



City of Kalamunda

Draft

Climate Change Action Plan

January 2023



Acknowledgement of Country

Kaya. We respectfully acknowledge the Traditional Owners, the Whadjuk Noongar People as the Custodians of this land. We also pay respect to all Aboriginal community Elders, past, present and future who have and continue to reside in the area and have been an integral part of the history of this region

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TABLE OF CONTENTS

Mayor’s Forward.....	3
Introduction	4
Mitigation and Adaptation	5
Purpose and Scope	5
Summary of Targets/Objectives	6
What is Climate Change?	7
The Greenhouse Effect	7
Global Impacts of Climate Change.....	8
Impacts and Consequences for the City of Kalamunda	11
Summary of Impacts.....	11
Summary of Consequences for the City of Kalamunda	16
How this Climate Change Action Plan is structured	18
How the Climate Change Action Plan was Developed.....	19
Focus 1: Carbon Footprint	21
Targets/Objectives.....	21
Achievements to Date	21
Actions	23
Focus 2: Waste and Circular Economy.....	26
Achievements to Date:	26
Actions:	27
Focus 3: Sustainable Development.....	30
Targets/Objectives:.....	30
Achievements to Date:	30
Actions:	32
Focus 4: Resilience under Changing Climate Pattens	35
Targets/Objectives:.....	35
Achievements to Date:	35
Actions:	36

Mayor's Forward

I am pleased to present the City of Kalamunda's first Climate Change Action Plan.

Adaptation to climate change safeguards people from the global effects of higher temperatures, rising seas, fiercer storms, catastrophic bushfires and often heavy and unpredictable rainfall.

The Action Plan provides a practical approach to dealing with a changing climate, building a strong green economy and further reducing greenhouse gas emissions.

A green transition, including a shift to renewable energy, construction of energy-efficient buildings and environmental initiatives, will create local employment opportunities.

Climate change is having local impacts upon our community notably in matters of extreme weather events, a drying climate and its impacts upon water supply and vegetation and an overall increase in average temperatures which impact the very young and our elderly.

Climate Change is a global threat. Local Government is committed to meeting international obligations through Australia's participation in protocols and agreements established under the United Nations Framework Convention on Climate Change (UNFCCC), including but not limited to the Paris Agreement and successive international treaties.

The City will actively pursue achievement of our Climate Change Action Plan to address risk to the environment, economy, infrastructure, and community health, safety and wellbeing in the City of Kalamunda, brought on by Climate Change.



"We must end fossil fuel pollution and accelerate the renewable energy transition, before we incinerate our only home." ANTONIO GUTERRES, United Nations Secretary-General, 18 May 2022.

Introduction

The City of Kalamunda has a vision for 2031 of connected communities, valuing nature, and creating our future together. Our guiding principle is to ensure everything we do will make the City of Kalamunda socially, environmentally, and economically sustainable.

We in the City of Kalamunda have a part to play in reducing greenhouse gas emissions, as part of the urgent global effort under the Paris Agreement to keep global warming below 1.5 degrees Celsius (°C).

The impacts of climate change are felt acutely at the local level, and local governments have a unique role in enhancing resilience to changing conditions while reducing greenhouse gas emissions.

As a signatory of the Western Australian Local Government Association (WALGA) Climate Change Declaration the City of Kalamunda recognises that climate change is occurring, and will continue to have a significant effect on the Western Australian environment, society, and economy. The Climate Change Action Plan (CCAP) is the first step in addressing risks to our City's environment, economy, infrastructure, community health, safety, and wellbeing.

As part of our declaration, we have committed to:

- Develop and implement a Climate Change Action Plan (this document),
- Set an appropriate emissions reduction target and work towards its achievement
- Support WALGA to work with State and Federal Government to ensure achievement of greenhouse gas emissions reduction targets as set out in key National and International agreements.
- Support WALGA to work with State and Federal Government to implement key actions and activities for climate change management at a local level.
- Assess the locally specific risks associated with climate change and implications for our services and identify areas where appropriate mitigation and/or adaptation strategies should be developed and implemented
- Ensure that, at appropriate review intervals, our climate change Action Plans/policies/strategies are reviewed and amended to incorporate the latest climate science, and to reflect the climate change management priorities and progress achieved to date
- Monitor the progress of our adaptation and/or mitigation actions and communicate our achievements to the Councils and Community.

Mitigation and Adaptation

The CCAP covers both mitigation and adaptation to climate change, as defined below.

Mitigation includes actions that seek to reduce the extent of climate change, typically by limiting the future increases in greenhouse gas concentration within the atmosphere. The best example of mitigation is the reduction of greenhouse gas emissions, which must be achieved at a global level but requires contribution at all levels of society to be effective. Reducing greenhouse gas emissions primarily involves reducing energy use and transitioning away from fossil fuels.

Adaptation is defined as an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. This includes taking action to reduce the City's vulnerability to impacts caused by a changing climate that cannot be avoided. Actions include ensuring homes are built in safer places, establishing more native vegetation to moderate ground temperature and reduce water consumption requirements, and ensuring new assets are designed for future conditions).

Purpose and Scope

Local governments are at the forefront in addressing the impacts of climate change at a local level. Innovative planning and appropriate action in both mitigating the impacts on and adapting to changes in climate are essential. Climate change is therefore both a crisis and an opportunity for the City of Kalamunda.

The purpose of the CCAP is to ensure we are prepared and ready to adapt to the climate challenges that lie ahead. It will also commit the City's support and advice to businesses and the community to help them meet these challenges.

The CCAP is an issue-specific plan that implements the aspirations identified by the community in the City's Strategic Community Plan (SCP) and actions of the Corporate Business Plan (CBP) as demonstrated in Figure 1.

Figure 1. City of Kalamunda Strategic Alignment



The CCAP is a live document that will evolve over time as new information and technologies emerge, and government initiatives become available. The City of Kalamunda will conduct an internal operational evaluation every year for the first five years of implementation and every two years thereafter to track progress and opportunities. The City's greenhouse gas emissions will be reported annually via a recognised reporting mechanism.

Summary of Targets/Objectives

- By 2030 - operational Greenhouse Gas emissions to be 40% lower than 2020 actual emissions
- By 2035 – City is net zero operational Greenhouse Gas emissions
- City supports its Community to become more resilient to Climate Change
- City is seen as strong advocate at State and Federal levels for Climate Change action by governments
- Improvements in urban forest canopy to reduce impacts of heat island effects
- Implementation of City's Waste Plan with 67% of domestic waste recovered by 2025 (compared to 41% in 2018) and 70% by 2030. Less than 15% of waste to be landfilled by 2030 (compared to 78% in 2018).

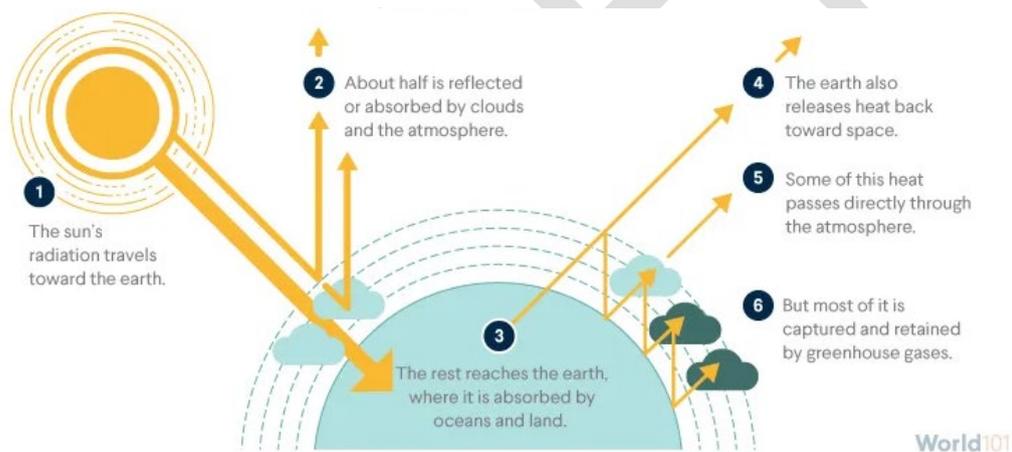
What is Climate Change?

According to the United Nations, Climate change can be a natural process where temperature, rainfall, wind and other elements vary over decades or more. In millions of years, our world has been warmer and colder than it is now. However, today we are experiencing unprecedented rapid warming from human activities, primarily due to burning fossil fuels that generate greenhouse gas emissions.

The Greenhouse Effect

Greenhouse gas emissions are so termed as they act to capture and retain heat within the atmosphere, through a process known as the Greenhouse Effect. This is a natural phenomenon that acts to stabilise the Earth's surface temperature, and without it the average temperature would be -17°C ¹. Human activities, primarily the burning of fossil fuels for energy, have rapidly increased the concentration of greenhouse gases within the atmosphere leading to more heat being trapped and, as a result, the average global temperature has risen. The Greenhouse Effect is illustrated by Figure 2.

Figure 2. Illustration of the Greenhouse Effect



There are seven key greenhouse gases: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (NH₃), sulfur hexafluoride (SF₆), Hydrofluorocarbons (HFCs), and Perfluorocarbons (PFCs). Total greenhouse gas emissions are expressed in units of carbon dioxide equivalent (CO₂-e). This combines the potency of each gas in terms of its impact on the greenhouse effect, and the longevity of its presence in the atmosphere.

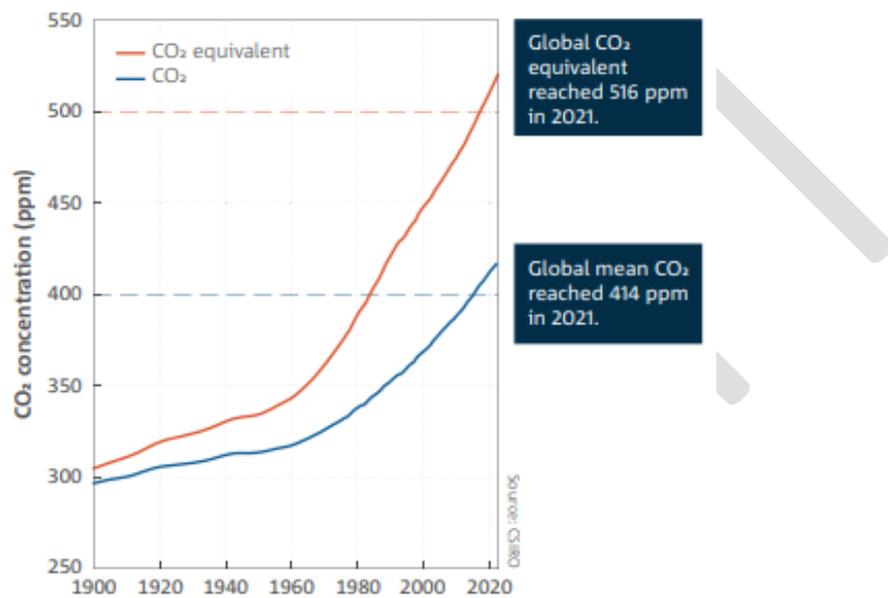
Human activities that cause greenhouse gases to be emitted include the burning of petrol and diesel for driving vehicles or coal for generating electricity. Clearing of land and forests

¹ IPCC. (2007). Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

also causes carbon dioxide to be released into the atmosphere and reduces opportunities for carbon sequestration. The degradation of organic material in landfills and use of natural gas are responsible for methane emissions. Energy, industry, agriculture, and waste disposal are among the major emitters.

Greenhouse gas concentrations will be at their highest levels in two million years and continue to rise. Figure 3 shows the increase in atmospheric CO₂-e concentration since industrialisation.

Figure 3. Concentration of atmospheric greenhouse gas emissions since 1900.

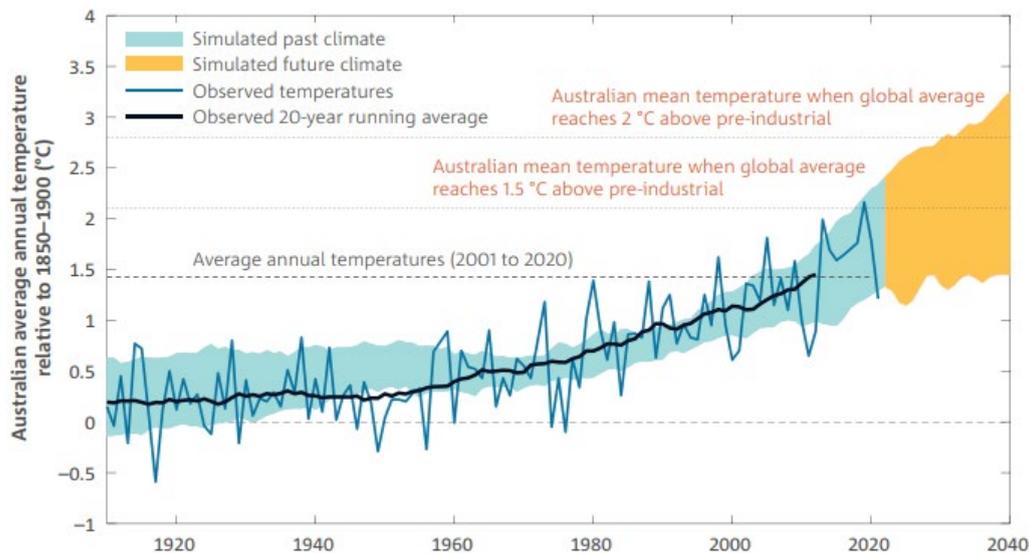


Global Impacts of Climate Change

As a result of rapidly increasing greenhouse gas emissions, the Earth is currently around 1.1°C warmer than it was prior to industrialisation. The last decade was the warmest on record.

Australia’s average temperature has warmed by 1.44 +/- 0.24 °C since 1910 when records began, as shown in Figure 4. Australia is projected to continue to increase more rapidly than the global average.

Figure 4. Annual temperature anomaly of Australia relative to 1850-1900 and simulated future climate.



Many people think climate change mainly means warmer temperatures. However, temperature rise is only the beginning of the story. The Earth is a system, where everything is connected, as such, changes in one area can influence changes in other areas. The primary consequences of climate change now include, among others:

- Intensification of the hydrological cycle meaning wet areas are getting wetter and dry areas getting drier,
- Intense droughts,
- Extreme heat and heatwaves,
- Water scarcity,
- Lengthened and more intense fires,
- Rising sea levels,
- Increased frequency and severity of extreme weather events and natural disasters,
- Melting polar ice,
- Melting of permafrost (ice over land),
- Catastrophic storms, and
- Declining biodiversity.

People are experiencing climate change in diverse ways. It affects our health, ability to grow food, housing, safety and work. Some of us are already more vulnerable to climate impacts, such as people living in small island developing States. Conditions like sea-level rise and saltwater intrusion have advanced to the point where whole communities have had to relocate. In the future, the number of “climate refugees” is expected to rise.

Every increase in global warming matters. In a 2018 report, thousands of scientists and

government reviewers agreed that limiting global temperature rise to no more than 1.5°C would help us avoid the worst climate impacts and maintain a liveable climate. Yet the current path of carbon dioxide emissions could increase global temperature by as much as 4.4°C by the end of the century.

The emissions that cause climate change come from every part of the world and affect everyone, but some countries produce much more than others. The 100 least-emitting countries generate 3 per cent of total emissions. The 10 largest emitters contribute 68 per cent. Everyone must take climate action.

Climate change is a huge challenge, but we already know many potential solutions. There are several opportunities that can deliver economic benefits while improving our lives and protecting the environment. We also have global agreements to guide progress, such as the United Nations Framework Convention on Climate Change and the Paris Agreement. Three broad categories of action are: cut emissions, adapt to climate impacts and finance required adjustments.

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Impacts and Consequences for the City of Kalamunda

Summary of Impacts

Western Australia's average temperature has risen by 1.3°C since 1910 accompanied by more hot days and extended warm spells. Perth and the South West Region have been impacted by climate change more than almost any other place on the planet.²

This section uses information from the Climate Change in Australia's Climate Futures Tool, the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report, and the State of the Climate report prepared by Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Bureau of Meteorology in 2022. The Climate Futures Tool provides a range of projection tools that consider four Representative Concentration Pathway (RCP) scenarios described in Table 1. Note, RCP2.6 is no longer achievable.

Table 1. Description of Representative Concentration Pathways used in climate projections.

Scenario	Description
RCP 8.5	Little curbing of emissions, CO2 concentration continues to rise rapidly, reaching 940 ppm by 2100
RCP 6.0	Lower emissions achieved through the application of some mitigation strategies and technologies leading to CO2 rising less rapidly than RCP8.5, but still reaching 660 ppm by 2100 and total radiative forcing stabilising shortly after 2100.
RCP 4.5	CO2 concentrations slightly above those of RCP6.0 until after mid-century, with CO2 concentration reaching 540 ppm by 2100.
RCP 2.6	The most ambitious mitigation scenario, with emissions peaking around 2020 then rapidly declining. CO2 concentration reaches 440 ppm by 2040 and then slowly declines to 420 ppm by 2100. <i>Note: RCP2.6 can no longer be achieved.</i>

According to CSIRO, the South West Region is projected to experience:

- Increased temperatures (very high confidence)
- Increased hot days (very high confidence)
- Harsher fire weather (high confidence)
- Decreased rainfall (high confidence)
- Increased extreme rainfall (high confidence)
- Fewer frosts (high confidence)
- Increased sea level (very high confidence)

² Climate Change in Western Australia, WA government Issues paper - September 2019, p1

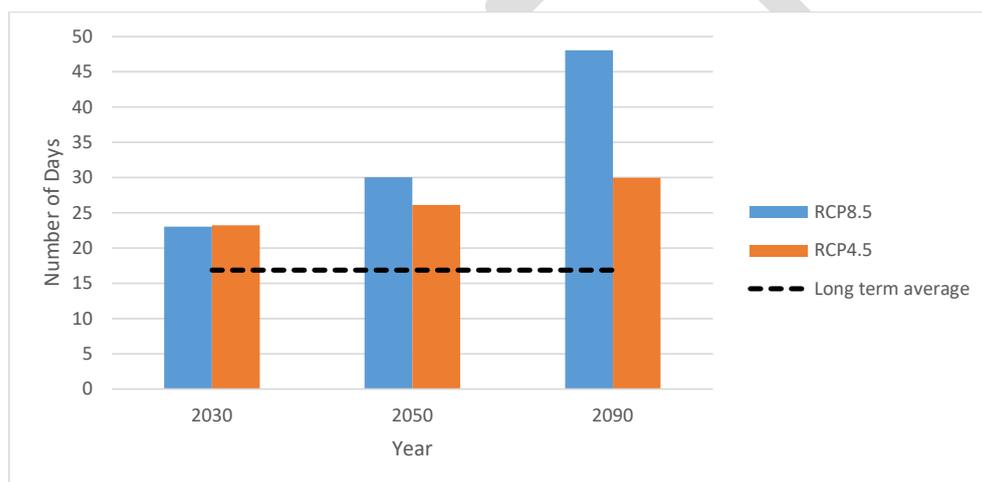
Perth and the South West Region have been impacted by climate change more than almost any other place on the planet.³ Climate change has the potential to affect the health and wellbeing of our residents, particularly the elderly and the very young.⁴

Increased temperatures, hot days, and warm spells

We face higher average temperatures, and an increase in the annual number of days in Perth over 35°C. Figure 5 shows the projected increase in number of days over 35°C, compared with a long term (1981-2010) average of 16.87 days.

By 2030, average temperatures are expected to be 0.5-1.2 degrees higher than the climate of 1986-2005 across all RCPs. By 2090, under RCP8.5, the projected warming is 2.6-4.2°C. If global emissions are reduced in line with RCP4.5, this increase could be limited to 1.1-2.1 °C.

Figure 5. Projected number of days over 35°C each year under two emissions scenarios (RCP8.5 and RCP4.5) in the short (2030), medium (2050), and long (2090) term.



In its largely residential areas, the City will be vulnerable to rising temperatures that concentrate heat in urban areas, leading to the ‘heat island effect.’

Some cities have begun measuring the rise in heat island effect.⁵ In places with few trees, bitumen roads and carparks, the City’s residents could experience temperatures 4 °C to 8°C higher than in other areas. The City has a high cross-section of citizens who may be particularly vulnerable to urban heat island effect, with a higher proportion of infants and

³ Climate Change in Western Australia, WA government Issues paper - September 2019, p1

⁴ <https://www1.racgp.org.au/ajgp/2018/july/climate-change-and-the-public-health>

⁵ Mark Siebentritt, Growing cool cities – The role of irrigated green cover, presentation to workshops in Perth and other Australian cities, project managed by Edge Environment for Hort Innovation, December 2019

junior school-age children, and a higher proportion of older workers, retirees and seniors than the average in Greater Perth.⁶ The older people are often living in and around Kalamunda township, and many young families make their home in our foothills' suburbs.⁷

Harsher fire weather

Western Australia's fire risk has increased over the past four decades, and fire seasons have lengthened due to warming, drying conditions (Figure 6). Future climate change will lead to increased average and maximum temperatures, time spent in drought and more extreme weather events.⁸ The number of days per year with severe fire danger weather is projected to almost double in the South West Region by 2090 if carbon emissions are not drastically reduced. The majority of the City of Kalamunda is already designated as a bushfire-prone area. A warming climate means a bigger risk of bushfire due to increased drying of forests and woodlands and more leaf fall and forest litter. The City may therefore face a longer and more costly fire mitigation season.⁹

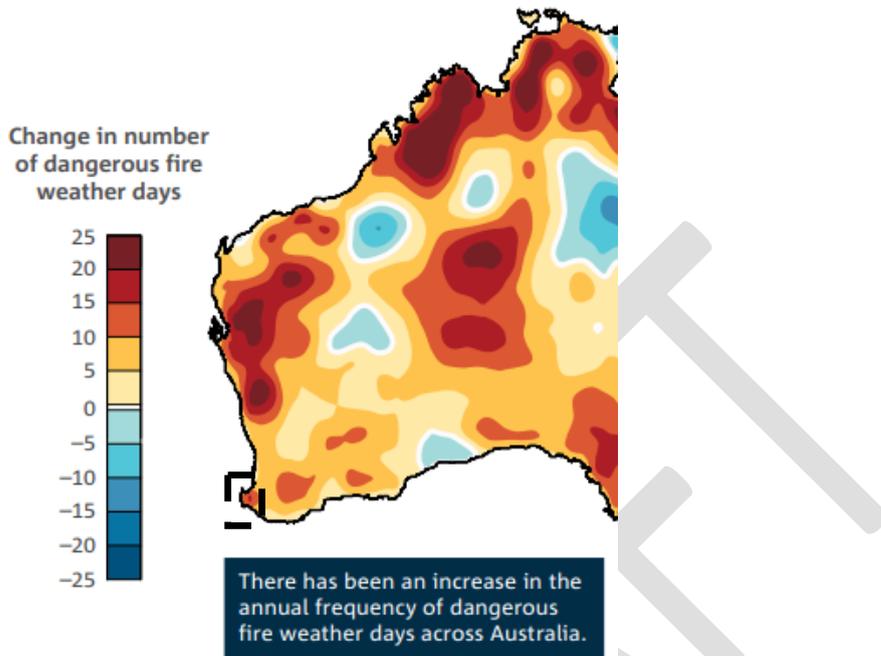
⁶ <https://profile.id.com.au/kalamunda/service-age-groups>

⁷ That foothills area includes the high density residential areas of Forrestfield, Wattle Grove East, Maida Vale, and High Wycombe.

⁸ Bureau of Meteorology 2016, State of the Climate 2016, Australian Government. Available from: <http://www.bom.gov.au/state-of-the-climate/State-of-the-Climite-2016.pdf>. [Accessed 16 April 2019].

⁹ Already the City has three people working full time all year in City-controlled properties, plus 4-5 contracted bushfire officers.

Figure 6. Change in annual number of dangerous fire weather days between 1950-1986 and 1986-2022.



Declining and Less Predictable Rainfall

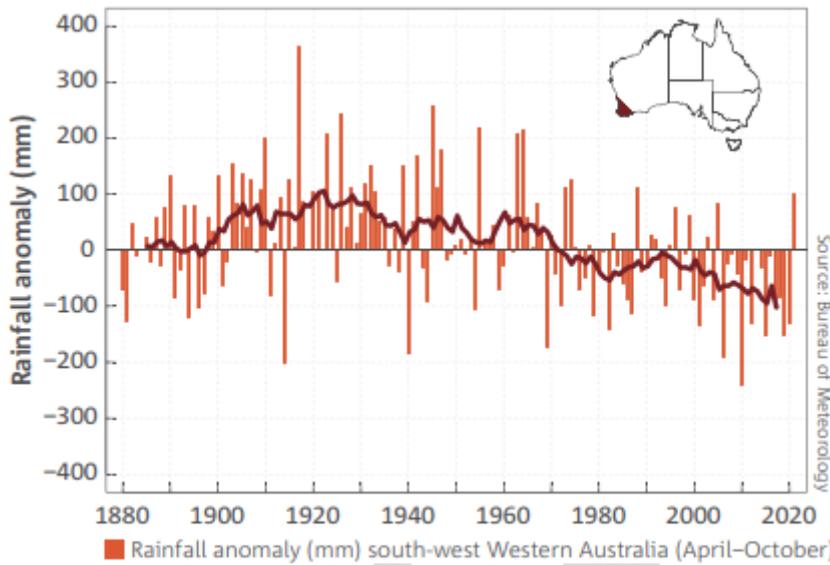
Rainfall has declined more rapidly in Western Australia than elsewhere in the country since 1900. A steady decline in rainfall has seen a 60 percent reduction of inflow to metropolitan dams since the 1970s. Perth has seen an average decline of 16% in spring and 20% in winter rainfall since 1970 (Figure 7). Stream flow has declined much further¹⁰, with streams in the Perth Hills region that once flowed year-round now seasonal.¹¹ Further decline in rainfall, higher temperatures and groundwater level dropping below the creek bed are predicted to reduce stream flows further by as much as three-quarters.¹² Less water in stream beds adversely affects our parks and reserves and could mean more costly water bills.

¹⁰ Water Corporation web-site. <https://www.watercorporation.com.au/water-supply/rainfall-and-dams/streamflow/streamflowhistorical>

¹¹ Kevin Petrone and others, *Streamflow decline in southwestern Australia, 1950-2008*, Geographical Research Letters, 2010.

¹² Ian Smith and Scott Power, *Past and future changes to inflows into Perth (Western Australia) dams*, Journal of Hydrology: Regional Studies, November 2014.

Figure 7. Rainfall anomaly in south west of Western Australia during April to October since 1880.



Observations show an increase in the intensity of heavy rainfall events. These events are associated with flash flooding, particularly in urban environments with a large amount of impervious ground cover (such as roads, car parks and buildings). This has been observed in the South West Region even with overall rainfall in decline. As the climate warms, all weather is occurring within an atmosphere that is wetter and more energetic. For every degree of warming the atmosphere is able to hold around 7% more water vapour, which can cause an increased likelihood of heavy rainfall events¹³. Flash flooding has a number of consequences on our natural and built environments including an increase in vector-borne diseases, transport of pollutants, greater runoff via stormwater rather than groundwater infiltration, and damage to infrastructure.

¹³ CSIRO & Bureau of Meteorology (2022) State of the Climate 2022. Available from: <http://www.bom.gov.au/state-of-the-climate/2022/documents/2022-state-of-the-climate-web.pdf>

Summary of Consequences for the City of Kalamunda

The City of Kalamunda is a key part of the South West Australia Eco-region, one of 34 biodiversity hotspots in the world. We live in a region that has more than 1500 plant species, or 0.5% of the world's plant population. However, the region has lost 70% of original vegetation and many species are already threatened.

Our community, natural environment, and built environment are all vulnerable to the impacts of climate change. A summary of possible consequences is provided in Table 2.

Table 2. Summary of consequences caused by climate change on key features of the City of Kalamunda.

Feature	Consequence
Natural Environment	<ul style="list-style-type: none"> • Loss of biodiversity as even the most adaptive native plants and animals cannot adapt to rapid heat increase. • Disruption to natural systems by bushfire and extreme weather events resulting in biodiversity loss • Impact on water quality following bushfires and flash flooding • Loss of habitat for native fauna
Health and Community	<ul style="list-style-type: none"> • Increase in vector-borne diseases, particularly from mosquitos • Rise in heat stress and mental health issues, particularly in vulnerable groups such as the elderly and children • Financial stress of costly and high usage of electricity and transport fuels during warm spells and more costly utility bills.
Built Environment	<ul style="list-style-type: none"> • Overuse of electricity for air conditioning during warm spells leading to electricity grid black outs • Reduced useful life of City assets and increased frequency of maintenance due to heat stress and impact of extreme weather
Primary Production	<ul style="list-style-type: none"> • Increase in food costs and overall reduction in productivity • Potential for cleared lands to become 'dead' zones with little or no vegetation cover • Impacts on land use, economy, and employment
Water Supply	<ul style="list-style-type: none"> • Reduced turf quality of playing fields • Park closures affecting community health and lifestyle • Loss of important watering habitat for native fauna
Transport	<ul style="list-style-type: none"> • Wear and tear of transport networks due to heat stress • Increased use of private vehicles instead of active transport due to high temperatures and extreme weather events
Emergency Management	<ul style="list-style-type: none"> • Increase in home evacuation to recovery centres during emergency events • Access blockage on major arterial roads and train lines • Death of people unable to evacuate • Increase in weed invasion • Damage to City facilities and property • Damage to street lighting

	<ul style="list-style-type: none">• Loss of power
Tourism	<ul style="list-style-type: none">• Loss of biodiversity and reduced health of iconic natural areas• Loss of amenity and cooling effect from natural water bodies

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How this Climate Change Action Plan is structured

We all share the responsibility for responding to climate change, to progress toward net-zero emissions and to ensure a resilient City cannot be undertaken alone. The City's CCAP acknowledges that local government is at the frontline of climate action, whilst recognising the need for similarly ambitious action at the state, national, and international levels. Therefore, as Figure 8 shows, the CCAP distinguishes between actions that are within the City's control that we can directly influence, and areas that require regulatory change beyond the City's jurisdiction, or that rely on community behaviour change.

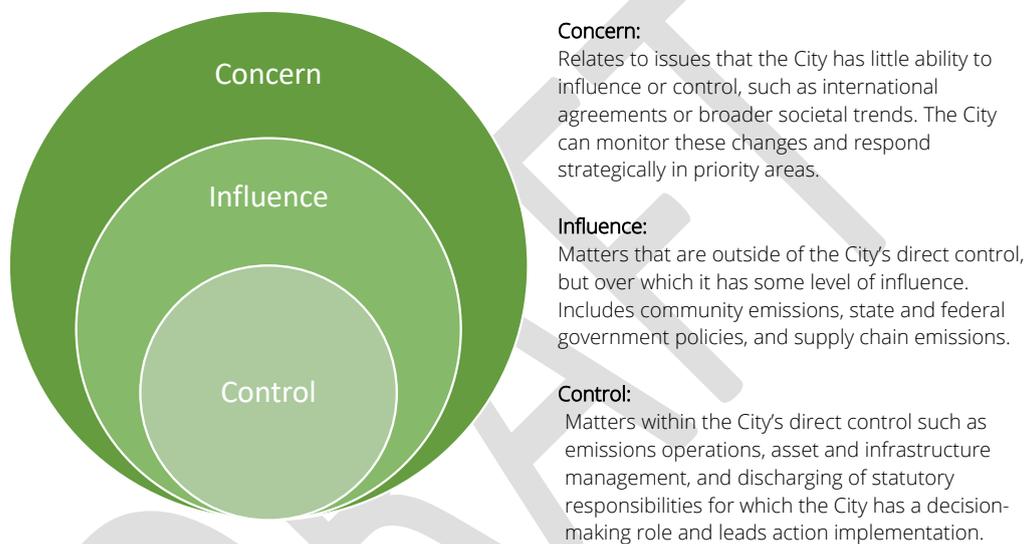


Figure 8 – Hierarchy of City Response to Climate Change

As such, the CCAP specifies four key audiences, which include the City of Kalamunda itself, residents within the City, businesses and commercial entities within the City, and the State and Federal Governments (Table 3).

Table 3. Key audiences identified for the Climate Change Action Plan

Key Audience	How the Plan would involve them and the City
The City of Kalamunda itself	Development and funding through annual budget processes of initiatives and actions to demonstrate leadership in the climate change space.
Residents within the City of Kalamunda	Primarily by the City providing advice, education, and awareness. Secondary actions include roll out of waste management initiatives and potential changes to planning and building requirements.
Businesses and	Focus will be balanced through environmental controls in development

Commercial entities within the City of Kalamunda	and building and joint initiatives in waste management and energy practices.
State and Federal Government	Primarily through advocacy for greater regulatory and financial support for all sectors in tackling climate change.

How the Climate Change Action Plan was Developed

This Plan is the product of extensive engagement, starting with community consultation to gauge the community's thoughts on climate change, responsibilities and what actions can be taken, creating the draft document with an internal working group, review by the Kalamunda Environmental and Sustainability Committee,, a report to Council with the draft and further consultation to finalise.

Community Consultation

Two stages of community engagement were undertaken to inform the development of this Plan. The first stage was undertaken in 2021 at 'Collaborate' level as per IAP2 best practice principles, enabling community feedback to guide the preparation of the first draft. Engagement included website pages, a media release, poster, letters to stakeholders, a community survey, newspaper advertisement, eNewsletters, and four face-to-face events including a Big Ideas workshop, live action ice carving event, and two pop-in booths. The outcome of this engagement, in combination with an internal working group, was the preparation of the Draft Climate Change Action Plan.

Targeted consultation seeking feedback on the Draft CCAP was undertaken between 29 June 2022 and 27 July 2022. This targeted consultation then informed the final document.

Focus Areas

It is recognised that any action plan addressing Climate Change could deal with a plethora of topics all of which would be relevant to the issue. In order to take a practical approach, four primary focus areas were defined through the extensive community engagement in conjunction with an internal working group. The focus areas are based on a review of City policy and plans, current operational guidance and procedures, climate projection literature and data analysis tools, and are outlined in Table 4.

Table 4. Key focus areas identified for the Climate Change Action Plan and a description of their importance.

	What it is	Why is it important
Focus 1	Carbon Footprint	Greenhouse gas emissions are the primary cause of human-induced climate change. The City has a role in moving towards a carbon neutral lifestyle for our citizens.
Focus 2	Waste and Circular Economy	The decomposition of waste in landfill produces methane which has a higher global warming potential than CO ₂ . The City and the community can implement more sustainable waste practices with long term benefits to the environment.
Focus 3	Sustainable Development	<p>a. Sustainable development outcomes can have a positive impact upon the environment with appropriate use of City planning controls. Conversely, unconstrained, inappropriate development can result in an unacceptable reduction in biodiversity and urban canopy, water and energy inefficiency, waste generation and exposure of users to increased risks such as bushfire and flooding events.</p> <p>b. Sustainable development can contribute toward:</p> <ul style="list-style-type: none"> • Reduced demand on non-renewable energy sources • Reduced building operating costs • Reduced urban heat island effect and healthier homes and communities • Reduction of ecological footprint • Efficient use of resources and reduced waste • Bushfire safety
Focus 4	Resilience under Changing Climate Patterns	This is the City's adaptation strategy, with the overall goal of improving resilience under the changing climatic conditions outlined in Table 2. with key focus on managing the risks of: <ul style="list-style-type: none"> • Bushfire, • Heat-related stress in the community, • Heat-related stress in the natural environment, • Reduced groundwater availability, • Loss of biodiversity, • Flash flooding and storm damage,

		• Damage to infrastructure.
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Focus 1: Carbon Footprint

As a local Council, the City undertakes day to day operations which in turn are responsible for generation of greenhouse gases. These operations include:

- Electricity consumption for buildings operated or occupied by the City,
- Electricity consumption for City operated street and carpark lighting systems and park reticulation bores and footpath lighting
- ‘Tailpipe’ emissions from its fleet of light vehicles and plant
- Gases (notably methane) generated by the decomposition of waste in landfill
- Gases generated from use of natural gas or LPG in facilities and reserves

At this moment, the City is undertaking investigations to complete a baseline audit and determination of the 2020 emissions from these sources. As soon as this is available, this Action Plan will be revised with this updated information.

Targets/Objectives

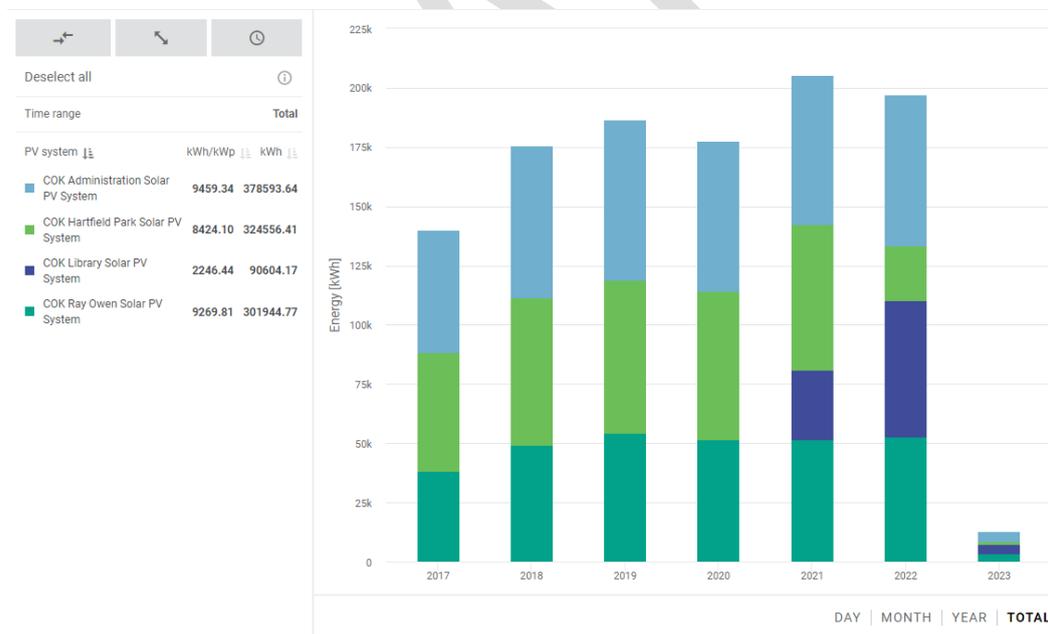
1. Target: The City of Kalamunda will achieve a 40 per cent reduction in its operational emissions by 2030, and net-zero emissions by 2035, compared with a 2020 baseline.
2. The City will provide support and advice to residents, businesses, and the community in their own efforts to reduce greenhouse gas emissions.

Achievements to Date

Energy efficiency: Facilities	Roll out of LED lighting in City-occupied offices, libraries, and recreation centres.
	Integration of reduced energy consumption and increased renewable sources within design standards for new building projects
Energy efficiency: Infrastructure	LED streetlights for Central Mall
Renewable electricity	Contract with Synergy to ensure that 100% of the City's contestable electrical demand (~800,000 kWh pa) is sourced from 100% renewable electricity from 1 July 2022.
	Use of solar PV and battery lighting systems in new carparks and park pathways.
	Solar PV systems have been progressively installed in key community facilities since 2017. As of December 2022 they have collectively generated over 1,000 MWhr of energy. Systems are installed at:

	<ul style="list-style-type: none"> • Kalamunda Library • Administration Centre • Ray Owen Stadium • Hartfield Park Recreation Centre
	Introduction of Financial Support packages for community and sporting groups who occupy City owned buildings to implement Solar PV panels for their ongoing electrical supply requirements
Transport fuels	Collaboration with WALGA to seek grant funding from ARENA (Australian Renewable Energy Agency) for provision of EV charging facilities for City fleet – outcomes to be known in 2023.
Waste	Adoption of City Waste Plan targeting significant diversion of waste from landfill
Education and behaviour change	City became member of the Switch Your Thinking collaboration in October 2022 which will facilitate community awareness of climate change and access to discounted solar PV systems

The following table illustrates the electricity generation since 2017 from the Solar PV installations:



Actions

Actions proposed in this Climate Change Action Plan will be subject to (where necessary) Council approved Business Plans and/or Budget allocation of funding on a year by year basis.

Action area	Action	Implementation years						Responsible Directorate
		23/24	25/26	27/28	29/30	31/32	33/34	
City of Kalamunda								
General	The City adopts an intent to achieve a 40% reduction in operational greenhouse gas emissions by 2030 and become net-zero by 2035, based on a 2020 baseline.							Asset Services
General	Develop the 2020 baseline greenhouse gas emissions against which emissions-reduction will be assessed.							Asset Services
Energy Efficiency	Develop and implement a Council policy guiding energy efficiency outcomes of new City buildings above the benchmarks set out in the National Construction Code applicable to Western Australia							Asset Services
Energy efficiency	Replace gas appliances in City-owned facilities with efficient electric alternatives as part of ongoing building maintenance.							Asset Services
Energy efficiency	Implement an energy audit and monitoring system as part of the City's building maintenance program.							Asset Services
Energy efficiency	Consolidate City-owned buildings not fully utilised by community groups into a smaller number of facilities with higher utilisation, improving energy efficiency per user.							Asset Services
Energy efficiency	Implement energy efficiency measures in infrastructure or public space upgrades with the view to convert 60% of City-managed public lighting to highly efficient LEDs by 2030.							Asset Services
Renewable energy	Obtain approval in principle from the state government to proceed with the Solar Farm project.							Development Services

Action area	Action	Implementation years						Responsible Directorate
		23/24	25/26	27/28	29/30	31/32	33/34	
Renewable energy	Pending state government approval, progress Solar Farm project in partnership with Private Industry with the goal of being operational from 2029/2030							Strategic Projects
Renewable energy	Investigate the feasibility of introducing battery storage to City-owned facilities with solar PV systems.							Asset Services
Renewable energy	Extend contract with Synergy when it is due for renewal to ensure contestable electrical demand remains covered by 100% renewable energy.							Corporate Services
Transport	Implement a Fleet Transition Plan to replace the City's Light fleet vehicles passenger vehicles with Battery Electric Vehicles (BEV) or hybrid options as they are due for renewal.							Asset Services
Transport	Investigate opportunities to procure alternate-fuelled heavy fleet vehicles with the view to convert heavy vehicle fleet to BEV or hydrogen-fuelled alternatives.							Asset Services
Transport	Introduce an incentive of \$9 per day for staff who utilise public or active means of transport to and from work.							Office of the CEO
Sustainable procurement	Develop and implement a sustainable procurement policy or guideline to reduce Scope 3 emissions.							Corporate Services
Carbon sequestration	Set up framework to monitor carbon sequestration over time through local planting programs.							Asset Services
Carbon sequestration	Demonstrate an increase in the amount of carbon sequestered locally by new planting programs.							Asset Services
Residents								
Education and Communication	Maintain membership with Switch Your Thinking to facilitate knowledge sharing and education opportunities for residents.							Community Engagement
Education and Communication	Launch a Climate Change Knowledge Hub through the City's website to communicate information and advice for the Community on emissions reduction (including access to key resources including Switch Your Thinking, Your Home, and Synergy).							Community Engagement

Action area	Action	Implementation years						Responsible Directorate
		23/24	25/26	27/28	29/30	31/32	33/34	
Transport	Partner with the state government and/or private enterprise to deliver Electric Vehicle charging stations in City-managed parking to facilitate the uptake of Electric Vehicles by residents.							Asset Services
Commercials and Businesses								
Education and Communication	Launch a Climate Change Knowledge Hub through the City's website to communicate information and advice for the Community on emissions reduction (including access to key resources including Switch Your Thinking, Your Home, and Synergy).							Community Engagement
Renewable energy	Provide businesses with access to locally generated renewable power once the City's Solar Farm is operational.							Corporate Services
State and Federal Government								
Advocacy	Advocate for State or Commonwealth affordable schemes and initiatives that bring the community closer to carbon neutrality. This could be in the form of funding for key initiatives or regulatory action forcing Industry to become carbon neutral							Office of the CEO
	Advocate to the State Government to undertake program of converting existing Western Power gas discharge streetlights to LED streetlights to reduce energy consumption and thus carbon emissions. Side benefits include improved road safety through better lighting and ongoing cost savings to the City through reduced street lighting costs.							Office of the CEO

Focus 2: Waste and Circular Economy

Waste to landfill is estimated to contribute approximately 4 per cent of the City’s total municipal emissions, which equates to just under 23,000 tonnes CO2-e per annum.

At a broader scale, a key driver of greenhouse gas emissions is the production, consumption, and end-of-life processing of products. Therefore, the principles of circular economy (repair, reuse, remanufacture and recycle) are important in addressing global climate change¹⁴.

Targets/Objectives:

- City of Kalamunda is targeting a 60 per cent reduction in waste to landfill (compared to 2018 benchmark) and 70 per cent increase in resource recovery by 2030
- The City will provide residents and businesses with support, education, and assistance in transitioning to a low waste City.

Achievements to Date:

Food Organics and Garden Organics (FOGO)	City commitment to undertake tender and implementation of kerbside Food Organic and Garden Organic (FOGO) for residential kerbside waste with potential of 10,000 tonnes pa of waste being converted to compost. This service is forecast to become operational in 2024
Circular economy	Diversion of General Waste residential skip bins from landfill to resource recovery facility. Nearly 1,000 tonnes of material pa is recovered rather than landfilled. Partnering with Workpower to develop “Second Chance” – a facility at Walliston Transfer Station which facilitates re-use of disposed household furnishings, electronics, media and the like. Approximately 7 tonnes per month of materials are sold to the public for re-use rather than landfilled.
Waste to energy	City commitment to divert residential residual waste from landfill to a new waste to energy plant under construction, and expected to become operational in 2023. Currently around 18,000 tonnes of residential waste is sent to landfill each year.
Education and behaviour change	Community education campaign encourage waste avoidance, reuse, and recycling Containers for Change community education campaign

¹⁴ Christis, M., Athanassiadis, A., & Vercauteren, A. (2019). Implementation at a city level of circular economy strategies and climate change mitigation – the case of Brussels. *Journal of Cleaner Production*, 218, 511-520. <https://doi.org/10.1016/j.jclepro.2019.01.180>

Actions:

Actions proposed in this Climate Change Action Plan will be subject to (where necessary) Council approved Business Plans and/or Budget allocation of funding on a year by year basis.

Action area	Action	Implementation years						Responsible Directorate
		23/24	25/26	27/28	29/30	31/32	33/34	
City of Kalamunda								
FOGO	Roll-out of the FOGO service to all residents in the City.							Asset Services
Circular economy	Implement waste separation bins (landfill, recycling and Containers for Change as appropriate) in all City occupied facilities, parks and reserves							Asset Services
	Prepare a guideline for assessing waste management plans submitted with development applications to encourage waste minimisation through recycling, utilisation of Containers for Change initiative, composting or worm farming, and other waste initiatives.							Asset Services
	Incorporate appropriate waste separation requirements in the lease of all tenancies of City-owned facilities.							Community Engagement
	Develop and implement a set of guidelines for capital works projects specifying a minimum percentage of reclaimed material (e.g. in asphalt and concrete products).							Asset Services
Waste avoidance	Develop a Sustainable Events Policy / Plastic-Free Events Policy for all events held on City-owned land.							Community Engagement
Residents								

Action area	Action	Implementation years						Responsible Directorate
		23/24	25/26	27/28	29/30	31/32	33/34	
Education & behaviour change	Launch a Climate Change Knowledge Hub through the City's website to communicate information and advice for the Community on waste reduction.							Community Engagement
Circular economy	Prepare a business case for the introducing of incentivised schemes such as worm farms and composting bins to reduce residential waste being disposed of via landfill.							Asset Services
Commercials and Businesses								
Circular economy	Undertake pilot project to collect FOGO waste from limited number of businesses to assess feasibility.							Asset Services
	Pending feasibility of the pilot project, extend FOGO collection to all commercials and businesses							Asset Services
	Explore the feasibility of assisting commercial and businesses to be able to achieve higher recycling rates for packaging							Asset Services
Waste avoidance	Promote the Responsible Cafes campaign and connect local businesses with the free WA Plastic Free Places initiative.							Community Engagement
State and Federal Government								
Advocacy	Advocate for increased proportion of recycled material to be incorporated in road works delivered by state agencies and Industry.							Office of the CEO
	Advocate for start-up investment into more recycling facilities that can be accessed near to the City of Kalamunda							Office of the CEO
	Advocate for incentives for Councils that implement best practice waste management schemes to lower emissions despite potentially being costlier than landfill.							Office of the CEO
	Advocate that governments mandate bans on unnecessary packaging for foodstuffs, including making packaging 100% recyclable or compostable							Office of the CEO

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Focus 3: Sustainable Development

Sustainable development outcomes can have a positive impact on the environment with appropriate use of the City's planning and development controls, with potential to conserve biodiversity and urban canopy, achieve energy and water efficiency, reduce waste generation, and manage risks of bushfire and storm damage. Furthermore, incorporating sustainable development at the planning and development stage can ensure the built environment is designed to:

- Reduce demand on non-renewable energy sources,
- Reduce utility costs during building operation,
- Reduce the urban heat island effect,
- Produce healthier and more comfortable homes and communities,
- Reduce ecological footprint and negative environmental impacts,
- Use resources efficiently (including embodied energy and waste material), and
- Enhance bushfire safety.

Targets/Objectives:

- All new and renovate City owned facilities demonstrate best practice sustainable design that contributes to human health, wellbeing and biodiversity while optimising site potential, energy use, water conservation, and building materials.
- New developments are required to:
- Demonstrate best practice in reducing greenhouse gas emissions from energy use,
- Support the use of electric/ zero emission vehicles,
- Demonstrate best practice in reducing scheme water use and maximise the capture and use of alternative water sources, and
- Demonstrate best practice in reducing waste associated with the construction and maintenance of buildings.

Achievements to Date:

Sustainable City-occupied buildings	<p>Kalamunda Community Centre built in 2021 with sustainable design principles. Sustainability initiatives include:</p> <ul style="list-style-type: none"> • Materials: concrete walls, timber panels, and concrete flooring require minimal maintenance; use of repurposed wood for external fencing • Renewable energy: carpark lighting is powered by solar PV • Water efficiency: waterless urinals • Water redirect: no gutters, redirecting water to the City's living streams and watercourses through purpose-built swales • Passive thermal performance: high auto-ventilation in the main halls to produce breezeways and assist natural air flow so as to reduce the need for mechanical cooling
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<p>Concept Plans and Local Planning Scheme No. 3</p>	<p>The Cambridge Reserve Concept Plan (Concept Plan) and an amendment to Local Planning Scheme No. 3 were adopted by the Council in August 2020 and approved by the WAPC in April 2022. The Concept Plan outlines a vision for Cambridge Reserve including a site for aged care and residential development and a focus on protection of environmental values, improved drainage, and open space improvements including new recreational spaces and improved access to the reserve.</p>
<p>Land Use Planning Strategy</p>	<p>Implementation of the City of Kalamunda Environmental Land Use Planning Strategy to promote sustainable planning practices that balance development with the need to protect and improve local environmental values.</p>
<p>Local Planning Policies</p>	<p>Local Planning Policy 9 – Dual Density Design Local Planning Policy 33 – Tree Retention</p>
<p>Urban Heat Island Effect</p>	<p>City maintains significant funding year on year to continue street tree planting programs.</p>

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Actions:

Actions proposed in this Climate Change Action Plan will be subject to (where necessary) Council approved Business Plans and/or Budget allocation of funding on a year by year basis.

Action area	Action	Implementation years						Responsible Directorate
		23/24	25/26	27/28	29/30	31/32	33/34	
City of Kalamunda								
Education & behaviour change	Examine the feasibility of Implementing a Sustainable Design Advisory Service to provide locally specific information for people looking to renovate or build within the City. Information will include: <ul style="list-style-type: none"> • Passive design measures • Water efficiency • Energy efficiency • Responsible and appropriate use of materials • Bushfire resilience 							Development Services
General	Ensure that climate change is considered in all scheduled reviews of Planning Strategies, Local Environment Strategy, Urban Forest Strategy, and Local Biodiversity Strategy.							Development Services
Policy	Develop a Sustainable Design Policy to mandate minimum performance for all new and substantially renovated City-owned buildings and target net-zero emissions.							Development Services
Residents								

Action area	Action	Implementation years						Responsible Directorate
		23/24	25/26	27/28	29/30	31/32	33/34	
Education & behaviour change	Provide access to the Sustainable Design Advisory Service with locally specific information for residents looking to renovate or build within the City.							Development Services
Policy	Investigate the introduction of a sustainability design verification statement/assessment as a requirement for planning applications							Development Services
	Continue to assess proposals against the Sustainable Design Principles of LPP 9- Dual Density Design, where applicable							Development Services
	Investigate opportunities to include minimum sustainability standards for developments within the Local Planning Scheme and/or a Local Planning Policy for sustainability that exceed existing regulatory requirements							Development Services
	Ensure development of design guidelines that include sustainability outcomes for all new precinct and structure planning areas							Development Services
Water	Investigate regulatory barriers that prevent grey water re-use in the City and if able to be overcome, promote the capability to residents							Development Services
General	Promote and celebrate outstanding sustainable development case studies to raise awareness of best practice standards and acknowledge developer performance							Development Services
Commercials and Businesses								
General	Promote and celebrate outstanding sustainable development case studies to raise awareness of best practice standards and acknowledge developer performance							Development Services
Policy	Investigate the introduction of a sustainability design verification statement/ assessment as a requirement for planning applications							Development Services
	Investigate opportunities to include minimum sustainability standards for developments within the Local Planning Scheme that exceed existing regulatory requirements							Development Services
Industry	Partner with the Department of Water and Environmental Regulation in implementing the light industry program to reduce pollution from small to medium industries							Development Services

Action area	Action	Implementation years						Responsible Directorate
		23/24	25/26	27/28	29/30	31/32	33/34	
State and Federal Government								
Advocacy	Advocate for sustainability to be better incorporated into the state planning framework, such as updates to R-codes, liveable neighbourhoods and model subdivision conditions							Office of the CEO
	Advocate for ongoing improvements to the National Construction Code to increase energy efficiency and reduce water consumption of buildings making them more sustainable							Office of the CEO
	Advocate, via WALGA, for mandatory disclosure of building energy ratings at point of sale to improve market knowledge and encourage construction of buildings with higher energy efficiency standards							Office of the CEO

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Focus 4: Resilience under Changing Climate Patters

The number of hot days (over 35°C) has doubled in the South West of Australia compared to 50 years ago. Over the same period we have also seen a decline in the South West Region at a faster rate than elsewhere in the country. Hotter and drier conditions have also increased the risk of bushfire, with increasing risk to local biodiversity, air quality, health, and wellbeing.

Projected climate change impacts by 2070 include¹⁵:

- Minimum 4 °C temperature increase
- Annual number of days above 35 °C to increase from 28 to 67 per year
- Reduction in rainfall between 20 and 40 per cent with reduced water quality, and
- Sea level rise of between 25 and 75 cm.

Action to increase the resilience of our water quality and quantity, native biodiversity and systems, health and wellbeing, and built environment in the face of increased bushfires, heatwaves and storm events is now critical.

Targets/Objectives:

- City of Kalamunda has a robust understanding of risks associated with climate change and is better prepared for the impact of climate change on human health, the natural environment, buildings, infrastructure, and essential services.
- The City of Kalamunda community is better connected, prepared for, and engaged for future climate related impacts

Achievements to Date:

Urban Forest and Local Biodiversity	Development of contemporary Urban Forest and Local Biodiversity Strategies to be adopted in 2023
Bushfire Risk Management	Completion of City-wide Bushfire Risk Management Plan, along with annual preparation of fire hazard reduction notice, fire hazard assessment plan and bushfire preparedness communication strategy.
Resilient water supply	Implementation of Managed Aquifer Recharge (MAR) Project at Hartfield Park to provide groundwater source irrigation over the use of potable water for playing fields in an environmentally sustainable manner Design for eventual construction of an extension of the MAR system to provide irrigation water for Ray Owen Reserve in Lesmurdie playing fields

¹⁵ EMRC. Future Proofing Perth’s Eastern Region. Available from: <https://www.emrc.org.au/sustainability/environmental-services/energy-water-and-climate-change/future-proofing-perth-s-eastern-region.aspx>

Actions:

Actions proposed in this Climate Change Action Plan will be subject to (where necessary) Council approved Business Plans and/or Budget allocation of funding on a year by year basis.

Action Area	Action	Implementation years						Responsible Directorate
		23/24	25/26	27/28	29/30	31/32	33/34	
City of Kalamunda								
General	Review most recent climate change information at a regional and local scale as it becomes available and communicate across all departments.							Community Engagement
	Review policies, procedures, and current levels of insurance coverage to ensure they are fit-for-purpose under projected climate changes.							Corporate Services
	Identify gaps in current decision-making frameworks and develop strategies to incorporate climate change.							Corporate Services
	Undertake revision of all environment-related strategies such that actions are noted that benefit the climate change action plan							Development Services
	Undertake regular (three-yearly) urban heat mapping and monitoring							Development Services
Water	Investigate drainage improvements at known flash flood points of transport system within the City and continue to upgrade stormwater infrastructure using water sensitive urban design methods. Ensure that modelling caters for climate change.							Asset Services
	Increase proportion of irrigated turf parks that are fed from aquifer recharge sources to maintain amenity in the face of reduced potable water availability							Asset Services
	implement program of converting areas of irrigated turf that are not essential to amenity needs to eco-zoning plantings that require less water							Asset Services

Action Area	Action	Implementation years						Responsible Directorate
		23/24	25/26	27/28	29/30	31/32	33/34	
	Continue to increase efficiency and effectiveness of irrigated turf areas through contemporary irrigation methods and turf management practices to reduce overall water consumption							Asset Services
	Undertake a feasibility study into grey water treatment systems for the irrigation of turf and playing fields.							Asset Services
Biodiversity	Develop thresholds for unacceptable change in the condition of natural areas, and incorporate those thresholds into Local Environment Plan and Local Biodiversity Strategy.							Development Services
	Design Public Open Spaces to provide increased shade for users							Asset Services
	Ensure landscaping and Public Open Space plans incorporate drought-tolerant and resilient species							Asset Services
	Continue and expand programs aimed at increasing naturally occurring tree and vegetation cover in the City through the Local Environment Strategy and Urban Forest Strategy.							Asset Services
Bushfire	Review Bushfire Risk Management Plans and update specific risk assessments and mitigation actions							Asset Services
Human health	Implement policy for outdoor work programs that considers the health impacts of working in higher temperatures.							Office of the CEO
Buildings & Infrastructure	Develop a Sustainable Design Policy to mandate minimum performance for all new and substantially renovated City-owned buildings with particular focus on passive thermal performance and water efficiency.							Development Services
	Undertake a vulnerability assessment on the risks to city-owned assets and services given projections of more extreme weather.							Asset Services
	Update asset management plans to include the impacts of climate change as a degrading factor and ensure replacement assets are designed to withstand extreme weather events and consistently higher temperatures.							Asset Services
Residents								

Action Area	Action	Implementation years						Responsible Directorate
		23/24	25/26	27/28	29/30	31/32	33/34	
Bushfire & Extreme Weather	Educate Residents about Bushfire safety and preparedness.							Community Engagement
	Continue to implement and promote the emergency management SMS system to help notify residents of the latest emergency management information such as bushfire safety, heatwaves and storm events.							Community Engagement
	Develop awareness and education campaigns to improve community resilience to extreme weather events							Community Engagement
Biodiversity	Deliver community awareness program focusing on the potential impacts of climate change on natural areas to encourage private land conservation and planting of drought tolerant vegetation.							Community Engagement
Water	Complete Citywide Drainage Catchment Strategy “Kalamunda Flowing” to provide Businesses with information surrounding stormwater flows such that they can manage impacts within their property							Asset Services
Commercials and Businesses								
General	Increase awareness of adaptation measures the business community can undertake via the Climate Change Knowledge Hub.							Community Engagement
Agriculture	Provide local agricultural businesses with information regarding climate-smart agriculture initiatives							Community Engagement
Water	Complete Citywide Drainage Catchment Strategy “Kalamunda Flowing” to provide Businesses with information surrounding stormwater flows such that they can manage impacts within their property							Asset Services
State and Federal Government								
Advocacy	Advocate for funding from State and Commonwealth governments to increase community resilience for changing climate							Office of the CEO

Action Area	Action	Implementation years						Responsible Directorate
		23/24	25/26	27/28	29/30	31/32	33/34	
	Advocate for improvements to the National Construction Code to increase resilience of buildings against increased impacts of hotter days, more frequent storms and bushfires							Office of the CEO
	Advocate for increased funding for natural resource management programs especially those that enhance and protect waterways, native forests and bushland reserves							Office of the CEO

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