SUBURBAN RAIL LOOP EAST

SRL East Draft Structure Plan | Box Hill

Climate Response Plan

More Homes For Victorians

VICTORIA State Government

Suburban Rail Loop

PREPARED FOR SUBURBAN RAIL LOOP AUTHORITY

SRL EAST DRAFT STRUCTURE PLAN – CLIMATE RESPONSE PLAN – BOX HILL

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Appendices

Glossary and abbreviations

Acronym	Abbreviation
AEP	Annual Exceedance Probability
ARENA	Australian Renewable Energy Agency
BESS	Built Environment Sustainability Scorecard
C&D	Construction and Demolition (waste)
CASBE	Council Alliance for a Sustainable Built Environment
CO_2e	Carbon Dioxide Equivalent
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CRP	Climate Response Plan
ESD	Environmentally Sustainable Design
GBCA	Green Building Council of Australia
HVAC	Heating, Ventilation, and Air Conditioning
IWM	Integrated Water Management
NABERS	National Australian Built Environment Rating System
NatHERS	Nationwide House Energy Rating Scheme
NCC	National Construction Code
SDA	Sustainable Design Assessment
SDAPP	Sustainable Design Assessment in the Planning Process

Executive summary

As part of the Suburban Rail Loop (SRL) East project, Draft Structure Plans (Structure Plans) are being prepared for the neighbourhoods surrounding the new underground stations at Cheltenham, Clayton, Monash, Glen Waverley, Burwood and Box Hill.

The Structure Plans will set a vision and framework to guide growth and change in each neighbourhood, while protecting and preserving the character and features people love about them now.

This SRL East Draft Structure Plan - Climate Response Plan – Box Hill (Climate Response Plan) will inform the development of the Draft Box Hill Structure Plan (Box Hill Structure Plan).

CLIMATE RESPONSE PLAN

SRL will generate growth and change that presents challenges and opportunities for the surrounding community and neighbourhood. The main climate related changes, challenges and opportunities are listed below.

More medium and high-density development	Greater connectivity	Connected planning	Zero emission mobility choices
Population growth	Liveability pressure in a changing climate	Greater energy and water demand	More pressure on open space, vegetation and natural resources

The Climate Response Plan will support the Box Hill Structure Plan Area to be more climate responsive to address to these changes, challenges and opportunities.

This Climate Response Plan responds to the Box Hill Vision Theme 5 – Empowering Sustainability.

Theme 5 aims to guide how development and growth in the Structure Plan Area surrounding the SRL station at Box Hill adapts to and mitigates the effects of climate change and contributes to environmental sustainability.

Seven sustainability focus areas were developed for the Box Hill Climate Response Plan. The focus areas:

- Support a triple-bottom line approach to achieving climate and sustainability outcomes aligned to the Vision and the SRL vision of productive, connected and liveable communities
- Support and align with relevant guidelines and SRL policies (including the SRLA Sustainability Policy, and SRL Urban Design Framework) to ensure a consistent, best practice approach to delivering SRL

KEY FINDINGS

The analysis of the sustainability focus areas for the Box Hill Structure Plan Area highlighted that:

- The Box Hill Structure Plan Area is currently experiencing sustainability challenges, including:
  - » High flooding vulnerability in some areas where flood depths can reach above 0.6 metres, such as north of the Box Hill Institute and Box Hill Gardens, and along the Box Hill South and Collins Street Main Drain in the south of the Structure Plan Area
  - » High urban heat vulnerability due to low tree canopy coverage primarily in the commercial area around the south-east and north-west of the rail line, and because of existing high density development
  - » Greenhouse gas emissions driven by non-renewable energy sources and energy inefficiency
- Current Victorian and local government policy supports addressing current and emerging climate change and sustainability challenges in the Box Hill Structure Plan Area. However, the implementation of these policies in the municipal planning schemes is limited, and there is generally a lack of planning support to deliver sustainability policy outcomes.

- Under a Future Business as Usual State, where SRL East is delivered but there is no change to the policy and planning environment of today, it is expected that current sustainability challenges will remain or worsen due to the projected growth and densification of the Box Hill Structure Plan Area, such as accelerated higher density development and changes to Station Street and Whitehorse Road. This will create a gap between what is expected and what the aspirations are for the Structure Plan Area.
- Under a Future Accelerated State, where changes to address sustainability challenges are implemented through policy and planning approaches to deliver accelerated sustainability outcomes, a number of sustainability opportunities have been identified that support the Box Hill Structure Plan Area achieving regional sustainability policy objectives, and the Vision.

RECOMMENDATIONS AND OPPORTUNITIES

This Climate Response Plan makes recommendations for each focus area to consider when developing the Box Hill Structure Plan.

The recommendations are sorted into three categories:

Structure Plan responses to guide and promote sustainability and climate considerations in the future planned land use, built form, and public spaces to support changing community needs.

Planning Scheme responses which recommend new planning controls to improve the climate responsiveness and sustainability of development in the Structure Plan Area.

Other opportunities to promote climate change resilience and sustainability, including partnerships and initiatives with government, industry and other organisations.

The recommendations address the sustainability challenges of the Box Hill Structure Plan Area, and aim to help achieve the SRL sustainability vision, and the sustainability outcomes of the Box Hill Vision.

The recommendations aim to close the gap between Future Business As Usual State, and what is possible under a Future Accelerated State.

The goal is for the neighbourhood around the SRL station to become more liveable, connected and productive as its population grows and the density of development increases, with greater climate change resilience and improved sustainability.

RECOMMENDATIONS AND OPPORTUNITIES FOR THE BOX HILL STRUCTURE PLAN

Focus area	Recommendations / Opportunities		Ref#
Realising net zero	Net zero buildings	Structure Plan response	1A
	Private development sustainability certification	Planning Scheme response	1B
	Partnerships for a decarbonised energy supply	Other opportunities	1C
Integrated water management	Place-based integrated water management	Structure Plan response	2A
	Alternative water supply	Planning Scheme response	2B
	Partnerships to support integrated water management	Other opportunities	2C
Circular economy and sustainable procurement	Supporting a circular economy	Structure Plan response	3A
	Embodied carbon reduction in new developments	Planning Scheme response	3B
	Construction and operational waste management targets	Planning Scheme response	3C
	Partnerships to support a circular economy	Other opportunities	3D
Place-based measures to promote zero emissions transport	Recommended to deliver zero-emissions transport measures through the SRL East Structure Plan - Transport Technical Report - Box Hill	N/A	(4)
Climate change adaptation	Climate change adaptation	Structure Plan response	5A
	Climate change risk management standards	Planning Scheme response	5B
Environmental enhancement and protection	Urban greening strategy	Structure Plan response	6A
	Green infrastructure for new developments	Planning Scheme response	6B
	Partnerships to support environmental enhancement and protection	Other opportunities	6C
Urban heat island strategy	Urban heat island mitigation	Structure Plan response	7A
	Private development site urban heat island performance criteria	Planning Scheme response	7B

1. Introduction

Suburban Rail Loop (SRL) is a transformational project that will help shape Melbourne's growth in the decades ahead. It will better connect Victorians to jobs, retail, education, health services and each other – and help Melbourne evolve into a 'city of centres'.

SRL will deliver a 90-kilometre rail line linking every major train service from the Frankston Line to the Werribee Line via Melbourne Airport.

SRL East from Cheltenham to Box Hill will connect major employment, health, education and retail destinations in Melbourne's east and south east. Twin 26-kilometre tunnels will link priority growth suburbs in the municipalities of Bayside, Kingston, Monash and Whitehorse.

SRL East Draft Structure Plan (Structure Plan) Areas will surround the six new underground stations at Cheltenham, Clayton, Monash, Glen Waverley, Burwood and Box Hill.

1.1 Purpose of this report

This Climate Response Plan will inform the development of the Box Hill Structure Plan to guide land use planning and development in the Structure Plan Area.

The Climate Response Plan describes the existing climate change and sustainability conditions in the Box Hill Structure Plan Area.

Challenges and opportunities relating to climate change and sustainability that impact planning for the development of the Structure Plan Area are identified.

Recommendations to consider when developing the Structure Plan are made. Recommendations include Structure Plan responses, Planning Scheme Responses and other opportunities (such as partnerships).

The recommendations aim to address the sustainability challenges of the Structure Plan Area, support Victorian and local government policies, and help achieve the SRL sustainability vision and the sustainability outcomes of the Box Hill Vision.

The Climate Response Plan will support the Structure Plan Area to be more climate responsive by:

- Outlining recommendations to reduce greenhouse gas emissions, and setting targets and measures to achieve net zero emissions across the Structure Plan Area
- Identifying resilience strategies for the Structure Plan Area to enhance its ability to withstand climate-related challenges and prepare communities and organisations to adapt to the impacts of a changing climate by identifying potential vulnerabilities
- Ensuring a comprehensive approach to targeted sustainability outcomes across seven focus areas (Refer to Section 2.1)
- Identifying stakeholders and opportunities for partnerships to support a coordinated effort to address climate change across the Structure Plan Area.

1.2 Project context

Construction of the SRL East underground stations is underway at Cheltenham, Clayton, Monash, Glen Waverley, Burwood and Box Hill. This provides an opportunity to enhance the surrounding neighbourhoods.

SRL East will support thriving and sustainable neighbourhoods and communities that offer diverse and affordable housing options, with easy access to jobs, transport networks, open space, and community facilities and services.

Visions have been developed in consultation with the community and stakeholders for the Structure Plan Areas and surrounds. The visions set out the long-term aspirations for the areas so they are ready to meet the needs of our growing population.

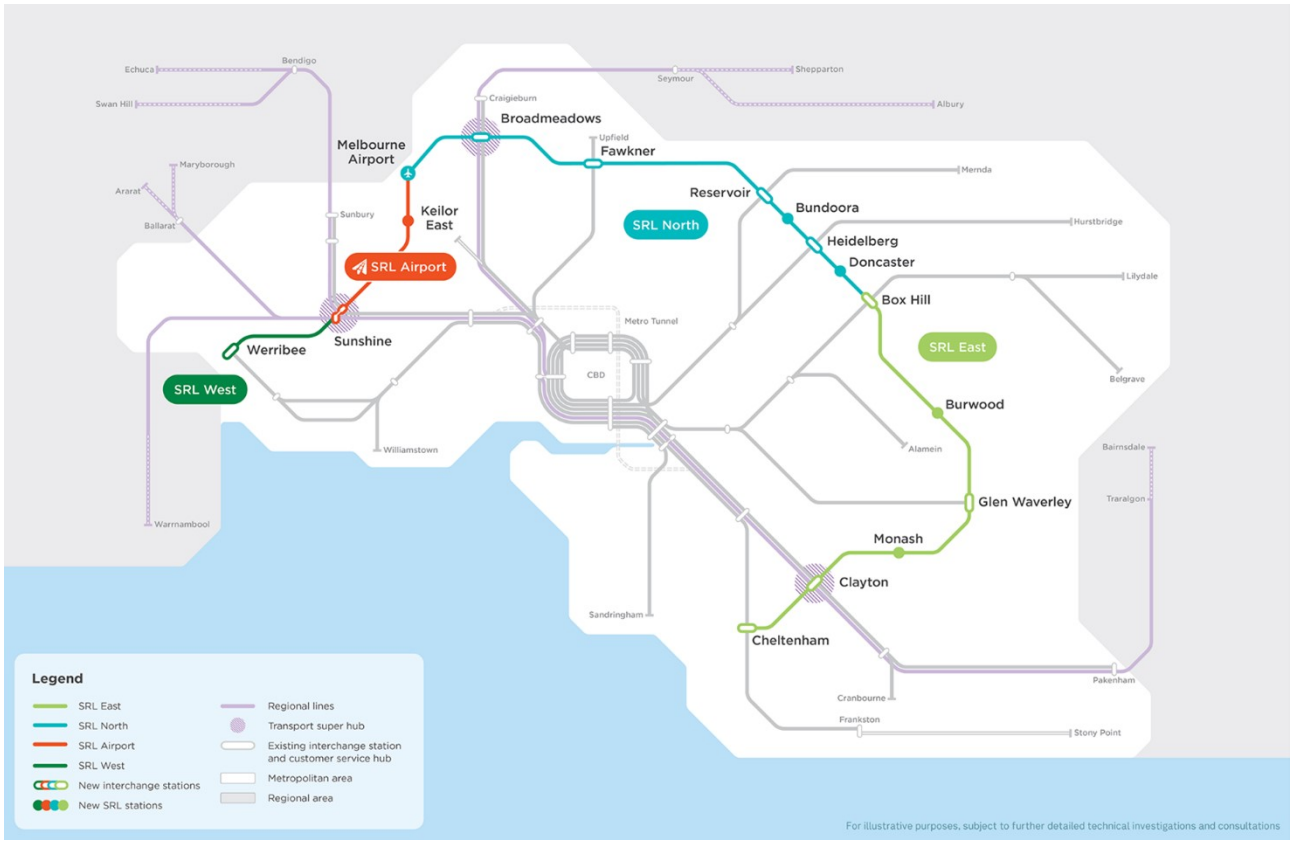

FIGURE 1.1 SRL EAST IN MELBOURNE'S RAIL NETWORK

1.3 Structure planning for SRL East

Draft Structure Plans (Structure Plans) have been prepared for defined areas surrounding the new SRL East stations to help deliver the Vision developed for each SRL East neighbourhood.

The Structure Plans cover defined Structure Plan Areas that can support the most growth and change. These areas cover a walkable catchment that extends from the SRL station entrances. Additional places are included within each defined area as required to make planning guidance more robust and effective, and to align with each community's aspirations and current and future needs.

A Structure Plan is a blueprint to guide how an area develops and changes over a period of time. Structure Plans describe how future growth within the area will be managed in an appropriate and sustainable way to achieve social, economic and environmental objectives. The plans cover a wide range of matters, such as transport connections and car parking, housing and commercial development, community infrastructure, urban design, open space, water and energy management, climate resilience and sustainability.

By tailoring planning decisions to reflect the needs of a defined area, Structure Plans give effect to the policies and objectives set for these areas and cater for changing community needs. They also provide certainty for residents, businesses and developers by identifying the preferred locations and timing of future land uses, development and infrastructure provision.

Structure Plans take a flexible and responsive approach that enables places to evolve over time.

Planning scheme amendments will be required to implement the Structure Plans into the planning schemes of the cities of Bayside, Kingston, Monash and Whitehorse.

1.4 Structure of this report

Section 1 provides the background and context of this Climate Response Plan.

Section 2 explains the methodology for developing the Climate Response Plan.

Section 3 defines the Box Hill Structure Plan Area.

Section 4 identifies existing and future sustainability conditions, challenges and opportunities.

Section 5 sets out recommendations to consider for the Structure Plan and other opportunities.

2. Methodology

The methodology for developing this Climate Response Plan involved:

- A Study Area was identified, which for the Climate Response Plan is the same area as the Structure Plan Area (see Section 3)
- Victorian Government and local government policies, strategies and planning schemes and settings relevant to climate change and sustainability in the Structure Plan Area were reviewed. These are summarised in Appendix A
- Seven sustainability focus areas were developed to guide development of the Climate Response Plan. These sustainability focus areas respond to the United Nations Sustainable Development Goals, as well as the SRLA Vision developed for Box Hill
- More information on the sustainability focus areas and the sustainability vision is provided below, in Section 2.1 and Section 2.2
- Existing climate change and sustainability conditions that identify challenges to deliver the Vision in the Structure Plan Area according to each sustainability focus area were identified. Future challenges under a 'Business as Usual State' and future opportunities under a 'Future Accelerated State' (see Section 4) were also identified
- Recommendations were developed for each sustainability focus area to support the achievement of the Vision, to address sustainability challenges and close the gap between what is expected under the a Future Business As Usual State and what is possible under a Future Accelerated State (see Section 5).

2.1 Sustainability focus areas

Seven sustainability focus areas were developed for the Climate Response Plan.

The focus areas aim to support targeted, practical and impactful recommendations to:

- Support a triple-bottom line approach to achieving climate and sustainability outcomes aligned to the Vision and the SRL vision of productive, connected and liveable communities
- Support and align with relevant guidelines and SRL policies (including the SRLA Sustainability Policy, and SRL Urban Design Framework) to ensure a consistent, best-practice approach to delivering SRL.

In line with Clause 11.02-2S (Structure planning) of the Victorian Planning Policy (VPP) framework,[1] this Climate Response Plan also embeds consideration of the United Nations Sustainable Development Goals (SDGs) into the focus areas and recommendations.

The sustainability focus areas and strategies, and how these align with the United Nations SDGs, are listed in Table 2.1.

[1] A strategy of Clause 11.02-2S of the VPPs is to 'Ensure the ongoing provision of land and supporting infrastructure to support sustainable urban development'.

TABLE 2.1 FOCUS AREAS FOR CLIMATE RESPONSE PLAN AND ALIGNMENT TO THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

Focus area	Focus area strategy	Alignment to SDGs
Realising net zero	Enable reductions in energy consumption and an accelerated transition to net zero	
Integrated water management	Embed sustainable water management practices in Structure Plan Area planning and design	
Circular economy and sustainable procurement	Foster responsible use of resources and supports the transition to a circular economy	
Place-based measures to promote zero emissions transport	Provide active and sustainable transport options	
Climate change adaptation	Mitigate climate risks and hazards to create climate resilient and adaptive places	
Environmental enhancement and protection	Protect natural habitats and improve biodiversity in green spaces and waterways	
Urban heat island strategy	Mitigate climate risks and hazards to create climate resilient and adaptive places	

2.2 Sustainability vision

The neighbourhoods around the new SRL East stations will be planned to ensure they have services and amenities to cater for and support the people who will live, work, study and visit them.

The SRL vision is to 'help ensure a more liveable Victoria for present and future generations – environmentally, socially and economically'[2] and deliver neighbourhoods that are enduring, sustainable, green and resilient to climate change.[3]

To support the SRL vision, a Vision for each SRL East neighbourhood was developed in consultation with the community, local governments and other stakeholders.

The Vision for Box Hill is:

> ***A thriving, culturally dynamic and cosmopolitan place where global and local communities connect.***

This Climate Response Plan directly supports the Box Hill Vision Theme 5 – Empowering Sustainability.

Table 2.2 outlines the sustainability Vision and links this to the sustainability focus areas.

[2] SRL Sustainability Policy (Suburban Rail Loop Authority)
[3] SRL Urban Design Framework (Suburban Rail Loop Authority)

TABLE 2.2 BOX HILL SUSTAINABILITY VISION AND LINK TO SUSTAINABILITY FOCUS AREAS

Vision	Link to sustainability focus area
Empowering Sustainability will guide how we adapt to and mitigate the effects of climate change and contribute to environmental sustainability. This could be achieved by:	
Enabling reductions in energy consumption and an accelerated transition to net zero	Realising net zero
Fostering responsible use of resources and supporting the transition to a circular economy	Circular economy and sustainable procurement
Mitigating climate risks and hazards to create climate resilient and adaptive places	Climate change adaptation
Greening urban areas to address heat issues and improve amenity	Urban heat island strategy
Protecting natural habitats and improving biodiversity in green spaces and waterways	Environmental enhancement and protection
Embedding sustainable water management practices in precinct planning and design	Integrated water management
Providing active and sustainable transport options to support healthy lifestyles (from Theme 3 – Better Connections)	Place-based measures to promote zero emissions transport

2.3 Assumptions and limitations

Recommendations in this Climate Response Plan rely on publicly available, secondary information.

The policy and planning scheme review was based on publicly available policies, strategies, planning schemes and other documentation published on Victorian and local government websites.

A detailed, bespoke evaluation of the baseline sustainability conditions in the Structure Plan Area (such as a climate risk assessment) was not undertaken.

No modelling of the recommendations was undertaken to determine the quantified impact on land use, building typologies and population in the Structure Plan Area (such as carbon modelling to determine specific greenhouse gas emissions reductions from recommendations). This was excluded on the basis that high-quality modelling requires a detailed, granular understanding of future precinct development to help inform decision-making, and this level of detail is not yet available at this early stage of precinct planning.

Information is therefore assumed to be accurate at the time this Climate Response Plan was developed, based on best available judgement.

Future detailed planning will refine and identify how Theme 5 – Empowering Sustainability can be delivered in the Box Hill Structure Plan Area, and support the Victorian Government's objective for Melbourne to remain a global city of opportunity and liveability.

2.4 Interactions with other technical reports

Other documents developed to inform the Box Hill Structure Plan also have a sustainability focus.

This Climate Response Plan should be read alongside those documents:

- **SRL East Structure Plan - Transport Technical Report - Box Hill** – to support the Climate Response Plan place-based measures for zero emissions transport outcomes and recommendations
- **SRL East Structure Plan - Urban Design Report - Box Hill** – to support the importance of open space quality, function and connectivity, and support the Climate Response Plan environmental enhancement and protection, and urban heat island strategy and recommendations
- **SRL East Structure Plan - Open Space Technical Report** – to reinforce the importance of open space quality, function and connectivity, and support the Climate Response Plan environmental enhancement and protection, and urban heat island strategy and recommendations
- **SRL East Structure Plan - Ecology and Arboriculture Technical Report - Box Hill** – makes recommendations to improve and enhance ecology and arboricultural values, and support the Climate Response Plan environmental enhancement and protection and urban heat island strategy outcomes and recommendations
- **SRL East Structure Plan - Utilities Servicing Technical Report** – to support the Climate Response Plan delivery of realising net zero and integrated water management outcomes and recommendations
- **SRL East Structure Plan - Flooding Technical Report** – to support the Climate Response Plan delivery of integrated water management outcomes and recommendations
- **SRL East Structure Plan - Integrated Water Management Strategy** – to support the Climate Response Plan delivery of integrated water management outcomes and recommendations.

3. Structure Plan Area

This section defines the Structure Plan Area for the Box Hill SRL East neighbourhood.

The Box Hill Structure Plan Area surrounds the SRL station at Box Hill in the City of Whitehorse.

It is generally bordered by Severn Street and McKean Street to the north, Clota Avenue and Laburnam Street to the east, slightly west of Elgar Road to the west and Canterbury Road to the south.

Whitehorse Road / Maroondah Highway and the existing Belgrave / Lilydale Line intersect the centre of the Structure Plan Area in an east-west alignment. The main road corridors include Whitehorse Road, Elgar Road and Station Street.

The Structure Plan Area for Box Hill is shown in Figure 3.1.

3.1 Study Area

A Study Area was established for the development of this Climate Response Plan.

The Study Area was based on the Structure Plan Area for Box Hill.

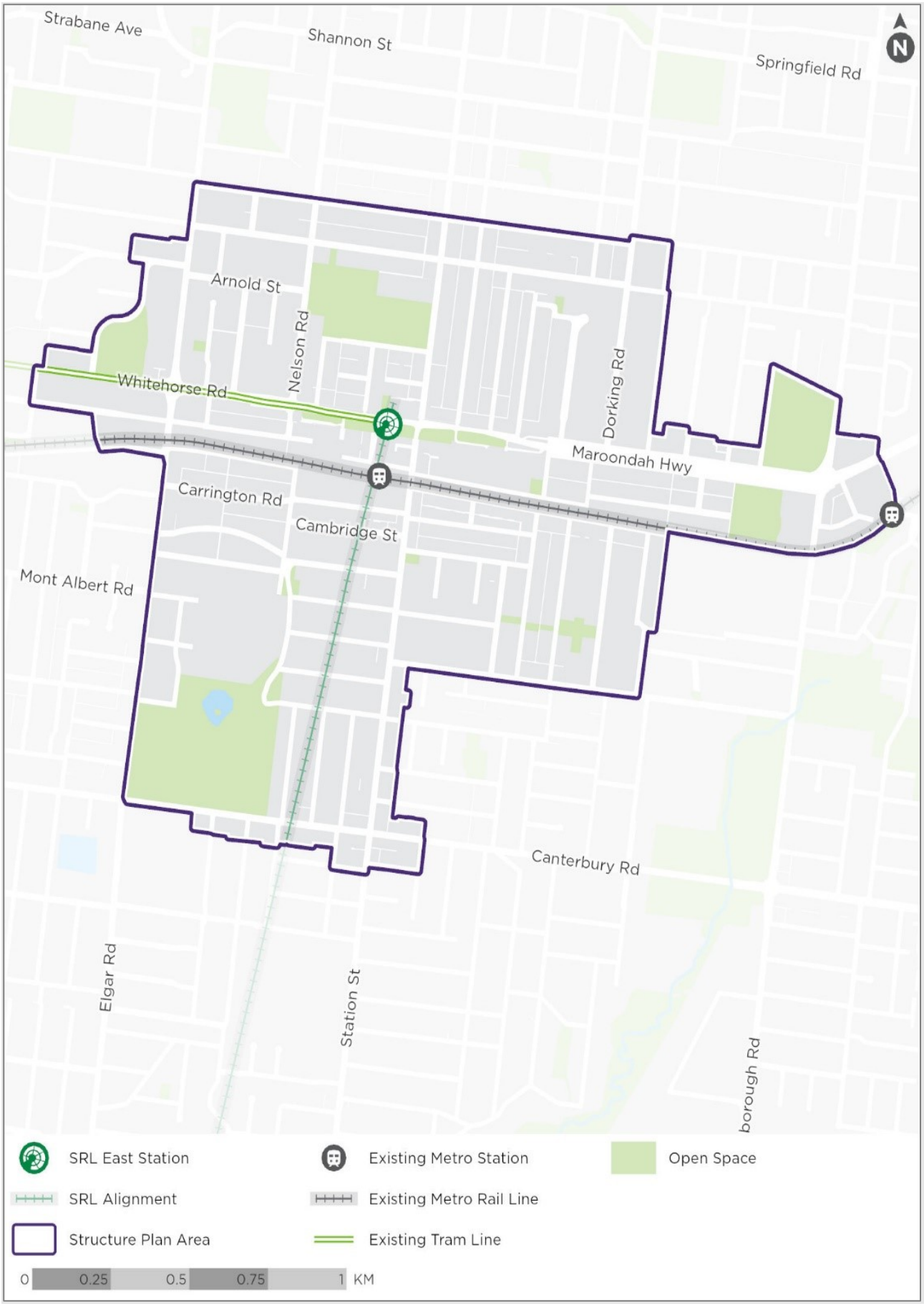

FIGURE 3.1 BOX HILL STRUCTURE PLAN AREA

4. Existing and future conditions

4.1 Current and future states

This section sets out existing sustainability challenges and opportunities (Current State) in the Structure Plan Area against each sustainability focus area.

Future conditions based on a 'Business as Usual' state, compared to a 'Future accelerated' state are projected, and the case for change is made.

Current State	Outlines the current challenges in the Structure Plan Area relating to each sustainability focus area and identifies how the current policy and planning environment impacts the achievement of sustainability outcomes.
Future Business as Usual (BAU) State	SRL East is delivered and generates increased density and population in the Box Hill Structure Plan Area, but there is no change to the policy and planning environment of today. The Climate Response Plan aims to address the sustainability challenges expected to be experienced in the Box Hill Structure Plan Area under a BAU State.
Future Accelerated State	SRL East is delivered and generates increased density and population in the Box Hill Structure Plan Area, with changes to address sustainability challenges implemented with updated policy and a planning scheme to deliver accelerated sustainability outcomes. The Climate Response Plan aims to support the delivery of an Accelerated State for Structure Plan Area, where changes are made to the Structure Plan Area delivery framework to realise identified opportunities (that is, Structure Plan responses, Planning Scheme responses and other opportunities).

4.1.1 REALISING NET ZERO

Challenges

- Greenhouse gas emissions driven by non-renewable energy sources primarily in residential homes, as well as commercial and industrial buildings (Snapshot Climate 2022)
- Most existing homes in Box Hill have low energy efficiency, which drives more energy use and greenhouse gas emissions (CSIRO 2024)
- Low uptake of rooftop solar panels compared to the statewide average (Clean Energy Regulator 2024)
- Gas is a popular fuel choice although as a fossil fuel, it must be substituted with renewable electricity to reach net zero targets (Snapshot Climate 2022)
- There is increasing reliance on electricity for energy use, which is mainly powered by fossil fuels (Snapshot Climate 2022).

Policy support

There is strong alignment to Victorian and local government net zero commitments and objectives. See Appendix A for details.

Planning support

- Development is encouraged to reduce greenhouse gas emissions and improve energy efficiency but there is a lack of specific requirements and targets, or requirements for moving towards or achieving net zero. This may risk the achievement of the Vision. See Appendix A for details
- The National Construction Code 2022 has increased energy efficiency requirements and introduced an energy budget for residential homes to encourage on-site renewable energy systems
- The National Construction Code 2022 requires future proofing of developments to allow for electric vehicle charging.

Challenges

Policy alignment remains strong but Victoria's net zero target may not be met in the Structure Plan Area due to insufficient performance requirements for development and a lack of strategic planning measures to integrate net zero performance outcomes into land use planning and development.

At most, development will be incentivised to reduce emissions 20 per cent under the Built Environment Sustainability Scorecard (Municipal Association of Victoria 2024).

- There is a gap in measuring progress towards net zero. See Appendix A for details
- There is growth in high-density, mixed-use development in Central Box Hill, and business services and industrial development in the north-east of the Structure Plan Area, which may drive increased energy use and greenhouse gas emissions
- There could be higher upfront costs, longer return-on-investments and technical challenges associated with energy efficient retrofits compared to new builds (Bell et al. 2023).

High costs and technical challenges are associated with transitioning from fossil fuels and in retrofitting low-carbon energy solutions in buildings being designed today.

A gradual 'greening' of the electricity grid is underway but it may not meet electricity demand.

The Climate Response Plan recommendations aim to address these challenges (see Section 5.1).

Opportunities

The Future Accelerated State aims to capitalise on net zero opportunities in the Structure Plan Area so that it:

Supports the delivery of rapid decarbonisation and achievement of net zero by 2045 in line with Victoria's climate action targets

Eliminates the use of fossil fuels with an accelerated transition to net zero

- Reduces embodied carbon with sustainable design
- Reduces operational emissions with highly efficient buildings that reduce energy loads
- Increases energy resilience and reduced emissions with on-site renewable energy generation and storage
- Delivers environmental co-benefits with credible nature-based solutions to address remaining emissions.

The Climate Response Plan recommendations support the achievement of these opportunities. (see Section 5.1).

4.1.2 INTEGRATED WATER MANAGEMENT

Challenges

The SRL East Structure Plan - Flooding Technical Report found that:

- Parts of the Structure Plan Area currently experience a high flood risk with 1 % AEP (1 in 100-year event) creating flood depths of up to 0.8 metres along the Box Hill South Main Drain to the south and along the Laburnum Street Main Drain to the east. A moderate to high flood risk is also associated with the Severn Street Main Drain.There is a high risk of over-floor flooding at properties in areas northwest of Box Hill Gardens along the Severn Street Main Drain, and those between Oxford Street and Albion Road
- There is a high dependency on potable water from water mains as there is no alternative or recycled water network available
- Box Hill is an area with existing high density development, which creates challenges for surface permeability. While Box Hill Gardens provides water retardation at a detention pond, there is limited water treatment or Water Sensitive Urban Design infrastructure in the Structure Plan Area.

Policy support

- Plan Melbourne 2017-2050 (2017b) sets objectives to reduce pressure on water supplies by adopting Integrated Water Management (IWM) Framework strategic measures to protect water assets. See Appendix A for details.

Planning support

- Planning scheme requirements consider and encourage water efficiency and use of alternative water in building design but there is a lack of performance-based measures to ensure that outcomes are achieved. While Clause 53.18 provides requirements for stormwater management, there are limited requirements around ‘integrated water management. See Appendix A for details.

Challenges

Alignment to policy remains strong, but increased density in the Structure Plan Area may exacerbate pressure on Melbourne’s water supplies. New development will support IWM by reducing potable water use through water efficient fixtures and rainwater capture and reuse.

Local streets, particularly in the north and south of the Structure Plan Area, may not have capacity to manage extreme flood events or contribute to urban cooling, with minimal water sensitive urban design measures.

- Population growth could increase residential water consumption 30 per cent by 2051, placing significant pressure on existing potable water sources (ESC 2023)
- A significant increase in density may exceed the opportunities to reduce potable water use from rainwater capture
- The need to supply Melbourne with an additional 600 GL of water by 2070 will be at risk due to hotter, drier conditions from climate change
- The increase in impervious surfaces from denser development and more frequent and intense storm events may exacerbate flooding in the Structure Plan Area
- Runoff from new developments could contribute to the pollution of existing waterways
- Existing or new green spaces lack adequate water, causing their deterioration and reducing their contribution to urban cooling.

The Climate Response Plan recommendations aim to address these challenges (see Section 5.2).

Opportunities

The Future Accelerated State aims to support integrated and sustainable water management in the Structure Plan Area. This includes the following opportunities:

- Rainwater reuse and water recovery is maximised to reduce potable water use across all water users, contributing to Melbourne’s water efficiency targets
- An alternative water network reduces potable water use in new developments
- Water sensitive urban design solutions help liveability and amenity improvements by greening streetscapes, active transport corridors, public open space and the private realm
- Strategic planning for potential IWM opportunities, such as the former Box Hill Brickworks
- IWM supports future flood risk management by promoting co-ordinated development and management of stormwater, using nature-based solutions that capture and slow down the flow rate of surface runoff

The Climate Response Plan recommendations support the achievement of these opportunities (see Section 5.2).

4.1.3 CIRCULAR ECONOMY AND SUSTAINABLE PROCUREMENT

Current State	Future BAU State	Future Accelerated State

Challenges

Construction and demolition (C&D) waste is nearly half of all waste generated in Victoria and continues to increase (Recycling Victoria 2023).

- The Structure Plan Area is home to a major retail and commercial centre as well as high density development which will contribute to high proportions of waste, particularly organic waste
- There are some existing circular economy enterprises in the Structure Plan Area, including a container deposit scheme (CDS) and op shops but recycling rates are around 47 % for households in the Structure Plan Area, meaning the other 53 % of resources goes to landfill (Recycling Victoria 2023)
- Due to existing high density development in the Structure Plan Area, embodied carbon from the use of virgin materials in non-residential and residential buildings contributes a substantial proportion of overall greenhouse gas emissions.

Policy support

- Victorian Government policies set ambitious circular economy targets for the state by 2030, including diverting 80 % of waste from landfill and reducing waste generated per person by 15 %
- There is a strong alignment to the Vision to support a circular economy. See Appendix A for details.

Planning support

- Planning scheme requirements encourage the adaptive reuse of buildings but there is no specific consideration of emissions associated with waste and materials, or requirements around managing construction waste.

Challenges

While policy remains strongly aligned to the Vision it fails to contribute to a circular economy during design and construction due to the lack of specific planning requirements for development to address resource recovery and the circular economy through design, construction and operations.

- Population and job growth in the Structure Plan Area increases waste generation 33 % by 2051, including a 65 % increase in organic waste, with some of this waste ending up in landfill
- Increased development risks the achievement of Victorian Government waste diversion targets
- Existing high density development in the Structure Plan Area cannot be easily disassembled and is unable to adapt to future resource recovery needs
- Rapid development of commercial and residential areas in the Structure Plan Area contributes to rising embodied carbon and C&D waste. C&D waste in Victoria increases to 29.4 Mt (from 7.7 Mt currently) by 2050 (Recycling Victoria 2023). Virgin materials could contribute to 85 % of a building's total carbon emissions (ThinkStep 2021).

The Climate Response Plan recommendations aim to address these challenges (see Section 5.3).

Opportunities

The Future Accelerated State aims to support a circular economy in the Structure Plan Area. This includes the following opportunities:

- The Structure Plan Area contributes to achieving a circular economy through design, construction and operation and helps meet Victorian Government waste management and circular economy targets
- More productive use of resources in all forms of development and enhanced resource recovery
- Waste to landfill in construction, demolition and operation is avoided wherever possible
- Development of durable and resilient infrastructure that requires less maintenance
- Embodied carbon reduced in new developments with good design and adoption of reused and recycled materials
- Developments are designed for disassembly and adaptability for alternative uses to avoid future demolition waste
- Opportunities for new resource recovery solutions are included in the Structure Plan Area
- Capability and development of local resource recovery and circular economy supply chains is encouraged.

The Climate Response Plan recommendations support the achievement of these opportunities (see Section 5.3).

4.1.4 PLACE-BASED MEASURES TO PROMOTE ZERO EMISSIONS TRANSPORT

Current State	Future BAU State	Future Accelerated State

Challenges

The SRL East Structure Plan – Transport Technical Report - Box Hill found that:

- The majority (67 %) of trips from, to, and within the Structure Plan Area are by private vehicles. Only 14 % of trips are by public transport and 19 % by active travel, walking and cycling
- Streetscape amenity for walking and cycling is poor, with narrow footpaths, poor street lighting, and limited permeability in key local neighbourhood areas, making it difficult to connect between major land uses in the Structure Plan Areal. While there are some good quality cycling links, there is generally a lack of continuous, segregated paths in the Structure Plan Area
- Public bicycle parking (including micro-mobility) is limited.

Policy support

- Victoria's legislative and policy framework requires an integrated transport system that is accessible, inclusive and safe for all Victorians
- Local government policies support improvements to walking and cycling networks, mobility and the integration of transport and land use to ensure a well-planned and liveable city. However, there is little to no policy on electric charging infrastructure, alternative fuels or reduced privately owned cars.

Planning support

- The planning scheme gives priority to walking and cycling but lacks references to maximum parking requirements and share vehicles, or reducing private car ownership.

Challenges

Policy maintains strong support for zero emissions transport with considerations for electric vehicles and active transport.

- However, implementation of these policies may be challenged, leading to:
  - » High levels of unrestricted car parking which reduces public amenity and continues to reinforce private vehicle ownership
  - » Continued barriers to movement contributing to a disconnected walking and cycling environment
  - » A lack of secure bicycle parking and end-of-trip facilities, disincentivising residents and employees from cycling
  - » Low-quality pedestrian environments
  - » A lack of public micro-mobility infrastructure
  - » Limited car share scheme parking spaces
  - » A lack of zero emissions transport infrastructure.
- Population and employment growth may continue to increase transport emissions in the Structure Plan Area.

The SRL East Structure Plan – Transport Technical Report - Box Hill and Climate Response Plan recommendations aim to address these challenges (see Section 5.4).

Opportunities

The Future Accelerated State aims to promote zero-emissions transport in the Structure Plan Area. This includes the following opportunities:

- Upgrades to support priority for walking, cycling and public transport trips in the Structure Plan Area, including the creation of a compact, urban centre and upgrades to support pedestrian movement along Station Street
- Reduced use of private vehicles
- An integrated management approach to car parking in the Structure Plan Area, including setting maximum (not minimum) parking spaces for residential and non-residential development, and considering parking provisions for zero emission and car share vehicles
- A central mobility hub and supporting hubs in the Structure Plan Area
- Ensuring all new developments support modal priorities and active transport with recommendations for end-of-trip facilities or bicycle parking, car parking reduction and other innovative approaches (car share schemes, micro-mobility, electric vehicle charging)
- Trials and delivery of low and zero-emissions transport initiatives, including micro-mobility solutions, innovative car parking approaches, and a central mobility hub.

This Climate Response Plan recommendations and the SRL East Structure Plan – Transport Technical Report - Box Hill support the achievements of these opportunities (see Section 5.4).

4.1.5 CLIMATE CHANGE ADAPTATION

Current State → **Future BAU State** · **Future Accelerated State**

Challenges

High levels of greenhouse gas emissions drive hotter temperatures and more extreme weather events.

- The Structure Plan Area experiences extreme heat, particularly in central commercial areas with low canopy cover around the south-east and north-west of the rail line
- The Structure Plan Area is vulnerable to flooding, particularly in areas north of Box Hill Institute and Box Hill Gardens, and near underground drains in the south
- There is a high risk of over-floor flooding for properties north-west of Box Hill Gardens.

Policy support

- There is strong alignment with the Vision for neighbourhoods that are resilient, adaptable and future-proof to climate change.

Planning support

- The planning scheme contains no provisions related to climate change resilience.

Challenges

Policy maintains strong action on adapting to climate change but implementation may be limited as private development is not required to mitigate the impacts of climate change in design and operations.

- The failure to limit global warming to 1.5°C to 2°C means the most severe impacts of climate change cannot be avoided
- A potential average temperature increase of 2°C by 2050 may increase extreme heat impacts to buildings, infrastructure, heat-related deaths, stress on essential services and disturbance to ecosystems
- There may be poorer quality of life outcomes for local residents
- There may be higher electricity costs to operate homes and businesses
- More intense floods may increase damage to homes and infrastructure, maintenance costs and stress on health and emergency services.

The Climate Response Plan recommendations aim to address these challenges (see Section 5.5).

Opportunities

The Future Accelerated State aims to create a climate resilient and adaptive Structure Plan Area. This includes the following opportunities:

- The Structure Plan Area is climate-ready with strong measures in place to ensure it is planned, designed and operated to be fully adapted and resilient to climate change
- Homes, commercial and industrial buildings, and infrastructure are planned and constructed to be resilient to climate-related hazards
- Existing building stock is retrofitted to increase resilience to extreme heat and flooding, as well as more resilient to grid disruptions and rising energy costs
- The Structure Plan Area features measures to reduce emissions and support adaptation (such as urban greening and diverse local renewable energy generation, distribution and storage)
- Policy vision, objectives and actions are achieved with strong action to adapt to climate change in the public and private realm.

The Climate Response Plan recommendations support the achievement of these opportunities (see Section 5.5).

4.1.6 ENVIRONMENTAL ENHANCEMENT AND PROTECTION

Current State → **Future BAU State** · **Future Accelerated State**

Challenges

Increased urban density is driving a loss of vegetation on private land as less space is being provided for vegetation on private land. This exacerbates the impacts of climate change risks such as heatwaves and flooding, and may exacerbate the urban heat island effect.

- The densification of private development is enabled with the consolidation of lots, which places pressure on the existing tree canopy and increases impervious cover on private land. This is causing a slow loss of tree canopy and vegetation, as well as fragmentation of habitat and habitat corridors for local fauna
- The Structure Plan Area has a canopy cover of 15 %. There is a lack of tree canopy coverage in the Structure Plan Area core. There is a risk of losing environmental amenity and biodiversity values, with dying trees in streets and parks due to extreme heat and lack of water.

Policy support

- There is strong alignment to Victorian and local government urban cooling strategy commitments and ambitions. See Appendix A for details
- There is strong policy support to prevent a decline in tree canopy cover, and target 30 % canopy cover.

Planning support

- The planning scheme supports environmental protection but there are no provisions for environmental enhancement in the Structure Plan Area
- Clause of 56.05 (Urban Landscape) of the Victorian Planning Provisions sets landscaping objectives for residential apartments and urban landscape objectives for the public realm in subdivisions but there is potentially a gap of requirements for commercial buildings and other public realm areas.

Challenges

Policy maintains strong support to retain vegetation and strengthen the capacity of the open space network to create an urban forest, but there may be limited incentive to enhance green spaces, biodiversity or ecological connectivity.

- There may be limited requirements for vegetation and tree canopy cover for other types of development
- There are limited canopy improvement opportunities for cover and connectivity due increased density in the Structure Plan Area
- Green spaces may be more fragmented, further reducing biodiversity
- Tree canopy may continue to be lost through the process of replacing single dwellings with denser multi-dwelling redevelopment.

The Climate Response Plan recommendations aim to address these challenges (see Section 5.6).

Opportunities

The Future Accelerated State aims to protect natural habitats, improve biodiversity in green spaces and enhance the natural environment in the Structure Plan Area. This includes the following opportunities:

- The growth of healthy trees and vegetation is supported for a cooler and greener urban environment
- Planning requirements limit further removal of ecological assets
- Mature trees that support biodiversity and wildlife are retained
- New and enhanced green corridors and shadier streets make walking and cycling easier and more enjoyable
- Greening urban areas address heat issues and improve amenity
- A cool and green environment is created
- Natural habitats are protected and biodiversity is improved in green spaces and waterways
- New open space is created and/or existing open space is enhanced to improve conservation, habitat and biodiversity functions.

The Climate Response Plan recommendations support the achievement of these opportunities (see Section 5.6).

4.1.7 URBAN HEAT ISLAND STRATEGY

Current State	Future BAU State	Future Accelerated State

Challenges

- There is incremental loss of vegetation due to redevelopment
- There is an urban heat island temperature difference of +8°C, driven by high-density development, gaps in open space and low tree canopy coverage
- Box Hill has the highest combined heat hazard on the southeast and northwest side of the rail line which is predominantly occupied by commercial buildings. There are urban heat pockets concentrated around the existing Box Hill railway station and adjoining commercial area
- Other areas of higher heat include Box Hill Institute and other public use zones in the precinct (linked to service and utility), a retirement estate in the east and a residential estate in the south of the precinct. Without focused efforts to proactively mitigate urban heat island effects, outdoor thermal comfort may be at risk.

Policy support

- There is strong alignment to Victorian and local government urban cooling strategy commitments and ambitions. See Appendix A for details.

Planning support

- The planning scheme encourages measures to address urban heat island issues, such as with landscape design, retention of trees and building design elements. However, there are no performance-based requirements.

Challenges

Strong policy support is maintained to encourage the delivery of urban heat island mitigation strategies, but a lack of strong planning controls means they are only encouraged, and not delivered in all developments.

- Continuing high-density development in the Structure Plan Area may increase the areas of impervious surfaces and reduce open spaces, increasing the urban heat island effect
- Reduced height-to-width ratios of streets (narrower streets relative to building height) can also increase the urban heat island effect. Narrow streets may hinder ventilation and limit the dispersion of heat, contributing to higher temperatures in urban areas
- Proposed taller buildings in the Structure Plan Area may trap additional heat
- As urban density increases, vegetation cover tends to decrease, reducing the crucial role vegetation plays in moderating temperatures by providing shade and evaporative cooling
- There may be inconsistency in the delivery of urban heat island mitigation strategy.

The Climate Response Plan recommendations aim to address these challenges (see Section 5.7).

Opportunities

The Future Accelerated State aims to mitigate the effects of urban heat in the Structure Plan Area. This includes the following opportunities:

- Urban heat island effects are mitigated
- A cool and green environment is provided for the community to enjoy, promoting physical activity and social interaction
- There is reduced risk of heat-related illnesses, such as heat exhaustion and heatstroke
- Mitigation strategies such as planting trees and creating green spaces help filter pollutants and improve air quality
- Greening urban areas address heat issues and improve amenity including:
  - » Energy savings
  - » Improved air
  - » Enhanced comfort
  - » Biodiversity support.

The Climate Response Plan recommendations support the achievement of these opportunities (see Section 5.7).

4.2 Case for change

Delivering increased density concentrated around mass rapid transit will support greater connectivity, connected planning and zero emission mobility choices for local communities, delivering sustainability opportunities. In transitioning to a more compact, densified built form, innovative approaches to deliver Integrated Water Management (IWM), enhance ecological values, and urban heat island mitigation are required – these will not be delivered under current planning controls. This may result in continued sustainability challenges in the Structure Plan Area and impacts on its liveability, connectivity and productivity.

If planning controls do not address the sustainability challenges now, the future state of the Structure Plan Area may see unsustainable development, with exposure to climate risk, an increase in greenhouse gas emissions, health impacts from exposure to urban heat, and costly retrofits to upgrade, rebuild and address sustainability challenges. The analysis of the sustainability focus areas above highlights that:

- The Box Hill Structure Plan Area is currently experiencing sustainability challenges.
- Victorian and local government policy supports addressing current and emerging climate change and sustainability challenges in the Box Hill Structure Plan Area. However, the implementation of these policies in the municipal planning schemes is limited, and there is generally a lack of planning support to deliver sustainability policy outcomes (see Appendix A).
- Under a Future Business as Usual State, it is expected that current sustainability challenges will remain or worsen due to the projected growth and densification of the Structure Plan Area, such as accelerated higher density development and changes to Station Street and Whitehorse Road. This will create a gap between what is expected and what the aspirations are for the Box Hill Structure Plan Area. This state is unacceptable as the Box Hill Structure Plan Area will fail to achieve sustainability policy objectives, or the Vision.
- Under a Future Accelerated State, a number of sustainability opportunities have been identified that support the Box Hill Structure Plan Area achieving regional sustainability policy objectives, and the Box Hill Vision.

This Climate Response Plan provides recommendations to close the gap between what is expected to be delivered under the Future Business as Usual State, and what is possible under the Future Accelerated State.The Current State and the Future Accelerated State through the Structure Plan delivery are shown in Figure 4.1.

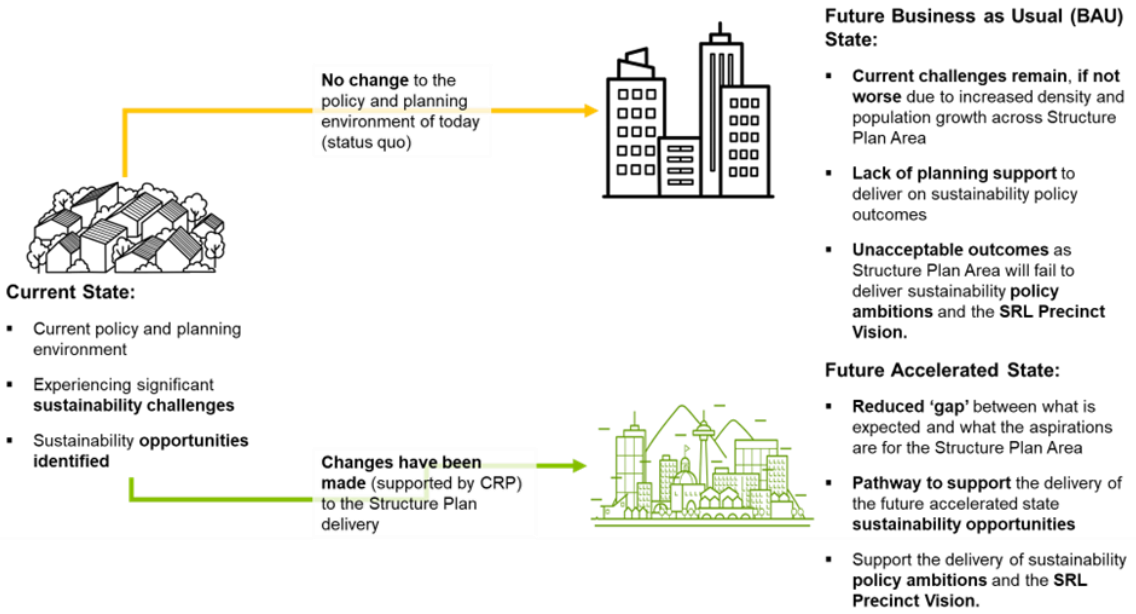

FIGURE 4.1 CURRENT AND FUTURE ACCELERATED STATE IN BOX HILL STRUCTURE PLAN AREA THROUGH THE STRUCTURE PLAN DELIVERY

5. Recommendations

This section sets out recommendations to inform the Box Hill Structure Plan.

The recommendations address the sustainability challenges of the Structure Plan Area, and seek to help achieve the SRL sustainability vision, and the sustainability objectives of the Box Hill Vision.

The goal is for the Structure Plan Area to become more liveable, connected and productive as its population grows and density increases, with greater climate change resilience and improved sustainability.

The recommendations aim to close the gap between what is expected under the Future Business As Usual State, and what is possible under the Future Accelerated State.

They also contribute to achieving Victorian and local government sustainability objectives.

Categories of recommendations

Land use planning is critical to influencing how cities are shaped, perform and respond to climate. However, creating sustainable, climate-responsive neighbourhoods should not rely on just planning controls.

Other opportunities such as partnerships and advocacy are required to build climate change resilience and improve sustainability.

This is why the recommendations are sorted into the three categories defined in Table 5.1.

TABLE 5.1 RECOMMENDATION CATEGORIES

	**Structure Plan responses** guide and promote sustainability and climate considerations in the future planned land use, built form, and public spaces to support changing community needs. • Provides long-term guidance to authorities about land use changes and buildings on private and public land • Provides community and investor certainty about expectations for the future form of development.
	**Planning Scheme responses** recommend new planning controls to improve the climate responsiveness of development in the Structure Plan Area. • Sets out policies and provisions that regulate how land can be used or developed • Creates binding requirements that can influence buildings and other infrastructure.
	**Other opportunities** promote partnerships with government, industry and other organisations. • Can include guidance, measurement tools or rating tools, or staging implementation to support Structure Plan and Planning Scheme responses • Builds relationships and provide access to more resources, a pool of diverse skills and knowledge and shared expertise to foster innovation and creativity • Enables access to new markets and customers, cost and risk sharing.

No single response will deliver the full scale of change required to address the sustainability challenges in the Structure Plan Area. Recommendations are therefore not prioritised for each focus area. Adopting the full suite of recommendations is advised.

While recommendations and other opportunities are provided against each sustainability focus area, measures may overlap with each another to achieve multiple outcomes and co-benefits across economic, environmental and social sustainability. Where this occurs, this is noted in the recommendation or opportunity.

Recommendations related to Planning Scheme responses are advisory only. At this stage, the Climate Response Plan is not able to provide definitive advice on where planning controls should 'sit' in policy, as the

planning structure and zoning is not yet resolved. These recommendations will be subject to further testing and refinement during the Planning Scheme Amendment process in 2024 and 2025.

Structure of recommendations

The recommendations are categorised under each sustainability focus area and structured as follows:

Focus area summary – summarises the focus area and the key challenges in the Box Hill Structure Plan Area, as well as the outcomes being sought.

Recommendations, which includes:

- **Description** – briefly describes the recommendation
- **Impact** – describes potential impacts and benefits to be gained from implementation
- **Implementation considerations** – considerations for implementing the recommendation, including key considerations for the Structure Plan Area and application to planning zones or building typologies where required.

5.1 Realising net zero

SRL is being delivered in the context of targets to rapidly reduce greenhouse gas emissions across the economy and community.

The Victorian Government has committed to an accelerated target to reduce the state's greenhouse gas emissions to net zero by 2045. This target is likely to be among the government's greatest and most critical tasks of the next two decades.

In simple terms, net zero emissions means balancing the greenhouse gas emissions released into the atmosphere, and the greenhouse gas emissions that are absorbed and stored (Climate Council 2023). Achieving net zero requires measures to reduce atmospheric greenhouse gases emissions, so that any remaining emissions can be naturally absorbed and stored, or removed through other methods (UN 2024).

How we consume energy will be a key determinant of Victoria's success or failure to achieve net zero. Electricity consumption is Victoria's major emissions source, much of which is used in buildings. In Australia, buildings account for over 50 per cent of electricity use and almost a quarter of greenhouse gas emissions (GBCA 2023).

Without strong action to transition new development to fossil-fuel free energy and energy efficient designs, the Box Hill Structure Plan Area will fail to contribute to Victoria's net zero target. Integrating net zero outcomes into new development is critical to avoid the steep costs and technical challenges of energy efficiency retrofits.

The knowledge and technology to decarbonise buildings is available. There is significant opportunity to cut emissions from the built environment in a deep, rapid and sustained way, and to balance emissions from other sectors which are harder to decarbonise.

Energy use represents the biggest source of emissions in the SRL East Structure Plan Areas, but reaching net zero will require Victoria to decarbonise its transport systems, industrial processes, product use and waste. For this reason, the measures recommended in Realising Net Zero should be considered alongside other focus areas. The initiatives in Circular Economy and Sustainable Procurement provide more insight into how SRL can address embodied carbon in materials and waste with sustainable design and construction. To understand how SRL can minimise emissions by reducing car dependency and promoting zero-emissions vehicles – see Place-based measures to promote zero emissions transport.

What's the challenge in the Box Hill Structure Plan Area?

Energy use is the major emissions source in the Box Hill Structure Plan Area, which accounts for around 75 per cent of municipal greenhouse gas emissions. This equates to approximately 1,317,000 tonnes of carbon emissions (CO_2e) each year.[4] Most of this energy is consumed in buildings.

Key challenges include:

- The Box Hill Structure Plan Area has a large number of residential buildings, which contribute significant emissions due to energy consumption
- Gas is a popular fuel choice among tenants, which presents challenges to eliminate from existing developments (particularly commercial developments) and transition to renewable electricity to achieve net zero targets
- Existing dwellings have low energy efficiency – the average existing dwelling has a 2.0 NatHERs star rating.[5]

[4] Emissions data has been sourced from Snapshot Climate, a publicly available tool developed by Beyond Zero Emissions and Ironbark Sustainability (https://snapshotclimate.com.au/). Municipal energy-related emissions data for Box Hill has been measured by taking the average of the City of Whitehorse' electricity and gas use for the period 2021/22. Please note that this figure is intended to be indicative only and is not based on carbon emissions modelling for the Structure Plan Area.

[5] NatHERS star ratings have been sourced from CSIRO Energy Rating Dashboard (2024). Data has been measured by taking the average star rating for existing dwellings in the City of

- The Box Hill Structure Plan Area has a lower uptake of on-site small-scale solar installations – the overall installation rate is 9 installations per 100 dwellings, compared to the statewide average of 34.[6]

In addition to this, the Box Hill Vision identifies the potential for:

- Taller mixed-use developments
- Higher-density apartments.

While SRL presents opportunities to enhance the Box Hill Structure Plan Area's sustainability performance, it will also generate more intensive development to accommodate a growing population. This will increase energy demand, creating major challenges to realising Victoria's net zero target.

Failing to set higher sustainability standards for development in the Structure Plan Area would be a missed opportunity and could also increase risks of obsolescence and poor adaptation to sustainability and climate-related challenges.

Without strong action to transition new development to renewable energy sources that are low in carbon, highly efficient, and offset with credible nature-based solutions, the Box Hill Structure Plan Area will fail to contribute to Victoria's net zero target. Integrating net zero outcomes into new development is even more critical to avoid the steep costs and technical challenges of retrofitting energy efficiency measures.

Policy and planning challenges

Appendix A summarises the strategies and policies reviewed to inform this Climate Response Plan. Findings include:

- Victorian Government policies demonstrate strong ambition to reduce emissions to achieve net zero by 2045
- The proposed updated Victorian Renewable Energy Target of 95 per cent renewable electricity by 2035 is considered world leading
- Victoria's Climate Change Strategy, and Plan Melbourne 2017-2050 (2017b) promote energy demand reductions, energy efficiency upgrades and renewable electricity uptake. The sustainability and climate policies of Whitehorse City Council align with these goals
- Planning controls do not require any type of development to demonstrate how it will be net zero ready
- However, because the electricity grid remains primarily powered by fossil fuels, population growth in the Box Hill Structure Plan Area will drive significant increases in emissions. This can be addressed by increasing uptake of on-site renewable energy to reduce emissions at the source
- Under current regulations, buildings are only required to achieve the standards set by the:
  - National Construction Code – Section J Energy Efficiency. Updated energy efficiency standards in the NCC will reduce emissions from new residential development
  - Built Environmental Sustainability Scorecard (BESS) Framework (see Section A.2 of this Plan).

Desired outcomes in the Box Hill Structure Plan Area

To achieve the Box Hill Vision, the Box Hill Structure Plan Area should be sustainable, climate responsive and net zero ready. This involves planning for new energy technologies to enable a smooth, orderly transition to net zero. It also requires embracing sustainable design practices so that new developments are low in carbon and powered by renewable energy. This will support the following outcomes:

Whitehorse between the period May 2016 – April 2024. Please note that this figure is intended to be indicative only and is not based on precinct-specific energy modelling.

[6] Solar uptake is based on small-scale solar installation data by postcode from 2001-2022 sourced from the Clean Energy Regulator (2024), and 2021 census data (ABS 2021). Please note that data is intended to be indicative only and is not based on emissions modelling for the Structure Plan Area.

- **Phase-out fossil fuels** – development in the Box Hill Structure Plan Area achieves net-zero emissions by or before 2045 and is free from fossil fuels where feasible (for example, by phasing out new gas connections)
- **Energy supplied from renewable resources** – the Box Hill Structure Plan Area supports the transition to new, diverse energy technologies for local renewable energy generation, distribution and storage
- **Reduced energy consumption** – the Box Hill Structure Plan Area reduces energy consumption through efficient buildings that are built with lower carbon materials and operated with smart energy management strategies
- **Remaining emissions mitigated** – development in the Box Hill Structure Plan Area addresses residual emissions with high-integrity, nature-based offsets that provide environmental benefits that can be seen.

Recommendations and other opportunities

The following responses are recommended for the Box Hill Structure Plan to deliver a Future Accelerated State for realising net zero – aiming to close the gap between the greenhouse gas emissions challenges facing the Structure Plan Area and the desired outcomes, to help achieve net zero emissions.

- **Recommendation 1A** – Net zero buildings (Structure Plan response)
- **Recommendation 1B** – Private development sustainability certification (Planning Scheme response)
- **Opportunity 1C** – Partnership for a decarbonised energy supply solution (Other opportunities).

Recommendation 1A – Net zero buildings

Structure Plan response

Description

A Structure Plan response is recommended to encourage all developments in the Structure Plan Area to support achievement of net zero by 2045, in line with Victoria's emissions reduction targets.

The Structure Plan response could also encourage developments in the Structure Plan Area on private and public land to avoid and reduce emissions through their design and construction.

Impact

- This Structure Plan response could generate benefits including:
  - » Establish net zero as an high priority early and set expectations on the level of energy performance expected for development as early as possible
  - » Support net zero by encouraging development to be fossil fuel free, highly energy efficient and powered by renewables, built with lower upfront emissions and embodied carbon (for new developments), and offset with credible nature-based solutions for remaining emissions.
- This will have the following positive impacts:
  - » Reduced emissions
  - » Reduced energy consumption
  - » Improved electricity grid resilience
  - » Improved air quality, human health and wellbeing
  - » Improved community response to the climate emergency
  - » Reduced exposure to risks associated with transition to a low-carbon economy (such as future carbon and energy policies).
- Support implementation of:

- » Victoria's greenhouse gas emissions reduction target of 75 to 80 per cent by 2035 and net zero by 2045 by supporting the delivery of net zero buildings, which is not currently a requirement in the planning scheme
- » Victoria's Climate Change Strategy, which supports action to transition from gas to renewable electricity, improve household energy efficiency, reduce building energy demand, and deliver local renewable energy projects
- » Whitehorse City Council's Climate Response Strategy 2023–2026, which aims for net zero community emissions by 2040, the maintenance of carbon neutral status for corporate emissions, 100 per cent renewable electricity for council operations by 2025, and net zero corporate emissions by 2032.

Implementation considerations

- The response is recommended to be supported by Recommendation 1B.
- There is an opportunity for the Box Hill Structure Plan to include the following directions and actions:
  - » Advance a Planning Scheme Amendment as proposed in Recommendation 1B
  - » Encourage (and require where feasible) industrial and commercial developments to use zero emissions energy sources, and not gas
  - » Future proof and plan for new energy technologies to be powered with 100 per cent renewable electricity – see Opportunity 1C
  - » Enable existing developments to be more energy efficient to reduce energy consumption and demand
  - » Construct new development to have low embodied emissions by using lower carbon materials and sustainable design principles
  - » Offset any remaining emissions with credible nature-based solutions.
- Precedent for this recommendation can be found in:
  - » Arden Structure Plan Objective 9 – Establish strong environmental governance that provides certainty, accountability and transparency to achieve the precinct's net zero carbon emissions target by 2040
  - » Fishermans Bend Framework Objective 7.1 – Develop Fishermans Bend as a zero net emissions precinct and Objective 7.3 – Maximise renewable energy generation, storage and distribution.
- Key considerations for the Box Hill Structure Plan Area:
  - » The Box Hill Structure Plan Area core is highly urbanised and dense, and will see more intensive development to accommodate a growing population. This presents opportunities to drive net zero through initiatives such as Green Star, given that higher-density development is more likely to meet certification thresholds. It may be feasible to explore initiatives such as micro-grids and the consolidation of services in high-density areas, such as in the Structure Plan Area core
  - » There is significant opportunity to ensure new residential and employment developments support net zero with stronger energy performance standards. This will be particularly critical given that in high density areas, such as the Box Hill core, retrofitting energy efficiency measures would be harder and more expensive
  - » Box Hill has an established footprint in hospitals and commercial buildings, which emit significant greenhouse gas emissions. Addressing emissions in these developments will be essential to achieving net zero
  - » Achieving net zero in development may involve different levels of effort depending on the type of development, land use and other contextual factors. Potential cost increases may be involved, such as for existing buildings to eliminate fossil fuels and transition to renewable electricity.

1B – Private development sustainability certification

Planning Scheme response

Description

A Planning Scheme Amendment is recommended to require developers to align with achieving net zero by 2045 by achieving a Green Star Buildings (or equivalent independent standard) certification.

Impact

- This Planning Scheme response could generate benefits including:
  - » Promote broader sustainability and climate resilience outcomes using tools such as Green Star (or equivalent) with holistic sustainability criteria that align with SRLA's vision and sustainability focus areas
  - » Create opportunities for higher financial returns, as Green Star-certified assets deliver higher returns on average – 16.4 per cent higher capital value per squared metres, 13.5 per cent higher annual return**, 23 per cent longer weighted average lease expire (WALE), 66 per cent less electricity and 51 per cent less water (Green Building Council of Australia 2023)
  - » A Green Star requirement supports developers and building owners to become leaders in sustainability and climate action by preventing disadvantage for developers seeking a sustainability certification. Sustainability credentials can also help attract tenants and reduce risk exposure
  - » Ensure new development over a certain threshold is designed and operated to achieve net zero emissions by 2045, and development below the implementation threshold can contribute to emissions reduction in a cost-appropriate manner
  - » Reduce embodied and operational emissions in design if sustainable design principles are promoted by using a holistic sustainability rating tool
  - » Increase energy resilience and reduce emissions if development uses on-site renewables energy generation and storage
  - » Support net zero if development is required to offset remaining emissions with credible nature-based solutions that deliver environmental co-benefits
  - » May reduce exposure to transitional risks associated with climate change, such as future carbon and energy policies, and increased fossil fuel.

Implementation consideration

- The Planning Scheme Amendment is recommended to apply to the following thresholds:
  - » 5 Star Green Star Buildings (or equivalent independent standard) certified rating to be achieved for a new building or additions that contain 5,000 square metres or more of gross floor area
  - » For smaller developments below these thresholds, consider seeking BESS-8 'Excellence' rating. 'Excellence' is defined in BESS as an overall score of 70 per cent or higher. Must also include exceeding the requirements of BESS (Energy) by a further greenhouse gas emissions reduction of 20 per cent.
- Precedent can be found in:
  - » City of Melbourne Amendment C376 (2023) and Fishermans Bend Precinct planning controls, where developments above 5000 squared metres require a 5 Star Green Star Buildings rating
  - » Arden Precinct planning controls also promote the achievement of a 6 Star Green Star rating.
- Potential barriers to uptake for this Planning Scheme response include:
  - » Green Star certification is verified by an independent third-party assessment process managed by the Green Building Council of Australia (GBCA)
  - » Green Star certification evidence from development applicants is to be reviewed by a qualified Green Star Accredited Professional (GSAP)
  - » Potential cost increases to developers to achieve a Green Star certified rating, depending on the scale of a development and building application. However, Green Star buildings deliver better returns on average, and costs may be reclaimed through energy savings and increased property values. Refer to the Green Star Buildings Business Case: https://gbca-

web.s3.amazonaws.com/media/documents/green-star-buildings-the-business-case.pdf).

- A number of considerations and incentives would support the adoption of a Green Star Buildings certification including:
  - » In Australia, the Green Star suite of tools provide a best-practice, holistic framework that directly aligns with SRLA's sustainability focus areas and can be used to address the current building performance gaps in the planning scheme
  - » Delivering Green Star certification maximises opportunities to drive best-practice sustainability performance and offers assurance that sustainability and climate resilience is embedded in the final building through minimum performance requirements
  - » Larger non-residential and multi-unit residential developments above a certain threshold within the Structure Plan Area are expected to have sufficient financial resources to achieve certification
  - » Green Star certification has been demonstrated to deliver a broad range of benefits for many stakeholders. The analysis of ratings tools and frameworks suggest the Green Star suite of ratings tools are the most appropriate for guiding a holistic climate response, and achieving the following performance outcomes:
    - Fossil fuel free
    - Fully electrified
    - Highly energy efficient
    - Fully powered by renewables
    - Built with lower upfront emissions and embodied carbon (for new developments)
    - Offset remaining emissions with credible nature-based solutions.
  - » Integrating Green Star Buildings in the planning stage facilitates the certification process by reducing development application fees, providing infrastructure charges rebates, deferral of fees, height and density bonuses and green door policies – refer to the GBCA Green Star Buildings: Fact Sheet for Government for more information: https://gbca-web.s3.amazonaws.com/media/documents/green-star-buildings-for-government.pdf
  - » Guidance on the Green Star tools is available from GBCA publications provided on the Green Building Council of Australia website: www.gbca.org.au/green-star/rating-system
  - » Guidance on certification schemes such as the Green Star Climate Positive Pathway is provided by the GBCA publications 'Climate Positive Buildings & our Net Zero Ambitions', as well as 'A practical guide to electrification for new buildings', which outlines the steps involved to transition buildings to all-electric, renewable-powered energy sources.
- Administrative considerations include:
  - » Green Star Buildings raise standards for new developments to address the climate and sustainability challenges of the next decades. Discretions and exemptions may need to be considered by the responsible authority where it is demonstrated that Green Star Buildings certification is unachievable
  - » Where a Green Star certification is achieved, the following focus area recommendations will be impacted:
    - Integrated water management – alternative water sourcing and demand reduction strategies will largely be covered in the Green Star framework
    - Circular economy and sustainable procurement – construction and operational waste reduction strategies and sustainable construction material specification strategies will largely be covered in the Green Star framework
    - Climate change adaptation – climate change risk management standards will largely be covered in the Green Star framework
    - Environmental enhancement and protection – greening of buildings, increased canopy planting, protection of vegetation and climate adaptive landscaping will be largely covered in the Green Star framework
    - Urban heat island strategy – measures to minimise the urban heat island effect from solar gains will be largely covered in the Green Star framework.

Opportunity 1C – Partnerships for a decarbonised energy supply

Other opportunities

Description

There is opportunity for the Victorian Government to establish a partnership with a local energy company and/or other relevant organisation(s) (such as the Department of Energy, Environment and Climate Action, ClimateWorks, ARENA, the local government) to investigate and implement a decarbonised energy supply, distribution and storage in the Structure Plan Area, and better demand management solutions.

Potential solutions that could be investigated:

- Renewable energy solutions in the Box Hill Structure Plan Area:
  - » Local renewable energy generation
  - » New energy solutions including hydrogen, geothermal and bioenergy
- Distribution and storage solutions:
  - » Smart grids (digital technology to monitor and control the flow of electricity)
  - » Micro-grid (localised/precinct scale distribution system)
  - » 2-way grids (allowing for bidirectional flow of electricity; while Australian regulations do not currently provide for 2-way grids, this will provide a future opportunity)
  - » Energy storage opportunities including batteries and other storage systems
  - » Demand management solutions using new technology (such as smart grids, blockchain, predictive management, optimisation, system efficiency.

Impact

- This opportunity could generate benefits including:
  - » Help to eliminate implementation barriers and create significant opportunities to drive transformations in energy supply, distribution and storage, and demand management
- » Increase access to resources, expertise and innovation opportunities, accelerating the development and deployment of a decarbonised energy supply in the Structure Plan Area
- » Support expanded, cost-effective delivery of decarbonised energy solutions by leveraging solutions that benefit from the economies of scale
- » Partnerships with energy companies may provide access to new customers that may not otherwise decarbonise their energy supply
- » Reduce emissions and energy bills, particularly if on-site renewables energy generation and storage is involved
- » Reduce the level of risk associated with transitioning to a decarbonised energy supply
- » Fast-tracking solutions to achieve state targets and growing knowledge and skills in the clean energy sector.

Implementation considerations

- It is advised the selection of solutions investigated is informed by a comprehensive analysis of:
  - » The energy and emissions profile of the Structure Plan Area, the reliability of existing supply and distribution, and the constraints and required upgrades to existing networks identified in the Utilities Assessment
  - » The feasibility of introducing new technology in the Structure Plan Area
  - » Hospitals and commercial buildings such as Box Hill Hospital contribute significant amount of emissions in the Structure Plan Area. Partnering with health services organisations may provide a valuable opportunity to investigate implementation of a decarbonised energy solution. This could support the health sector to reduce its greenhouse gas emissions as well as the broader Structure Plan Area
  - » Gas is a popular fuel choice in the Structure Plan Area, particularly by tenants in commercial developments. A partnership to help transition current gas users to alternative, zero-emissions fuels could help address this challenge

» The partnership may seek to involve local governments to explore implementation on a broader municipal scale. This may be particularly relevant for implementing on-site renewable energy generation and storage.

5.2 Integrated water management

Integrated water management (IWM) brings together all facets of the water cycle to maximise social, environmental and economic outcomes. It considers how water cycle services are provided and the drivers or constraints that influence its management, such as climate change, population growth, land use change, environmental decline and community preferences.

IWM aims to deliver water sensitive and resilient communities while mitigating the adverse impacts of climate change, including extreme flooding and drought events.

Water for Victoria (2016) and the Integrated Water Management Framework for Victoria (2017a) provide strong policy support for the IWM planning approach by identifying measures to sustainably manage water resources, including establishing the IWM forums to help deliver on IWM objectives using a place-based planning approach. These policies are further reinforced through:

- Plan Melbourne 2017-2050 (2017b) which sets out a key directive to integrate urban development and water cycle management to support a resilient and liveable city
- Target 150, a water efficiency program encouraging Melburnians to limit water consumption to 150 litres per person, per day.

Examples of IWM in the urban environment are shown in Figure 5.1.

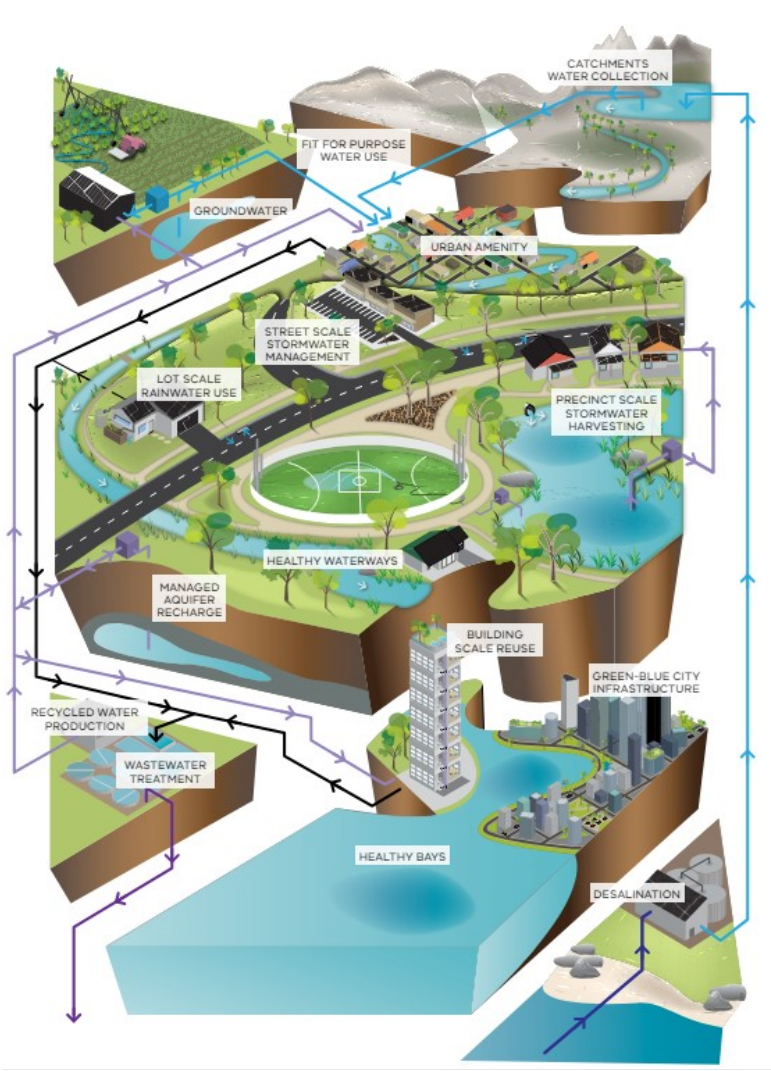

FIGURE 5.1 EXAMPLES OF THE APPLICATION OF IWM IN THE URBAN ENVIRONMENT (DELWP 2017)

What's the challenge in the Box Hill Structure Plan Area?

The Box Hill Structure Plan Area is vulnerable to flooding – flood depths can reach above 0.6 metres, such as north of Box Hill Institute and Box Hill Gardens in the north of the Structure Plan Area, and along the Box Hill South and Collins St Main Drain in the south. A high risk for over-floor flooding exists for properties north-west of Box Hill Gardens (SRL East Structure Plan - Flooding Technical Report 2024).

These flood extents are expected to be larger when considering climate change impacts. No alternative water supply network exists for the Box Hill Structure Plan Area, so development currently relies on a potable water mains network.

While flooding events provide surplus water in the Structure Plan Area, water availability for human consumption, biodiversity and urban greening will become increasingly threatened and expensive in the face of climate change.

As Victoria becomes warmer and drier due to climate change, it is expected that streamflows to some catchments could reduce around 50 per cent per year by 2065 (Water for Victoria 2016). At the same time, Melbourne may need 85 GL of additional water by 2030, and 600 GL by 2070 (Greater Western Water et al. 2022).

Under a Future Business as Usual State in the Box Hill Structure Plan Area, residential water consumption is may increase 30 per cent by 2051, placing pressure on existing potable water sources (ESC 2023).

Policy and planning challenges

Appendix A summarises the strategies and policies reviewed to inform this Climate Response Plan. Findings include:

- The IWM Framework for Victoria (2017a) is supported by other key Victorian policies to strengthen the IWM planning process. This includes Plan Melbourne 2017-2050 (2017b), which supports the use of all water sources so the city remains liveable and sustainable, and to reduce reliance on drinking-water supplies, and the Greater Melbourne Urban Water & System Strategy: Water for Life (2022) which sets out the need for alternative water supply to meet Melbourne's needs
- City of Whitehorse policies support strong ambitions for IWM outcomes and translation of these into structure planning approaches. For example, the Whitehorse Integrated Water Management Strategy 2022–2042 requires 100 per cent of all projects to consider IWM as part of the design and support aspirations to reduce community consumption of potable water to 140 litres, per person, per day
- The planning controls have come some way to embedding these policy goals in the planning scheme for the Structure Plan Area at a catchment and development scale. For example, water efficient fixtures, use of alternative water sources and Water Sensitive Urban Design approaches are encouraged
- While the planning scheme requires connection to alternative water sources for residential development, where it exists, there is no similar requirement for commercial or industrial development.

Future challenges

An appropriate planning response will be required to address the water management challenges and planning challenges facing the Box Hill Structure Plan Area in future decades. With the increase in development and density and population, combined with the complexity of stakeholders involved in water management, issues such as increased flooding risk and reduced water availability from hotter and drier conditions may be exacerbated. Despite existing planning controls supporting rainwater capture and water efficiency, the increase in density may exacerbate demand for water beyond these opportunities. Not delivering on these principles means the liveability of the Structure Plan Area and its resilience to a warmer and drier climate may be at greater risk. This will significantly increase the challenge for Greater Melbourne to ensure sustainable growth and a continued supply of water in the decades to come.

Urban development and redevelopment presents the greatest opportunity to build the required infrastructure and create demand for alternative water sources in the Structure Plan Area.

Desired outcomes in the Box Hill Structure Plan Area

To achieve the Vision, the Box Hill Structure Plan Area should embed IWM principles to ensure resilience to climate change effects and extreme events such as flooding, as well as create functional, high-quality green networks that keep water in the landscape. The Structure Plan Area should support IWM by considering the whole water cycle early in the planning and design of new urban areas to improve the water performance of new buildings and precincts. This could support the liveability of the Box Hill Structure Plan Area and ensure its resilience to a warmer and drier climate, supporting the following outcomes:

- **Ensure a safe, secure and affordable supply of water** from a diverse range of water supplies and sources, embedding water efficiency in all new development, to manage water demand to less than 150 litres per person, per day in line with Melbourne's targets
- **Achieve or exceed Victoria's stormwater quality objectives** to protect urban environments and maintain waterway health
- **Enable effective and affordable wastewater systems** that meet public health and environmental standards and maximises waste to resource opportunities
- **Retain water in the landscape** to ensure healthy and valued urban places, cool green urban spaces and support natural water cycles
- **Manage existing and future flood risk from climate change events** to maximise outcomes for the community and minimise risk to life and property.

Recommendations and other opportunities

The following responses are recommended for the Box Hill Structure Plan to deliver a Future Accelerated State for IWM – aiming to close the gap between the water challenges facing the Box Hill Structure Plan Area and the desired outcomes:

- **Recommendation 2A** – Deliver place-based integrated water management (Structure Plan response)
- **Recommendation 2B** – Alternative water supply (Planning Scheme response)
- **Opportunity 2C** – Partnerships to support integrated water management (Other opportunities).

Recommendation 2A – Deliver place-based integrated water management

Structure Plan response

Description

A Structure Plan response is recommended to encourage all new development and public realm to incorporate innovative place-based integrated water management (IWM) interventions that manage the risk of flooding to future development, enhance waterway health, and deliver water sensitive neighbourhoods.

Impact

- This Structure Plan response could generate benefits including:
  - » Ensure that new developments are encouraged to recognise and consider the contribution of water in creating liveable neighbourhoods that are resilient to climate change impacts
  - » Reduced demand on the metropolitan water supply system with increased use of alternative water, in line with Victorian Government policy objectives
  - » Reduced localised flooding impacts around the Box Hill South, Severn Street and Collins St Main Drains
  - » Enhanced urban greening and cooling with a passive irrigation source to retain water in the landscape
  - » Improved quality of stormwater entering waterways (Gardiners Creek) and Port Phillip Bay by enhancing how it is captured and filtered in the urban environment
  - » Support for community wellbeing with greener open space and access to healthier, cleaner waterways
  - » Reduced infrastructure costs over the long run with affordable and diversified sources of water.

Implementation considerations

- This response is recommended to be supported by Recommendation 2B and 2C
- Potential strategies to deliver IWM in the Structure Plan Area may include:
  - » Set minimum infiltration requirements and capture or divert stormwater into tank or Water Sensitive Urban Design assets to provide an adequate water source for green assets, spaces and landscaping
  - » Strategically plan large sites that may accommodate IWM opportunities such as at the former Box Hill Brickworks
  - » Integrate Water Sensitive Urban Design into the design of transport corridors such as along Station Street, and in new and enhanced green spaces around the SRL station
  - » Set rainwater tank requirements in new development to ensure appropriate on-site retention, treatment and reuse of water
  - » Support the delivery of water infrastructure to provide alternative water as a substitute for potable water for toilet flushing, laundry and irrigation in public and private developments
  - » Adopt additional built form setbacks to support conveyance of flood water in flood-affected areas, such as new development around Box Hill Gardens.
- Precedent can be found in:
  - » Fishermans Bend Framework Objectives 5.1 and 5.2, which set out strategies and planning controls to harvest, treat and reuse stormwater to minimise flooding, maximise water reuse and minimise potable water use
  - » Arden Structure Plan Objective 19, which seeks to minimise the risk of flooding with creative solutions including Water Sensitive Urban Design on specific streets and green links; and Objective 20 which aims to provide access to high-quality alternative water in buildings and to irrigate open spaces.
- Key considerations for the Box Hill Structure Plan Area:
  - » To deliver this objective, an IWM Plan for the Structure Plan Area should be prepared in collaboration with IWM Forum members that identifies IWM and associated Water Sensitive Urban Design interventions, blue-green

corridors, and local flooding solutions to address land use limitations and manage water as a strategic resource in a sustainable manner

  - » The IWM Plan should be prepared with Whitehorse City Council as the owner and managers of public open space and local drainage assets to determine where IWM solutions including stormwater management solutions are viable
  - » Supporting uptake of recycled water connections will be critical in the Box Hill Structure Plan Area. It is already home to high-density development with more projected in the next decades. This may exceed water demand provided by rainwater capture and water efficient fixtures under existing planning controls.

- This Structure Plan response should be delivered alongside the SRL East Structure Plan - Flooding Technical Report, SRL East Structure Plan - Integrated Water Management Strategy, SRL East Structure Plan - Transport Technical Report - Box Hill, and the SRL East Structure Plan - Utilities Servicing Technical Report.

Recommendation 2B – Alternative water supply

Planning Scheme response

Description

A Planning Scheme Amendment is recommended to requires new development to incorporate available or planned alternative water supply by providing third-pipe plumbing in the development to service:

- All toilets and washing machines
- Landscaped areas.

Impact

- This Planning Scheme response could generate benefits including:
  - » Reduce potable water demand for approved uses (toilets, washing machines and irrigation) to reduce pressure on potable water supply – in some recent developments in Melbourne's north-east, the use of recycling water is aiming to reduce potable water consumption 45 per cent (Development Victoria 2023)
  - » Reduce cost of water for Structure Plan Area customers as non-potable water is cheaper to purchase than potable water
  - » Support additional water for irrigation of open space, landscaped areas, and streetscapes, delivering on urban cooling and biodiversity, ecological and urban greening initiatives
  - » Increase resilience of Structure Plan Area to a warmer and drier climate, and support for Victorian-wide policy objectives.

Implementation considerations

- The Planning Scheme Amendment is recommended to apply to the following thresholds:
  - » In line with Recommendation 1B, if a development is greater than 5000 squared metres in gross floor area, the development is recommended to

achieve a 5 Star Green Star Buildings (or equivalent independent standard) certified rating

  - Under this approach, development will be required to achieve Credit 25 (Water Use) which requires, for credit achievement, that the building has infrastructure for recycled water in a district or location where local council or water authorities (or similar) have planned for installation of recycled water infrastructure
  - For smaller developments below these thresholds, implementation could be considered through an Sustainable Management Plan (SMP) as required by the municipal planning scheme. The SMP could include a minimum requirement that ensures the third-pipe (to use alternative water) plumbing and any associated infrastructure and fixtures are included in the development.

- Precedent can be found in:
  - The Arden Climate Response Plan planning controls, which set out IWM standards for new developments to meet, including connection to any third-pipe and stormwater management system
  - Fishermans Bend Framework Strategy 5.2.1, which supports the delivery of a water recycling plant and associated third-pipe infrastructure to provide recycled water as a substitute for potable water for toilet flushing, laundry and irrigation.
- Potential barriers to uptake for this Planning Scheme response include:
  - Collaboration with water authorities and retailers on the viability and cost-effectiveness of an alternative water system will be required to provide an alternative water supply to development in the Structure Plan Area at an appropriate time
  - Yarra Valley Water (water retailer) may require sites in the Structure Plan Area for local pump stations and treatment plants.
- A number of initiatives and incentives are underway that would support the adoption of an alternative water supply including:
  - Recycled water facilities have been implemented by Yarra Valley Water in Doncaster Hill, north of the Box Hill Structure Plan Area, servicing 6000 households and local sports grounds and parks
  - The commercial viability of requiring development to provide third-pipe plumbing supported by an alternative water supply has been greatly accepted in recent structure planning in Melbourne (Fishermans Bend, Arden, and growth areas) as an acceptable use in residential developments for toilets, laundry and irrigation.
- Administrative considerations – discretions and exemptions may need to be considered by the responsible authority where it is demonstrated an alternative water supply is unavailable or inaccessible
- This Planning Scheme response could be delivered alongside Recommendation 1B (Private development sustainability certification), as well as the SRL East Structure Plan - Integrated Water Management Strategy, and SRL East Structure Plan - Utilities Servicing Technical Report.

Opportunity 2C – Partnerships to support integrated water management

Other opportunities

Description

There is opportunity to use the existing IWM Forum members to prepare IWM Plans for the Structure Plan Area.

Impact

- This opportunity could generate benefits including:
  - » Translate catchment priorities into initiatives specific to the Structure Plan Area that respond to the forecast development, and help to manage existing precinct IWM challenges
  - » Unlock co-investment from parties on delivery of IWM solutions
  - » Support early and upfront IWM asset ownership agreements
  - » Create opportunities for multi-purpose land uses, such as co-located drainage infrastructure with recreational facilities, open space, and walking or cycling routes.

Implementation considerations

- It is recommended this opportunity supports delivery of Recommendation 2A.
  - » IWM planning takes time with many stakeholders interested in water management outcomes. The IWM Forums are responsible for delivering IWM actions for all water-related outcomes across Melbourne. However, more analysis and engagement with potential partners may be required to identify the most appropriate partnership model and appropriate staging of IWM solutions
  - » Outcomes of this engagement may be supported and strengthened through collaboration with research organisations such as Water Sensitive Cities Australia.

5.3 Circular economy and sustainable procurement

A circular economy approach aims to reduce or avoid waste by keeping resources in use for as long as possible by reusing, repairing, sharing, refurbishing and recycling them. It involves a mindset shift from waste as a 'problem' to resources that have continued value and productive use. Resource flows in a circular economy are shown in Figure 5.2.

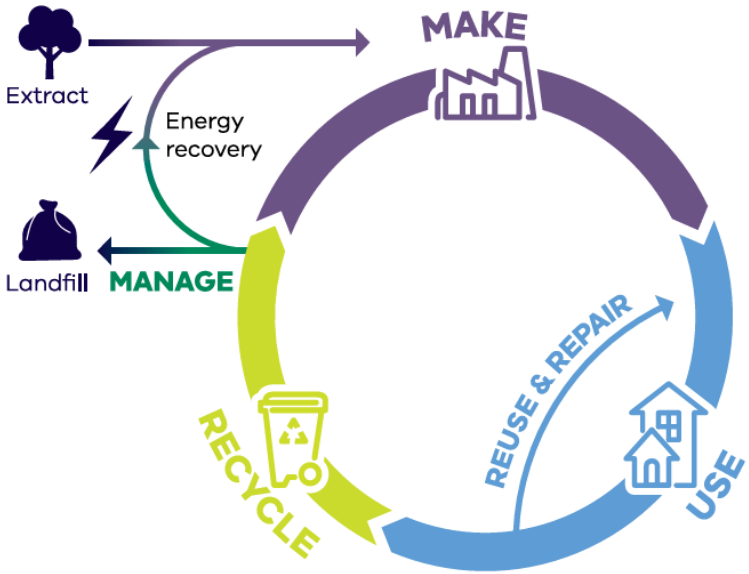

FIGURE 5.2 RESOURCE FLOWS IN A CIRCULAR ECONOMY (VICTORIAN GOVERNMENT 2020)

The Victorian Government's circular economy policy and action plan, Recycling Victoria: A new economy (2020) supports these outcomes.

Victoria has committed to an overhaul of its recycling system, with reform to kerbside recycling, the introduction of a container deposit scheme, new investment in industry, and the creation of waste management as an essential service. Recycling Victoria sets ambitious targets to:

- Divert 80 per cent of waste from landfill by 2030
- Cut total waste generation by 15 per cent per capita by 2030
- Halve the volume of organic materials going to landfill between 2020 and 2030 (with an interim target of 20 per cent reduction by 2025)
- Ensure every household has access to food and organised waste recycling or local composting by 2030.

What are the current challenges in the Box Hill Structure Plan Area?

Circular economy and waste challenges

Current recycling rates in the Box Hill Structure Plan Area are around 47 per cent,[7] meaning the other 50 per cent of resources goes to landfill (Recycling Victoria 2023). While there is no specific data on construction and demolition (C&D) waste for the Structure Plan Area, C&D waste represents the majority of Victoria's waste – 7.7 Mt of waste generated in 2022 was from C&D activities from a total 15.82 Mt, with around 15 per cent of C&D waste going to landfill (Recycling Victoria 2023).

In Australia, 228 kilograms of CO_2-e are produced per square metre (squared metres) of floor space in a residential building during construction. For non-residential buildings, this rises to 433 kilograms CO_2-e/squared metres, generally due to larger buildings requiring more substantial foundations and structures (ThinkStep 2021).

Under a Future Business as Usual State, the rapid development commercial and residential areas of the Structure Plan Area, increasing population

[7] Recycling rates represent 2023 recycling rates for City of Whitehorse. Note this figure is indicative only and is not based on precinct resource modelling for Box Hill Structure Plan Area (Source: Recycling Victoria, 2023).

growth, and the significant amounts of materials required to construct new infrastructure will lead to:

- Increased construction and demolition waste, which is expected to rise in Victoria to 29.4 Mt by 2050, an increase of nearly 300 per cent (Recycling Victoria 2023)
- Issues with material availability and rising embodied carbon, with virgin materials contributing as much as 85 per cent of a building's total carbon emissions by 2050 (ThinkStep 2021)
- Increased waste generation per person, which may rise by around 33 per cent by 2051 in the Structure Plan Area, including a 65 per cent increase in organic waste (Recycling Victoria 2023).

Policy and planning challenges

- The circular economy is strongly considered in Victorian Government policy with ambitious state-wide circular economy targets to be achieved by 2030
- Victorian Government policy is reinforced through:
  - » Plan Melbourne 2017-2050 (2017b), which sets directions to transition to a low carbon city, reduce waste and improve waste management and resource recovery
  - » Local government policies for Whitehorse which set targets to divert waste from landfill over the next 5 years and support actions to maximise resource recovery
- These policies have limited implementation in the Whitehorse Planning Scheme. It sets no requirements for construction waste reduction performance (such as C&D waste diversion targets). There are minimal prescriptive requirements or targets to manage operational waste in residential, commercial and industrial development
- Clause 22.10 of the Whitehorse Planning Scheme encourages the use of durable and reusable materials, and promotes waste avoidance in all stages of development. However, the planning scheme does not set minimum requirements for material choice or the reduction of embodied carbon in new developments. This topic is also not addressed under the Built Environment Sustainability Scorecard (BESS)
- Appendix A summarises the strategies and policies reviewed to inform this Climate Response Plan.

Future challenges

There are significant gaps to be addressed to align policy direction, the planning system and built environment performance outcomes. If not adequately planned for, increased development in the Box Hill Structure Plan Area combined with more jobs, people and dwellings will contribute to more waste going to landfill, reduced availability of virgin materials, increased pollution and rising greenhouse gas emissions, exacerbating climate change.

Continuing a linear economy approach of 'take, use and throw away' will risk achievement of the Victorian Government circular economy and net zero targets and fail to deliver opportunities for innovation and productivity with more efficient resource use.

Desired outcomes in the Box Hill Structure Plan Area

To achieve the Box Hill Vision, infrastructure, buildings and places being designed now should support a circular economy by enabling more productive use of natural resources, avoiding waste through good design, and ensuring that infrastructure is durable and adaptive to future changes in resource use.

Embedding circular economy principles into the Box Hill Structure Plan should support zero waste outcomes in design, construction and the operation of new developments.

Neighbourhoods could be more liveable, durable, resilient and sustainable, and achieve circular economy policy targets. This could support the following outcomes:

- **Reduced embodied carbon** – the built environment adopts non-virgin, lower carbon materials contributing to the achievement of Victoria's net zero emission targets

- **A more circular Structure Plan Area** – keeping resources in productive use for as long as possible by encouraging reuse, recycling and reducing construction, demolition and operational waste sent to landfill
- **Durable, resilient and adaptive infrastructure** – which requires less maintenance and is designed to be disassembled or adapted, avoiding future demolition waste and emissions and encouraging a continued circular approach to material use
- **Reduced waste generation per person and for businesses**– by encouraging opportunities for resource recovery.

Recommendations and other opportunities

The following responses are recommended for the Box Hill Structure Plan Area to deliver a Future Accelerated State for circular economy – aiming to close the gap between the circular economy challenges facing the Structure Plan Area and the desired outcomes.

- **Recommendation 3A** – Supporting a circular economy (Structure Plan response)
- **Recommendation 3B** – Embodied carbon reduction in new developments (Planning Scheme response)
- **Recommendation 3C** – Construction and operational waste management targets (Planning Scheme response)
- **Opportunity 3D** – Partnerships to support a circular economy (Other opportunities).

Recommendation 3A – Supporting a circular economy

Structure Plan response

Description

A Structure Plan response is recommended to facilitate a circular economy in the Structure Plan Area by encouraging all public and private development to adopt leading waste and resource recovery practices to achieve 80 per cent diversion in waste from landfill, reduce the amount of waste produced 15 per cent, and reduce embodied carbon from materials.

It is also recommended the response encourages existing developments to support the Structure Plan response where possible.

Impact

- This Structure Plan response could generate benefits including:
  - » Encourage the design, construction and operation of all new development to consider opportunities to reduce embodied carbon from virgin materials and maximise resource recovery from the early planning stages
  - » Support the aims and targets of the Victorian Government circular economy and net zero policy and targets
  - » Further encourage businesses, jobs or enterprises to support more efficient resource use, resources sharing or resource recovery, building on the existing resource recovery industry in the Structure Plan Area
  - » Support residents and employees in the Structure Plan Area to further understand their role in supporting circular economy outcomes.

Implementation considerations

- This response is recommended to be supported by Recommendations 3B, 3C and 3D
- Potential strategies to support a circular economy for developments in the Structure Plan Area may include:
  - » Requiring developments to:

  - Avoid waste by designing out materials, using fewer materials or more durable materials that require less maintenance, and can be reused or recycled in the future
  - Adopt reused, low carbon or recycled materials in design where possible
  - Design for future waste streams by allowing appropriate sizing and space
  - Manage all waste at the source (such as through on-site organic waste management, or off-site recycling facilities).
- Requiring capital works to:
  - Reduce embodied carbon at least 10 per cent and minimise the use of virgin materials by adopting recycled or reused materials
  - Adopt materials which are considered to be more durable than standard materials or reduce the maintenance requirements of the works
  - Use materials that can be composted, recycled or reused at the end of their life
  - Introducing innovative education and engagement programs for residents, businesses and the construction sector which leverage existing resource recovery opportunities.
- Precedent can be found in:
  - Fishermans Bend Framework Objectives 8.1 and 8.3, which encourage leading-practice waste and resource recovery management in buildings and maximum value to be extracted from waste
  - Arden Structure Plan Objective 13 which aims to minimise waste production, optimise reuse and recycling and encourage a circular economy.
- Key considerations for the Box Hill Structure Plan Area:
  - The Box Hill Structure Plan Area is home to a small number of resource recovery opportunities, including a container deposit scheme. There are opportunities to engage retail and commercial businesses to strengthen local circular economy outcomes – for example, identifying opportunities to manage waste streams at a larger scale, such as organic waste management from Box Hill Central.
  - The large amount of existing development and planned development to occur in the area immediately around the SRL station provides opportunity to support the coordination of retail and commercial collection contracts to avoid individual contracts across developments, provide a centralised location for waste management, and ensure bulk waste collections. There may be opportunities to consolidate waste contracts across existing and new development
  - The existing high-density development in Box Hill may provide challenges to supporting circular economy outcomes. Development may not be easily disassembled and is not adaptive to future resource recovery needs. Partnerships or other opportunities (see Recommendation 3D) will be required to support circular economy outcomes across the Structure Plan Area
  - Guidance to support circular economy and waste management outcomes in new development could be sourced from the Victorian Government's circular economy policy and plan, Recycling Victoria: a new economy (2020), Sustainability Victoria or other emerging government policy and guidance
  - This Structure Plan response should be delivered alongside the SRL East Structure Plan – Transport Technical Report - Box Hill.

Recommendation 3B – Reduce embodied carbon in new development

Planning Scheme response

Description

A Planning Scheme Amendment is recommended to encourage all new development to:

- Reduce embodied carbon at least 20 per cent (compared to those of a reference building)
- Minimise the use of virgin materials used by adopting recycled or reused materials
- Adopt materials which are considered to be more durable than standard materials or reduce the maintenance requirements of the development
- Use materials that can be composted, recycled or reused at the end of their life.

Impact

- This Planning Scheme response could generate benefits including:
- Reduced greenhouse gas emissions in the Structure Plan Area by using materials with lower embodied carbon such as recycled or reused materials in new residential and commercial buildings. Materials could include:
  - » Concrete – for a 40 MPa concrete used in a commercial building slab with 30 per cent supplementary cementitious materials (SCM) results in 50 kilograms CO2/t less embodied carbon than standard concrete (CEFC 2021)
  - » Recycled steel – every tonne of scrap used for steel production avoids the emission of 1.5 tonnes of CO2 (AHURi 2023)
  - » Timber use instead of other materials – using 17 per cent timber in construction as an alternative to brick, aluminium, steel and concrete can reduce greenhouse gas emissions by about 20 per cent in a standard building (AHURi 2023).

Implementation considerations

- The Planning Scheme Amendment is recommended to apply to the following thresholds:
  - » In line with Recommendation 1B, if a development is greater than 5000 squared metres in gross floor area, the development is recommended to achieve a 5 Star Green Star Buildings (or equivalent independent standard) certified rating. Under this approach, development will be required to achieve Credit 21 (Upfront Carbon Emissions) which requires, at a minimum, buildings demonstrate reduction of embodied carbon by at least 10 per cent (rising to a minimum 20 per cent reduction for projects from 2026 onwards).
  - » For smaller developments below these thresholds, implementation could be considered through a Sustainable Management Plan (SMP) where developers would respond to a checklist of requirements to demonstrate how they have met the planning control.
- Precedent can be found in:
  - » City of Melbourne Amendment C376 (2023) and Fishermans Bend Precinct planning controls, where developments above 5000 squared metres require a 5 Star Green Star Buildings rating. This contains a minimum requirement that the building's upfront carbon emissions are at least 20 per cent less than those of a reference building
  - » Arden Precinct planning controls promote the achievement of a 6 Star Green Star rating.
- Potential barriers to uptake for this Planning Scheme response include:
  - » There may be cost increases to developers in adopting recycled or low carbon materials, depending on the scale of development and building application (such as structural vs non-structural). For example, potential cost premiums on recycled materials – the capital cost premium of concrete with supplementary cementitious materials is approximately $\$10/m^3$ (Frontier Economics 2022). However, this may be offset with smart design (using fewer materials) or if existing materials are reused on site.
  - » There is currently a modest market for the reuse of construction and demolition waste materials In addition, the accelerated growth and rapid development of the Structure Plan Area may place increased demand on

recycled materials or low carbon material supply chains, impacting availability and supply of recycled or reused materials.

- A number of initiatives and incentives are underway that would support the adoption of recycled, reused and low carbon materials including:
  - » Sustainability Victoria, Ecologiq and other Australian and Victorian government agencies are supporting the development of new recycled and reused material supply chains and consolidated databases of products available
  - » Environmental Product Declarations (EPDs), which communicate the lifecycle performance of verified products and services, including embodied carbon, are publicly available via EPD Australasia, including for construction products such as aggregates, concrete, asphalt, cladding and façade, and floor systems
  - » Material passports are an evolving concept being adopted by large development and construction companies such as Multiplex, and being investigated by Victorian Government agencies such as Ecologiq. These are electronic identity cards that detail all the components and materials of a building, providing information on material production and performance to support future reuse and recovery, and detailing the embodied carbon. Material passports aim to make it easier for developers to choose circular building materials.
- Administrative considerations – As per the above, this space is still progressing and discretions and exemptions may need to be considered by the responsible authority where it is demonstrated materials are unavailable
- This Planning Scheme response could be delivered alongside Recommendation 1B (Private development sustainability certification).

Recommendation 3C – Construction and operational waste management targets

Planning Scheme response

Description

A Planning Scheme Amendment is recommended to require multi-residential and non-residential development to achieve:

- 90 per cent diversion of C&D waste from landfill during construction
- 80 per cent diversion of waste from landfill during operation of the development, including:
  - » Ensuring space is allocated for separation and management of four waste streams, including general waste, co-mingled recycling, glass and organics (or other waste streams considered standard at the time of implementation) and other non-standard waste (such as clothing, e-waste)
  - » Appropriate waste management and collection services are in place to meet these targets.

Impact

- This Planning Scheme response could generate benefits including:
  - » Generate savings by avoiding costs of C&D and organic waste to landfill – estimates suggest the avoided cost of C&D waste to landfill (tonnes) is $125/tonne and for organic waste is $93/tonne (including consideration of landfill levies) (Frontier Economics 2022)
  - » Support resource recovery at the development scale by ensuring appropriate source separation – evidence indicates that appropriate source separation in commercial and residential develop could supports resource recovery of up to 92 per cent (Infrastructure Victoria 2020)
  - » Enable waste-related emissions to be avoided and/or reduced by diverting waste from landfill
  - » Support a circular economy by recycling, reusing or repurposing potentially scarce or stretched resources.

Implementation considerations

- The Planning Scheme response is recommended to apply to the following thresholds:
  - » In line with Recommendation 1B, if a development is greater than 5000 squared metres in gross floor area, the development is recommended to achieve a 5 Star Green Star Buildings (or equivalent independent standard) certified rating. Under this approach, development will be required to achieve: Credit 2 (Responsible Construction) which requires, at a minimum, buildings to recycle 80 per cent of construction and demolition waste; and Credit 4 (Operational Waste) where buildings must have appropriate spaces for waste management and an appropriately sized loading dock.
  - » For smaller developments below these thresholds, implementation could be considered through the existing Waste Management Plan required under the Built Environment Sustainability Scorecard (BESS) which currently supports on-site reuse of organic waste. This Planning Scheme response could expand the scope of the Waste Management Plan to include construction and demolition waste during construction, and hard-to-manage waste during operation.
- Precedent can be found in:
  - » Fishermans Bend Planning Controls which aim to include requirements for on-site waste separation (Strategy 1.7.1) and deliver leading practice waste and resource recovery management within buildings (Objective 8.1)
  - » City of Melbourne Planning Scheme which requires developments to produce a Waste Management Plan that meets the requirements of the City of Melbourne's Guidelines for Waste Management Plans or a precinct waste management plan (if there is one in place). The guidelines response to the City of Melbourne's target to divert 90 per cent of waste from landfill by 2030.
- Potential barriers to uptake for this Planning Scheme response could include:
  - » For operational waste – implication of spacing requirements (particularly for organic waste on-site management) has not been measured, although this could be done in accordance with Sustainability Victoria's Waste Management and Recycling in Multi-unit Developments (2019) Better Practice Guide. If considered early in planning stages, the capital cost for developers is potentially negligible as waste storage areas are required under business-as-usual planning processes.
  - » For operational waste – may create implications or cost to building owners to manage 'hard to manage' waste that is not currently part of existing council hard waste or e-waste collection schemes.
- Opportunities to support the uptake of this planning scheme response include:
  - » The rise in organic waste is expected to be significant in Box Hill Structure Plan Area. While Victorian Government targets support residential on-site management of organic waste, there is an opportunity to support stronger commercial organic waste management. For example, a centralised approach for commercial organic waste management at Box Hill Central (Vicinity).
  - » There is opportunity to support coordination of residential and commercial collection contracts to avoid individual contracts across development, provide a centralised location for waste management and ensure bulk waste collections. This would be particularly prevalent for proposed high density development in the inner and outer Structure Plan Area core (areas proposed to be greater than 20 storeys). There may also be opportunities to consolidate waste contracts across existing and new development.
- Administrative considerations – achievement of waste diversion rates may depend on available and appropriate processing resource recovery infrastructure to manage the waste streams and volumes within each development
- This Planning Scheme response should be delivered alongside the SRL East Structure Plan – Transport Technical Report - Box Hill.

Opportunity 3D – Partnerships to support a circular economy

Other opportunities

Description

There is opportunity to establish partnerships between Victorian Government agencies (such as Sustainability Victoria), local government, research organisations (CSIRO, Australian Circular Economy Hub) or major tenants (Vicinity – Box Hill Central) to deliver targeted investment in circular economy opportunities in the Box Hill Structure Plan Area. This could include:

- Opportunities to deliver community-scale resource recovery hubs such as community-driven recycling hubs, sites for local exchanges, or repair cafes
- Opportunities for small-scale resource recovery (such as bioenergy opportunities infrastructure or development of a recycling solution for specific materials)
- Opportunities to connect local industry producers of waste with local recyclers.

Impact

- This opportunity could generate benefits including:
  - » Access to additional project finance – a significant number of Victorian Government initiatives are underway to support local investment in circular economy outcomes (such as through Sustainability Victoria's Circular Economy Innovation Fund)
  - » Help to source appropriate investment opportunities through strategic partnerships to meet the circular economy and resource recovery needs specific to the Structure Plan Area
  - » Support targeted investment in resource recovery solutions (such as community resource hubs)
  - » Increase access to research and innovation (such as the role of artificial intelligence (AI) to accelerate circular economy solutions and outcomes)
  - » Access understanding of industry lessons learnt to deliver circular economy solutions.

Implementation considerations

- Opportunities identified through partnerships should align to Victoria-wide waste and circular economy infrastructure priorities (including the Statewide Waste and Resource Recovery Infrastructure Plan (Sustainability Victoria 2018) and its future iterations, such as the Victorian Recycling Infrastructure Plan)
- Opportunities for small-scale resource recovery would require an analysis of context, and would need to be undertaken in line with partnerships to support net zero outcomes in the Structure Plan Area
- A range of stakeholders (government, not-for-profit) could play a role in operating resource hubs. For example, not-for-profit organisations or local government may support repair cafes.

5.4 Place-based measures to promote zero emissions transport

The SRL East Structure Plan – Transport Technical Report - Box Hill outlines a holistic blueprint for the Box Hill Structure Plan Area on how the transport network will maximise opportunities in surface transport infrastructure, including zero-emissions transport solutions such as active transport, electric vehicles and mobility solutions.

This Climate Response Plan supports and reinforces the recommendations made in the SRL East Structure Plan – Transport Technical Report - Box Hill to ensure emissions from transport are reduced in the Structure Plan Area and that opportunities consider the local context. These recommendations should be considered as statutory tools to guide land use and development outcomes across the Structure Plan Area and non-statutory tools that may involve strategic partnerships with local government and other key stakeholders. These recommendations include:

- Upgrades to support priority for walking, cycling and public transport trips in the Box Hill Structure Plan Area and reduce private vehicle use
- Adopt an integrated management approach to car parking across the Structure Plan Area, including seeking maximum (rather than minimum) parking rates for residential and non-residential development, and consider parking provisions for zero emission and car share vehicles
- Delivery of a central mobility hub and supporting hubs in the Structure Plan Area
- Ensuring that all new development supports active transport in the built environment through recommendations for end-of-trip facilities or bicycle parking, car parking reduction and other innovative approaches (car share schemes, micro-mobility)
- Partnerships with Whitehorse City Council, potential operators and other key stakeholders (such as Vicinity – Box Hill Central) on trials and delivery of low and zero-emissions transport initiatives, including micro-mobility solutions and innovative car parking approaches.

5.5 Climate change adaptation

By the time SRL is delivered, Melbourne's climate will be significantly changed. Victorian Government projections indicate that if global greenhouse gas emissions continue rising at high rates, by 2050 the Structure Plan Area could experience the following changes in climate (Department of Environment, Land, Water and Planning 2022):

- Warmer average temperatures - maximum daily temperatures could increase by around 1.8 degrees Celsius
- More heatwaves and extreme heat days – days over 35 degrees Celsius could double from around 7 days per year to around 16 days per year
- Long-term drying trend – rainfall will be highly variable but there is projected to be a long-term decline in cool season rainfall and snow, with a possible 8.5 per cent decrease in annual rainfall
- More extreme rainfall events – extreme daily rainfall to be highly variable with significant increases and decreases both possible. A 1-in-20 year extreme rainfall event could see 100 millimetres of rainfall
- More dangerous fire weather – for greater Melbourne, the number of days where the Forest Fire Danger Index exceeds the 95th percentile could increase by 42 % (Department of Environment, Land, Water and Planning 2015).

While exposure to climate risks depends on how quickly and aggressively emissions are cut, some impacts from climate change will be unavoidable. This means that how the Structure Plan Area is designed today needs to factor in future climate change.

Climate change adaptation focuses on preparing the Structure Plan Area for the effects of climate change in order to reduce current and future risks, build social and economic resilience, and protect community wellbeing (Department of Environment, Land, Water and Planning 2022). Climate hazards can be categorised into 'shocks' and 'stresses', which can have a range of direct and indirect impacts. For example:

- **Climate shocks** are sudden, extreme weather events such as flash flooding, storms or extreme heatwaves that cause damage to buildings, homes and infrastructure. This may cause disruption to services, business operations, construction activity and movement within the Structure Plan Area
- **Climate stresses** are typically longer-term, ongoing and emerging changes such as reduced annual rainfall. This may cause vegetation loss over time which then increases pressure on local biodiversity and reduces the amenity and community usage of gardens, sporting fields, and other green spaces).

What's the challenge in the Box Hill Structure Plan Area?

The built environment in the Box Hill Structure Plan Area is already exposed to the impacts of climate change. Areas north of Box Hill Institute and Box Hill Gardens experience 1-in-100-year flood events where flood depths can reach above 0.6 metres. Flooding also occurs near underground drains in the south of the Structure Plan Area. Urban heat pockets are concentrated around the existing Box Hill Station and commercial areas, at Box Hill Institute and other public use zones, and at large residential estates.

Key challenges include:

- Increased maximum temperatures and extreme heat, long-term rainfall declines, more intense extreme rainfall events and flash flooding (Whitehorse City Council 2023)
- Increasing urban density is causing the loss of vegetation on private land, exacerbating climate change risks such as heatwaves and flooding
- Existing developments and infrastructure may not be resilient enough to the changing climate and extreme weather events
- Taller mixed-use developments and higher-density apartments are planned for the Structure Plan Area, bringing more people into the area
- Existing developments and infrastructure may not be resilient enough to the changing climate and extreme weather events.

How the Structure Plan Area develops will affect the community's resilience to the physical and transitional risks associated with climate change, now and in future. Without place-based climate adaptation measures, impacts from climate hazards may be exacerbated by SRL. High-density development often increases the amount of heat-absorbing materials in neighbourhoods and could make the Structure Plan Area uncomfortably hot during warm periods. There is also a risk of localised flooding due to increased runoff from a greater area of impermeable surfaces. This may also increase the risk of economic losses and stranded assets for new development.

Policy and planning challenges

Appendix A summarises planning policies and other documents reviewed to inform this Climate Response Plan. Findings include:

- The Victorian Government supports strong action to plan for climate risks across all sectors of the economy, which has been legislated under the *Climate Change Act 2017* (Vic). Under the Act, climate change adaptation plans for key sectors of the economy must be delivered every 5 years
- Victoria's Built Environment Climate Change Adaptation Action Plan 2022–2026 aims to ensure the built environment is fully adapted to climate change by 2051. This supports action to strengthen planning standards, neighbourhood design and infrastructure to avoid siting development in high-risk locations and to adopt measures that enhance climate resilience (such as through urban cooling and greening)
- While climate change adaptation policy is robust, more action is required to integrate policy actions into the planning system. For example, climate risk is a consideration for planning of settlements, structure planning, and infrastructure development applications (Clauses 11.01-1S; 13.01-1S; 11.02-2S; 19), development is not required to demonstrate how adaptive measures have been incorporated into design and operations to reduce vulnerability to climate risks
- Whitehorse City Council has committed to support, enable and encourage the community to mitigate and adapt to climate change. However, climate change adaptation policies are not included in the Whitehorse Planning Scheme. This means there is a gap in managing climate change risks in the private realm
- The Whitehorse Planning Scheme requires stronger provisions to address climate change risks in the private and public realm. This could take the form of a requirement to mitigate the impacts of extreme weather events on building access, power supply or other internal infrastructure, or to consider the degradation of building assets as temperatures rise
- The Building Environment Sustainability Scorecard (BESS) addresses thermal comfort and stormwater management but it does not require other site-specific climate change risks to be addressed
- The National Construction Code (NCC) 2022 provides minimum performance standards for homes developed in areas subject to flooding, bushfires and cyclones, but does not account for site-specific climate variables or changing climate conditions.

Desired outcomes in the Box Hill Structure Plan Area

To achieve the Box Hill Vision, the Box Hill Structure Plan Area should be resilient to climate shocks and stresses. Fortunately, adapting to climate change is generally easier, cheaper and more cost-effective at an early stage. Dedicated measures can ensure that new developments consider localised climate risks and develop adaptation measures are bespoke to the development, including impacts of extreme weather events.

Climate change adaptation measures will be crucial for addressing the challenges projected climate change impacts in the Structure Plan Area, and could deliver benefits and outcomes including:

1. **Reduced exposure to climate change risks** – new development within the Structure Plan Area is planned and sited to avoid climate risks where possible
2. **Enhanced resilience and durability** – development within the Structure Plan Area is designed to be resilient and adaptable to climate change hazards, contributing to safety and wellbeing of the community

3. **Improved adaptive capacity** – the built environment is operated to be capable of managing climate risks and implement adaptation measures for the full life cycle as required (such as retrofitting existing buildings and preparing emergency response and recovery plans)
4. **Provision of co-benefits** – place-based climate change adaptation measures are designed to deliver co-benefits (such as landscaping measures which manage rainfall extremes while improving biodiversity).

Recommendations and other opportunities

The following responses are recommended for the Box Hill Structure Plan to deliver a Future Accelerated State for climate change adaptation – aiming to close the gap between the adaptation challenges facing the Structure Plan Area and the desired outcomes:

- **Recommendation 5A** – Climate change adaptation (Structure Plan response)
- **Recommendation 5B** – Climate change risk management standards (Planning Scheme response).

Recommendation 5A – Climate change adaptation

Structure Plan response

Description

A Structure Plan Response is recommended to support the design and construction of public and private developments, capital works and infrastructure to be resilient and adapted to climate change impacts.

Impacts

- This Structure Plan Response could generate benefits including:
  - » Reinforce climate change adaptation as a critical issue for the Structure Plan Area and promote stronger climate change adaptation measures in new developments
  - » Improve the adaptive capacity of the built environment in the Structure Plan Area to short-term climate risks (such as flash flooding, extreme heat days) and longer-term climate risks (such as drought, increased average maximum temperatures, sea level rise)
  - » Enhance resilience and durability of the Structure Plan Area by reinforcing the Victorian Planning and Environment Act 1987 (Vic) requirement for climate change to be factored into decision-making about future land use planning
  - » Promote consideration and uptake of climate change adaptation in the design and construction of new development, particularly those which provide co-benefits (such as landscaping measures which aid stormwater management. and support biodiversity.

Implementation considerations

- This response is recommended to be supported by Recommendation 5B.
- Potential strategies to support a climate change adaptation in the Structure Plan Area include:

- » Ensure all new infrastructure incorporates climate change adaptation measures to improve resilience to climate hazards expected during their design life. This may include measures such as:
  - Design drainage system to have capacity for an uplift in extreme rainfall events due to climate change to reduce the likelihood of flooding due to surcharge of drainage systems
  - Apply passive design principles to mitigate heat gain, avoid accelerated degradation of materials, and support user comfort
  - Design foundations to accommodate enhanced shrink/swell of soils during drought periods
  - Select materials and finishes to increase durability to hotter temperatures (such as using more durable binders in pavement).

- Encourage and facilitate existing buildings and infrastructure to be retrofitted to improve resilience to climate hazards expected during their design life. This may include measures such as:
  - » HVAC system upgrades to accommodate future temperature rises and more frequent extreme heat events
  - » Update landscaping to include water sensitive urban design in verges and rainwater capture to promote passive irrigation towards garden beds and reduce the likelihood of heat stress to plants (and costs to replace/repair landscaped areas.

- Precedent can be found in:
  - » Arden Structure Plan Objective 7 – Encourage buildings to remain adaptable as uses change over time; Objective 27 – Ensure that early activation and place-shaping activities are delivered alongside early precinct development and in readiness for the station opening, and that long-term planning, development and service delivery are considered early in the life of the precinct to create a distinct sense of place, promote a vibrant and interesting early local experience and ensure the long-term resilience of the precinct (including adaptation to climate change)
  - » Fishermans Bend Framework Goal 4 – 'A climate resilient community' sets a target that the community is resilient to the shocks and stresses of climate change. This goal is supported by four objectives to reduce the urban heat island effect, embed green infrastructure into the design of public spaces and buildings, develop better community understanding of climate risks and deliver 50 per cent urban canopy coverage in public spaces by 2050. Objective 5.1 – Design the urban form to accommodate sea level rise and storm events, also supports a climate resilient community.

- Key considerations for the Box Hill Structure Plan Area:
  - » Box Hill's existing exposure to climate hazards, including flooding and extreme heat, increases the importance of addressing these risks early in the Structure Plan Area design and development. This is particularly critical given that climate change is expected to exacerbate these risks further, resulting in more severe and frequent heatwaves and flood events
  - » Exposure to climate hazards may not always be avoidable through siting measures. In these instances, there may be cost uplifts involved to deliver climate resilient outcomes for land use planning and/or development. Mechanisms to address issues of commercial viability and/or technical feasibility of climate change adaptation measures should be considered to support uptake
  - » Climate change adaptation measures through structural planning should consider short-term, sudden events (that is, storms and extreme heat events) as well as long-term, gradual changes (drought, average temperature increases).

Recommendation 5B – Climate change risk management standards

Planning Scheme response

Description

A Planning Scheme Amendment is recommended to require new development to consider climate change risks and incorporate adaptation measures.

Impact

- This Planning Scheme response could generate benefits including:
  - » Ensure new development considers measures to embed resilience into a the design and operations of a building
  - » Identify multiple and overlapping climate risks and hazards that may occur over time and develop adaptation measures to reduce vulnerability
  - » Significantly extend the lifespan of buildings and reduce the risk of loss and harm from climate-related hazards, leading to improvements in health and wellbeing of building occupants
  - » Safeguarding investment: Lower operating and maintenance costs by reducing the risk of deteriorating design life or asset capacity. A $1 investment to reduce risks associated with climate hazards or natural hazards has been estimated to save $2 to $11 in post-disaster recovery and reconstruction costs (CSIRO 2020).

Implementation considerations

- The Planning Scheme Amendment is recommended to apply to the following thresholds:
  - » In line with Recommendation 1B, if a development is greater than 5000 squared metres in gross floor area, the development is recommended to achieve a 5 Star Green Star Buildings (or equivalent independent standard) certified rating
  - » Under this approach, development will be required to achieve Credit 16 (Climate Change Resilience) which requires, at a minimum, applicants demonstrate consideration of potential climate change impacts and risk treatments by completing a climate change pre-screening checklist. Credit achievement requires developing a climate change risk assessment for the project that treats extreme and high risks
  - » For smaller developments below these thresholds, implementation could be considered through a Sustainable Management Plan (SMP) where developers would respond to a checklist of requirements to demonstrate how they have met the planning control.
- Precedent can be found in:
  - » The Arden Structure Plan features a strategy that requires the design of all buildings to consider future climate scenarios and exceed minimum required life expectancies and aim for at least 100 years of structural performance.
- Potential barriers to uptake of this Planning Scheme response could include:
  - » Potential cost increases for developers in undertaking a climate change risk assessment and integrating adaptation measures into building design, which may require engaging professional advice
  - » Poorly designed adaptation measures can create undesirable outcomes for other Climate Response Plan focus areas – for example, using energy-intensive HVAC systems to adapt a building to extreme heat events would work against achieving net zero objectives to improve energy efficiency and reduce emissions. To avoid this, climate change risk assessments should identify interfaces with other focus area measures.
- A number of initiatives and incentives are underway to support the adoption of climate change risk management standards including:
  - » Existing Australian Standard (AS 5334:2013 Climate change adaptation for settlements and infrastructure) provides guidance on the approach to climate change risk and adaptation assessment
  - » Green Star Buildings Credit 16 provides guidance on climate change risk and adaptation assessment and best-practice operational emergency risk management and guidance on requirements for a suitably qualified professional
  - » Adaptation measures introduced early can reduce future costs to manage climate change (Australian Government Department of Climate Change and Energy Efficiency 2013).
- Administrative considerations – discretions and exemptions may need to be considered by the responsible authority where it is demonstrated that climate change adaptation measures are not feasible.
- This Planning Scheme response could be delivered alongside Recommendation 1B (Private development sustainability certification).

5.6 Environmental enhancement and protection

Environmental enhancement and protection refers to actions and regulations aimed at safeguarding and improving the natural environment.

As urban population growth continues it will be vital to reserve space for parks and nature. Green spaces are crucial for:

- **Human wellbeing** – as cities and neighbourhoods become denser, access to green spaces becomes more critical, providing opportunities for relaxation, exercise and mental rejuvenation. Urban residents need direct, personal experiences with nature. When people have positive encounters with green spaces, they are more likely to value and advocate for their preservation. Exposure to greenery has also been linked to reduced stress, anxiety and depression
- **Physical health** – green spaces encourage physical activity, reducing sedentary lifestyles which can be associated with urban living. Access to nature positively impacts overall health, including stress reduction and improved immune function
- **Biodiversity and ecosystem services** – green spaces support native flora and fauna. They act as refuges for wildlife, allowing them to thrive even in urban environments. These areas also contribute to ecosystem services such as air purification, carbon sequestration and water retention and treatment
- **Social cohesion** – green spaces serve as meeting points for communities. They can foster social interactions, community events, and a sense of belonging. Well-designed parks enhance social cohesion and create vibrant neighbourhoods and communities
- **Climate resilience** – trees and vegetation in green spaces help mitigate the urban heat island effect, regulate temperatures, and absorb excess rainfall. As density in the Structure Plan Area increases, maintaining these natural buffers is crucial for climate resilience.

What's the challenge in the Box Hill Structure Plan Area?

There is generally good provision and access to open space in the Box Hill Structure Plan Area but these spaces are prioritised more highly for community uses, and there are opportunities to enhance their contribution to biodiversity.

A decline in tree canopy cover in the Box Hill Structure Plan Area include:

- Loss of environmental amenity and biodiversity values, with the risk of dying trees in the streets and parks due to extreme heat and a lack of water
- Population growth, urbanisation and climate change are increasing pressure on the health and extent of the urban forest
- Two areas of biodiversity significance have been identified on the northern edge of the Box Hill Structure Plan Area
- The Strategic Biodiversity Value mapping reflects the lack of habitat in the Structure Plan Area with low to very low values throughout
- Existing open space is focused on community, sports, and linear parks, with a lack of conservation function parks.

Given the scale of change that SRL East is projected to generate, a key challenge will be protecting existing canopy cover and increasing canopy coverage and plantings to support biodiversity corridors and mitigate urban heat islands particularly in the activity centre. Opportunities to create and enhance green corridors and for rewilding in the Structure Plan Area's public and private realm will improve the connectivity and health of ecosystems.

High urban heat in the Box Hill Structure Plan Area is directly related to its low tree canopy cover, which is currently around 15 per cent cover.

The consolidation of lots and higher-density residential development will further reduce canopy cover and vegetation and increase the area of impervious surfaces, causing more fragmentation of habit and habitat corridors for local fauna (despite a council target to increase canopy cover of the municipality to 30 per cent).

The fragmentation of the Structure Plan Area's open spaces presents a challenge to improving biodiversity and green corridors. Roadways are also major impervious areas that contribute to the urban heat island effect and to air pollution.

Policy and planning challenges

Appendix A summarises planning policies and other documents reviewed to inform this Climate Response Plan. Findings include:

- This Climate Response Plan aligns with Outcome 6 of Plan Melbourne (2017-2050) (2017b) to make Melbourne a sustainable and resilient city, and Direction 6.4 to make Melbourne cooler and greener
- It supports the Victorian Planning Authority's Guidelines for Precinct Structure Planning in Victoria's New Communities, specifically Target 13 – Potential canopy tree coverage within the public realm and open space should be a minimum of 30 per cent (excluding areas dedicated to biodiversity or native vegetation conservation)
- It aligns with Protecting Victoria's Environment – Biodiversity 2037, and the goal 'Victorians Value Nature', by increasing the number of Victorians connecting with nature and enhancing biodiversity
- Greening projects in the Structure Plan Area will build on SRLA commitments to replant double the number of trees removed to construct SRL
- They will support achieving the council target of increasing the municipality's tree canopy coverage to at least 30 per cent
- The Victorian Planning Provisions (Clause 56.05: Urban Landscape) set landscaping objectives for residential apartments and urban landscape objectives for public realm in subdivisions, but there is potentially a gap in requirements for the development of private development sites
- There are currently no planning controls to support the expansion of green infrastructure across the Structure Plan Area.

While environmental protection is supported in the municipal planning scheme, there are no planning controls that require environmental enhancement.

It is important to include environmental enhancement requirements as part of development application assessments to limit further removal of key ecological assets.

Desired outcomes in the Box Hill Structure Plan Area

Effectively managed protected areas are critical for safeguarding biodiversity, maintaining ecosystems and preserving important habitats. Protected areas build climate change resilience, help maintain water quality, conserve natural resources, drive economic success, curb the spread of diseases and pests, and provide other benefits to wildlife and human health.[8]

To achieve the Box Hill Vision, the Box Hill Structure Plan should support enhancement of the environment, protect natural habitats and reduce fragmentation of biodiversity. This could support the following outcomes in alignment with local government policy, Plan Melbourne (2017b) and the Box Hill Vision:

- **Increased tree canopy cover,** supporting the Whitehorse City Council 30 per cent tree canopy target for the municipality (Whitehorse City Council Urban Forest Strategy (2021–2031))
- **Enhanced greening** of urban areas to address heat island impacts, improve amenity and create a cool and green environment
- **Protection of natural habitats** that support biodiversity and local wildlife through initiatives such as the retention of mature trees on public and private land
- **Improving biodiversity** in green spaces and waterways

[8] Protected Areas Have a Lot of Benefits. Here's How to Maximize Them. National Geographic (2019)

- **New and enhanced green corridors** and shadier streets to make walking and cycling easier and more enjoyable.

Recommendations and other opportunities

The most effective responses to support environmental enhancement will vary across public and private land in the Box Hill Structure Plan Area, but all will contribute to the desired outcomes listed above.

The following responses are recommended for the Box Hill Structure Plan to deliver a Future Accelerated State for environmental enhancement – aiming to close the gap between the environmental enhancement challenges facing the Structure Plan Area and the desired outcomes:

- **Recommendation 6A** –Urban greening strategy (Structure Plan response)
- **Recommendation 6B** – Green infrastructure for new developments (Planning Scheme response)
- **Opportunity 6C** – Partnerships to support environmental enhancement and protection (Other opportunities).

Recommendation 6A – Urban greening strategy

Structure Plan response

Description

A Structure Plan response is recommended to encourage a minimum 30 per cent tree canopy cover and enhanced green landscaping in the Structure Plan Area.

Impact

- This Structure Plan response could generate benefits including:
  - » Significantly improve the connectivity and health of ecosystems in the Structure Plan Area by creating and enhancing green corridors and rewilding in the public realm
  - » Enhance thermal comfort for the community in the public realm and deliver health benefits by increasing shading of transport corridors (particularly those used for active transport) with canopy cover
  - » Help to ensure that long-lived tree canopy cover in the Structure Plan Area is considered for retention
  - » Improve the provision of high-quality green open spaces that contribute to liveability in the Structure Plan Area, with greater tree canopy coverage and urban greening
  - » Australia-based research has identified that middle-aged and older adults are significantly more likely to undertake moderate to vigorous exercise when more than 20 per cent green space is available within a 1-kilometre radius of their home (Astell-Burt et al. 2014). The impacts on heat vulnerability can be calculated.
- Support implementation of:
  - » The Victorian Planning Authority Guidelines for Precinct Structure Planning in Victoria's New Communities: Target 13 – Potential canopy tree coverage within the public realm and open space should be a minimum of 30 per cent (excluding areas dedicated to biodiversity or native vegetation conservation)

- » Plan Melbourne (2017b): Direction 6.4 Make Melbourne Cooler and Greener, and Policy 6.4.1: The city must establish and maintain canopy trees along transport corridors, green buildings (roofs, facades and walls) and plant up open spaces—including parks, waterway corridors, school grounds and utility easements—together with the provision of a public open space network across Melbourne. Policy 6.4.2: Better planning, design and use of new and existing public open space is critical.
- » The Whitehorse City Council Urban Forest Strategy (2021–2031) outlines a vision for 'a diverse, healthy and resilient urban forest' and sets a canopy cover target for the municipality of 30 per cent by 2050, with an interim target of 27 per cent by 2031. The Urban Forest Strategy sets the objective to 'Grow more trees and vegetation across both the public and private realm to build climate resilience'.
- » Protecting Victoria's Environment – Biodiversity 2037: Goal: Victorians Value Nature.

Implementation considerations

- This objective is supported by the Planning Scheme Amendment in Recommendation 7B.
- Potential strategies to increase urban greening in the Structure Plan Area may include:
  - » Increase tree canopy coverage with understorey planting and greening in the following public spaces:
    - Trees and garden bed plantings, including street rights-of-way areas
    - Public transport (rail corridors) and active transport corridors (walking and cycling pathways)
    - Other public realm areas associated with linear infrastructure
  - » Encourage green walls and green roofs in new developments (particularly where site setbacks are not available)
  - » Explore opportunities to conserve existing areas with native vegetation in the Structure Plan Area to support habitats for native fauna
  - » Create new biodiversity connections and new open space or improve existing open space that provide conservation, habitat and biodiversity functions
  - » Ensure landscaping is climate-responsive, supports biodiversity, wellbeing and amenity.
- Precedent can be found in:
  - » Arden Structure Plan Objective 21 and Objective 22 which seeks to expand and improve green open space and increase the tree canopy to achieve 40 per cent coverage in public and private realm
  - » Fishermans Bend Framework Objective 4.3, which seeks to achieve 50 per cent tree canopy coverage in public spaces by 2050.
- Key considerations for the Box Hill Structure Plan Area:
  - » Space for trees as critical green infrastructure (including horizontal offsets, overhead clearance, passive irrigation and adequate soil volumes and root bridging) must be prioritised with equal importance with other street infrastructure including overhead and underground services, lighting, signage and urban elements
  - » Utility service providers have ownership of the utility and have final say and approval of designs, which gives them a high level of influence about their offset requirements for tree plantings
  - » Depending on the extent of existing green infrastructure on a development site, there may be an initial increase in upfront costs to developers to increase green infrastructure at a site to meet the urban greening targets
  - » Street section typologies can provide more information about placement and coverage. Where site setbacks are not available, the use of green wall and green roof solutions are encouraged. This is in line with the Building Environmental Sustainability Scorecard (BESS) framework which encourages green roofs and green walls and facades (see Appendix A)
  - » The BESS framework promotes vegetation and green infrastructure within and around private development, although it is limited in its capacity to influence tree canopy coverage and greening in the public realm
  - » Guidelines such as Victoria's Trees for Cooler and Greener Streetscapes: Guidelines for Streetscape Planning and Design, and Victoria's Movement and Place Framework can provide guidance for prioritising tree planting along transport corridors.

Recommendation 6B – Green infrastructure for new developments

Planning Scheme response

Description

A Planning Scheme Amendment is recommended to require development in the Structure Plan Area to deliver environmental enhancement and protection by greening buildings, increasing canopy planting, protecting vegetation, and climate adaptive landscaping.

Impacts

- This Planning Scheme response could generate benefits including:
  - » Multiple benefits from increasing tree canopy coverage and other greening measures, including significant improvements to ambient temperatures from shading and evapotranspiration
  - » Improved urban biodiversity with green infrastructure that provides habitat, enhances habitat connectivity, and improves air quality.

Implementation considerations

- It is recommended the Planning Scheme Amendment is applied to the following thresholds:
  - » In line with Recommendation 1B, if a development is greater than 5000 squared metres in gross floor area, the development is recommended to achieve a 5 Star Green Star Buildings (or equivalent independent standard) certified rating
  - » Under this approach, a development may pursue: 1) Credit 37 (Nature Connectivity) which requires development sites to encourage species connectivity, including through canopy cover, green roofs and other landscaping and 2) Credit 36 (Biodiversity Enhancement) which requires landscaping that enhances habitat provision
  - » For smaller developments below these thresholds, implementation could be considered through an Urban Greening Compliance Report that demonstrates:
    - – Urban greening targets – 30 per cent canopy and 50 per cent garden bed coverage across a development site
    - – Strategy to protect and retain and enhance existing site vegetation
    - – Demonstrate the use of an endemic and climate-adaptive landscape palette and vegetation selection
    - – Achievement of nature-positive outcomes (stopping biodiversity loss and restoring nature) across the development site
    - – Setbacks are maximised to ensure adequate space for tree canopy planting and landscaping
    - – Where setbacks are unable not possible, greening of building exterior (with green walls and green roofs).
- Precedent can be found in:
  - » Arden Precinct planning controls, which require 40 per cent of a site area to be green cover, including vegetation, podium landscaping, green roofs and green walls.
- Potential barriers to uptake for this Planning Scheme response include:
  - » Depending on the extent to which a development site currently includes green infrastructure (which is retained), there may be a minor initial increase in upfront costs to developers to introduce additional greening across the site to meet the identified urban greening targets
  - » Where green roofs are being considered, developers may need to consider structural implications from any associated weight loading (which may be particularly relevant for industrial development).
- Administrative considerations – discretions and exemptions may need to be considered by the responsible authority where it is demonstrated that an environmental enhancement and protection strategy is not feasible.
- This Planning Scheme response should be delivered alongside Recommendation 1B (Private development sustainability certification), the Urban heat island strategy recommendations, and the SRL East Structure Plan - Open Space Technical Report, the SRL East Structure Plan - Ecology and Arboriculture Technical Report - Box Hill.

Opportunity 6C – Partnerships to support environmental enhancement and protection

Other opportunities

Description

There is opportunity for a greater collaboration and partnership approach to address barriers and realise opportunities for achieving environmental enhancement and protection in the Structure Plan Area, including with Victorian Government departments (such as Parks Victoria), local governments, and major developers.

Impact

- This opportunity could generate benefits including:
  - » Greater access to resources, expertise and innovation opportunities
  - » Access to research and innovation aimed at conserving and protecting nature on Victoria's parks estate (The Nature Conservation Strategy 2021–2031)
  - » Advice from experience in managing a diverse network of parks from protected areas such as national, state and wilderness parks and nature conservation areas
  - » Access to additional project finance (green bonds, sustainable finance).

Implementation considerations

- Opportunities include:
  - » Undergrounding power lines to enable larger trees to be planted
  - » Increasing tree planting along major arterial roads and in service corridors
  - » Increasing protection of locally significant trees and vegetation
  - » Providing greater certainty about maintenance requirements and costs associated with more innovative streetscape designs.

Implementation considerations

- Opportunities identified through partnerships should align to:
  - » Victoria's Trees for Cooler and Greener Streetscapes: Guidelines for Streetscape Planning and Design
  - » Plan Melbourne (2017b): Direction 6.4 Make Melbourne Cooler and Greener.

5.7 Urban heat island strategy

Urbanisation disrupts the surface energy balance of an urban area. As population centres grow and develop, they modify a greater area of land and with corresponding increase in average temperature, forming urban heat islands.

As the Whitehorse City Council's Urban Forest Strategy (2021–2031) states:

> *'Trees are one of the most effective providers of shading and localised cooling. Hotspots can be ameliorated by increased vegetation and water in the landscape. Particularly in suburbs with low-rise buildings, mature trees provide thermal comfort by reducing the urban heat island effect in the height of summer.'*

Urban heat islands typically form when vegetation is replaced with non-reflective, high mass, water resistant, impervious surfaces that absorb a high percentage of incoming solar radiation. This often causes significantly warmer temperatures in urban areas. The main cause of the urban heat island effect is the modification of land through urban development which uses materials that retain heat, such as concrete and asphalt, which have a high thermal mass as well as a high heat capacity and thermal conductivity. Darker surfaces also absorb significantly more electromagnetic radiation than light surfaces and so magnify their contribution to an area's overall urban heat island effect.

Urban heat island mitigation measures can include:

- **Canopy coverage** – trees can reflect or absorb the sun's energy, limiting the heat absorbed by its shaded surface while providing natural cooling through evaporation. Increasing tree and vegetation cover helps reduce the heat island effect, generates health benefits and improves habitat diversity and connectivity, helping to conserve biodiversity
- **Ground coverage** – ground cover that receives enough water absorbs sunlight while providing a cooling effect through evaporation. Ground cover should aim to be passively watered to maximise the cooling effects and minimise water demand (may require supplementary water for irrigation)
- **Surface reflectivity** – minimum Solar Reflective Index (SRI) values should be established for the Structure Plan Area to minimise the urban heat island effect from solar gain. The SRI indicates the ability of a surface to reject solar heat, and is the combined value of reflectivity and emittance. A standard black is zero (reflectance 0.05, emittance 0.90) and a standard white is 100 (reflectance 0.80, emittance 0.90).

What's the challenge in the Box Hill Structure Plan Area?

The Box Hill Structure Plan Area currently experiences one of the lowest urban heat island effects of all Structure Plan Areas. The current urban heat island effect in the broader Box Hill suburb is a temperature difference of +8°C, driven by limited open space, low tree canopy and high-density development.

- The highest heat area in the Structure Plan Area with the lowest canopy cover is in the centre around the existing Box Hill Station and adjoining commercial area. Other areas of higher heat include Box Hill Institute and other public use zones (linked to service and utility), a retirement estate in the east and a residential estate in the south of the Structure Plan Area
- The highest combined heat hazard is located on the south-east and north-west side of the rail line in an area mainly occupied by commercial buildings
- The built environment being relatively tall and high density means it is already exposed to the impacts of climate change and urban heat island effects.Taller mixed-use developments and higher-density apartments are planned for the Structure Plan Area, which may result in contributing to the urban heat island effect by creating 'urban canyons' that retain heat and prevent natural airflow
- Urban heat islands in the Box Hill Structure Plan Area could become more widespread from climate change and increased urbanisation. As noted in Plan Melbourne (2017-2050) (2017b), 'Urban intensification will add to the urban heat-island effect unless offsetting measures are implemented. Greening the city can provide cooling benefits and increase the community's resilience to extreme heat events'.

Without focused efforts to mitigate the urban heat island effect, outdoor comfort for people may be at risk. Any further contribution to existing precinct urban heat islands may have a negative impact on the user experience and overall desirability of Structure Plan Area and the creation of great places.

Policy and planning challenges

Appendix A summarises planning policies and other documents reviewed to inform this Climate Response Plan. Findings include:

- Outcome 6 of Plan Melbourne (2017–2050) (2017b) aims to make Melbourne a sustainable and resilient city, and Direction 6.4 to make Melbourne cooler and greener
- Protecting Victoria's Environment – Biodiversity 2037 features a goal to help 'Victorians Value Nature' by increasing the number of Victorians connecting with nature and enhancing biodiversity
- The Victorian Planning Provisions (56.05 Urban Landscape) set landscaping objectives for residential apartments and urban landscape objectives for public realm in subdivisions, but there is potentially a gap in requirements for the development of private development sites
- There are currently no planning controls that require private land developers to deliver urban heat island mitigation measures in the Box Hill Structure Plan Area

It is important to include urban heat island mitigation provisions as part of development application assessments to limit development that may contribute to urban heat island effects.

Desired outcomes in the Box Hill Structure Plan Area

There is an opportunity to improve the current urban heat island impacts, and implement strategies to mitigate the urban heat island impacts of proposed future developments, and contribute to reducing the heat island effect in the Box Hill Structure Plan Area.

To achieve the Box Hill Vision, the SRL East Structure Plan Areas should include people-friendly streets, high-quality open spaces, functional green spaces, and embrace the natural qualities of the neighbourhood.

Urban heat island mitigation measures will play a crucial role in addressing the challenges posed by predicted rising temperatures across the Box Hill Structure Plan Area and could deliver benefits including:

- **Energy savings** – urban heat island mitigation can reduce energy consumption and decrease the need for air conditioning and other cooling systems
- **Improved air quality** – urban heat island mitigation helps improve air quality and reduce material surface temperatures, contributing to better public health and well-being (protecting the community from extreme heat with fewer heat-related illnesses and fatalities)
- **Enhanced comfort** – cooler urban environments improve community comfort and quality of life, and delivers high-quality outdoor spaces
- **Biodiversity support** – green spaces and vegetation foster biodiversity by providing habitats for various species. Urban heat island mitigation contributes to urban ecosystems and ecological balance.

The Whitehorse City Council Urban Forest Strategy (2021–2031) outlines a vision to deliver 'a diverse, healthy and resilient urban forest' as well as the objective to 'Grow more trees and vegetation across the public and private realm to build climate resilience.

Recommendations and other opportunities

The following responses are recommended for the Box Hill Structure Plan to deliver a Future Accelerated State for urban heat island mitigation – aiming to close the gap between the urban heat island challenges facing the Box Hill Structure Plan Area and the desired outcomes:

- **Recommendation 7A** – Structure Plan urban heat island mitigation (Structure Plan response)
- **Recommendation 7B** – Private development site urban heat island performance criteria (Planning Scheme response).

Recommendation 7A – Structure Plan urban heat island mitigation

Structure Plan response

Description

A Structure Plan Response is recommended improve urban heat island mitigation and performance in new developments, capital works and the public realm in the Structure Plan Area.

It is recommended the Structure Plan Response encourages existing developments to support the Structure Plan Response where possible.

Impact

- This Structure Plan Response could generate benefits including:
  - » Energy savings with reduced energy consumption for built form (due to reduced external heat load) and associated greenhouse gases
  - » Improved air quality
  - » Enhanced human health, wellbeing and comfort
  - » Biodiversity support by creating green spaces and habitat
  - » Improved functionality of urban design strategy, placemaking, and use of public open space through reduced social infrastructure surface temperatures
  - » Support implementation of Whitehorse City Council's Urban Forest Strategy (2021–2031) which outlines a vision to deliver 'a diverse, healthy and resilient urban forest' as well as the objective to 'Grow more trees and vegetation across the public and private realm to build climate resilience.
- The exact impact of the proposed surface urban heat island mitigation measure cannot be accurately quantified without microclimate modelling as the results are extremely sensitive to quantity and placement of mitigation measures.

Implementation considerations

- This response should be supported by Recommendation 7B
- Potential strategies to mitigate urban heat island impacts in the Structure Plan Area may include:
  - » Increasing canopy coverage – trees are one of the most effective providers of shading and localised cooling. Hotspots can be ameliorated by increasing vegetation and water in the landscape. In suburbs with low-rise buildings, mature trees are particularly effective at reducing the urban heat island effect at the height of summer (City of Whitehorse Urban Forest Strategy (2021-2031)). Key areas for Box Hill where there is low tree canopy coverage include Box Hill Central
  - » Increasing ground coverage – grasses, shrubs and low-lying vegetation absorb sunlight while providing a cooling effect through evaporation
  - » Surface reflectivity – selecting construction materials including for capital works for their minimum Solar Reflective Index (SRI) values will help minimise the urban heat island effect from solar gain on to surfaces, including for capital works.
- Precedent can be found in:
  - » Arden Structure Plan Objective 14 which seeks to mitigate the urban heat island in the public and private realm through strategies such as: requiring 75 per cent of project site areas to use building or landscaping elements that increase solar reflectance; and requiring all new buildings to meet a standard of 40 per cent green cover as demonstrated through the City of Melbourne Green Factor tool
  - » Fishermans Bend Framework Objective 4.3 – Tree planting to deliver 50 per cent urban forest canopy coverage in public spaces by 2050.
- Key considerations for the Box Hill Structure Plan Area:
  - » Irrigation requirements of existing and additional vegetation (canopy and ground cover) need to be considered. Water is vital to cooling the municipality, particularly through irrigation of green spaces
  - » Material selection must also consider heritage, character, durability or maintenance criteria.

» The City of Melbourne's Green Factor Tool[9] (or equivalent alternatives) may provide a suitable format to assess the credentials of a project's green infrastructure and its impact on the urban heat island effect

» This Structure Plan response should be delivered alongside: Environmental Enhancement and Protection recommendations; Recommendation 2A (Place-based IWM interventions); and the SRL East Structure Plan - Open Space Technical Report.

Recommendation 7B – Private development site urban heat island performance criteria

Planning Scheme response

Description

A Planning Scheme Amendment is recommended that requires development to minimise the urban heat island effect from solar gain by meeting Minimum Solar Reflective Index (SRI) values. The Planning Scheme Amendment should include the following technical compliance criteria:

Exposed materials across 75 per cent of the total project site (in plan view) that comprise building or landscaping elements to achieve the following SRI values:

- SRI>34 for unshaded hardstand surfaces
- SRI>64 for roofing material.

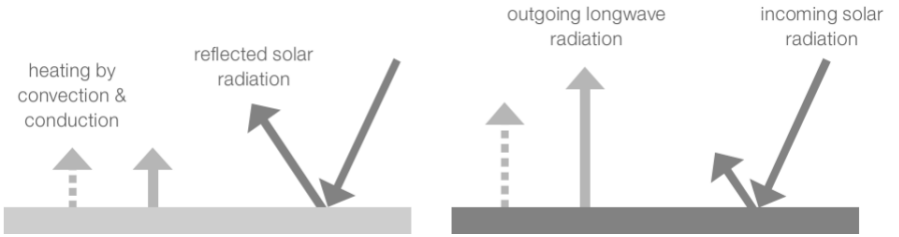

FIGURE 5.3 URBAN HEAT ISLAND EFFECT – IMPACT OF COLOUR SPECIFICATION (SOURCE: BLUESCOPE STEEL)

Impact

- This Planning Scheme response could generate benefits including:
  - » Minimised contribution to the built form urban heat island by increasing the heat reflected by pavements and rooftop materials
  - » Minimised rooftop solar gains in buildings

[9] Green Factor Tool: https://www.greenfactor.com.au/

- » Improved functionality of urban design strategy, placemaking, and use of public open space through reduced social infrastructure surface temperatures
- » Reduced energy consumption for built form (due to reduced external heat load) and associated greenhouse gases
- » Human health, wellbeing and comfort.

- The exact impact of the proposed surface urban heat island mitigation measure cannot be accurately quantified without microclimate modelling as the results are extremely sensitive to quantity and placement of mitigation measure.

Implementation considerations

- The Planning Scheme Amendment is recommended to apply to the following thresholds:
  - » In line with Recommendation 1B, if a development is greater than 5000 squared metres in gross floor area, the development is recommended to achieve a 5 Star Green Star Buildings (or equivalent independent standard) certified rating. Under this approach, development will be required to achieve Credit 19 (Heat Resilience) which requires, at a minimum, that a building demonstrates that 75 per cent of the whole site area comprises one or a combination of strategies that reduce the heat island effect
  - » For smaller developments below these thresholds, implementation could be considered through a Sustainability Management Plan (SMP) where developers would respond to a checklist of requirements to demonstrate how they have met the planning control.
- Precedent can be found in:
  - » Arden Precinct planning controls which contain a minimum requirement that the equivalent of at least 75 per cent of the development's total site area as building or landscape elements that reduce the impact of the urban heat island effect
  - » Fishermans Bend planning controls for new developments mandate equivalent SRI performance across 70 per cent of the total project site.
- Potential barriers to uptake for this Planning Scheme response:
  - » More guidance on what constitutes an increase in solar reflectance will need to be developed to guide developer responses. As much as possible this should mirror the Green Star Buildings credit criteria (Credit 19)
  - » Material selection must also consider heritage, character, durability or maintenance criteria. However, the capital cost impact for lighter coloured metal and pavers is considered cost neutral compared to darker materials.
- A number of initiatives are underway that would support the uptake of private development site urban heat island performance criteria, including:
  - » Plan Melbourne (2017-2050) (2017b) Strategy Direction 6.4 which notes that 'Other methods of cooling the city include the use of special heat-reflective coatings for dark building surfaces to reduce the amount of heat absorbed'. By selecting cooler or more reflective materials, surface temperatures can be reduced by 20 to 40°C degrees compared to standard material specification (darker and more absorbent materials).
- Administrative considerations – discretions and exemptions may need to be considered by the responsible authority where it is demonstrated SRI values are unachievable.
- This Planning Scheme response should be delivered alongside Recommendation 1B (Private development sustainability certification), recommendations outlined in Environmental Enhancement and Protection, and the requirements and recommendations of the SRL East Structure Plan - Open Space Technical Report.

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Joint Venture

Appendix A

Policy and planning review

A-1 POLICY AND PLANNING REVIEW

A-1.2 PLANNING SCHEME REVIEW

Provisions of the planning scheme which relate to environmentally sustainable design (ESD) for the Box Hill Structure Planning Area are:

- The Planning Policy Framework which contains state, regional and local planning policies, including:
  - » Whitehorse City Council ESD planning policy (Clause 22.10)
- Particular provisions such as the energy efficiency requirements in Clauses 58 and 55.07 for Apartment Development, energy, and Clause 53.18 Stormwater Management in Urban Development.

The local ESD planning policies require the preparation of a Sustainable Design Assessment or Sustainable Management Plan (depending on development thresholds) which are based around the Sustainable Design Assessment in the Planning Process (SDAPP) Framework. The SDAPP framework was developed by Victorian local government councils to provide a streamlined and consistent methodology for requesting, receiving and assessing built environment sustainability outcomes through the planning process. The SDAPP Framework aims to ensure sustainability is considered at the very early design phase to maximise sustainability outcomes. The Framework sets policy objectives articulated in local ESD planning policies and supporting tools to implement the Framework, including the Built Environment Sustainability Scorecard (BESS).

Other requirements such as building regulations under the National Construction Code (NCC) must also be considered in the built environment.

The main sustainability challenges in the Box Hill Planning Scheme are summarised in Table A.1.

TABLE A.1 SUMMARY OF SUSTAINABILITY CHALLENGES IN BOX HILL PLANNING SCHEME

Topic	Summary of challenge
General	• The Whitehorse ESD planning policies both require applicants for medium and large developments to prepare a Sustainable Design Assessment (SDA) or Sustainability Management Plan (SMP) (depending on the size of the development) to demonstrate how the development is addressing local ESD planning requirements. However, many planning policy elements are not mandated (they are 'encouraged') and the responsible authority makes a decision on the adequacy of the development approach.
General	• Implementation of SDAs and SMPs using BESS supports mandatory pass requirements on stormwater (100 per cent), indoor environment quality (50 per cent), water (50 per cent) and energy (50 per cent). However, BESS does not mandate achievement against other categories. It also does not address challenges related to materials, embodied carbon, climate resilience, or canopy coverage.
General	• Sustainable Design Fact Sheets support the implementation of ESD policies. Best practice expectations are considered against a range of sustainability challenges and climate response areas. However, implementation is primarily at the discretion of applicants.

A-1.3 POLICY ANALYSIS

Victoria's legislative and policy framework outlines a strong focus on driving sustainability outcomes across climate change, biodiversity, circular economy and transport in the coming decades. Legislation such as the *Climate Change Act 2017* (Vic) and Victorian Government policies such as Recycling Victoria: A new economy (2020), and Water for Victoria (2016) aim to achieve net zero greenhouse gas emissions, support a circular economy, create integrated water management, and address climate change impacts across Melbourne.

A range of Whitehorse City Council policies set sustainability objectives for the next decade. Whitehorse City Council's Climate Response Strategy 2023-2026 (2023) outlines their ambitions and proposed actions to respond to climate change and support community climate action. These are summarised in Appendix A.

There is a reasonably strong alignment between Victorian Government and local government policies with the SRL vision for sustainability, particularly in relation to biodiversity, urban forests and integrated water management outcomes. Ambitious targets in Plan Melbourne 2017-2050 (2017b) (supported by Whitehorse) include increasing the tree canopy cover to 30 per cent, as well as long-term strategies to support collaboration with water authorities to develop flood resilience and recycled water.

The challenge for the Box Hill Structure Planning Area is that implementation of these policies through the existing local planning schemes is limited. This is a significant gap which, if not addressed, may prevent the Box Hill Structure Planning Area from achieving meaningful progress in achieving the SRL sustainability ambition.

A.2 RATING TOOLS AND FRAMEWORKS

SRLA is committed to demonstrating leadership on climate action and sustainability and recognise that decisions on land use and development today have ongoing, long-term consequences for the future. Using a third-party 'green building' rating system may offer benefits of independent verification of built-form sustainability outcomes in the Box Hill Structure Planning Area. Third-party rating systems provide proof that architects, contractors, and consultants have fulfilled their promises in terms of sustainable design and operation, and help to verify that buildings meets specific standards, ensuring accountability and transparency.

The delivery of SRL offers the opportunity to rethink how development in the Box Hill Structure Planning Area occurs to drive a more sustainable and resilient built environment. This is particularly critical in the core of the Box Hill Structure Planning Area, where the most significant increase in development and population is expected.

While increased urban density can provide conveniences and potential sustainability benefits, the projected population growth also:

- **Intensifies resource consumption** – greater demands on energy and other natural resources
- **Increases waste generation** – leads to more waste being generated, which often goes to landfill
- **Reduces urban green space** – increases pressure on green space to accommodate high-density development.

There is also increasing expectation from communities, occupiers, employees and investors that buildings are designed with sustainability and health at front of mind.

A range of existing best-practice sustainability guidance documents, frameworks and rating tools can be leveraged to ensure that leading sustainability outcomes in land use and development are achieved in the Box Hill Structure Planning Area. Table A.2 provides a high-level analysis of the applicability of the National Construction Code (NCC) Section J, the Built Environment Sustainability Scorecard (BESS), and Green Star Buildings to the sustainability focus areas in this Climate Response Plan.

The analysis found:

- The purpose of Section J of the National Construction Code (NCC) is to focus on energy efficiency in buildings. It encompasses regulations, requirements and guidelines to ensure commercial and residential constructions in Australia align with global sustainability standards. Section J can deliver outcomes related to reducing greenhouse gas emissions, efficient energy use and encouraging the use of on-site renewable energy. Section J plays a crucial role in promoting energy efficiency and sustainability in building design and operation, benefiting occupants and the environment, but does not deliver outcomes against the remaining Climate Response Plan focus areas.
- Adopting current sustainability frameworks such as BESS that support Sustainability Design Assessments (SDAs) and Sustainability Management Plan's (SMPs) as part of the Permit Application process do not adequately address the focus areas identified in the Climate Response Plan. The BESS framework is not mandated, meaning there is currently no requirement for developers to achieve all the outcomes prescribed in BESS (other than achieving the minimum credits for the mandatory categories) when applying for a planning permit. Even when the highest 'Excellent' score is targeted (>70 per cent score) the BESS framework delivers building performance that is below the benchmark of voluntary sustainability rating systems (such as Green Star) and is therefore not the focus of recommendations in the Climate Response Plan.
- Green Star Buildings strongly supports a broader range of sustainability outcomes that go beyond standard practice, and more closely align with the outcomes targeted in the Climate Response Plan, across all Climate Response Plan focus areas. More information on Green Star Buildings is provided in below.

TABLE A.2 FOCUS AREAS FOR BOX HILL CLIMATE RESPONSE PLAN AND ALIGNMENT TO OTHER FRAMEWORKS

Focus area	Strategy	Alignment to: NCC	BESS	Green Star
Realising net zero	Enable reductions in energy consumption and an accelerated transition to net zero	Partial	Partial	✓
Integrated water management	Embed sustainable water management practices in Structure Plan Area planning and design	✗	✓	✓
Circular economy and sustainable procurement	Foster responsible use of resources and supports the transition to a circular economy	✗	✗	✓
Place-based measures to promote zero emissions transport	Provide active and sustainable transport options	✗	✓	✓
Climate change adaptation	Mitigate climate risks and hazards to create climate resilient and adaptive places	✗	✗	✓
Environmental enhancement and protection	Protect natural habitats and improve biodiversity in green spaces and waterways	✗	✓	✓
Urban heat island strategy	Mitigate climate risks and hazards to create climate resilient and adaptive places	✗	Partial	✓

A comprehensive evaluation of the performance benchmarks against each sustainability framework in the context of the Box Hill Structure Planning Area has not been undertaken. The Council Alliance for a Sustainable Built Environment (CASBE) has undertaken more significant analysis on rating tools, which is available here at www.casbe.org.au/what-we-do/sustainability-in-planning/.

A-2.1 GREEN STAR

Green Star is a voluntary sustainability rating system for buildings in Australia. It was launched in 2003 by the Green Building Council of Australia (GBCA), a not-for-profit organisation with the key objective of driving the transition of the Australian property industry towards the design and construction of a more sustainable built environment.

The Green Star tools are holistic sustainability frameworks that are tried and tested in the Australian market.

TABLE A.3 GREEN STAR TOOL RECOMMENDATION

Rating tool – Green Star Buildings
Launched in 2020, Green Star Buildings is especially designed to meet the challenges of the next decade, delivering assets that meet the expectations of today as well as being future ready and able to withstand evolving customer demands, regulatory requirements, and increased scrutiny against greenwashing. Green Star Buildings is a holistic tool that extends beyond the environment to address the issues that will define the next decade of the built environment. The tool's 8 categories enable owners and developers to act on the areas of sustainability that matter most, future proofing a building for the long-term. Green Star Buildings includes the Climate Positive Pathway which requires net zero operational energy. The pathway, which is mandatory for 5 Star Buildings, provides a clear set of targets aligned with the IPCC recommendations to help deliver a climate positive building which is fossil fuel free, powered by renewables, highly efficient, built with lower carbon materials and offset with nature. Any building that meets the climate positive pathway automatically complies with the Climate Bonds Initiative, making attracting investment simpler than ever. Green Star Buildings are specifically designed to align with leading frameworks, including the UN Sustainable Development Goals, GRESB, IPCC recommendations and the Task Force for Climate Related Financial Disclosure.
Recommendation 1B – Private development sustainability certification: Implement a Planning Scheme Amendment that requires achievement of a Green Star Buildings (or equivalent independent standard) certification. For details, see Section 4.1.

A-2.2 EMERGING PLANNING

This Climate Response Plan coincides with other developments underway to improve the integration of best practice sustainable development requirements into Victorian and local government planning schemes. It is recommended this Climate Response Plan is revisited as these planning amendments and changes progress. This includes:

- **CASBE proposed 'Elevating ESD Targets' Planning Scheme Amendments** (n.d.) for 24 councils– the amendments are currently awaiting authorisation. CASBE sets out a range of proposed planning amendments that build on and elevate the existing local ESD policies and seek for them to be included as objectives and standards in a particular provision. Proposed ESD amendments would require new developments to:
  - » produce net zero operational carbon emissions
  - » make buildings more energy efficient
  - » provide a healthier and more comfortable environment for building occupants
  - » better manage water quality, use and collection; protect and enhance greening and biodiversity
  - » be more resilient to changing climate impacts.
- **Victorian Government ESD Roadmap** – implementation of the ESD roadmap is progressively making changes to the Victorian Planning Policy Framework. Further implementation will be underway to embed planning responses related to emerging Victorian Government strategies (such as reducing urban heat exposure, gas substitution). Updates to the Better Apartment Design Standards as a result of the Victorian Legislative Assembly Environment and Planning Committee's 2021 Inquiry into apartment design standards will also be considered as part of the ESD Roadmap.
- **National Construction Code (NCC)** (2022) (to be adopted May 2024) updates – to enhance residential energy efficiency for houses and other low rise multiple dwelling projects, with the aim of improving the minimal level of thermal performance of new homes. NCC 2025 is proposed to progress energy efficiency enhancements for commercial buildings and may consider net zero emissions for residential homes, with consideration of embodied carbon (DCCEEW 2023).

- **Climate Change and Energy Legislation Amendment (Renewable Energy and Storage Targets) Bill 2023** – proposes to bring forward Victoria's net zero emissions targets to 2045, and enshrine interim targets in legislation. It also proposes to update the *Planning and Environment Act 1987* (Vic) to include specific consideration of Victoria Government climate policy in the planning framework. Updates will also provide an additional duty to planning authorities to give due consideration to net zero targets and potential climate risks associated with development (Municipal Association of Victoria 2023).

The Arden and the Fishermans Bend urban renewal projects are instructive precedents for sustainable precinct development in Melbourne. These projects feature strong sustainability local policies through Clause 11.03 (Melbourne and Port Philip), which address topics including urban heat island and green infrastructure, sustainable transport, operational management plans, thresholds for 6 Star Green Star and a circular economy. Fishermans Bend also drives improved sustainability performance through Schedule 1 to Capital City Zone (Clause 37.04), which sets out application requirements and mandatory permit conditions relating to ESD. The policy precedents established at Arden and Fishermans Bend offer useful insights into the types of sustainable development requirements that have been pursued through urban renewal projects.

A.3 DETAILED REVIEW SUMMARY

A-3.1 REALISING NET ZERO

Policy	Title	Summary	Delivery alignment
State Policy	*Climate Change Act 2017* (Vic)	This is Victoria's key piece of climate change legislation, which has established a target of net zero greenhouse gas emissions by 2050, which has recently been updated to 2045. This is supported by five-yearly interim emissions reduction targets. Key features include the following: • Objectives to support a transition to net zero emissions and increase the resilience of all systems (including the built environment) to climate-related hazards • Requires the State Government to develop plans every 5 years to address the impacts of climate change.	• Aligns with the SRL vision to deliver climate responsive, net zero ready neighbourhoods by 2045. • To support these targets at a local level, there is a need to align with commitment to deliver buildings that achieve net zero emissions, or that are net zero ready. This is not currently a requirement in the planning scheme.
	Victoria's 2035 emissions reduction target (2023)	This policy establishes Victoria's emissions reduction target of 75-80 % by 2035, and net zero emissions by 2045. It commits to the following: • Update legislated Victorian Renewable Energy Target (VRET) to 65 % by 2030 • Legislate the new VRET target of 95 % renewable electricity by 2035 • Renewable energy storage capacity targets of 2.6 gigawatts (GW) by 2030, and 6.3 GW of storage by 2035 • Support existing homes to reduce emissions (e.g. via Solar Homes Program) and remove mandatory gas connection requirement for new housing developments • Update energy efficiency standards for all new buildings to support transition to buildings with lower energy use and emissions by 2030.	• Aligns with the SRL vision to deliver climate responsive, net zero ready neighbourhoods by 2045 and encourage uptake of renewable energy on a regional scale • To support these targets at a local level, there is a need to align with a commitment to deliver buildings that achieve net zero emissions, or that are net zero ready. This is not currently a requirement in the planning scheme.
	Victoria's Climate Change Strategy (2021)	This is Victoria's first Climate Change Strategy with actions to cut emissions for 2021–2025 and beyond. It commits to the following: • Target to achieve net zero emissions by 2050 (note: updated to 2045) • Source 50 % of Victoria's electricity from renewable energy sources by 2030 (note: proposed update to target aims for 65 % by 2030 and 95 % by 2035) • Update NCC to require all new homes to meet at least 7 Star energy efficiency standards • Expand the Victorian Energy Upgrades (VEU) program to improve energy efficiency for households and businesses • Provide rebates for solar panels, solar hot water systems and batteries to 778,500 households • Provide rebates for solar panels to 15,000 small businesses • Fund construction of affordable, energy efficient homes and energy efficient upgrades • Strengthen NCC energy standards for new commercial buildings and refurbishments from 2025	• Aligns with the SRL vision to deliver climate responsive, net zero ready neighbourhoods by 2045. • Opportunity to align with commitment to deliver buildings that achieve net zero emissions, or that are net zero ready, reduce energy demand, elevate energy efficiency standards and facilitate renewable energy generation and storage • Consider measures to improve energy performance of commercial buildings, given the strength of future updates to NCC standards is unknown.

Policy	Title	Summary	Delivery alignment
		• Implement the Gas Substitution Roadmap • Deliver local renewable energy projects (e.g. microgrids, neighbourhood batteries).	
	Gas Substitution Roadmap (2023)	This policy provides a roadmap to strengthen planning and building regulations and standards for new homes and commercial buildings by 2025, to phase out gas and transition to clean energy. It commits to the following: • Expand the VEU scheme to incentivise energy efficient products • Phases out VEU incentives for household gas appliances by the end of 2023 • VPPs to phase out gas connections for new homes requiring planning permits from January 1, 2024 (implemented via amendment VC250) • Investigate phased electrification of all new homes and most commercial buildings where feasible • Increase minimum energy efficiency standards for rented homes • Transition NCC to 7 Star Standard for new residential development.	• Aligns with the SRL vision to support deliver climate responsive, net zero ready neighbourhoods by 2045 • Opportunity to align with commitments to eliminate gas from new development and transition to renewable electricity where feasible.
	Plan Melbourne 2017-2050 (2017b)	Plan Melbourne sets out Melbourne's 35-year strategy to guide long-term land use, infrastructure, and transport planning. It commits to the following: • Transition to a low carbon city to support Victoria's net zero emissions target (policy direction 6.1). This is to be achieved by actions to reduce energy demand, improve energy efficiency, and increase the share of renewable electricity • Support local, precinct-scale initiatives that combine renewable energy and energy efficiency solutions • Review planning system to support ESD outcomes and develop State-level ESD planning standards • Advocate for higher building energy efficiency standards under the NCC • Embed renewable energy and energy efficiency considerations in land use planning and precinct structure planning processes.	• Aligns with the SRL vision to deliver climate responsive, net zero ready neighbourhoods by 2045 • Opportunity to align with commitments to reduce energy demand, improve energy efficiency, and utilise the planning scheme to provide performance standards that align with net zero targets, as state-wide ESD planning standards have not been introduced yet.
Council Policy	Whitehorse City Council Climate Response Strategy 2023-2026 (2023)	This policy outlines City of Whitehorse's strategy to reduce emissions and adapt its buildings and infrastructure to be climate resilient. It commits to the following: • Maintain carbon neutral status for corporate emissions • Source 100 % renewable electricity for council operations by 2025 • Achieve net zero corporate emissions by 2032 • Aspire for net zero community emissions by 2040 • Support community uptake of energy efficiency measures, solar PV panels and battery storage, and renewable electricity procurement • Facilitate increased uptake of walking, cycling, public transport and electric vehicles as an alternative to private vehicles.	• Aligns with the SRL vision to deliver climate responsive, net zero neighbourhoods by or before 2045 • Opportunity to extend commitments to introduce net zero amendment in the planning scheme.

Policy	Title	Summary	Delivery alignment
	Whitehorse City Council Climate Response Plan 2023-2026 (2023)	This policy outlines City of Whitehorse's actions to support, enable and encourage the community to mitigate and adapt to climate change. It commits to the following: • Partnerships that support rapid uptake of new emissions reduction technology, innovation and research opportunities • Achieve and maintain Climate Active certification and develop a pathway to net zero emissions for Council operations • Deliver a community energy performance advice service to residents and businesses • Explore community bulk purchase schemes for solar panels, energy-efficient appliances, renewable energy sources, electric vehicles and/or active transport options such as e-bikes.	• Closely aligns with the SRL vision to support delivery of net zero neighbourhoods and explore implementation of renewable energy solutions on a neighbourhood -wide scale • Opportunity to extend on the role of the planning scheme to support emissions reductions in built environment.
Planning scheme	Settlement	Clause 11.01-1S: • Features a strategy to deliver networks of high-quality integrated settlements by contributing to net zero greenhouse gas emissions through renewable energy infrastructure and energy efficient urban layout and urban design.	• Aligns the SRL vision by providing policy support for planning's role in the transition to net zero greenhouse emissions • However, the impacts of this high-level policy strategy are limited because the net zero ambition is focused at an urban design scale rather than a building design scale • Planning scheme does not set out specific requirements to deliver net zero emissions reductions for new developments.
	Built environment and heritage	Clause 15: • States that planning should facilitate development that 'supports the transition to net zero greenhouse has emissions'.	• Aligns with the SRL vision by providing policy support for planning's role in the transition to net zero greenhouse emissions • However, the impacts of this policy strategy are limited because the planning scheme does not set out specific requirements to deliver net zero emissions reductions for new developments.
	Building design	Clause 15.01-2S: • Features a strategy to improve building energy performance through siting and design measures that encourage passive design responses to minimise energy demand, on-site renewable energy generation and storage technology and use of low embodied carbon materials • Features a strategy to restrict the provision of reticulated natural gas in new dwelling development.	• Aligns with the SRL vision to drive energy performance improvements • However, the impacts of this policy strategy are limited because the planning scheme does not require building energy performance improvements for every development • Natural gas is prohibited in new dwellings, however, is allowed in all new commercial buildings (including offices).
	Renewable energy	Clause 19.01-2R: • Features a strategy to facilitate the uptake of renewable energy technologies on a site-by-site and neighbourhood level during the master planning of new communities.	• Aligns with the SRL vision by supporting renewable energy uptake through the planning scheme • However, there are no requirements for inclusion of renewable energy technologies for development typologies that

Policy	Title	Summary	Delivery alignment
			often consume larger amounts of energy (e.g. high-density commercial buildings).
	Environmentally sustainable development	Clause 22.10 (Whitehorse): • This is the key ESD planning policy in the planning scheme. It includes various strategies to facilitate and encourage environmentally sustainable development • Features strategies to reduce energy use and peak demand through design measures including building orientation, shading, optimising glazing and supporting uptake of renewable technology • A Sustainable Design Assessment (using BESS, STORM, or other methods) or a Sustainability Management Plan (using BESS/Green Star, STORM/MUSIC or other methods) and a Green Travel Plan required for residential and non-residential developments above given thresholds, and mixed-use development.	• Aligns with the SRL vision by requiring applicants to prepare an SDA or SMP that must consider energy efficiency • However, the planning scheme does not set out specific requirements to deliver net zero emissions reductions for new developments • BESS requires a 50 % mandatory energy score. However, the impact on development is limited because this score can be achieved through a variety of credits and does not include mandatory on-site renewable energy provision.
	Energy supply	Clause 19.01-1S: • Features strategies to support the development of energy generation, storage, transmission, and distribution infrastructure to transition to a low-carbon economy and to facilitate renewable energy generation and storage to meet on-site energy needs • Policy guidelines note to consider as relevant the long-term and interim emissions reduction targets under the *Climate Change Act 2017* (Vic).	• Aligns with the SRL vision by supporting renewable energy uptake through the planning scheme • This policy seeks to facilitate renewable energy development such as solar farms and wind farms • Opportunity to consider how SRLA neighbourhoods can support uptake of precinct-scale renewable energy solutions, through structure planning and/or strategic partnerships.

A-3.2 INTEGRATED WATER MANAGEMENT

Policy	Title	Summary	Delivery alignment
State Policy	Integrated Water Management Framework for Victoria (2017a)	This policy provides a strategic framework to guide collaboration between water sector stakeholders to deliver urban water management initiatives. • Led to the establishment of forums to implement integrated water management practices • Forums are responsible for driving integrated water management through collaboration to identify, prioritise and oversee the implementation of shared water opportunities.	• Aligns with the SRL vision by promoting interdisciplinary collaboration to deliver exemplary integrated urban water management outcomes.
	Water for Victoria (2016)	This policy outlines the Victorian Government's strategic plan to sustainably manage water resources. The plan identifies the following measures to support resilient and liveable cities and towns. It commits to the following: • Urban water corporations to develop climate change and resilience strategies which address alternative water sources • Partnerships between water sector and local government to improve wastewater management • Review planning and building regulations to improve stormwater management • Diversify water sources, including recycled water and stormwater • Adopt integrated water planning across Victoria, with place-based planning to support community values and local opportunities.	• Aligns with the SRL vision by supporting integrated water management to maximise liveability outcomes for all users and promote resilience to climate change and extreme weather events.
	Plan Melbourne 2017-2050 (2017b)	Plan Melbourne sets out Melbourne's 35-year strategy to guide long-term land use, infrastructure, and transport planning. A directive is to integrate urban development and water cycle management to support a resilient and liveable city and reduce pressure on water supplies. It commits to the following: • Strengthen planning provisions and precinct structure planning to make best use of all water sources in homes and precincts • Integrated water management forums to identify and prioritise places that would most benefit from the development of a place-based integrated water management plan • Protect water, drainage, and sewerage assets with land area buffers to protect from urban encroachment.	• Aligns with the SRL vision by proposing action to update the planning scheme and structure planning to support integrated water management in Structure Plan Areas.
	Built Environment Climate Change Adaptation Action Plan 2022-2026 (2022)	This policy establishes a vision for the built environment to be planned, designed, and operated to support climate resilient communities that can withstand water scarcity and flooding. It commits to the following: • Planning to address water-efficient design, water conservation and integrated water management practices (e.g. reuse of stormwater and recycled water) • Regulatory options as a cost-efficient means to support water conservation (e.g. rainwater tank installation and higher efficiency standards) • Design all new drainage and flood management infrastructure to account for climate change.	• Aligns with the SRL vision by supporting role of planning to deliver integrated water management design measures to enhance climate resilience.
	Building Victoria's Climate Resilience (2022a)	This policy sets out Victoria's approach to adapt and build resilience to climate change. A priority area is to integrate climate change adaptation into all aspects of the water cycle system (2022-2026). It commits to the following: • Utilise alternative water sources • New water efficiency standards for homes • Review building and plumbing requirements for rainwater tanks and water efficiency.	• Aligns with the SRL vision by supporting updated planning and building requirements to improve water efficiency and utilise alternative water sources.

Policy	Title	Summary	Delivery alignment
Council Policy	Co-Designed Catchment Program for the Dandenong Catchment Region: Working together for healthy waterways (2021)	This policy provides a strategic framework to protect and enhance the health of waterways of the Port Phillip and Westernport region to deliver co-benefits to the environment, community, and economy. Goals include managing the catchment to be integrated and address the whole water cycle. It commits to the following: • Use Victoria's planning system effectively to protect and enhance waterway corridor • Ensure programs, standards, tools, and guidelines are in place to protect wetland vegetation communities from urban and rural threats.	• Aligns with the SRL vision by supporting role of planning to deliver integrated water management design measures to deliver a broad range of liveability benefits.
	Whitehorse City Council Integrated Water Management Strategy 2022-2042 (2022)	This policy document sets out Whitehorse City Council's approach to managing water for the 20-year period between 2022-2042. It commits to the following: • 500 kg/yr of nitrogen removed from stormwater through Council projects • 60 ML/yr reduction in stormwater discharged to waterways through Council projects • 100 % of projects cross consider integrated water management and flood mitigation as part of design • Aspire to support the community to reduce its potable water use to 140 litres/person/day.	• Aligns with the SRL vision by setting targets to improve stormwater management and adopt integrated water management practices. Planning scheme requirements can be used to support delivery of community potable water target.
Planning scheme	Integrated Water Management	Clause 19.03-S: • Seeks to sustainably manage water supply and demand, water resources, wastewater, drainage, and stormwater through an integrated water management approach • Features a strategy to plan and coordinate integrated water management, bringing together stormwater, wastewater, drainage, water supply, water treatment and re-use, to: » Consider the catchment context » Protect downstream environments, waterways, and bays » Manage and use potable water efficiently. » Reduce pressure on Victoria's drinking water supplies » Minimise drainage, water or wastewater infrastructure and operational costs. » Minimise flood risks » Provide urban environments that are more resilient to the effects of climate change » Manage stormwater quality and quantity through a mix of on-site measures and developer contributions at a scale that will provide greatest net community benefit » Integrate water into the landscape to facilitate cooling, local habitat improvements and provision of attractive and enjoyable spaces for community use.	• Aligns with the SRL vision by supporting the proposed outcomes for integrated water management for the Structure Plan Areas. • However, the impacts of this policy strategy are limited because supported outcomes are not mandatory.
	Building Design	Clause 15.0-2S: • Includes the strategy to encourage water efficiency and the use of rainwater, stormwater, and recycled water • Seeks to minimise stormwater discharge through site layout and landscaping measures that support on-site infiltration and stormwater reuse.	• Aligns with the SRL vision by encouraging water efficiency and stormwater reuse • However, the impacts of this high-level policy strategy are limited because supported outcomes are not mandatory.
	Stormwater Management in Urban Development	Clause 53.18: • Provides standards for the retention and reuse of stormwater, mitigation of the impacts of stormwater on	• Aligns with the SRL vision by providing standards that require development to meet

Policy	Title	Summary	Delivery alignment
		the environment, property, and public safety, and to provide cooling, local habitat, and amenity benefits.	the current best practice performance objectives for stormwater quality, to maximise the retention and reuse of stormwater, and to demonstrate capability to manage storm events.
	Integrated waste and stormwater management - Apartment Design Standards	Clause 55.07-5 (Apartments up to 4 storeys) and Clause 58.03-8 (Apartments 5 storeys and above): • Standards apply to apartment buildings only and seek to ensure developments collect rainwater for non-drinking purposes such as flushing toilets, laundry appliances and garden use • Connecting to a non-portable dual pipe is encouraged but not required • Policy also seeks that buildings are connected to a non-potable dual pipe reticulated water supply, where available from the water authority.	• Aligns with SRL vision by promoting reuse of stormwater • However, the impact of standards is limited because they are expectations as opposed to mandatory requirements • The stormwater management system should be designed to meet the current best practice performance objectives for stormwater quality.
	Environmentally sustainable development	Clause 22.10 (Whitehorse): • Features strategies on the following: » Reduce total operating potable water use through appropriate design measures such as water efficient fixtures, appliances, equipment, irrigation, and landscaping » Encourage the appropriate use of alternative water sources (including greywater, rainwater, and stormwater) » Incorporate best practice Water Sensitive Urban Design to improve the quality of stormwater runoff and reduce impacts on water systems and water bodies. • Clause can be addressed under BESS. BESS also seeks water efficient fittings and appliances, and irrigation by non-portable water • Sustainability Management Plans or Sustainable Development Applications have a mandatory requirement to meet the Urban Stormwater Management Best Practice standards for water quality (CSIRO, 1999), e.g. through min 100 % STORM score, or compliant MUSIC model.	• Aligns with the SRL vision with some requirements on urban stormwater management • However, other water sensitive urban design measures and stormwater quality treatment measures are not mandatory and are only encouraged.

A-3.3 CIRCULAR ECONOMY AND SUSTAINABLE PROCUREMENT

Policy	Title	Summary	Delivery alignment
State Policy	Recycling Victoria: A new economy (2020)	This policy outlines Victoria's targets for 2030 to support waste reduction and resource recovery. It commits to the following: • Reduce waste to landfill (80 % of waste diverted from landfill by 2030) • Reduce waste generation per person (15 % reduction) • Halve the volume of organic materials going to landfill • All households to have organic waste recycling services by 2030 • Support appropriate waste to energy industry and will require mandatory recycling separation by commercial sites.	• Closely aligns with the SRL vision with clear goals to avoid waste generation and maximise recovery of resources over the next decade • Provides appropriate support to the expected development in SRL Structure Plan Areas by ensuring increasing organic waste is managed across households.
	Victoria Statewide Waste and Resource Recovery Infrastructure Plan (2018)	This policy provides strategic direction for managing resource recovery and waste infrastructure in Victoria for 30 years, including across key waste streams such as organics, recyclables, construction and demolition waste, and e-waste. It commits to the following: • Guide an integrated statewide waste and resource recovery system that effectively manages the expected mix and volumes of wastes and materials • Support a viable resource recovery industry • Reduces the number of valuable materials going to landfill.	• Closely aligns with the SRL vision by proposing actions that aim to support a circular economy across Victoria by providing the appropriate infrastructure to manage future waste generation and needs, including in SRL Structure Plan Areas.
Council Policy	Whitehorse City Council Waste Management Strategy 2018-2028 (2018)	This policy sets out a goal to increase waste diversion from landfill by 80 % It also includes general goals and actions to minimise waste. It commits to the following: • Undertake food and organics recycling • Planning in the face of closure of landfill sites • Strategically aligning waste contracts, and maximising resource recovery.	• Aligns with the SRL vision by setting strong ambition for Whitehorse to surpass Victoria's overall waste diversion ambitions • However, there are no clear actions nor targets to avoid waste, including through sustainable procurement measures.
Planning scheme	Waste and resource recovery	Clause 19.03-5S: • Includes a strategy to ensure future waste and resource recovery infrastructure needs are identified and planned for to manage all waste streams safely and sustainably and maximise opportunities for resource recovery.	• Aligns with the SRL vision to sustainably manage all waste streams and to maximise opportunities for resource recovery.
	Building Design	Clause 15.01-2S: • Includes a strategy to ensure the layout and design of development supports resource recovery, including separation, storage and collection of waste, mixed recycling, glass, organics and e-waste.	• Aligns with the SRL vision to facilitate a circular economy through resource recovery • This policy applies to all new buildings but has limited impact due to a lack of specific performance requirements • This policy does not include any consideration of construction and demolition waste
	ResCode and Apartment	Clause 55.07-11 and Clause 58.06-1: • Requires consideration of waste and recycling in new dwelling developments	• Aligns with the SRL vision to integrate circular economy and waste considerations into

Policy	Title	Summary	Delivery alignment
	Development Standards	through the preparation of a Waste Management Plan.	development design and operations • However, the impact of this policy is limited because it only applies to residential developments • There are no considerations or requirements around construction and demolition waste.
	Environmentally sustainable development	Clause 15.01-2L (Whitehorse): • Strategy to promote waste avoidance, reuse and recycling during the design, construction, and operation stages of development • Strategy to encourage use of durable and reusable building materials • Strategy to ensure sufficient space is allocated for future change in waste management needs, including (where possible) composting and green waste facilities.	• Aligns with the SRL vision to consider waste in the design, construction, and operation stages of development • However, it lacks specific requirements for SMPs • However, the impact of this policy is limited due to a lack of specific requirements for SMPs • There is also limited scope on waste management credits in the BESS scorecard, which addresses building re-use, food and garden waste and convenience of recycling • There is a need to strengthen requirements around construction and demolition waste and building materials.

A-3.4 CLIMATE CHANGE ADAPTATION

Policy	Title	Summary	Delivery alignment
State Policy	*Climate Change Act 2017* (Vic)	This policy is Victoria's key piece of climate change legislation, which establishes a target of net zero greenhouse gas emissions by 2050, which has recently been updated to 2045. It commits to the following: • A net zero target with five-yearly interim emissions reduction targets • Transition to net zero emissions and increase the resilience of all systems (including the built environment) to climate-related hazards • State Government to develop plans every 5 years to address the impacts of climate change.	• Closely aligns with the SRL vision to deliver climate resilient neighbourhoods by supporting adaptation measures in all sectors of the economy (including the built environment).
	Building Victoria's Climate Resilience (2022a)	This policy sets out Victoria's approach to adapt and build resilience to climate change across seven key systems including the built environment. It commits to the following: • Update building standards to better account for climate change impacts • Partnerships to support vulnerable communities to adapt to climate change • Support hazard-exposed communities to develop place-based resilient energy generation, including through temporary relief measures.	• Closely aligns with the SRL vision by supporting adaptation measures that are implemented through building standards and the planning systems.
	Built Environment Climate Change Adaptation Action Plan 2022-2026 (2022)	This policy establishes a vision for the built environment to be planned, designed, and operated to support climate resilient communities. It commits to the following: • By 2031, integrate climate change adaptation and emissions reduction into all relevant investment and decision-making across the Built Environment system • By 2051, adapt the entire Built Environment to climate change and contribute to emissions reduction • Update planning provisions to respond to climate change • Update building standards relevant to climate hazards • Support upgrades of existing building stock.	• Closely aligns with the SRL vision by supporting climate change adaptation measures that are integrated into the design and delivery of the built environment • Supports implementation of climate change adaptation through the planning scheme.
	Plan Melbourne 2017-2050 (2017b)	This policy establishes Melbourne's 35-year strategy to guide long-term land use, infrastructure, and transport planning. It commits to the following: • Strategic land use and infrastructure planning to mitigate exposure to natural hazards and adapt to the impacts of climate change • Mitigate exposure to natural hazards and adapting to the impacts of climate change	• Closely aligns with the SRL vision by encouraging climate change adaptation considerations to be integrated into strategic land use and infrastructure planning.
	Victoria's Climate Change Strategy (2022)	This policy details Victoria's current responses to climate change to achieve emissions reductions targets and increase climate resilience. ▪ Priority actions include ensuring relevant legislation, standards and codes support the use of best available climate change data and adaptive planning principles as part of decision-making on land use change and development.	• Closely aligns with the SRL vision to ensure land use planning and development decision-making accounts for climate change.
Council Policy	Whitehorse City Council Response Plan (2021)	This policy outlines City of Whitehorse's actions to support, enable and encourage the community to mitigate and adapt to climate change. It commits to the following: • Identifying and providing targeting assistance for vulnerable community members (i.e. through community partnerships, external funding such as government grants or other investment)	• Closely aligns with SRL vision to support community resilience to climate change • This can be delivered through the planning scheme by setting performance-based

Policy	Title	Summary	Delivery alignment
		• Develop and implement a climate vulnerability assessment framework and process for Council buildings and infrastructure assets to identify vulnerabilities to climate change • Form partnerships with local groups to support local climate change mitigation, adaptation and resilience projects.	requirements for development.
Planning scheme	Settlement	Clause 11: • Planning is to recognise the need for, and as far as practicable, contribute, towards climate change adaptation and mitigation.	• Aligns with SRL vision by providing high-level recognition of the role of the planning system in climate change adaptation • However, the impact of this policy is limited because it does not provide specific policies related to climate change resilience or adaptation relevant to the Box Hill Structure Plan Area.
	Natural hazards and climate change	Clause 13.01-1S: • Features strategy to develop adaptation response strategies for existing settlements in risk areas to accommodate change over time • Features strategy to ensure that planning controls allow for risk mitigation and climate change adaptation strategies to be implemented.	• Aligns with the SRL vision by providing support for climate change adaption planning controls to be implemented at the local level • However, the impact of this policy is limited because it does not provide specific policies related to climate change resilience or adaptation relevant to the Box Hill Structure Plan Area.

A-3.5 ZERO EMISSIONS TRANSPORT

Policy	Title	Summary	Delivery alignment
State Policy	*Transport Integration Act 2010* (Vic)	This policy is Victoria's principal transport Act. It features objectives that transport should actively contribute to environmental sustainability (Sect 10). It commits to: • Promote forms of transport which reduce environmental impacts and contribution of transport-related greenhouse gas emissions • Seek to increase the share of public transport, walking and cycling trips.	• Closely aligns with the SRL vision by promoting active and low-carbon transport options to contribute to a climate responsive transport network and deliver positive environmental outcomes.
	Victoria's Climate Change Strategy (2022)	This policy details Victoria's response to climate change to achieve emissions reductions targets and increase climate resilience. It commits to: • Promote action and targets to invest in innovative zero-emissions technologies, climate smart businesses and communities • Electrify public transport network • Increase provision of cycling and walking infrastructure	• Closely aligns with the SRL vision by supporting a climate responsive transport network which supports zero emissions technologies.
	Zero Emissions Vehicle Roadmap (2021c)	This policy provides a roadmap for Victoria to support a fully decarbonised road transport sector by 2045. It commits to the following: • Update the NCC from 2022 to reduce barriers to future installation of EV charging in new buildings • Land use planning to increase active transport and reduce car dependency.	• Closely aligns with the SRL vision to reduce emissions in transport by supporting uptake of less carbon-intensive transport choices and reducing transport-related greenhouse gas emissions.
	Plan Melbourne 2017-2050 (2017b)	Plan Melbourne sets out Melbourne's 35-year strategy to guide long-term land use, infrastructure, and transport planning. It commits to the following: • 20-minute city where communities can meet daily needs within a 20-minute walk, cycle or local public transport trip.	• Closely aligns with the SRL vision by seeking to deliver climate responsive transport network that reduces emissions through increased active transport.
	Victorian Cycling Strategy 2018-2028 (2018)	This policy establishes a vision and strategy to increase cycling uptake in Victoria. It commits to: • Investing in a safer, lower-stress, better-connected network • Prioritise strategic cycling corridors • Make cycling a more inclusive experience.	• Aligns with the SRL vision by promoting active and low-carbon transport options to contribute to a climate responsive transport network.
Local Policy	Whitehorse Cycling Strategy (2016)	This policy sets out Whitehorse City Council's vision, objectives and goals to increase uptake of cycling while respecting other community needs. It commits to the following: • Increase the percentage of all journeys to work trips made by bicycle from 0.7 % to 2 % by 2026 • Increase the percentage of journey to work trips by bicycle, which start and end in Whitehorse, from 1.1 % to 3 % by 2026 • Increase the number of short distance bicycle trips (1-5 km) by 7.5 % by 2026 • Promote cycling through infrastructure, education, leadership, and evaluation action • Continue to review green travel plans submitted to Council to ensure they align with the Whitehorse Cycling Strategy 2016.	• Aligns with the SRL vision by supporting cycling as a key component to delivering a climate responsive transport network.
	Whitehorse Integrated Transport Strategy (2011)	This policy provides a framework to support delivery of a sustainable, convenient, accessible, and safe travel network. It commits to the following: • Increase the use of sustainable transport modes to minimise the impact of transport on the environment	• Aligns with the SRL vision by supporting active transport modes as a key component to delivering a climate responsive transport network.

Policy	Title	Summary	Delivery alignment
		• Increase the use of sustainable transport modes that promote healthy lifestyles, such as walking and cycling.	
	Whitehorse Climate Response Plan 2023-2026 (2023)	This policy outlines City of Whitehorse's actions to support, enable and encourage the community to mitigate and adapt to climate change.. It commits to the following: • Investigate Council opportunities to increase the uptake of electric vehicles in the community and act on high value opportunities • Support opportunities to improve connectivity between sustainable transport modes (e.g. cycling routes and public transport hubs).	• Aligns with the SRL vision by supporting zero-emissions vehicle technologies and increasing the connectivity of municipality to enable uptake of lower emissions transport modes.
Planning scheme	Sustainable and safe transport	Clause 18.01-3S: • Features strategies to deliver the following: » Prepare for and adapt to climate change impacts » Prioritise the use of sustainable personal transport » Protect, conserve, and improve the natural environment by supporting forms of transport, energy use and transport technologies that have the least environmental impact » Avoid, minimise, and offset harm to the environment by protecting biodiversity and reducing transport-related greenhouse gas emissions. • Design development to promote walking, cycling and the use of public transport, in that order, and minimise car dependency.	• Closely aligns with the SRL vision by facilitating an environmentally sustainable transport system that prioritises walking and cycling, and public transport over private car use • However, the impact of this policy is limited because it does not include any specific requirements for new developments.
	Environmentally sustainable development	Clause 22.10 (Whitehorse): • Design development to promote the use of walking, cycling and public transport, in that order; and minimise car dependency. » Promote the use of low emissions vehicle technologies and supporting infrastructure.	• Aligns with the SRL vision with objectives to support active and public transport • However, the impact of this policy is limited because there is no mandatory pass score in BESS for transport categories • Under BESS, credits can be achieved for providing 1 bicycle space per dwelling for residents and 1 space per 5 dwellings for visitors, located in a convenient location. For non-residential, employee bicycle parking at 50 % more than existing Planning Scheme requirements can be awarded credits. Provisions of electric vehicle Infrastructure is limited to credit for providing one space that has electric vehicle charging infrastructure installed.

A-3.6 ENVIRONMENTAL ENHANCEMENT AND PROTECTION

Policy	Title	Summary	Delivery alignment
State Policy	Plan Melbourne 2017-2050 (2017b)	This policy sets out Melbourne's 35-year strategy to guide long-term land use, infrastructure, and transport planning. It commits to the following: • Support a cooler Melbourne by greening urban areas, buildings, transport corridors and open spaces to create an urban forest • Features various actions to promote enhanced greening outcomes.	• Closely aligns with the SRL vision by promoting green network enhancements, habitat restoration and open space connectivity.
	Living Melbourne: our metropolitan urban forest (2019)	This policy outlines Melbourne's strategy to 2050 to increase urban resilience by enhancing greening and urban forest approaches across metropolitan regions. It commits to the following: • Protect and restoring species habitat and connectivity • Increase urban canopy and understorey to achieve various targets across metropolitan regions • Increase greening in the private realm by strengthening planning and development standards.	• Closely aligns with the SRL vision by advancing targets for canopy coverage and understorey provision to enhance habitat provision and connectivity.
	Protecting Victoria's Environment Biodiversity 2037 (2023)	This policy communicates the long-term vision for Victoria's biodiversity to address challenges presented by climate change and population growth. It commits to the following: • Strategic land-use planning tools to better protect areas of private land that support significant biodiversity values • Identify opportunities for targeted land purchases.	• Closely aligns with the SRL vision by promoting action to deliver biodiversity conservation through strategic planning and provision of habitat.
	Metropolitan Open Space Strategy (2021a)	This policy provides a framework to strengthen Melbourne's open space network to enhance connectivity and maximise positive experiences in open spaces for the community. It commits to the following: • Explore place-based planning approaches to integrate green and blue infrastructure in precinct delivery • Review and, where needed, update relevant sections of the Victoria Planning Provisions and local planning schemes to align with the strategic framework.	• Closely aligns with the SRL vision by seeking to enhance provision of open space and green infrastructure through the planning scheme and structure planning.
Council Policy	Whitehorse Urban Forest Strategy (2021)	This policy aims to protect the urban forest across private and public land, expanding the urban forest and enhancing biodiversity. Key targets include increasing tree canopy to 27 % by 2031 and 30 % by 2050. It commits to the following: • Strengthen the Whitehorse Tree Management Plan and tree policies to protect and enhance vegetation • Advocate for strengthened State planning controls for vegetation protection on private land • Identify and quantify vegetation opportunities across the municipality on public land • Develop a decadal planting program with precinct plans to fill greening gaps and deliver on urban forest objectives • Develop a green corridors enhancement program	• Closely aligns with the SRL vision by encouraging uplift in standards to protect and enhance vegetation in the public and private realm.

Policy	Title	Summary	Delivery alignment
		• Strengthen nature strip planting guidelines and permit process to facilitate greening.	
Planning scheme	Protection of biodiversity	Clause 12.01S: • Features strategies to assist in the establishment, protection, and re-establishment of links between important areas of biodiversity, including through a network of green spaces • Support land use and development that contributes to protecting and enhancing habitat for indigenous plants and animals in urban areas.	• Aligns with the SRL vision by providing high-level policy support for a network of green spaces and enhancing biodiversity • However, the impacts of policy strategies are limited because supported outcomes are encouraged, but not mandatory.
	Landscaping - Apartment Design Standards	Clause 55.07-4 (Apartments up to 4 storeys) and Clause 58.03-5 (Apartments 5 storeys and above): • Includes metrics for deep soil and canopy tree provision • This policy applies to apartment developments only • It provides a sliding scale for greater deep soil and tree canopy coverage for site area. Canopy coverage requirements range from 5 % for small sites to up to 20 % for sites larger than 2500sqm.	• Aligns with the SRL vision by supporting landscaping provisions in high-density developments • However, the application of this standard is limited because it depends on the development context.
	Environmentally sustainable development	Clause 22.10 (Whitehorse): • Includes a strategy to protect and enhance biodiversity by incorporating natural habitats and planting indigenous vegetation.	• Aligns with the SRL vision by encouraging tree retention, planting of indigenous vegetation, and enhancing biodiversity • However, the impact of this policy is limited because it does not include any metrics or specific requirements • Under the BESS credit scoring, more points are available if the percentage of the site that is vegetated is increased. There are no minimum requirements, no metrics around tree canopy coverage, and no mandatory minimum pass scores for urban ecology.
	Tree conservation policy	Clauses 22.04 (Whitehorse): • Seeks to seeks to retain trees where they can reasonably be retained. If significant trees cannot be retained that these are replaced.	• Aligns with the SRL vision to retain or replace trees • However, there are no further requirements in relation to environment enhancement.
	Environment	Clause 21.05-4 (Whitehorse): • Seeks to ensure the replanting of tall trees and indigenous vegetation is appropriate to the type of vegetation in the area and enhances and retains biodiversity.	• Aligns with the SRL vision by supporting the planting of tall trees and indigenous vegetation.

A-3.7 URBAN HEAT ISLAND

Policy	Title	Summary	Delivery alignment
State Policy	Plan Melbourne 2017-2050 (2017b)	Plan Melbourne sets out Melbourne's 35-year strategy to guide long-term land use, infrastructure, and transport planning. It commits to the following: • Support a cooler Melbourne by greening urban areas, buildings, transport corridors and open spaces to create an urban forest and to strengthen the integrated metropolitan open space network • Update residential development provisions to mitigate against the loss of tree canopy cover and permeable surfaces because of urban intensification.	• Closely aligns with the SRL vision by supporting measures in land use planning and the planning scheme to enhance greening to support cooling.
	Living Melbourne: our metropolitan urban forest (2019)	This policy outlines recommendations to focus vegetation and canopy cover expansion efforts in various land use contexts. This includes greening in new precincts and infrastructure developments to support cooling. It commits to the following: • Increase urban canopy and understorey to achieve various targets across metropolitan regions • Increase greening in the private realm by strengthening planning and development standards.	• Closely aligns with the SRL vision by supporting urban heat island mitigation strategies in structure planning.
	Built Environment Climate Change Adaptation Action Plan 2022-2026 (2022)	This policy supports cooling and greening objectives to support climate resilience in the built environment. It commits to the following: ▪ Update planning schemes to include new provisions to reduce urban heat exposure, including targets and standards such as minimum tree canopy cover.	• Closely aligns with the SRL vision by supporting greening as an urban heat island mitigation strategy through the planning scheme.
	Better Apartments Design Guidelines – Victoria (2023)	This policy supports the implementation of the Better Apartment Design Standards with guidance on landscaping and open space requirements to support canopy trees, plants and other greenery that help to make cities cooler. It commits to the following: ▪ Supports landscaping standards on material specifications to lower surface temperatures and reduce heat absorption.	• Aligns with the SRL vision by providing standards for higher-density development to enhance cooling in the private and public realm.
Council Policy	Whitehorse City Council Urban Forest Strategy 2022-2040 (2022)	This policy outlines the vision and strategy for Whitehorse City Council to protect, enhance and connect natural assets in the municipality. The policy identifies the risk of increased urban heat islands due to urban densification, and emphasises the critical role played by trees in mitigating this impact. It commits to the following: • Measures to promote greening within the precinct identified within Environmental Enhancement and Protection apply to address urban heat island issues.	• Closely aligns with the SRL vision to increase vegetation and reduce urban heat gains through built form planning and design.
Planning scheme	Building Design	Clause 15.01-2S: • Includes a strategy to ensure development provides landscaping that responds to its site context, enhances the built form, creates safe and attractive spaces and supports cooling and greening of urban areas.	• Aligns with the SRL vision to encourage landscaping around buildings that supports cooling and greening of urban areas. • However, the impacts of policy strategies are limited because supported outcomes are encouraged, but not mandatory.

Policy	Title	Summary	Delivery alignment
	Environmentally sustainable development	Clause 15.01-2L (Whitehorse): • Includes strategy to provide environmentally sustainable landscapes and natural habitats and minimise the urban heat island effect • Encourage the retention of significant trees and the planting of indigenous vegetation.	• Aligns with the SRL vision to encourage vegetation to mitigate urban heat islands • Under the BESS credit scoring, more points are available if the percentage of the site that is vegetated is increased • There are no minimum requirements and no mandatory minimum pass scores for urban ecology • BESS encourages green roofs and green walls and facades, but these are not mandatory • BESS also does not include any metrics or credits for solar reflective materials or canopy tree coverage.

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