

**GREEN OUR CITY
STRATEGIC ACTION PLAN
2017–2021**

**VERTICAL AND ROOFTOP
GREENING IN MELBOURNE**



CITY OF MELBOURNE



A CITY THAT CARES FOR THE ENVIRONMENT

Environmental sustainability is the basis of all Future Melbourne goals. It requires current generations to choose how they meet their needs without compromising the ability of future generations to be able to do the same.

Womin-je-ka (Welcome)

The City of Melbourne respectfully acknowledges the Traditional Owners of the land, the Kulin Nation. For the Woiwurrung (Wurundjeri), Boonwurrung, Taungurong, Dja Dja Wurrung and the Wathaurong groups who form the Kulin Nation, Melbourne has always been an important meeting place for events of social, educational, sporting and cultural significance. Today we are proud to say that Melbourne is a significant gathering place for all Aboriginal and Torres Strait Islander peoples.

CONTENTS

Introduction	04
Actions to date	06
Overview of the green our city strategic action plan	11
A need for change	12
A closer look at the green our city strategic action plan	18
Next steps and reporting	26
Attachments and supporting material	27
Glossary	38
References	39

June 2017

Disclaimer

This report is provided for information and it does not purport to be complete. While care has been taken to ensure the content in the report is accurate, we cannot guarantee it is without flaw of any kind. There may be errors and omissions or it may not be wholly appropriate for your particular purposes. In addition, the publication is a snapshot in time based on historic information which is liable to change. The City of Melbourne accepts no responsibility and disclaims all liability for any error, loss or other consequence which may arise from you relying on any information contained in this report.

To find out how you can participate in the decision-making process for City of Melbourne's current and future initiatives, visit melbourne.vic.gov.au/participate

1. INTRODUCTION

The City of Melbourne covers 3770 hectares. The total built space in the municipality was 3198 hectares in 2015, an increase from 2953 hectares in 2013. In 2015, the residential population was 128,963 and based on current forecasts it is projected that the number of people residing in the municipality will double over the next two decades. Although this growth can be seen as a reflection of the city's popularity and liveability, this level of urbanisation and expansion poses challenges too.

Climate change also compounds the effect of such urbanisation. Reduced green space means that the city is less prepared to manage an environment with higher temperatures; the urban heat island effect; greater risks of flooding due to extreme weather events; and increased pressure on air quality as congestion worsens (see Figure 1).

The City of Melbourne has proactively taken action to support amenity, liveability and adaptation to climate change. Actions have focused on leading by example, expanding urban greening in public areas, making available relevant information and data to the public, and introducing changes to the planning scheme.

However, the City of Melbourne owns and controls less than one third of the city's land area, with the majority of the municipality in private ownership or other government ownership. In terms of built form, City of Melbourne owns 1.3 per cent of the buildings in the municipality (279 out of a total of 22152).

The size of the challenges faced by Melbourne demand a greater degree of green infrastructure than the city can deliver on its own. This is demonstrable by the fact that as of November 2017 there are only 38 green rooftops in the city

Ensuring the private sector is an active participant in this change will help the city to be in the best position to mitigate the impact of urbanisation, help deliver the city's six sustainability strategies and thus improve the city's resilience. It will also help maintain the city's cherished liveability status and ensure Melbourne continues to be a tourist and work destination, supporting our local jobs and economy.

Greening the City and Environmentally Sustainable Design (ESD)

Green infrastructure for the purpose of this report is defined as green roofs and vertical greening. Green Infrastructure forms part of a broader set of ESD initiatives which include measures such as indoor environment quality, energy efficiency, water efficiency, stormwater management, waste management and site permeability. This action plan focuses on green infrastructure within the private realm.

High Energy Use

Air conditioners in offices, industry & homes increase greenhouse gas emissions

Food Production

Climate change threatens urban sprawl food production and distribution

Poor Air Quality

Dust and vehicular pollution & trapped air in urban canyons

Hotter Cities

Heat-related illness & death.
Poor city liveability

Lack of Green Space

Water Quality

Urban run-off collects pollution

Flooding

Extreme rainfall clogs drains & leads to localised flooding

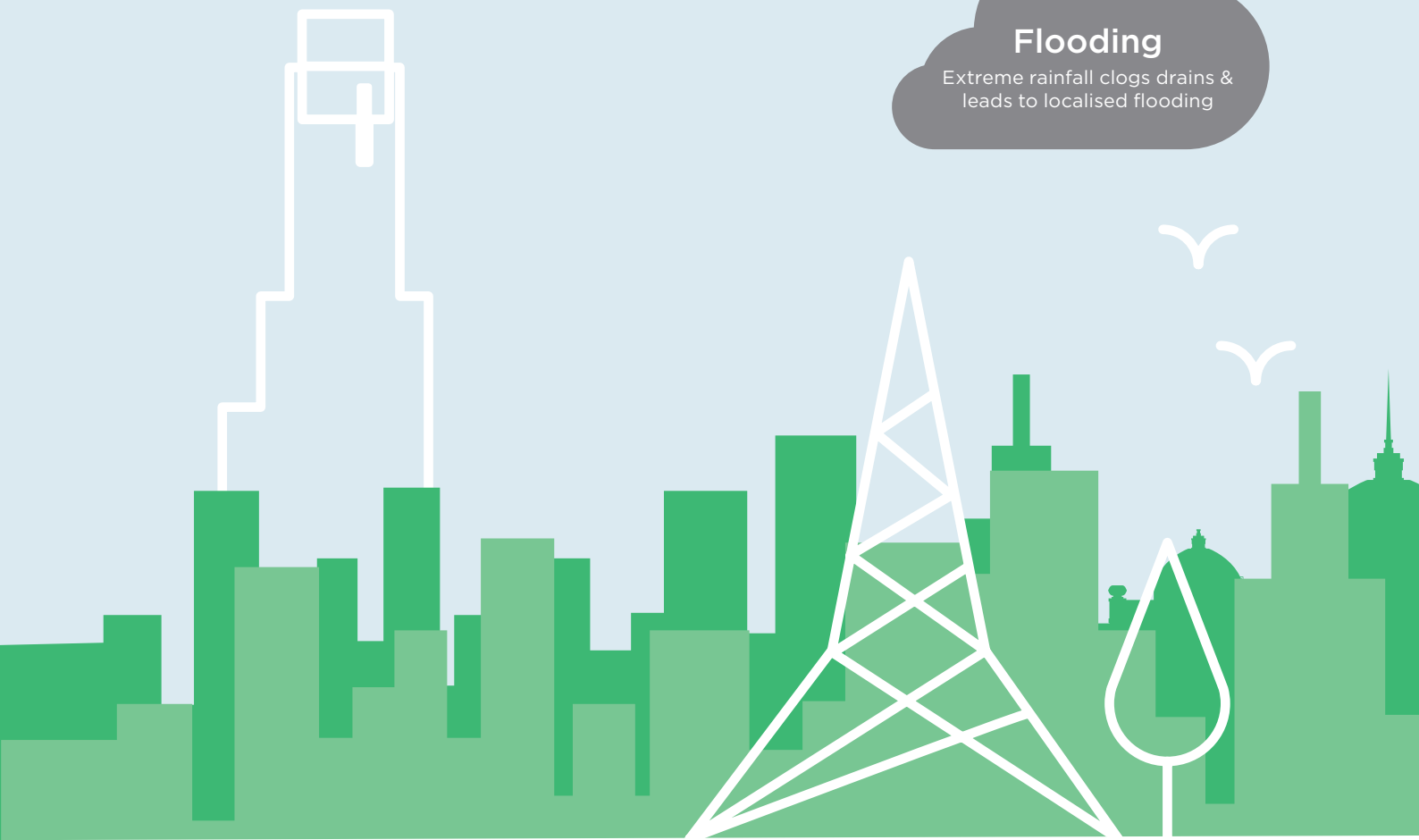


Figure 1: Impacts of climate change and urban densification that challenge liveability and resilience in Melbourne.

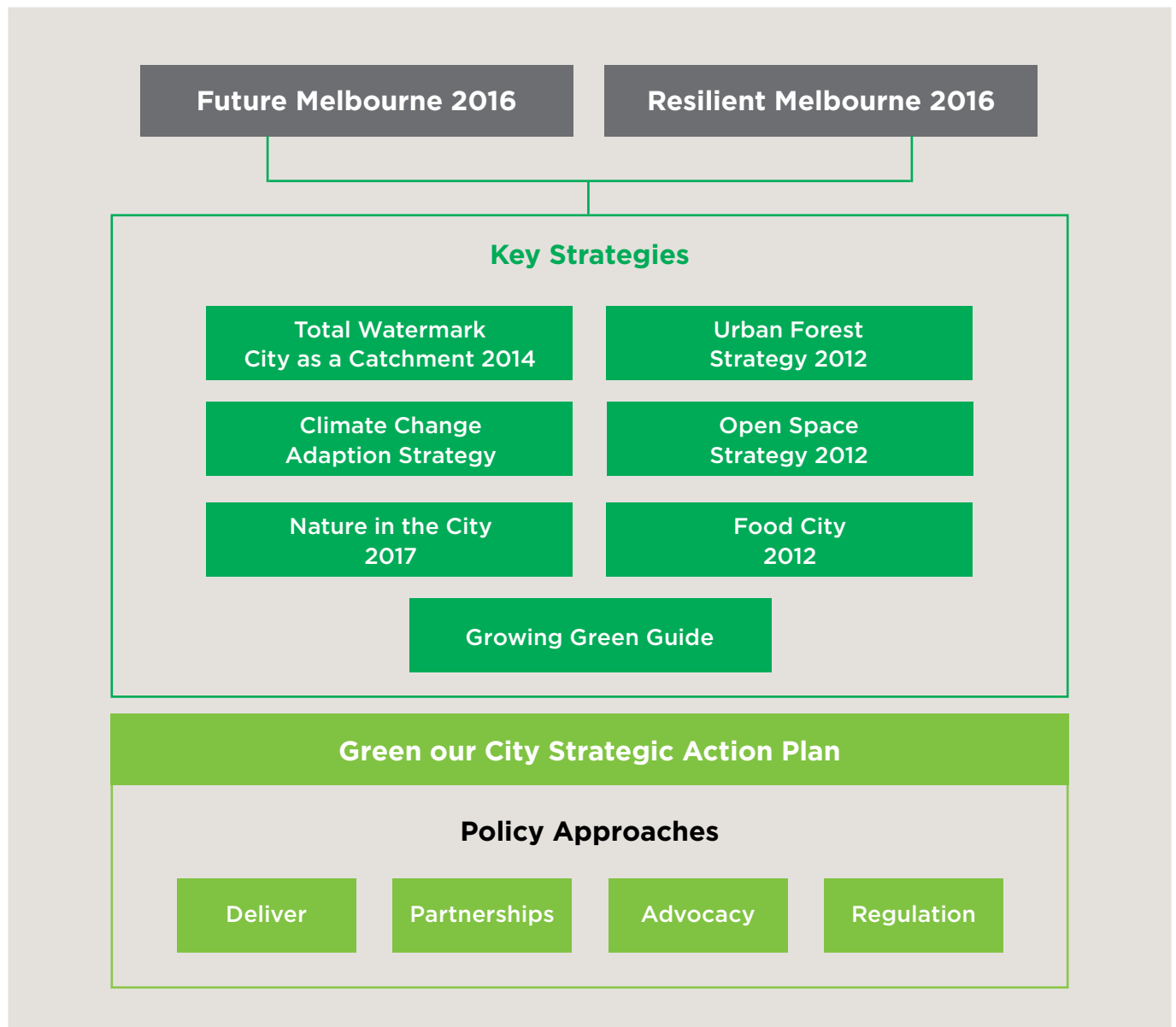
2. ACTIONS TO DATE

Much of the work undertaken to date by the City of Melbourne has focused on enhancing ESD initiatives in public places through strategies such as the Urban Forest Strategy, Total Watermark Strategy, Open Space Strategy, Climate Change Adaptation Refresh and Nature in the City. This is supported by Future Melbourne 2026, the community's plan for Melbourne and connected with wider Melbourne through the Resilient Melbourne Strategy (see Figure 2).

Many of these strategies identify targets for achieving ESD outcomes (Attachment 1). For example, the City of Melbourne has developed a climate change adaptation program which delivers the planting of 3000 trees per year, improved open spaces throughout the city and the implementation of water sensitive urban design and integrated water management outcomes in the public realm.

The Urban Forest Strategy 2012 makes specific mention of green infrastructure and includes green roofs and vertical greening in its definition of what an urban forest is. These elements are illustrated in Figure 3.

Figure 2: Policy context showing relevant strategies and outputs.



“The City of Melbourne’s Urban Forest comprises all of the trees and other vegetation – and the soil and water that supports it – within the municipality it incorporates vegetation in streets, parks, gardens, plazas, campuses, river and creek embankments, wetlands, railway corridors, community gardens, green walls, balconies and roofs.”

- Urban Forest Strategy 2012

To increase green infrastructure within the private realm, the City of Melbourne has:

- Developed a series of “how to” guides for home-owners and developers including the Growing Green Guide.
- Partnered on a number of demonstration green infrastructure projects including Green Your Laneway and Green Our Rooftop.
- Worked with the State Government to implement planning scheme amendment C270 for the Capital City Zone.

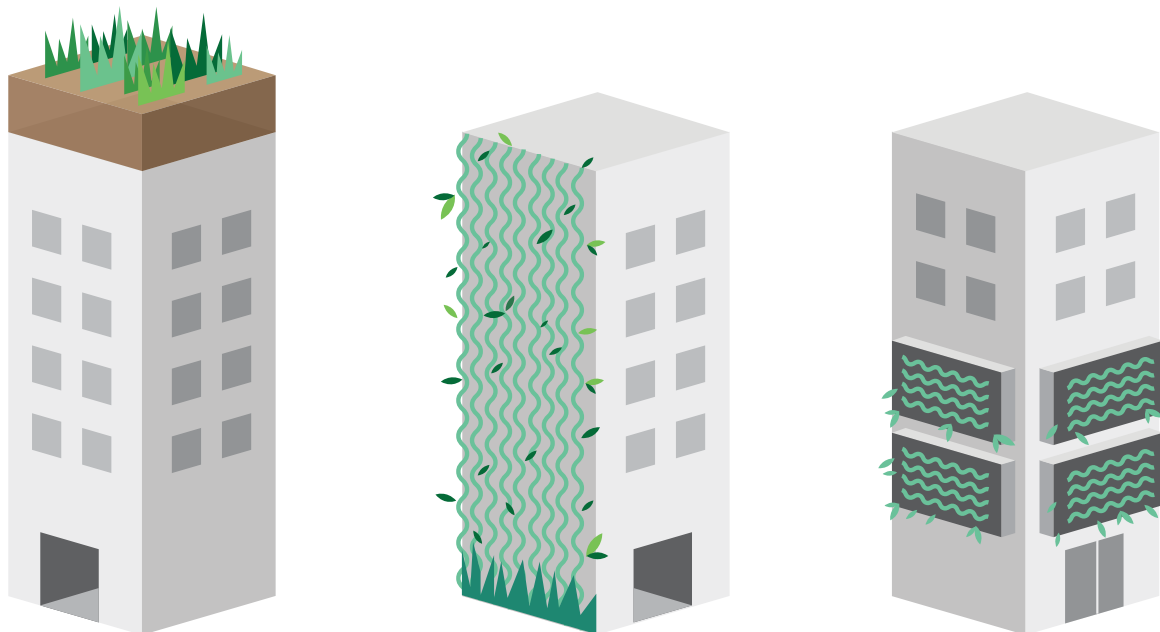


Figure 3: A green roof, facade and wall



The current planning framework

Green infrastructure initiatives within the private realm can be encouraged (discretionary provisions) and enforced (mandatory provisions) through the state and local planning framework.

There are challenges to this approach which are outlined within Attachment 2: The challenges of implementing sustainability measures through the Planning Scheme.

State policy

State Planning Policies apply to all planning schemes and therefore all land in Victoria. These policies must be taken into account when developing local policy and making planning decisions. The State Planning Policies help provide builders and developers, other industry stakeholders and the public, with clarity on the broad principles that the Victorian government considers should guide development across the state.

In April 2017 the Better Apartment Design standards were released. They apply to apartment buildings above 5 storeys. They include mention of ESD and green roofs and vertical greening.

Local policy

The Local Planning Policy Framework contains a Municipal Strategic Statement (MSS) and local planning policies. The framework identifies long term directions about land use and development in each municipality; presents a vision for its community and other stakeholders; contains locally applicable policies, and provides a rationale for the application of zone and overlay requirements and particular provisions in the scheme. Zones prescribe the type of land use allowed in an area. Overlays outline the development and built form requirements in an area, and additional requirements for subdivision, buildings and works. Particular provisions show requirements for any specific uses and development.

The MSS is a statement of the key strategic planning, land use and development objectives for a municipality and includes strategies and actions for achieving the objectives. The MSS provides the strategic basis for the application of local policies as well as zones and overlays. The City of Melbourne's MSS includes reference to vegetated rooftops as a method for increasing biodiversity in cities. The MSS is due to be updated this year.

The City of Melbourne currently references ESD and green infrastructure objectives within the MSS, local policy and some overlays.

City of Melbourne policies

The City of Melbourne's Energy, Water and Waste Efficiency Policy (22.19) implements the City of Melbourne's eco-city goals by ensuring that any new development meets the objectives of the energy, water and resource efficiency strategies. There is opportunity to update and broaden this policy to refer to contemporary best practice, rather than particular assessment tools and incorporate green infrastructure provisions including green roofs and vertical greening. These updates would align with recent policies from the Council Alliance for a Sustainable Built Environment (CASBE) (refer to Attachment 3).

The Growing Green Guide- A Guide to Green Roofs, Walls and Facades was developed by the then Inner Melbourne Action Plan Councils of Melbourne, Port Phillip, Yarra and Stonnington and the State Government of Victoria in 2014. This guide explains how to design, construct and maintain green roofs, walls and facades.

Policy limitations

Unlike mandatory provisions, local policies can be debated and interpreted (particularly at the Victorian Civil and Administrative Tribunal).

The current requirement within local policy 22.19 for 5 Star Green Star is only for 'preliminary design potential'. The applicant submits a report from an ESD engineer demonstrating how 5 stars can be achieved. The planning scheme does not require any accountability to ensure that the building complies with a 5 Star Green Star rating as built. The policy could include provisions for a third party ratings scheme to assess the development as built.

Expertise is required within Council at the planning assessment stage to understand when applicants are unrealistic in their approach.

City of Melbourne Design and Development Overlays (DDO)

City of Melbourne's DDO 10 allows for floor area uplift subject to developments delivering associated public benefits including publicly-accessible open space. However, this amendment is limited to parts of the city and only applies to significant new developments. Green infrastructure is an added extra rather than a necessary part of the design.

DDO60 includes the decision guideline '*whether the development will provide a microclimate where street trees, green roofs, and green walls can flourish*' however this statement really only applies if the applicant has already decided to include green infrastructure. A more useful inclusion into a DDO would encourage or mandate a minimum green infrastructure requirement.



3. OVERVIEW OF THE GREEN OUR CITY STRATEGIC ACTION PLAN

The crux of the issue is that despite all the action to date by the City of Melbourne to encourage green infrastructure, uptake of green roofs and vertical greening has been slow and as of November 2017 there are only 38 green rooftops in the municipality.

The action taken so far by City of Melbourne to help green our city's environment (refer to Table 1) has resulted in positive change to the city, but more significant results are needed to curb the loss of green space and provide additional greening to support a more populous, prosperous, healthy, cool and liveable city.

By developing a strategic action plan, a clear direction is set to address identified barriers the private sector faces and the gaps in the current approach so that in the future green infrastructure will become part of the norm. The delivery of the actions identified in this plan, along with Council's existing suite of aligned programs, policies and strategies, will contribute to the municipality's liveability, resilience and community health and wellbeing.

This action plan outlines the way Council and the community can substantially increase the quantity and quality of green infrastructure in both the public and private realm using a variety of approaches.

Table 1: Greening action taken by the City of Melbourne to date.

YEAR	ACTION
2005	Construction of the extensive green roof and green facades on City of Melbourne building Council House 2.
2008	Developing and continuing Australia's first quarterly green roof forum - Canopy: Melbourne's Green Roof Forum.
2008	Sponsoring and staff involvement in the Committee for Melbourne Growing Up project to build a green roof on a Melbourne building (131 Queen Street).
2010	Design and construction of the Venny green roofs and associated research project.
2010	Feasibility studies for green roofs on council buildings.
2011-14	Developing the Growing Green Guide for Melbourne project, Policy Options Paper and investigating demonstration sites.
2014-16	Funding Australian Research Council and Cooperative Research Centre projects to further research into green roofs, walls and facades.
2014	Creating a green facade in Fitzroy Gardens.
2015	Mapping all roofs in the municipality to determine their potential for green roofs. (Refer to Figure 8).
2015	Mapping laneway on ground and vertical surfaces in the central city to determine their potential for greening. (Figure 9).
2016	C270 Planning Scheme Amendment (State Government) put in place to allow floor area uplift in exchange for provision of public benefit including publicly accessible open space. This resulted in Design and Development Overlay (DDO) 10.
2016	Creation of a position for coordination of green infrastructure across City of Melbourne in urban sustainability.
2016-17	Green Your Laneway pilot project.
2017	Commenced literature study, gap analysis and priorities for 'Quantifying the Benefits of green roofs, walls and facades in Melbourne' to establish evidence base.
2017-21	Partnering with the Department of Environment, Land, Water and Planning to deliver a publicly-accessible 'demonstration' green roof.

4. A NEED FOR CHANGE

To manage the impacts of climate change, population densification and development in the city, City of Melbourne needs to accelerate action to increase green infrastructure in the city.

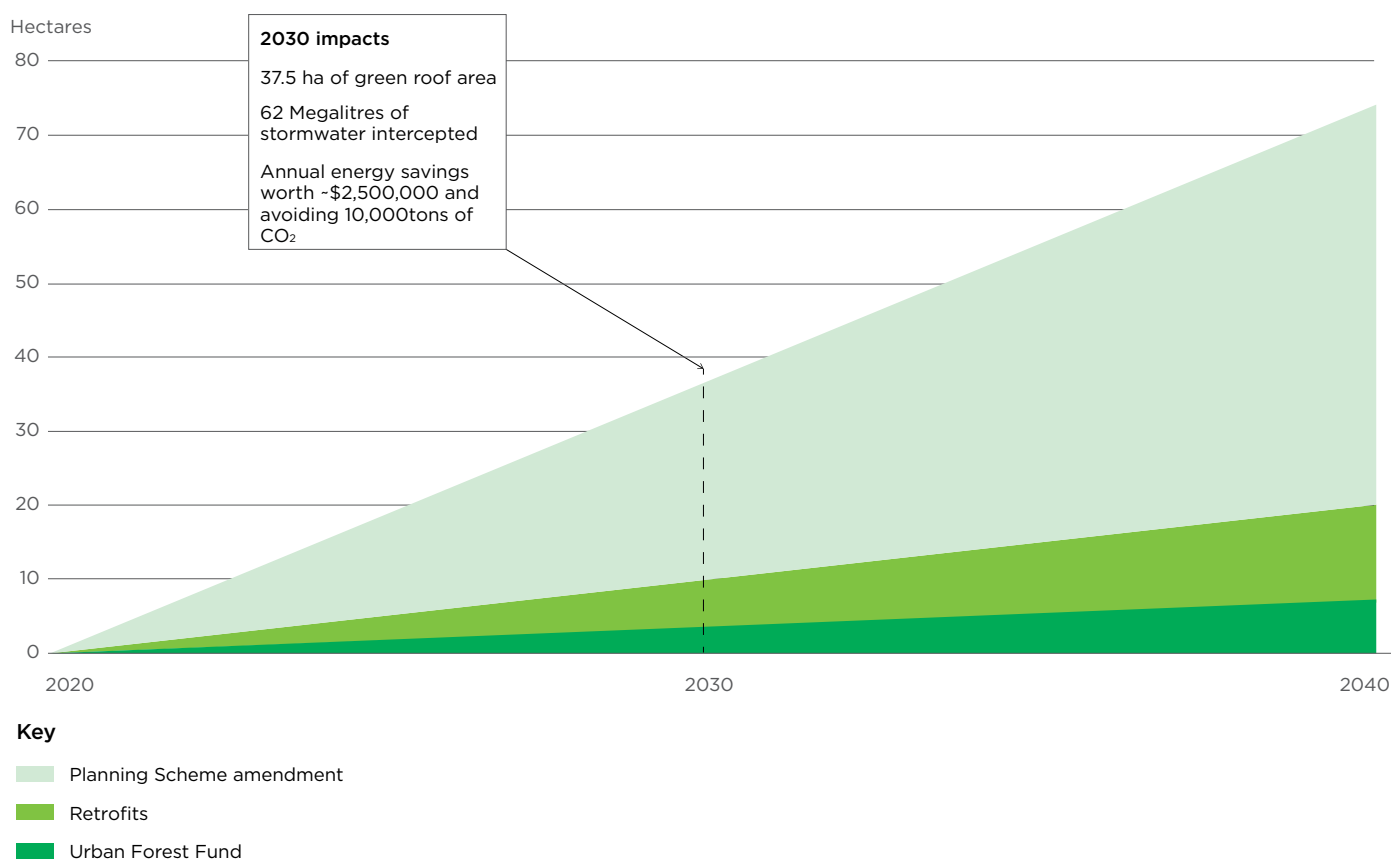
Green roofs and vertical greening are living systems that have been shown to improve the built environment by providing environmental and economic benefits, as well as social and aesthetic benefits. These systems can be included on new buildings or retrofitted to existing buildings. They are well placed to help compensate for the increasing loss of urban greenery in dense urban areas and even reverse it. In addition they also provide localised cooling, better water resource use and a reduction in peak stormwater flows.

Globally, green roofs and vertical greening have been utilised to help mitigate the effects of climate change and improve city amenity. It is important to note that cities including Berlin, Chicago, London, New York, Malmo, Seattle, Tokyo and Toronto have all created greener cities by introducing planning requirements. Research across all international cities confirms that the increased number of green roofs would not have occurred without these regulatory changes (refer to Attachment 9 for supporting data).

Similarly, preliminary estimates of policy impact¹ suggest that introducing planning regulations in Melbourne would have a similar effect of increasing green infrastructure in the city. (Figure 4)

Projected green roofs - hectares

Figure 4: Estimate of policy impact from current levels



¹ The following assumptions underpin the preliminary estimates

- The likely observed trend in land developed in CoM from 2010 to 2015 - approximately 18 ha average at ground level (major developments only, only on sites >5 ha).
- Assumed this trend will continue to 2040.
- Assumed rooftops form 50 per cent of property area.
- Assumed 60 per cent of rooftop area was suitable for greening.

- Assumed 50 per cent policy coverage.
- Therefore 2.8 ha of roof was assumed annually.
- This is conservative given current CBD growth, Arden Mac, Fishermans Bend Urban Renewal Area, West Melb etc.
- A retrofit rate of 0.1 per cent per annum was assumed for viable intensive and extensive green roofs.

There is no 'silver bullet' to influence and create the sort of change needed in uptake of green roofs and vertical greening. But, with a combination of complementary actions and the introduction of planning regulations we can ensure that stakeholders have the capacity to deliver well designed and maintained green infrastructure, that provides multiple benefits for the city.

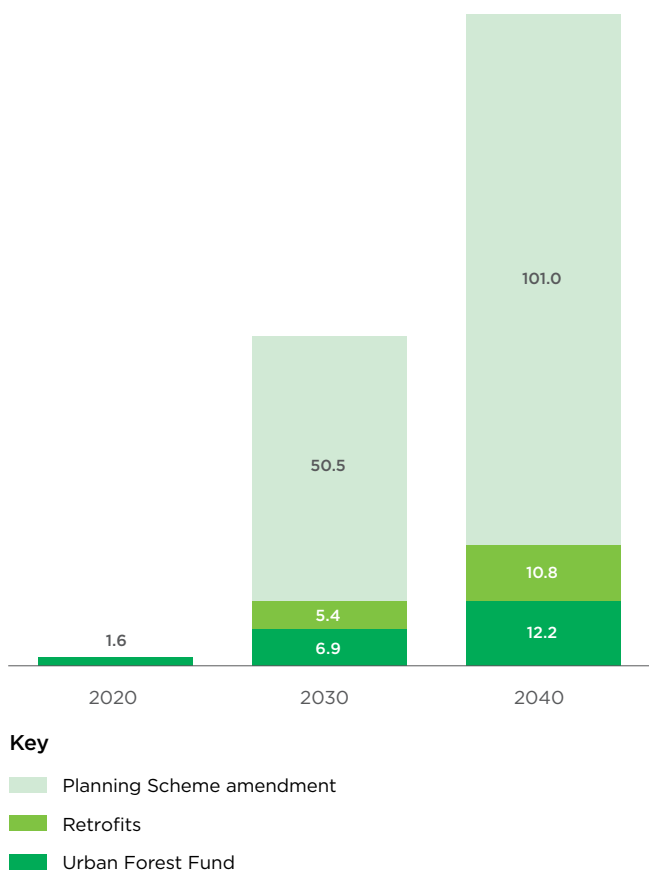
To date, estimates of policy impact are limited to rooftop greening. With substantial vertical greening opportunities in the city, the policy package may ultimately deliver well beyond the outlined estimates. It is recognised that further

work is required to accurately quantify the impacts of green roofs and vertical greening in Melbourne. Using the likely uptake modelled, as well as international trends, we can gain a better understanding of how our city will benefit.

Figures 5 and 6 estimate the substantial impact that green roofs could have if planning requirements are introduced in Melbourne:

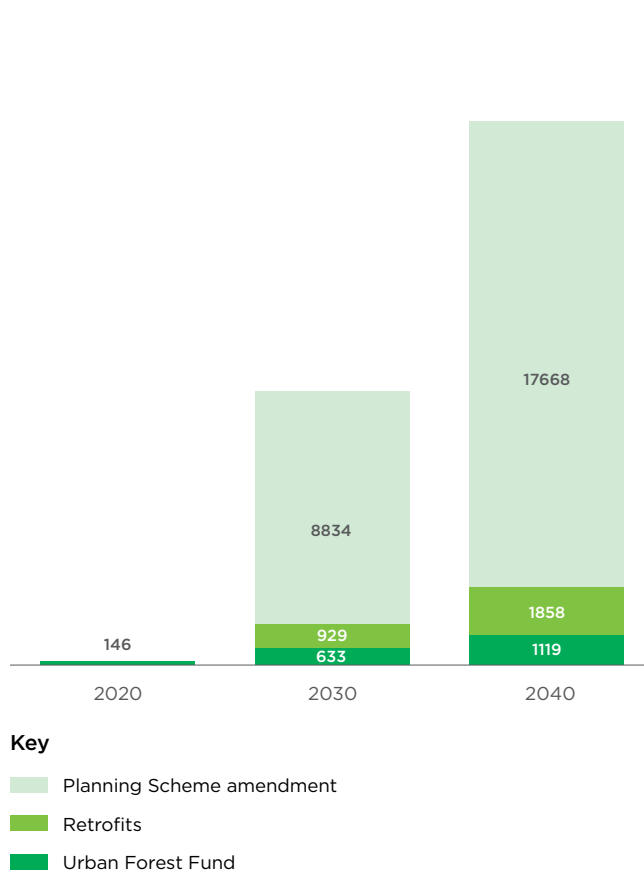
Flood storage capacity - megalitres

Figure 5: Estimate of benefit from current levels - resulting in reductions in flood impact of the city.



Avoided emissions - Tons of CO2 equivalent

Figure 6: Potential Policy Impact scenario - Co2 reductions.



Case study: Elizabeth Street catchment

Flooding in the Elizabeth Street Catchment is a significant issue for the city. The total additional storage volume required for this catchment has been modelled at 6.8 megalitres (ML) to reduce flood risk to an acceptable level.

Modelling shows that even a low uptake of intensive green roofs (5 per cent) could take 5.9 of the 6.8 ML of flood waters required to reduce the flood risk in this catchment.

4.1 – Known barriers and gaps

As already discussed, private-sector uptake of green roofs and vertical greening has been minimal and slow. It is clear that despite the city's ongoing commitment to green infrastructure, there are still barriers and gaps that need to be addressed and overcome to increase the uptake.

There are many common, well-defined barriers (both perceived and real) to greening our city for the private sector. They include:

- Lack of mandatory green infrastructure and broader ESD provisions within the planning framework.
- Lack of evidence to fully quantify the economic benefit to the city and building owners.
- Not knowing where and when to start to include greening on a new or existing building.
- Lack of maturity in the green roof and vertical greening industry impacting on costs and accessibility of advice.
- Absence of any approved best practice standards to regulate the green roof and vertical greening industry.
- Lack of knowledge in the understanding of the horticultural needs of supporting greening on rooftops, walls and facades.
- Lack of knowledge with regards to building and planning requirements.
- The ability to ensure urban greening in perpetuity as buildings are sold.
- Agreeing who pays for the initial build and ongoing maintenance.
- What happens when greening fails and how Council can enforce maintenance standards.
- Exploring partnerships with council to achieve urban greening on private land.
- Retrofitting existing buildings.

Our current policies and strategies also don't provide adequate information in key areas such as:

- Greening in the private realm
- Knowledge on the benefits that ecosystem services provide the city
- Climate adapted parks and vegetation – choosing planting species that are appropriate for the predicted future climate (in progress but needs strengthening)
- Lack of appropriate and relevant urban design policy incorporating adaptation considerations (needs strengthening)
- Protecting the public realm by ensuring trees and vegetation have enough sun, water, and soil and that public spaces are protected from excessive wind and heat.

We will continue to partner with research institutions to close the gaps in what we don't know, especially relating to ecosystem services and quantification of the benefits including:

- Reduced stormwater run-off
- Health and wellbeing benefit, including urban agriculture
- Cooling of the city
- Support and increase biodiversity.

4.2 – Availability of potential green space

Rooftop potential

Currently rooftops across the municipality make up 880 hectares of space – more than five times the size of Melbourne’s largest park, Royal Park. Many of these rooftops retain heat across the city, thus exacerbating the urban heat island effect.

There are multiple opportunities for roofs on existing and new buildings (in the municipality) to improve sustainability outcomes and reduce the negative impacts these surfaces can have on the liveability of the city. The *Rooftop Project* has mapped all the rooftops in the City of Melbourne to see if they have the potential to be turned into solar, cool or green roofs. Whilst any of these rooftop adaptations may be suitable, this action plan concentrates specifically on green roof systems due to the unique challenges this green infrastructure poses. The mapping results are summarised below to demonstrate the quantum of potential these elements represent and the modelling assumptions.

Figures 7 and 8 show that 236 hectares (27 per cent) of rooftops have low, or no constraints for retrofit with intensive green roofs and 328 hectares (37 per cent) of roofs are similarly unconstrained for extensive green roofs. These areas represent a significant opportunity to improve the city’s capacity to mitigate the ongoing loss of urban greenery, especially when considered in the context that the City of Melbourne’s public open space network is only approximately 480 hectares in total area.

Figure 7: Results of opportunity analysis of existing rooftop potential for intensive and extensive green roofs.

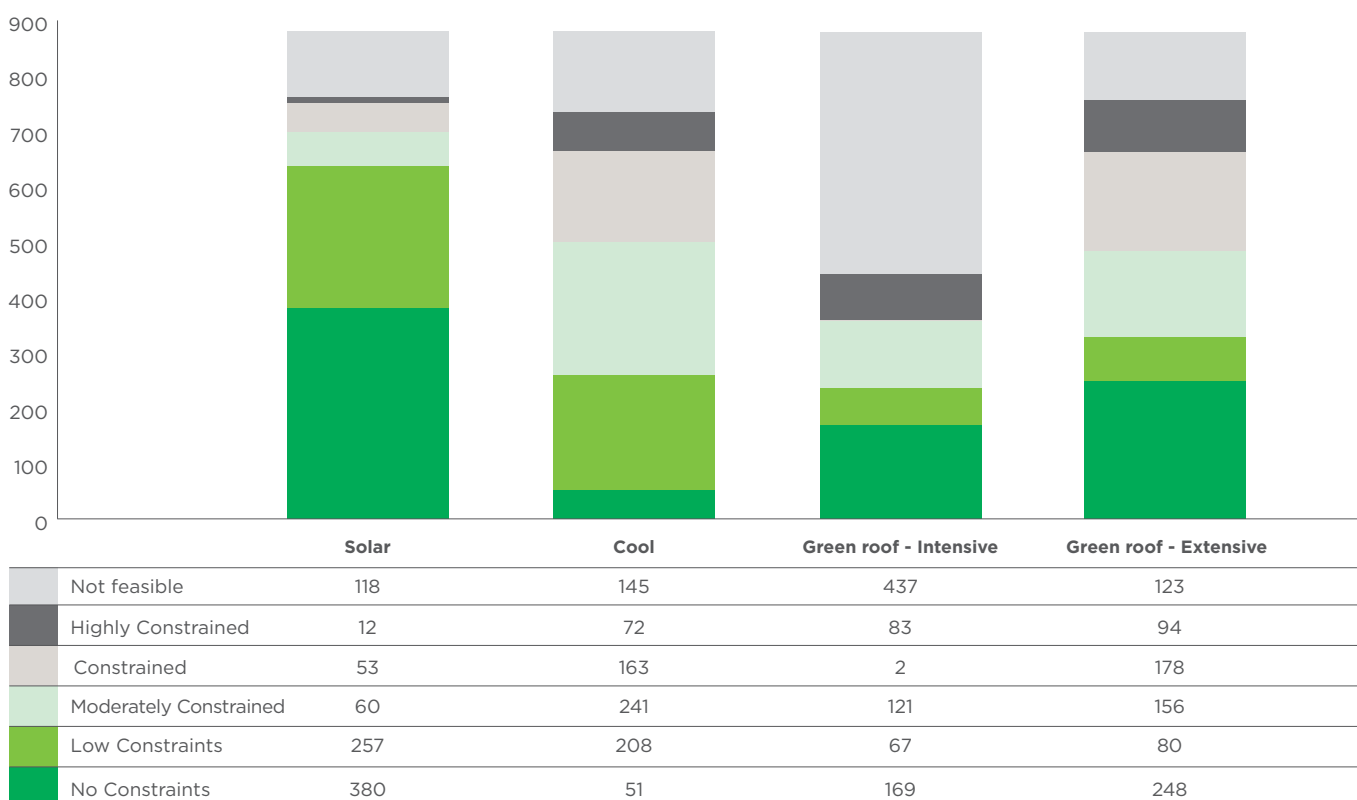
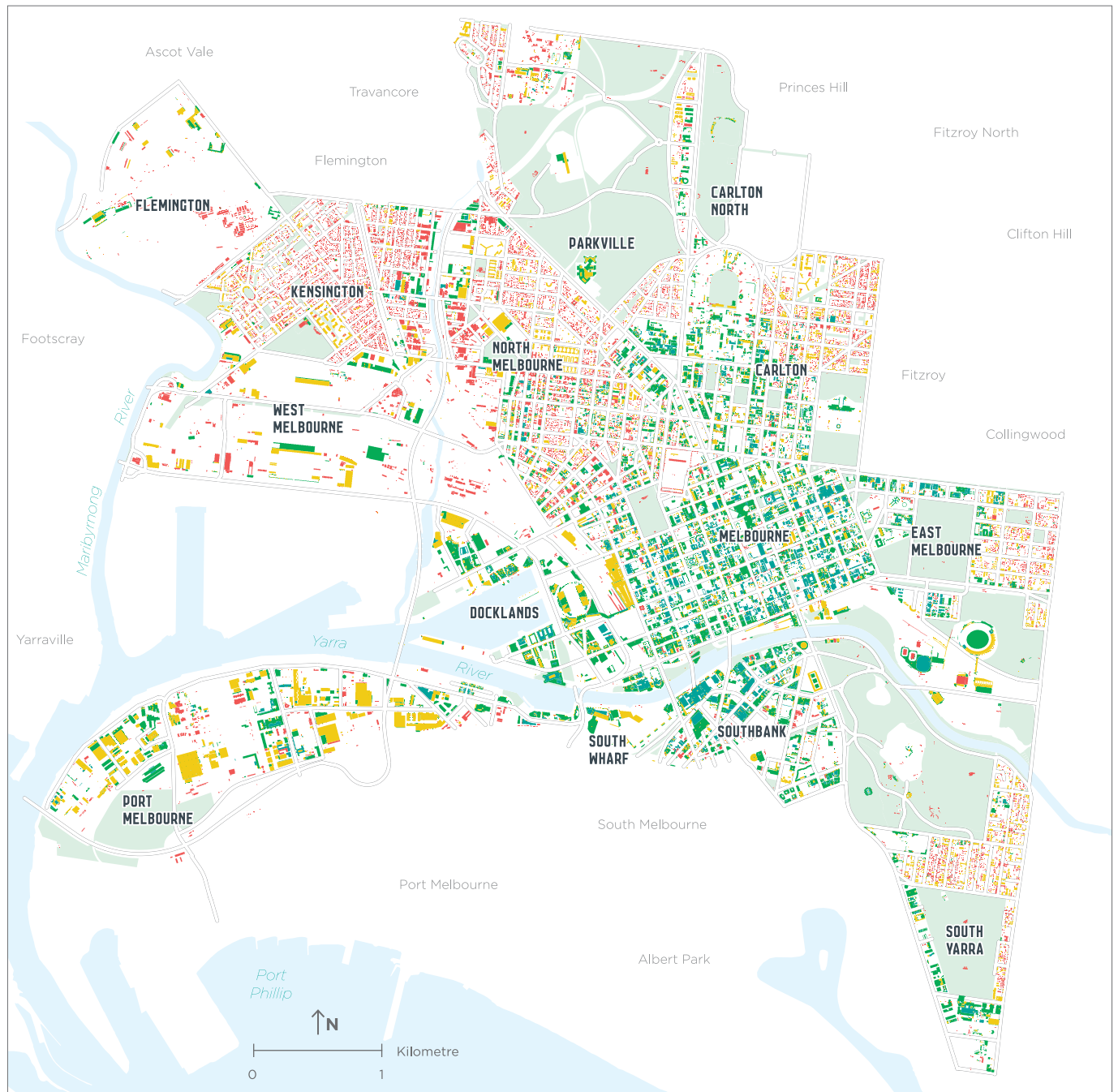


Figure 8: Map of opportunity analysis results (Intensive green roof types).



Key

- | | | |
|--|--|--|
| ■ Highly constrained | ■ Constrained | ■ Moderately constrained |
| ■ Low constraint | ■ No constraint | |

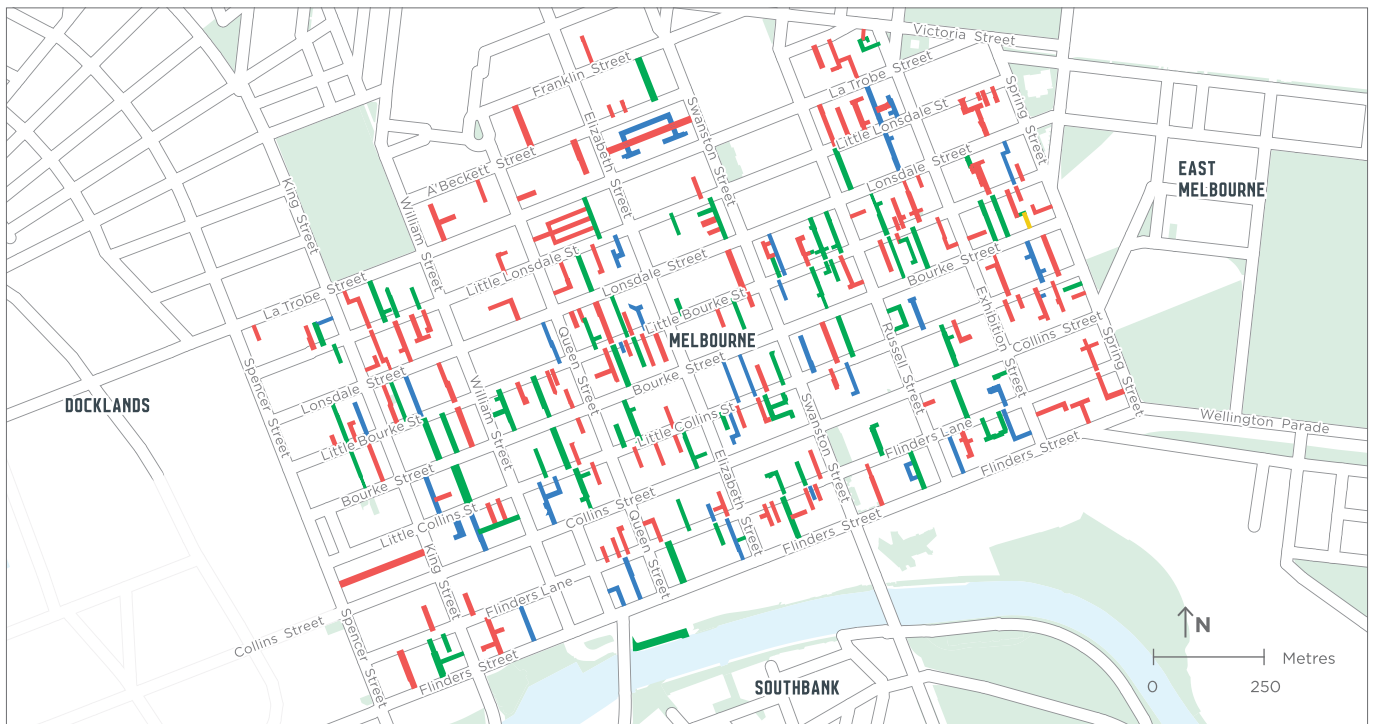
Laneway and vertical space potential

City of Melbourne owns or manages almost three-quarters of the laneways in the city, many of which are currently unappealing and un-vegetated spaces. However, the adjacent walls and facades are privately-owned and any greening needs the support of the building owners.

The Urban Forest Strategy includes comprehensive precinct plans for greening streets. However, the precinct plans do not address many smaller laneways which require unique greening solutions. These laneways occupy an area of 60 hectares, with a further 150 hectares of useable vertical space on walls identified in the central city. The Green Your Laneway project mapped these laneways to understand and help realise these potential opportunities.

These laneways are a significant opportunity to cost-effectively create valuable green space that delivers on the listed range of our strategies. The Green Your Laneway pilot project is currently being delivered (2017) to test how four laneways can be greened, including vertical greening. The project will be evaluated once the laneways have been transformed, to understand whether the anticipated ecosystem services benefits will be realised and provide key lessons to ensure smooth delivery of future projects.

Figure 9: Opportunity mapping of park laneways. Dark green = higher potential, red = lower potential.



Key

■ Highest potential	■ Good potential
■ Some potential	■ Lowest potential

5. A CLOSER LOOK AT THE GREEN OUR CITY STRATEGIC ACTION PLAN

The quantity, density and scale of development the city is experiencing, as well as the impacts from climate change means that further collaboration with the Victorian Government and the private sector is imperative. Regulatory mechanisms such as planning requirements will ultimately accelerate increased investment in green infrastructure.

A number of policy documents have informed the development of this action plan. The actions and targets identified in this plan have been formed in consultation with other portfolios in the City of Melbourne, external stakeholders from research, industry and government agency sectors. Future Melbourne engagement feedback along with focused community engagement through Canopy: Melbourne's Green Roof Forum has also informed

these actions. The actions also take reference from and build on the Growing Green Guide for Melbourne policy options developed in 2014.

This strategic action plan not only utilises the City of Melbourne's business as usual approach to the facilitation of green infrastructure delivery and uptake but also articulates a number of key actions which specifically explore regulatory measures.

The strategic action plan is divided into four focus areas: leading by example, developing and maintaining partnerships, targeted advocacy and effective regulation. Eleven actions have been identified to be undertaken over the lifetime of this action plan.

Focus Area 1: Lead by example

DELIVER GREEN INFRASTRUCTURE BY LEADING BY EXAMPLE						
NO.	ACTION	2017-18	2018-19	2019-20	2020-21	RESOURCING
1.1	<p>Undertake a Green Our Rooftop project</p> <p>1.1.1 Continue to deliver publically accessible demonstration green roofs, through the partnership with Department of Environment, Land, Water and Planning.</p> <p>1.1.2 Use and promote this and other examples to encourage uptake of green roofs.</p>	🔄	✓			In approved 2017-18 capital works budget.
1.2	<p>Laneway and street greening</p> <p>Evaluate the four Green Your Laneway pilots to better understand barriers and opportunities and share findings publicly.</p>	🔄	🔄	✓		Confirmed for 2017-18. Later years are subject to Annual Plan and budget.
1.3	<p>Information accessibility</p> <p>Provide better public information on what greening is required, where and why, to complement the existing Rooftop Project Open Data and support developers and building owners to enhance greening.</p>	🔄	✓			Business as usual.

Key

🔄 Start action or ongoing action ✓ Completed

Developing and implementing a prioritised program of greening projects in the public and private realm to demonstrate leadership in this sector, encourage uptake, and help to reach our identified goals. The projects are to incorporate lessons learnt from projects such as Green Your Laneway pilot project and Green our Rooftop demonstration roof/s.

Mapping of information on flood risk, hot spots, vegetation, biodiversity corridors and open spaces to determine intervention requirements and gap areas will help prioritise which locations in the municipality we need to focus on. Basing this on our goals such as cooling the city and including our growth areas will target the highest priorities for interventions.



Focus Area 2: Develop and maintain partnerships

PARTNER TO DEVELOP MORE GREEN INFRASTRUCTURE						
NO.	ACTION	2017-18	2018-19	2019-20	2020-21	RESOURCING
2.1	Urban Forest Fund Co-fund further greening of the city by the private sector (including green roofs and vertical greening) through the Urban Forest Fund.	🔄	🔄	🔄	🔄	Note: Council Plan Initiative #10 for 2017-18 is to: Implement the Urban Forest Fund to enable greening in the public and private realm.
2.2	Industry standards and rating mechanisms 2.2.1 Advocate for the development of industry standards for green roofs and vertical greening. 2.2.2 Collaborate with industry to integrate the role of green infrastructure with other organisations. 2.2.3 Work with the Green Building Council of Australia to develop industry standards and rating tools for green buildings that extend beyond energy efficiency to include green infrastructure.	🔄	🔄	🔄	🔄	Subject to Annual Plan and budget.

Key

🔄 Start action or ongoing action

✓ Completed

To ensure that existing buildings are considered for their potential to retrofit green infrastructure, the Urban Forest Fund will partner with the private sector to provide matched funding on green infrastructure projects.

There are gaps and barriers to the uptake of green roofs and vertical greening that the City of Melbourne cannot directly control but can support and influence. Advocating for change will send a message that Council recognises and supports the need for the development of industry standards and further education for both the public and industry sectors in particular.

Focus Area 3: Targeted advocacy

TARGETED ADVOCACY FOR THE UPTAKE OF GREEN INFRASTRUCTURE						
NO.	ACTION	2017-18	2018-19	2019-20	2020-21	RESOURCING
3.1	<p>Work with the Fishermans Bend Taskforce, the Victorian Planning Authority, and Development Victoria</p> <p>Ensure that green infrastructure is incorporated into the areas of the municipality where the state is the planning and development authority.</p>	🔄	🔄	🔄	🔄	Business as usual
3.2	<p>Canopy public forum</p> <p>Continue the Canopy Green Roof quarterly forums to share industry best practice and to contribute to the capacity building of the industry.</p>	🔄	🔄	🔄	🔄	Business as usual
3.3	<p>CASBE</p> <p>Join and continue to actively participate with The Council Alliance for a Sustainable Built Environment (CASBE).</p>	🔄	🔄	🔄	🔄	Business as usual

Key

🔄 Start action or ongoing action

✓ Completed

Further to this, championing and supporting developments and projects that incorporate green infrastructure will encourage others to follow suit.

There is also a need to advocate for and actively engage with other Councils to enable knowledge sharing and increase the capacity of the industry. For example, enabling information and key findings to be accessed and shared could facilitate regulatory outcomes for other municipalities. The Council Alliance for a Sustainable

Built Environment (CASBE) is an association of Victorian councils committed to the creation of a sustainable built environment within and beyond their municipalities.

Lastly, advocating with other government agencies to include greening outcomes in their project and policy delivery with projects such as Fishermans Bend Urban Renewal, will help influence within and beyond our municipal boundaries.

Focus Area 4: Effective regulation

DEVELOP AND IMPROVE REGULATORY PROCESSES TO DELIVER GREEN INFRASTRUCTURE						
NO.	ACTION	2017-18	2018-19	2019-20	2020-21	RESOURCING
4.1	<p>Pursue changes to the planning scheme to require all types of development in the City to play a part in achieving environmentally sustainable design targets, including green roofs and vertical greening.</p> <p>Review the planning scheme to determine the most effective planning scheme tools to deliver improved green infrastructure outcomes. Include an economic feasibility study to ensure that green infrastructure can be delivered by developers without compromising feasibility. Economic analysis should include consideration of other planning requirements such as affordable housing provision and design requirements to understand the cumulative impact of all controls.</p> <p>Considerations will include:</p> <ul style="list-style-type: none"> • how best to work with other Councils, including the work of CASBE, and the State and build on existing reforms • how to ensure that real change is delivered, while engaging productively with the development community and ensuring the commercial context is understood • how best to adapt world leading initiatives such as Seattle's Green Factor in a City of Melbourne context. 	🔄	🔄	🔄	✓	<p>Business as usual for 2017-18</p> <p>Planning scheme review, justification and business case 2018-19</p> <p>Planning Scheme Amendment Subject to Annual Plan and Budget 2019-21</p>
4.2	Enhance sustainability objectives through the Municipal Strategic Statement (MSS) refresh	🔄	🔄	🔄	✓	
4.3	<p>Provide an ESD support service</p> <p>Include an ESD support officer with the specific technical knowledge to assess ESD reports within the City of Melbourne's planning and building function. Along with assessing applications the officer will engage with developers and renovators to build understanding and capacity to implement green infrastructure.</p>		🔄	🔄	✓	Subject to Annual Plan and budget.

Key

🔄 Start action or ongoing action

✓ Completed

The City of Melbourne has taken many steps to improve green infrastructure as part of the buildings and sites it controls, but the potential presented by the buildings and sites controlled by other levels of Government and the private sector is still to be realised.

It is proposed that the City of Melbourne looks at recent and proposed planning scheme changes to identify options to deliver additional sustainability outcomes including private realm green infrastructure.

There are many existing sustainability focused approaches in the planning scheme (such as local planning policies at clause 22.23 Stormwater Management and clause 22.19 Energy, Water, Waste, developments from the recent C270 Planning Scheme Amendment, voluntary approaches and Section 173 agreements).

Targets

Four targets are proposed to help measure the success of this four year strategic action plan:

1. Double the area of green roofs in the municipality from five hectares (2015) to ten hectares, as measured through comparative mapping of green roofs.
2. Double the number of vertical green installations from 50 (2016) to 100, as measured through planning scheme applications and Urban Forest Fund initiatives.
3. Achieve at least 80 percent healthy and diverse vegetation in green roofs and vertical greening installations, measured using aerial spectral analysis and visual assessment (as they are living systems
100 per cent of vegetation being healthy is considered unreasonable).
4. Staff and stakeholders in the planning, development and property management sectors understand the need for green roofs and vertical greening and their value; are knowledgeable on the subject; and are supportive during the delivery of actions, as measured by surveys in 2017 and 2021.

There is an opportunity to draw together these sustainability policies so that green infrastructure options are examined when a developer is considering how to plan a new building or upgrade an existing building. The intended result would be a streamlined policy with improved effectiveness rather than the current fragmented approach.

This may be similar to other successful international policies which use a similar combination of delivery, partnering and regulatory tools. City of Melbourne is able to draw on case studies in cities such as Chicago and Seattle for examples. (Refer to Attachments 6, 7 and 8.).





6. NEXT STEPS AND REPORTING

This action plan runs over four (business) years from 2017-21 to coincide with the current council term.

The plan will be monitored and reported on an annual basis to Council. The action plan will also be reviewed at the end of the four year timeframe.

Implementation of these actions is subject to future council budget approval and business planning processes to allocate appropriate resources.



7. ATTACHMENTS AND SUPPORTING MATERIAL

Attachment 1: Targets from relevant strategies

STRATEGY	TARGET	CURRENT LEVEL
Urban Forest Strategy (2012)	<ul style="list-style-type: none"> • Increase canopy cover to 40 per cent on public land across the catchment by 2040. • Increase diversity of species. • Improve vegetation health. 	24.09 per cent of public land has canopy cover (2016).
Total Watermark (2012)	<ul style="list-style-type: none"> • 8 per cent of all municipal water use sourced from alternative water sources. • 30 per cent of all council water use sourced from alternative water sources by 2018. 	Council 13 per cent (5.5ML), Municipal 1 per cent (75ML).
	<ul style="list-style-type: none"> • 40 per cent of the Elizabeth Street Catchment's soil surface is unsealed by 2030. 	17 per cent unsealed soil.
	<ul style="list-style-type: none"> • 20 per cent reduction in total nitrogen. • Contribute to the waterways from the municipality of Melbourne's catchment. 	2 per cent reduction in total nitrogen.
Open Space Strategy (2012)	<ul style="list-style-type: none"> • Increase the provision of open space by 42 hectares (municipal level open space and below only). 	1.6 ha of open space has been delivered. 5.4 – 6.2 ha in design, community engagement and construction stages (April 2016).
Elizabeth Street Catchment Integrated Water Cycle Management Plan (IWM) (2015)	<ul style="list-style-type: none"> • To reduce the Melbourne Water Flood Risk rating from extreme to high. • To increase open space, soil moisture and areas of unsealed soil in Elizabeth Street Catchment. • To mimic the natural water cycle by retaining more rainwater in the upper section of the catchment and reducing stormwater runoff. • To improve the health of existing vegetation through irrigation from alternative water sources. 	Extreme Flood Risk.
Nature in the City (2017)	<ul style="list-style-type: none"> • There is a net increase in biodiversity, habitats, and ecosystem health within the City of Melbourne by 2027. • By 2027 City of Melbourne will be a more ecologically-connected city than in 2017. • By 2027 the private realm is playing a significant role in supporting nature in the city. • By 2027 more residents, workers, and visitors encounter, value, and understand nature in the city more than they did in 2017. • Deliver flagship biodiversity and urban ecology projects that are recognised as innovative and outstanding. 	Baseline established by end of 2017.
Climate Change Adaptation Strategy (2017)	<ul style="list-style-type: none"> • This strategy uses the targets within above strategies. • Relevant goal is: Goal 1: Enhance the natural environment and green spaces of our municipality. 	This strategy uses the targets within above strategies.
Municipal Integrated Water Cycle Management Plan (2017)	<ul style="list-style-type: none"> • All habitable finished floor levels within private development are free from flooding from Council drains during a 100 year Average Recurrence Interval (ARI) rainfall event. • 1:20 ARI (or equivalent) flow capacity of all council drains within the central city and growth areas. • Minimum 20 per cent of each catchments surface is considered permeable by 2030. 	No current level developed yet.

Attachment 2: The challenges of implementing sustainability measures through the Planning Scheme (CASBE PLANNING Information Sheet 1 Version 1—November 2016)

Challenge One: The Validity of Sustainability in Planning

Initial attempts at assessing the sustainable qualities of a proposal through planning were met with strong opposition at VCAT, the central claim being that sustainability was a matter for the building code. A number of arguments were used in favour of this claim: Regulation was being duplicated across two systems; Sustainability was based on elements of detail not available at the planning stage; and that as some developments do not require planning permits, an issue such as sustainability which should be applied to all developments is not suitable for planning to consider.

With the approval of amendments across multiple planning schemes which explicitly call for sustainability measures, this question has largely been answered. There is a legitimate and necessary role for planning in ensuring sustainability.

Challenge Two: Local Policy Support

This challenge addresses whether there is sufficient support found in local policy to justify the sustainability measures proposed. There is significant overlap with the first challenge, particularly over arguments of fairness about applying additional sustainability requirements to only a subset of developments with no justification as to why this is a good approach. A key response to this criticism has been the development of triggers for requirements. Having policy which states that developments of particular sizes should be subject to higher standards of sustainability assessment means that the selection of which developments are subject to assessment is no longer arbitrary.

Where it has been established that there is both a valid role for SDAPP and that local policy supports it, attempts to avoid or reduce sustainability requirements have turned to whether they are justified for the specific proposal. There have been a number of approaches to this.

Challenge Three: Site Specific Considerations

Historically the most prevalent argument has been that the requirements sought are disproportionate to the scale of the proposal. The central claim in this approach is that the requirements would impose a burden which the applicant can't reasonably bear. This has been addressed systematically in two ways. Firstly, a number of councils have formalised the requirements for sustainability assessment at various sizes of development. Secondly, tools such as the Built Environment Sustainability Scorecard have been developed to make the documentation requirements simpler to meet, reducing the financial burden of doing so. This has also been incorporated into the size triggers, with many councils requiring a self-assessment using recommended tools for smaller developments, rather than the employment of an ESD consultant.

Vagueness of conditions has also been a factor in VCAT removing the sustainability requirements sought by council, particularly in removing the requirement for an ESD report. This can be and is being addressed by improving the consistency of wording both within and across councils, as well as providing supplementary information to applicants clarifying the requirements council expects to be met.

Attachment 3 : The Council Alliance for a Sustainable Built Environment (CASBE)

The Council Alliance for a Sustainable Built Environment (CASBE) is an association of Victorian councils committed to the creation of a sustainable built environment within and beyond their municipalities. CASBE provides a forum:

- for the exchange of information, innovation and best practice in Ecologically Sustainable Development (ESD) to effectively represent and advocate the collective views of the member councils
- for strengthening partnerships between member councils, relevant agencies and industry
- to provide leadership in ESD policy and practice.

CASBE's focus is on applying ESD principles to the built environment through the statutory planning system. This coordinated program of formal and consistent measures is called the Sustainable Design Assessment in the Planning Process (SDAPP) framework. The SDAPP framework is the method that councils use to ask for, receive and assess sustainability information on buildings (a standardized local policy, factsheets, standard conditions, training for officers etc).

While CASBE's role is primarily related to the SDAPP framework, the alliance also helps councils incorporate ecologically sustainable development into council-managed buildings and capital works projects.

CASBE member councils include: Banyule City Council, Bass Coast Shire Council, Darebin City Council, Greater Bendigo City Council, Greater Dandenong City Council, Hobsons Bay City Council, Hume City Council, Kingston City Council, Knox City Council, Manningham City Council, Maribyrnong City Council, Maroondah City Council, Monash City Council, Moonee Valley City Council, Moreland City Council, Port Phillip City Council, Stonnington City Council, Strathbogie Shire Council, Whitehorse City Council, Whittlesea City Council, Wyndham City Council, Yarra City Council.

CASBE operates under the auspices of the Municipal Association of Victoria (MAV).

The City of Melbourne is not currently a member of CASBE. The reason for this is that the CASBE process is to help Councils achieve what City of Melbourne already have, which is to introduce a ESD policy into their planning scheme. However, it is recommended that the City of Melbourne joins CASBE in order to allow formalised knowledge sharing and a co-ordinated approach to consider changes to State Government policy.

City of Melbourne's policy (Clause 22.19 Energy Water Waste Efficiency) was approved through amendment C187 in April 2013. It was the first one in Victoria and, together with other City of Melbourne initiatives; it won the C40 Siemens Climate Change leadership Award in the category of Energy Efficient Built Environment in London in September 2013.

Under a process facilitated by MAV/CASBE, six councils had a local ESD Local Policy gazetted for their municipalities (Banyule, Moreland, Port Phillip, Stonnington, Whitehorse and Yarra) in November 2015. CoM's amendment C187 was used to support these amendments. Monash had its policy gazetted in September 2016 and Darebin and Manningham then followed suit. CASBE/MAV is now providing facilitation for a 'third round' of councils interested in collaborating on the introduction of an ESD local policy in their respective planning scheme.

The newer CASBE/MAV ESD policies (Cities of Yarra, Moreland, Port Phillip, Whitehorse and Banyule) address a wider range of matters than City of Melbourne's policy (Clause 22.19 Energy Water Waste Efficiency), by including not only energy water and waste but also indoor environmental quality, stormwater management, transport, innovation and urban ecology. These ESD policies do not specify particular assessment tools, but refer to best practice which allows them to remain current.

It is recommended that the City Of Melbourne continues to work with the CASBE councils to investigate additional requirements for green infrastructure within local and state policy and the inclusion of mandatory requirements within the planning framework. In the shorter term the City of Melbourne's policy (Clause 22.19 Energy Water Waste Efficiency) should be reviewed to consider broadening the scope to include green infrastructure provisions and references to best practice.

ATTACHMENT 4

Triptych Apartments – green wall

Project type: Large-scale outdoor green wall, hydroponic

Location: 8-10 Kavanagh Street, Southbank

Project cost: \$350,000

Completion Date: 2009

Context: New building, no heritage considerations

Located in Melbourne's arts and cultural precinct, Triptych Apartments were designed with sustainability and community living in mind. The green wall on the exterior façade of the building symbolises this design approach. Visible from the street, the feature was considered by the developer to provide 'wow-factor', setting the building apart from other inner city residences and blending in with the leafy streetscape. The purpose of the green wall was to clad the exterior of the multi-level parking area with vegetation to obscure its function, to use foliage to soften the built environment, to provide habitat and increase diversity through the use of native and exotic plant species, and to utilise collected rainwater.

Results

Overall, those involved in the project found it to be rewarding and believe that it has added value to Triptych Apartments. Stable Group reflects that the living wall has contributed to the appeal of the apartments to residents and makes a statement about the green focus of the design. As an outdoor project, the wall is visible from street level, neighbouring offices and apartments, so it is also able to be widely enjoyed by the public.

Habitat production is ongoing and thriving, and the rainwater harvested from the building is able to be used for irrigating the plants.



ATTACHMENT 5

Freshwater Place - green roof

Project type: Semi-intensive green roof

Location: 1 Queensbridge Square, Southbank, Melbourne

Completion Date: 2004

Context: New building, no heritage considerations

Size: 1650m²

Freshwater Place is a residential complex containing 534 apartments, located on the Southbank side of Melbourne's Yarra River. The aim of the project was to provide residents with a functional outdoor space that would enhance their inner-city lifestyle and add value to the property. Located on top of the nine storey car park, the green roof is part of the communal facilities and includes barbeque areas, pool, gym and function spaces. Residents and their guests have full access to the level 10 roof and it can be seen from most of the apartments. As such, maintaining the aesthetic appeal of the green roof is the priority for all maintenance activities.

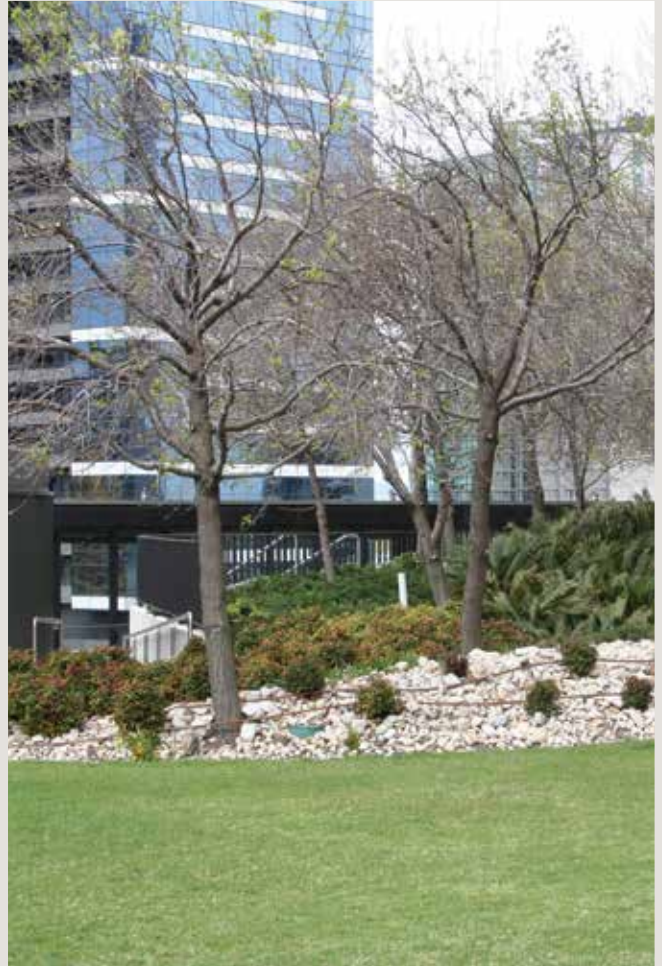
Design and Components

The green roof is an elevated landscape made up of a series of garden mounds, a grass lawn, storage sheds and planter boxes for growing vegetables. A wind-break wall was added to protect the site from the strong southerly wind. There are 30 established trees growing in the garden beds, surrounded by a range of shorter shrubs.

Results

Overall, the Freshwater Place management team are extremely happy with the aesthetic and social benefits of the green roof. The useability of the space gives the building a unique edge and adds value to the property.

The green roof is a highly used space, particularly in the warmer months of the year. The managers note that the barbeques are in constant use throughout the summer and the lawn is a popular place for picnics. The vegetable gardens are maintained by residents, who enjoy the social aspect of growing produce together.



Attachment 6: Policy Case study

CITY OF CHICAGO	
Location	Chicago, U.S.
Policies	Green Permit Program, Density Bonus, Building Green/Green Roof Policy, Green Roof Grant Program, Green Roof Improvement Program.
Application	Regulation, incentives and encouragement for green roofs in private realm.
Key Driver	UHI, Stormwater management, Air Quality, Greening.
Population	2,696,598
Area	600 square kilometres
Latitude	41° 88'N
Longitude	87° 63'E
Mean Daily Temperature	January -10.6oC to -1.7oC July -17.0oC to 28.7oC
Mean Annual Rainfall	921mm
Mean Annual Snowfall	965mm
Mean Annual Sunlight Hours	2508hrs
Summary	<p>Chicago's "Green Building Agenda" in 2004 implemented a number of programs that promote and incentivise green roofs. This including the following.</p> <ul style="list-style-type: none"> • Green Permit Program. Developers can receive expedited building permits, by adding certain elements from a "Green Menu" to their project, including green roofs. Projects can receive permits in 15-30 days rather than the standard 60-90 days. • Density Bonus. Developers can receive a 'density bonus', permitting increased building densities, if 50% or 2,000 square feet (whichever is greater) of a roof is covered with vegetation. • Building Green/Green Roof Policy. Requires any developer who receives city assistance to implement green roofs and/or sustainability requirements. • Green Roof Grant Program. \$5,000 grants were also provided for small-scale commercial and residential properties. • Green Roof Improvement Program (GRIF). Commercial projects in the financial district can receive reimbursement grants for up to \$100,000 if certain criteria are met. This includes greater than 50% of the roof area being vegetated, and it being highly visible to surrounding buildings. <p>These programs are considered to have been largely successful, and as a result Chicago has the largest area of green roofs of any city in North America. As of 2010, Chicago has 359 green roofs covering approximately 51 hectares.</p>
Benefits	<ul style="list-style-type: none"> • Suite of non-mandatory policies effective • City Council leading by example • Incentives to developers effective
Limitations	<ul style="list-style-type: none"> • Financial reimbursements or grants subject to budget constraints.

Attachment 7: Policy Case study

CITY OF SEATTLE "GREEN FACTOR"	
Location	Seattle, U.S.
Policies	Seattle Green Factor.
Application	Mandatory score-based greening requirements for private and public realms.
Key Driver	Greening (mitigate effects of high density development).
Population	608,660
Area	215km ²
Latitude	47° 36'N
Longitude	122° 19'E
Mean Daily Temperature	January are between -1.8oC to -7.2oC August are between -13.2oC to 24.0oC
Mean Annual Rainfall	950mm
Mean Annual Snowfall	150mm
Mean Annual Sunlight Hours	2170hrs
Summary	<p>The City of Seattle introduced the Green Factor in 2006, adopting a similar approach to that adopted in both Berlin (Biotope Area Factor) and Malmö (Green Space Factor).</p> <p>Green Factor is a score-based code requirement that commenced in 2007, through the City's Land Use Code - Seattle Municipal Code, Title 23. It aims to increase the amount and improve the quality of landscaping in new development and redevelopment, in both the public and private realm.</p> <p>Initially applying only to commercial development, it has since 2010 also applied to a range of higher density zonings including multi-dwelling residential.</p> <p>Although the policy has only recently been implemented, as of 2009 there were 62 green roofs in Seattle with a vegetated area of 3.3 hectares. There were also eight large at-grade green roofs making up a further 13.4 hectares of vegetated area.</p> <p>Green roofs however are only one element of the Green Factor. A study in 2008 found that surface areas other than green roofs account for 82% of the total contributing 'green' area in Green Factor developments. Therefore the greening impact of the policies is likely to be much larger than indicated by the surveyed area of green roofs.</p>
Benefits	<ul style="list-style-type: none"> • Flexible approach for designers, developers and residents • System can be tailored to suit specific drivers • Mandatory requirements effective
Limitations	<ul style="list-style-type: none"> • Doesn't apply to large areas (eg. industrial zones)

Attachment 8: Policy Case Study – ‘Green Factor’ Scorecard (Revised 12/28/10)

The Green Factor works using a scoresheet similar to the following:

- Applicant enters number and/or area of landscape features
- Score sheet multiplies each feature by an agreed factor (from 0.1 to 1.0)
- Total divided by parcel size, translates to per cent or Green Factor score.
- For further information see <http://www.seattle.gov/dpd/codesrules/codes/greenfactor/default.htm>

EXAMPLE OF ‘GREEN FACTOR’ SCORE SHEET					
Project title:		enter sq ft of parcel			
Parcel size (enter this value first)*		5,000		SCORE -	
Landscape Elements**		Totals from GF worksheet		Factor	Total
A Landscaped areas (select one of the following for each area)					
1	Landscaped areas with a soil depth of less than 24"		enter sq ft 0	0.1	-
2	Landscaped areas with a soil depth of 24" or greater		enter sq ft 0	0.6	-
3	Bioretention facilities		enter sq ft 0	1.0	-
B Plantings (credit for plants in landscaped areas from Section A)					
1	Mulch, ground covers, or other plants less than 2' tall at maturity		enter sq ft 0	0.1	-
2	Shrubs or perennials 2' + at maturity - calculated as 12sq ft per plant (typically planted no closer than 18" on center)	enter no. of plants 0	0	0.3	-
3	Tree canopy for "small trees" or equivalent (canopy spread 8' to 15') - calculated at 75 sq ft per tree	enter no. of plants 0	0	0.3	-
4	Tree canopy for "small/medium trees" or equivalent (canopy spread 16' to 20') calculated at 150 sq ft per tree	enter no. of plants 0	0	0.3	-
5	Tree canopy for "medium/large trees" or equivalent (canopy spread 21' to 25') - calculated at 250 sq ft per tree	enter no. of plants 0	0	0.4	-
6	Tree canopy for "large trees" or equivalent (canopy spread 26' to 30') - calculated at 350 sq ft per tree	enter no. of plants 0	0	0.4	-
7	Tree canopy for preservation of large existing tree with trunks 6"+ in diameter - calculated at 20sq ft per inch diameter	enter inches DBH 0	0	0.8	-
C Green roofs					
1	Over at least 2" and less than 4" of growth medium		enter sq ft 0	0.4	-
2	Over at least 4" of growth medium		enter sq ft 0	0.7	-
D Vegetated walls			enter sq ft 0	0.7	-
E Approved water features			enter sq ft 0	0.7	-
F Permeable paving					
1	Permeable paving over at least 6" and less than 24" of soil or gravel		enter sq ft 0	0.2	-
2	Permeable paving over at least 24" of soil or gravel		enter sq ft 0	0.5	-
G Structural soil systems			enter sq ft 0	0.2	-
H Bonuses		sub-total of sq ft=	0		
1	Drought-tolerant or native plant species		enter sq ft 0	0.1	-
2	Landscaped areas where at least 50% of annual irrigation needs are met through the use of harvested rainwater		enter sq ft 0	0.2	-
3	Landscaping visible to passerby from adjacent public right of way or public open spaces		enter sq ft 0	0.1	-
4	Landscaping in food cultivation		enter sq ft 0	0.1	-
				Green factor numerator =	-

* Do not count public rights-of-way in parcel size calculation.

** You may count landscape improvement in rights-of-way contiguous with the parcel. All landscaping on private and public property must comply with the Landscape Standards Director's Rule (DR 6-2009)



Attachment 9: Policy types used internationally

OVERVIEW OF DRIVERS AND POLICY TYPES UTILISED BY OTHER CITIES. SOURCE: GHD REPORT 2014			
LOCATION	DRIVERS	POLICY TYPE	POLICY DESCRIPTION
Basel	Energy reduction	Mandatory building regulations	Basel's "Building and Construction Law" has requirements, criteria and guidelines for green roofs.
	Biodiversity conservation	Financial Incentives	Financial incentives have been offered in the past to encourage implementation.
Berlin	Reduce environmental impacts of high build density	Mandatory policy requirements	Berlin's "biotope area factor" (BAF) has been established as legally binding ordinance in landscape plans for selected parts of the city centre.
		Financial Incentives	It is mandatory for residential, commercial and infrastructure new development and redevelopment. In other section of the city the (BAF) is voluntary.
Chicago	Urban Heat Island reduction	Building regulation (incentives)	Under Chicago's "Green Permit Program" developers can receive expedited building permits by adding elements from a green menu.
	Air quality	Financial Incentives	"Green Roofs Initiative" developers receive a density bonus if 50 per cent or 2,000 sq. feet (whichever is greater is covered with vegetation). \$5000 grants are provided for small-scale commercial and residential properties.
	Aesthetic		
	Stormwater Management		"Green Roof Improvement Program" commercial buildings in the financial district can receive grants of up to \$100,000 if greater than 50 per cent of the roof area is vegetated and is highly visible to surrounding buildings.
Seattle	Greening	Mandatory policy	Seattle's "Green Factor" is score based code requirement that requires a minimum to be attained through delivery of green roofs, rain gardens, vegetated walls etc. Bonus credits are achieved by using native plants and creating food gardens. Different zonings have different score requirements. The Green Factor can be applied to commercial zones as well as low - mid and high rise residential developments.
Tokyo	Greening	Mandatory planning policy	Tokyo Metropolitan Government's "Nature Conservation Ordinance" requires mandatory greening of all private developments greater than 1000m2. 20 per cent of the roof must be greened in addition to requirements relating to residual building site and perimeters facing the road.
	Urban Heat Island	Financial Incentives	In 2005 the initiative was broadened to incorporate existing buildings. Failure to comply results in a financial penalty.
Toronto	Stormwater management	Mandatory planning policy	Green Roof Bylaw requires the construction of green roofs on new development, including residential, commercial, institutional and industrial.
	Energy	Financial Incentives	

Attachment 10: Estimating Policy Impact supporting data

International Case Studies demonstrating Impact after introduction of regulatory measures, and resulting increase in the number of green roofs which would otherwise not have occurred.

LOCATION	ROOF SCAPE GREENING
Germany	Since 1993, Germany's Federal Building Code has provided a legal basis for governments, at the local or state level, to set mandatory requirements for green roofs as a compensation for the loss of valuable nature and landscape. In 2003, green roofs made up 14% of the total roof area in Germany , and nearly one third of all cities have regulations for green roofs. ⁹
Stuttgart, Germany	Grant reimbursements have been available since 1986 for green roofs, Since 1993. regulations has required all developments with roofs below a 12 degree slope to have green roofs. By 2005, Stuttgart had more than 200 hectares of green roofs. ¹⁰
Basel, Switzerland	Basel has the highest area of green roofs per capita in the world, and since 2002 they have been mandatory for all new flat roofs. In 2007, it was estimated that the green roof area in Basel was over 70 ha. It was expected that 30% of all flat roofs would be greened by 2017. ¹¹
Chicago, USA	Chicago's 2004 "Green Building Agenda" implemented a number of programs that promote and incentivise green roofs. A study conducted for the City of Chicago, analysing satellite imagery from 2010, identified 359 vegetated roofs covering approximately 51 hectares. ¹²
Singapore	Singapore has a programme to promote rooftop greening in order to reach the goal of 50 hectares of new Skyrise Greenery Areas by the year 2030.
Tokyo, Japan	Tokyo Metropolitan Government's (TMG) Nature Conservation Ordinance requires mandatory greening for all private developments greater than 1000m ² . Since 2001, this has also required that at least 20% of a roof must be greened. The policy stimulated the construction of approximately 130 hectares of green roofs and other green spaces between 2001 and 2010. Between 2007 and 2010 there was 57.2ha of green roofs and walls planned, as well as 16.7 ha of voluntary green efforts in the private sector. ¹³

8. GLOSSARY

Ecosystem services: Ecosystem services are the benefits that are obtained from nature that contribute directly or indirectly to human wellbeing (Millennium Ecosystem Assessment, 2005). They include clean air, noise reduction, climate regulation, water filtration, recreation, nature education, natural heritage, among others. In cities, ecosystem services can come from green infrastructure such as parks, gardens and forests as well as street trees, pop-up parks, wetlands and lakes. These services can be valued in several ways such as economic, ecological, socio-cultural, health or insurance contribution. Ecosystem services can be considered in four categories:

Green infrastructure: There are various descriptions for green infrastructure. At City of Melbourne we use the term to describe the layers and infrastructures in the city that directly provide multiple ecosystem services or support the provision of those services. Examples of green infrastructure in our city include; all vegetation, parks, gardens, reserves, greenways, living green roofs and walls, stormwater and rainwater harvesting interventions, permeable surfaces, waterways and wetlands.

Green roof: where a vegetated landscape is built up from a series of layers that are installed on a roof surface. Vegetation on green roofs is planted in a growing substrate (a specially designed soil substitution medium) that may range in depth from 100mm (known as shallow or extensive) to more than a metre (known as intensive), depending on the weight capacity of the building's roof and the aims of the design.

Green facades: a wall or structure that is designed to allow for climbing plants to grow onto or in front of.

Green walls (living wall): where modular systems of growing media are integrated into, or fixed onto, a wall.

Growing Green Guide: The Growing Green Guide for Melbourne project was a joint initiative of the University of Melbourne and the Inner Melbourne Action Plan (IMAP) with the cities of Melbourne, Yarra, Stonnington and Port Phillip and funded by the Victorian State government. The project ran from 2011 to 2014 and created:

- A guide for the design, construction and maintenance of green roofs, walls and facades.
- A policy options paper to help government agencies consider the range of ways to support and encourage green roofs, walls and facades
- A review of possible demonstration sites for green roofs, walls and facades in the inner Melbourne region.

Open space: as defined by our Open Space Strategy. Open space is not covered in this action plan. There is a current small open spaces amenity project which is not covered in this action plan but will be considered as part of action 3.

Private realm: This is land that is privately managed. The City of Melbourne currently manages public land under Council control; however much of the land in our city is under private tenure.

Rooftop garden: A rooftop garden is an on roof or podium outdoor space, primarily for use by people, with containerised planting such as planter boxes that do not cover a significant portion of the roof. It may also include a swimming pool, deck area and other recreational items.

Urban agriculture: the term urban agriculture refers to the exploration of urban horticulture as a part of the larger approach to food production in the urban environment.

Vertical greening: green facades and/or green walls.

9. REFERENCES

1. **Growing Green Guide. 2014.** Growing Green Guide – Technical. <http://www.growinggreenguide.org/technical-guide/>.
2. **City of Melbourne. Elizabeth Street Catchment Integrated Water Cycle Management Plan. 2015.** http://urbanwater.melbourne.vic.gov.au/wp-content/uploads/2015/06/COM_SERVICE_PROD-9175506-v1-FINAL_Elizabeth_St_Catchment_Plan.pdf
3. **GHD. 2013. Green Infrastructure and the Private Realm: International Review for the City of Melbourne.** GHD, Melbourne.
4. **City of Melbourne. 2017. Nature in the City Strategy.** <https://www.melbourne.vic.gov.au/.../nature-in-the-city-strategy.pdf>
5. **Young, C. K, Jones, R. N. and Symons, J. (2014) Investing in Growth – Understanding the Value of Green Infrastructure’ Climate Change Working Paper No. 20,** Victoria Institute of Strategic Economic Studies, Victoria University, Melbourne, Australia.
6. **City of Melbourne. 2016. Urban Forest Fund.** <http://www.melbourne.vic.gov.au/community/parks-open-spaces/urban-forest-fund/Pages/urban-forest-fund.aspx>
7. **City of Melbourne. 2012. Urban Forest Strategy 2012-2032.** <https://www.melbourne.vic.gov.au/SiteCollectionDocuments/urban-forest-strategy.pdf>
8. **GHD. 2015. City of Melbourne Rooftop Adaptation Study: Green Roofs, Cool Roofs and Solar Panels.** GHD, Melbourne
9. **Millennium Ecosystem Assessment (MEA. 2005. Ecosystems and human wellbeing: a framework for assessment.** Millennium Ecosystem Assessment Series. Island Press, Washington DC. 5
10. **City of Melbourne. 2017. Climate Change Adaptation Refresh.** <http://www.melbourne.vic.gov.au/sitecollectiondocuments/climate-change-adaptation-strategy-refresh-2017.pdf>
11. **City of Melbourne. 2016. Future Melbourne 2026.** <http://www.melbourne.vic.gov.au/SiteCollectionDocuments/future-melbourne-2026-plan.pdf>
12. **GHD. 2014. Green Infrastructure and the Private Realm: International Review Report.** GHD
13. **Wilkinson, S. J., and R. Reed. 2009. Green roof retrofit potential in the central business district.** Property Management 27:284-301.
14. **Williams, N. S. G., J. P. Rayner, and K. J. Raynor. 2010. Green roofs for a wide brown land: opportunities and barriers for rooftop greening in Australia.** Urban Forestry & Urban Greening 9:245-251.
15. **Low Carbon Living CRC (CRCLCL). 2017. Cooling cities: Strategies and technologies to mitigate urban heat.** Discussion Paper. http://www.lowcarbonlivingcrc.com.au/sites/all/.../discussion_paper_cooling_cities_final.pdf
16. **Low Carbon Living CRC (CRCLCL). 2017. Guide to Urban Cooling Strategies.** <http://www.lowcarbonlivingcrc.com.au/resources/crc.../guide-urban-cooling-strategies-2017>

How to contact us

Online: melbourne.vic.gov.au

In person:

Melbourne Town Hall – Administration Building
120 Swanston Street, Melbourne
Monday to Friday, 7.30am – 5pm
(Public holidays excluded)

Telephone: 03 9658 9658

Monday to Friday, 7.30am – 6pm
(Public holidays excluded)

In writing:

City of Melbourne
GPO Box 1603
Melbourne VIC 3001
Australia

Fax: 03 9654 4854



Interpreter services

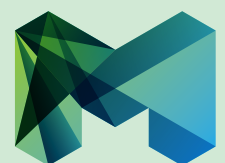
We cater for people of all backgrounds
Please call 03 9280 0726

03 9280 0717 廣東話
03 9280 0719 Bahasa Indonesia
03 9280 0720 Italiano
03 9280 0721 普通话
03 9280 0722 Soomaali
03 9280 0723 Español
03 9280 0725 Việt Ngữ
03 9280 0726 عربي
03 9280 0726 한국어
03 9280 0726 हिंदी
03 9280 0726 All other languages

National Relay Service:

If you are deaf, hearing-impaired or speech-impaired, we ask that you call us via the National Relay Service: Teletypewriter (TTY) users phone 1300 555 727 then ask for 03 9658 9658
Monday to Friday, 9am – 5pm
(Public holidays excluded)

melbourne.vic.gov.au



CITY OF MELBOURNE