Corporate Climate Action Plan

July 2023

City of
Melville

Veggie beds filled with FOGO derived soil at Kulungah Myah Family Centre

EXECUTIVE SUMMARY

The impacts of climate change are already being felt by communities around the world, including increasing temperatures, longer droughts, more frequent and intensive natural disasters such as heatwaves and bushfires, and sea level rise, with associated increases in coastal erosion and inundation. With these impacts projected to further increase over the coming years and decades, the City of Melville recognises that it needs to act now to safeguard our community and our environment.

The risks associated with climate change are becoming more important to Local Governments. Being the level of government closest to the people, the need for Local Governments to respond to and manage the impacts of climate change has never been greater. Local Governments are on the front line of addressing climate change and have an important role to play. To establish our support for climate change action, the Council made a Climate Emergency Declaration in June 2021.

As outlined in the Climate Emergency Declaration, we recognise that climate change will continue to have a significant effect on the Western Australian environment, society, and economy. We are addressing climate change in our Local Government municipality to minimise these impacts through a commitment to be carbon neutral as an organisation by 2030 and net zero as a geographical region by 2050. The definition of carbon neutral permits a larger amount of offsetting than does the definition of net zero which the City will have difficulty in achieving due to the large emissions from our supply chain. We will strive to meet net zero as an organisation in as short a timeframe as possible.

The City of Melville is committed to finding practical ways to address climate change risks and impacts within our region. Our community and business plans are aligned with the United Nations Sustainable Development Goals to ensure our actions are economically, socially and environmentally sustainable. We have developed this Corporate Climate Action Plan to bring together the actions to tackle climate change, build resilience, and minimise the vulnerability of our organisation. The actions are based on a detailed climate vulnerability, risk, and opportunity assessment conducted for the City in 2022-2023.

The plan's approach to achieving our carbon neutral by 2030 target is based on a science-based methodology that prioritises emission reductions in the areas that will have the most significant impact. The actions are grouped under ten key themes, highlighting existing activities and proposed future actions to mitigate and adapt to climate change. The ten themes are:

1. Emissions reduction
2. Built environment
3. Financing
4. Policies and planning
5. Habitat protection
6. Transport
7. Education and awareness
8. First Nations
9. Advocacy
10. Initial community actions.

These actions focus on the emissions that come from the City as an organisation (i.e. from electricity or fuels used in our buildings, cars and machinery known as Scope 1 and 2 emissions), as well as key sources of Scope 3 emissions from our value chain and materials used in buildings, City activities and waste production.

These actions also support key opportunities to protect our community from the impacts of climate change through adaptation efforts on City managed land.

These actions build on substantial ongoing actions the City has been taking since 2015-2016 to reduce carbon emissions when our first emissions reduction target was set. This target was a 48% reduction from 2004-2005 carbon emissions levels by 2024-2025. Carbon emissions reductions to date have been achieved through:

- The Installation of 560 kW of solar photovoltaic (PV) systems on 11 council facilities.
- Transitioning all light fleet vehicles to hybrid vehicles.
- Providing staff with fleet bicycles, e-bikes, and Smart Riders to commute during the workday.
- Prioritising energy efficiency in our facilities by implementing voltage optimisation, LED lighting (buildings and sports grounds), heating, ventilation and air conditioning system retrofits, and water efficiency measures.
- Implementing a Food Organics Garden Organics program in some facilities to minimise waste sent to landfill.
- Ensuring continuous progress toward establishing a Carbon Budget for each service area, setting targets for reducing carbon emissions annually.
- Integrating sustainability considerations into our procurement process, to ensure that we prioritise environmentally friendly goods and services.
- Increasing tree canopy coverage on City owned land.
- Considering Water Sensitive Urban Design in capital works and upgrade projects.

The City is now focusing on key short-term actions to be completed in 2023-2024 and 2024-2025 and has set aside funding to undertake actions across key areas including:

- **Emissions Reduction:** Assess and improve efficiency practices for tools powered by fossil fuels, while planning for their future transition to renewable power as suitable technology becomes available. Maximise the City's renewable electricity, explore renewable energy microgrids, optimise energy use through demand management and the existing dashboard to support reporting and communication.
- **Built Environment:** Perform an audit across the building portfolio using the Green Building Council Australia Performance framework to identify potential emission reductions and resilience against extreme weather. Implement outcomes of audits following review of cost/emissions. Undertake an infrastructure audit to enhance climate resilience.
- **Finance:** Review and update the City's sustainability revolving fund to allow savings from sustainability initiatives to fund future initiatives.
- **Education and Awareness:** Undertake education and awareness sessions for staff and Elected Members.
- **Habitat Protection:** Explore nature-based solutions as protective measures against climate change and disasters, particularly in areas of flooding and riverine erosion.
- **Policies and Planning:** Include climate change related risks into the Risk Management Framework and Environmental Management System, and revise the Business Continuity Plan, to ensure uninterrupted service provision during extreme events.
- **Transport:** Assess active transport routes and infrastructure at City buildings to facilitate staff usage for commuting, including end-of-trip facilities and parking options.
- **Community Focus:** Develop a Community Climate Action Plan to outline collective strategies and initiatives for addressing climate change.

Yearly Action Implementation Schedules will detail how these actions will be addressed, ensuring they are executed in an economically and environmentally sustainable manner.

This Corporate Climate Action Plan serves as the first phase of a broader, inclusive community-wide climate planning effort which will result in the development of a Community Climate Action Plan in 2023-2024, in consultation with our Climate Action Reference Group and through other community engagement activities. Some actions the City may need to lead have been flagged in this plan to identify where resources may be required to achieve desired outcomes.

It is estimated that the City's emissions are only around 1% of the total emissions from the community within the City's geographical region. The development of a broader Community Climate Action Plan is therefore critical for achieving the long-term target of net zero by 2050 for the geographical region.

Acting on, and responding to, climate change is an ongoing process and the Corporate Climate Action Plan will be reviewed and updated every two years to reflect changing circumstances and emerging information.

Purpose of this Document

The purpose of this document is to establish corporate mitigation and adaptation actions for the City. Through the implementation of these actions, the City can contribute to reducing greenhouse gas emissions associated with our services and operations whilst seeking to avoid the future impacts of climate change beyond what is already projected.

Long Term Vision Statement

City of Melville vision as outlined in the Corporate Business Plan (2020-2024):

Engaging with our diverse community to achieve an inclusive, vibrant and sustainable future.

The City of Melville will provide robust leadership on sustainability with a stronger focus on climate action in accordance with the Council's Climate Emergency declaration made in June 2021, with a target to achieve carbon neutrality by 2030 as an organisation and net zero by 2050 for the community of our geographic region.

Acknowledgement of Country

An Acknowledgement of Country, or Acknowledgement of Traditional Owners, is a way that all people, both Aboriginal or non-Aboriginal, can show respect for Whadjuck Noongar heritage and the ongoing relationship of traditional owners with the land.

City of Melville nagolik Bibbulmen Nyungar ally-maga milgebar gardukung naga boordjar-il narnga allidja yugow yeye wer ali kaanya Whadjack Nyungar wer netingar quadja wer burdik.

The City of Melville acknowledges the Bibbulmun people as the Traditional Owners of the land on which the City stands today and pays its respects to the Whadjuk people, and Elders both past and present.

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1. INTRODUCTION

1.1 Climate Change Science and Impacts

International scientific consensus is that climate change is occurring, and it is driven by anthropogenic (human) causes. Human activities have had a profound impact on the concentration of greenhouse gas (GHG) emissions since the start of the industrial revolution. Ultimately, these activities, such as the burning of fossil fuels, land clearing and agriculture, have increased GHG 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 across the globe and at all levels to develop climate related policies. The IPCC assessments are fundamental inputs into negotiations at the United Nations (UN) Climate Conferences and the negotiation of international climate agreements. To make projections of future climate change, the scientific community developed climate models, using advanced computer simulations for a range of different GHG emissions scenarios (i.e. projections of what the global GHG emissions may be in future years). These scenarios are used to inform policy and decision makers to plan for the future.

The IPCCs latest report, the Sixth Assessment Report, 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… Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in carbon dioxide (CO_2) and other greenhouse gas emissions occur in the coming decades."

The IPCC has also found that:

"…limiting human-induced global warming to a specific level requires limiting cumulative CO_2 emissions, reaching at least net zero CO_2 emissions, along with strong reductions in other greenhouse gas emissions."

In the Sixth IPCC Assessment, a set of four possible scenarios, also known as Representative Concentration Pathways (RCPs), were proposed. These RCPs represent possible pathways based on global atmospheric greenhouse gas emissions concentrations and predict how concentrations of greenhouse gases in the atmosphere will impact the climate.

This Corporate Climate Action Plan uses the Very High emissions scenario – based on the IPCC's RCP8.5. This scenario models what happens if very low efforts are made to drive decarbonisation and lower emissions, and results show there could be a temperature increase of 3.7°C, a 0.63m sea level rise and a large increase in extreme weather events (by 2081-2100, relative to 1986-2005). The RCP8.5 scenario was selected for this plan as it allows the City to prepare for a future where the worst impacts of climate change may occur.

Climate change can be addressed through both mitigation and adaptation actions.

Mitigation aims to reduce and minimise GHG emissions entering the atmosphere. This can be completed in two ways, either by reducing the sources of GHG or by creating 'sinks' that absorb and store GHG.

Adaptation, on the other hand, addresses the impact of those heat-trapping emissions already locked into the system. Implementing risk reduction measures by integrating resilience means not only reducing the likelihood of impacts on infrastructure, or other assets, but also reducing vulnerability across numerous interconnected systems and the broader community.

Climate change is one of many factors influencing the City and the community into the future as it is already causing significant impacts such as sea level rise, coastal erosion, flooding, rainfall, bushfire, temperature rise, and more frequent extreme weather events. These impacts have the potential to affect infrastructure, public health and the natural environment.

Future trends suggest more extreme weather events (of increasing frequency and severity) should be expected. The City is projected to experience significantly increasing temperatures and declines in annual rainfall.

An increase in mean and maximum temperatures and significant increases in the number of hot days above 35°C is expected. Heatwaves are expected to be longer. The number of severe fire weather days is also expected. Decreases in annual rainfall (particularly winter and spring) will likely occur. Rainfall intensity will increase, with more frequent and severe storms. Higher sea levels and more frequent sea level extremes with an increased risk of coastal erosion should be expected.

It is important to note that climate change projections involve a level of uncertainty and therefore the precautionary principle should be applied, and preventative action should be taken where possible and practical.

It is important to take action to reduce GHG emissions and adapt to the changing climate to minimise these impacts in the future. Whilst the City needs to continue to urgently cut emissions to reduce the effects of climate change, the City also needs to accelerate its adaptation planning to manage the changes that are already locked in. Adapting to climate change requires everyone to do things differently. It also involves making decisions to avoid, mitigate and adapt to climate change impacts that require a long view and involve a high level of complexity and inter-connectedness.

1.2 Mitigation

There are seven main greenhouse gases covered by the Kyoto Protocol whose concentrations are rising in the atmosphere: carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, and nitrogen trifluoride. Each has a different ability to trap heat in the atmosphere, but each also lasts for a different time in the atmosphere before breaking down. The term "carbon dioxide equivalent" (CO_2-e) is a standardised measure that was created by the IPCC to make the climate effects of different greenhouse gases comparable.

Emissions within the City's boundary fall into three categories Scope 1, Scope 2 and Scope 3 depending on whether they are from direct or indirect sources, and on the type of activities which cause them (Figure 1).

Scope 1 are emissions which occur directly at the source of use and from assets owned and controlled by the City. Examples:

- Petrol and diesel used for the City's fleet (vehicles, small and large plant)
- Gas burned to create hot water for heating the pools at LeisureFit Booragoon
- Refrigerants used in air conditioning or heat pump systems

Scope 2 are emissions from grid-supplied electricity purchased and used by the City.

Scope 3 are emissions form City-initiated activities but occurring from sources the City do not own or do not directly control. Examples:

- Use of mains water supply
- Electricity used by the community in City-owned facilities like sporting clubs
- Western Power owned streetlights within the City's geographical boundary
- Asphalt and concrete production materials
- Waste and wastewater emissions
- Embodied carbon in purchased goods and services (e.g. office supplies)
- Transport related emissions (staff travel, suppliers, contractors)
- Investments
- Fugitive emissions from energy supplied to the City

Figure 1: Defining Scope 1, 2, and 3 City emissions sources and boundaries

Whilst emissions data presented in this plan relate to Scopes 1 and 2 only, emissions from Scope 3 sources will be included in the review of the Corporate Climate Action Plan once they are quantified. However, actions which would reduce the City's Scope 3 emissions have been included within this plan as they will form a critical part of the City's carbon neutral journey.

1.2.1 Emission Measurement

The Greenhouse Gas Protocol provides international standards, guidance, tools and training for business and government to measure and manage climate-warming emissions. The Greenhouse Gas Protocol for Cities has two relevant standards under which the City can create an inventory of Scopes 1, 2 and 3 emissions:

1. The GHG Protocol Corporate Accounting and Reporting Standard covers the accounting and reporting of the seven greenhouse gases.
2. The GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard allows companies to assess their entire value chain emissions impact and identify where to focus reduction activities.

The City is using both standards for emission measurement, however only data for Scopes 1 and 2 are presented in this plan. Scope 3 emissions data will be included at a later date.

The Offsets Mitigation Hierarchy is used by the Australian Government Department of Climate Change, Energy, the Environment, and Water and is a tool for limiting "the amount of damage an action will have on the environment"[1]. It comprises three steps, with each to be followed to the greatest extent possible before moving to the next:

1. Avoid impacts where possible
2. Mitigate impacts where they can't be avoided
3. Offset remaining impacts

This process is being followed by the City for mitigation actions.

1.3 Adaptation

Adaptation refers to changes in processes, practices and structures to moderate potential damages or to benefit from opportunities associated with climate change. Adaptation is more complicated than emission reduction. Two frameworks which may help to assess adaptation measures are the UN Sustainable Development Goals (SDGs) and the Making Cities Resilient tool. The City is still assessing which of these frameworks will be the most suitable for evaluating the progress of its adaptation actions.

1.3.1 United Nations Sustainable Development Goals

In September 2015, 193 countries across the globe including Australia, committed to the SDGs. They are a set of 17 goals and 231 indicators established by the UN to promote sustainable development and address global challenges while protecting the planet, and work towards a more sustainable and resilient future. In 2020, the City embedded the SDGs into the Strategic Community Plan and Corporate Business Plan.

[1]https://www.dcceew.gov.au/environment/epbc/approvals/offsets/guidance/mitigation-hierarchy#:~:text=Definition,moving%20on%20to%20the%20next

The SDGs provide a framework for the City to work towards in creating a more sustainable, equitable and resilient community, capable of adapting to the effects of climate change. By aligning policies and actions with the SDGs, the City aims to reduce poverty, improve health and well-being, promote sustainable economic growth, and protect the environment.

Ultimately, the SDGs provide a roadmap for the City to create a better future while also contributing to the global effort to achieve a more sustainable and equitable world. The indicators may be used to assess and monitor progress towards adaptation at a local level.

1.3.2 Making Cities Resilient

The Making Cities Resilient[2] tool provides a set of assessments that allow local Governments to assess their disaster resilience, structured around the UN Office for Disaster Risk Reduction's Ten Essentials for Making Cities Resilient. It also helps to monitor and review progress and challenges in the implementation of the Sendai Framework for Disaster Risk Reduction: 2015-2030[3] and supports the baseline analysis for preparation of the disaster risk reduction and resilience strategies.

1.4 How the Plan was Developed

The UN Habitat Guiding Principles for City Climate Action Planning[4] framework was used to guide the development of this Corporate Climate Action Plan. This process is one of continual improvement, which is an iterative and circular process (Figure 2). This process will be re-evaluated annually.

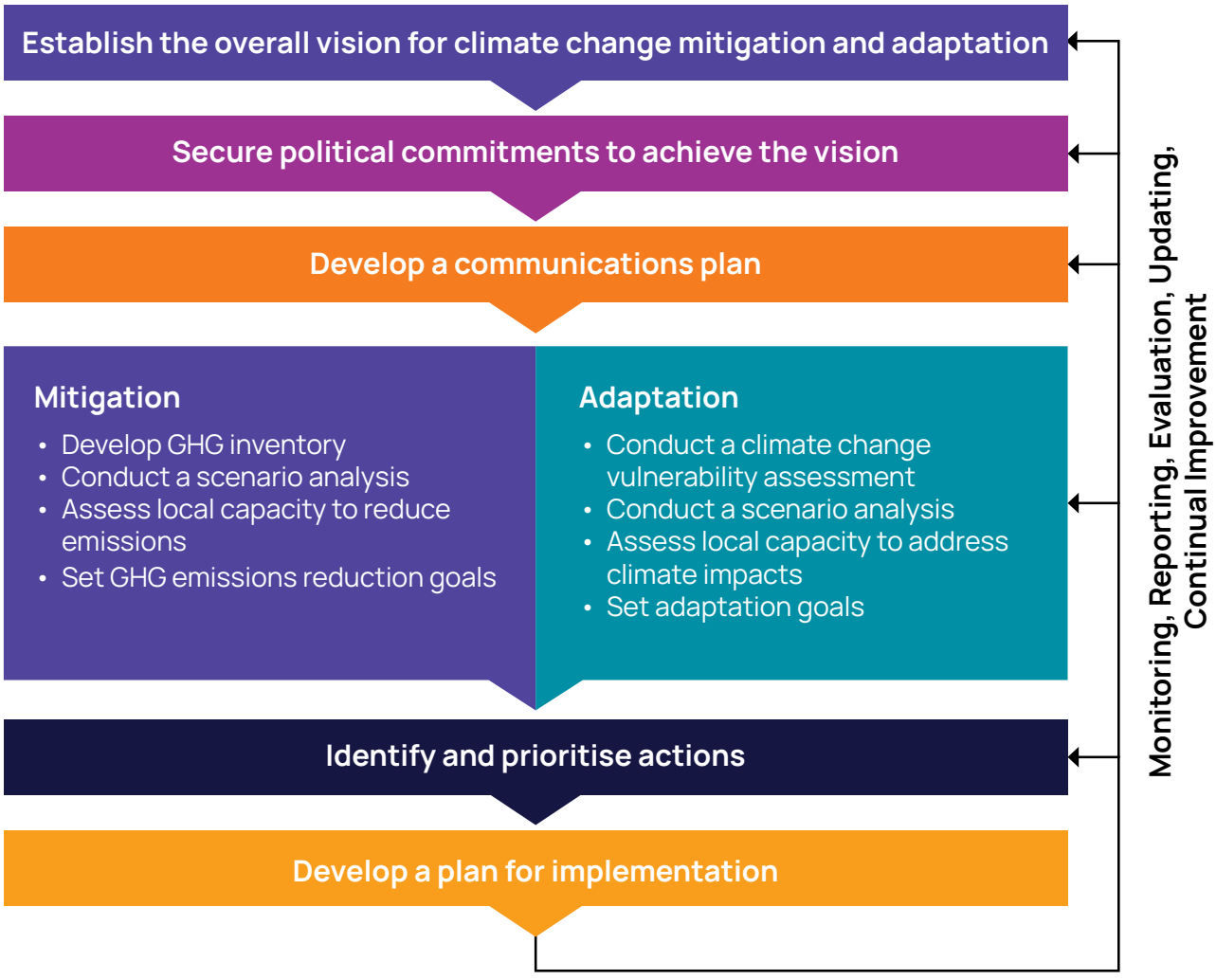


Figure 2: Action planning process based on the UN Habitat climate action planning process.

[2] https://mcr2030.undrr.org/online-disaster-resilience-scorecard-cities
[3] https://www.undrr.org/implementing-sendai-framework/what-sendai-framework
[4] https://unhabitat.org/guiding-principles-for-city-climate-action-planning

The first iteration of this process has already commenced with the establishment of the vision, political commitments, and cross-sectoral support. A GHG inventory for Scope 1 and 2 emissions has been completed, along with calculations of some of the City's Scope 3 emissions.

A scenario analysis was completed within the climate Vulnerability, Risk, and Opportunity (VRO) assessment undertaken in 2022-2023 for the City by a consultant. The most conservative climate change scenario (RCP8.5) was used for this assessment and resulted in many recommendations being identified. City staff also had input into the VRO and subsequent actions through workshops held with the managers of each service area, representing the different functions of the City.

The VRO provided an assessment of the local capacity to reduce emissions and address climate impacts, whilst gathering insights into current mitigation and adaptation activities. The final step in the process, the Action Implementation Schedule, will follow and include actions prioritised by costs, benefits, co-benefits, timelines and actionability.

The process of monitoring and reporting on emissions will be completed using an international reporting methodology, and evaluation. The updating of the actions will occur through the annual review of the Action Implementation Schedule, with a major review of the Corporate Climate Action Plan to occur every two years. A climate VRO assessment will be undertaken every 3-5 years to remain up to date with climate change science impacts for the region, and to feed into the continual improvement process.

1.5 City of Melville Strategic Influences

As a signatory to the Paris Agreement under the UN Framework Convention on Climate Change and the UN SDGs, Australia has committed to taking action on climate change and to ensuring that mitigation and adaptation action is equitable and consistent with the aims of the SDGs.

The Paris Agreement's overarching goal is to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. It expressly recognises the importance of engagement at all levels of government. As such, the management of climate-change risks is spread across the three tiers of government: Commonwealth, State and Territory and Local.

Local Governments are on the frontline of 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 the area, and that local communities and stakeholders are consulted and involved in our efforts. Local Governments have the capacity to implement planning and development measures that reduce the impacts of climate change on many aspects of the community, and therefore have more hands-on responsibilities than the Commonwealth Government and complementary responsibilities of State and Territory governments.

Within the City of Melville, this Corporate Climate Action Plan is situated alongside other strategic documents (Figure 3). This plan has been developed with reference to several other City strategies and plans including the:

- Strategic Community Plan 2020-2030
- Corporate Business Plan 2020-2024
- Corporate Environmental Strategic Plan 2016-2025
- Urban Forest Strategy 2017-2036
- Waste Plan 2021-2025
- Building Asset Management Plan 2013-2032
- Natural Areas Asset Management Plan 2019
- Lighting Asset Management Plan 2013-2032
- Active Reserve Infrastructure Strategy 2020
- Estuarine Reserves Strategic Management Plan 2020; and
- Public Spaces Strategy 2017

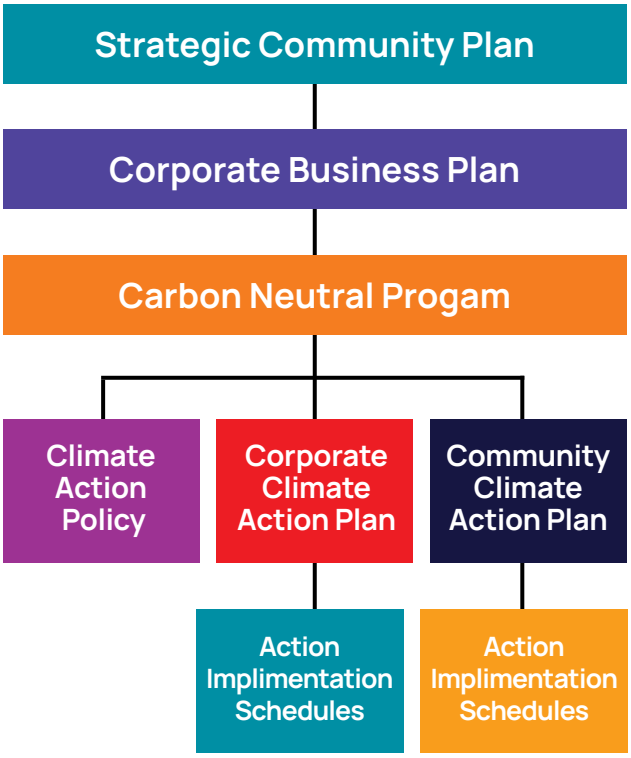


Figure 3: How this Plan links with the City's key strategic and business plans and policies

At the Ordinary Meeting of Council held 21June 2021, the Council declared a Climate Emergency and, in part, committed to "the reduction of carbon emissions caused by the operations of the City of Melville to net zero by December 2030". In June 2023, this was amended to be carbon neutral for City operations by December 2030.

The carbon accounting process for the City's emissions concluded that it will be unable to meet the organisation's true 'net zero' definition within the 2030 timeframe due to extensive emissions in our Scope 3 or supply chain, over which the City has some influence, but not direct control. See Figure 4 for the definitions of the two terms.

It is impossible to produce no carbon emissions so the City will have to offset some emissions. If the City offset less than 10% of emissions, the City can be net-zero certified under the Science Based Targets initiative international standards. If the City offsets more than 10% of total emissions, carbon neutral certification can be sought.

Focusing on carbon neutral by 2030 is far more practical and achievable for the City and will enable the City to focus on direct actions rather than onerous emissions quantification and analysis. The City remains committed to working with the State and Federal Governments, the community and local businesses to ensure that the carbon emissions within the geographical area of the City of Melville reach net zero by 2050. This aligns with the State Government and international carbon targets through the Paris Agreement.

Carbon Neutral

Carbon neutral means that any carbon dioxide released into the atmosphere from a company's activities, products and services is balanced by an equivalent amount being removed.

This can be achieved through reducing operational emissions and by using carbon offsets which are generated from an activity that prevents, reduces or removes greenhouse gas emissions from being released into the atmosphere.

The Australian Government's Climate Active certification does not have a minimum requirement on the level of carbon offsets versus operational emissions reduction to achieve certification.

Net Zero emissions

A state in which the amount of greenhouse gas emissions produced by a company's activities, products and services is equal to the amount removed from the atmosphere.

This is achieved through a combination of reducing emissions and implementing measures to remove carbon dioxide and other greenhouse gases from the atmosphere.

Net zero implies a connection to the Paris Agreement, which outlines the goal to "achieve a balance between anthropogenic emissions by sources and removals by sinks of GHG in the second half of the century".

The Science Based Targets initiative allows a maximum of 10% of total emissions to be offset to be certified net-zero.

Figure 4: Definitions of carbon neutral and net zero emissions

1.6 Overview of The Plan

The establishment of a Carbon Neutral target represents a new benchmark for the City and requires an accelerated pathway involving consideration of more complex climate mitigation and adaptation actions.

This Corporate Climate Action Plan provides overarching guidance and coordination of the City's mitigation and adaptation actions. This Plan acts as a framework with key themes and actions across the organisation's service areas to be undertaken in the short-term (1-2 years) and medium-term (3-5 years). Each action is associated with the UN SDGs to ensure alignment with the City's Strategic Community and Corporate Business Plan.

A yearly Action Implementation Schedule will detail how these actions will be undertaken, ensuring they are executed in an economically and environmentally sustainable manner. The Corporate Climate Action Plan will be reviewed every 2 years until 2030.

The community assists with hand-watering at Davis Lawlor Park

2. BASELINE DATA

Emissions form the City's operations have been measured and monitored for around 20 years (Figure 5). The original emissions reduction roadmap presented in the Corporate Environmental Strategic Plan (2016-2025) used a baseline year of 2005-2006 financial year in line with global targets at the time. A baseline year is a starting point in time against which future GHG emissions are measured. At that time the City set a target to reduce these 14,221 tCO_2-e Scope 1 and 2 baseline emissions by 45-50% by the financial year 2024-2025.

A roadmap was developed showing the opportunities for emission reductions to 7,596 tCO_2-e, a 48% reduction from the baseline levels.

Current measurements of Scope 1 and 2 emissions indicate the City will exceed this reduction by 2024-2025, however in June 2021, with the City's Climate Emergency Declaration, the City endorsed a net zero by 2030 target. This change aligns the City with the Paris Agreement, however requires the inclusion of Scope 3 emissions.

Emission monitoring using smart meters installed into all of the City's major facilities commenced in 2019, allowing much greater data collection and accuracy. For emissions accounting and international reporting purposes, a new baseline year of 2021-2022 financial year has been chosen as this is the first year where the City has access to comprehensive data. The inclusion of Scope 3 emissions into the baseline will occur as this data is calculated.

Reducing Scope 3 emissions will be a challenge, not just for the City, but for all organisations as these are emissions over which the organisation does not have direct control, merely influence. As more organisations undertake a carbon neutral journey, the City's Scope 3 emissions should reduce organically through the supply chain, however, in the meantime, the City will do its utmost to encourage organisations in its supply chain to reduce their emissions. This can be advanced through requirements for

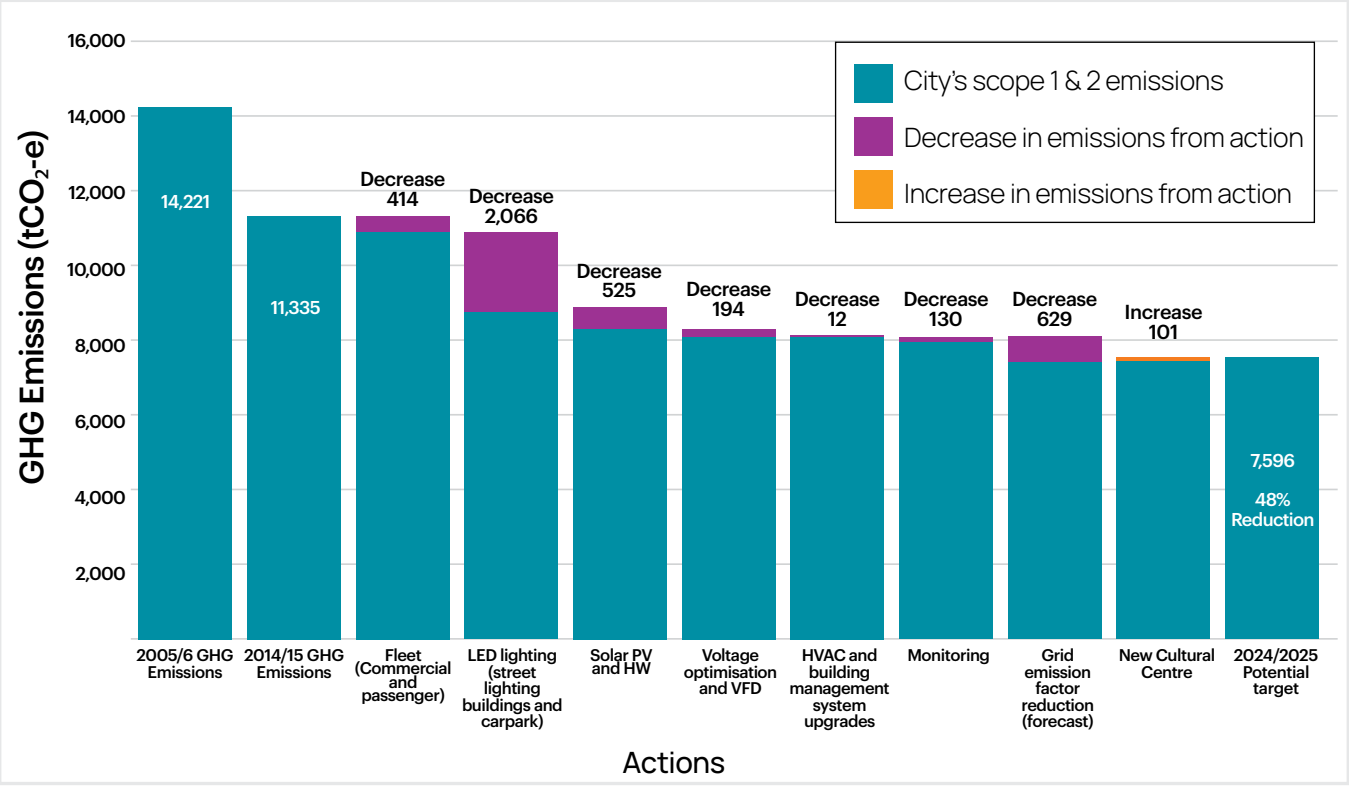


Figure 5: The City's original greenhouse gas reduction roadmap from the Corporate Environmental Strategic Plan (2016-2025).

Solar PV system at Piney Lakes Environmental Education Centre

suppliers to provide data on their emissions and to demonstrate how they calculate data based on activities undertaken for the City.

This section details the City's existing adaptation and mitigation measures, GHG emissions inventory for the chosen baseline year 2021-2022, and a summary from an external consultant's assessment of the climate vulnerabilities, risks, and opportunities for the City.

2.1 Existing Local Adaptation and Mitigation Initiatives

The City has already undertaken some GHG mitigation and adaptation measures aimed at reducing GHG emission and the City's exposure to climate change. To date, emissions in the City have been reduced through targeting largely known and commonly adopted actions along with some innovative projects.

These actions focus on the emissions that come from the City as an organisation (i.e. from electricity or fuels used in our buildings, cars and machinery), as well as key sources of Scope 3 emissions from our value chain, materials used in buildings, City activities and waste production. They also address key opportunities to protect our community from the impacts of climate change through adaptation efforts on City managed land.

Reductions to date have been made through:

- Installation of 560 kW of solar photovoltaic (PV) systems on 11 council facilities.
- Transitioning all light fleet vehicles to hybrid vehicles.
- Providing staff with fleet bicycles, e-bikes, and Smart Riders to commute during the workday.
- Prioritising energy efficiency in facilities by implementing voltage optimisation, LED lighting (buildings and sports grounds), heating, ventilation, and air conditioning (HVAC) system retrofits, and water efficiency measures.
- Implementing a Food Organics Garden Organics (FOGO) program in some facilities to minimise waste sent to landfill.
- Establishing a Carbon Budget for each service area in financial year 2022/2023, setting targets for reducing carbon emissions annually to ensure continuous progress.
- Integrating sustainability considerations into the procurement process, ensuring that environmentally friendly goods and services are prioritised.
- Increasing tree canopy coverage on City owned land.
- Consideration of Water Sensitive Urban Design in projects in capital projects and upgrades.

2.2 Greenhouse Gas Emissions Inventory

The following provides a breakdown of Scope 1, and 2 emissions across the City. Emissions of CO_2-e have been calculated using the Australian National Greenhouse Accounts factors[6]. An updated base year of 2021-2022 financial year has been used for this analysis, as described previously.

2.2.1 Inventory Across all Areas

The inventory of GHG from the City for the base year 2021-2022 financial year consists of Scope 1 and Scope 2 emissions only (Figure 6). Scope 3 emissions are being included in the inventory as data becomes available but are not presented in this plan.

[6] https://www.dcceew.gov.au/climate-change/publications/national-greenhouse-accounts-factors

The baseline data will need to be adjusted once the Scope 3 emissions inventory has been completed.

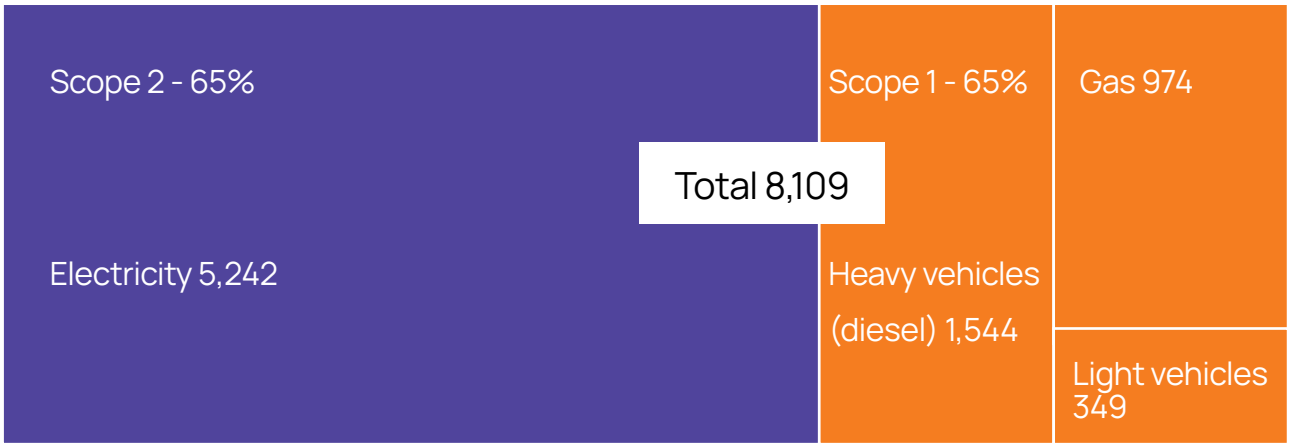


Figure 6: Breakdown of the City's Scope 1 and 2 emissions for the base year financial year 2021-2022 (tCO_2-e)

Figure 7 shows the electricity consumption across the City's facilities, (excluding Western Power operated streetlights which are accounted for in Scope 3 emissions).

The largest 20 facilities account for 78% of the total City's electricity consumption. The three largest facilities, LeisureFit Booragoon, the Civic Centre and the Operations Centre account for 42% of total electricity consumption. The remaining 17 contestable facilities consume a further 36%. A contestable site is one which uses more than 50MWh per year.

Electricity use financial year 2021/2022

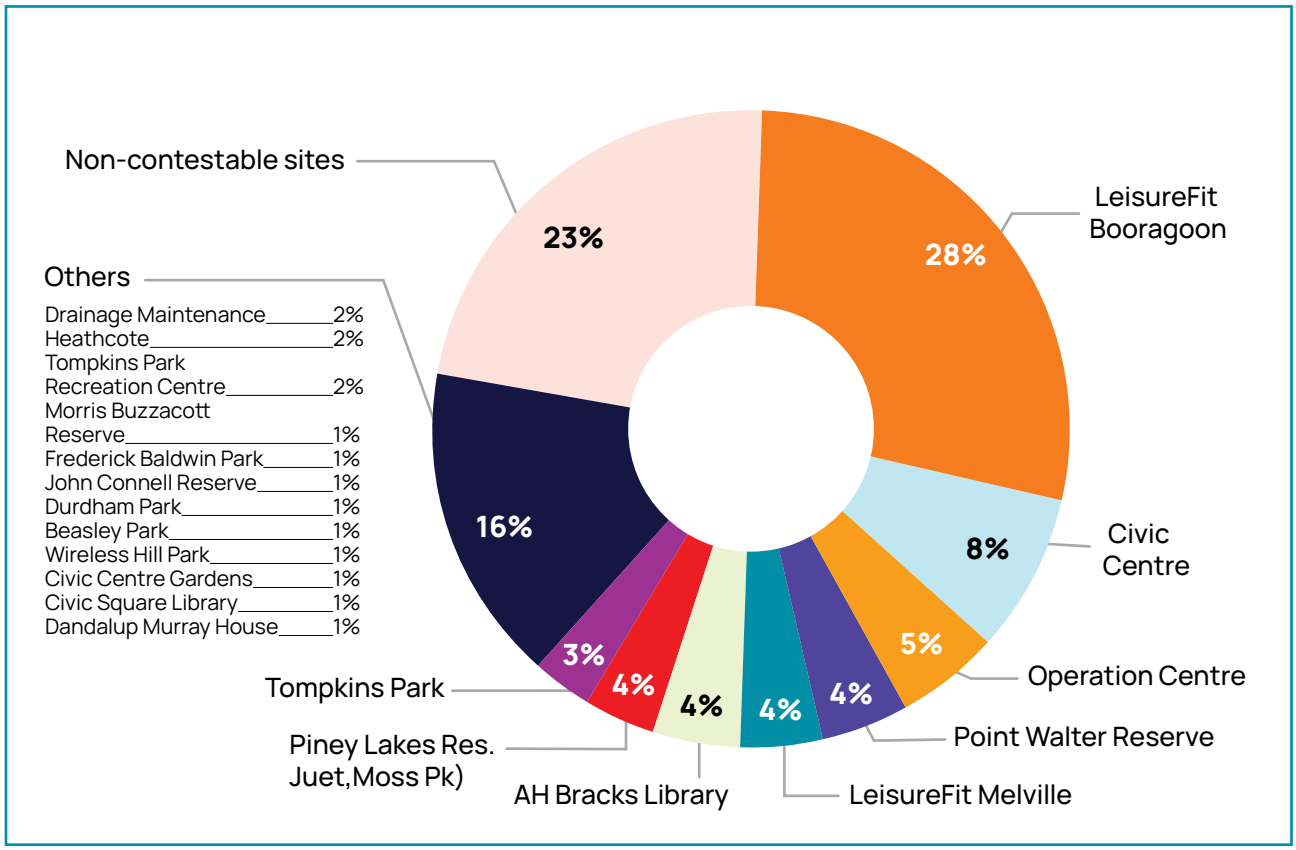


Figure 7: The City's electricity consumption breakdown financial year 2021-2022.

The City is yet to comprehensively quantify the Scope 3 emissions due to the complexity of measurement and calculation. Only a fraction of the total Scope 3 emissions have been calculated to date which include emissions from Western Power-owned streetlights, estimated landfill from City facilities, electricity and gas usage in City-owned but community-run facilities, and fugitive emissions from the supply of electricity, gas, and fuel.

Yet to be included in our Scope 3 emissions are life-cycle emissions from the City's other purchases, employee commuting, business travel and emissions associated with investments. Indications are that Scope 3 emissions will form a significant part of the City's carbon budget. Scope 3 emissions will be included in the next review of this plan in 2025.

It is important to note that some services provided by the City which incur Scope 1 and 2 emissions for the City can be outsourced to contractors and other third parties. However, the emissions produced by these third parties would then need to be accounted for in the City's Scope 3 emissions. The City would still be responsible for these Scope 3 emissions however it would be more difficult to reduce them as they would be outside the City's direct control. Activities should ideally only be outsourced to organisations which are already on a carbon neutral trajectory, therefore matching the City's journey.

2.2.2 Area Specific Inventories

The City's organisational structure consists of many service areas. Each service area is best placed to implement adaptation and mitigation measures within the resources and assets over which they have control. To give a more targeted approach to mitigation, Scope 1 and 2 emissions have therefore been calculated for key service areas (Figure 8).

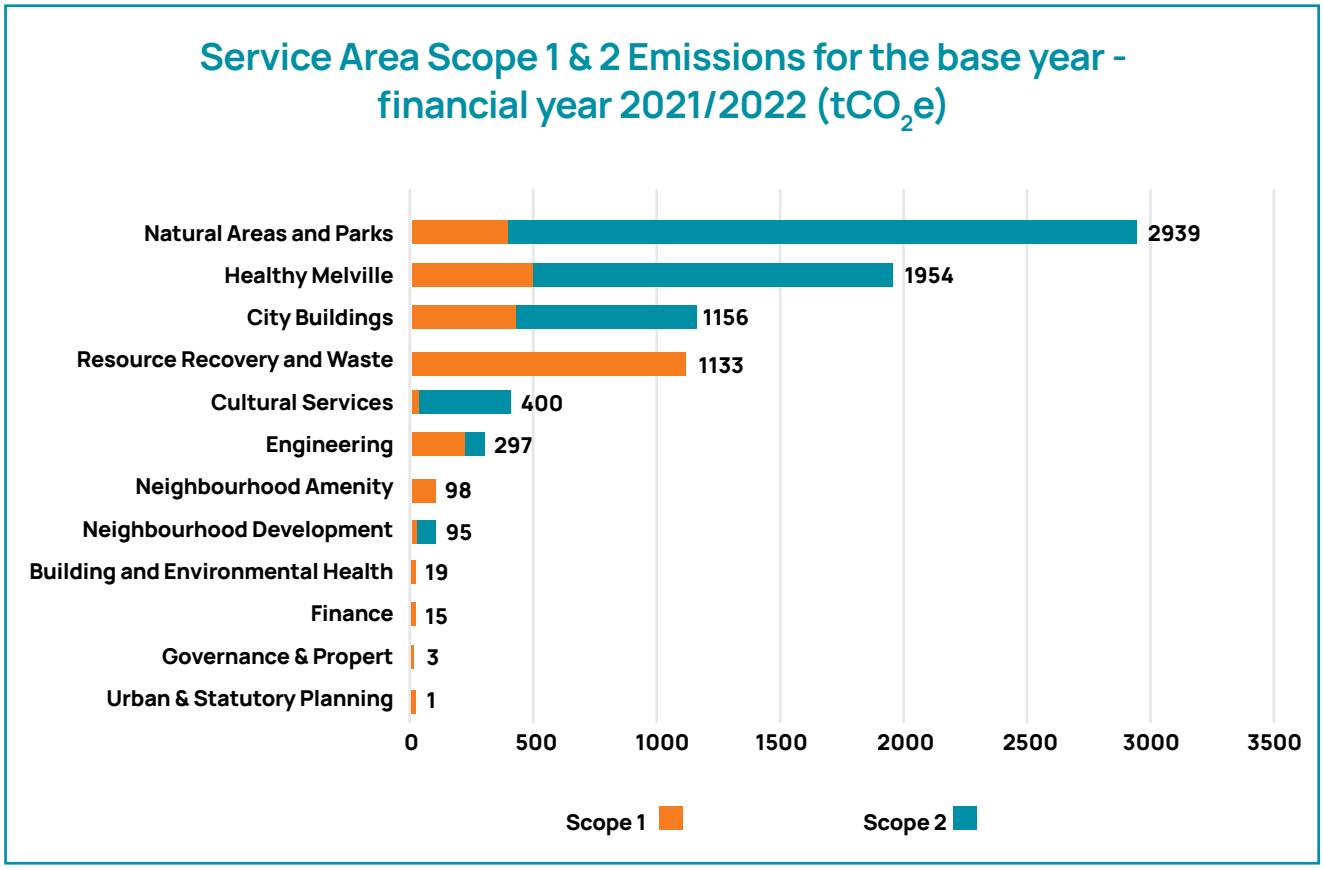


Figure 8: Service area Scopes 1 and 2 emission for the base year (financial year 2021/2022).

2.2.3 Key Action Areas for Emissions Reductions

The City will focus on reducing emission sources from electricity, petrol and diesel, gas, water, waste, refrigerants, as well as those from its supply chain (e.g. contractors, material use etc.).

Most of the City's Scope 1 emissions are from the fuel used in heavy vehicles (1,544 tCO_2-e). These originate from vehicles used in resource recovery activities (which makes up the bulk of this at 1,110 tCO_2-e), with natural area management, and engineering being the next largest (249 and 181 tCO_2-e respectively).

The single largest Scope 1 emissions are from the gas used for heating the pool at LeisureFit Booragoon (475 tCO_2-e). This is closely followed by the gas heating use at the Civic Centre (368 tCO_2-e).

Most of the Scope 2 emissions (4,873 tCO_2-e) are from electricity usage in the City across reserves, and at facilities operated by the City (the two leisure centres, the Civic Centre, Operations Centre, and the libraries). A building audit across the portfolio will identify opportunities for emission reductions through efficiencies. Further opportunities exist to install more renewables potentially with energy storage, explore a renewable energy microgrid for sharing of electricity between facilities, and to optimise energy use through demand management and use of the existing dashboard.

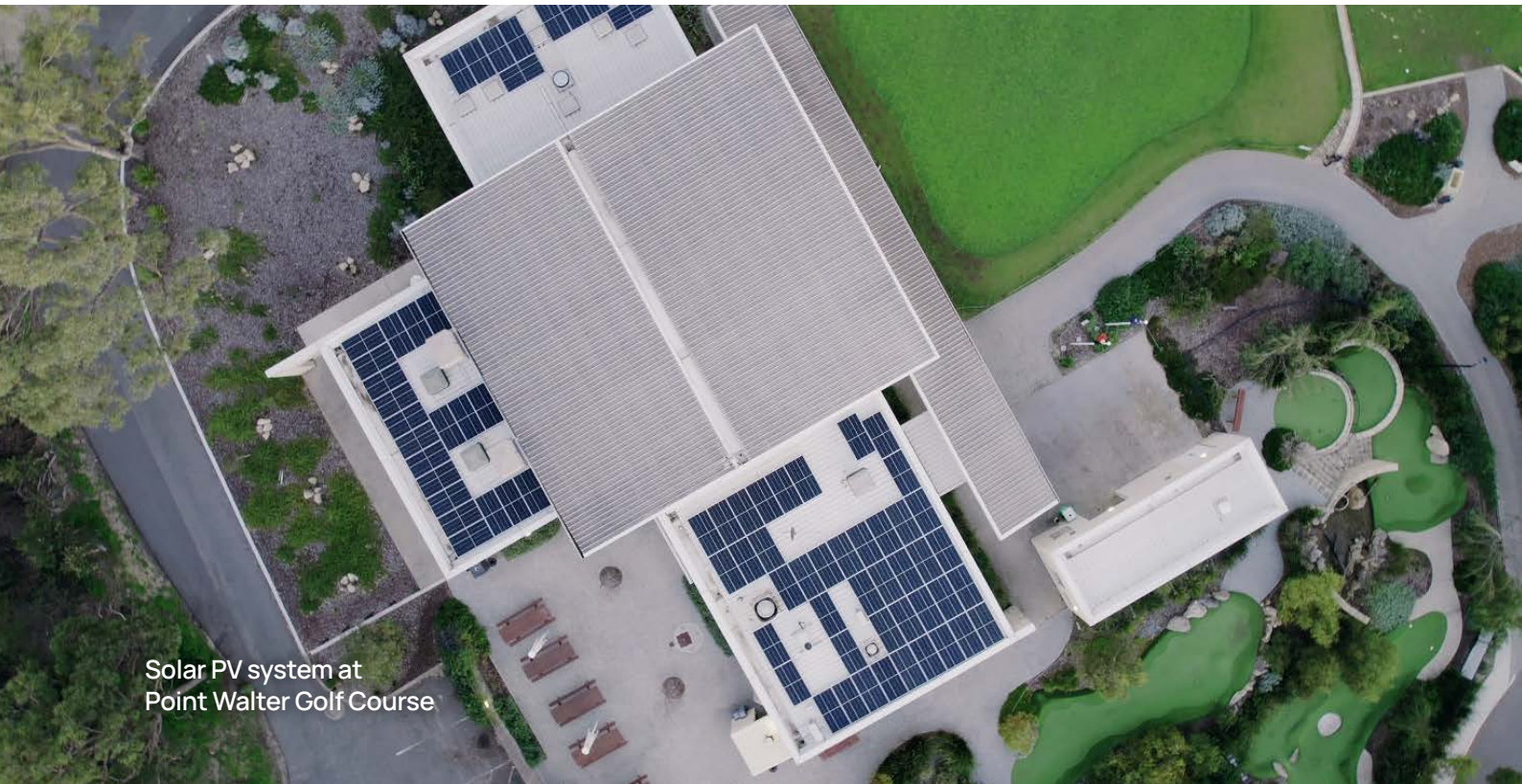
This plan outlines existing and future action aimed at reductions in all the above areas, however it is recognised that the technology for some of the required actions may not yet be mature enough to make immediate changes (e.g. hydrogen powered trucks).

Technology which is currently available at a reasonable cost may be used to immediately reduce emissions from some of the lower emitting activities in the meantime. Examples include, battery electric passenger vehicles, battery operated small plant (mowers, power tools etc.), reverse cycle air conditioners and electric heat pump hot water systems to replace gas systems used in change rooms.

Yearly Action Implementation Schedules will be used to guide the timing and specific features of the actions implemented by the City.

Taking climate action to reduce emissions can also produce co-benefits. For example, an action which reduces emissions through reduced burning of fossil fuels will have the co-benefit of improving urban air quality. Other co-benefits of mitigation actions include:

- Disaster risk reduction and enhanced resilience to change
- Economic growth and job creation
- Improvements to public health and resource quality such as air and water
- Poverty reduction
- Social inclusion and social justice



Solar PV system at Point Walter Golf Course

FOGO bin contents are converted into high quality compost

Co-benefits are important to consider as it has been shown that people are more likely to take action or more likely to support governments that take action on climate change, if the wider co-benefits of those actions are emphasised[7] . The co-benefits of the actions in this plan have been assessed using the SDGs framework. The corresponding SDGs have been identified for each action in Section 3.

It is estimated that the City's emissions are only around 1% of the total emissions from the community within the City's geographical region. The development of a Community Climate Action Plan is therefore critical for achieving the long-term target of net zero by 2050 for the geographical region.

The City's population in the base year (2021) was 106,845[8] and is predicted to rise to 119,849 by the year 2031. The City's emissions are dependent on the region's population through both service delivery and facility provision (e.g. increased population leads to an increase in the number of waste services and increased use of community facilities with the potential requirement to build more). The effect of proposed actions will take this projection into consideration and per capita emissions will be investigated as part of the Community Climate Action Plan.

2.3 Climate Vulnerability, Risk, and Opportunity Assessment

To inform the Corporate and Community Climate Action Plans, the City commissioned a consultant to undertake a climate Vulnerability, Risk, and Opportunity (VRO) assessment from October 2022 to April 2023. The VRO outlined current and future vulnerabilities and risks to the City and its assets and services, as well as to the community and the environment resulting from the changing climate, potential opportunities climate change presents for the City, and recommendations that will be used for selecting, designing and prioritising climate actions for the City and the community.

The assessment consisted of a climate risk desktop study, workshops with four community groups (First Nations, businesses and stakeholders, representatives of established community-based groups, and the Climate Action Reference Group) and three workshops with internal staff within service areas.

The VRO allowed the City to identify the aspects of operations most at risk to the physical and transitional impacts of climate change. This assessment has influenced the recommendations in the Corporate Climate Action Plan and the future Community Climate Action Plan to be written in financial year 2023/2024. The VRO assessment report is located on the City's website[9].

[7] Bain, P., Milfont, T., Kashima, Y. et al. Co-benefits of addressing climate change can motivate action around the world. Nature Clim Change 6, 154–157 (2016). https://doi.org/10.1038/nclimate2814

[8] https://profile.id.com.au/melville

[9] https://www.melvillecity.com.au/waste-and-environment/environmental-sustainability/our-climate-emergency-declaration

Climate change is already influencing the City and is expected to cause further disruptions in the future. Future trends suggest more extreme weather events (of increasing frequency and severity) should be expected. The City is projected to experience significantly increasing temperatures and declines in annual rainfall.

An increase in mean and maximum temperatures and significant increases in the number of hot days above 35°C is expected. Heatwaves are expected to be longer. The number of severe fire weather days is also expected. Decreases in annual rainfall (particularly winter and spring) will likely occur. Rainfall intensity will increase, with more frequent and severe storms. Higher sea levels and more frequent sea level extremes with an increased risk of coastal erosion should be expected. However, it is important to note that climate change projections involve a level of uncertainty and updated projections should occur every 3-5 years.

A total of 62 risks were identified through the Climate VRO assessment for the City's assets, provision of services to the community and the local area. The assessment investigated four key areas: business and industry, people and the built environment, infrastructure, and natural environmental assets. The risks were categorised by the likelihood and the impact of the risk (see opposite).

Over 100 recommendations were provided in the assessment, highlighting actions the City or the community can take to mitigate and adapt to climate change. These recommendations cover nine key areas of transport, planning, habitat protection, financing, emissions reduction, education, and awareness, built environment, advocacy, and First Nations engagement.

The recommendations also note whether they strengthen an existing activity, require additional action, build capacity and understanding or require new actions to be taken by the City or the community. These recommendations, along with others identified by City staff, have formed the basis for the actions in the Corporate Climate Action Plan and will inform the development of the Community Climate Action Plan.

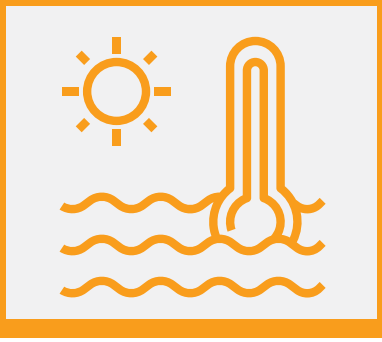
Climate change is one of the most important issues for local young people (Directions from Young People Strategy 2022-2025)

THE HIGHEST RATED RISKS ARE LISTED BELOW:

Broad decline in economic activity due to climate related events

Disruption of services and damage of infrastructure and property due to climate related events including rainfall events, flooding and fire

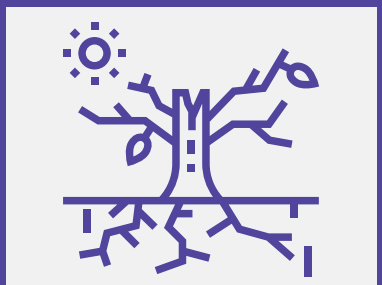
Increasing marine water temperatures impacting marine ecosystem health



Sea level rise increasing erosion and impacting infrastructure along the foreshore, particularly during storm tides

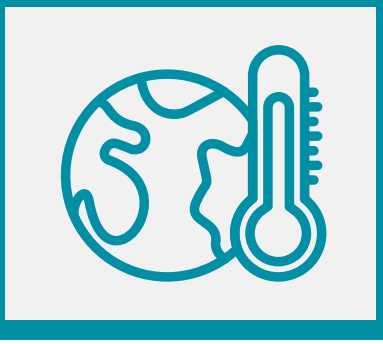
Significant impacts on the region's native fauna and flora

Reduction in average rainfall, increases in the frequency and severity of droughts impacting ecosystems



Health impacts related to widespread bushfire smoke exacerbating air pollution

Higher average and extreme temperatures, amplified by the urban heat island effect



3. ACTIONS

Ten themes have been identified to indicate the areas where actions will be required for the Corporate Climate Action Plan. These themes are:

Built Environment, Emission Reduction, Financing, First Nations, Habitat Protection, Policies and Planning, Transport, Education and Awareness, Advocacy, and initial Community Focused Actions.

3.1 Action Prioritisation and Planning

Actions presented in this section have been divided into three categories:

- Existing and ongoing actions.
- Short-term new actions based on the City's ability to commence implementation in the short-term (1-2 years) and on the urgency and impact of the action on both mitigation and adaptation.
- Medium-term new actions – those which would commence in the next 3-5 years.

It is recognised that the easiest and quickest actions will not necessarily be the ones which should be completed first. Difficult yet significant actions will also need to be commenced in the short-term to allow the planning, costs, and implementation to be spread over a longer time frame.
Actions were selected considering the following global principles of city climate action planning[10] :

- **Ambitious:** goals and actions work towards an ambitious vision.
- **Inclusive:** involve multiple departments, stakeholders and communities in planning and implementation.
- **Fair:** seek solutions that equitably address the risks of climate change and share the costs and benefits of action across the City.
- **Comprehensive and integrated:** aim to coherently undertake actions across a range of sectors within the City, as well as supporting broader regional initiatives and the realisation of priorities of higher levels of government when possible and appropriate.
- **Relevant:** actions seek to deliver local benefits and support local development priorities.
- **Actionable:** propose cost-effective actions that can be realistically implemented.
- **Evidence-based:** action planning reflects scientific knowledge and local understanding and uses assessments of vulnerability and emissions and other empirical inputs to inform decision-making.
- **Transparent and verifiable:** following an open decision-making process, and set actions that can be measured, reported, verified, and evaluated.

A thorough assessment of actions will be completed in the Action Implementation Schedule which will pull together all new short-term impactful actions for prioritisation. The following criteria will be used[11] :

- **Specificity:** actions should be specific enough that they can be readily implemented and measured.
- **Cost, benefits, and financing:** to the degree possible, actions should contain estimates of net costs and benefits (both to the climate and otherwise), their distribution, and potential sources of financial support.
- **Co-benefits, synergies, and trade-offs:** actions should consider potential co-benefits, synergies and trade-offs regarding local development priorities, and adaptation and mitigation objectives.
- **Timelines and prioritisation**: actions should be prioritised and contain clear timelines for implementation.
- **Assignment of responsibilities:** actions should be assigned to specific agencies, organisations, or stakeholders so that those entities can be held accountable for implementation.

[10] https://unhabitat.org/guiding-principles-for-city-climate-action-planning

[11] UN Habitat Guiding Principles for City Climate Action

An actions risk assessment will also form part of the Action Implementation Schedule.

Prioritisation of all actions will be re-assessed on an annual basis through a review of the Action Implementation Schedule with input from relevant service areas across the City.

To provide overall direction for mitigation and adaptation action planning, the mitigation and adaptation guides shown in Figure 9 (mitigation) and Figure 10 (adaptation) were developed that target key action areas.

These figures are followed by actions for each key theme with a focus on existing and ongoing actions and new actions in the short-term and medium term (if applicable). Reference is also provided to the relevant SDGs related to each action.

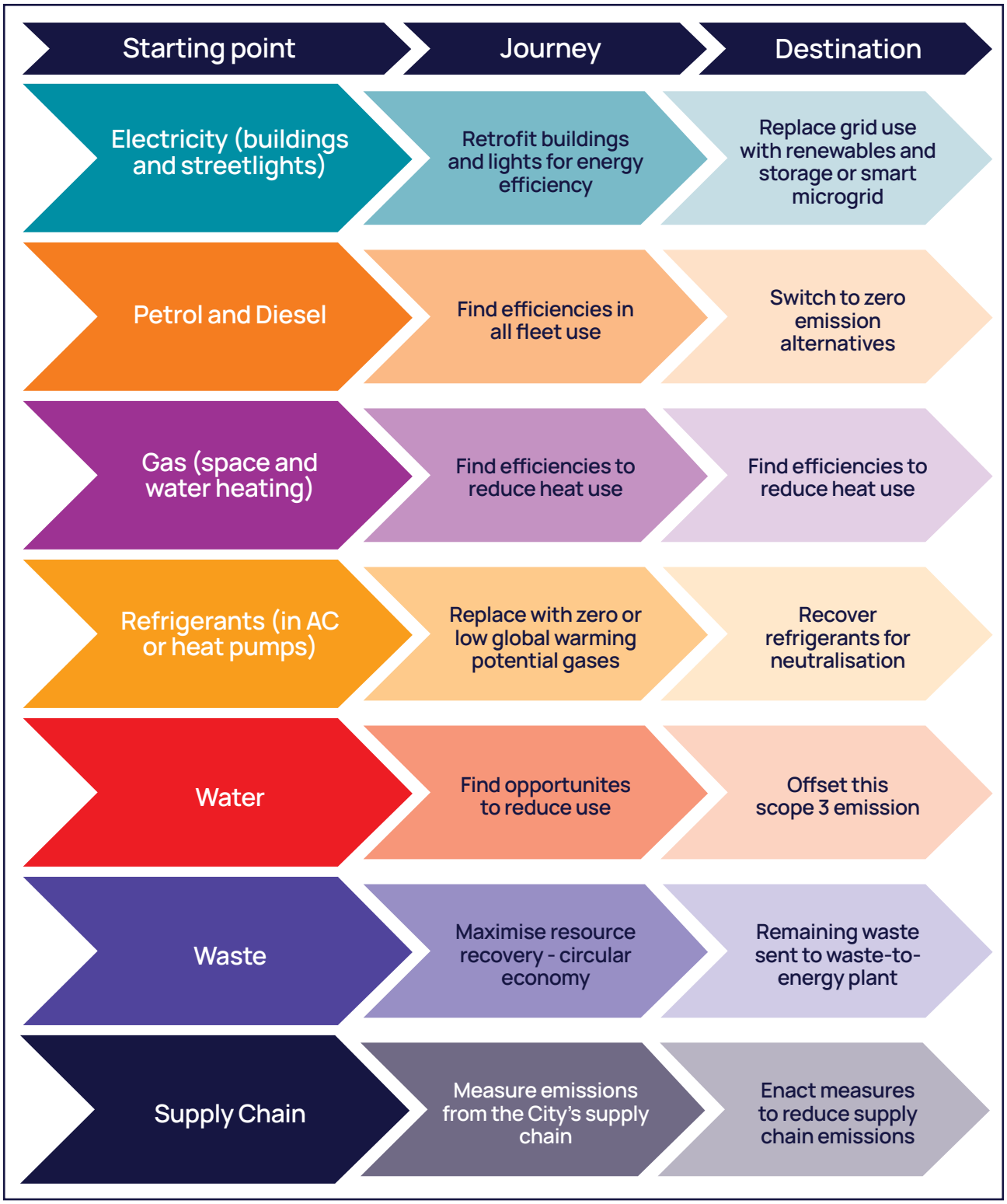


Figure 9: Mitigation guide

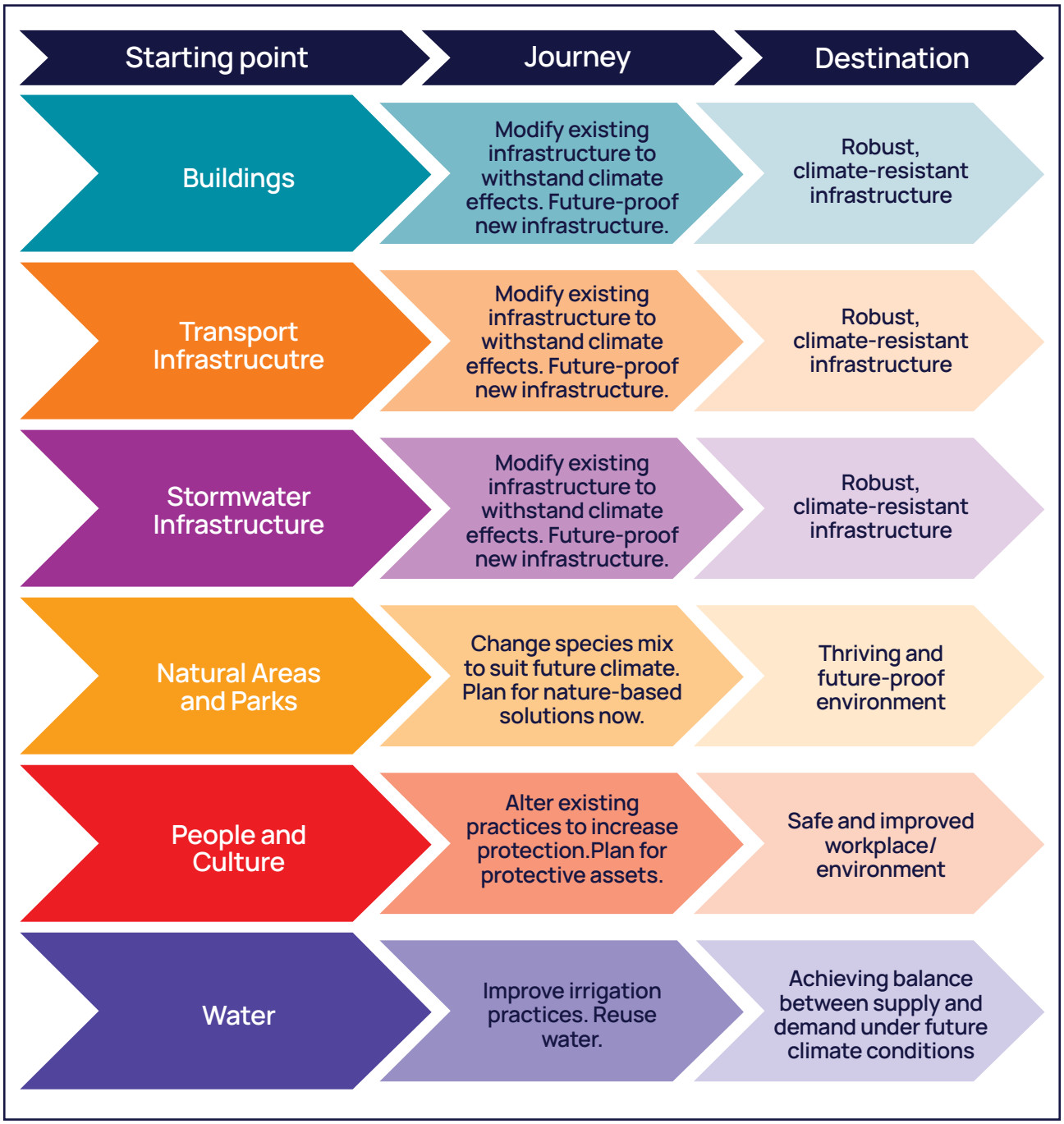


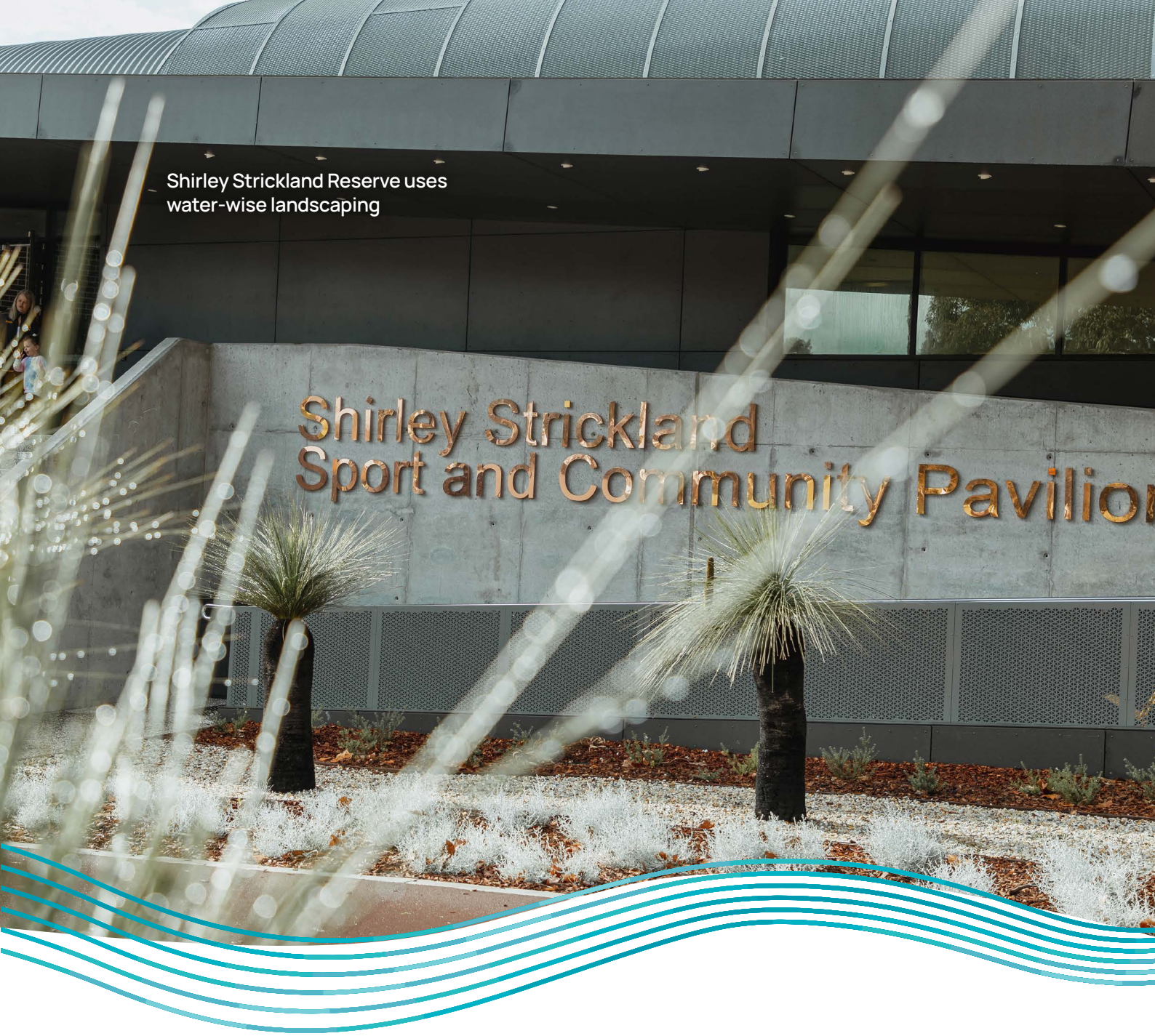
Figure 10: Adaptation guide

3.2 Built Environment

Built environment actions should consider reduction of energy and water consumption in new and existing buildings, incentives for green building initiatives, and resilience of infrastructure to adverse weather (such as heat and flooding) with emergency plans for supply disruption.

Previous and ongoing emission reduction projects already undertaken by the City include:

- Energy efficiency in facilities by implementing LED lighting.
- HVAC system retrofits with more efficient systems.



Shirley Strickland Reserve uses water-wise landscaping

- Installation of better than the minimum Building Code of Australia WELS ratings for water efficiency for water fixtures, fittings, and appliances for all new buildings.
- Implementation of gully infill program to increase storage capacity of the drainage network and thereby reduce flooding incidences in line with Water Sensitive Urban Design principles
- Drainage pipe rehabilitation by trenchless technology – stormwater pipes are being upgraded and rehabilitated by installing ultra-violet cured in-place liners in pipes and existing manholes. The pipe relining method significantly reduces environmental and drainage impacts compared with traditional drainage replacement works.
- Road surface enrichment program – cost effective and lower emissions pavement treatment that extends the life of road surfaces and therefore saving on embodied emissions.

Table 1 shows actions which have already begun and are still in progress or expected to continue for some time. Table 2 shows the new short-term actions. There are no medium-term actions for this theme identified at this time with further action planning to be undertaken in the next two years to shape the development of action responses.

Table 1 - Built Environment – Existing and ongoing actions

Action	Lead Service Area
Implement Water Sensitive Urban Design principles in City projects	City Buildings and Projects
Upgrades to LeisureFit centres to improve energy and water efficiencies	City Buildings and Projects
Trialling procurement of low-emissions materials in City projects	Engineering
Drainage pipe rehabilitation by trenchless technology	Engineering
Road surface enrichment program	Engineering
Increase awareness and implementation of Ecologically Sustainable Development design principles and energy efficiency criteria for new and refurbished City facilities	City Buildings and Projects

Table 2 - Built Environment - New short-term actions

Action	Lead Service Area
SHORT-TERM NEW ACTIONS	
Perform an audit across the building portfolio using the Green Building Council Australia Performance framework to identify potential emission reductions and resilience against extreme weather. Implement outcomes of audits following review of cost/ emissions benefit	City Buildings and Projects
Undertake an infrastructure audit to enhance climate resilience	Engineering
Compile a sustainable buildings and material checklist for all new projects and maintenance projects on City buildings	Sustainability and Climate Action
Update City asset management plans to include climate change considerations and to help manage insured risks	All

3.3 Emission Reduction

Emission reduction actions should consider energy and water demand management, renewable energy generation and distributed energy systems. Actions should also consider water reuse and recycling, energy efficient water treatment, reducing, reusing, and recycling waste, and waste to energy.

The main previous and ongoing emission reduction projects already undertaken by the City include:

- LED streetlight replacement program (800 completed, 10,000 lights total, estimated total savings 1,500 tCO_2-e).
- Program of works to replace metal halide flood lights on sporting fields with LED lighting. The new lighting is controlled by an app to allow users to manage the lights which provides greater energy efficiencies (estimated energy and emissions savings of 20%).
- Low-emissions purchasing policy for light vehicles (saving 20 tCO_2-e per year).
- Ongoing upgrade of resource recovery and waste trucks in line with the procurement policy to purchase the best environmental and sustainability standard of vehicle on changeover (latest are EURO6). This has saved approximately 7% in fuel from financial year 2019-2020 to 2020-2021.
- Installation of 560 kW of solar PV on 11 council facilities, since 2019 the main 5 systems alone have saved more than 1,350 tCO_2-e.
- From 1st July 2022 the City entered into an aggregate purchase of energy agreement for 3 years through WALGA for 100% green power for all of the City's 20 contestable sites (sites which use more than 50MWh p.a.). The City has calculated that in the period July 2022 to March 2023 this has offset 1,769 tCO_2-e.
- Partnership with Murdoch University on a Smart Grid Paralleled Mode Micro-grid project which developed a methodology and software to optimise renewable energy microgrids for local government facilities. The resulting installation of smart metering technology on major facilities (218 electrical and 12 water smart meters) enables real-time monitoring of energy usage on a dashboard to provide energy and water efficiencies. This project also includes smart poles at Riseley Street and Canning Bridge to improve management practices and provide baseline data for community transport emissions.

Solar PV system at Tompkins Park Function Centre

- Current Gold status under Water Corporation's Waterwise Council program, conducting regular water audits and adopting innovative approaches to water management.
- Introduction of Food Organics Garden Organics kerbside collection (detailed in the Community Focus section).

Measurement and monitoring activities are essential for emission reduction and are currently provided by the smart metering of energy and water usage on major City facilities and displayed in real-time on a web-based dashboard.

Table 3 lists actions which have already begun and are still in progress or expected to continue for some time. Table 4 shows the short-term new actions along with the medium-term new actions.

Table 3 - Emission Reduction – Existing and ongoing actions

Action	Lead Service Area
Progressing the Smart LED Street light program for city-owned lights to support the transition towards energy-efficient lighting	Engineering
LED lighting retrofits on streetlights through project with Western Power	Engineering
Installation of 560 kW of solar PV on 11 council facilities with plans to install more across other facilities such as sporting clubs, community halls etc	City Buildings and Projects
An ongoing program to purchase and install more energy efficient appliances including HVAC systems on the City's facilities	City Buildings and Projects
Follow the hierarchy of waste for Information and Communications equipment: Reduce equipment needed, reuse equipment where possible, recycle at end-of-life	Information, Technology and Communication
Influencing the reduction of Scope 3 and community emissions throughout the City's value chain through educational initiatives, engagement efforts and the implementation of sustainable procurement policies	Sustainability and Climate Action
Review the percentage weighting for the carbon footprint of suppliers of goods and/or services in the procurement process	Finance
Converting City parking meters to solar power	Community Safety
Smart LED floodlight replacement	Healthy Melville
Implement a circular economy approach for all streams of waste in City operations, including FOGO roll out and meeting the targets set in the Strategic Waste Plan 2021-2025	Resource Recovery and Fleet

Ongoing upgrade of resource recovery and waste trucks in line with the procurement policy to purchase the best environmental and sustainability standard of vehicle on changeover	Resource Recovery and Fleet
Conducting annual measurements of CO_2 emissions and track progress towards emissions reduction targets for Scope 1, 2 and where feasible, Scope 3 to align with the City's goal of Carbon Neutrality by 2030	Sustainability and Climate Action
Continuously collecting baseline data and monitoring emissions in existing and future City buildings and infrastructure to enable effective performance management	Sustainability and Climate Action
Continue involvement in the Water Corporation's Waterwise Council program, conducting regular water audits and adopting innovative approaches to water management- current Gold status	Sustainability and Climate Action
Partnership with Murdoch University on a Smart Grid Paralleled Mode Micro-grid project involving installation of smart metering technology for our major facilities	Sustainability and Climate Action
From 1st July 2022, the City is part of the 3-year WALGA Sustainable Energy Project where 100% green power for all of the City's 20 contestable sites (sites which use more than 50MWh p.a.)	Sustainability and Climate Action
Continue to assess and improve irrigation practices to enhance water and energy efficiencies	Natural Areas and Parks

The launch of Plastic Oceans Australasia's EPIC Business Program (Waste Wise Melville) to reduce single-use plastic in the workplace in July 2023.

Table 4 - Emission Reduction - New short-term and medium-term actions

Action	Lead Service Area
Assess and improve efficiency practices for tools powered by fossil fuels, while planning for their future transition to renewable power as suitable technology becomes available	Natural Areas and Parks
Maximise the City's renewable electricity generation, explore a renewable energy microgrid, optimise energy use through demand management and the existing dashboard	City Buildings and Projects
Implement a Sustainable Events Operational Policy for Council events	Resource Recovery and Fleet
Implement the Pre-Booked verge collection system to reduce emissions from waste collection	Resource Recovery and Fleet
Investigate green energy purchasing options once current WALGA agreement expires	Finance
Set an annual carbon budget for service areas based on the marginal cost of abatement for actions	Sustainability and Climate Action
Provide greater consideration given to suppliers using recycled, environmentally friendly, locally or First Nations produced materials or food	Finance
Establish Wastewise Melville staff audit and training program	Resource Recovery and Fleet
Investigate local offsets in the City's supply chain such as renewable energy generation, storage and bio-sequestration on City land	Sustainability and Climate Action
Integrate smart technologies (demand management technology) to create grid-interactive efficient buildings	City Buildings and Projects
Investigate third party verification of the City's greenhouse gas emission statements in line with ISO 14064-3:2019	Sustainability and Climate Action

3.4 Financing

Financing actions should consider the variety of forms of financing available, the mobilisation of additional financial resources including climate financing (grants) available at the national, regional, or global level, potential costs as a result of climate risk exposure and influence over the supply chain through procurement processes.

The City currently has:

- An Organisational Environmental Sustainability Reserve to fund projects showing high scores across social, economic, environmental, governance, and financial aspects.
- Almost half of its investment portfolio in green/ethical investments.

Table 5 shows actions which have already begun and are still in progress or expected to continue for some time. Table 6 shows the short-term new actions along with the medium-term new actions.

Table 5 - Financing – Existing and ongoing actions

Action	Lead Service Area
Maintain a deliberate preference for green/ethical investments in the City's investment portfolio (balanced with return on investment)	Finance
Implementation of the Sustainability Revolving Fund - using the Organisational Environmental Sustainability Reserve	Finance

Mingle at Moreau Mews

Table 6 - Financing - New short-term and medium-term actions

Action	Lead Service Area
SHORT-TERM NEW ACTIONS	
Review and update the City's sustainability revolving fund to allow savings from sustainability initiatives to fund future initiatives	Finance
Investigate the establishment of a sustainability grants fund for City-run events to procure sustainable items like reusable cups and water fountains	Sustainability and Climate Action
Explore and increase awareness of grant opportunities for supporting climate change mitigation and adaptation projects undertaken by the City.	Sustainability and Climate Action
Explore the integration of carbon emission data into the finance system for systematic and transparent carbon accounting	Finance
Investigate allocating a percentage of project costs for sustainability initiatives in all business cases	Finance
MEDIUM-TERM NEW ACTIONS	
Identify additional costs associated with transitioning to climate positivity rather than climate neutral by 2030	Finance
Investigate the reporting of climate-related financial information following the Taskforce on Climate-Related Financial Disclosures framework	Finance

3.5 First Nations

Since 2013, the City has embarked on a reconciliation journey with the development of a Reconciliation Action Plan and a Continuous Improvement Team. Actions relating to climate change and emissions reduction should consider the sophisticated knowledge of the ecology, weather, and seasonal cycles gained by First Nations people over thousands of generations.

Traditional knowledge systems and cultural land management practices have an important role in protecting Country for future generations. Actions should also consider that people from marginalised groups are on the frontlines of climate impacts. The establishment of the First Nations Ranger Program by the City in 2022 provides a focus on long-term job prospects for local rangers. First Nations people involvement in these and other projects provides opportunities to improve the condition, appreciation or understanding of cultural knowledge and areas of significance.

Table 7 shows actions which have already begun and are still in progress or expected to continue for some time related to First Nations. Table 8 shows the short-term new actions along with the medium-term new actions.

Table 7 - First Nations – Existing and ongoing actions

Action	Lead Service Area
Continue to foster collaboration with First Nations groups to engage their expertise and understandings in enhancing land and natural asset management practices, including through initiatives like the First Nations Rangers Program and the City's Stretch Reconciliation Action Plan	Cultural Services

Table 8 - First Nations - New short-term and medium-term actions

Action	Lead Service Area
SHORT-TERM NEW ACTIONS	
Identify avenues to safeguard culturally significant sites located on City managed land that are vulnerable to the impacts of climate change	Cultural Services
MEDIUM-TERM NEW ACTIONS	
Investigate integrating First Nations land management practices into existing land management strategies to reduce vulnerability to bushfires and protect native species	Natural Areas and Parks


Nyin, Ni, Koorliny Walk for Reconciliation 2023

3.6 Habitat Protection (Flora and Fauna)

Habitat protection actions involve solutions that protect, restore, and enhance green and blue infrastructure (natural systems that provide the ecological and amenity value associated with urban greening, provide receiving environments for stormwater management), ecosystem-based approaches to adaptation and manage the impact of climate change on native and invasive species.

Actions should look to promote compact, dense development that is better able to protect existing nature and build up new and additional natural systems. Examples include adding transit-oriented (not car-oriented) development, avoiding greenfield development, retrofitting old buildings/infrastructure (instead of building new), and establishing protection areas around water resources like wetlands, streams, reservoirs, and coastal ecosystems. These actions can serve not only to preserve nature and ecosystems but also to provide climate adaptation and resilience, as well as equity benefits, in urban settings.

The City has been very progressive in its active management of the natural environment. The main actions the City has undertaken to date related to climate action are:

- Increasing tree canopy cover on City controlled land and streetscapes by 23.6 hectares based on measurements undertaken in 2016 and 2022 through remote imaging.
- Installation of smart environmental monitoring system at Frederick Baldwin Park to monitor algal blooms and to increase efficiencies in the use of aeration pumps.

Table 9 shows actions which have already begun and are still in progress or expected to continue for some time for Habitat Protection. Table 10 shows the short-term new actions along with the medium-term new actions.

Table 9 - Habitat Protection – Existing and ongoing actions

Action	Lead Service Area
Enhance canopy cover, habitat, and ecological connectivity on public and private land through the implementation of the updated Urban Forest Strategy	Natural Areas and Parks
Continue to develop planting and landscape renewal plans for urban greening, parks, gardens and public domains that factor in changing rainfall, flooding, storm and drought patterns and consider species adaptability to climate change	Sustainability and Climate Action
Continue flora and fauna monitoring, implement weed and pest management and employ best practices for maintaining resilience and ecosystem function in natural areas	Natural Areas and Parks
Environmental monitoring at Frederick Baldwin Lake case study	Sustainability and Climate Action
Continue to implement wetland and conservation area monitoring, restoration and adaptive management practices in key selected areas to enhance resilience and ecosystem function	Natural Areas and Parks
Continue to enhance the habitat of indigenous plant pollinators to increase invertebrate diversity and densities on City land	Natural Areas and Parks

Table 10 - Habitat Protection - New short-term and medium-term actions

Action	Lead Service Area
SHORT-TERM NEW ACTIONS	
Explore nature-based solutions as protective measures against climate change and disasters, particularly in areas of flooding and riverine erosion	Natural Areas and Parks
Incorporate climate change projections in the review of environmental management plans and policies	Natural Areas and Parks
Explore options for carbon sequestration projects with local land, coastal/foreshore and wetland sites with local Registered Aboriginal Parties, private landowners, community groups and other Councils/ agencies	Sustainability and Climate Action, Natural Areas and Parks
MEDIUM-TERM NEW ACTIONS	
Investigate developing a pathway to transition to dry parks where suitable including an extensive community engagement process	Natural Areas and Parks

Tree planting at Bicton Quarantine Park

3.7 Policies and Planning

Policies and Planning actions should consider compact, transit-oriented, mixed-use development, regulations based on flood risk mapping that reflects both current risk plus the projected impacts of climate change, air quality improvement measures (including reductions of short-lived climate pollutants), heat wave (or cold snap) health action plans, prevention of the spread of diseases affected by climate change and organisational planning.

To date, the City has:

- Embedded the UN SDGs within the City's Strategic Community Plan and Corporate Business Plan, aligning the policy and planning actions to create a more sustainable, equitable and resilient community.
- Published transparent data on our progress towards the goals on the Community Outcome Reporting dashboard[12].
- Included a sustainability scorecard in all business case applications to assess social, economic, environmental and governance aspects of the project. This will also be included in all Council reports as well.

Table 11 shows actions which have already begun and are still in progress or expected to continue for some time related to Policies and Planning. Table 12 shows the short-term new actions along with the medium-term new actions.

Table 11 - Policies and Planning – Existing and ongoing actions

Action	Lead Service Area
Collaborate with emergency response agencies to enhance understanding of the impact of climate change on emergency preparation, response and recovery efforts	Healthy Melville
Integration of the Sustainable Development Goals into the City's strategic documents and plans	Marketing and Communications
Review of Local Planning Scheme and Strategy - sustainability a key theme	Planning
Inclusion of the quadruple bottom line and sustainable value test in all business case applications	Sustainability and Climate Action
Remain up to date with climate change science impacts for the region and conduct the Climate Vulnerability, Risk and Opportunity assessment every 3-5 years	Sustainability and Climate Action
Attract and retain staff to work at the City based on sustainability and climate action leadership	People and Culture

[12] https://www.melvillecity.com.au/our-city/city-management/community-outcome-reporting

Table 12 - Policies and Planning - New short-term and medium-term actions

Action	Lead Service Area
SHORT-TERM NEW ACTIONS	
Include climate change related risks into the Risk Management Framework and Environmental Management System. Revise the Business Continuity Plan, to ensure uninterrupted service provision during extreme events	People and Culture
Develop visual maps outlining climate-related hazards and risks to aid staff in planning and communicating activities	Information, Technology and Communications
MEDIUM-TERM NEW ACTIONS	
Incorporate sustainability and climate action components into job descriptions, operational policies and investigate relevant Key Performance Indicators	People and Culture
Review and update the local planning frameworks to effectively integrate resilience planning mechanisms, low carbon requirements and life-cycle analysis, taking into account the impacts of climate change	Planning
Review City staff working hours and schedules in response to increased risks posed by climate change, including heat stress	People and Culture
Review the local government Bushfire Risk Management Plan, taking future climate change impacts into account	Natural Areas and Parks

Piney Lakes Environmental Education Centre

3.8 Transport

Transport actions should consider options for reducing kilometres travelled (including efficiencies), introducing cleaner or zero emissions fuels, increasing active/non-motorised transport (walking and bicycling), climate proofing transit infrastructure and other forms of demand management for private vehicles.

The City's main actions in transport are:

- Introduction of a low-emissions purchasing policy for light vehicles which has successfully transitioned all pool vehicles to small hybrids, saving approximately 20 tCO_2-e per year.
- Encouraging the use of active and public transport through provision of bicycles and e-bikes and free use of public transport Smart Riders, with data on travel behaviours being captured in an ongoing staff travel survey.

Table 13 shows actions which have already begun and are still in progress or expected to continue for some time related to Transport. Table 14 shows the short-term new actions along with the medium-term new actions.

Table 13 - Transport – Existing and ongoing actions

Action	Lead Service Area
Continue to support hybrid work modes to minimise private vehicle travel for employees and elected members	People and Culture
Continue the transition of the City's light fleet vehicles to fully electric	Resource Recovery and Fleet
Analyse GPS data from fleet to enhance fleet performance and efficiency	Resource Recovery and Fleet
Conduct an annual staff travel survey to monitor changes in commuting practices	Sustainability and Climate Action
Encouraging active transport options for staff to use during the workday by providing fleet bicycles, e-bikes, and public transport Smart Riders	Engineering

Table 14 - Transport - New short-term and medium-term actions

Action	Lead Service Area
SHORT-TERM NEW ACTIONS	
Utilise the cross-sector fleet and operations working group to develop a plan for transitioning the light fleet to electric vehicles and identify suitable locations for EV charging infrastructure on City-owned sites. Update Fleet Asset Management Plan to include electric vehicles, a step up from low emissions vehicle consideration	Resource Recovery and Fleet
Assess active transport routes and infrastructure at City buildings to facilitate staff usage for commuting, including end-of-trip facilities and parking options	Engineering
MEDIUM-TERM NEW ACTIONS	
Explore alternate fuels for waste trucks and other heavy vehicles, with a focus on zero emission fuels once commercially viable technologies become available	Resource Recovery and Fleet

E-bike and hybrid vehicles

3.9 Education and Awareness

Education and awareness actions consider incentives and training to encourage green economy industries, green procurement policies and engagement with staff and community on mitigation and adaptation actions.

The City understand that alone they can only affect small change at an organisational level, but by working together with community, local businesses and other key partners we can all take real action and achieve real tangible outcomes.

The City has key partnerships with Murdoch University, Switch Your Thinking and Cities Power Partnership to partner on locally based innovative projects. The City is also a signatory to the Global Covenant of Mayors, the largest international alliance of Cities and Local Governments with a shared long-term vision of promoting and supporting action to combat climate change and move to a low emission, resilient society.

The main actions confirming the City's commitment to the carbon neutral journey have been:

- Formation of the Climate Action Governance Committee in 2021 to facilitate decision making, consisting of key members of the senior leadership team including the CEO and Directors.
- Partnership with Murdoch University which has involved a federally funded, award-winning Smart Grid Paralleled Mode Micro-grid project.

Table 15 shows actions which have already begun and are still in progress or expected to continue for some time related to Education and Awareness. Table 16 shows the short-term new actions along with the medium-term new actions.

Table 15 - Education and Awareness – Existing and ongoing actions

Action	Lead Service Area
Inclusion of sustainability implications section in all Council reports	Governance
Internal Climate Action Governing Committee continues oversight on Carbon Neutral related actions	Sustainability and Climate Action
Educate and support staff to transition to active transport modes including supporting Ride to Work day, providing e-bikes at City facilities for Staff use and providing Smart Riders for public transport use	Sustainability and Climate Action
Continue Switch Your Thinking and Cities Power Partnership membership with other Local Governments locally and around Australia	Sustainability and Climate Action
Continue Murdoch University partnership to undertake innovative projects and share lessons	Sustainability and Climate Action

Table 16 - Education and Awareness - New short-term and medium-term actions

Action	Lead Service Area
SHORT-TERM NEW ACTIONS	
Develop an internal climate action engagement and education plan that may include additional training for staff and Elected Members	Sustainability and Climate Action
Enhance staff awareness of carbon considerations in decision making, project design and procurement for the City's services and operations and gradually strengthen this criterion	Sustainability and Climate Action
Investigate including sustainable procurement awareness into Council's induction program for suppliers	Finance
Providing Council and the community with annual updates on the progress in implementing the Corporate Climate Action Plan and achieving emissions reduction targets	Sustainability and Climate Action
Train and communicate with employees on how to respond to heatwaves, floods, air quality issues and other climate events at work to stay healthy and safe	People and Culture
MEDIUM-TERM NEW ACTIONS	
Provide fact sheets and training to staff and stakeholders who use City buildings and facilities, promoting efficient management to reduce energy, water and waste emissions	Sustainability and Climate Action
Transform Piney Lakes Education Centre into a Climate Innovation and Environmental Hub, fostering collaboration and dialogue among national and state authorities, Local Governments, businesses, the community, and civil society to advance climate change initiatives	Sustainability and Climate Action

3.10 Advocacy

Advocacy is the process of lobbying for positive climate action in all directions: upwards to State and Federal Governments; sideways to City of Melville staff and other Local Governments; and downwards to the Local Government supply chain and to the local community.

Actions should consider incentives for more sustainable packaging; addressing emissions linked to city supply chains including food, cement and other construction materials; green procurement; addressing vulnerability of key supply chains.

The City has reached out to:

- The Federal Government to advocate for strengthening the energy performance standards for new homes from 6 to 7 stars in the National Construction Code.
- The WA State Government to provide feedback on its Climate Adaptation Strategy under development.

Table 17 shows actions which have already begun and are still in progress or expected to continue for some time related to Advocacy. Table 18 shows the short-term new actions.

Table 17 - Advocacy – Existing and ongoing actions

Action	Lead Service Area
Advocate to National and State level governments to protect and enhance the biodiversity of our environment and natural assets	ELT
Engage with the WA State Government on their Climate Adaptation Strategy	ELT
Working with emergency response agencies to improve the understanding of how climate change will impact emergency preparation, response, and recovery activities	People and Culture working with the Local Emergency Management Committee

Table 18 - Advocacy - New short-term actions

Action	Lead Service Area
SHORT-TERM NEW ACTIONS	
Advocate to State and National Governments for improved tools and responses in strategic asset management to address the impacts of climate change	Sustainability and Climate Action
Advocate to the State Government to declare a climate emergency and act in accordance with climate science projections for RCP 8.5	Sustainability and Climate Action

Dyoondalup Point Walter

3.11 Initial Community Actions

The City as an organisation is responsible for only a fraction (estimated to be 1%) of the emissions produced in the geographical City of Melville area, the other 99% of emissions are generated from the community. The City will support the community in climate mitigation and adaptation initiatives which will be identified in the Community Climate Action Plan.

The City will encourage the development of sustainable local industries and help to facilitate the transition to a net zero economy. This may include grants for a just transition such as renewables on low-income housing and increasing trees and public transport in low socio-economic areas. More details and the resources required to do this will be outlined in the Community Climate Action Plan.

Previous and ongoing community emission reduction projects already undertaken by the City include:

- Introduction of a separate FOGO kerbside collection across the community in 2019 which has reduced residential waste sent to landfill from approximately 20,000t down to 10,000t per year, saving 35,000 tCO_2-e.
- In 2022, 24 community members were selected to form a Climate Action Reference Group. The selection was made such that the group consisted of a broad range of demographics. The group will provide demographic-relevant climate actions for input into the Community Climate Action Plan. The group is informed through consultant recommendations, expert speakers, group workshops and meets once per month for 12 months (in progress).
- Annual well-being surveys of the community.
- The City's 2022-2025 Directions from Young People has key actions on engaging and supporting young people to take climate action.
- Community programs related to sustainability and climate action including Switch Your Thinking and environmental education programs.
- Improve efforts to promote local circular economies to support supply chains. Waste reduction examples include (but are not limited to) toy and tool libraries, Men's Sheds and Repair Lab.
- Measurement of community CO_2 emissions and tracking progress towards emissions reduction targets for Scope 1, 2 and where feasible Scope 3 emissions, aligning with the City's geographical Net Zero by 2050 goal.

Some significant new actions which the City is planning to lead or resource include:

- Develop a Community Climate Action Plan to outline collective strategies and initiatives for addressing climate change to be completed in financial year 2023-2024.
- Minimisation of waste in commercial businesses through FOGO roll out and education activities.
- Implement diverse and inclusive educational programs to raise awareness about the effects of climate change on daily lives and actions residents and businesses can take to mitigate and adapt.
- Improvement of active and public transport opportunities for the community to reduce transport emissions.
- Creation of a City nursery for the organisation, residents, and groups, supplying local natives (free or cheap), run by volunteers to create community cohesion.

3.12 Greenhouse Gas Emissions Roadmap

Figure 11 shows a roadmap for GHG reductions across Scopes 1 and 2 based on the main actions to be undertaken as a result of this plan.

Assumptions have been made about the projected grid emissions factor in 2030, the operational energy of the new Library and Cultural Centre, increases in electricity use as a result of changing to electric vehicles and replacing gas heating, and on potential efficiencies from buildings and monitoring of buildings. The remaining emissions in 2030 (estimated to be 2,401 tCO_2-e will be from the non-renewable component of the grid (predicted to be 20% non-renewable by 2030 according to the SWIS Demand Assessment[13]). This will be mitigated to zero or below using local renewable generation and storage.

Scope 3 emissions (once quantified) will also need to be offset to meet the Climate Active standard for carbon neutrality. In line with the City's Climate Action Policy, the City's preference is for these offsets to be "demonstrated beneficial for the local community from an economic and environmental perspective across its life cycle. Such projects may include options such as bio-sequestration, renewable energy generation or other technologies as appropriate."

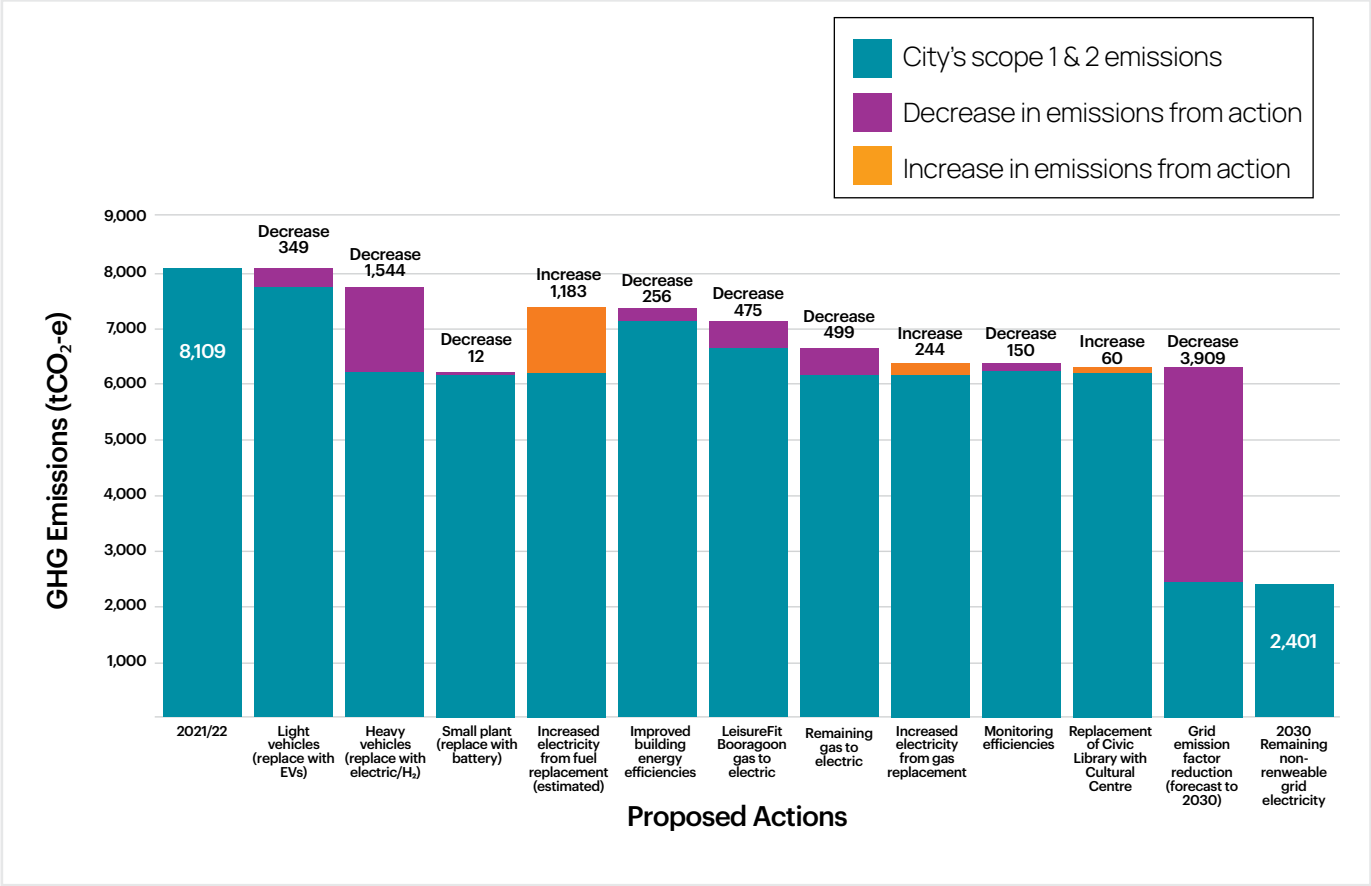


Figure 11: Scopes 1 and 2 GHG emissions roadmap for main actions to be undertaken as a result of this plan.

[13] https://www.wa.gov.au/government/document-collections/swis-demand-assessment

4. COMMUNICATION STRATEGY

It is important for the City to communicate what actions are being implemented in relation to climate change mitigation and adaptation to employees and the community to obtain support for these actions and to share the successes and challenges.

An internal climate action engagement and education plan will comprise of both internal and external aspects.

Internally the City will:

- Share resources on our mitigation and adaptation actions via the staff intranet.
- Provide updates at Councils and staff meetings.
- Continue the monthly "Climate Corner" updates within internal newsletters.
- Continue meetings of the Climate Action Governing Committee to oversee implementation of the actions.

Externally the City will:

- Communicate what actions are being taken the City's website.
- Share good news stories on the City's social media.
- Include communications within e-news updates.
- Continue working with the Climate Action Reference Group in developing the Community Climate Action Plan.

The Risely Centre

5. MONITORING AND EVALUATION

Having a formal and periodic process in place for monitoring and evaluating the Corporate Climate Action Plan is fundamental to understanding progress in addressing climate change, the effectiveness of actions and will assist in guiding future decisions.

Monitoring and evaluation of the plan will also generate learning and idea creation opportunities in relation to climate change which will help to improve the design and delivery of future climate change related policies, plans and activities. It is the City's aim that, through this ongoing monitoring and evaluation process, climate change adaptation considerations will be embedded into business-as-usual processes.

The City will use indicators to understand how they are tracking in relation to implementing the adaptation actions. Two possibilities are the SDGs, which have been used as an initial guiding framework, aligning with the City's Strategic Community Plan and Corporate Business Plan, or the Making Cities Resilient tool. More details in relation to the guiding framework will be provided in the annual Action Implementation Schedules or in the next review of the plan in 2025.

The Corporate Climate Action Plan will be overseen by the City's Climate Action Governance Committee. The delivery of actions will be overseen by the City's Sustainability and Climate Action team, with direct responsibility by other directorates on a number of actions. There are key projects identified within the plan that lend themselves to grant opportunities either in their entirety or to establish the initiative, and a range of funding opportunities will be explored over plan's duration. Funding and implementing actions will be outlined in business cases or the Action Implementation Schedule.

This Corporate Climate Action Plan will be monitored on an annual basis. The outcomes of the assessments will be used to identify key challenges and focus areas for the following year based on actions that have been completed or are alternatively not on track for completion within desired timeframe and outcomes.

Following the annual monitoring process, the City will update the Action Implementation Schedules to identify areas that require updates, or additional funding/focus in order to achieve outcomes. Any changes made will be communicated through the Council and to the community where relevant.
The City will also update the climate change vulnerability, risk and opportunities assessment every 3-5 years to enable tracking of progress in managing risks. As adaptation actions are implemented to address the risks resulting from climate change, the residual risks should reduce and demonstrate progress in the City's approach to adaptation. However, should adaptation actions not be undertaken, the residual risks will remain the same, and will demonstrate lower levels of progress against the plan.

The City's Plan will be reviewed in full every two years to maintain its relevance and currency. This will be a wider review process including input from all service areas at a Manager and Coordinator level.

The outputs of the annual review process will be documented in a report to Council showing progress against each action and target. Where changes are required to the plan as outlined in the annual report, these will be referred to Council for approval if required.

The outcomes of the full review process will generate a revised version of the Corporate Climate Action Plan to be submitted to Council for adoption. Major updates and achievements will be publicly communicated to the City's residents, businesses and the wider community such as through online communications and within the City's Annual Report

5. REPORTING AND VERIFICATION

In line with the City's Climate Action Policy, the City commits to annually reporting emissions for the entire geographical region (both City and community) to the Carbon Disclosure Project (CDP). This allows the City to benchmark against international cities and provides feedback for improvement.

The City is a signatory to the Global Covenant of Mayors for Climate and Energy (GCoM). Reporting to the GCoM is undertaken through a Common Reporting Framework via the international Carbon Disclosure Project (CDP)[14], a not-for-profit charity that runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts.

Although not a requirement for Local Government, reporting through the CDP identifies ways to help manage environmental risks and opportunities. In July 2022, the City reported its base year sustainability actions, including its GHG emissions inventory, to the CDP for assessment against international benchmarks. The assessment demonstrated progress made and identified areas for improvement. The City has committed to this annual reporting framework as a way of continuously improving its sustainability performance.

6.1 Verification

There are two standards which could be used for verification and subsequent certification or validation:

- The Australian Governments Climate Active program, and
- The international Science Based Targets initiative (SBTi).

There are two terms commonly used to describe an organisations emission reduction journey, these are "carbon neutral" (used by Climate Active) and "net zero" (used by SBTi).

The main difference is in the amount of carbon offsets each of these methods allow. Under Climate Active, there is no restriction on the number of offsets which can be purchased by the City. However, the City must consider that the costs of offsets will be an ongoing cost for a number of years and the price will continue to increase as other entities are required to purchase them. The City's stakeholders will expect it to show leadership in reducing emissions as much as possible, and as quickly as practicable, and not just resort to excessive offsets as an "easy fix".

Under the SBTi, the "net zero" definition limits offsetting to no more than 10% of all base year emissions (i.e., Scope 1, 2, and 3 emissions). However as described earlier, under this definition, the City will be unable to meet a "net zero by 2030" target due to the extensive emissions in its supply chain (Scope 3).

The City has therefore committed to becoming carbon neutral by 2030, reducing its Scope 1 and 2 emissions to zero by 2030 and will work with its supply chain to minimise Scope 3 emissions as fast as possible. Any remaining emissions by 2030 will be offset through local offsetting schemes and the City will certify to be 'carbon neutral' through Climate Active in 2030, with the intent to be net zero as an organisation under the SBTi by 2050.

[14] https://www.cdp.net/en

7. GLOSSARY

Adaptive capacity
The capacity of an organisation or system to moderate the risks of climate change, or to realise benefits, through changes in its characteristics or behaviour.

Climate
The composite of surface weather conditions such as temperature, rainfall, atmospheric pressure, humidity, sunshine and winds, averaged over a period of time ranging from months to thousands of years.

Climate change
Any change in climate over time, whether due to natural variability or as a result of human activity.

Climate change adaptation
Climate change adaptation is a response to global warming and climate change, that seeks to reduce the vulnerability of social and biological systems to relatively sudden change and thus offset the effects of global warming.

Climate change mitigation
Climate change mitigation consists of actions to limit the magnitude or rate of long-term climate change. Climate change mitigation generally involves reductions in human emissions of greenhouse gases.

Carbon Neutral
Carbon neutral means that any carbon dioxide released into the atmosphere from a company's activities, products and services is balanced by an equivalent amount being removed. This can be achieved through reducing operational emissions and by using carbon offsets which are generated from an activity that prevents, reduces or removes greenhouse gas emissions from being released into the atmosphere. The Australian Government's Climate Active certification does not have a minimum requirement on the level of carbon offsets versus operational emissions reduction to achieve certification.

Climate projection
A projection of the response of the climate system to scenarios of greenhouse gas emissions or atmospheric concentrations of greenhouse gases. Climate projections are often based upon simulations of the climate system by computer based mathematical models. Climate projections depend on assumptions about emission rates and concentrations and response of the climate system to changes in these variables and can therefore be distinguished from climate predictions.

Climate scenario
A coherent, plausible but often simplified description of a possible future state of the climate. A climate scenario should not be viewed as a prediction of the future climate. Rather, it provides a means of understanding the potential impacts of climate change, and identifying the potential risks and opportunities created by an uncertain future climate.

Climate variability
Variations or deviations from the mean state of the climate. The climate system has natural, internal variability but variability could be affected by external factors driving climate change such as changes in the atmospheric concentration of greenhouse gases.

Enhanced greenhouse effect
Increases in the atmospheric concentration of greenhouse gases such as carbon dioxide, methane and nitrous oxide due to human activities, leading to an increase in the amount of thermal radiation near the Earth's surface.

Extreme event
Weather conditions that are rare for a particular place and/or time such as an intense storm or heat wave.

Fleet
Comprises approximately 450 separate items consisting of small commercial and passenger vehicles, waste trucks, sweepers, tractors, mowers, trailers and numerous items of small plant.

Global warming
An increase in the global average surface temperature due to natural or human caused factors.

Greenhouse gases
A greenhouse gas (GHG) is a gas in an atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect.

Greenhouse effect
The process where gases in the lower atmosphere such as carbon dioxide and water vapour trap radiation released by the Earth's surface after it has been warmed by solar energy. These gases then radiate heat back towards the ground, adding to the heat the ground receives from the Sun.

Life Cycle Assessment
Life cycle assessment or LCA is a methodology for assessing aspects and impacts associated with all the stages of the life of a commercial product, process, or service.

Net zero emissions
A state in which the amount of greenhouse gas emissions produced by a company's activities, products and services is equal to the amount removed from the atmosphere. This is achieved through a combination of reducing emissions and implementing measures to remove carbon dioxide and other greenhouse gases from the atmosphere. Net zero implies a connection to the Paris Agreement, which outlines the goal to "achieve a balance between anthropogenic emissions by sources and removals by sinks of GHG in the second half of the century". The Science Based Targets initiative allows a maximum of 10% of total emissions to be offset to be certified net-zero.

Offsets
A carbon offset (or carbon credit) is generated from an activity that prevents, reduces or removes greenhouse gas emissions from being released into the atmosphere to compensate for emissions occurring elsewhere. Carbon credits should be permanent and of high-quality and satisfy additionality.

Renewable energy
Renewable energy is energy that is collected from renewable resources that are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat.

Resilience
The capacity of individuals, institutions, businesses and systems to adapt to chronic stresses and acute shocks.

Sensitivity
The degree to which a system is affected, either adversely or beneficially, by climate related variables including means, extremes and variability.

Urban heat island effect
Refers to when an urban area is significantly warmer than its surrounding rural areas due to human activities. The main cause of the urban heat island effect is from the modification of land surfaces.

Vulnerability
The extent to which a system or organisation can cope with the negative impacts of climate change, variability and extremes. It is a function of risk and adaptive capacity.

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