strategic and legislative framework

National

Legislation	Policy Strategy and Agreements
▪ Aboriginal and Torres Strait Islander Heritage Act 1984 ▪ Australian Heritage Commission Act 1975 (Register of the National Estate) ▪ Environment Protection and Biodiversity Conservation Act 1999 ▪ Native Title Act 1993 ▪ Water Act 2007	▪ A Directory of Important Wetlands in Australia (EA 2001) ▪ Australiaôs Biodiversity Conservation Strategy 2010ï 2030 ▪ Australian Pest Animal Strategy 2007 ▪ National Framework for the Management and Monitoring of Australiaôs Native Vegetation (2001) ▪ National Indigenous Reform Agreement (Closing the Gap) ▪ National Water Quality Management Strategy (1992) ▪ Strategy for Australiaôs National Reserve System 2009ï 2030 ▪ The Australian Weeds Strategy (revised 2007) ▪ Wetlands Policy of the Commonwealth Government of Australia 1997

State

Legislation	Policy Strategy and Agreements
▪ Aboriginal Heritage Act 2006 ▪ Catchment and Land Protection Act 1994 ▪ Climate Change Act 2010 ▪ Conservation, Forests and Lands Act 1987 ▪ Cooperative Management Agreement 2004 ▪ Crown Land (Reserves) Act 1978 ▪ Environment Protection Act 1970 ▪ Fisheries Act 1995 ▪ Flora and Fauna Guarantee Act 1988 ▪ Forests Act 1958 ▪ Heritage Rivers Act 1992 ▪ Land Act 1958 ▪ National Parks Act 1975 ▪ Parks Victoria Act 1998 ▪ Planning and Environment Act ▪ Reference Areas Act 1978 ▪ State Environment Protection Policy (Waters of Victoria) 2003 ▪ Sustainable Forests (Timber) Act 2004 ▪ Traditional Owner Settlement Act 2010 ▪ Assessment Council Act 2001 ▪ Victorian Conservation Trust Act 1972 ▪ Water Act 1989 ▪ Wildlife Act 1975	▪ Biosecurity Strategy for Victoria 2009 ▪ Indigenous Partnership Framework 2007-10 (reviewed 2010) ▪ Invasive Plants and Animal Policy Framework 2010 ▪ Our Water Our Future (DSE 2004) ▪ Native Vegetation Management ï A Framework for Action (Revised 2005) ▪ Policy for Sustainable Recreation and Tourism on Victoriaôs Public Land 2002 ▪ State Environment Protection Policy (Waters of Victoria 1988) ▪ State Environment Protection Policy (Groundwaters of Victoria) 1997 ▪ Sustainability Charter for Victoriaôs State Forests 2006 ▪ 2009 Victorian Bushfires Royal Commission ▪ Victorian Bushfire Strategy 2008 ▪ Victorian Landcare Program Strategic Plan 2012 ▪ Victorian Flood Management Strategy 1998 ▪ Victorian Planning Provisions 1998-1999 ▪ Victorian Waterway Management Strategy 2013 ▪ Victorian Floodplain Management Strategy 2016 ▪ Victoriaôs Nature based Tourism Strategy 2008ï 2012 ▪ Victoriaôs Salinity Management Framework 2000 ▪ Water for Victoria (discussion paper) 2016

Regional

Legislation	Policy Strategy and Agreements
▪ N/A	▪ Central Highlands Regional Growth Plan 2014 ▪ Grampians Central West Waste and Resource Recovery Group Implementation Plan 2016 (draft) ▪ South West Landscape Assessment Study 2012 ▪ Grow West Implementation Plan 2013 ▪ Corangamite Regional Catchment Strategy 2013 ▪ Corangamite Waterway Strategy 2014 ï 2022 ▪ Corangamite Landcare Support Plan 2013 ▪ Corangamite Invasive Plant and Animal Management Strategy ▪ Corangamite Soil Health Strategy 2006 ï 2012 ▪ Corangamite Native Vegetation Plan 2003 ï 2008 ▪ Corangamite Salinity Action Plan 2005 ï 2008 ▪ Corangamite Wetland Strategy 2006 - 2011 ▪ Port Phillip and Westernport Regional Catchment Strategy ▪ Port Phillip and Westernport Healthy Waterways Strategy 2013 ▪ Port Phillip and Westernport Native Vegetation Plan 2006 ▪ Port Phillip and Westernport Rabbit Action Plan 2003 ▪ Port Phillip and Westernport Weed Action Plan 2003 ▪ Melbourne Water Port Phillip and Westernport Region Flood Management and Drainage Strategy 2007 ▪ Western Alliance for Greenhouse Action (WAGA) (2012), *Climate Change Adaptation Strategy 2013-2020 Full Report* ▪ Western Alliance for Greenhouse Action (WAGA) (2012) *Climate Change Adaptation Action Plan 2013-30* ▪ Western Alliance for Greenhouse Action (WAGA) (2011) *Climate Change Risk Assessment* ▪ Western Alliance for Greenhouse Action (WAGA) (2014) *Low Carbon West: A Strategy for a Transition to a Low Carbon Economy in the WAGA Region*

Appendix 2: Bioregions and ecological communities of Moorabool Shire

Bioregions of the Moorabool Shire

Bioregions are a landscape-scale approach to classifying the environment using a range of attributes such as climate, geomorphology, geology, soils and vegetation. Bioregions capture the patterns and ecological characteristics in the landscape. There are 28 bioregions identified across Victoria (DEPI 2014).

Within Moorabool Shire there are two bioregions that characterise the landscape. An overview of these bioregions is provided in Table 4.

Table 4. Bioregions of Moorabool Shire

Bioregion	Characteristic
Central Victorian Uplands	Dominated by Lower Palaeozoic deposits giving rise to dissected uplands at higher elevations, amongst granite and sedimentary terrain metamorphic and old volcanic rocks, which have formed steeply sloped peaks and ridges. Supports grassy woodlands and forests (DEPI 2014). Extends across the north of the Shire.
Victorian Volcanic Plains	Vast open areas of grasslands and small patches of open woodland. Dominated by Cainozoic volcanic deposits that formed extensive flat to undulating basaltic plain with stony rises, old lava flows, numerous volcanic cones and old eruptions points and is dotted with shallow lakes both salt and freshwater. Numerous volcanic cones (scoria and basalt) dot the landscape (DEPI 2014). South of the Shire. Supports productive agricultural land.

Ecological communities

The large areas of protected reserves within Moorabool Shire provide good examples of intact remnants of original ecosystems. These areas are important habitat and refuge for threatened flora and fauna that are known to occur in the Shire. Council reserves and many of the roadsides across the Shire also provide important habitat values for threatened flora and fauna.

The natural environment of Moorabool Shire also provides important ecosystem services for humanity like clean water, fresh air, food, fuel and energy. Subsequently, the use of natural resources to provide these services has resulted in significant change to the natural, or ecological, function of the landscape in Moorabool Shire.

Steps are being taken to restore the ecological function of the landscape, with landholders, Landcare, programs such as Grow West and Council undertaking activities to rehabilitate the natural environment and restore some of its former ecological function. These activities and proposed actions such as increasing the connectivity between reserves and patches of remnant habitat, will contribute to the protection and restoration of ecological communities within the Shire.

There are five ecological communities in the Shire that are listed under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*. These are identified in Table 5.

Table 5. Endangered ecological communities in Moorabool Shire (DoE 2014)

Ecological community	Status
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically endangered
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically endangered
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically endangered
White Box-Yellow Box-Blakelyôs Red Gum Grassy Woodland and Derived Native Grassland	Critically endangered
Grey Box *(Eucalyptus microcarpa)* Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered

In addition, there are 32 threatened species (17 fauna species and 15 flora species) that are listed under the *EPBC Act,* as well as 11 migratory species. Two of these species are critically endangered:

- Golden Sun Moth *(Synemon plana)*
- Plains Rice-flower *(Pimelea spinescens subsp. spinescens)* (DoE 2014).