



Climate Change Strategy and Action Plan 2025 - 2035



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Climate Change Strategy and Action Plan

Acknowledgement of Country

This land, also known as the Shire of Serpentine Jarrahdale, has been a cradle of life, a canvas of dreams, and a testament to the resilience and strength of the original inhabitants since time immemorial. Their spirit has shaped and nurtured this land, leaving an indelible imprint on every grain of sand and blade of grass, and we pay respect to them for their enduring presence and stewardship of these lands throughout the ages.

The President, Councillors and staff of the Shire of Serpentine Jarrahdale acknowledge the Nyungar people of Bindjareb boodja as the traditional custodians of this land. We pay our respect to their elders, past, present, and emerging, for they hold the memories, traditions and culture of their people. We acknowledge their enduring connection to this land, a connection that has survived and thrived through countless seasons, challenges, and changes.

As we consider and implement the contents of this document, let us remember to tread gently and respectfully on this ground, honouring the wisdom of the ages that it holds, and the future it continues to nurture.

Executive Summary

The changing climate has extensive and significant social, economic, and legal implications for local government and the community. The Shire of Serpentine Jarrahdale is already experiencing the effects of the changing climate, including higher temperatures, more heat waves, reduced rainfall, more frequent and intense heavy rainfall events, increased fire danger, and changes to biodiversity.

The Shire has a fundamental role in responding to the changing climate, given its responsibilities for land use planning, emergency management, ownership of public infrastructure, and delivery of community services.

This strategy's vision is for the Shire of Serpentine Jarrahdale to emerge as a leader in climate resilience and sustainability, aspire to achieve carbon neutrality as a local government and commit to collaborating with the community to adapt to our evolving climate.

The Shire sought direction from the community on how to establish a sustainable and climate-resilient future. The community shared their vision, aspirations, and insights on potential actions. This vision has been used to develop a resilience roadmap with 14 objectives to achieve carbon neutrality and increase adaptive capacity.

1. Demonstrate strong climate leadership
2. Achieve net zero emissions
3. Transition to zero emissions fleet
4. Reduce and eliminate emissions from waste
5. Transition to 100% renewable energy
6. Increase efficiency of energy consumption
7. Innovate for a smart city
8. Educate and collaborate
9. Foster the waterwise shire
10. Conserve biodiversity
11. Increase urban and rural forest canopy
12. Maintain community infrastructure
13. Enhance health and wellbeing
14. Manage peri-urban hypergrowth

Introduction

The changing climate is already impacting the Shire of Serpentine Jarrahdale. The increased frequency and intensity of heatwaves and bushfires has significant effects on both natural and constructed environments, and it is anticipated that the impacts on infrastructure and communities will escalate in the future.

Local governments are on the frontline in addressing the impacts of the changing climate and have a critical role in tailoring responses to the specific risks in their area, and in consulting and involving local communities and stakeholders. Local governments can implement planning and development measures that reduce the impacts of the changing climate on the community.

Responding to the changing climate needs a comprehensive approach that includes both mitigation and adaptation. Mitigation measures aim to reduce and eliminate human sources of greenhouse gas emissions, while adaptation actions reduce risks from climate impacts and address those that are inevitable.

Climate resilience is being prepared to respond and adapt to future uncertainties while maintaining fundamental functions and identity. Resilience is of paramount importance in facing the impacts of the changing climate and local governments need to be proactive in their response strategies.

Achievements to date

Policy achievements

In January 2011, Council supported a Climate Change Position Statement with the objective to ensure that Serpentine Jarrahdale:

- Understands and addresses climate change impacts in a local, regional and international context;
- Evaluates the climate change implications of operational decisions and policy positions; and
- Is committed to greenhouse emissions reductions and risk management through appropriate mitigation and adaptation strategies.

In May 2015, Council adopted a Climate Change Strategy and Local Action Plan which has directed the functions of the Shire in respect to climate change mitigation and adaptation. Twenty actions were identified, with the following identified as key actions:

2. Incorporate global, national, regional and local, scientifically based research for predictive modelling, scenario planning, identification of knowledge gaps and information dissemination.
3. Incorporate relevant up to date risk assessment information.
6. Promote and educate the community on the importance of local food production, good public transport, the slow food movement, food miles and resource recycling.
12. Integrate fire management practices that maintain levels of public safety while conserving biodiversity, through use and promotion of low flammability plants and fire plans developed for natural areas in consultation with local governments and land managers.
13. Climate change is expected to favour species that are highly adaptable to change, which are often pest and weed species. Consider the introduction of an adequately funded regional campaign to address new and emerging weed and pest species.
15. Incorporate new "growing biodiversity and green" technologies and initiative such as roof, wall gardens and design opportunities to enhance Green Infrastructure as an adaptive response to climate change.
16. Plan for larger, more complex and more frequent disasters that cross local government boundaries.

In June 2022, Council requested the Chief Executive Officer to develop an updated Climate Change Strategy and Local Action Plan. This resolution formed part of the commitments detailed in the Climate Change Declaration endorsed by Council and signed by the Shire President in March 2023.

Additional achievements

The 2015 strategy provides the broad framework to the organisation's ongoing response to the changing climate. The action plan has not been updated since then, and numerous additional actions are being undertaken that contribute to combating the impacts of the changing climate. These include:

1. Policy framework:
 - Urban and Rural Forest Strategy 2018-2028;
 - State of the Environment Report 2019;
 - Gold Waterwise Council accreditation, with a Waterwise Action Plan;
 - Founding member of the South East Regional Energy Group (SEREG) since 1999;

- Switch Your Thinking's Business Plan 2020/21 – 2024/25.
2. Planning, urban design and building regulation:
 - Ensuring structure plans provide for mixed use walkable communities;
 - Ensuring integration of the Byford Rail Extension into the urban fabric of the town;
 - Emphasising opportunities for bike path planning;
 - Ensuring built form responds to the inherent bushfire risk on the landscape.
 3. Education:
 - Sustainability-themed programs and events;
 - School holiday events featuring environmental or sustainability topics;
 - Switch Your Thinking's sustainability and energy-efficiency programs and events.
 4. ICT programs:
 - E-waste strategy ensures no e-waste goes into landfill;
 - Strategic Information Systems Plan has sustainability as a key theme;
 - Cloud-based strategy aims to reduce on-premise equipment and power consumption.
 5. Infrastructure:
 - Solar panels installed on 14 facilities;
 - Sustainable power purchase agreement negotiated through WALGA for highest electricity consuming sites (>50MWh per year);
 - LED street lighting required in all new developments;
 - Water Sensitive Urban Design (WSUD) implemented in all new developments;
 - Footpath extension and renewal programs to encourage walkability and reduced car use;
 - Playground renewal to increase shade and make playable even in hotter environments.
 6. Landscaping and parks:
 - Low water use plants in planning and retrofitting of parks and gardens;
 - Easy maintenance and resilience prioritized in parks and planting programs;
 - Free verge plant program provides free local native seedlings to residents;
 - Free street trees planted on verges.
 7. Risk management:
 - Risks associated with climate change and an action plan included in the Strategic Risk Register;
 - Risk management for large events considers natural disaster mitigation;
 - Bushfire and emergency support brigades maintained, with appliances upgraded and added to;
 - Ensuring high season fire-fighting fleet is allocated to the Shire;
 - Funding bushfire mitigation efforts, with dedicated human resources;
 - Bringing to the attention of other agencies the need to manage the risk of vegetation fuel levels.
 8. In-house action:
 - Energy efficiency education provided to staff
 - Required standards for events include reusable cutlery, no balloons, solar lighting etc.;
 - Battery and light bulb recycling program;
 - Recreation centre café has no single use plastics;

- Energy efficiency report on the recreation centre makes recommendations which are being progressively implemented.

9. In progress:

- Purchase of hybrid vehicles;
- Re-use shop at the transfer station;
- Consideration of solar power for the re-use shop at the transfer station;
- Consideration of introduction of FOGO (Food Organics and Garden Organics) bins;
- Cleaning contracts reviewed to specify separation, sorting and recycling of waste;
- Internal waste management modified to reduce consumption, increase recycling and address improvements;
- West Mundijong Industrial Estate has potential for industrial/commercial solar microgrids and business clusters;
- Agricultural sector is working to adapt to climate change through water and energy efficiency.

Vision

The Shire of Serpentine Jarrahdale will emerge as a leader in climate resilience and sustainability, aspire to achieve carbon neutrality as a local government and commit to collaborating with the community to adapt to our evolving climate.

Impacts of the changing climate in Serpentine Jarrahdale

The changing climate is a key issue for the Shire that impacts almost all aspects of the Shire's operations and responsibilities. The Shire's *State of the Environment Report 2019* discusses climate change as one of the fundamental pressures that affect the natural and built environment:

“Anthropogenic climate change (the enhanced greenhouse effect) is predicted to result in warmer, drier conditions across the south-west of Western Australia. The expected changes will be a significant stress on the atmosphere; affect the ability of the land to support native vegetation and productive agriculture; have significant impacts on surface and groundwater availability and quality; place extreme pressure on ecosystems that are already under threat from many other factors; and impact on the population and urban expansion. Predicted human health impacts include increased heat stress related deaths, failure of public transport and electricity grids, and increased respiratory illness and disease during heatwaves and bushfires. Climate change will significantly affect hydrology and bushfire risk, which in turn will affect many of the themes of this report.”

Climate change is a global threat, and Australia has committed to being part of the solution. The Australian Federal Government has committed to a target of net zero greenhouse gas emissions by 2050, and the Western Australian State Government to a target of 80% below 2020 levels by 2030. These targets can only be achieved through engagement at all levels of government

International scientific consensus is that climate change is occurring, and it is driven by anthropogenic (human) causes, with human activities having a profound impact on the concentration of greenhouse gas emissions since the start of the industrial revolution (around the year 1750). Activities such as the burning of fossil fuels for industry, power and transport, land clearing and agriculture have increased greenhouse gas concentrations in the atmosphere, leading to changes in the climate system over long periods of time.

The Intergovernmental Panel on Climate Change (IPCC) is an international body responsible for assessing the science related to climate change. IPCC assessments provide a scientific basis for governments at all levels to develop climate related policies, and they are fundamental inputs to negotiations at the United Nations Climate Conferences and the negotiation of international climate agreements. The IPCC's latest report as part of the Sixth Assessment Report (AR6), *Climate Change 2021: The Physical Science Basis*, found that:

“It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred.”

“The scale of recent changes across the climate system as a whole – and the present state of many aspects of the climate system – are unprecedented over many centuries to many thousands of years.”

“Human-induced climate change is already affecting many weather and climate extremes in every region across the globe. Evidence of observed changes in extremes such as heatwaves, heavy precipitation, droughts, and tropical cyclones, and, in particular, their attribution to human influence, has strengthened since AR5.”

“Global surface temperature will continue to increase until at least mid-century under all emissions scenarios considered. Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO₂ and other greenhouse gas emissions occur in the coming decades.”

“Many changes due to past and future greenhouse gas emissions are irreversible for centuries to millennia, especially changes in the ocean, ice sheets and global sea level.”

The IPCC also published a *Fact Sheet – Australasia: Climate Change Impacts and Risks* as part of AR6. This identified nine key risks for the Australasian region, which included:

“4. Transition or collapse of.... northern jarrah forests in southern Australia due to hotter and drier conditions with more fires”

Loss of the iconic jarrah forests of the Jarrahdale region would have significant and long-term consequences for both residents and visitors to the area. Widespread vegetation deaths and areas of total collapse have been evident following the unprecedented heat and drought of the summer of 2023/24, giving a preview of the likely conditions of the future.

Projected changes to the local climate of Serpentine Jarrahdale include:

- Further increase in minimum and maximum temperatures, with more extremely hot days and fewer extremely cool days;
- More heat waves that will be longer and hotter;
- Ongoing sea level rise;
- A decrease in cool-season rainfall;
- More frequent, longer and more intense droughts;
- More intense heavy rainfall, particularly for short-duration extreme rainfall events (storms);
- An increase in the number of high fire weather danger days and a longer fire season;
- Changes to biodiversity including increased species extinction.

These changes are likely to pose significant risks to the safety and wellbeing of the community, the natural and built environment and impact the liveability and amenity of the Shire. Council will need to plan and adapt to these changes. Detailed information on the climate models used to predict changes to the Shire’s climate are provided in the Climate Change Physical Risk and Adaptation Plan (Appendix 1).

The role of local government

In 2012, the Councils of Australian Governments (COAG) formally agreed on the roles and responsibilities for climate change mitigation and adaptation in Australia. Local governments are on the frontline in addressing climate change impacts and have a critical role to play in ensuring that mitigation and adaptation responses are suitably tailored to the specific risks in their area, and that local communities and stakeholders are consulted and involved. Local governments have the capacity to implement planning and development measures that reduce the impacts of climate change on all aspects of the community, and therefore have more hands-on responsibilities than the Commonwealth Government and complementary responsibilities to State and Territory governments.

Local governments are responsible for:

- Administering relevant State and Territory and/or Commonwealth legislation to promote adaptation as required including the application of relevant codes;
- Managing risks and impacts to public assets owned and managed by local governments;
- Managing risks and impacts to local government service delivery;
- Collaborating across local governments and with State and Territory governments to manage risks of regional climate change impacts;
- Ensuring policies and regulations under their jurisdiction, including local planning and development regulations, incorporate climate change considerations and are consistent with State and Commonwealth government adaptation approaches;
- Facilitating building resilience and adaptive capacity in the local community, including through providing information about relevant climate change risks;
- Working in partnership with the community, locally based and relevant NGOs, business and other key stakeholders to manage the risks and impacts associated with climate change; and
- Contributing appropriate resources to prepare, prevent, respond and recover from detrimental climatic impacts.

The Shire is responsible for managing the climate risks to its assets (road infrastructure, parks, reserves, public buildings, recreation facilities) and service delivery (waste collection, library and community services, public open space, roads construction, etc). Local governments are also responsible for setting targets to reduce emissions from their operations, incorporating climate change considerations in policies and contributing appropriate resources to prepare, respond and recover from climate change impacts. Councils are best placed to provide localised information about relevant climate risks to help the community build resilience and increase adaptive capacity.

Challenges for local government

Local government is facing significantly more challenges resulting from the changing climate on various fronts.

1. **Council Plans:** Climate change increasingly requires integration into Council Plans, the Corporate Business Plan and Policies, to respond to the impacts of the changing climate. The right balance will need to be found between climate change mitigation and adaptation and other competing priorities, whilst still ensuring the threat of the changing climate is

adequately addressed. Institutional constraints that may pose challenges to implementing the required interventions will also need to be identified and addressed.

- 2. Fund and implement plans:** Funding needs to be available for climate change mitigation and adaptation through the Council Plan, Corporate Business Plan and Long Term Financial Plan, especially for solutions that come with high upfront costs. This will allow innovation and provide access to the best available technology to counter the risks.
- 3. Retrofitting infrastructure:** Due to the increasing intensity of weather events, infrastructure that was built to accommodate certain conditions (for instance volume of rainfall) is being overwhelmed and will need upgrading and retrofitting for greater capacity and energy efficiency with tools such as energy efficient plant and fittings.
- 4. Planning instruments:** Climate change adaptation increasingly requires modification of Local Planning Schemes and other planning policy instruments to incorporate specific planning interventions.
- 5. Decision-making timeframes:** The time horizons for climate change adaptation exceed the political lives of decision-makers at local level, posing challenges to long-term planning.
- 6. Collaboration:** Local governments are increasingly required to link with networks such as the Smart Cities initiative, “Carbon Disclosure Project” and other similar initiatives to assist in monitoring and delivering on projects, and also to identify what new technologies are available and what policies will enable a real difference.
- 7. Community expectations:** Local governments, and especially elected members, are increasingly being held to account by constituents who are being impacted by outcomes resulting from the changing climate. The administration is required to respond to protect the political decision-makers from negligent practices that are evident.

Community consultation

Community Engagement specifically with regard to the Strategy and Action Plan will commence once Council has endorsed the documentation for advertising with the aim of identifying how the Shire should demonstrate climate resilience and sustainability. The first draft of the Climate Change Strategy and Action Plan will be released for public comment, accompanied by an online survey and the comments and suggestions received will be used to update the Climate Change Strategy and Action Plan to reflect the community's concerns and priorities.

Greenhouse gas emissions in Serpentine Jarrahdale

Community emissions profile

A Community Emissions Profile is a tool that provides the greenhouse gas emissions profiles for a specific geographic area such as the Shire. The profiles are designed to help communities, decision makers, and governments act on the changing climate. They offer a snapshot of local emissions, which can assist in planning for emissions reduction.

The carbon footprint for the entire Serpentine Jarrahdale local government area was estimated in 2021 to be almost 300,000 tonnes of carbon dioxide equivalent (tCO₂-e) per year (Figure 1). On-road transport is by far the biggest greenhouse gas emitter in Serpentine Jarrahdale (46%), followed by electricity (27%, of which 15% is residential, 8% commercial and 4% industrial) and agriculture (10%) (Figure 1 and Table 1).

The Shire of Serpentine Jarrahdale’s corporate emissions over 2022/23 (Scope 1 direct emissions such as transport and mains gas, and Scope 2 indirect emissions such as mains or grid electricity consumption) accounts for 0.5% of the total emissions for the local government area, which includes emissions from gas, transport and electricity. Electricity for street lighting is Scope 3, owned and operated by Western Power and therefore not under the Shire’s operational control. The inclusion of Scope 3 emissions from street lighting would approximately triple the Shire’s corporate emissions to 1.5% of total emissions.

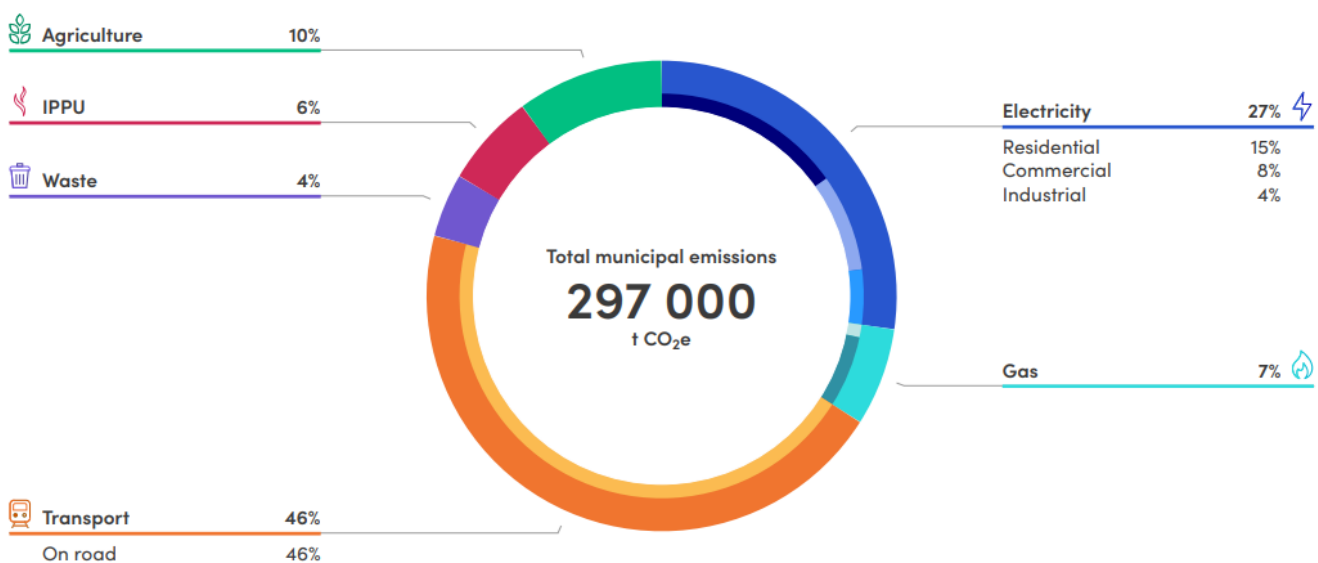


Figure 1: Community emissions profile for the Shire of Serpentine Jarrahdale.

(Serpentine-Jarrahdale 2021 municipal emissions snapshot, Snapshot community climate tool)

Table 1: Community emissions profile for the Shire of Serpentine Jarrahdale.

(Serpentine-Jarrahdale 2021 municipal emissions snapshot, Snapshot community climate tool)

Source	Sector	Emissions (t CO ₂ e)
Electricity	Residential	45 000
	Commercial	23 000
	Industrial	13 000
Gas	Residential	3 000
	Industrial	17 000
Transport	On road	134 000
Waste		13 000
IPPU		19 000
Fugitive		0
Agriculture		30 000
Land Use		20 000

Corporate emissions profile

A Corporate Emissions Profile is a detailed report of a corporation’s greenhouse gas emissions and energy consumption. All corporate entities, including local government, should publish Scope 1 and Scope 2 emissions in addition to net energy consumption. Scope 1 emissions are “direct emissions” from sources that are owned or controlled by the organisation, such as diesel or unleaded petrol for transport, and mains gas. Scope 2 emissions are the emissions released into the atmosphere from the use of purchased energy (electricity). These are called “indirect emissions” because the actual emissions are generated at another facility such as a power station. This data helps in understanding an organisation’s environmental impact and can guide strategies for reducing emissions and energy consumption. This information is crucial for local governments to understand their environmental impact and take steps towards sustainability.

The Shire of Serpentine Jarrahdale’s corporate emissions total 1,408 tCO₂-e during 2022/23 over Scope 1 direct emissions such as transport and mains gas and Scope 2 indirect emissions such as electricity consumption. This accounts for 0.5% of the total emissions for the local government area, and includes emissions from gas, transport and electricity. The Shire’s corporate waste has not been factored in, mainly due to the Shire not having its own landfill. Electricity for street lighting is Scope 3 (indirect emissions that are not owned or controlled by the Shire) and has not been included in this assessment. Street lighting is owned and operated by Western Power and therefore not under the Shire’s operational control, although the Shire is responsible for payment for electricity use and maintenance of these assets. The inclusion of Scope 3 emissions from street lighting would approximately triple the Shire’s corporate emissions to 1.5% of total emissions.

Purchased electricity (Scope 2) and diesel (Scope 1) are the main contributors to overall corporate emissions, each accounting for approximately 40% (Figure 2). Scope 1 emissions account for 60% of emissions and include fuel (45%) and gas (15%) (Figure 2). When broken down into fuel type, the Scope 1 emissions are dominated by diesel (40%), mains gas (15%) and unleaded petrol (5%) (Figure 2).

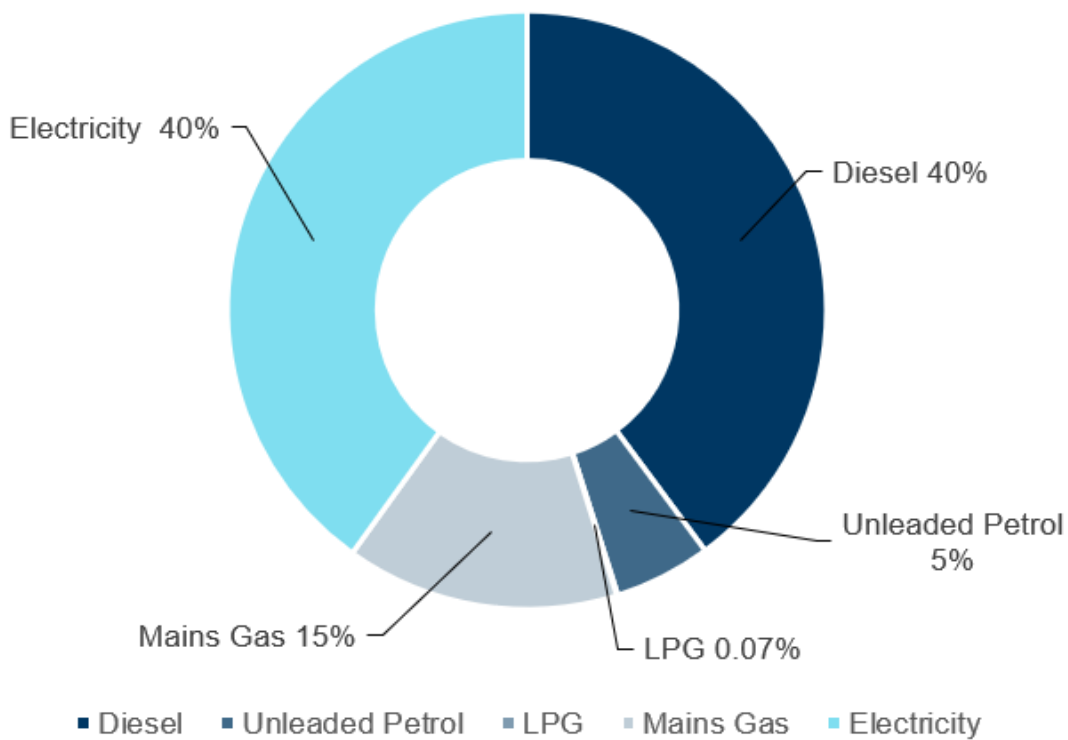


Figure 2: Total Scope 1 & 2 emissions by fuel type.

The profile is different when energy consumption is considered instead of emissions, as different types of fuel generate different amounts of emissions for the amount of energy generated. The majority of energy consumption is from fuel (70%), of which diesel accounts for 62% of overall energy consumption (Figure 3). Purchased electricity accounts for approximately 30% of energy consumed, with mains and LPG gas a minor contributor (Figure 3).

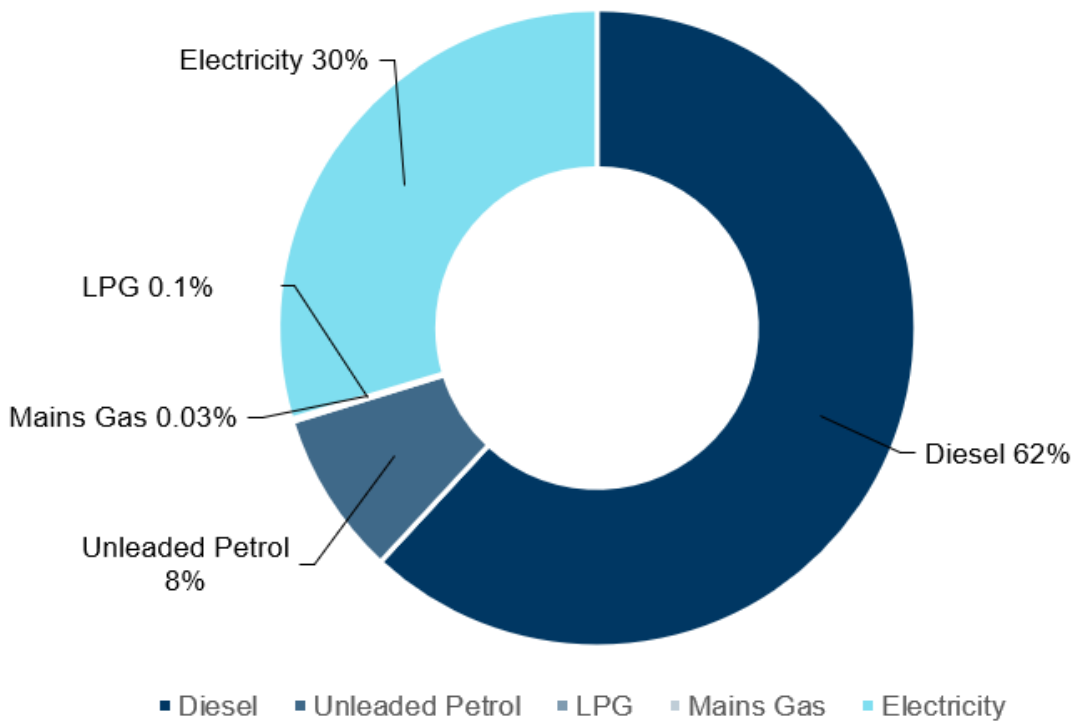


Figure 3: Energy consumption by fuel type.

Scope 1 emissions are generated directly by the Shire’s operational activities. The majority of Scope 1 emissions are generated by diesel (67%), with unleaded petrol accounting for approximately 9% of total Scope 1 emissions (Figure 4). Mains gas (Alinta Energy) consumption by Shire facilities and emergency services accounts for 25% of Scope 1 emissions, while LPG (Kleenheat gas cylinders) at four Shire facilities contributes only 0.1 % (Figure 4).

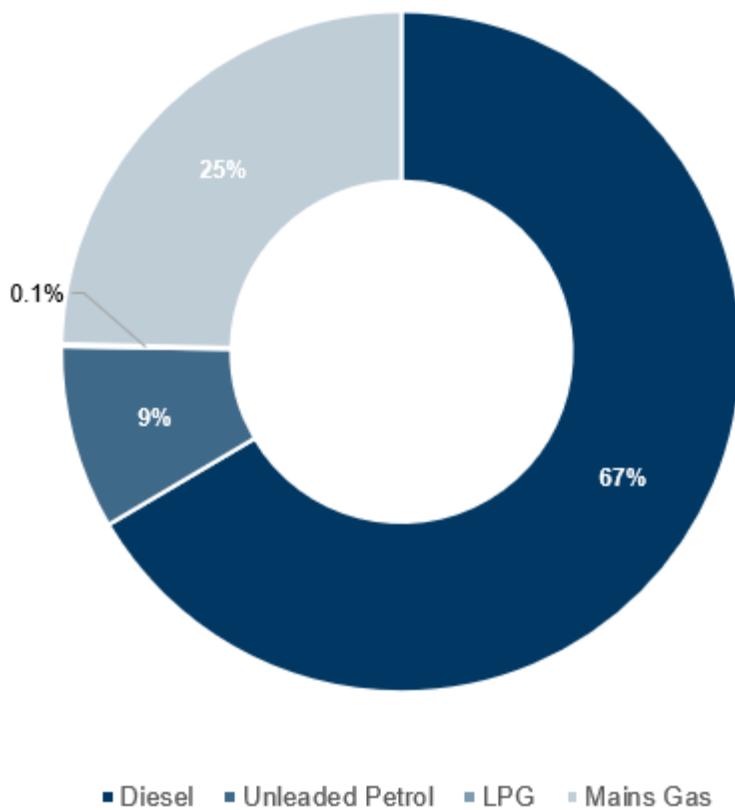


Figure 4: Scope 1 emissions by source.

Scope 2 emissions for the Shire consist of purchased electricity (Synergy), of which Facilities accounts for 91.4%, Emergency Services for 5.2% and Parks for 3.4%. The Shire assets with the highest energy consumed from purchased electricity are shown in Figure 5. Many of the highest consuming facilities have solar panels, which contribute to their energy consumption which is dominated by purchased electricity.

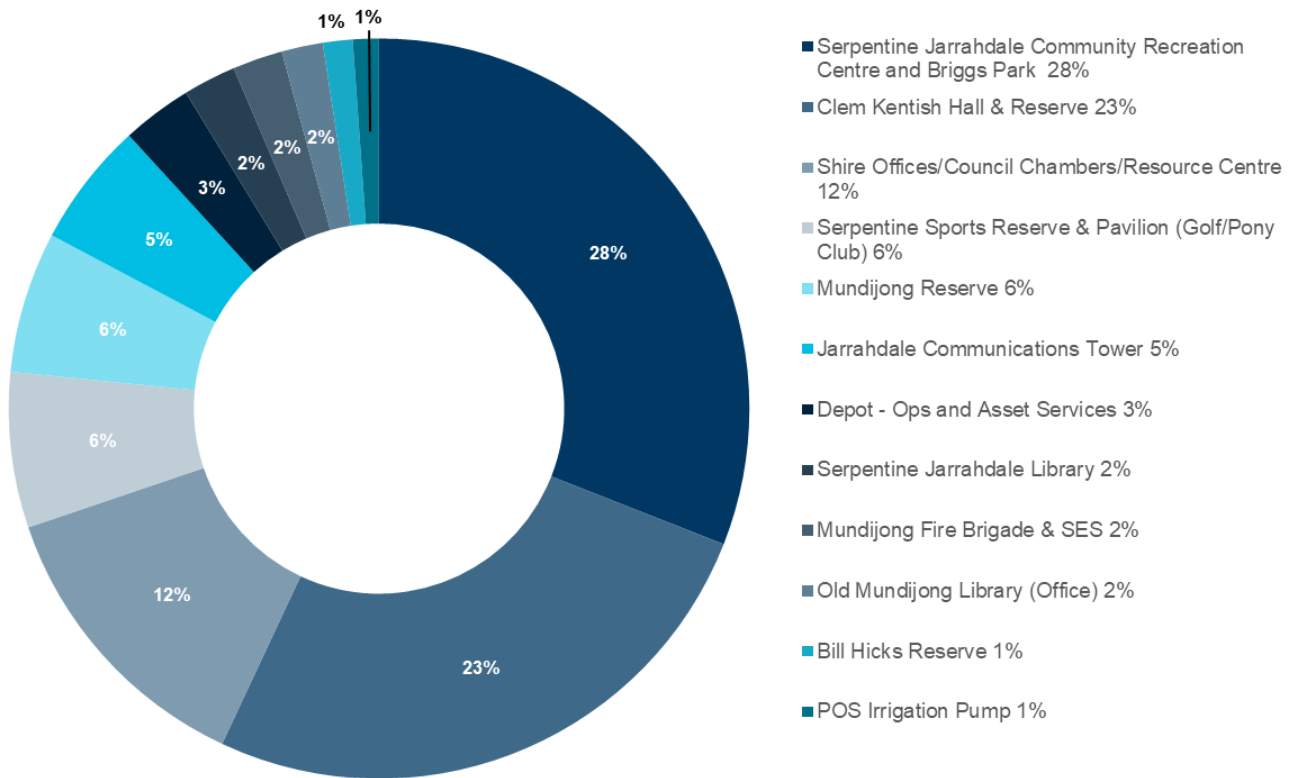


Figure 5: Assets/facilities with the highest energy consumption from purchased electricity.

Electricity for street lighting is Scope 3 (indirect emissions that are not owned or controlled by the Shire), owned and operated by Western Power and therefore not under the Shire’s operational control. A breakdown of highest asset emissions, including Scope 2 and Scope 3, demonstrates that emissions from street lighting comprises over 60% of corporate emissions from electricity (Figure 6).

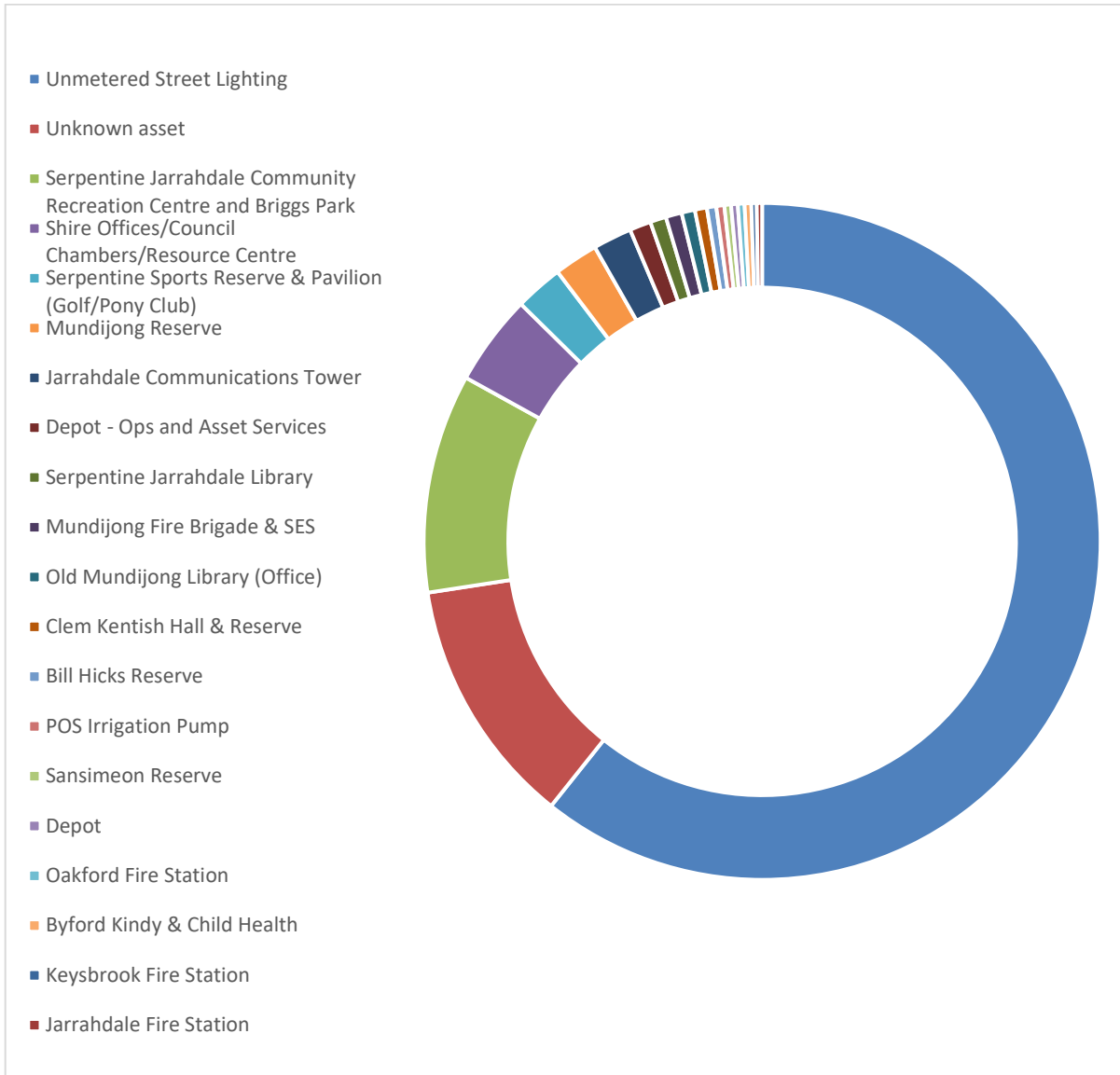


Figure 6: Highest asset emissions (tCO₂-e) from purchased (Scope 2) and street lighting (Scope 3) electricity

More detail on the Shire’s corporate emissions profile is provided in the Greenhouse Gas Emissions Assessment and Mitigation Opportunities (Appendix 2).

Climate change mitigation

Although the Shire is already experiencing the impacts of the changing climate, the solutions to help address this challenge are at hand.

'Climate change mitigation' is the term used to describe actions to reduce greenhouse gas emissions. The community would like the Shire to increase assistance to the community, consider the governance issues around the changing climate, focus on longer term benefits and savings rather than short terms savings, take a risk-based approach, and work towards being a carbon neutral local government which means reducing greenhouse gas emissions by all emitters.

This strategy presents net zero emissions targets for the Shire and the community (to achieve by 2050 in line with Federal government commitments). The emission reduction targets are supported by the following objectives:

- Achieve Net Zero Emissions
- Transition to Zero Emissions Fleet
- Reduce and Eliminate Emissions from Waste
- Transition to 100% Renewable Energy
- Increase Efficiency of Energy Consumption
- Innovate for a Smart City

The Mitigation Hierarchy (Figure 7) can be applied to provide a step-by-step approach in order of priority to mitigate GHG emissions. Opportunities to mitigate energy usage and GHG emissions are prioritised in terms of avoidance, reduction (e.g., efficiency improvements), replacement, and lastly, through offsetting with accredited renewable energy certificates or carbon credit units.

The first priority in the hierarchy and initial focus is to avoid energy use at the point of consumption. This can be done by focusing on design or by introducing policies or practices aimed at avoiding unnecessary consumption of energy.

Once all efforts have been made to avoid consumption, the focus should then be directed towards reducing energy consumption through efficiency improvements. The process of reducing energy consumption should be on-going and efficiency opportunities revisited regularly. Energy efficiency can be achieved through a combination of design considerations identified in the avoidance step as well as the introduction of energy efficient purchasing standards.

After potential operational energy efficiencies have been identified, the replacement of carbon/GHG intensive energy sources with renewable alternatives can be pursued. This can include things such as electrification of fleet vehicles, installation of renewable generation infrastructure (e.g. solar PV and battery storage systems), and purchase of renewable electricity through power purchase agreements (PPAs).

Once all opportunities to mitigate energy usage and GHG emissions through avoidance, reduction and replacement have been exhausted, any remaining emissions must be offset with accredited renewable energy certificates or carbon credit units.

In the case of the Shire's corporate emissions profile, most Scope 1 and Scope 2 energy sources can be avoided, reduced or replaced with the exception of Scope 1 diesel usage for heavy plant, for which there is currently no replacement. Diesel usage, which makes up approximately 40% of the Shire's emissions, must therefore be offset.

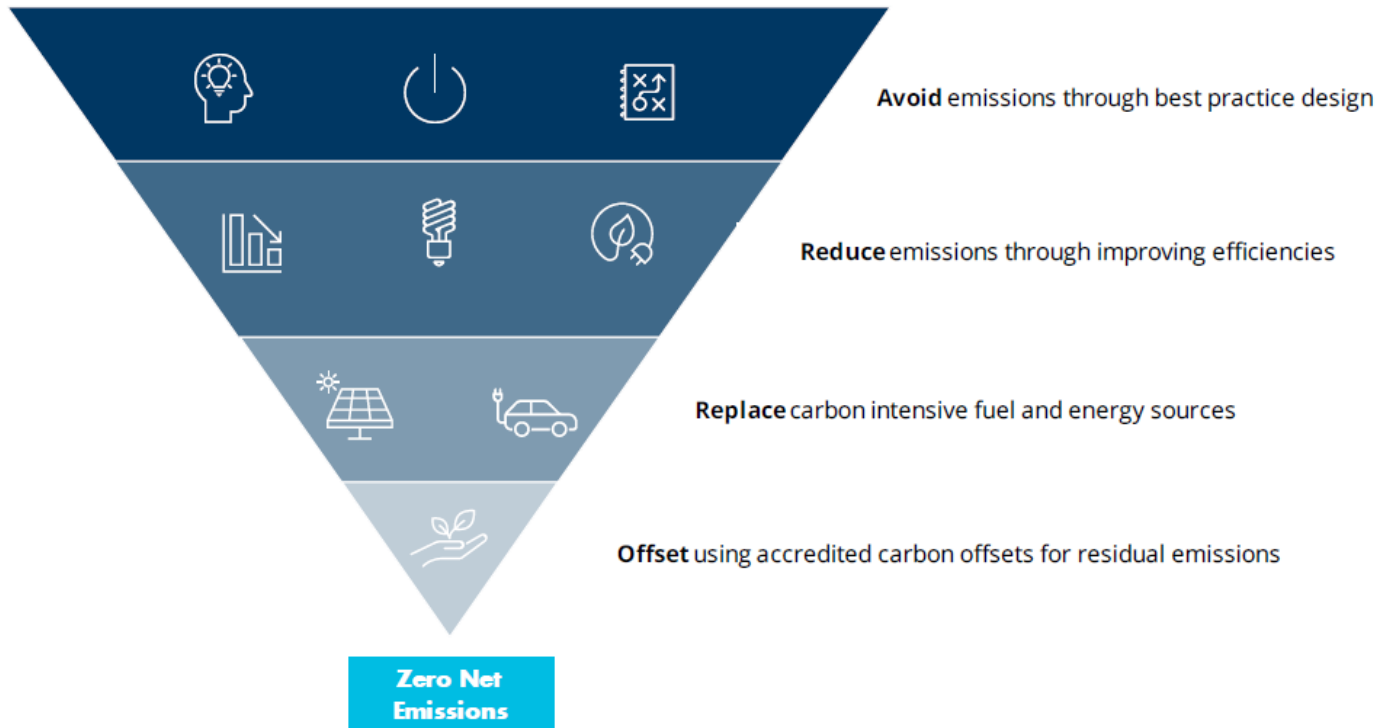


Figure 7: Mitigation hierarchy showing step-by-step approach in order of priority.

To determine the most beneficial abatement opportunities the Shire's emissions were estimated and projected with the goal of net zero by 2050. The projected emissions for 2050 of 1,921 tCO₂-e was used to estimate the amount of carbon abatement required to achieve carbon neutral by 2050. Potential actions to achieve the required abatement and which actions achieve the highest carbon abatement are shown in Figure 8.

Potential actions can also be considered in terms of perceived effort and impact in relation of emissions savings. This method of determining the most beneficial abatement opportunities is shown in Figure 9 with a set of example potential actions.

More detail on potential mitigation opportunities is provided in the Greenhouse Gas Emissions Assessment and Mitigation Opportunities (Appendix 2).

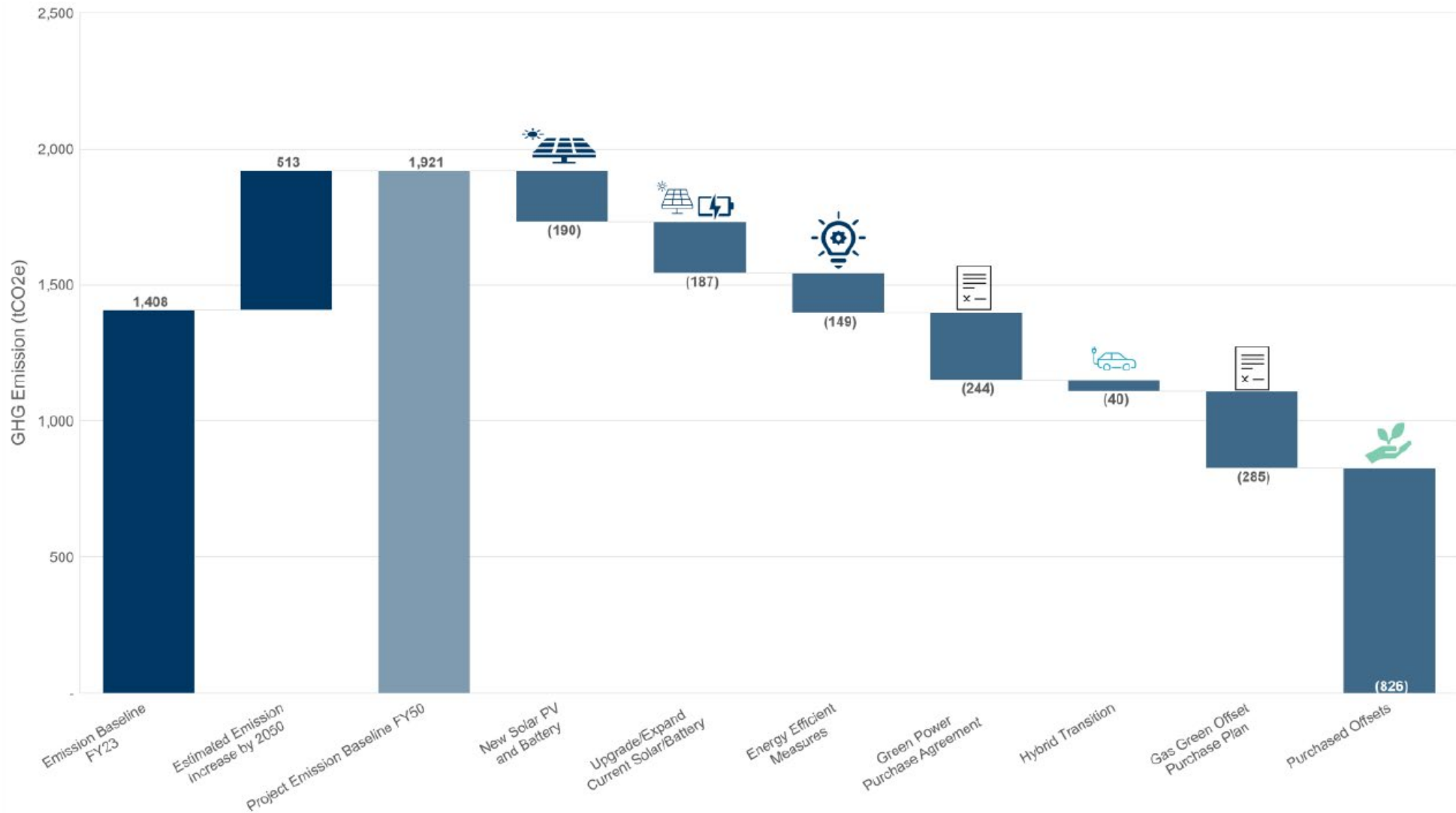


Figure 8: Estimated projected emission abatement.

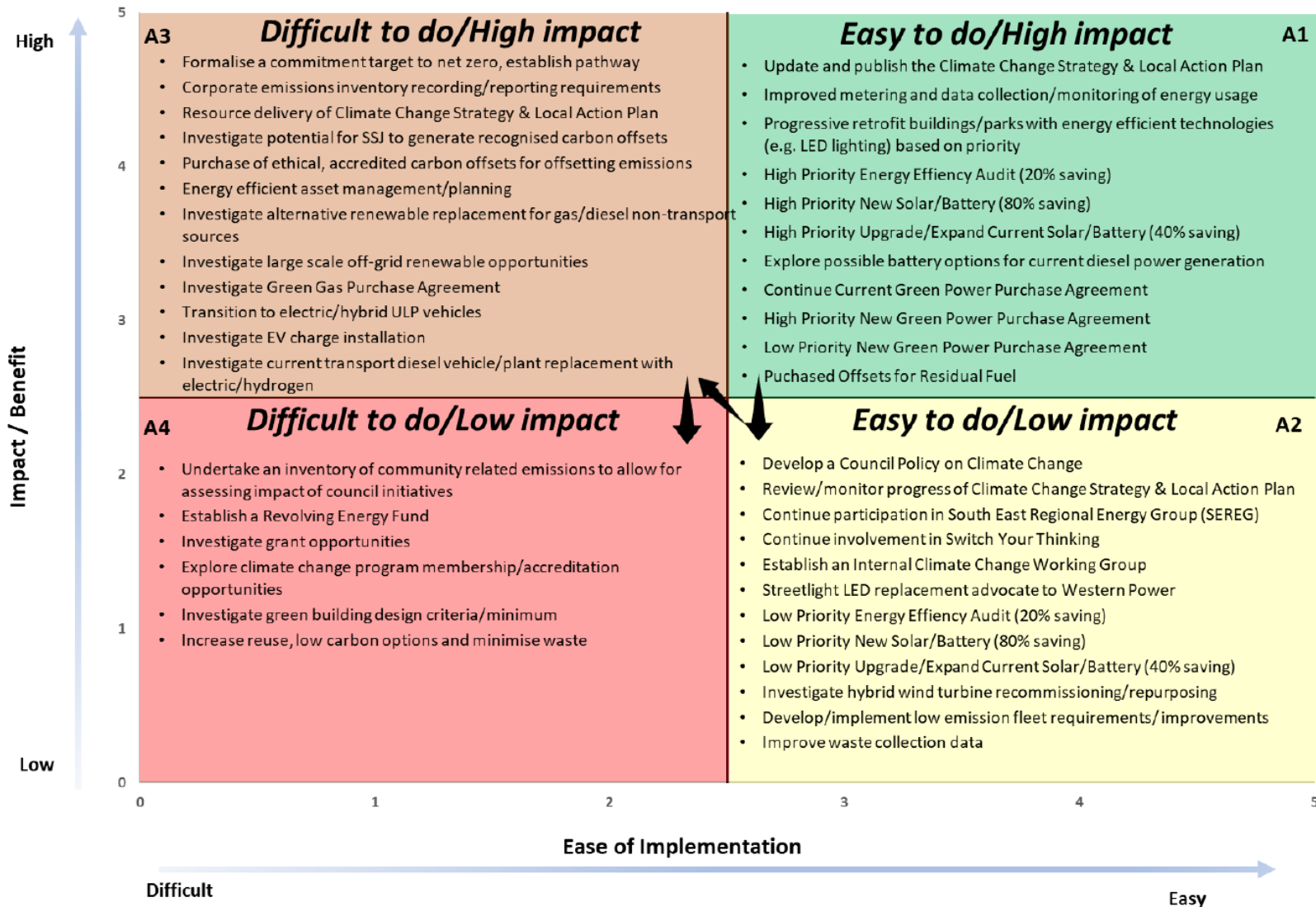


Figure 9: Evaluation and prioritisation of potential actions.

Impact / Benefit considers: carbon emission abatement, cost savings, reputational or other benefit.

Ease of implementation considers: commitment, time, expense, complexity, effort, or resources.

A1: Easy to do/High impact: Prioritise these activities as the first to do. Getting these projects done helps with encouragement and support for more difficult projects as well as motivation for creating an impact.

A2: Easy to do/Low impact: These activities are to be done if they are a precursor to an activity which has a greater impact on the goal.

A3: Difficult to do/High impact: These activities require time spent on planning as they have a higher likelihood of resulting in a poor outcome. Poor outcomes from executing some activities can result in the overall strategy being unsuccessful or limited. This can affect support of the overall strategy by senior management.

A4: Difficult to do/Low impact: These activities should only be attempted if they are a precursor to activities with a higher impact on the goal. Activities which are precursors to others can be broken up into smaller and easier to do activities. Difficult to do activities that can be viewed as consuming resources and taking time are at risk of being the first to be rejected or have the least support by senior management.

Climate risk and opportunity management

Identifying the risks and opportunities of the changing climate builds capacity to adapt to and mitigate the impacts of the changing climate. The Shire of Serpentine Jarrahdale's operations and communities are all vulnerable to the impacts of the changing climate. Climate risk assessments provide an opportunity to build resilience to the changing climate through understanding and treating its physical and transition risks.

Physical risks consider direct impacts of the changing climate due to acute (e.g. bushfires) and chronic (e.g. rainfall decline) hazards (Figure 10). These risks are often the easiest to predict and understand – it is simple to imagine safety hazards, infrastructure damage, or supply chain disruptions due to flooding or bushfires. The Shire of Serpentine Jarrahdale and its community already experience the effects of these chronic and extreme acute weather events to workplaces and wellbeing.

Risks to the Shire come in various forms which include:

- 1. Physical Risks:** The changing climate can lead to more frequent and severe weather events, causing direct damage to the Shire's assets and infrastructure. This includes damage to built infrastructure, flora and fauna, water supply, landforms and, most importantly, human health.
- 2. Economic Transitional Risks:** The Shire needs to consider how economic transition risks associated with the changing climate may impact its financial stability. These risks include policy and regulatory responses, technological developments, and shifts in stakeholder preferences in the transition to a low-emissions economy.
- 3. Litigation:** The Shire may face increased exposure to litigation where climate risks have not previously been taken into consideration or acted upon.
- 4. Increased Demands:** The impact of the changing climate on public and private assets may lead to additional demands being made on the Shire.
- 5. Community Expectations:** The Shire will face the challenge of balancing political and financial considerations with community expectations.
- 6. Transitional Risks:** These are risks associated with the transition to a low-carbon economy. They could include policy changes, reputational impacts, and shifts in market preferences.
- 7. Liability:** These are risks related to potential legal action. For example, the Shire could face lawsuits for not adequately disclosing its climate risks or for contributing to the changing climate.
- 8. Insurance:** Affordability is a concern as insurance premiums will keep rising in high risk areas, making insurance unaffordable for many customers. To the Shire this is and will continue to push up premiums, risking possible under-insurance and higher premiums, or making some assets uninsurable. Insurers are changing what they will continue to re-insure, increasing the risk of under-insurance for the Shire.
- 9. Infrastructure capacity:** There are areas in the Shire that need infrastructure upgrades as it is being overwhelmed by more intense weather events. Without intervention it may be impossible to insure these areas due to bushfire (for instance in Jarrahdale) and where drainage is unable to cope (due to the 1:100 year flood lines being exceeded regularly and to a greater extent than planned for).

10. Decreasing tourism potential: The Shire is trying to leverage tourism potential through pushing the funding of many economic development projects that rely on the integrity of the natural environment, including the Jarrahdale trails hub, mountain bike trails, and so on. Loss of the jarrah forest due to drought or lack of water will result in declining tourism and possibly loss of capital investment and economic development of the local area.

11. Political insecurity: Rising costs of insurance premiums and increasing costs of repairing damage to facilities and infrastructure (or even just having to redesign it) will in all probability require rates rises which is politically unacceptable. This tension may result in more frequent changes of elected members and political uncertainty.

Building resilience to physical climate risks will lead to multiple benefits and opportunities (Figure 10). These include conserving biodiversity, supporting eco-tourism, and building a more resilient agricultural sector.

It is also vital to consider the transition risks of the global transition to net zero (Figure 10). These risks are driven by impacts to policy, legal, technology, markets, and reputation during this transition. Changes in population, urbanisation, land use, economic and industrial activity, energy system composition, transport and logistics are all important determinants of transition risks.

A well-timed and orderly transition to a low carbon future affords the opportunity to increase access to new markets and support economic growth (Figure 10).

Climate change physical risk assessment

There are five overarching climate risk themes that have the potential to impact the Shire's service delivery, natural environmental, local community and infrastructure:

- Reduced water availability from decreased rainfall
- Biodiversity loss from the changing climate
- Urban and rural forest decline from the changing climate
- Community infrastructure damage from the changing climate
- Public health decline from the changing climate

The Shire undertook a risk assessment and updated its climate change risk register in 2023. Detailed information on the risk assessment methodology and results are provided in the Climate Change Physical Risk and Adaptation Plan (Appendix 1).

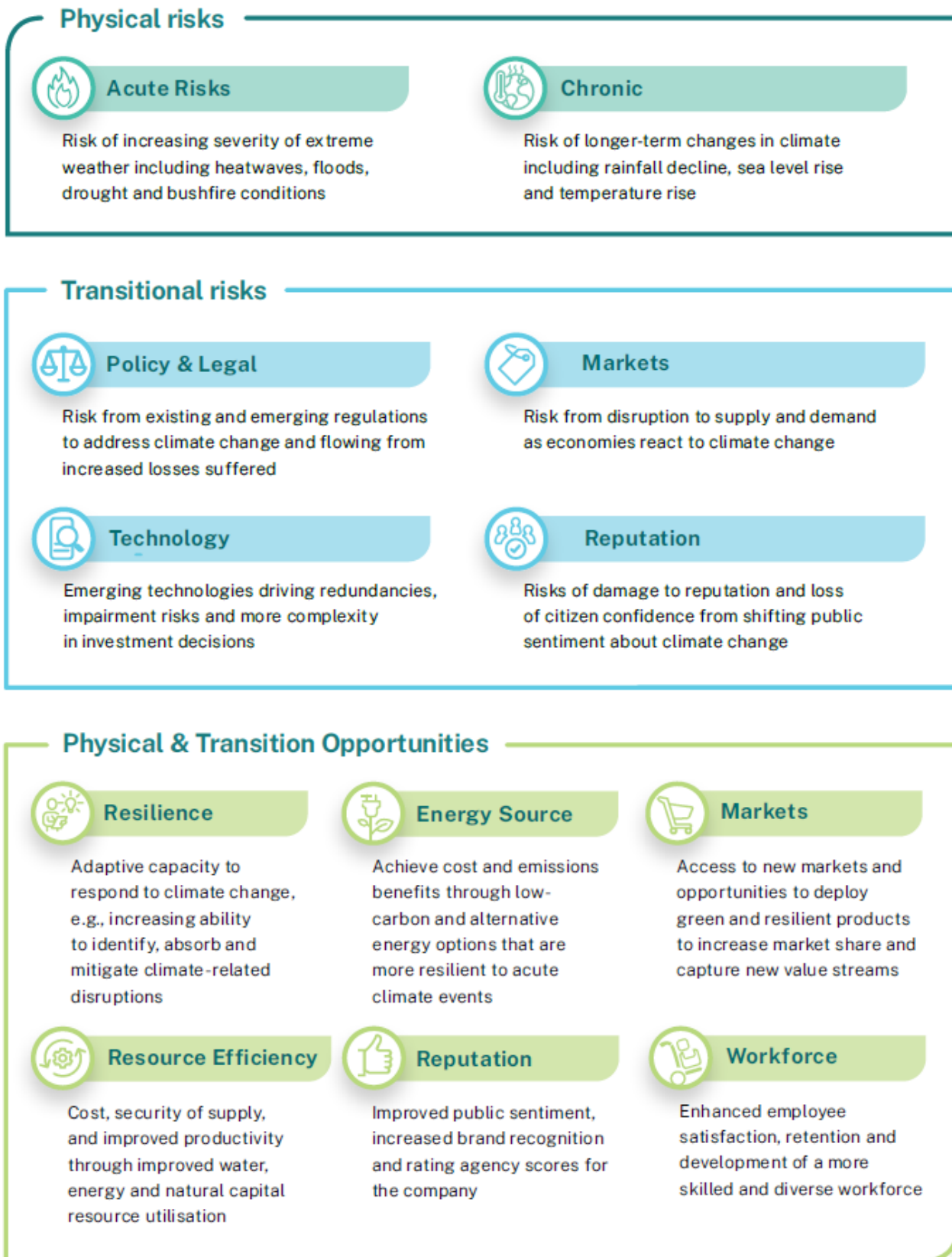


Figure 10: Climate change risks and opportunities.
(Department of Climate Change, Energy, the Environment and Water – *Climate Risk Management*)

Climate adaptation

To reduce the impact of climate risks and increase adaptive capacity, the Shire has integrated the five overarching climate risk themes into its Risk Management and Safety System (RMSS) and identified key solutions in the climate resilience roadmap.

There are five adaptation objectives that will help reduce the impacts of the changing climate:

- Foster the Waterwise Shire
- Conserve Biodiversity
- Increase Urban and Rural Forest Canopy
- Maintain Community Infrastructure
- Enhance Health and Wellbeing

Table 2: Climate risk themes and assessment.

Risk Title	Risk Description	Risk Rating	Responsibility	Adaptation Objective
Reduced water availability from decreased rainfall	Decreased livability, reduced water availability for people and the environment, loss of urban vegetation and biodiversity caused by climate impacts (decreased rainfall)	High	Executive Manager Operations	Foster the Waterwise Shire
Biodiversity loss from the changing climate	Damage to or loss of biodiversity and natural habitat caused by climate impacts (decreased rainfall, increased bushfires, extreme temperatures / heatwaves, severe storms and extreme rainfall / flooding)	High	Executive Manager Operations	Conserve Biodiversity
Urban and rural forest decline from the changing climate	Urban forest decline caused by climate impacts (extreme temperatures / heatwaves and decreased rainfall)	Moderate	Executive Manager Operations	Increase Urban and Rural Forest Canopy
Community infrastructure damage from the changing climate	Damage to or loss of infrastructure and increased demand for electricity and water, as a result of climate impacts (increased bushfires, extreme rainfall / flooding, severe storms and extreme temperatures / heatwaves)	High	Director Infrastructure Services	Maintain Community Infrastructure
Public health decline from the changing climate	Reduced public safety, health and wellbeing caused by climate impacts (decreased rainfall, increased bushfires, extreme temperatures / heatwaves, severe storms and extreme rainfall / flooding)	Extreme	Director Community Engagement	Enhance Health and Wellbeing

Climate resilience roadmap

The community has provided its vision, and the Shire has used information from the risk assessment to develop a 'resilience roadmap' that sets aspirational targets to achieve carbon neutrality and increase resilience to the changing climate.

The resilience roadmap presents 14 objectives that demonstrate leadership, encourage collaboration, reduce emissions (mitigation) and increase adaptive capacity (adaptation). Each objective is addressed through a comprehensive action plan that will deliver innovative solutions for energy supply, waste management, protecting the natural environment, and ensure best practice adaptation.

1. Demonstrate strong climate leadership
2. Achieve net zero emissions
3. Transition to zero emissions fleet
4. Reduce and eliminate emissions from waste
5. Transition to 100% renewable energy
6. Increase efficiency of energy consumption
7. Innovate for a smart city
8. Educate and collaborate
9. Foster the waterwise shire
10. Conserve biodiversity
11. Increase urban and rural forest canopy
12. Maintain community infrastructure
13. Enhance health and wellbeing
14. Manage peri-urban hypergrowth

A Climate Resilience Roadmap is a strategic plan that guides how an organization can withstand and adapt to the impacts of the changing climate. It is a critical tool for climate action and reducing emissions. A Climate Resilience Roadmap is important for:

- Understanding Risks:
 - It helps in understanding the different types of climate hazards that could have a serious impact.
- Planning and Preparation:
 - It aids in preparing for climate impacts such as heatwaves, floods, and storms while reducing carbon emissions, and helps in identifying key actions.
- Setting Targets:
 - It assists in setting measurable metrics and science-based targets for resilience.
- Policy Development:
 - It helps in identifying key policies.
- Community Involvement:
 - It ensures that the most vulnerable are central to efforts to build a resilient future.
- Adaptation and Mitigation:
 - It supports governments, communities, and businesses to better adapt to the future climate, recognising that adaptation is a shared responsibility that requires sustained and ongoing action.

The Climate Resilience Roadmap will set metrics to help measure climate resilience, establish urgent priorities and industry-wide targets, as well as pinpoint essential actions and policies to achieve them.

Climate resilience roadmap

1. **Demonstrate Strong Climate Leadership**
 - Leadership in action is about setting aspirational targets, listening and working together, and increasing adaptive capacity by strengthening existing programs and trialling new technology with a fund set up to allow capital for longer term savings.
2. **Achieve Net Zero Emissions**
 - The Shire aims to achieve net zero corporate emissions and will work with the community and the State Government to achieve net zero community emissions by 2050.
3. **Transition to Zero Emissions Fleet**
 - The Shire aims to improve the fleet's efficiency and reduce the risks of fuel price volatility by exploring advances in hybrid, electric and hydrogen powered vehicles.
4. **Reduce and Eliminate Emissions from Waste**
 - The Shire's vision for responsible waste management is for 100% of non-hazardous waste to be diverted from landfill by 2030, thereby reducing and eliminating emissions from waste.
5. **Transition to 100% Renewable Energy**
 - The Shire aspires to progressively add more renewable energy sources and energy storage systems to its energy portfolio and transition to 100% renewable energy by 2030.
6. **Increase Efficiency of Energy Consumption**
 - A key step in the resilience roadmap is to decrease the energy demand and cost of the Shire's street lighting, parks and facilities by improving efficiency and optimising performance.
7. **Innovate for a Smart City**
 - The Shire will invest in innovative technology-based solutions to meet the challenges of the changing climate and ensure the Shire is better connected, safer and more resilient.
8. **Educate and Collaborate**
 - The Shire acknowledges the shared responsibility of the changing climate and will provide information on local climate impacts and work with the community, business and stakeholders to take action and build resilience.
9. **Foster the Waterwise Shire**
 - The Shire is experiencing the impact of declining rainfall and aims to improve water security by maintaining its Gold Waterwise Council status and implementing the Waterwise Action Plan.

10. Conserve Biodiversity

- The changing climate has the potential to cause damage to, or loss of, biodiversity and natural habitat. The Shire aims to increase the resilience of natural ecosystems through implementation of the Reserve Management Plans for Banksia Woodland, Marri Woodland and Scarp & Plateau Forest.

11. Increase Urban and Rural Forest Canopy

- Increased temperatures, pests, diseases and reduced water availability pose risks to the urban and rural forest. The Shire aims to increase tree canopy, maintain water security and improve liveability by implementing planning controls, the Urban and Rural Forest Strategy and Waterwise Action Plan.

12. Maintain Community Infrastructure

- The changing climate may cause damage to, and loss of, infrastructure because of bushfires, extreme weather and higher temperatures. The Shire will reduce these risks by implementing the Local Emergency Management Arrangements and best practice infrastructure management.

13. Enhance Health and Wellbeing

- The changing climate presents a risk to the health, safety and wellness of the community because of increased bushfires, heatwaves and extreme weather events. The Shire will manage these impacts by implementing the Health and Wellbeing Strategy and Local Emergency Management Arrangements.

14. Manage Peri-Urban Hypergrowth

- The Shire has consistently been one of the highest-growth local government areas in Australia over the past 20 years, and this hyper-growth is expected to continue. Hyper-growth brings with it the risks of higher emissions from construction and the activities of increased population, as well as opportunities to mitigate these emissions, incorporate adaptation responses, and eventually increased revenue. Hyper-growth brings with it financial constraints as growth precedes revenue.

Climate action plan

The climate action plan has been developed with direction from the community on how the Shire can create a sustainable and climate resilient future. The plan provides information on the 14 key objectives of the climate resilience roadmap and a comprehensive set of actions to help eliminate greenhouse gas emissions and increase the Shire's adaptive capacity.

1. Demonstrate Strong Climate Leadership

Leadership in action is about setting aspirational targets, listening and working together, and increasing our adaptive capacity by strengthening our existing programs and trialling new technology with a fund set up to allow capital for longer term savings.

The Shire will achieve this through:

- Listening and working together – with the community through education, creative engagement and communication towards a healthy and resilient future.
- Setting aspirational targets – to reduce all greenhouse gas emissions throughout the Shire, supported by the community.
- Increasing adaptive capacity – by strengthening existing initiatives, innovating to take advantage of emerging opportunities, trialling new technology and developing programs to support businesses and residents to better care for the land and adapt to a changing climate.

	Actions for strong leadership	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
1.1	Endorse the 2024 Climate Change Strategy and Action Plan.	Council	Climate Change Strategy and Action Plan	Key	Now (2024 to 2025)	New	Strategy and Action Plan adopted by Council
1.2	Commit to net zero emissions by 2050.	Council	Climate Change Strategy and Action Plan	High	Now (2024 to 2025)	New	Council commits to net zero emissions
1.3	Establish a Climate Change Working Group to explore opportunities and technology.	Strategic Planning	Climate Change Strategy and Action Plan	Medium	Short Term (2025 to 2027)	New	Climate Change Working Group established
1.4	Invest in the Climate Resilience Action Fund using financial savings from energy reduction and renewable energy projects.	Executive	Climate Change Strategy and Action Plan	High	Short Term (2025 to 2027)	New	Climate Resilience Action Fund allocated
1.5	Employ a full-time Climate Change Officer to deliver this Strategy and Action Plan.	Development Services	Climate Change Strategy and Action Plan	Key	Short Term (2025 to 2027)	New	Climate Change Officer employed
1.6	Review the Climate Change Strategy in 2028 and update the Action Plan.	Strategic Planning	Climate Change Strategy and Action Plan	High	Ongoing	New	Climate Change Strategy reviewed
1.7	Explore climate change program membership/ accreditation opportunities.	Strategic Planning	Climate Change Strategy and Action Plan	Medium	Ongoing	New	Membership/ accreditation opportunities utilised
1.8	Investigate implementing a Fossil Free Investment preference within the Shire's investment policy.	Financial Services	Council Policy 3.2.3 - Investments	Low	Medium Term (2027 to 2030)	New	Funds are invested in accordance with policy
1.9	Promote the Shire's initiatives and achievements to encourage others.	Communications	Climate Change Strategy and Action Plan	Medium	Ongoing	New	Information shared with the community and other Councils

2. Achieve Net Zero Emissions

Reducing greenhouse gas emissions is a major challenge that will require strong action to ensure avoidance of the worst impacts of the changing climate.

Pathway to net zero emissions

Net zero emissions can be achieved by reducing emissions as far as possible by improving energy efficiency, fuel switching, reducing waste to landfill and sourcing energy from renewable sources. Any remaining emissions would be balanced with an equivalent amount of carbon removal.

Corporate emission reduction target

The Shire of Serpentine Jarrahdale aims to achieve net zero emissions by 2050 and will transition to source 100% of electricity for its facilities from renewable sources. The corporate target relates specifically to Council operations.

The Shire will achieve this through:

- Establishing an emissions baseline, annually monitoring and reporting emissions.
- Eliminating non-hazardous waste to landfill.
- Eliminating use of gas and transitioning to full electrification.
- Transitioning to 100% renewable energy.
- Increasing efficiency of energy consumption and reducing operational costs.
- Transitioning to energy efficient public lighting.
- Transitioning to a zero emissions fleet.
- Investing in accredited carbon offsets for residual emissions.

Community emission reduction goal

The Shire will work with the Serpentine Jarrahdale community and the State Government to achieve net zero emissions by 2050. This goal recognises the shared responsibility for action on the changing climate and aligns to the Western Australian Government's emission reduction target. Governments at all levels, businesses, communities and individuals all have important roles to play in reducing emissions.

The Shire acknowledges that it is well placed to educate, facilitate and support the community, but ultimately the State Government, residents and business must take action themselves to achieve net zero emissions.

The Shire will achieve this through:

- Providing households with the information and support they need to reduce energy, water and waste.
- Developing an Economic Development Framework and action plan to assist local businesses to reduce their energy consumption and prosper in a low emissions economy.
- Issuing an open letter to the State Government to acknowledge the shared responsibility in working towards net zero emissions.
- Advocating for improvements to public transport.
- Providing infrastructure such as electric vehicle charging stations and shared paths to facilitate sustainable and active transport.

	Actions to achieve net zero emissions	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
2.1	Undertake an annual greenhouse gas emission corporate inventory and report on performance against targets.	Waste & Fleet	Climate Change Strategy and Action Plan	Key	Ongoing	Existing	Annual inventory and report completed
2.2	Implement the climate resilience roadmap to reduce corporate emissions as much as practical by eliminating emissions from waste, transitioning to 100% renewable energy, and increasing efficiency of energy consumption.	Strategic Planning	Climate Change Strategy and Action Plan	Key	Medium Term (2027 to 2030)	New	Implementation of climate resilience roadmap
2.3	Invest in ethical, accredited carbon offsets for residual emissions.	Financial Services	Climate Change Strategy and Action Plan	Medium	Long Term (2030 to 2035)	New	Investment in accredited carbon offsets
2.4	Investigate the potential to generate recognized carbon offsets.	Natural Reserves	Climate Change Strategy and Action Plan	Low	Long Term (2030 to 2035)	New	Carbon offset potential inventoried
2.5	Issue an open letter to the State Government to acknowledge the shared responsibility in working towards net zero emissions.	Strategic Planning	Climate Change Strategy and Action Plan	Medium	Short Term (2025 to 2027)	New	Letter issued
2.6	Assist the community in achieving net zero emissions by 2050 through education and collaboration.	Strategic Planning	Climate Change Strategy and Action Plan	High	Medium Term (2027 to 2030)	New	Implementation of climate resilience roadmap
2.7	Establish partnerships to assist industry achieve net zero emissions by 2050.	Economic Development	Climate Change Strategy and Action Plan	Medium	Medium Term (2027 to 2030)	New	Implementation of climate resilience roadmap

3. Transition to Zero Emissions Fleet

The Shire aims to improve its fleet's efficiency and reduce the risks of fuel price volatility by exploring advances in electric and hydrogen powered vehicles, with potentially the use of hybrid vehicles during the transitional period.

The Shire has operational requirements for a range of vehicles, plant and equipment which deliver essential services. Fleet emissions from consumption of petrol and diesel fuel contribute 45 % of the Shire's total emissions, of which 40 % is diesel and 5 % unleaded petrol.

Innovations in the vehicle industry and declining battery costs will soon put Electric Vehicles (EVs) on par with conventional fuel powered vehicles. Electric vehicles will play an important role in the Shire's transition to 100% renewable energy. EVs can also form part of the Shire's power system as they use, generate and store electricity. Technological advances in hydrogen fuel cell vehicles may also present opportunities, particularly for heavy vehicles.

The Shire will achieve this through:

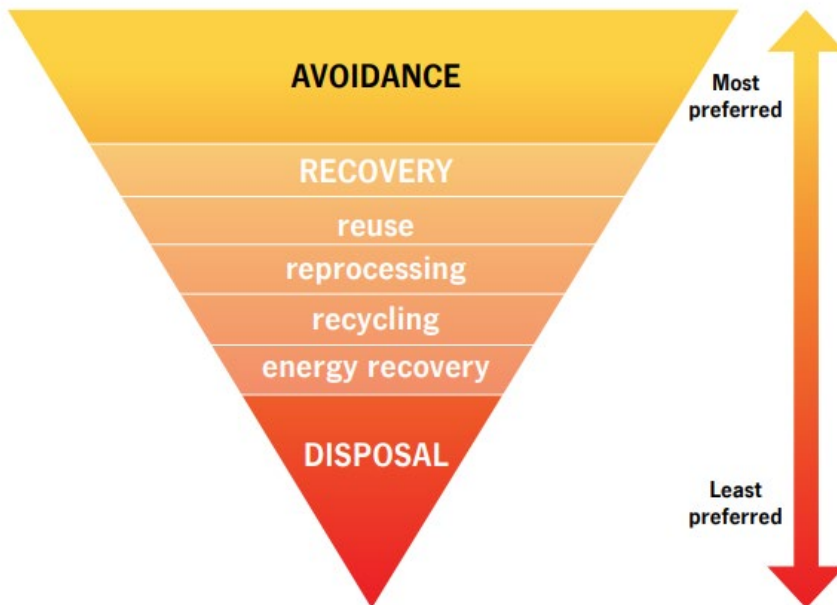
- Exploring advances in hybrid, electric and hydrogen powered vehicles.
- Investigating and transitioning the fleet to non-fossil-fuel based energy sources.
- Transitioning hand tools and other mobile maintenance equipment (e.g. lawn mowers) to battery powered alternatives.
- Providing EV charging infrastructure.
- Encouraging staff to carpool or use more sustainable transport.

	Actions for a zero emissions fleet	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
3.1	Develop a best practice Council fleet policy and ensure fleet purchases meet strict greenhouse gas emissions requirements.	Waste & Fleet	Climate Change Strategy and Action Plan	Key	Short Term (2025 to 2027)	New	Policy updated
3.2	Incentivise the selection of low or “zero” emission fleet vehicles.	Waste & Fleet	Climate Change Strategy and Action Plan	Medium	Short Term (2025 to 2027)	New	Vehicle selection updated
3.3	Set a requirement for a proportion of fleet vehicles to be EV.	Waste & Fleet	Climate Change Strategy and Action Plan	High	Short Term (2025 to 2027)	New	Requirement set
3.4	Develop a plan to adopt new technology to transition Council’s fleet to electric vehicles or hydrogen and power these by 100% renewable energy.	Waste & Fleet	Climate Change Strategy and Action Plan	Medium	Short Term (2025 to 2027)	New	Plan endorsed and implemented
3.5	Investigate the potential to transition Council’s heavy vehicles to low emissions alternatives.	Waste & Fleet	Climate Change Strategy and Action Plan	High	Medium Term (2027 to 2030)	New	Investigation completed and implemented
3.6	Transition hand tools and other mobile maintenance equipment (e.g. lawn mowers) to battery powered alternatives and power these by 100% renewable energy.	Operations	Climate Change Strategy and Action Plan	High	Short Term (2025 to 2027)	Existing	Battery powered tools acquired
3.7	Investigate purchasing carbon offsets for residual transport emissions.	Financial Services	Climate Change Strategy and Action Plan	Low	Long Term (2030 to 2035)	New	Carbon offsets purchased
3.8	Provide charging infrastructure throughout the Shire at key locations for electric vehicles.	Infrastructure Services	Climate Change Strategy and Action Plan	Key	Medium Term (2027 to 2030)	New	EV charging infrastructure installed
3.9	Upgrade the staff vehicle booking system to include the ability to facilitate carpooling to meetings.	Waste & Fleet	Climate Change Strategy and Action Plan	Low	Now (2024 to 2025)	Existing	Vehicle booking system upgraded

4. Reduce and Eliminate Emissions from Waste

The Shire's vision for responsible waste management is for 100% of non-hazardous waste to be diverted from landfill by 2030, thereby reducing and eliminating emissions from waste.

This will be achieved by applying the WA State Government's waste hierarchy, with avoidance of waste being the most preferred option.



The Shire will achieve this through:

- Applying the WA State Government's waste hierarchy, with avoidance of waste being the most preferred option.
- Implementing the waste-to-energy project to divert waste from landfill.
- Investing in research-based behaviour change programs to encourage community and industry to generate less waste.
- Developing a community engagement program which will be supported by a community drop off facility, recycle shop and education centre.
- Recognising that the disposal of waste to landfill is the least preferred option, as it recovers the least value from materials that are disposed.
- Recognising that there will be a small percentage of hazardous and toxic material (e.g. asbestos) that can only be safely disposed of within a specialised landfill site. The Zero Waste to landfill objective excludes hazardous waste.

	Actions to reduce and eliminate emissions from waste	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
4.1	Eliminate organic waste to landfill by complete product separation at source.	Waste & Fleet	Waste Management Strategy	High	Long Term (2030 to 2035)	Existing	Organic waste separated
4.2	Implement the waste-to-energy project.	Waste & Fleet	Waste Management Strategy	High	Short Term (2025 to 2027)	Existing	Waste used to generate energy
4.3	Improve resource recovery and education through a community drop off facility, reuse shop and education centre.	Waste & Fleet	Waste Management Strategy	Key	Short Term (2025 to 2027)	Existing	Community facility re-opened
4.4	Develop and deliver research-based behaviour change programs to encourage the community to generate less waste and adopt leading waste separation practices.	Waste & Fleet	Waste Management Strategy	Medium	Medium Term (2027 to 2030)	Existing	Behaviour change programs developed and delivered
4.5	Increase recovery from verge side collections through improved processes.	Waste & Fleet	Waste Management Strategy	High	Medium Term (2027 to 2030)	Existing	Recovery rates increased
4.6	Investigate opportunities to facilitate a circular economy within Serpentine Jarrahdale.	Waste & Fleet	Waste Management Strategy	Low	Medium Term (2027 to 2030)	Existing	Feasibility study completed
4.7	Provide container deposit scheme collection points and reduce single use materials at Shire events.	Waste & Fleet	Waste Management Strategy	High	Short Term (2025 to 2027)	Existing	Wastewise event policy adopted
4.8	Increase the use of recycled and sustainable materials within road construction.	Infrastructure Services	Waste Management Strategy	High	Ongoing	Existing	Recycled material use increased
4.9	Maintain and improve waste data collection.	Waste & Fleet	Waste Management Strategy	High	Ongoing	Existing	Waste data collection improved
4.10	Update procurement policy to prioritise low emissions options.	Procurement	Procurement policy	Key	Short Term (2025 to 2027)	Existing	Procurement policy updated
4.11	Assess emissions savings from reuse / recycling / low carbon options implemented through procurement practices.	Waste & Fleet	Waste Management Strategy	Low	Medium Term (2027 to 2030)	Existing	Emissions savings assessed

5. Transition to 100% Renewable Energy

The Shire aspires to progressively add more renewable sources to its energy portfolio and transition to 100% renewable energy by 2030. In order to achieve this transition, the Shire will need to purchase green energy from an electricity provider, eliminate gas use entirely and/or purchase offsets for energy produced by mains electricity and gas.

The Shire will achieve this through:

- Sourcing electricity from small to medium scale rooftop solar on occupied Council facilities.
- Sourcing electricity from large scale solar on the Serpentine Jarrahdale Operations Centre and Administration Building.
- Investigating a renewable energy park on Council land.
- Investigating energy storage devices including batteries, hydrogen cells and electric vehicles.
- Investigating organic 'energy from waste'.

	Actions to achieve 100% renewable energy	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
5.1	Install, upgrade and expand solar photovoltaic systems on all major Council facilities.	Infrastructure Services	Climate Change Strategy and Action Plan	Key	Ongoing	Existing	PV systems installed
5.2	Investigate the feasibility of battery storage.	Infrastructure Services	Climate Change Strategy and Action Plan	Medium	Medium Term (2027 to 2030)	New	Feasibility study completed
5.3	Investigate off-grid energy options.	Infrastructure Services	Climate Change Strategy and Action Plan	Low	Medium Term (2027 to 2030)	New	Feasibility study completed
5.4	Replace petrol driven tools and other mobile maintenance equipment (e.g. lawn mowers) with rechargeable battery options and power them with renewable energy.	Operations	Climate Change Strategy and Action Plan	High	Short Term (2025 to 2027)	Existing	Replacement program completed
5.5	Phase out gas appliances and change over to electric powered appliances which can be powered by renewable energy.	Infrastructure Services	Climate Change Strategy and Action Plan	Key	Ongoing	New	Replacement program completed
5.6	Support community groups in leased facilities to install renewable energy infrastructure through grants programs.	Community Development	Council Policy 5.1.7 – Community Funding	Low	Ongoing	New	Grant criteria amended
5.7	Continue power purchase agreements for green power and expand to other facilities.	Infrastructure Services	Climate Change Strategy and Action Plan	High	Short Term (2025 to 2027)	Existing	Agreements established

6. Increase Efficiency of Energy Consumption

A key step in the resilience roadmap is to decrease the energy demand and cost of the Shire's street lighting, parks and facilities by improving efficiency and optimising performance.

The Shire manages various facilities and parks which use electricity and gas to power appliances, lighting, pumps, heating, cooling and more. Street lighting is a significant source of greenhouse gas emissions. Currently it is difficult for local governments in WA to influence the electricity consumption from street lighting, as the majority of lights are under the operational control of Western Power, who determine which luminaire is fitted to each light and their operational hours.

The Shire will achieve this through:

- A commitment to implementing best practice in facility management.
- Transitioning to the use of energy efficient appliances and fittings.
- Implementing real time monitoring of energy consumption.
- Installation of solar power systems and battery storage and application of environmentally sustainable design for all new Council facilities.
- Advocating for technology replacement and working with Western Power to facilitate a roll out of more energy efficient street lighting.

	Actions to increase efficiency of energy consumption	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
6.1	Design all new Council buildings to best practice Environmentally Sustainable Design (ESD) by allocating 3% of the project budget towards innovative ESD.	Corporate Performance	Climate Change Strategy and Action Plan	High	Ongoing	Existing	ESD incorporated into new builds
6.2	Investigate opportunities for carbon positive buildings.	Infrastructure Services	Climate Change Strategy and Action Plan	Low	Short Term (2025 to 2027)	New	Report completed
6.3	Implement environmentally and financially sustainable methodology for government facilities management.	Infrastructure Services	Climate Change Strategy and Action Plan	Key	Ongoing	New	Best practice implemented
6.4	Support community groups in leased facilities to undertake energy efficient upgrades through grant programs.	Community Development	Council Policy 5.1.7 – Community Funding	High	Ongoing	New	Grant criteria amended
6.5	Undertake energy audits of all major community facilities, identify a schedule of works and develop building optimization plans to reduce operating costs, better manage energy demand and reduce consumption.	Infrastructure Services	Climate Change Strategy and Action Plan	High	Medium Term (2027 to 2030)	Ongoing	Energy audit program completed
6.6	Progressively retrofit buildings / parks with energy efficient technologies.	Infrastructure Services	Climate Change Strategy and Action Plan	High	Ongoing	New	Retrofit program completed
6.7	Switch to energy efficient street lighting by working with WALGA and Western Power (WP) to upgrade streetlights and Council owned streetlighting to LED.	Executive	Climate Change Strategy and Action Plan	Medium	Medium Term (2027 to 2030)	New	Smart street light rollout completed
6.8	Continue to monitor the Shire's energy use via an online monitoring platform and integrate real-time data.	Waste & Fleet	Climate Change Strategy and Action Plan	Key	Ongoing	Existing	Monitoring reports completed

7. Innovate for a Smart City

The Shire will invest in innovative technology-based solutions to meet the challenges of the changing climate and ensure the Shire is better connected, safer and more resilient.

A smart city (local government) is one that uses information and technology to increase operational efficiency, improve communication and enhance liveability.

There are new approaches, innovative technologies and smart infrastructure that can help meet the challenges of the changing climate and ensure a more sustainable and resilient future.

Sensors and integrated technology providing real time data can be used in decision making to improve liveability of the Shire, i.e. by monitoring urban heat, energy use, water use and waste levels. Smart lighting can also help to reduce energy demand and costs.

The Shire will achieve this through:

- Investigating and investing in innovative technology-based solutions.
- Investigating and investing in sensors and integrated technology that provides real-time data to monitor urban heat, energy use, water use and waste levels.
- Advocating the installation of smart street lighting with environmental sensors, dimming technology, metering, traffic measurement etc.

	Actions for smart city innovation	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
7.1	Review and implement the Strategic Information Systems Plan and Cloud-based Strategy.	Information & Communication Technology	Strategic Information Systems Plan & Cloud-based Strategy	High	Short Term (2025 to 2027)	Existing	Plan and Strategy reviewed and implemented
7.2	Develop an Innovation Framework.	Executive	Corporate Business Plan	Low	Short Term (2025 to 2027)	Existing	Framework endorsed by Council
7.3	Advocate smart street lighting e.g. technology with environmental sensors, dimming technology, metering, traffic measurement etc.	Executive	Climate Change Strategy and Action Plan	Medium	Short Term (2025 to 2027)	New	Smart street lighting supported
7.4	Advocate for a fast-tracked roll-out of residential Advanced Meter Infrastructure to help establish a smart grid and facilitate a virtual power plant in the community.	Strategic Planning	Climate Change Strategy and Action Plan	Medium	Short Term (2025 to 2027)	New	Advanced Meter Infrastructure installed
7.5	Support Western Power in the installation of Community Storage (large scale batteries) to meet network needs and facilitate a smart grid.	Strategic Planning	Climate Change Strategy and Action Plan	High	Ongoing	New	Community Storage Batteries installed
7.6	Provide electric vehicle charging infrastructure to facilitate sustainable transport.	Infrastructure Services	Climate Change Strategy and Action Plan	Key	Ongoing	New	EV charging infrastructure installed
7.7	Investigate usage-pricing technology and pay-as-you-throw programs for municipal waste.	Waste & Fleet	Waste Management Strategy	Medium	Long Term (2030 to 2035)	New	Feasibility study completed
7.8	Investigate smart technology to reduce litter (e.g. microplastics) in wetlands and waterways.	Waste & Fleet	Waste Management Strategy	Low	Medium Term (2027 to 2030)	New	Feasibility study completed

	Actions for smart city innovation	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
7.9	Investigate reverse vending machines for household waste to engage the community and provide incentives to reduce waste.	Waste & Fleet	Waste Management Strategy	Low	Short Term (2025 to 2027)	New	Investigation completed and incentives provided
7.10	Implement smart building controls to monitor and manage Shire facilities remotely (e.g. to enable switch-off of lights and appliances).	Infrastructure Services	Strategic Information Systems Plan & Cloud-based Strategy	Key	Short Term (2025 to 2027)	New	Smart building controls installed
7.11	Installation and real-time monitoring of energy sub-meters.	Infrastructure Services	Climate Change Strategy and Action Plan	High	Medium Term (2027 to 2030)	New	Sub-meters installed and monitored
7.12	Explore innovative ways to utilise renewable energy technology to establish a local network of energy generators, peer-to-peer trading and micro-grids.	Strategic Planning	Climate Change Strategy and Action Plan	Medium	Medium Term (2027 to 2030)	New	Feasibility study completed
7.13	Investigate design requirements for road signage and line markings to accommodate future advances in transport including driverless and autonomous electric vehicles.	Infrastructure Services	Hypergrowth Road Network Implementation Plan	Low	Long Term (2030 to 2035)	Existing	Investigations completed
7.14	Encourage smart city infrastructure in land developments.	Strategic Planning	Climate Change Strategy and Action Plan	High	Ongoing	Existing	Advice provided to land developers

8. Educate and Collaborate

The Shire acknowledges the shared responsibility of the changing climate and will provide information on local change impacts and work with the community, business and stakeholders to take action and build resilience.

Education and collaboration are essential elements in the Shire's response to the changing climate. Through education, the Shire can help the community and business understand the specific climate risks to the region, which can empower them to take action to reduce emissions and build resilience by being prepared to adapt to the impacts.

The Shire will achieve this through:

- Continuing to support Switch Your Thinking's community and business education programs.
- Continuing to apply the WALGA Climate Change declaration.
- Continuing to work with WALGA to advocate for changes in regulation and policy to enable local government to deliver core services in a sustainable manner.
- Continuing to work with the Department of Fire and Emergency Services (DFES) to mitigate the risks and impacts that fire may have on the community.
- Continuing membership of the Cities Power Partnership.

	Actions to educate and collaborate	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
8.1	Develop and implement environmental education programs to build awareness and understanding of climate risks and resilience.	Strategic Planning	Climate Change Strategy and Action Plan	Medium	Short Term (2025 to 2027)	New	Education programs developed and delivered
8.2	Continue to support Switch Your Thinking's education programs.	Executive	Climate Change Strategy and Action Plan	Key	Ongoing	Existing	Support for programs continued
8.3	Continue to support Switch Your Thinking's behaviour change programs such as Rewards for Residents and Energysmart SMS Tips.	Executive	Climate Change Strategy and Action Plan	High	Ongoing	Existing	Support for programs continued
8.4	Continue the Cities Power Partnership membership.	Infrastructure Services	Climate Change Strategy and Action Plan	High	Ongoing	Existing	Membership maintained
8.5	Work with WALGA to advocate for changes to policy and legislation.	Strategic Planning	Climate Change Strategy and Action Plan	Medium	Ongoing	Existing	Partnership continued
8.6	Support the implementation of the State Government climate policy.	Executive	Climate Change Strategy and Action Plan	Medium	Ongoing	Existing	Support continued
8.7	Develop and implement sustainable behaviour change programs and	Waste & Fleet	Climate Change	High	Ongoing	New	Programs developed

	Actions to educate and collaborate	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
	provide households with the information and tools they need to reduce energy, water and waste consumption.		Strategy and Action Plan				and delivered
8.8	Prepare an Economic Development Framework that outlines how the Shire can build resilience, help business prosper in a low emissions economy and create new jobs.	Economic Development	Corporate Business Plan	Medium	Short Term (2025 to 2027)	New	Economic Development Framework adopted
8.9	Continue to encourage sustainable transport use such as public transport, walking and cycling through the 'Your Move' program, transport planning and design.	Infrastructure Services	Walking and Cycling Plan	Key	Ongoing	New	Walking and Cycling Plan implemented
8.10	Investigate how the Shire can support the community and local businesses to develop, own, or benefit from renewable energy projects.	Strategic Planning	Climate Change Strategy and Action Plan	Low	Short Term (2025 to 2027)	New	Report completed
8.11	Explore community ownership models for large-scale renewable energy infrastructure.	Strategic Planning	Climate Change Strategy and Action Plan	Low	Short Term (2025 to 2027)	New	Report completed

9. Foster the Waterwise Shire

The Shire is experiencing the impact of declining rainfall and groundwater and aims to improve water security by maintaining its Gold Waterwise Council status and implementing the Waterwise Action Plan.

Serpentine Jarrahdale's water security has already been influenced by the changing climate and associated local decline in rainfall. This has resulted in reduced ground water availability, which may decrease liveability with loss of urban vegetation and a decline in biodiversity.

The Shire will achieve this through:

- Maintaining Gold Waterwise Council status and aspiring to Platinum status.
- Reviewing, updating and implementing the Waterwise Action Plan.
- Investigating real time monitoring of water use.
- Actively managing the impacts of reduced water availability on its operations.
- Reducing water use by rationalising irrigation through hydrozoning, planting drought tolerant native species and using central controlled irrigation systems.

	Actions for a waterwise shire	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
9.1	Maintain Gold Waterwise Council Status and aspire to Platinum status.	Strategic Planning	Waterwise Action Plan	High	Ongoing	Existing	Gold Status maintained
9.2	Review, update and implement the Waterwise Action Plan to address climate change.	Strategic Planning	Waterwise Action Plan	High	Now (2024 to 2025)	New	Plan updated
9.3	Hold regular meetings of the waterwise working group to advance the Waterwise Action Plan and water sensitive urban design.	Strategic Planning	Waterwise Action Plan	High	Now (2024 to 2025)	Existing	Regular meetings held
9.4	Reduce community and corporate water consumption.	Waste & Fleet	Waterwise Action Plan	High	Short Term (2025 to 2027)	Existing	Water consumption reduced
9.5	Investigate real-time monitoring of water use.	Waste & Fleet	Waterwise Action Plan	Low	Medium Term (2027 to 2030)	New	Water use monitored in real time
9.6	Develop and implement a program to increase water literacy and offer incentives to encourage water efficiency in households.	Waste & Fleet	Waterwise Action Plan	Low	Ongoing	Existing	Education and incentives program developed and delivered
9.7	Continually reduce Council groundwater abstraction and explore use of alternative water sources.	Infrastructure Services	Waterwise Action Plan	Key	Now (2024 to 2025)	Existing	Groundwater usage reduced, alternatives identified

	Actions for a waterwise shire	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
9.8	Ensure the provision of water supplies with new areas of public open space.	Strategic Planning	Waterwise Action Plan	Key	Ongoing	Existing	Water supplies provided
9.9	Implement Water Sensitive Urban Design initiatives.	Infrastructure Services	LPP 2.4 – Water Sensitive Design	High	Ongoing	Existing	WSUD initiatives implemented
9.10	Continue to monitor water use and sources for public open space and adjust regimes.	Operations	Integrated Water Management Strategy	Medium	Ongoing	Existing	IWMS implemented
9.11	Continue to investigate and implement opportunities to reduce irrigated surface area and improve irrigation design e.g. hydrozoning.	Operations	Waterwise Action Plan	High	Ongoing	Existing	Irrigation reduced
9.12	Conduct water audits at the top 5 water using facilities/locations.	Infrastructure Services	Waterwise Action Plan	Medium	Short Term (2025 to 2027)	Existing	Audits completed
9.13	Require best practice strategies for new urban development and existing storm water drainage management systems, to be capable of handling greater flows considering latest climate science.	Infrastructure Services	Climate Change Strategy and Action Plan	Medium	Medium Term (2027 to 2030)	New	Review undertaken

10. Conserve Biodiversity

The changing climate has the potential to cause damage to, or loss of, biodiversity and natural habitat. Impacts to the jarrah forest are likely to be particularly severe, with transition or collapse of the system possible. The Shire aims to increase the resilience of natural ecosystems through implementation of the Reserve Management Plans for Banksia Woodland, Marri Woodland and Scarp & Plateau Forest.

The Shire of Serpentine Jarrahdale manages large areas of natural reserves, which includes coastal plain, wetland and upland areas. As well as natural area reserves, the Shire manages a number of ecological linkages in developed areas which provide important movement passages and shelter for fauna and habitat for flora.

Detailed information on climate risks to biodiversity, current controls, and actions are provided in the Climate Change Physical Risk and Adaptation Plan.

The Shire will achieve this through:

- Continuing to implement the Weed and Pest Management Plan.
- Continuing to monitor flora and fauna in natural area reserves.
- Continuing to implement the Biodiversity Action Plan.
- Continuing to manage the impacts of bushfire and control burning on ecosystems.
- Continuing to support the free verge plant program which provides free local native seedlings to residents.

	Actions to conserve biodiversity	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
10.1	Implement the Weed and Pest Management Plan.	Natural Reserves	Weed and Pest Management Plan	High	Now (2024 to 2025)	Existing	Plan implemented
10.2	Implement the Biodiversity Action Plan and Local Biodiversity Strategy.	Strategic Planning	Biodiversity Action Plan and Local Biodiversity Strategy	High	Now (2024 to 2025)	Existing	Plan and Strategy implemented
10.3	Update and implement reserve management plans for banksia woodland, marri woodland and scarp/plateau forest.	Strategic Planning	Reserve Management Plans	Key	Now (2024 to 2025)	Existing	Management Plans updated and implemented
10.4	Investigate and implement methods to increase the resilience of the jarrah forest.	Natural Reserves	Biodiversity Action Plan and Local Biodiversity Strategy	High	Medium Term (2027 to 2030)	New	Resilience of jarrah forest improved
10.4	Develop and implement a Bushfire Risk Management Plan and Conservation specific Fire Response Plans to reduce adverse impacts upon biodiversity.	Emergency Services	Fire Hazard Reduction Notice	Key	Short Term (2025 to 2027)	New	Plans developed and implemented
10.5	Investigate provision of help to protect at risk	Natural Reserves	Biodiversity Action Plan	Low	Medium Term	New	Investigations completed

	Actions to conserve biodiversity	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
	species by increasing protected bushland areas, and relocating species that are under threat to suitable areas.		and Local Biodiversity Strategy		(2027 to 2030)		
10.6	Continue to investigate and implement alternative species of plants, and trees for new parks/ ovals and old parks/ovals requiring upgrading/replacing.	Landscape	Biodiversity Action Plan and Local Biodiversity Strategy	High	Now (2024 to 2025)	Existing	Plant selection lists updated
10.7	Continue to monitor conservation areas and adapt management regimes to build resilience and maintain ecosystem function.	Natural Reserves	Biodiversity Action Plan and Local Biodiversity Strategy	High	Now (2024 to 2025)	Existing	Monitoring and adaptation regimes implemented
10.8	Develop and provide education programs/campaigns to assist the public in understanding biodiversity loss and implementing biodiversity preservation strategies in their own gardens.	Strategic Planning	Biodiversity Action Plan and Local Biodiversity Strategy	Medium	Short Term (2025 to 2027)	New	Education campaigns developed and delivered
10.9	Continue to support provision of free local native seedlings to residents through the free verge plant program.	Natural Reserves	Biodiversity Action Plan and Local Biodiversity Strategy	High	Ongoing	Existing	Continued support for program
10.10	Continue to support provision of free local native street trees through the free street tree program.	Operations	Urban and Rural Forest Strategy	High	Ongoing	Existing	Continued support for program

11. Increase Urban and Rural Forest Canopy

Increased temperatures, pests, disease and reduced water availability pose a risk to the urban forest. The Shire aims to increase tree canopy, maintain water security and improve liveability by implementing planning controls, the Urban and Rural Forest Strategy and Waterwise Action Plan.

The Shire will achieve this through:

- Implementing the Urban and Rural Forest Strategy.
- Implementing the Waterwise Action Plan.
- Implementing the vegetation protection clauses in the Local Planning Scheme no. 3.
- Implementing the street tree policy and tree retention policy.
- Maintaining and updating the significant tree register.
- Encouraging urban greening initiatives.

	Actions to increase urban and rural forest	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
11.1	Lead the implementation of the Urban and Rural Forest Strategy to increase canopy cover and enhance resilience of the Shire's urban and rural forest.	Strategic Planning	Urban and Rural Forest Strategy	Key	Now (2024 to 2025)	Existing	Urban and Rural Forest Strategy implemented
11.2	Lead the implementation of the Waterwise Action Plan to enhance the resilience of urban trees.	Strategic Planning	Waterwise Action Plan	High	Now (2024 to 2025)	Existing	Waterwise Action Plan implemented
11.3	Implement the vegetation protection clauses in Local Planning Scheme 3.	Statutory Planning	Local Planning Scheme 3	Key	Now (2024 to 2025)	Existing	Local Planning Scheme 3 implemented
11.4	Implement Council Policy 2.1.12 – Street Trees and LPP 4.16 Tree Retention and Planting.	Operations	Council Policy 2.1.12 – Street Trees & LPP 4.16 – Tree Retention and Planting	High	Now (2024 to 2025)	Existing	Council Policy 2.1.12 – Street Trees & LPP 4.16 Tree Retention and Planting implemented
11.5	Develop and implement residential design guidelines to mandate deep soil zone for trees in new grouped dwellings.	Statutory Planning	Urban and Rural Forest Strategy	Medium	Short Term (2025 to 2027)	New	Guidelines developed and implemented
11.6	Develop and deliver a plan for climate resilient green spaces to reduce irrigated grass and increase hydrozoning and tree canopy in identified streetscapes and public open space.	Landscape	Urban and Rural Forest Strategy	Medium	Medium Term (2027 to 2030)	New	Plan for climate resilient green spaces developed and delivered
11.7	Continue to maintain and update the significant tree register.	Strategic Planning	Urban and Rural Forest Strategy	Low	Ongoing	Existing	Significant tree register maintained and updated
11.8	Encourage canopy planting in agricultural areas to reduce heat.	Strategic Planning	Urban and Rural Forest Strategy	High	Short Term (2025 to 2027)	Existing	Increased rural canopy
11.9	Encourage urban and rural greening initiatives.	Landscape	Urban and Rural Forest Strategy	High	Ongoing	Existing	Increased urban and rural greening

12. Maintain Community Infrastructure

The changing climate may cause damage to, and loss of, infrastructure as a result of bushfires, extreme weather and higher temperatures. The Shire will reduce these risks by implementing the Local Emergency Management Arrangements and best practice infrastructure management.

Collectively these impacts may result in:

- Financial loss to the Shire through increased insurance premiums, maintenance and repair costs.
- Reduced public safety, health and wellness.
- Legal, financial and reputational damage to the Shire.
- Power outage impacts on transport infrastructure such as traffic lights causing traffic congestion and delays.
- Increased operational costs and peak energy demand for utilities.

The Shire will achieve this through:

- Implementing planning provisions to improve infrastructure resilience.
- Implementing best practice infrastructure management.
- Designing and retrofitting buildings for climate resilience.

	Actions to maintain community infrastructure	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
12.1	Review capacity of existing Council buildings to withstand more severe storms and retrofit as appropriate and if required to meet updated building codes.	Infrastructure Services	Climate Change Strategy and Action Plan	High	Short Term (2025 to 2027)	New	Review completed
12.2	Review the frequency of reactive and preventative maintenance performed on the Shire's infrastructure assets to identify potential gaps in service and develop an environmentally and financially sustainable methodology for maintenance, renewal and repair.	Infrastructure Services	Climate Change Strategy and Action Plan	Key	Medium Term (2027 to 2030))	New	Review completed

	Actions to maintain community infrastructure	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
12.3	Consistent with Planning Policy provisions continue to ensure all proposed Structure Plans are accompanied and informed by a Bushfire Management Plan where required.	Strategic Planning	Climate Change Strategy and Action Plan	Key	Ongoing	Existing	Bushfire Management Plans developed
12.4	Ensure all Shire owned buildings (within Bushfire Prone Areas) have Bushfire Risk Assessments completed.	Emergency Services	Climate Change Strategy and Action Plan	High	Ongoing	Existing	Bushfire Risk Assessments completed
12.5	Consistent with Planning Policy provisions continue to ensure that the new building design approval processes (within Bushfire Prone Areas) incorporate bush fire management.	Emergency Services	Climate Change Strategy and Action Plan	High	Ongoing	Existing	Bushfire management undertaken
12.6	Design and retrofit buildings for climate resilience and improve energy management, through implementation of ESD guidelines.	Infrastructure Services	Climate Change Strategy and Action Plan	Medium	Short Term (2025 to 2027)	New	ESD guidelines implemented
12.7	Implement LPP 2.9 – Environmentally Sustainable Design Considerations for Development, and extend to residential developments.	Statutory Planning	LPP 2.9 – Environmentally Sustainable Design Considerations for Development	Key	Short Term (2025 to 2027)	New	ESD policies implemented

13. Enhance Health and Wellbeing

The changing climate presents a risk to the health, safety and wellness of the community as a result of increased bushfires, heatwaves, higher temperatures, less rainfall and more extreme weather events. The Shire will manage these impacts by implementing the Health and Wellbeing Strategy and Local Emergency Management Arrangements.

The impacts of changes to climate can result in:

- Increased pressure on emergency and social services.
- Reduced air quality from smoke following bushfire events.
- Increase in mosquito borne and other disease, food poisoning cases or nuisance species.
- Heat stress and reduced wellbeing.
- Increased reliance on artificial cooling to maintain comfort.
- Reduced liveability of the Shire.
- Greater demand for resources to accommodate displaced persons.
- Cancellation or postponement of public events organised by the Shire.
- Legal, financial and reputational damage to the Shire.
- Increased downtime during hot weather or extreme weather.

The Shire will achieve this through:

- Implementing the Health and Wellbeing Strategy.
- Implementing the Local Emergency Management Arrangements.
- Providing community education programs to build resilience.

	Actions to enhance health and wellbeing	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
13.1	Undertake a climate change health vulnerability assessment and map vulnerable residents and areas.	Environmental Health	Health and Wellbeing Strategy	High	Short Term (2025 to 2027)	New	Vulnerability assessment completed
13.2	Review, update and implement the Health and Wellbeing Strategy, including actions that reduce climate change risk to public health such as heat stress, increases in mosquito and vector borne disease, food poisoning, nuisance species, bushfires, pandemics, extreme weather events, etc.	Environmental Health	Health and Wellbeing Strategy	Key	Short Term (2025 to 2027)	New	Health and Wellbeing Strategy reviewed, updated and implemented
13.3	Develop, update and implement a shade strategy for community facilities, playgrounds and parks.	Landscape	Climate Change Strategy and Action Plan	Medium	Ongoing	Existing	Shade strategy developed, updated and implemented
13.4	Review, update and implement the Local Emergency Management Arrangements.	Emergency Services	Local Emergency Management Arrangements	Key	Short Term (2025 to 2027)	New	Plan is updated and implemented
13.5	Develop and provide education programs to assist the public to prepare for emergency situations.	Emergency Services	Local Emergency Management Arrangements	High	Ongoing	Existing	Education programs developed and delivered
13.6	Review existing warning systems and identify potential gaps and opportunities for improvement.	Emergency Services	Local Emergency Management Arrangements	Medium	Short Term (2025 to 2027)	Existing	Review completed
13.7	Provide updated information to assist the public to understand the impacts of climate changes and empower them to take action to build resilience.	Strategic Planning	Climate Change Strategy and Action Plan	Medium	Short Term (2025 to 2027)	New	Education resource developed and delivered

14. Manage Peri-Urban Hypergrowth

The Shire has consistently been one of the highest-growth local government areas in Australia over the past 20 years, and this hyper-growth is expected to continue. Hyper-growth brings with it the risks of higher emissions from construction and the activities of increased population, as well as opportunities to mitigate these emissions, incorporate adaptation responses, and eventually increased revenue. Hyper-growth brings with it financial constraints as growth precedes revenue.

The Shire will achieve this through:

- Mitigation of elevated emissions from construction activities.
- Mitigation of emissions from increasing population.
- Incorporation of adaptation responses into growth areas.
- Utilisation of increased revenue to mitigate and adapt to the impacts of hyper-growth.

	Actions to manage peri-urban hypergrowth	Leader	Related Plan	Priority	Timeframe	Resource	Measure of Success
14.1	Educate and encourage the construction industry to utilize low-emissions construction materials and methods.	Strategic Planning	Climate Change Strategy and Action Plan	Key	Short Term (2025 to 2027)	Existing	Developments have an Environmentally Sustainable rating
14.2	Provide updated information to new residents to assist understanding of the impacts of climate changes and empower action to build resilience.	Communications	Welcome Pack	High	Short Term (2025 to 2027)	Existing	Brochures are included in the Welcome Packs
14.3	Utilise the planning system to incorporate adaptation responses into growth areas.	Statutory Planning	Local Planning Scheme No.3	Medium	Short Term (2025 to 2027)	Existing	Developments have an Environmentally Sustainable rating
14.4	Sequester a portion of the increased revenue to assist the community to adapt to climate change impacts.	Financial Services	Climate Change Strategy and Action Plan	High	Short Term (2025 to 2027)	New	Reserve created
14.5	Implement a Climate Resilience Action Fund	Financial Services	Climate Change Strategy and Action Plan	Key	Short Term (2025 to 2027)	New	Reserve created and growing

Resourcing

The action plan is supported by the Shire's Climate Resilience Action Fund which includes an initial allocation of \$150,000 each year. The intent of this seed capital is to then deploy it to immediate short-term measures, that will reduce ongoing operational costs of the organisation through (initially) making buildings as efficient as possible.

With these operational costs then measured, it is proposed that subsequent budgets redirect savings (on for example utility costs) into the Climate Resilience Action Fund, in order to then invest in other measures that focus upon reduced costs through pursuing efficient operations, and capital projects.

The Shire will also explore grant opportunities from the state and federal government to further advance the action plan. Many actions in this strategy align to existing strategies or plans which provide guidance on resources and funding. The remaining actions will be subject to annual budget submissions, approved business cases by responsible leaders and budget capacity.

Coordination of the actions, delivery of education programs and the continued investment in researching new initiatives will require the appointment of a full-time Climate Change Officer in the 2025–2026 financial year to oversee the implementation of this strategy and the climate resilience roadmap.

	Key Priority Actions	Leader	Related Plan	Timeframe	Estimate of Cost	Measure of Success
1.1	Endorse the 2024 Climate Change Strategy and Action Plan.	Council	Climate Change Strategy and Action Plan	Now (2024 to 2025)	Staff time	Strategy and Action Plan adopted by Council
1.5	Employ a full-time Climate Change Officer to deliver this Strategy and Action Plan.	Development Services	Climate Change Strategy and Action Plan	Short Term (2025 to 2027)	\$70,000 per year	Climate Change Officer employed
2.1	Undertake an annual greenhouse gas emission corporate inventory and report on performance against targets.	Waste & Fleet	Climate Change Strategy and Action Plan	Ongoing	Staff time (if full time officer appointed)	Annual inventory and report completed
2.2	Implement the climate resilience roadmap to reduce corporate emissions as much as practical by eliminating emissions from waste, transitioning to 100% renewable energy, and increasing efficiency of energy consumption.	Strategic Planning	Climate Change Strategy and Action Plan	Medium Term (2027 to 2030)	Total cost to implement the Climate Change Strategy and Action Plan	Implementation of climate resilience roadmap
3.1	Develop a best practice Council fleet policy and ensure fleet purchases meet strict greenhouse gas emissions requirements.	Waste & Fleet	Climate Change Strategy and Action Plan	Short Term (2025 to 2027)	\$30,000 for consultant	Policy updated
3.8	Provide charging infrastructure throughout the Shire at key	Infrastructure Services	Climate Change	Medium Term (2027 to 2030)	\$100,000 or more depending	EV charging infrastructure installed

	Key Priority Actions	Leader	Related Plan	Timeframe	Estimate of Cost	Measure of Success
	locations for electric vehicles.		Strategy and Action Plan		on coverage (\$10,000 per charger for 10 charging stations)	
4.3	Improve resource recovery and education through a community drop off facility, reuse shop and education centre.	Waste & Fleet	Waste Management Strategy	Short Term (2025 to 2027)	\$5 million as part of a bigger project	Community facility re-opened
4.10	Update procurement policy to prioritise low emissions options.	Procurement	Procurement policy	Short Term (2025 to 2027)	Staff time	Procurement policy updated
5.1	Install, upgrade and expand solar photovoltaic systems on all major Council facilities.	Infrastructure Services	Climate Change Strategy and Action Plan	Ongoing	\$80,000 for a 100kW system (\$800,000 for ten buildings)	PV systems installed
5.5	Phase out gas appliances and change over to electric powered appliances which can be powered by renewable energy.	Infrastructure Services	Climate Change Strategy and Action Plan	Ongoing	\$1500 for new electric stove, \$2000 for new electric water heater (\$35,000 for ten buildings)	Replacement program completed
6.3	Implement environmentally and financially sustainable methodology for government facilities management.	Infrastructure Services	Climate Change Strategy and Action Plan	Ongoing	\$30,000 for consultant to design, staff time to implement	Best practice implemented
6.8	Continue to monitor the Shire's energy use via an online monitoring platform and integrate real-time data.	Waste & Fleet	Climate Change Strategy and Action Plan	Ongoing	\$15,000 per year	Monitoring reports completed
7.6	Provide electric vehicle charging infrastructure to facilitate sustainable transport.	Infrastructure Services	Climate Change Strategy and Action Plan	Ongoing	\$30,000 to \$1 million depending on coverage (\$10,000 per charger)	EV charging infrastructure installed
7.10	Implement smart building controls to monitor and manage Shire facilities remotely (e.g. to enable switch-off	Infrastructure Services	Strategic Information Systems Plan & Cloud-based Strategy	Short Term (2025 to 2027)	\$5,000 to \$40,000 per building (\$50,000 to \$400,000)	Smart building controls installed

	Key Priority Actions	Leader	Related Plan	Timeframe	Estimate of Cost	Measure of Success
	of lights and appliances).				for ten buildings)	
8.2	Continue to support Switch your thinking's education programs.	Executive	Climate Change Strategy and Action Plan	Ongoing	\$60,000 per year	Support for programs continued
8.9	Continue to encourage sustainable transport use such as public transport, walking and cycling through the 'Your Move' program, transport planning and design.	Infrastructure Services	Walking and Cycling Plan	Ongoing	Staff time	Walking and Cycling Plan implemented
9.7	Continually reduce Council groundwater abstraction and explore use of alternative water sources.	Infrastructure Services	Waterwise Action Plan	Now (2024 to 2025)	Staff time	Groundwater usage reduced, alternatives identified
9.8	Ensure the provision of water supplies with new areas of public open space.	Strategic Planning	Waterwise Action Plan	Ongoing	Staff time	Water supplies provided
10.3	Update and implement reserve management plans for banksia woodland, marri woodland and scarp/plateau forest.	Strategic Planning	Reserve Management Plans	Now (2024 to 2025)	Staff time to develop, \$150,000 annually to implement	Management Plans updated and implemented
10.4	Develop and implement a Bushfire Risk Management Plan and Conservation specific Fire Response Plans to reduce adverse impacts upon biodiversity.	Emergency Services	Fire Hazard Reduction Notice	Short Term (2025 to 2027)	\$30,000 for consultant to develop, \$50,000 per year to implement	Plans developed and implemented
11.1	Lead the implementation of the Urban and Rural Forest Strategy to increase canopy cover and enhance resilience of the Shire's urban and rural forest.	Strategic Planning	Urban and Rural Forest Strategy	Now (2024 to 2025)	\$80 per tree and staff time to install (\$40,000 per year for 500 trees)	Urban and Rural Forest Strategy implemented
11.3	Implement the vegetation protection clauses in Local Planning Scheme 3.	Statutory Planning	Local Planning Scheme 3	Now (2024 to 2025)	Staff time	Local Planning Scheme 3 implemented
12.2	Review the frequency of reactive and preventative maintenance performed on the Shire's infrastructure assets to identify potential gaps in service and develop an environmentally and financially sustainable	Infrastructure Services	Climate Change Strategy and Action Plan	Medium Term (2027 to 2030))	\$30,000 for consultant	Review completed

	Key Priority Actions	Leader	Related Plan	Timeframe	Estimate of Cost	Measure of Success
	methodology for maintenance, renewal and repair.					
12.3	Consistent with Planning Policy provisions continue to ensure all proposed Structure Plans are accompanied and informed by a Bushfire Management Plan where required.	Strategic Planning	Climate Change Strategy and Action Plan	Ongoing	Staff time	Bushfire Management Plans developed
13.2	Review, update and implement the Health and Wellbeing Strategy, including actions that reduce climate change risk to public health such as heat stress, increases in mosquito and vector borne disease, food poisoning, nuisance species, bushfires, pandemics, extreme weather events, etc.	Environmental Health	Health and Wellbeing Strategy	Short Term (2025 to 2027)	\$30,000 for consultant to review, staff time and \$50,000 per year to implement	Health and Wellbeing Strategy reviewed, updated and implemented
13.4	Review, update and implement the Local Emergency Management Arrangements.	Emergency Services	Local Emergency Management Arrangements	Short Term (2025 to 2027)	\$30,000 for consultant	Plan is updated and implemented
14.1	Educate and encourage the construction industry to utilize low-emissions construction materials and methods.	Strategic Planning	Climate Change Strategy and Action Plan	Short Term (2025 to 2027)	Staff time	Developments have an Environmentally Sustainable rating
14.5	Implement a Climate Resilience Action Fund	Financial Services	Climate Change Strategy and Action Plan	Short Term (2025 to 2027)	\$150,000 per year	Reserve created and growing
	Total cost – single/capital items				\$1,715,000	
	Total cost – recurring (annual)				\$585,000 per year	

Monitoring and review

This strategy will be reviewed in 2028 to stay up to date with changes in circumstances, opportunities, policy, technology and climate change science. Annual greenhouse gas emission inventory reports will continue to be produced to measure the Shire's carbon footprint.

The Shire recognises that risk management is an ongoing process and will monitor and review climate change risks and actions as new data becomes available.

References

- Department of Climate Change, Energy, the Environment and Water (2024) – *Climate Risk and Opportunity Management Program* (dceew.gov.au/climate-change/publications/climate-risk-opportunity-management-program-resources)
- Intergovernmental Panel on Climate Change (IPCC) (2021) – *Sixth Assessment Report (AR6) Climate Change 2021: The Physical Science Basis*
- Intergovernmental Panel on Climate Change (IPCC) (2021) – *Sixth Assessment Report (AR6) Regional Fact Sheet – Australasia*
- Intergovernmental Panel on Climate Change (IPCC) (2022) – *Sixth Assessment Report (AR6) Climate Change 2022: Mitigation of Climate Change*
- Intergovernmental Panel on Climate Change (IPCC) (2023) – *Sixth Assessment Report (AR6) Synthesis Report: Climate Change 2023*
- Ironbark Sustainability & Beyond Zero Emissions – *Snapshot Climate* (snapshotclimate.com.au)
- Shire of Serpentine Jarrahdale (2011) – *Climate Change Position Statement*
- Shire of Serpentine Jarrahdale (2015) – *Climate Change Strategy and Local Action Plan*
- Shire of Serpentine Jarrahdale (2019) – *State of the Environment Report*
- Shire of Serpentine Jarrahdale (2022) – *Climate Change Declaration*

Appendix 1 – Background Information Report