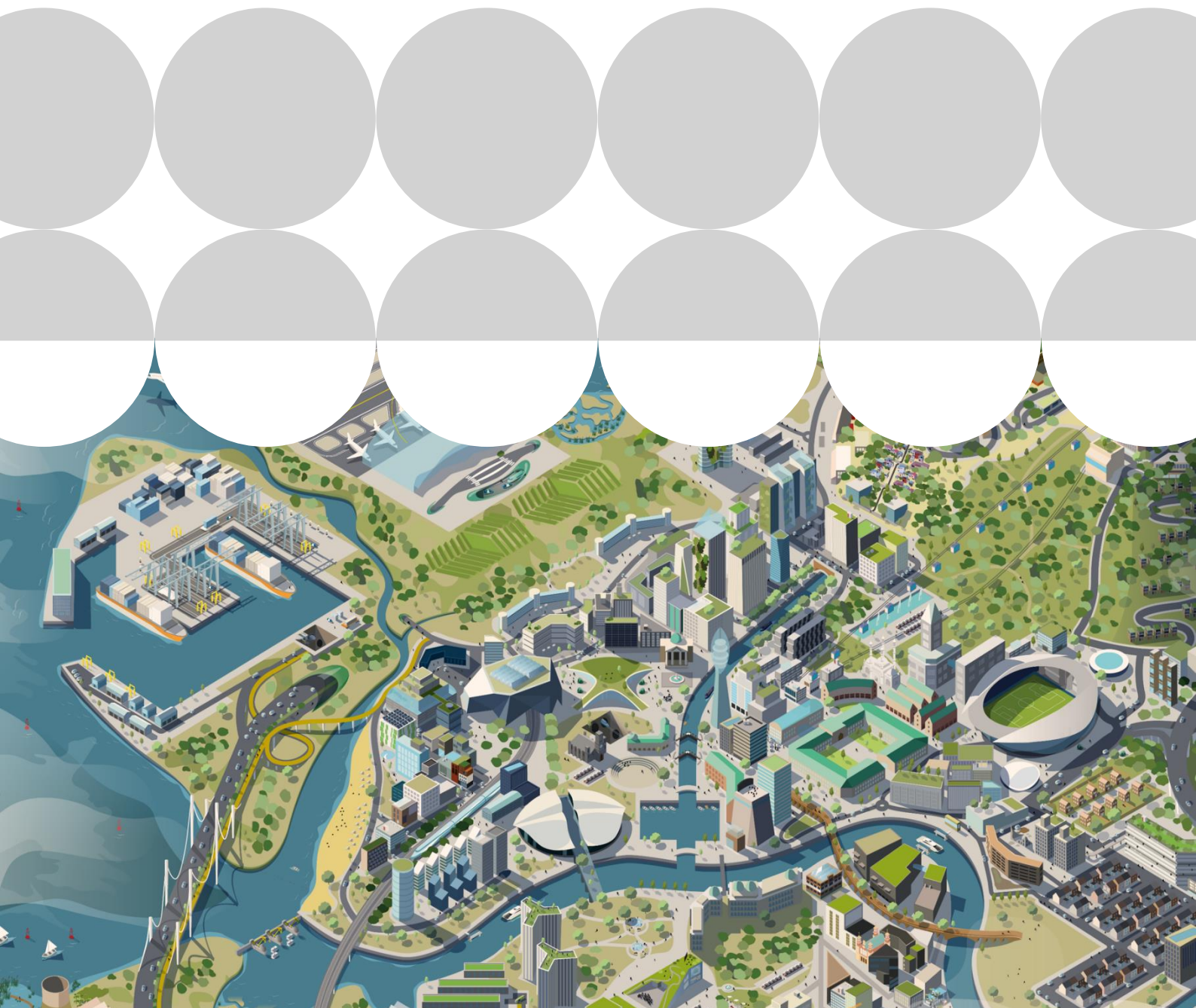


Green Our City Strategic Action Plan

Strategic justification for regulatory requirements for sustainability

Final report



OCULUS

HillPDA
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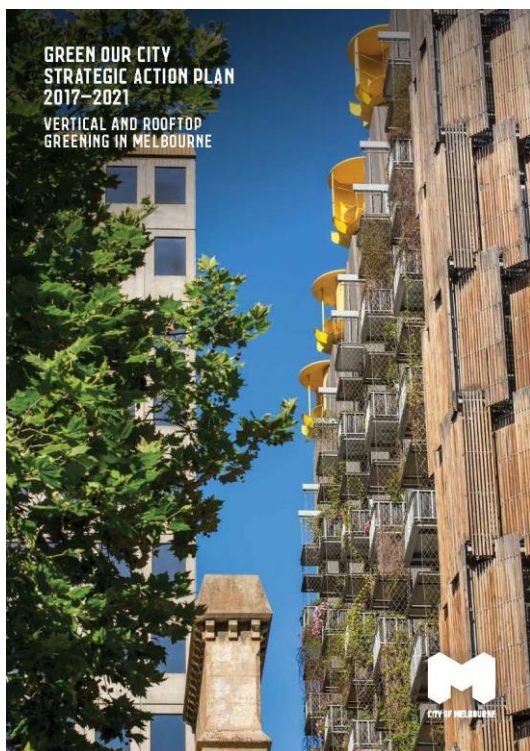
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Summary

Introduction

On behalf of City of Melbourne, Arup, Oculus, HillPDA and Jungleyfy have developed a suite of sustainable design and green infrastructure standards. The proposed standards translate sustainability-related goals and targets from City of Melbourne's strategies and plans into potential planning requirements.

This report brings together the findings of our investigation into developing the strategic justification for enhanced regulatory requirements, as set out in Action 4.1 of the Green Our City Strategic Action Plan (GOCAP).



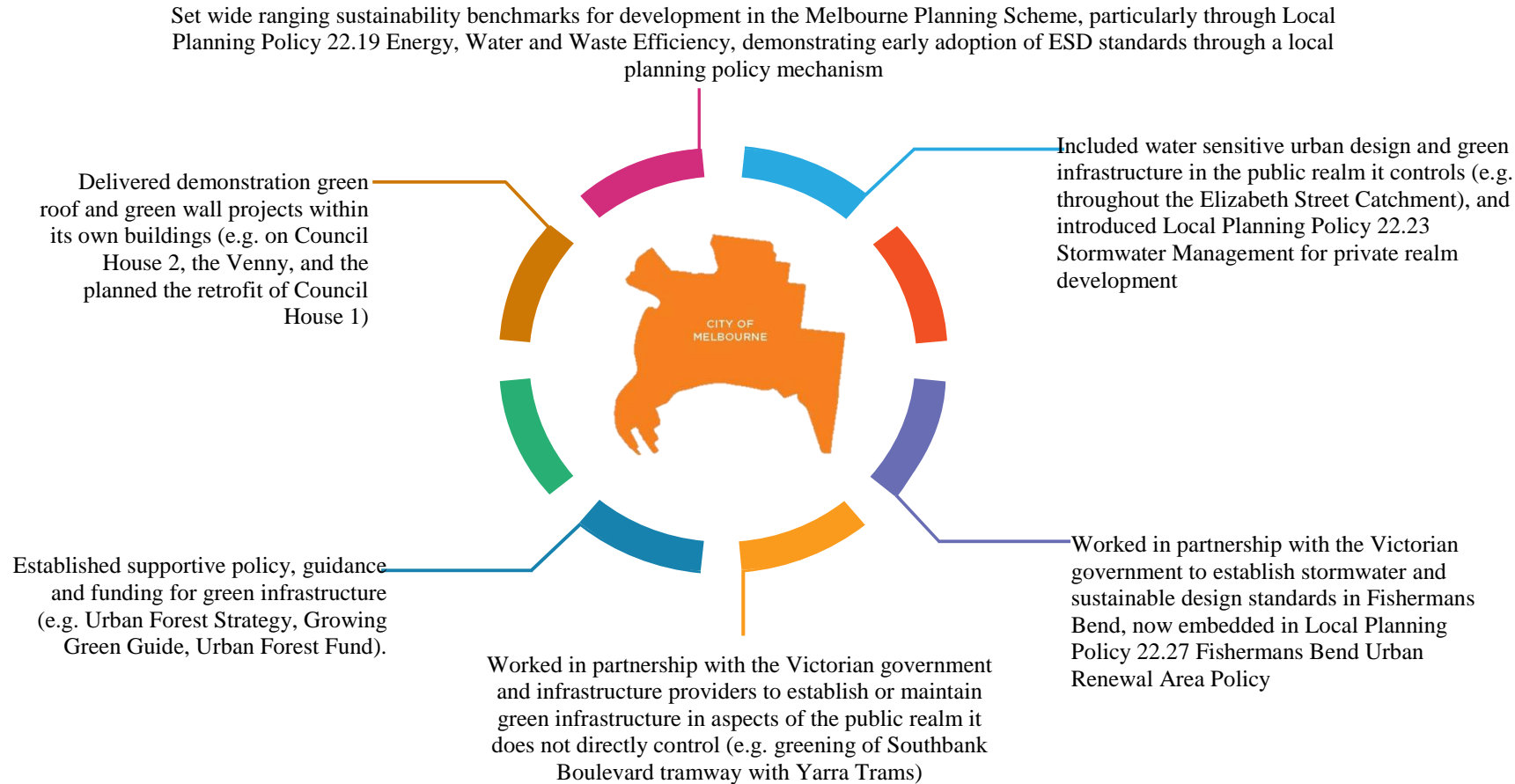
Green Our City Strategic Action Plan

Action 4.1 is to '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'. GOCAP highlights green infrastructure as a key tool to support the municipality's continued liveability, resilience, and health and wellbeing as the population grows and the climate changes.

This report provides the strategic justification to support a future sustainability focussed planning scheme amendment by addressing the following questions:

- Which standards will enable development to meaningfully contribute to achieving City of Melbourne's sustainability and green infrastructure goals?
- Which standards are technically viable (can be built) and commercially feasible (will be built)?
- What are the broader socio-economic benefits to residents, workers and visitors of implementing such standards?

Figure S1 City of Melbourne as a leader for embedding sustainability into developments across Victoria over the past 10 years



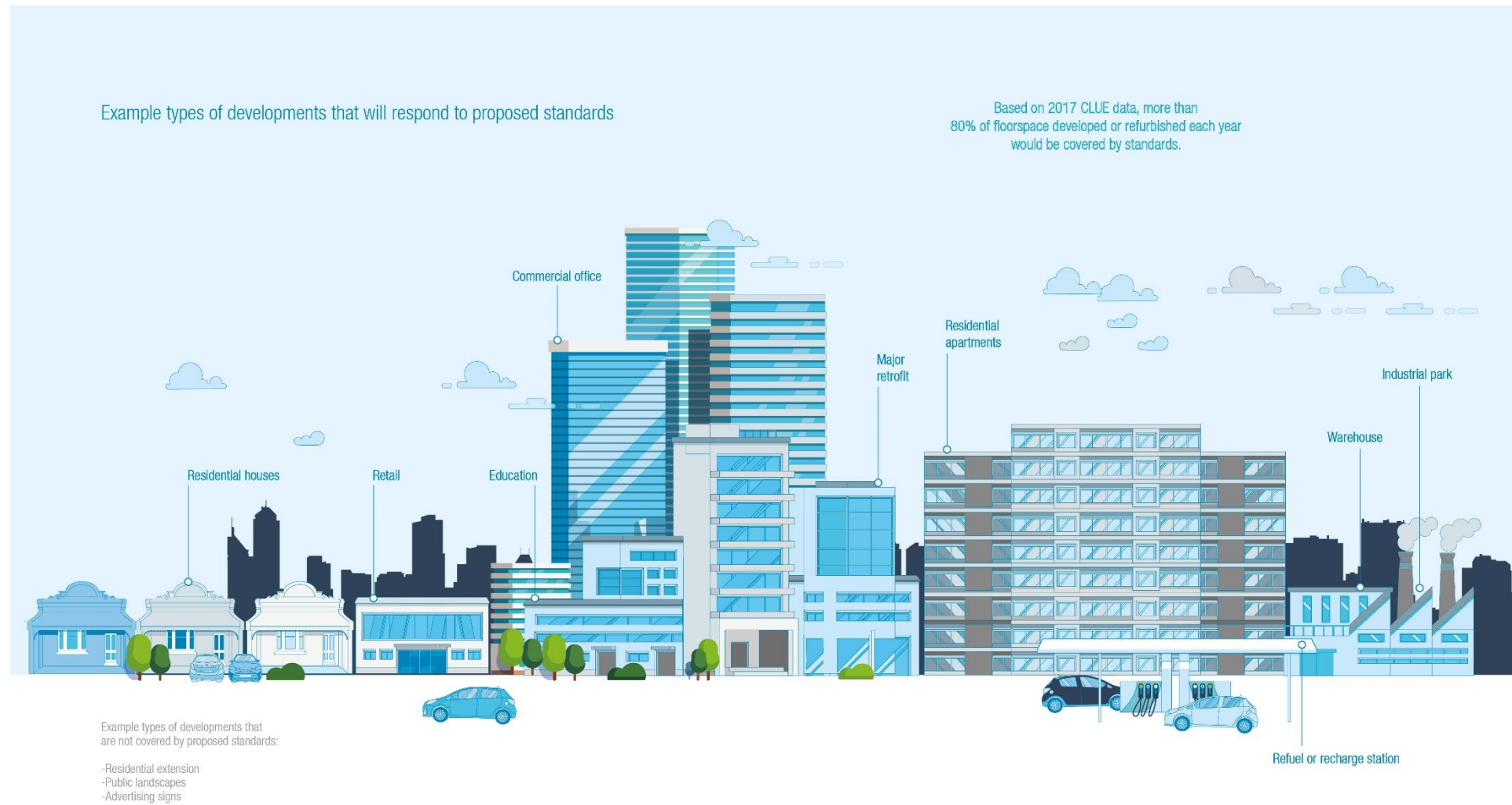
In line with the direction from GOCAP Action 4.1, the sustainability standards have been developed to be embedded in the planning scheme. The standards are therefore triggered by activities such as land use change, new development and significant alterations (example developments shown in Figure S2).

Over the next twenty years, the standards are expected to affect around half of Melbourne's buildings, which presents a major opportunity for the planning system to deliver the city's sustainability goals (Table S1).

Table S1 Policy impact on building floorspace in Melbourne municipality

Year	Dwelling forecast growth from 2021	Employment forecast growth from 2021	Proportion of building stock affected by proposed standards
2031	48%	20%	~30%
2041	94%	Not available. Assume same as 2021-2031 growth	~50%

Figure S2 Application of the proposed standards

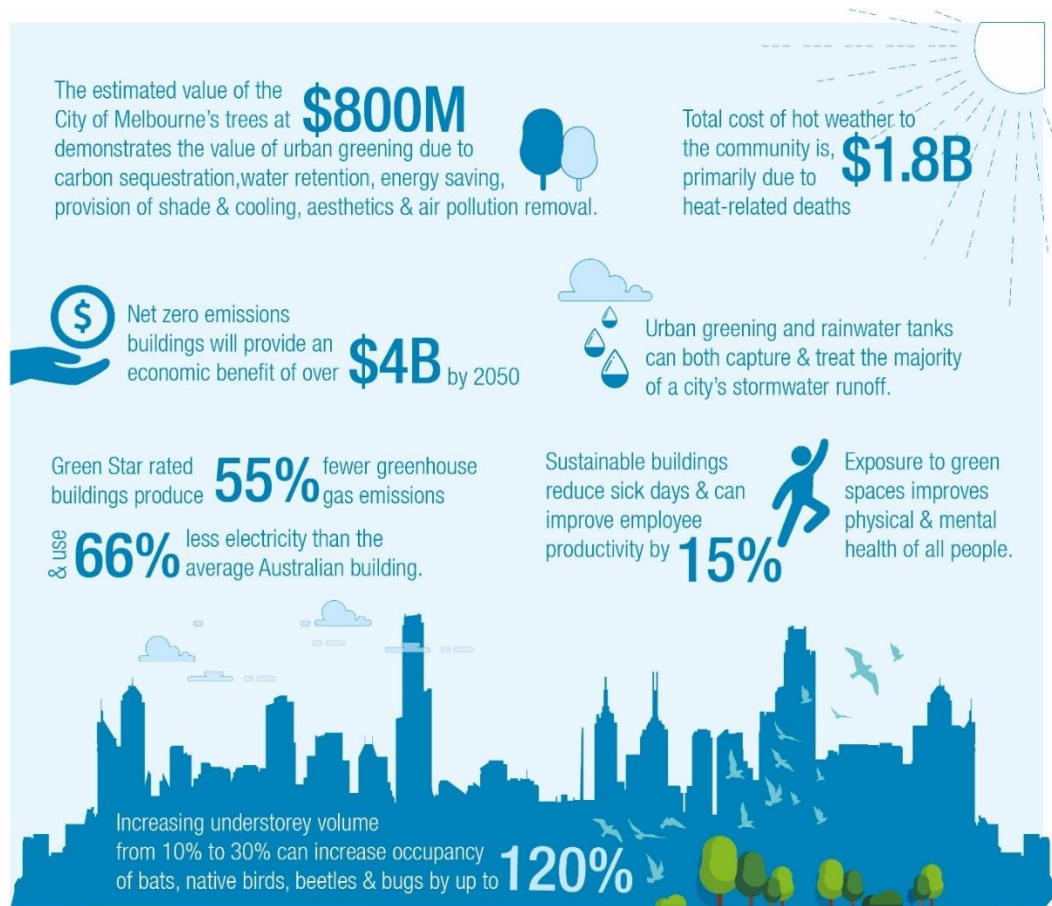


Benefits to the city

The strategic justification for regulatory requirements for sustainability is underpinned by the wider benefits to the city, its community and economy. These benefits are fundamental to the development of a liveable and resilient Melbourne.

The proposed standards offer the opportunity to help realise a wide range of benefits, as illustrated in Figure S3.

Figure S3 Wider benefits of the requirements



Policy analysis

The aim of the proposed standards is to lift performance expectations in line with council's strategies and ensure that the private realm is contributing to the mitigation and adaptation of Melbourne to climate change.

We reviewed City of Melbourne's endorsed strategies and plans and prioritised 40 goals, actions and targets that could be partially achieved by private development. Most of these goals, actions and targets exist in the Melbourne Planning Scheme, to varying levels of performance and prescriptiveness. The planning scheme review found that:

- Green infrastructure, climate change adaptation and biodiversity have the most limited representation in the planning scheme and must be the focus area for developing new tools and standards
- Transport, flooding, sunlight, vegetation and resource efficiency targets were the most well-defined in terms of clarity and objectivity
- The most robust planning provisions incorporated measurable targets, usually facilitated by a sustainability rating scheme such as Green Star
- Planning provisions for Fishermans Bend had readily interpretable guidelines and targets for planners.

Lessons learned

Our investigation has identified the lessons learned by:

- City of Melbourne's implementation of the Local Planning Policy 22.19 Energy, Water and Waste Efficiency
- Victorian councils in implementing ESD policies since 2013
- Australian and international cities in their first years of requiring green infrastructure through planning policy.

A recent review of Local Policy 22.19 identified that the main impediment to the effectiveness of the policy is that planning applications need only to demonstrate that a building has the preliminary design potential to achieve performance measures equivalent to a Green Star project. Requiring formal Green Star As-Built certification or compliance in other ways has the potential to address this issue.

A monitoring report on local ESD planning policies across six Victorian councils highlighted the value of industry consultation informing the developing of planning policies. Uptake and compliance with planning policies and provisions was attributed to the availability of information and training, as well as the clarity of the policy objectives.

Through interviews, we heard from policy makers and practitioners in international cities about the factors that led to the successful implementation of

new green infrastructure policies. The lessons relevant to City of Melbourne include:

- Providing the industry information through in-person sessions, technical and design guidelines
- Identifying green infrastructure priorities in different areas of the municipality, which allows the coordination of individual developments to contribute to precinct needs
- Assisting first movers through the learning curve with reputational or financial rewards
- Developing a green infrastructure assessment tool that allows green infrastructure solutions that reflect the opportunities and constraints of individual developments
- Collecting data to track lessons and industry changes to inform the revision of guidelines and tools.

Proposed standards

We developed a suite of standards that improves performance to reflect City of Melbourne's goals, actions and targets. There are two tiers of proposed standards:

- Minimum requirements – this standard is to be achieved across all development types (mandatory). Mandatory standards are necessary to drive meaningful green infrastructure and ESD outcomes where discretionary standards alone may be insufficient¹.
- Preferred standard – this standard achieves above the minimum requirements and would provide a higher contribution towards achieving the municipality's sustainability actions and targets (discretionary).




The proposed standards are summarised in Table S2. Where there are constraints on the ability for a development to achieve the preferred standard, City of Melbourne could apply discretion to allow the minimum requirement. The scope of the standards and examples of key requirements are illustrated in Figure S4.



The standards use a range of tools including Green Star, the Built Environment Sustainability Scorecard (BESS), National Australian Built Environment Rating Scheme (NABERS) Energy and Water, Nationwide House Energy Rating Scheme (NatHERS), and a new green infrastructure assessment tool for Melbourne.

Green Star plays an important role in enabling City of Melbourne to achieve zero carbon buildings and precincts for the municipality, as the rating scheme is committed to a carbon positive roadmap. The new green infrastructure assessment tool will give development applicants flexibility to respond to site specific challenges when designing to meet the green infrastructure standards, while rewarding designs that provide maximum environmental benefit to the city.

¹ (Carter & Fowler, 2008)

Table S2 Summarised table of minimum requirements and preferred standards for each theme.

Theme	Minimum requirement	Preferred standard
<p>Energy and emissions</p> 	<p>New developments >5000sqm:</p> <ul style="list-style-type: none"> ≥ 5 Star Green Star Design & As-Built (or contemporary equivalent) ≥ 5.0 Star NABERS Energy Average ≥ 7.5 NatHERS across multiple dwellings, and minimum 6.5 NatHERS rating for each dwelling <p>New developments ≤ 5000sqm and Non-residential building alterations > 1000sqm:</p> <ul style="list-style-type: none"> ≥ 55% BESS score ≥ 55% score in BESS Energy category Average ≥ 7.5 NatHERS across multiple dwellings, and minimum 6.5 NatHERS rating for each dwelling <p>New developments must incorporate on-site renewable or low carbon energy generation where cost-effective</p>	<p>New developments >5000sqm:</p> <ul style="list-style-type: none"> 6 Star Green Star Design & As-Built (or contemporary equivalent) ≥ 5.5 Star NABERS Energy <p>New developments ≤ 5000sqm:</p> <ul style="list-style-type: none"> >70% BESS Score <p>New developments:</p> <ul style="list-style-type: none"> should incorporate on-site renewable or low carbon energy generation to the extent feasible should reduce reliance on fossil fuels by avoiding gas use altogether or be ready to transition to electrical services and appliances.
<p>Sustainable transport</p> 	<p>New residential</p> <ul style="list-style-type: none"> ≥ one secure bicycle space per dwelling <p>New non-retail development</p> <ul style="list-style-type: none"> ≥ one bicycle parking space for 20% of regular occupants in the case of a new building without onsite car parking. <p>New retail development</p> <ul style="list-style-type: none"> ≥ one bicycle parking space for 5% of peak visitors in the case of a new building without onsite car parking. 	<p>New residential development</p> <ul style="list-style-type: none"> ≥ one secure bicycle space per bedroom <p>New non-retail development</p> <ul style="list-style-type: none"> ≥ one bicycle parking space for 10% of regular occupants in the case of a new building without onsite car parking.
<p>Waste and resources recovery</p> 	<p>All developments:</p> <ul style="list-style-type: none"> Waste management plan Separate collection for recycling, hard-waste, and food and green waste 	<p>All developments:</p> <p>In addition to minimum requirements, provide a waste management plan that:</p> <ul style="list-style-type: none"> Combines commercial and residential waste storage Provides for the collection of additional waste streams including e-waste, clothing, cosmetics, etc Share storage or collections with adjacent developments.

Theme	Minimum requirement	Preferred standard
Urban heat reduction 	<p>All developments: ≥ 70 per cent site area must comprise building or landscape elements that reduce the impact of the urban heat island effect including:</p> <ul style="list-style-type: none"> Vegetation, green roofs and water bodies Roof materials, shade structures or hard scaping materials with high solar reflectivity index, including solar panels 	None additional
Integrated water management 	<p>All developments:</p> <ul style="list-style-type: none"> Achieve the best practice water quality performance objectives set out in the Urban Stormwater Best Practice Environmental Management Guidelines, CSIRO 1999 (or as amended) Developments must use stormwater treatment measures that improve the quality and reduce the flow of water discharged to waterways Connected to a recycled water source and/or install rainwater tank Achieve water use certifications consistent with best practice energy efficient fixtures and fittings 	<p>All developments:</p> <p>In addition to minimum requirements</p> <ul style="list-style-type: none"> Use of measures to prevent litter being carried off-site in stormwater flows Achieve the following water quality performance objectives (expressed as retention of typical urban annual load): <ul style="list-style-type: none"> Total Phosphorus (TP) – 60% Litter – 90% Total Petroleum Hydrocarbons – 90% Free Oils – 90% Use alternative water sources for all non-potable uses onsite. <p>The site area covered by porous surfaces should be at least:</p> <ul style="list-style-type: none"> The minimum area specified in a schedule to the zone; or If no minimum area is specified in a schedule to the zone, 20 per cent of the site.


Theme	Minimum requirement	Preferred standard
<p>Urban ecology</p> 	<p>All developments:</p> <ul style="list-style-type: none"> • Protect existing overstorey and understorey vegetation • Plant biodiverse species • Provide green infrastructure equivalent to ≥ 40 per cent site area as green cover. Green cover includes tree, shrub, grasses, climbers, other vegetation and lawn and excludes non-plantable surfaces (hard non-permeable and permeable). 	<p>All developments:</p> <p>In addition to minimum requirements</p> <ul style="list-style-type: none"> • Provide 20% understorey vegetation habitat • Retain or provide net gain in trees and habitat • Prioritise the planting indigenous Victorian vegetation • High quality publicly accessible and visible green and blue open space is encouraged. • Are encouraged to incorporate green walls or green facades to south facing façade areas.

Figure S4 Themes and selected proposed standards



Testing the standards

We tested the draft standards on four case studies through a technical feasibility study, then a development viability study.

The purpose of the technical feasibility study was to examine the green infrastructure standards in depth, and account for interactions with the other standards. While most standards (e.g. climate change mitigation, stormwater and flood) could be established through benchmarking and precedent policies, there is minimal Victorian-based evidence to establish green infrastructure standards. The technical study helps to fill this gap.

The development viability study assessed how the likely impact on viability differs on a project-by-project basis.

To test the standards, alterations were made to bring four current proposed developments in line with the minimum requirements, while minimising changes to building massing and layout.

The results showed that the impact of the proposed standards on construction costs, development yield and land value could be readily offset by the price premium the market is currently paying for sustainable and green developments.

Stakeholder engagement

City of Melbourne held two external advisory workshops involving developers, building managers, academics, development organisations and State and Local government.

The workshops covered topics including:

- Helping to select scenarios for testing
- Providing feedback on draft standards
- Identifying partnership opportunities and mechanisms for ongoing discussion
- Prioritising resources and processes that support policy implementation.

Across all board, stakeholders were supportive of the scope and level of ambition of the standards as presented.

Summary and recommendations

This investigation has been a significant step forward in building the strategic justification for new standards for urban ecology; energy and greenhouse gas emissions; sustainable transport; waste and resources recovery; urban heat reduction; and integrated water management. The standards would apply to half of Melbourne's building stock over the next 20 years. The city continues its significant growth, and the way we design, and construct buildings today will affect the resilience and liveability of the city in the decades to come.

While many sustainability themes were well represented in the planning scheme, green infrastructure, climate change adaptation and biodiversity were less defined in terms of clarity and objectivity. The GOCAP planning scheme amendment can fill this gap and drive the uptake of green infrastructure to deliver a wide range of council's goals.

The planning scheme amendment can also take advantage of recent industry-driven changes such as the requirement for As-Built certification under Green Star and the Green Star roadmap towards zero net emissions for buildings and precincts. These are both major industry initiatives that enable council to meet its own goals for securing sustainable outcomes.

The planning scheme amendment would be supported by further testing of the proposed standards for urban ecology and sustainable transport (specifically bicycle parking). These recommendations are expanded below.

This report provides seven recommendations, which set out the way forward.

1. Refine urban ecology standards and the green infrastructure assessment tool

The proposed standards for urban ecology will benefit from further refinement and modelling to ensure that sustainability performance outcomes are achieved. We recommend investigations on policy impact, further testing across a wider array of development types and scales, and establishing performance pathways through guidance in a green infrastructure assessment tool.

2. Refine bicycle parking standards

As part of the active transport theme, we have recommended increasing bicycle parking rates across the municipality, as it has been demonstrated that not enough bicycle parking is being provided in new developments.² We recommend further work to document the rationale for the proposed rates and refine them if necessary.

The City of Melbourne should continue to advocate for changes to the Victorian Planning Provisions to allow a local schedule to introduce appropriate bicycle parking rates for the municipality.

3. Consider expanding sustainability standards for less developed themes

There is the opportunity to undertake further analysis in additional themes as part of the GOCAP planning scheme amendment. These include:

- Parking and electric vehicles
- Adaptive reuse
- Pedestrian connections in support of walking
- Occupant amenity

² (City of Melbourne, 2019)

4. Continue to pursue the GOCAP planning scheme amendment

This investigation shows that the benefits of enhanced sustainability standards are likely to outweigh the costs. The proposed standards for the other sustainability themes can be progressed to a planning scheme amendment. In parallel to recommendations 1 and 2, the City of Melbourne should investigate the appropriate planning controls in which to embed the standards.

5. Develop comprehensive support processes

During international interviews and workshops with Melbourne stakeholders, there was a consistent message that the development sector would benefit from resources that build the sector's capacity to design and construct green infrastructure. We recommend that City of Melbourne implement a comprehensive suite of support processes alongside the new policy. In particular, City of Melbourne highlighted the ability of the Central Melbourne Design Guide to initiate productive conversations with developers at early planning stages. We recommend City of Melbourne adopt lessons from this resource in implementing the green infrastructure standards through the planning scheme.

6. Collaborate with the Green Building Council of Australia

As we have nominated certification to the Green Star Design and As-Built tool as a minimum requirement, we recommend City of Melbourne work closely with the Green Building Council of Australia to:

- Account for changes to the rating tool
- Develop shared resources, calculators and other tools
- Plan for the project pipeline
- Establish precinct-wide certification approaches for urban renewal areas, which simplify the Green Star process for individual developers
- Collect and share data.

7. Monitor policy impact

We recommend monitoring and reporting the outcomes of the planning scheme amendment. This includes establishing a baseline for green infrastructure and building certifications (e.g. Green Star) prior to the planning scheme amendment. This could be in the form of a map or database of buildings.

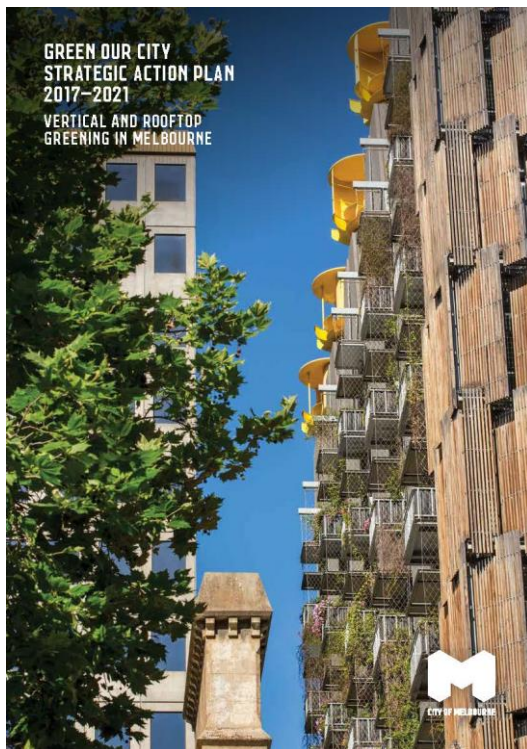
Through green infrastructure assessment tool's online database, the City of Melbourne should collect and analyse how developments respond to the standards and have met community needs.

1 Introduction

On behalf of City of Melbourne, Arup, Oculus, HillPDA and Jungleyfy have investigated and developed the strategic justification for adding and enhancing sustainable design and green infrastructure standards for developments requiring a planning permit.

The proposed standards translate sustainability-related actions and targets from City of Melbourne's strategies and plans into possible planning requirements.

This report brings together the findings of our investigation into the strategic justification for enhanced regulatory requirements, as set out in Action 4.1 of the Green Our City Strategic Action Plan (GOCAP). GOCAP highlights green infrastructure as a key tool to support the municipality's continued liveability, resilience, and health and wellbeing as the population grows and the climate changes.



Green Our City Strategic Action Plan

Action 4.1 is to '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'. GOCAP highlights green infrastructure as a key tool to support the municipality's continued liveability, resilience, and health and wellbeing as the population grows and the climate changes.

Our investigation tasks include:

- Stage 1 – Council policy review, global and Australian interviews, gap analysis, draft standards and stakeholder consultation.
- Stage 2 – Technical feasibility study of proposed standards, development viability impacts, stakeholder consultation and standards refinement.

This report provides the strategic justification to support a future planning scheme amendment by addressing the following questions:

- What standards will enable development to meaningfully contribute to achieving City of Melbourne's sustainability and green infrastructure goals?
- What standards are technically feasible and commercially viable?
- What evidence exists to support the proposed standards?

Our approach to the study is detailed in Table 1.

Table 1 Overview of methodology

Stage 1	
1. Gap analysis of planning scheme	Prioritised 40 sustainability goals/ targets across 13 City of Melbourne strategies for sustainable design and green infrastructure. Assessed how well these are translated into existing planning requirements in the Victorian and Melbourne Planning Scheme. Documented methodology to enable other councils to replicate.
2. Lessons learned	Summarised strengths and weaknesses of existing sustainability-related planning policies, including City of Melbourne's Local Policy 22.19 Energy, Water and Waste. Interviewed global practitioners and policy-makers to capture informal and contemporary knowledge of strengths and weaknesses of minimum requirements for green infrastructure and sustainability in planning systems. Tested findings from literature review.
3. Technical standards	Identified existing effective standards in the planning scheme. Drafted two tiers of standards, based on practitioner knowledge of industry capability and project decision making. Define scope of regulation for different development types.
4. Economic implications	Reviewed literature on the social, environmental and economic implications of policy to the city. Outlined expected costs and benefits. Set out process for specific feasibility analyses in Stage 2.
5. Stakeholder consultation	Consultation across City of Melbourne. External advisory workshop to seek input from industry and institutional stakeholders.
Stage 2	
5. Refined standards	Refined draft standards to reflect consultation feedback.
7. Technical feasibility and development viability studies	Applied the proposed standards to four representative scenarios, based on current planning applications. Tested the technical feasibility of the refined standards, then assessed the impact on development viability.
8. Socio-economic context	Summarised the wider social, environmental and economic benefits of proposed standards based on available literature.
9. Stakeholder consultation	External advisory workshop to present technical feasibility and development viability findings and sought feedback on refined standards and related opportunities.
10. Proposed standards	Updated standards to consider Stage 2 findings.

The report is structured as follows.

Section 2 summarises the benefits to the city of sustainable design and green infrastructure.

Section 3 describes City of Melbourne's strategies and goals for sustainability and green infrastructure, existing planning policies and, and the scope of regulations in terms of applicable development types.

Section 4 refines and justifies our proposed standards and identifies appropriate regulatory assessment tools and their respective risks.

Section 5 details the impact of the proposed requirements in terms of development viability and technical feasibility of four representative scenarios.

Section 6 summarises feedback from the external advisory workshop and outlines how this has been incorporated into our recommendations.

Section 7 sets out our recommendations for regulatory requirements for sustainability to be reflected in a planning scheme amendment.

2 Benefits to the city

The strategic justification for regulatory requirements for sustainability is underpinned by the wider social, economic and environmental benefits to the city, its community and economy.

Some of these benefits are captured in a conventional development viability model (see Section 5.3), where property purchasers value the amenity, reputational, productivity and long-term value of sustainable buildings. However, there are additional benefits that accrue to the wider community.

This section summarises the literature on the range of benefits from sustainable design. The literature suggests that standards such as those proposed in Section 4 will help drive the development of our resilient and liveable city.

The full literature review is provided in Appendix A. The Valuing Green Guide, a companion document to this report also provides further details on these benefits³.

Climate change mitigation

In a business-as-usual scenario, the impacts of climate change and the missed economic opportunities of transitioning to a low carbon economy will cost \$12.6 billion to the municipality's economy by 2050⁴.

Buildings contribute 66 per cent of current annual greenhouse gas emissions, and so have the potential to mitigate a significant proportion of this cost. If all new buildings constructed in the municipality are zero emissions by 2030, with all existing buildings net zero by 2050, the economic benefit to the municipality will be over \$4 billion, with a benefit: cost ratio of 1:86⁵.

Green Star rated buildings produce 55 per cent fewer greenhouse gas emissions and use 66 per cent less electricity than the average Australian building.

As well as reductions in costs associated with highly thermally efficient and energy efficient buildings, these design measures also make buildings, and their occupants, less vulnerable to higher external temperatures and extreme heat.

Water management

In the Greater Melbourne region, mean annual temperatures have risen by up to 1.6 degrees since 1950, with the rate of warming increasing since 1960. Warmer temperatures are associated with more intense rainfall events⁶.

Over the long term, climate change will mean more extreme climatic events, less rainfall, and potentially 50 per cent reduction in streamflow by 2065. Victoria's

³ (City of Melbourne, 2019)

⁴ (City of Melbourne, 2018)

⁵ (City of Melbourne, 2018)

⁶ (Department of Planning & Development, 2015)

population will almost double by 2051 placing further demand on scarce water resources. Our challenge is to do more with less water⁷.

Large cities like Melbourne are continually vulnerable to different types of flooding. Floods cause more damage per year in terms of lives lost and dollars, than any other natural hazard in Australia.⁸ Extreme flooding can lead to loss of life, severe property and essential infrastructure damage, disruption of travel, and further degradation of urban waterways due to run-off resulting in pollution, scouring and habitat damage.⁹

There is a need for stronger emphasis on increasing permeability as the city grows. Stormwater runoff and flood risk can be reduced while cooling the city by using green roofs, increasing the permeability at ground level through on ground green space. Lack of permeability correlates to reduced soil moisture and vegetation health.

Evidence from the UK shows green roofs help absorb and slow stormwater, with intensive soil green roofs intercepting as much as 90% of annual rainfall¹⁰. One Melbourne case study found stormwater runoff was reduced by 162 ML per year through a mix of introduced green roofs, rainwater tanks and perimeter greening¹¹.

More people in the catchment and more intense storms will increase the volume of nutrients, pathogens, pesticides, heavy metals and sediments in the waterways and Port Phillip bay. A stronger focus in the private realm on increased permeability and Water Sensitive Urban Design will reduce the amount of pollution entering the Yarra River, Maribyrnong River, Moonee Ponds Creek, and ultimately the bay.

Improved surface water management can also help reduce the impacts of rainfall on city streets and provide continued building efficiency through reducing potable water consumption, achieved through water tanks plumbed for toilet flushing and garden irrigation.

The report produced by a consortium of Melbourne councils found rainwater tanks were beneficial in reducing the amount of potable water used within buildings through using the collected water for some areas of residential irrigation¹².

Urban heat reduction

Heatwaves have significant human health impacts, especially in the most vulnerable. The 2009 heatwave in Victoria resulted in 374 excess deaths and increased ambulance callouts by 46%¹³.

⁷ (DELWP, 2016)

⁸ (Emergency Vic, 2019)

⁹ (Emergency Management Victoria, 2016)

¹⁰ (Greater London Authority , 2019)

¹¹ (Victoria Institute of Strategic Economic Studies, 2015)

¹² (CASBE , 2018)

¹³ (Natural Capital Economics, 2018)

Increasing temperatures are a global concern, and the urban heat island effect causes urban areas to be between 5 and 10 degrees warmer than a non-urban baseline.¹⁴ Globally, heat waves contribute to an estimated 12,000 deaths annually. The risks from heatwaves continue to grow as temperatures rise, with a quarter of a million people predicted to be impacted in 2050.

In the City of Melbourne, the total economic cost to the community due to hot weather is estimated to be approximately \$1.8 billion in present value terms (2012), with one-third of these impacts due to heatwaves.¹⁵

Trees and other types of greening reduce urban heat through evapotranspiration and shade provision, which reduces the exposure of urban surfaces to solar radiation. One study estimating that doubling the leaf canopy in Melbourne would result in 28% fewer heat related deaths annually.

Increased greenery can have economic benefits of lower electricity costs for residential and commercial buildings due to reduced demand for air conditioning. The Melbourne municipality has 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 roofs¹⁶. These areas represent a significant opportunity to improve the city's capacity to mitigate the ongoing loss of urban greenery.

Biodiversity

Increasing understorey volume from 10% to 30% can increase occupancy of bats, native birds, beetles and bugs by 30–120%. Occupancy across all native taxa increases 10–140% as the proportion of native vegetation increases from 10% to 30%¹⁷.

Over 30% of Australia's nationally threatened species are found to occur within urban environments¹⁸. Cities are hotspots for biodiversity but reduced green space creates greater difficulty for species to thrive. Green roofs that are designed to increase biodiversity should feature indigenous vegetation local to the area. Biodiversity roofs should also incorporate different vegetation layers and landscaping features to increase opportunities for wildlife to feed and shelter.¹⁹

Green roof habitats are promising in their contributions to local habitat conservation, particularly in supporting populations of invertebrate and avian communities²⁰. An Australian report has found that green roofs host a larger number and variety of organisms than conventional bare roofs²¹.

¹⁴ (DELWP, 2019)

¹⁵ (AECOM, 2012)

¹⁶ (GHD, 2013)

¹⁷ (Threlfall, 2017)

¹⁸ (Ives et al 2016)

¹⁹ (Growing Green Guide, 2014)

²⁰ (Oberndorfer & Lundholm 2007)

²¹ (Berthon 2015)

There is extensive literature suggesting that in improving the ecological quality of the built environment through measures such as the incorporation of green infrastructure, biodiversity and ecological connectivity can be greatly enhanced²².

Health, wellbeing and worker productivity

In Melbourne around 20% of the adult population have been diagnosed with depression and anxiety. An even greater number experience psychological distress to varying degrees.

A study from the Green Building Council of Australia found that Green Star certified projects resulted in an average of 2.88 fewer sick days annually and a 15% boost in employee productivity²³. Staff health and productivity in a workplace are correlated with lighting levels, thermal comfort, air quality and ventilation, with one study finding a 1.7% productivity increase for every two-fold increase in the ventilation rate²⁴. Sustainable building design provides a multi-faceted solution for sick building syndrome, which can result in reduced productivity, increased absenteeism and poor occupant-wellbeing²⁵.

Opportunities to view and interact with nature in micro-breaks have been demonstrably linked to better moods, greater attention control, and improved task performance in the workplace²⁶. Research also reveals the capacity to green roofs to provide restorative experiences through providing opportunities for socialisation, physical activity and mindfulness²⁷.

Studies find that exposure to green spaces tend to improve physical and mental health of people regardless of gender, age and socio-economic standing. One UK report estimated that Londoners get £370 million worth of avoided health costs annually due to better mental health from public parks and greenery²⁸.

Other wellbeing benefits can be gained by additional greenery, with increased seating, trees and well-maintained shrubbery contributing to a person's feelings of safety.

Improved air quality

Fine particles carry the greatest health burden, proven to cause death, heart disease, lung cancer, stroke, type two diabetes and low birth weight for babies, and are suspected of causing dementia²⁹.

In Melbourne, the value of street trees was estimated at \$800 million, with individual trees providing benefits to the ecosystem of \$163 per tree annually, this

²² (Nielsen, van den Bosch, Maruthaveeran, Konijnendijk 2013)

²³ (Green Building Council of Australia, 2013)

²⁴ (Wilson & Tagaza, 2006)

²⁵ (Roodman, 1994)

²⁶ (Lee, Sargent, Williams, & Williams, 2018)

²⁷ (Williams, et al., 2019)

²⁸ (Vivid Economics, 2017)

²⁹ (Ewald, 2018)

figure encapsulates value from carbon sequestration, water retention, energy saving, aesthetics and air pollution removal³⁰.

The reduction of carbon helps improve air quality and which improves health and limits deaths, a UK study found that the negatives effects of poor air quality contributed to the loss of 40,000 life years in London³¹.

In Melbourne, the improved air quality in a precinct was estimated to reduce health costs associated with asthma hospitalisation and early death of \$7.1 million annually. A US report found that green roofs reduction of nitrogen-oxide compounds was worth up to US \$0.589 per square foot of green roof.

Property prices and property spend

If a single building cuts its peak demand by one kilowatt (kW), equivalent to the power used to run a small oil heater, it is estimated this will save almost \$1,000 in required investment in electricity system infrastructure, reducing electricity prices for everyone³².

Greenery and sustainability both contributed towards increased property values and reduced property spend. Proximity to green spaces was found to generally uplift property prices with addition of tree canopy accounting for a 10-15% uplift in property value in Subiaco, Western Australia³³.

A US report highlighted the implementation of green roofs in Washington D.C. would have an estimated effect of \$10 value per square foot of green roof (and \$13 when applied nationally)³⁴. The increased aesthetic of properties with greenery often results in more positive perceptions and in turn increased value and sale prices.

Along with increased property value, there were economic benefits through costs savings due to the ESD designs. Green Star certified buildings were found to use 66% less electricity than the average Australian building.

Another report found that building improvements such as increased insulation, double glazed windows and ceiling fans amongst a variety of alterations could help reduce 19-25% of the energy required to deliver net zero energy. Other benefits of sustainable design and greenery were noise reductions for residents, with one report finding that proximity to greenery and tree canopies contributed to sound dampening effects.

³⁰ (Symons, Jones, Young, & Rasmussen, 2015)

³¹ (The Nature Conservatory, 2016)

³² (Australian Sustainable Built Environment Council and ClimateWorks Australia, 2018)

³³ (Yew, 2012)

³⁴ (United States General Services Administration, 2011)

3 Analysis

3.1 Sustainability and green infrastructure goals

Melbourne's community has set out its goals and priorities for the municipality's liveability now and for future generations. The *Future Melbourne 2026* community plan is an overarching umbrella for council's vision, plans and strategies including:

- Council plan 2017 – 2021
- Municipal Public Health and Wellbeing plan
- Municipal Strategic Statement
- Transport Strategy
- Climate Change Adaptation Strategy
- Climate Change Mitigation Strategy
- Municipal Integrated Water Management Plan
- Green Our City Strategic Action Plan (GOCAP).

GOCAP directly addresses two of the nine community goals of *Future Melbourne 2026*: a city that cares for its environment; and a city for people. GOCAP identified that green infrastructure (also called living infrastructure) is an important yet underutilised strategy for delivery a wide range of sustainability benefits for stormwater, amenity, air quality, urban heat reduction and biodiversity. Such infrastructure includes in-ground greening, green walls, green facades, and green roofs.

GOCAP Action 4.1 is to use the planning scheme as a mechanism for ensuring that new development in the municipality contributes to the sustainability of the city and makes effective use of green infrastructure as part of meeting sustainability targets. The planning scheme is an appropriate vehicle for green infrastructure and sustainable design standards for several reasons including:

- Providing a driver to require sustainability outcomes within the wider context of the site and at an early stage of design, where it is generally more cost effective
- Direct relevance to the city's built environment.

To establish the scope of this investigation, we reviewed City of Melbourne's endorsed strategies and plans to identify goals, actions and targets that had strong links to the planning stages of private development. Working with council, we prioritised 40 actions, summarised in Appendix B by the following themes:

- Energy and greenhouse gas emissions
- Sustainable transport
- Waste and resources recovery
- Amenity
- Urban heat reduction
- Integrated water management
- Urban ecology

These themes primarily reflect the environmental aspects of sustainability, as well as the social co-benefits of environmental sustainability such as walkability and heritage conservation. Social (e.g. homelessness) and economic (e.g. employment) dimensions of sustainability are not within the scope of GOCAP.

Most of these themes already feature in the Melbourne Planning Scheme, to varying levels of performance and prescriptiveness (see Section 3.2). The aim of the proposed standards was to recommend new or updated standards that lift performance expectations in line with council's strategies.

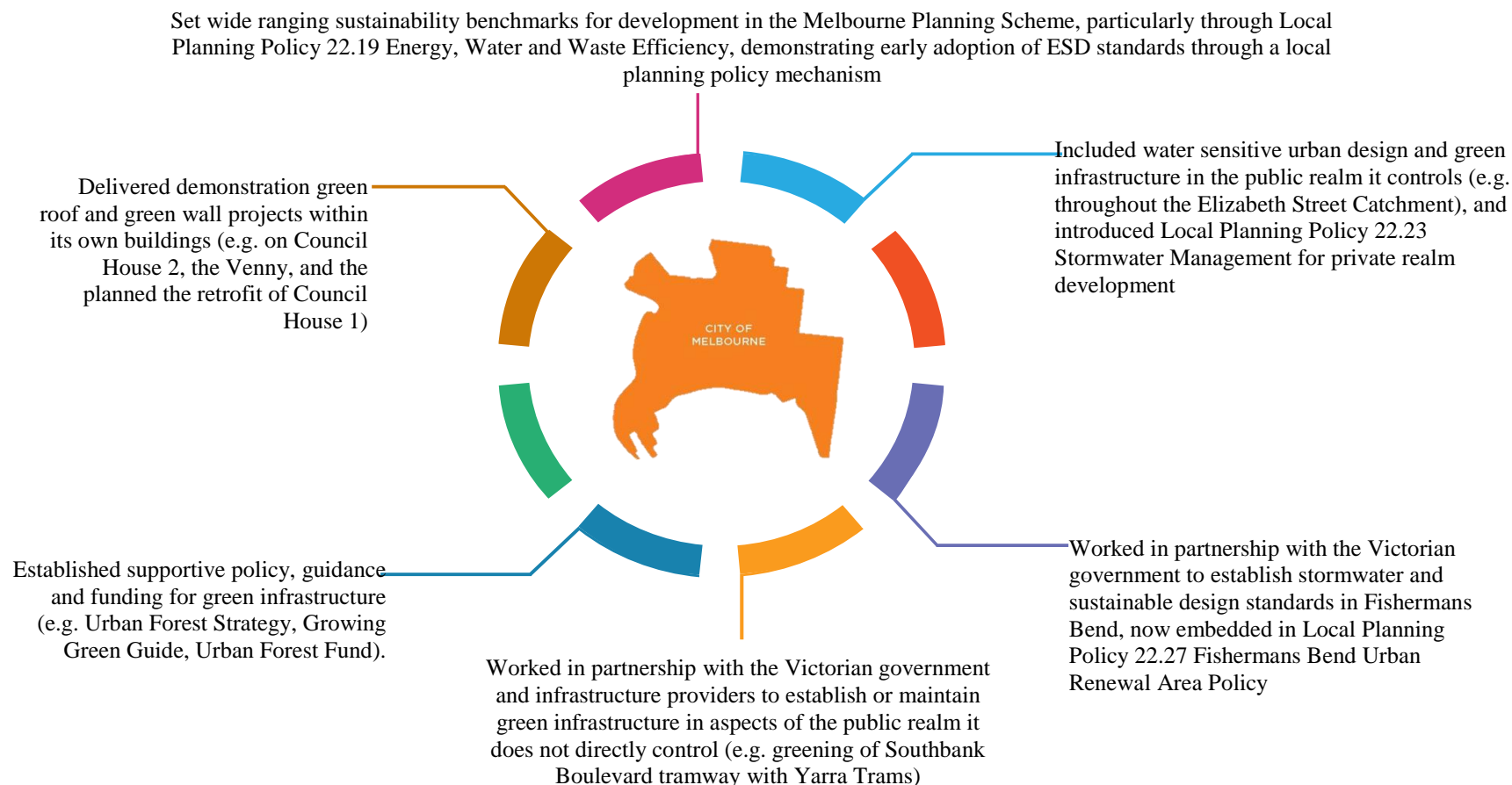
The City of Melbourne has been an early mover in embedding quantitative benchmarks for sustainability into its local planning scheme (see selected milestones in Table 2).

Table 2 Selected milestones in sustainability standards in the Melbourne Planning Scheme

Date	Plan or provision	Significance
1996	Melbourne Planning Scheme, Part 4 Melbourne Docklands (MPS), Amendment L202	First instance of environmental management plans in planning scheme and is supported by the Docklands ESD Guide
2009	Environmental Sustainable Office Building standard (MPS Clause 22.19, 2009)	The first standard to use Green Star as a benchmark in planning requirements
2012	Energy, water and waste local policy (MPS Amendment C187: Clause 22.19)	Leading planning example for ESD, lack of translation into as-built phase signals a need for impact measurement and monitoring mechanisms
2018	Fishermans Bend (MPS Amendment GC81: Clause 22.27)	Australia's largest urban renewal project, leading sustainability targets including zero net greenhouse gas emissions

As shown in Figure 1, over the past 10 years, City of Melbourne has driven sustainability in the built environment through planning controls and partnerships. The proposed planning scheme amendment is a continuation of this agenda.

Figure 1 City of Melbourne as a leader for embedding sustainability into developments across Victoria over the past 10 years



3.2 Existing planning policy and provisions about sustainability and green infrastructure

3.2.1 Overview

We reviewed the planning scheme for keywords to identify relevant policies, overlays and schedules. We identified and screened around 300 instances where current planning provisions affect the nominated sustainability actions. We then rated each instance based on its ability to drive built outcomes. This process enabled us to consider which of the existing standards across the municipality should be retained or expanded. The gap analysis found:

- Green infrastructure, climate change adaptation and biodiversity have the most limited representation in the planning scheme and must be the focus area for developing new tools and standards
- Transport, flooding, sunlight, vegetation and resource efficiency targets were the most well-defined in terms of clarity and objectivity
- The most robust planning provisions incorporated measurable targets, usually facilitated by a sustainability rating scheme such as Green Star
- Planning provisions addressing Fishermans Bend also represented readily interpretable guidelines and targets for planners.

This review is provided as Appendix C and described the relevant strategies and targets, and existing policies and provisions for each sustainability theme.

3.2.2 Gaps in planning provisions

In this section, we summarise the gaps in the planning provisions. These gaps informed the scope of our investigation, leading to the proposed standards in Section 4.

Energy and greenhouse gas emissions

The existing planning policy and provisions provide the foundations for achieving the driving goal of zero emission buildings and precincts. Local Policy 22.19 Energy, Water and Waste, as well as 22.27 Fishermans Bend Urban Renewal Area Policy sets out the expectation for 4 or 5 Star Green Star for development greater than 5,000 sqm and 2,000 sqm respectively.

The Green Building Council of Australia has put Green Star rated buildings on a trajectory that ensures all new buildings and fit-outs must have no greenhouse gas emissions from their operations by no later than 2030. We therefore recommend the continued use of Green Star, as it is consistent with council's zero emissions goals and with previous benchmarks in the planning scheme.

In addition, Local Policy 22.19 sets an expectation for NABERS Office 5 Stars for development over 2000 sqm. Therefore, the use of NABERS as a planning

benchmark is well established. Council's target of accelerating the uptake of NABERS for apartments could be expressed in the planning scheme as well. Therefore, we recommend setting a NABERS expectation across all development to which NABERS applies, including apartments.

For further discussion on the suitability of Green Star and NABERS, refer to Section 4.3.1.

Sustainable transport – cycle infrastructure

Through various site or area specific amendments, City of Melbourne has increased the requirement for bicycle spaces in selected areas and for selected types of development (e.g. student housing, capital city, Fishermans Bend, public housing on Abbotsford Street).

We recommend increasing the bicycle parking requirements for development across the municipality to reflect council's goals to encourage active transport. The requirements should be readily understood in terms of Green Star credits.

Sustainable transport – walkability

Through precinct-specific controls, there are requirements for pedestrian connections in selected precincts including Central City, Southbank, Queen Victoria Market Precinct, West Melbourne Waterfront and Fishermans Bend. We believe there is value in extending such requirements throughout the municipality as part of encouraging walking modes.

However, to establish the appropriate benchmarks across the municipality, further urban design testing will be required.

Waste and resources recovery

The existing policies and provisions require waste management plans that are consistent with contemporary waste management guidelines. This is a well-established and understood mechanism. The Waste and Resources Recovery Strategy 2030 commits to the continued update of the guidelines in support of the landfill diversion and waste reduction targets.

We recommend the retention of the waste management standard throughout the municipality, as well as additional reference to the policy objectives of recovering organic wastes and use of shared/communal waste hubs.

Adaptive reuse

One of the goals initially prioritised for this investigation related to adaptation and reuse through the Heritage Strategy. While this action is in the context of heritage, there are also emerging drivers to increase adaptive reuse as part of the circular

economy, as well as the potential for carparking spaces to become redundant through trends in active transport, shared mobility and autonomous vehicles³⁵.

We believe that adaptive reuse across all building types and heritage adaptive reuse requires an integrated review to develop sustainability standards including:

- The consideration of waste and material reuse prior to demolition
- Transition of car parks to alternative uses
- Floor-to-floor heights of at least 3.5 metres to allow future adaptation

We recommend that this is an area for future investigation, building on City of Melbourne's evidence base for recent amendments such as C308 Urban design in the central city and Southbank and C309 West Melbourne.

Amenity

In its strategies, the City of Melbourne has no specific goal related to sunlight and occupant wellbeing in private development.

Internal occupant amenity is affected by daylight provision, thermal comfort, air quality and acoustic environment. These areas are covered by: residential minimum standards in the Better Apartment Design Standards and ResCode (for other residential buildings); discretionary standards for other types of buildings through Green Star and BESS. There may be value in expanding the Better Apartment Design Standards for sunlight access to communal outdoor open space to other types of development.

There is the opportunity for council to set internal occupant amenity goals based on wellbeing and resource efficiency outcomes, then fill the gap in non-residential amenity standards.

Urban heat reduction

There are relevant standards in Local Policy 22.27 Fishermans Bend Urban Renewal Area Policy, which sets the expectation for: at least 70 per cent of the total site area should comprise building or landscape elements that reduce the impact of the urban heat island effect; and buildings should include deep soil zones and incorporate green facades and rooftop, podium or terrace planting.

We recommend that the planning scheme amendment builds on the Fishermans Bend benchmark of 70% of total site area to reduce urban heat island effect and provide more explicit requirements for green infrastructure.

Integrated water management – stormwater and flood

There is a comprehensive suite of stormwater and flood standards in the planning scheme. To meet the strategies and goals for permeability and drainage infrastructure, we recommend the planning scheme amendment provide a permeability target throughout the municipality (20 per cent, in line with ResCode

³⁵ (DELWP 2018)

and the Municipal Integrated Water Management Plan 2017) and set standards for the use of green infrastructure.

Integrated water management – water use

There is strong support for water efficiency and use of alternative water sources in existing policies and provisions. The main gap is that the existing water use targets refer to a Green Star rating tool that is now superseded. We recommend that the benchmark is updated to reflect a contemporary standard.

Urban ecology – biodiversity

Existing planning policies and provisions focus on retaining existing significant vegetation.

To help deliver council's strategies and targets, we recommend standards that refer to council's existing guidelines for diverse planting, and that exotic vegetation be retained where it is in good health and provides habitat.

Urban ecology – green infrastructure

While the existing policies and provisions provide prompts for the consideration of green infrastructure, there is no mandatory requirement for green infrastructure. Given the underutilisation of green infrastructure in private development, this suggests that the lack of regulation is a hindering uptake of green infrastructure. This echoes the rhetoric of our interviews with global experts and is supported by extensive literature (refer to Section 3.4.2).

We recommend a green infrastructure standard that provides a strong signal for planning applications to investigate and implement green infrastructure.

Summary of City of Melbourne's research into the role of building separation and envelope controls to enable sustainable design and green infrastructure outcomes

The following information has been provided by City of Melbourne and provides insight into how building envelope controls support or hinder sustainability standards.

The City of Melbourne, consistent with practice across Victoria, has an envelope-based planning system which specifies preferred street wall heights, setbacks and maximum building heights in areas undergoing significant growth. These controls can be either 'preferred' or 'mandatory'.

The built outcome ends up with the tallest part of the development at the centre of the lot with lower edges to the boundaries. This means increased height and therefore increased value of developable floor area at the centre of the lot.

The resultant high site coverage and absence of central courtyards can constrain environmentally sustainable design and the incorporation of green infrastructure into building development. This includes reducing scope for tree retention, passive ventilation, daylight access, accessible courtyards, landscape views, and contiguous in-ground deep planting zones within the site and limited opportunities to peripheral setbacks.

According to City of Melbourne, Victoria (within the exception of Moreland) does not have effective building separation requirements within the Better Apartment Design Standards (BADs) or other amenity-oriented planning controls. As a result, there is limited impetus to provide generous areas between apartments facing one another within a development or an adjacent site.

Under a plot ratio system with flexible envelope controls and a fixed development density, areas of the site left open because the separation requirement could be traded for higher areas elsewhere within the site. The inclusion of areas suitable for integration of green infrastructure would not result in a penalty to development yield.

We understand that, in growth areas, the City of Melbourne is shifting toward a combined approach with fixed Floor Area Ratios and flexible envelope controls. Council's view is that this approach, combined with an effective spatial separation requirement, could increase the opportunity for achieving sustainable design and green infrastructure initiatives within development parcels.

The City of Melbourne has undertaken research of comparable Australian cities and identified several benefits from the planning controls employed in Metropolitan Sydney, particularly in the type of development seen in areas such as the Green Square urban renewal area. These areas have high levels of green infrastructure provision as standard.

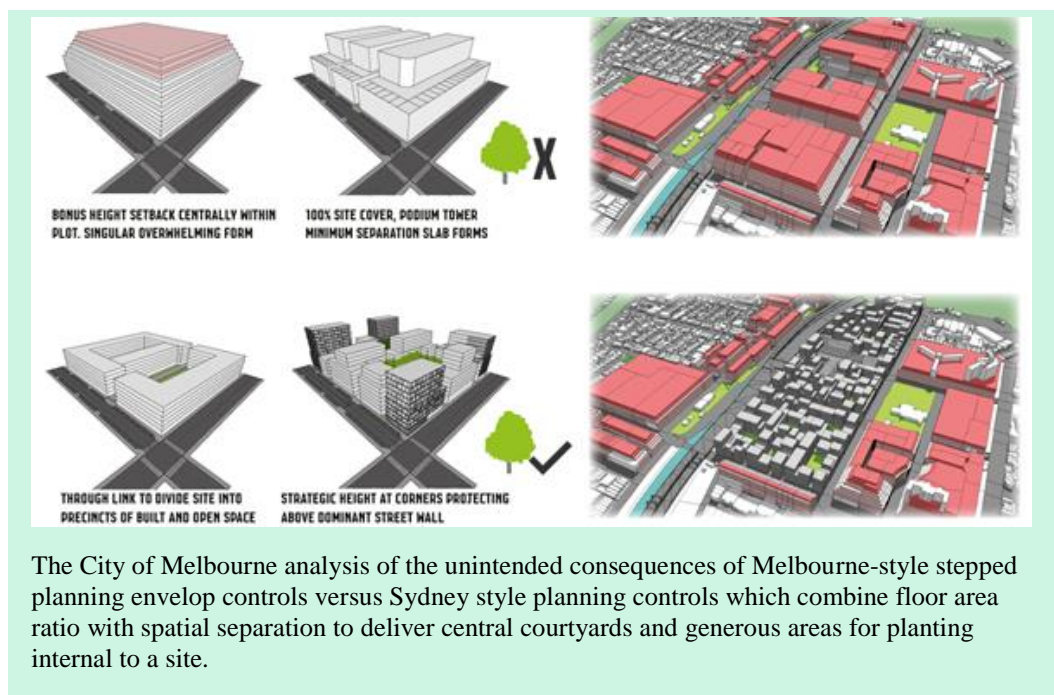
Sydney uses Floor Area Ratio (FAR) controls to determine building density, which operate in conjunction with spatial separation requirements between apartments. This helps to drive the development of large courtyard spaces between buildings and lower site coverage. Buildings in these precincts tend to avoid stepped envelope arrangements and instead employ efficient mid-rise built form to the street edges and large open courtyards of between 12 and 24 in width at the centre of the urban block.

The City of Melbourne's view is that these controls, as opposed to stepped envelope controls, could assist in achieving enhanced green infrastructure outcomes due to the land area available for planting. Stepped envelope or podium-tower controls tend to position bulk centrally within a site and preclude the creation of unbuilt areas within the site, whereas FAR controls would enable the unbuilt areas centrally within the site to be redistributed to higher street edge-built form.

The City of Melbourne has identified that there is a critical need for the planning scheme to consider the combined benefits of urban design, amenity and performance to improve the sustainability of developments through enhanced opportunities for the integration of low cost green infrastructure.



Typical Sydney condition with spatial separation driving a large space with possibility for green infrastructure and lower plot densities (left) as opposed to typical Melbourne development with minimal lower level setbacks and planting opportunities (right).



3.3 Emerging planning requirements for sustainability

As a topic, sustainability in the planning system might evolve quickly in the coming years. The Department of Environment, Land, Water and Planning is in the process of implementing Action 80 of the Plan Melbourne Implementation Plan:

‘Review the Victorian planning and building systems to support environmentally sustainable development outcomes for new buildings to consider their energy, water and waste management performance.’

The Victorian Government is also reviewing the Better Apartment Design Standards, which sets quality expectations for multi-unit residential developments. The Standards cover aspects of sustainable building design including energy efficiency, solar access, landscaping, waste and recycling, integrated water and stormwater management.

3.4 Building on lessons learned

3.4.1 Impact review of Victorian ESD local policies

To assist in addressing the gaps and recommendations in Section 3.2, we have summarised the reviews of current ESD policies in the City of Melbourne and other CASBE councils. The full reports are provided Appendix D.

Melbourne Local Policy 22.19 Energy, Water and Waste

In 2018, City of Melbourne commissioned an impact review of Local Policy 22.19 by Arup. The impact review assessed all built outcomes since the policy's adoption, rather than planning submissions. Local Policy 22.19 states the following objectives:

- To ensure buildings achieve high environmental performance standards at the design, construction and operation phases
- To minimise the city's contribution to climate change impacts by reducing greenhouse gas emissions
- To improve the water efficiency of buildings and encourage the use of alternative water sources
- To minimise the quantity of waste going to landfill and maximise the recycling and reuse of materials
- To minimise the impacts of waste on the community
- To encourage the connection of buildings to available or planned district energy, water and waste systems in urban renewal areas to achieve additional energy, water & waste efficiency arising from a precinct-wide approach to infrastructure where appropriate.

Key features of the policy include:

- Quantitative benchmarks (expectations of performance) for energy efficiency expressed in terms of the National Australian Built Environment Rating System (NABERS), the Sustainable Design Scorecard (SDS) or the Green Star credit
- Quantitative benchmarks for water efficiency, expressed in terms of the relevant Green Star credit
- Requirement for a waste management plan
- Requirement that all planning applications to submit an Environmentally Sustainable Design Statement. This must demonstrate that the building has the 'preliminary design potential' to achieve a set of relevant performance measures. It is noted that there is no requirement to ensure the building achieves these measures as built.
- The expectation that buildings above 5,000 square metres have the design potential to attain a 5-star rating under the Green Star.

The review found that:

- The policy has had a small impact on eliciting the uptake of sustainability measures in the residential sector
- It is unlikely to have been a driver for awareness, motivation or capability in the commercial sector, where the sustainability benchmarks are already industry standard practice in Melbourne municipality.

The review identified that the main impediment to translating policy to built outcomes is the **non-mandatory nature of certification under the Green Star scheme**. This means that there is no As-Built compliance process and therefore no certainty in built outcomes.

The review was based on 11 case studies of completed buildings in the six years since the policy's gazettal. The long timeframe for development makes monitoring and evaluation difficult to assess its impact over the short/medium term.

CASBE ESD local policies

The following is a summary of CASBE's review of the ESD policies in six municipalities. In contrast to City of Melbourne's impact review of Local Planning 22.19 (which focused on built outcomes), CASBE's review focused on the extent to which planning applicants provided submissions in response to the ESD policies. **The review did not monitor outcomes beyond planning submission.**

Aside from City of Melbourne, 15 Victorian municipalities have local planning policies for ESD. The policies are relatively consistent, based on the approach established in 2015 by six Victorian local governments (the 'first round' of ESD planning policies). The six municipalities were City of Banyule, City of Port Phillip, City of Moreland, City of Stonnington, City of Whitehorse and City of Yarra.

As required by the Minister as part of the policies' gazettal, the Council Alliance for a Sustainable Built Environment (CASBE) has monitored the uptake of environmentally sustainable design (ESD) policies and published its findings³⁶.

The local planning policy encourages outcomes and processes that support best practice ESD in private development, encompassing energy (usage and renewable energy generation), stormwater management, water, waste management, urban ecology, indoor environmental quality and transport.

Whilst the ESD local planning policy does not contain mandatory standards, it includes mandatory application requirements similar in nature to Local Planning Policy 22.19 for energy, water and waste in the Melbourne Planning Scheme. For example, it is mandatory that all applications are accompanied by either a Sustainable Design Assessment (developments with gross floor area 50-1000sqm) or Sustainability Management Plan (developments with gross floor area >1000sqm).

The requirement for additional application requirements is largely accepted by industry. Significant participation before the gazettal of the ESD local planning policy was mainly due to the availability and ease of using the prescribed tools (e.g. Built Environment Sustainability Scorecard (BESS) and access to supporting education material. This echoes the uptake of the Urban Greening tool in London prior to the publishing of the new London Plan in which it features.

³⁶ (CASBE, 2018)

Although Green Star is employed for some Sustainability Management Plans, our discussions with Moreland City Council indicate that BESS is the industry's preferred sustainability rating tool in those municipalities. Unlike Green Star, a BESS assessment does not require third party certification or certification as-built. This means that the process of using BESS is less resource intensive, which is particularly valued for smaller scale developments.

CASBE attributes the uptake of the policies in the planning application phase to the fact that it is a mandatory part of the planning submission. Other supportive measures included:

- Signalling of the impending policy
- Training council urban planners about ESD
- Direct meetings with key stakeholders to discuss the new local policy (including OVGA, developers, universities)
- Internal council processes in place ensuring that ESD reports are reviewed in a timely and efficient manner

The main challenges identified in implementing sustainable design in the built environment for CASBE councils are³⁷:

- Gap between the planning and building system
- Weaknesses in the planning system, including lack of leadership and innovation deficits in sustainable design
- Governance, inconsistencies and coordination across councils and in terms of policy longevity
- Need for improved networks and advocacy

Subsequent rounds of planning scheme amendments saw further councils implement the ESD policy. These include Darebin, Manningham, Brimbank, Greater Dandenong, Hobsons Bay, Kingston, Whittlesea, Wyndham and Greater Bendigo. These implementations are recent (2017, 2018) and are not required by the Minister to be monitored in the same way that the first round of policies have been.

Difference between Melbourne and CASBE ESD policies

We note that the sustainability standards in Melbourne's Local Planning Policy 22.19 Energy, Water and Waste and Local Planning Policy 22.27 Fishermans Bend Local Policy differ from those of the other CASBE councils.

This is due to:

- Different strategic basis for sustainability objectives – in Melbourne, the policies have been driven by the quantitative energy, water and waste Eco City Goals (Melbourne's previous Community Plan). This led to Local Policy 22.19 focusing on energy, water and waste and the benchmarks as quantitative targets where possible. In contrast, the other local policies addressed a wider

³⁷ (Moore, Moloney, Hurley, & Doyon, 2017)

array of ESD topics and the CASBE ESD Policies do not set quantitative targets.

- More stringent process requirements (use of Green Star rating tool), reflecting the scale and complexity of development in the Melbourne municipality.

Recommendations based on local policy lessons

We recommend the use of mandatory certification standards where possible to drive compliance and change. This includes taking advantage of As-Built certifications to secure outcomes. For example, in 2013 when Local Policy 22.19 was gazetted, Green Star was used only at the design stage. The tool requires As-Built submissions to achieve certification.

In line with existing good practice by the City of Melbourne, the success of the planning scheme amendment will be supported by:

- Extensive consultation with key stakeholders
- Targeted information resources on the new standards for development applicants
- Replicability in other councils to foster consistency with future policies in other municipalities
- Internal measures to mitigate extensive processing delays
- Alignment of requirements with nominated certification tools.

3.4.2 Lessons from global green infrastructure requirements

This section integrates the discussions across nine interviews, as shown in Table 3. It also draws in relevant comments from literature.

Our interviews focused on green infrastructure in planning requirements, as this is the area in the future planning scheme amendment that requires the most innovation.

Table 3 Global interviews on green infrastructure

Interviewee and role	City and organisation	Green infrastructure mechanism	Interview date
Vincent Lee, Associate Principal, Infrastructure	New York (Arup)	NYC Green Infrastructure Plan (for bioswales)	30/11/2018
Dion Anandityo, Singapore Sustainability Leader	Singapore (Arup)	Landscaping for Urban Spaces and High rises (LUSH) programme	03/12/2018
Michael Zhao, Associate, Infrastructure	Beijing (Arup)	China's Sponge City	03/12/2018
Tom Armour, Director, Landscape Leader	London (Arup)	London Plan, All London Green Grid and London Urban Greening Factor	04/12/2018

Interviewee and role	City and organisation	Green infrastructure mechanism	Interview date
Kirstin Weeks, Associate, Buildings	San Francisco (Arup)	Green Building Ordinance, CALGREEN	04/12/2018
Rudi Scheuermann, Arup Fellow, Director, Global Building Envelope Design Leader	Berlin (Arup)	Berlin Biotape Factor	04/12/2018
Peter Massini, Lead – Green Infrastructure, Development, Enterprise & Environment	London (Greater London Authority)	London Plan, All London Green Grid and London Urban Greening Factor	18/12/2018
Barbara Schaeffer, Principle Landscape Architect	Sydney (NSW Office of the Government Architect)	Sydney Green Grid	14/01/2019
Emily Lofstedt, Senior Land Use Planner	Seattle (Department of Construction and Inspection, City of Seattle)	Seattle Green Factor	18/01/2019

Steep learning curve for policy makers and industry

Interviewees consistently raised the value in building capacity through less stringent requirements and reflecting on learnings in the early phases of policy implementation. Frequent updates to planning standards are likely to be required to optimise green infrastructure outcomes.

The concept of capacity-building was a focal aim of the incentivisation phases in both San Francisco and Singapore and could be emulated in City of Melbourne through seminars on best practice and other initiatives geared towards education (Weeks) (Anandityo).

In Beijing, Zhao noted that ‘the government is slowing the pace of green infrastructure implementation after 3-4 years of the policy to consider lessons learned and to respond to feedback’.

The ambiguity of green infrastructure as an aesthetic/ functional/ adaptive concept confuses the placement of accountability and prevents the transition into the ‘realm of [green infrastructure] implementation’³⁸.

Lennon (2015) comments on the value in *gradually* adding complexity to a modest initial planning provision thereby smoothing the learning curve. Informative guidelines have driven the installation of meaningful, quality green infrastructure in London according to Armour and Massini.

Similarly, information sessions and stakeholder consultation facilitated a smooth incorporation of the Green Factor system in Seattle, for which the tool is currently

³⁸ (Lennon, 2015, p. 972).

undergoing an update to reflect lessons learned since implementation in 2007 (Lofstedt).

Challenges for green infrastructure to contribute to coordinated outcomes

Armour commented on the importance of a green infrastructure masterplan (such as that incorporated into the London Infrastructure Plan) ‘to achieve meaningful, optimised green infrastructure’.

Such a plan could identify the needs across precincts of the city, such as green infrastructure network for managing stormwater, providing publicly accessible open space, creating or completing ecological corridors. Armour noted that without a plan, green infrastructure may only perform as a quick-fix, short-term solution. This may be costlier in the long-run if re-installation is necessary.

In contrast, there are benefits to implementing green infrastructure whenever the opportunity arises (a piecemeal development-by-development model) including rapid learning, visibility and industry investment.

Lee noted the momentum and market transformation associated with this approach, which enable a faster realisation of heat island effect benefits. Anandityo (Arup, Singapore) reiterated these benefits in reflecting upon the opportunistic approach in Singapore.

The lack of literature available to this project suggests a lack of monitoring and measurement, which in turn may be due to the piecemeal approach to delivering green infrastructure.

Lennon (2015) does allude to the limitations of a siloed planning approach in Ireland; the meaningful implementation of a green infrastructure policy may be hindered by multifaceted planning issues, which could be alleviated with a masterplan strategy.

Support for first movers

Widespread adoption of a green infrastructure policy relies on adoption by leaders in the industry who bear more of the burden of risk. To an extent, City of Melbourne has taken a first mover role through its past and ongoing green roof and green wall demonstration projects.

One of the major penalties observed by first movers is higher installations costs resultant of limited market capacity. Compensating these costs with financial or reputational rewards alleviates the first mover incumbrance³⁹.

Carter and Fowler (2008) criticise direct financial incentivisation schemes (such as the Green Permit program in Chicago) for their cost-inefficiency compared to indirect incentivisation schemes with rewards spanning building density bonuses (Singapore), expedited building permits and discounted utility fees.

³⁹ (GHD, 2013)

As a counterweight, Singapore employed an effective temporary financial incentivisation mechanism to signal a future mandatory mechanism, using the scheme as a mechanism to build market capacity and expertise (Anandityo).

Developer resistance driven by installation costs should be addressed via education about life-cycle cost savings, promotion of the extensive green infrastructure benefits, and reputational rewards, according to Massini.

Both Scheuermann and Massini highlight the role of civil society and non-government actors in supporting first movers and establishing green infrastructure norms. Creating a narrative for green infrastructure that can be embraced by civil society and non-government actors will also spur first movers. This was successful in London where the impetus for rapid green infrastructure uptake was driven by bee-conscious consumers, and in Berlin where the car industry scandal provoked major air pollution talks and dismantled resistance (Armour).

The need for site-specific design responses

Although there are different types of planning policies, ranging from discretionary to financial incentivisation to mandatory, the balance of informative yet prescriptive standards and guidelines is necessary to drive meaningful green infrastructure and ESD outcomes⁴⁰.

This sentiment was echoed by Armour who discussed how the translation of mandatory mechanisms into quality design and longevity ‘relies on developer design autonomy and quality guidance documents (outlining best practice case studies, cost-benefit analysis, education material on the myriad of benefits and social return on investment)’.

In the absence of thorough benchmarks and guidelines, Carter and Fowler (2008) criticise the compromised quality and unsustainability of merely compliant green infrastructure outcomes. Compliance with planning provision requirements and standards does not guarantee meaningful outcomes; site-specific design has the capacity to drastically enhance the overall sustainability contribution by optimising the use of certain green infrastructure elements based on the site.

The Malmö Green Space Factor mandates a target Green Factor score of 0.5 for new developments across the municipality. However, the accompanying guidelines have been repeatedly revised to better reflect the geographical context and to avoid the high prevalence of low-impact green infrastructure installations such as permeable pavements and lawns⁴¹. Short-term interest developers may compromise the overall value-add of green infrastructure if there are not prescriptive and tailored guidelines in place.

On the other hand, implementing overly stringent planning provisions or codified guidelines ‘risks confining green infrastructure to a discourse of engineering expertise that frames the concept as a mechanical design endeavour’⁴² and

⁴⁰ (Carter & Fowler, 2008).

⁴¹ (Kruuse, 2001)

⁴² (Lennon, 2015, p. 972)

undermines the initial impetus for uptake. A policy of this nature may also ‘stifle innovation if installers are bound to rigid criteria’⁴³.

Precedents in Victoria include relying on third party rating schemes, which encode technical detail into manuals and provide expert independent review.

Internationally, green infrastructure assessment tools (often called ‘green factor tools’) have emerged as effective planning and modelling tools to encourage the integration of green infrastructure and ESD without stifling design autonomy. The main benefit of a green infrastructure assessment tool is the ability to modify weightings based on geographical priorities, optimising the longevity and quality of green infrastructure in developments⁴⁴.

Lynch (2018) highlights the role of nature corridors and stepping-stones in enhancing urban habitat connectivity. Manipulating weightings in a green infrastructure assessment tool to promote habitat connectivity through nature corridors based on contextualised precinct priorities will help to optimise biodiversity benefits.

Difficulty in capturing maintenance requirements in a planning mechanism

The benefits from well-designed green infrastructure can only be realised through good operation and maintenance. Even in cases of a stringent mandatory mechanism, the efficacy of a policy in eliciting long-term benefits relies on monitored maintenance and operational requirements.

In the case of the Green Space Factor in Malmö, Green Factor scores often decline from their initial mandated level due to poor upkeep and an absence of greening replacement⁴⁵. Poor maintenance is driven by ongoing operational costs and knowledge gaps⁴⁶. Lofstedt indicated that deteriorating Green Factor scores were more prevalent in smaller scale developments, where maintenance plans were not coordinated as an overhead cost.

Consistently reiterated by interviewees, maintenance is both a key barrier to uptake and the driver behind declining green infrastructure performance⁴⁷. Many of the incentives for first-movers are attributed to reputational benefits and publicity, both of which hardly suffer from inadequate accountability for upkeep (Armour) (Anandityo). In many cases, unsatisfactory long-term outcomes are due to a lack of maintenance guidelines, even in cases where stringent installation guidelines or codified standards exist (Lee).

A key consideration in ensuring satisfactory long-term outcomes is the need to align developer and manager expectations. This is where mandatory mechanisms can be complemented by a green infrastructure assessment tool to leverage maintenance outcomes as in Helsinki, Toronto and Seattle⁴⁸. A requirement of permit applications in Seattle is the submission of a maintenance plan that has

⁴³ (Carter & Fowler, 2008, p. 157)

⁴⁴ (Inkiläinen, Tiihonen, & Eitsi, 2016)

⁴⁵ (GHD, 2013)

⁴⁶ (Irga, et al., 2017)

⁴⁷ (Ong, Hes, Fryd, Aye, & Ngo, 2013)

⁴⁸ (EU Strategy for the Baltic Sea Region , 2015) (City of Toronto , 2018) (Department of Planning & Development , 2015)

been certified by a landscape architect/ professional (Lofstedt, City of Seattle, Seattle). This ensures that installations are suitable and allocates accountability for the operational phase. This is supported by a complaint-based inspection model.

Precedent in the Victorian planning system includes the mandatory requirement in the City of Port Phillip, requiring the completion of a water sensitive urban design maintenance template for submission in the planning phase. Moonee Valley City Council has also employed a water sensitive urban design education and compliance officer to ensure accountable implementation in the as-built phase. Moreland City Council has employed two ESD Planning Enforcement Officers to conduct proactive inspection and enforcement of ESD commitments made by developments in the municipality.

Importance of impact measurement mechanisms

In addition to the incorporation of maintenance mechanisms, impact measurement is crucial in determining the efficacy of a policy⁴⁹. Schaffer (NSW Office of the Government Architect, Sydney) highlights the critical need for establishing the evidence base to facilitate the process of impact measurement and evaluation.

Green infrastructure mapping may be used to assess the impact of a policy on green infrastructure uptake, however embedded monitoring mechanisms has a greater capacity to monitor performance in relation to prioritised benchmarks (i.e. contributions to liveability, ecological impacts, stormwater implications).

Recommendations for green infrastructure planning standards based on global lessons

Based on our interviews and literature review, we recommend that:

- New green infrastructure standards should be accompanied by targeted guidance documents that build industry knowledge and clearly outline compliance pathways.
- To reflect developments and changing practices, the planning mechanism should enable regular updates to standards and technical requirements. These updates are informed by practical application to learn from local capability and experience.
- Green infrastructure masterplan(s) should be developed to spatially identify needs and priorities including potential corridors, gaps in or sufficient provision of accessible open space. This could be integrated with City of Melbourne's Infrastructure Priority List. Before the planning scheme amendment, there should be a baseline spatial database of existing green infrastructure, and this is updated to track policy impact.
- Council should publicise and celebrate action by first movers.

⁴⁹ (GHD, 2013)

- There should be a green infrastructure assessment tool developed to promote meaningful incorporation of green infrastructure and ESD without stifling design autonomy and innovation.
- Applicants should submit a maintenance plan for all sustainable design elements, including green infrastructure.
- Council should engage an education and compliance officer for sustainability, with a focus on green infrastructure.

3.5 Scope of regulations

In line with the direction from GOCAP Action 4.1, the sustainability standards have been developed to be embedded in the planning scheme. The standards are therefore triggered by activities such as land use change, new development and significant alterations (example developments shown in Figure 2).

Over the next twenty years, the standards are expected to affect around half of Melbourne's building floor space, which presents a major opportunity for the planning system to deliver the city's sustainability goals (Table 4).

The proportion of building stock affected by proposed standards in 2031 and 2041 is based on combining the following data sets:

- Floor space by use by block 2017⁵⁰
- Employment and floor space forecasts⁵¹
- Forecast population, households and dwellings⁵²

The floor space in 2017 has been forecasted assuming that:

- Community floor space and private open space track dwelling growth
- Transport and private parking floor space tracks employment growth.

⁵⁰ (City of Melbourne, 2018)

⁵¹ (City of Melbourne, 2018)

⁵² (forecast.id, 2019)

Table 4 Policy impact on building floorspace in Melbourne municipality

Year	Dwelling forecast growth from 2021	Employment forecast growth from 2021	Proportion of floor space affected by proposed standards
2031	48%	20%	~30%
2041	94%	Not available. Assume same as 2021-2031 growth	~50%

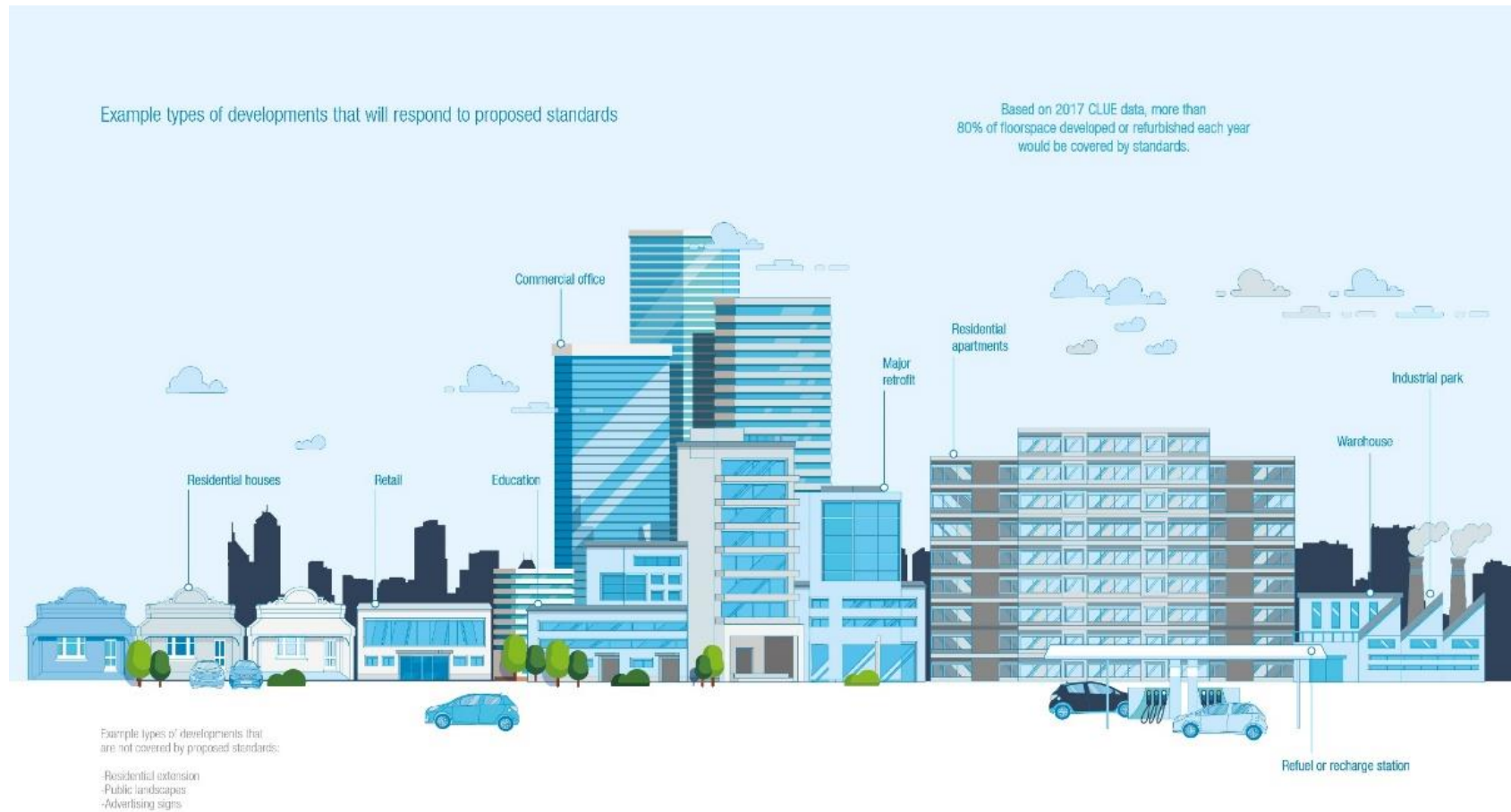
The proposed standards are structured so that there are minimum requirements for all new development. Some of the benchmarks and assessment tools vary with development type and scale due to:

- The eligibility of a development type to meet the benchmark – For example, NatHERS applies only to residential buildings, and NABERS is relevant to office, mixed use development, retail and apartments.
- Costs of documentation relative to project value – BESS certification requires less documentation than Green Star and is a more proportionate tool for smaller scale development.
- For green infrastructure requirements, the proposed green infrastructure assessment tool provides performance-based pathways tailored for different development types and scale.

Despite the different benchmarks and tools, the standards across different development types and scale have been equivalised to achieve the same performance outcomes.

There is precedent for standards and tools to vary with development scale, in recognition of the costs of documentation and evidence. For example, in Local Policy 22.19 on Energy, Water and Waste and Local Policy 22.27 for Fishermans Bend, there are differentiated benchmarks for developments of 2,000 sqm and 5,000 sqm gross floor area. In general, the benchmarks for larger buildings (as defined by higher floor area triggers) require more comprehensive documentation through third party rating schemes.

Figure 2 Example developments that will respond to proposed standards



4 Proposed standards

4.1 Overview

The proposed standards draw from the research outlined in this report, combined with our team's multidisciplinary input (engineering, landscape design, planning and economics). The proposed standards presented in Table 5 have evolved throughout this project, based on feedback and reviews by a variety of stakeholders. Details of this evolution are provided in Appendix E.

There are two tiers of proposed standards:

- Minimum requirements – this standard is to be achieved across all development types (mandatory). Mandatory standards are necessary to drive meaningful green infrastructure and sustainable design outcomes where discretionary standards alone may be insufficient⁵³.
- Preferred standard – this standard achieves above the minimum requirements and would provide a higher contribution towards achieving the municipality's sustainability actions and targets (discretionary).

Where there are constraints on the ability for a development to achieve the preferred standard, City of Melbourne could apply discretion to allow the minimum requirement.

Table 5 sets out the proposed standards. It is structured as follows:

- Council action or target – Actions from City of Melbourne strategies and plans to which the standards are based and will contribute
- Translation of action or target to private realm – Identifies the role of development to deliver on the council target
- Minimum requirements – Expectations that reflect technical feasibility and development viability (mandatory)
- Preferred standard – Preferred actions that fulfil council's targets (discretionary)
- How to measure – Tools, application requirements and submissions that enable applications to be assessed against the standards

Table 5 should be read alongside Section 4.2, which provides the rationale for the standards.

At the point of inclusion in a planning scheme amendment, the structure, standards detail and wording, measurement tools and wording must be updated to reflect best practice drafting for the selected planning mechanism.

⁵³ (Carter & Fowler, 2008)

Table 5 Proposed standards

Council action or target	Translation of action or target to private realm	Minimum requirement	Preferred standard	How to measure
Energy and greenhouse gas emissions				
<p>Climate Change Mitigation Strategy</p> <p>Renew and implement planning policies to support the development of zero emissions buildings and precincts.</p> <p>Facilitate the take up of the National Built Environment Rating Scheme for apartments across the municipality.</p> <p>Future Melbourne 2026</p> <p>Urban planning policies will encourage use of state-of-the-art building design, construction and management to ensure the sustainability and liveability of the city's built environment.</p>	No translation required, as action applies to all development, including private development	<p>Developments must demonstrate Australian best practice in sustainability and climate change mitigation. This is achieved through the following certifications, where eligible:</p> <p>New developments >5000sqm:</p> <ul style="list-style-type: none"> • ≥ 5 Star Green Star Design & As-Built (or contemporary equivalent) • ≥ 5.0 Star NABERS Energy • Average ≥ 7.5 NatHERS across multiple dwellings, and minimum 6.5 NatHERS rating for each dwelling <p>New developments ≤ 5000sqm and non-residential building alterations > 1000sqm:</p> <ul style="list-style-type: none"> • ≥ 50% overall BESS score with ≥ 55% score in BESS Energy category • Average ≥ 7.5 NatHERS across multiple dwellings, and minimum 6.5 NatHERS rating for each dwelling 	<p>In addition to the minimum requirements, developments should demonstrate world leadership in sustainable design and climate change mitigation. This is achieved through the following certifications, where eligible:</p> <p>New developments >5000sqm:</p> <ul style="list-style-type: none"> • 6 Star Green Star Design & As-Built (or contemporary equivalent) • ≥ 5.5 Star NABERS Energy <p>New developments ≤ 5000sqm:</p> <ul style="list-style-type: none"> • >70% BESS Score 	<p>Certifications against schemes in the most recent version at time of planning application. In the case of BESS, report from qualified professional.</p> <p>NABERS Base Building Commitment Agreements</p>
		New developments must incorporate on-site renewable or low carbon energy generation where cost-effective.	<p>New developments should incorporate on-site renewable or low carbon energy generation to the extent feasible.</p> <p>New developments should reduce reliance on fossil fuels by avoiding gas use altogether, or be ready to transition to electrical services and appliances</p>	<p>Energy opportunities report</p> <p>Development plan, with building</p>

Council action or target	Translation of action or target to private realm	Minimum requirement	Preferred standard	How to measure
				services identified
Sustainable transport				
Climate Change Mitigation Strategy Reallocate road space to create more space for walking, cycling and green infrastructure Prioritise active and public transport through dedicated lanes, traffic light priorities, parking controls and road user pricing.	Action applies to public space (roads). To translate to private realm, prioritising active transport has been interpreted as providing cycle infrastructure in buildings.	Developments must achieve the following rates of bicycle parking provision. New residential development <ul style="list-style-type: none"> ≥ One secure bicycle space per dwelling New non-retail development <ul style="list-style-type: none"> ≥ One bicycle parking space for 20% of regular occupants in the case of a new building without onsite car parking. Regular occupants are occupants who occupy the building for 2 hours a day on a daily basis (excludes weekends for buildings which operate on business days only). New retail development <ul style="list-style-type: none"> ≥ One bicycle parking space for 5% of peak visitors in the case of a new building without onsite car parking. 	Developments should achieve the following rates of bicycle parking provision. New residential development <ul style="list-style-type: none"> ≥ One bicycle space per bedroom for developments New non-retail development <ul style="list-style-type: none"> ≥ One bicycle parking space for 10% of regular occupants in the case of a new building without onsite car parking. Regular occupants are occupants who occupy the building for 2 hours a day on a daily basis (excludes weekends for buildings which operate on business days only). 	Parking plan
Waste and resources recovery				
Waste and Resources Recovery Strategy 85 per cent of all residential waste is diverted from landfill	Target is municipal-wide. To translate to private realm, targets have been interpreted as the waste collection and storage infrastructure in	Developments must provide a waste management plan that optimises waste storage and efficient collection methods. This is achieved through meeting City of	In addition to minimum requirements, provide a waste management plan that: <ul style="list-style-type: none"> Combines commercial and residential waste storage 	Waste management plan

Council action or target	Translation of action or target to private realm	Minimum requirement	Preferred standard	How to measure
75 per cent of commercial and industrial waste is diverted from landfill	buildings, which interface with waste collection and treatment.	Melbourne's Waste Management Guidelines. Developments must establish separate collection for recycling, hard waste, and food and green waste. Developments must meet the requirements of the precinct waste management plan, if there is one in place.	<ul style="list-style-type: none"> Provides for the collection of additional waste streams including e-waste, clothing, cosmetics, etc Share storage or collections with adjacent developments. 	
Urban heat reduction				
Climate Change Adaptation Strategy Amend the Municipal Strategic Statement to include specific objectives, minimum standards and performance measures for climate change adaptation in the municipality's built environment. Enhance the Melbourne Planning Scheme to consider future flood, heat and drought impacts Municipal Integrated Water Management Plan Further integrate our city with our waterways, both natural and man-made, in order to enhance the city and community's resilience to heat impacts.	Urban heat island is the cumulative result of all surfaces in the city. The private realm represents at least two-thirds of the city's land area and so requirements have been established for all developments.	At least 70% of the development's total site area must comprise building or landscape elements that reduce the impact of the urban heat island effect including: <ul style="list-style-type: none"> Vegetation, green roofs and water bodies Roof materials, shade structures or hard scaping materials with high solar reflectivity index, including solar panels. Facade areas exposed to summer sun must incorporate green wall, green façade, or have integrated shading. Shade structures must not detrimentally impact existing vegetation.	None additional	Green infrastructure assessment tool Roof plans Elevations / facades plans

Council action or target	Translation of action or target to private realm	Minimum requirement	Preferred standard	How to measure
Integrated water management				
<p>Urban Forest Strategy Replace asphalt and concrete with porous surfaces such as porous asphalt, turf, garden beds and rain gardens to reduce heat retention and encourage soil moisture retention</p> <p>Municipal Integrated Water Management Plan 2017 Increase permeability across the municipality by introducing place-based permeability targets, building on those already in the Elizabeth Street Catchment Integrated Water Cycle Management Plan Green infrastructure is used to respond to current and future flood risk. Upgrade the drainage infrastructure in the central city and urban renewal areas to cater for a 1 in 20-year flood event by 2030 Incorporate flood, drought and heat risks into the</p>	<p>The actions and targets are catchment-wide or apply to public realm. To translate to private realm, the proposed standards target the aspects of private realm that impact stormwater retention and stormwater treatment – that is, site permeability and discharge quality.</p>	<p>Development must achieve the best practice water quality performance objectives set out in the Urban Stormwater Best Practice Environmental Management Guidelines, CSIRO 1999 (or as amended).</p> <p>Currently, these water quality performance objectives are (expressed as retention of typical urban annual load):</p> <ul style="list-style-type: none"> • Suspended Solids - 80% • Total Nitrogen - 45% • Total Phosphorus - 45% • Litter - 70% <p>Developments must use stormwater treatment measures that improve the quality and reduce the flow of water discharged to waterways. This can include but is not limited to:</p> <ul style="list-style-type: none"> • Collection and reuse of rainwater and stormwater on site • Vegetated swales and buffer strips • Rain gardens • Installation of water recycling systems • Multiple uses of water within a single manufacturing site • Direction of flow from impervious ground surfaces to landscaped areas. 	<p>In addition to the minimum requirements, developments should use of measures to prevent litter being carried off-site in stormwater flows including:</p> <ul style="list-style-type: none"> • Appropriately designed waste enclosures and storage bins, and—the use of litter traps for developments with the potential to generate significant amounts of litter. • Use of vegetation, where practicable (to be irrigated with rainwater/stormwater) to manage the quality and quantity of stormwater. <p>In addition to the minimum requirements, developments should achieve the following water quality performance objectives (expressed as retention of typical urban annual load):</p> <ul style="list-style-type: none"> • Total Phosphorus (TP) – 60% • Litter – 90% • Total Petroleum Hydrocarbons – 90% • Free Oils – 90% <p>The site area covered by porous surfaces should be at least:</p> <ul style="list-style-type: none"> • The minimum area specified in a schedule to the zone; or • If no minimum area is specified in a schedule to the zone, 20 per cent of the site. • Allow for increases in rainfall intensity due to climate change when calculating the above 	<p>Water Sensitive Urban Design Response (response to 22.23) – modelled using STORM or MUSIC</p>

Council action or target	Translation of action or target to private realm	Minimum requirement	Preferred standard	How to measure
development and implementation of structure plans and broader strategic plans. Design and upgrade the drainage network to cater for current and future flood risk.				
Municipal Integrated Water Management Plan 2017 Municipal: 20% of all water use sourced from alternative sources Continue to implement the Energy, Water and Waste Efficiency Planning Policy, requiring all developments to meet water efficiency standards and to embed integrated water management design into drainage plans	No translation required, as action applies to all development, including private development.	Developments must: <ul style="list-style-type: none"> Connect to a recycled water source if available, Install rainwater tank to: support onsite green infrastructure; or supply a minimum of 10% of internal water demand New developments >5000sqm must achieve: <ul style="list-style-type: none"> ≥ 4 Star NABERS Water unless demonstrated to require additional water to sustain green infrastructure. New developments ≤ 5000sqm and non-residential building alterations > 1000sqm: <ul style="list-style-type: none"> ≥ 50% score in BESS Water category, unless demonstrated to require additional water to sustain green infrastructure. 	Developments should use alternative water for all non-potable uses onsite e.g. rainwater, stormwater or recycled water	NABERS pre-commitment and rating Green Star water credit BESS assessment of water section Feasibility study of greywater collection and reuse
Municipal Integrated Water Management Plan 2017	The action applies only to public realm. To translate to private realm, the same	Essential services, such as power connections, switchboards and other critical	In addition to the minimum requirements:	

Council action or target	Translation of action or target to private realm	Minimum requirement	Preferred standard	How to measure
Consider the risk of flood in future design and re-design of the public realm	considerations (the need for flood proofing) have been applied to buildings.	services must be located to address potential flooding events.	<ul style="list-style-type: none"> Design elements and materials should be resilient including water proof doors and windows, elevated power outlets and the like. Land uses at ground floor level should be able to easily recover from the impacts of temporary flooding. Any level change required between street level and internal ground floor should be integrated into the design of the building to maintain good physical and visual connection between the street and internal ground floor. Only consider the raising of internal ground floor level above street level as a last resort, except where the implementation of other measures coupled with an evidence-based approach to risk management reasonably necessitates raising internal floor levels above street level. 	
Urban ecology				
Nature in the City Strategy Identify and mitigate threats that reduce the quality or extent of nature in the city, including of significant species, vegetation communities and habitats Improve ecological connectivity across the municipality in a systematic, comprehensive and coordinated manner, taking into account biodiversity	The actions and targets apply to the public realm. To translate to the private realm, the proposed standards focus on the retention of valuable vegetation on private land and biodiversity of private landscaping.	Overstorey and understorey vegetation with high retention value must be protected, enhanced, and in some instances, offset, exempting trees declared 'noxious weeds'. Where tree controls are attached to the site's planning overlay those significant trees or protected trees are to be retained. Trees with a low or moderate retention value may be removed. Trees with a medium retention value can be replaced with a 1:1 tree with a tree of an equivalent canopy and ecological value.	At least 20% of the total site area should provide understorey vegetation habitat. Where trees are deemed to have high tree retention value they should be retained wherever possible or replaced at a 2:1 ratio with a tree of an equivalent canopy and ecological value. Trees deemed to have very high site tree retention value should be retained wherever possible or replaced at a 3:1 ratio with a tree of an equivalent canopy and ecological value. Open space should be provided around retained existing trees.	Arboricultural Construction Impact Assessment Tree Management Plan Understorey vegetation brief report Green infrastructure

Council action or target	Translation of action or target to private realm	Minimum requirement	Preferred standard	How to measure
<p>corridors and actions identified in the Urban Forest and Open Space Strategies.</p> <p>Identify and implement opportunities to improve, create and connect small green spaces throughout Melbourne's most urbanised areas.</p> <p>Protect and enhance native vegetation and habitats by increasing the use of indigenous species and 'Caring for Country' management practices.</p> <p>Urban Forest Strategy</p> <p>Increase urban forest diversity: the City of Melbourne's urban forest population will be composed of no more than 5% of one tree species, no more than 10% of one genus and no more than 20% of any one family</p> <p>Undertake plantings to increase understorey habitat on City of Melbourne managed land by 20 per cent.</p>		<p>Replacement or supplementary vegetation must not result in a reduction of the site's landscape character, amenity, and ecological value of the development.</p> <p>If native vegetation is removed, it must be reinstated to an equivalent or improved canopy and ecological value.</p> <p>Species selection (including green walls and roofs) should focus on maximising ecosystem health whilst being mindful of site constraints and microclimates (aspect, wind etc.) to ensure long term planting viability and green infrastructure benefits.</p> <p>Species selection, whether native or exotic, should consider the strategies outlined in the Nature in the City Strategy, Urban Forest Strategy and any precinct plans.</p> <p>Designers must consider species selected for use in urban projects from the City of Melbourne's Urban Nature Planting Guide or pre-1750 Ecological Vegetation Classes (EVC) along with Future Urban Forest research. Consideration of the growing conditions, planting characteristics and biodiversity benefits is also required.</p> <p>Impacts of proposed development to existing vegetation in the local area that might affect flora and fauna are to be minimised. Developments must demonstrate how adverse impacts have been minimised.</p>	<p>Trees that provide important habitat or urban wildlife linkages should be retained.</p> <p>Where development necessitates the removal of trees that provide habitat for hollow-dwelling species such as parrots, possums and bats, simulated natural hollows (roosting boxes) should be installed in existing retained trees, or on proposed buildings or wooden/steel poles.</p> <p>Proposed vegetation should include locally indigenous vegetation (Greater Melbourne)/native vegetation (Victorian according to planning scheme) where microclimate and landscape character of the immediate context permits. Native understorey vegetation volume and biodiversity is to be maximised.</p> <p>Replacement or supplementary vegetation should improve the site's landscape character, amenity, and ecological value.</p>	assessment tool

Council action or target	Translation of action or target to private realm	Minimum requirement	Preferred standard	How to measure
<p>Municipal Integrated Water Management Plan 2017</p> <p>Green infrastructure is used to assist in the management of current and future flood risk.</p> <p>Green our City Strategic Action Plan</p> <p>Double the quantity of green roofs and vertical greening.</p> <p>More than 80% of green roofs and vertical greening are healthy and diverse.</p>	No translation required, as action applies to all development, including private development	<p>The site must achieve the equivalent of ≥ 40 per cent total site area as horizontal green cover, as demonstrated using City of Melbourne's green infrastructure assessment tool. Equivalence is defined as the ability for green infrastructure to provide ecosystem service outcomes.</p> <p>Green cover includes tree, shrub, grasses, climbers, other vegetation and lawn and excludes non-plantable surfaces (hard non-permeable and permeable).</p> <p>Where they are not green roofs, roofs orientated to the north must be adaptable for sustainability initiatives, either for energy generation or retrofit of a future green roof, including drainage connections, structure and access.</p>	<p>In addition to the minimum requirement:</p> <ul style="list-style-type: none"> High quality publicly accessible and visible green open space and water bodies is encouraged. On south facing façade areas, green walls or green facades with appropriate shade tolerant is encouraged. 	<p>Green infrastructure assessment tool</p> <p>Roof plans</p> <p>Elevations / facades plans</p>

4.2 Rationale for standards

4.2.1 Energy and greenhouse gas emissions

Independent certification standards

Independent certifications provide multiple benefits in the planning scheme, including providing consistent and understood methodologies, strong governance and stakeholder engagement processes, ease of implementation, and existing industry capacity due to commercial building disclosure and common procurement guidelines. This standard will require As-Built rating and third-party certification (not self-assessed) to secure sustainability outcomes for the city.

5 Star Green Star puts development on a zero-carbon pathway by 2030. It also requires 10% improvement on the National Construction Code. The use of Green Star is consistent with previous benchmarks in the planning scheme.

The NABERS benchmarks are technically and commercially feasible improvements on average practice (defined by NABERS as 3 Stars). NABERS 5 Star is defined as Excellent and 6 Stars as Market Leading. NABERS is also consistent with previous performance benchmarks in the planning scheme.

The NatHERS requirement reflects the trajectory of the National Construction Code 2022, which aims for a 40% improvement in Australia's energy productivity by 2030.⁵⁴ The star rating increases are

Table 6 Proposed NatHERS standard for dwellings

Current minimum to proposed standard	Improvement	
Minimum per dwelling 5 star to 6.5 star	149 to 98 MJ/m2.annum	34%
Average across dwellings 6 stars to 7.5 stars	114 to 68 MJ/m2.annum	40%

Use of BESS is well accepted for smaller scale development. BESS is an established tool with an enduring system of governance and update. BESS assessments require a score of 50% to demonstrate minimum compliance. Adopting a 55% score represents a minimum requirement in line with the Green Star improvements over the NCC. For the preferred standard, a 70% score is indicative of "BESS Excellence".

As local policy 22.19 Energy, Water and Waste currently establishes 5 Star Green Star as the expectation, we expect minimal additional impact on development viability.

⁵⁴ (Department of the Environment and Energy, 2018)

Renewable energy standards

Renewable energy is to be installed where cost-effective compared to purchase of GreenPower, offsets or offsite renewable energy. On-site solar power generation is now typically included in a least cost Green Star pathway.

For the minimum requirement, cost effectiveness is typically with a payback of less than 10 years.

For the preferred standard, the technically feasible is typically the ability to contribute at least a 15% reduction in peak electrical demand of the building or a 30kW system, whichever is smaller.

In line with the Advancing Net Zero project led by the World Green Building Council of Australia, and the Green Building Council of Australia's Green Star for New Buildings Consultation Paper, the preferred standard discourages the use of natural gas for space heating, water heating or electricity generation. However, cooking and emergency gas is allowed.⁵⁵

4.2.2 Sustainable transport

Active transport standards

The proposed rates of bicycle space provision reflect:

- Survey of building demand in Melbourne municipality⁵⁶
- City of Melbourne's expert witness report for Fishermans Bend Local Policy 22.27⁵⁷
- City of Melbourne off-street bicycle and motorcycle parking review⁵⁸

The rates are an increase on current requirements in the Capital City Zone. We investigated the space implications of bicycle parking in development viability studies for four case study scenarios.

For residential rates, the proposed preferred standard reflects City of Melbourne's previous studies above, while the minimum requirement is closer to the current Green Star Design and As-Built tool (credit 17B.4 Active Transport Facilities). The preferred standard is a substantial increase in bicycle parking, which might not apply to very high-density developments.

For non-residential rates, these are broadly in line with the current Green Star Design and As-Built tool (credit 17B.4 Active Transport Facilities). The definition of regular occupants is sourced from the Green Star Performance tool. City of Melbourne's previous studies nominated bicycle parking provisions based on development floor area. Instead, the standards proposed in this report are based on

⁵⁵ (GBCA, 2019)

⁵⁶ (Phillip Boyle & Associates, 2018)

⁵⁷ (Williamson, 2018)

⁵⁸ (Phillip Boyle & Associates, 2016)

occupation, as we believe this is a more accurate reflection of demand for bicycle parking.

As discussed in Section 7, we recommend further work to review and refine bicycle parking standards.

4.2.3 Waste and resources recovery

City of Melbourne has a well operating practice of requiring waste management plans that are consistent with contemporary waste management guidelines.

As local policy 22.19 Energy, Water and Waste currently establishes the requirement for a waste management plan, we expect minimal additional impact on development viability.

4.2.4 Urban heat reduction

The 70% benchmark for urban heat island reduction is consistent with Local Policy 22.27 Fishermans Bend Urban Renewal Area. The allowable solutions include white roofs, solar panels and shade structures, which are relevant for all types of development. This in turn is closely related to Credit 25 of Green Star Design-and-As-Built, which requires at least 75% of total project site area to reduce heat island effect. The proposed approach is reviewed in the Fishermans Bend Standards Review.

Vegetation, water bodies and materials that have high solar reflectivity reduce the heat island effect. Solar reflectivity index (0-1.00) is a measure of the reflected solar radiation from a surface. A high solar reflectivity index (>0.75) will positively contribute to heat island effect reduction.

50 per cent green cover target is consistent with Green Star Communities v1.1 credit 31 (heat island effect).

4.2.5 Integrated water management

Stormwater management

The minimum requirement is a subset of requirements under the current Local Policy 22.23 Stormwater Management. The objectives expressed as 'encourage developments' have been included as preferred standard.

Preferred standard stormwater quality targets are consistent with Category B in Green Star Design & As-Built (Table 26.2). This is an improvement on the Urban Stormwater - Best Practice Environmental Management Guidelines. These guidelines are currently under review. The minimum requirement states that developments must account for the guidelines as amended.

The preferred permeability standard reflects the City of Melbourne 2030 target (Minimum 20 per cent of each catchment's surface is considered permeable by 2030), benchmarks for Elizabeth Street catchment (a high density area) and ResCode.

The preferred standard states that climate change should be considered in design rainfall intensities. Developments can demonstrate this through the selection of appropriate percentage increase of rainfall intensities and adopting the latest Intensity-Frequency-Duration values, in line with Australian Rainfall and Runoff Guidelines 2019.

Water use standards

Local Planning Policy 22.19 currently sets water efficiency requirements in terms of Green Star Credit Wat-1, which is no longer in use.

Since the policy was gazetted, NABERS Water was developed and is now well established for a wide range of building types (offices, shopping centre, apartments and hotels). The standard has been updated to reflect this contemporary standard.

Consistent with the previous 22.19 standard, the proposed standard would be met using best practice efficient fixtures and fittings (within 1 star of best WELS ratings) and 10% rainwater for internal water demand. The 10% rainwater sizing reflects technical feasibility in inner Melbourne built environments.

Significant irrigation requirements would not enable 4 Star NABERS to be met, therefore we have provided an exception for green infrastructure requirements.

Space implications are considered in development viability studies for four scenarios.

Flooding standards

The requirements widen the Fishermans Bend requirements to Melbourne municipality. DELWP is currently working through options for compatible uses where flood levels may not be required to be above free board level. Broader change to Land Subject to Inundation Overlay may encapsulate this (study currently underway), however referrals go to Melbourne Water and they are yet to agree to this approach.

4.2.6 Urban ecology

Biodiversity standards

Overstorey and understorey vegetation has economic, social, ecological and environmental value. The sequestration value of existing vegetation has been considered in determining the standards.

Understorey requirements reflect the Nature in the City target to undertake plantings to increase understorey habitat on City of Melbourne managed land by 20 per cent. Increasing the proportion of native vegetation and volume of understory vegetation increases occupancy of native birds, bats, bugs and beetles.

Both native and exotic vegetation can potentially contribute to healthy and resilient urban ecosystems; however native vegetation has a stronger, more positive effect on flora and fauna biodiversity.

Incentivised by the green infrastructure assessment tool to include but not limited to: species and conditions that provide: habitat to attract a diversity of species, food cultivation for human consumption, improved air quality, shade and shelter for buildings and people, wind shelter, carbon sequestration, stabilisation of slopes and soils, maintained or enhanced landscape character, reduced solar gain based on aspect, evaporative cooling and wellbeing, views to passers-by, recreation facilities for various ages, community engagement opportunities and publicly accessible spaces.

Potential adverse impacts due to the removal of existing vegetation include loss of landscape character and identity, loss of amenity, loss of biodiversity, a reduction in thermal comfort e.g. from full sun to full shade, increased wind, increased use of artificial light at night (brightness or changes to colour of light), increased noise or vibration and elevation changes.

Green infrastructure standards

We have proposed a green infrastructure standard expressed as green cover. Green cover includes tree, shrub, grasses and lawn and excludes non-plantable surfaces (hard non-permeable and permeable).

The proposed standard uses 40% green cover as a benchmark. The benchmark can be achieved through green infrastructure other than green cover including:

- Large, medium, small trees
- Large and small shrubs
- Climbers
- Lawn/turf
- Raingardens

Each of these elements provide a range of ecosystem service benefits including urban temperature regulation, recreation, aesthetic benefits, place values and social cohesion, habitat for biodiversity and surface runoff. The equivalence of each green infrastructure element to provide ecosystem services is part of the evidence for developing Melbourne's green infrastructure assessment tool⁵⁹. This nominates, for example, that ground cover is slightly better than climbers for urban temperature regulation and habitat, and on par for the other ecosystem service categories. The full equivalence matrix is provided in Appendix F.

The target is based on a net gain approach, on the basis that more vegetation cover provides increasing benefits, particularly in relation to biodiversity and urban temperature regulation. This is in recognition that Melbourne's urbanisation has radically altered the thermal and ecological profile compared to adjacent non-CBD areas. As set out in Section 2, this leads to economic and social costs.

It is not likely to be viable or feasible to return Melbourne to its natural state. Therefore, setting a green cover benchmark becomes a matter of determining what provides meaningful benefit, what is technical feasible and what is financially viable.

⁵⁹ (Hip v Hype, 2019)

The 40% as a meaningful starting point for testing feasibility and cost impacts has been informed by:

- Green Star Communities Urban Heat Island Credit (50% green site target)
- Upper limiting targets of 75% and 70% from Green Star Design-and-as-Built and Fishermans Bend local policy respectively (vegetation as a contribution to urban heat reduction coverage)
- Lower limiting target of 25% based on Cairns building height overlay code
- International benchmarking (New York, London) that indicates 50%+ horizontal vegetation cover.

As can be seen in Section 5, the initial horizontal green cover standard was updated to allow vertical coverage in direct square metres. According to the evidence base for the green infrastructure assessment tool, these are equivalent for most ecosystem service categories⁶⁰. The results indicate that this has acceptable development viability impacts.

We recommend further analysis as part of refining the green infrastructure assessment tool. In particular, the standard could be revised following a policy impact study that assesses the municipal-wide ecosystem service benefits of the standard.

Discussion on how to measure urban ecology

An Environmental Significance Overlay (ESO) may include existing trees on a development site. There may be tree controls attached to an ESO or other planning overlays. Those controls seek to minimise or mitigate, significant impacts on native vegetation and wildlife habitat areas. Whether an ESO is in place or not an Arboricultural Construction Impact Assessment must be prepared for trees greater than 5m in height, by a qualified arborist to seek to assess, avoid, minimise or mitigate, significant impacts on existing trees including recommendations for protecting and enhancing, and in some instances, offsetting removed vegetation.

The arboricultural report will identify any local laws that dictate that without a permit, any significant tree or any other protected tree, be destroyed, damaged or removed or allow to be destroyed, damage or removed on any development site. The report is to include the definition of a protected tree and note the exemption of any trees declared 'noxious weeds'.

The report will address the health and structural condition of the trees, the suitability of these trees for retention on the site in consideration of the proposed development, the impact of the development on these trees and recommendations for the protection of these trees during construction. The report will identify the location of the tree, the retention value of the tree to the site, whether the tree is proposed to be retained on the site, and the construction impact.

The retention value of the tree to site may range from low, medium, high and very high. Trees that have a low or poor retention value can be removed without any

⁶⁰ (Hip v Hype, 2019)

further evaluation. For trees that have a medium retention value reasons for the proposed removal are to be presented in a brief report along with a proposed replacement strategy. Trees that have a high or very high retention value should not be considered for removal.

A Tree Management Plan should be created for the development site to inform tree management and guide construction within the Tree Protection Zones for all assessed retained trees.

For all understorey vegetation, a brief report is to be provided by a qualified landscape architect, ecologist or horticultural noting the health, landscape character, amenity, and ecological value of existing site vegetation and recommending its removal, retention replacement or offset.

The green infrastructure assessment tool is to be used to determine the value of proposed vegetation (combining area cover and ecological and character value), and the value and equivalence of replacement vegetation in consideration of the assessed.

4.3 Preferred regulatory assessment tools

The use of independent certifications as sustainability benchmarks is well established in the planning scheme. There are many benefits to embedding an independent third-party sustainability certification, such as Green Star, into technical standards. These include:

- Ability to verify outcomes and establish governance processes for outcomes at the as-built stage
- Ability for applicants to capture the value of sustainability using schemes that are well understood by the market
- Provision of an agreed and consistent methodology for setting targets and measuring progress towards benchmarks
- Governance processes that have robust and inclusive industry engagement to confirm technical feasibility and market acceptance
- Governance processes to embed regular updates to benchmarks and requirements
- Assessment processes resourced by experienced professionals to undertake technical assessment.

To gain the benefits above, it is critical that the full certification pathway is used, rather than requiring only demonstration of equivalent performance at planning application stage.

4.3.1 Green Star

We have nominated Green Star as the primary sustainability certification for large developments for the following reasons:

- Established use in the Melbourne Planning Scheme (through Local Policy 22.19 and Fishermans Bend Local Policy 22.27)
- Long track record and strong governance ensures longevity
- Market capability for implementation and compliance
- Well-understood market value
- Broad scope, aligned with evolving industry best practice and with City of Melbourne strategies as they relate to development and the built environment, including the transition to zero carbon buildings and precincts
- Integration with other more specific tools including NABERS and NatHERS.

Green Star is a well-regarded, robust, internationally recognised sustainability rating tool. The governing body for Green Star is the Green Building Council Australia (GBCA), which is a membership-based organisation of industry and government. Having managed Green Star accreditation since 2003, GBCA is a national organisation that is trusted, has a good track record and provides a robust governance structure, regularly updated assessment tools and monitoring. It currently has 2,200 Green Star rated projects.

City of Melbourne's *Climate Change Mitigation Strategy 2018* sets the goal that all new buildings and precincts will be net zero emissions by 2030. This is aligned with the GBCA's Carbon Positive Roadmap, of which the overarching goal is to place Green Star rated buildings on a trajectory that ensures all new buildings and fit-outs must have no greenhouse gas emissions from their operations by no later than 2030. Existing buildings and fit-outs must have no greenhouse gas emissions from their operations by 2050 or earlier⁶¹.

An important element of achieving zero emissions buildings is transitioning from gas to renewable electricity. Ensuring that new development either avoids gas use altogether (along with the costs of providing gas infrastructure) or is ready to transition to electrical services and appliances will help to achieve this. This can be addressed by using Green Star if there is an explicit standard within the proposed planning requirements⁶².

A planning scheme amendment would also allow the use of alternative rating schemes that are well governed and drive similar progress towards Melbourne's policy objectives.⁶³

⁶¹ (GBCA, 2018)

⁶² (GBCA, 2019)

⁶³ For a detailed discussion of the qualities of suitable certification schemes, refer to the [review of sustainability standards for Fishermans Bend](#).

Figure 3 Alignment between Green Star Rating tools and City of Melbourne climate mitigation actions



Precincts, infrastructure and residential building carbon positive roadmap to be released by Green Building Council of Australia in 2019

City of Melbourne goals from the Climate Change Mitigation Strategy:

- All new buildings zero emissions by 2030
- All existing buildings zero emissions by 2050

4.3.2 BESS

We have nominated the Built Environment Sustainability Scorecard (BESS) as the certification tool for small ($\leq 5000\text{sqm}$) developments. We have nominated BESS due to its:

- Established use for smaller scale development, with an enduring system of governance
- Tool is updated to align with evolving standards and industry practice
- Market capability for implementation and compliance
- Familiarity to local government authorities
- Relatively simple tool compared to Green Star Design and As-Built, meaning it is not onerous for smaller developments.

A BESS assessment does not currently require third party certification and was created to assist builders and developers to demonstrate that they meet sustainability information requirements as part of planning permit applications. Any size or type of development can use the tool via a single online interface.

The BESS Governance Board is the decision-making body for the direction and management of the tool. The Governance Board is a sub-committee of the CASBE Steering Committee.

4.3.3 NatHERS

We have nominated the Nationwide House Energy Rating Scheme (NatHERS) as the tool to benchmark energy performance for all residential developments due to its:

- Established use and long track record (through the National Construction Code)
- Strong governance to ensure longevity
- Ability to drive passive design outcomes within residential developments.

NatHERS is administered by the Department of the Environment and Energy and provides homes and apartments with a star rating out of ten based on predicted heating and cooling energy use. NatHERS ratings are conducted by professionals using purpose-built software.

4.3.4 NABERS

We have nominated NABERS as the tool to assess the energy and water performance of large, new, non-residential developments and large non-residential building alterations, due to its:

- Market recognition and therefore value – NABERS Energy is a requirement under Commercial Building Disclosure regulations for the sale, lease or sublease of offices larger than 1,000 sqm.
- Established use and long track record
- Strong governance to ensure longevity
- Availability of benchmarking data to directly compare buildings.

NABERS is administered by the NSW Department of Planning, Industry and Environment, but is a national government program. The NABERS tool measures actual performance of a building's operations by benchmarking 12 months of energy and emissions data (or water data as appropriate) along with building size, use patterns and other features. The rating must be submitted by an accredited assessor and is audited by either the NABERS technical team or an external panel. NABERS has partnered with the GBCA to develop a pathway for buildings to become certified as carbon neutral.

NABERS ratings are available for the following building types, with future expansion expected:

- Offices (base building, whole building and tenancy)
- Hotels
- Shopping centres
- Data centres (infrastructure, IT equipment, whole facility)
- Apartment buildings

A NABERS Commitment Agreement is a contract signed by a developer or owner to commit to design, build and commission a building to achieve a specific NABERS energy rating within 3 years of practical completion. Asking for this agreement as a planning permit condition helps ensure that buildings are not only designed to achieve the appropriate level of energy efficiency and greenhouse gas emissions, but the obligation to manage the building to achieve this outcome is more likely to be embedded into management contracts.

4.3.5 Green infrastructure assessment tool

4.3.5.1 Global use of green infrastructure assessment tools

Green infrastructure assessment tools, or green factor tools, have emerged as planning, modelling and assessment tools to encourage the integration of green infrastructure into developments due to the myriad of climate adaptation benefits such as mitigating the urban heat island effect, eliciting wellbeing benefits and contributing to stormwater management⁶⁴.

Versions of this tool have been employed in Seattle, Berlin, London, Malmo, Toronto and Helsinki as a means of green infrastructure promotion or mandate. Essentially, the tool demonstrates a ratio of green areas to built-up areas, and the Green factor target may be achieved by incorporating several greening elements

⁶⁴ (Juhola, 2018)

such as green walls, different plant types, trees, vertical greening etc. to grant freedom of design choice.

Alongside design autonomy, the main benefit of a green infrastructure assessment tool is the ability to modify weightings based on geographical priorities⁶⁵. As in the case of Seattle where an update to the specifications is currently underway, it is possible to adjust these weightings based on lessons learned and experience gained from the operational phase (Lofstedt, Seattle).

Notably, developing a meaningful and tailored tool for any city requires a clear outline of the city's priorities. These will ultimately inform the relative weightings of different elements to ensure that the policy contributes to the achievement of desired outcomes. Furthermore, these priorities – functionality, aesthetic, water management, heat island effect mitigation, liveability – may be modified for different zones/areas in a city to enhance the overall outcome.

In developing a robust mechanism for implementation by City of Melbourne, the following aspects should be considered:

- Incorporation of contextual considerations
- Geographic zoning requirements
- Variation in green factor scores based on development types and scale

4.3.5.2 Melbourne green infrastructure assessment tool

During this project, City of Melbourne developed a prototype web-based green infrastructure assessment tool which represents a step change on international approaches such as the Seattle and Helsinki Green Factor tools.

The tool has been designed for landscape architects, architects, ESD consultants and other built environment professionals to assess the credentials of their project's green infrastructure at the planning stage.

The tool is underpinned by research that provides evidence supporting urban greenery's provision of functions and benefits. The research identified and weighted the key greenery forms and functions (urban ecosystem services), based on local conditions and social-ecological priorities.

The tool is currently a prototype and will be calibrated with Melbourne developments in the lead up to a planning scheme amendment. The four scenarios tested in this project will be provided to the tool development team.

The final form of the tool should reflect the achievement of the policy standards and provide resources and feedback tailored to planning applicants. Over time, the tool should respond to identified precinct needs, which might be identified through future green infrastructure masterplans.

⁶⁵ (Inkiläinen, Tihiainen, & Eitsi, 2016)

4.4 Risks

Risk: Delayed action on climate change

Cities that plan and act early will better withstand the impacts of climate change and maintain a platform for future health and prosperity. Delayed action on climate change subjects cities to increased economic, social and environmental risks such as:

- Damage to commercial and residential buildings
- Damage to civil infrastructure
- Business productivity loss
- Disrupted services
- Heat-related deaths

Delaying action is likely to increase the economic toll and human suffering⁶⁶.

Risk: Changes to the Victorian Planning Scheme

As noted in Section 3.3, the Victorian Government is currently developing a state-wide approach to sustainability in the planning scheme. There is the potential for a future sustainability policy to conflict with Melbourne's approach.

This risk can be mitigated through City of Melbourne working with the Department of Environment, Land, Water and Planning as it develops the state-wide approach.

More fundamentally, the Victorian Government is implementing Stage 3 of the Smart Planning Program, which includes rules reform that will change the planning policy framework and update local schedules.

Risk: Changes to Green Star Design and As-Built, BESS, NatHERS or NABERS

The proposed standards reflect current State and local policy, the building code, council and industry tools. This brings benefits such as industry capacity, market recognition and technical robustness. As City of Melbourne does not own these tools, there is a risk that they will be revised in ways that impact the proposed standards.

The potential impacts include: proposed standards become difficult to interpret; assessment methods and tools are not readily available; the standard changes in aspiration or meaning; or the costs of achieving these standards change.

During the original Local Policy 22.19 (2009-2012), the federal Australian Building Greenhouse Rating was replaced with NABERS. In the second iteration of the policy (2013 onwards), the Green Star tool was substantially revised, which has affected the useability of the nominated benchmarks.

However, the benefits (summarised in Section 4.3.1 and 4.3.2) of specifying an external tool outweigh the risk, and the risks can be mitigated. Without such tools,

⁶⁶ (Global Commission on Adaptation, 2019)

it would be difficult for a regulation to specify a level of performance and assessment criteria.

To mitigate this risk, we have nominated third-party tools that are well established, have a strong quality and governance process, and are embedded in other planning schemes. These tools are most likely to be revised in a structured and consultative process, through which City of Melbourne can participate. For a detailed discussion of the qualities of suitable certification schemes, refer to the review of sustainability standards for Fishermans Bend⁶⁷.

Risk: Green infrastructure assessment tool does not transition from pilot to ongoing tool

The green infrastructure assessment tool is being developed to enable design autonomy to meet mandatory requirements. It is a new tool and does not yet have an ongoing governance model. There is risk associated with how it is funded, developed, used and managed in the long term. This in turn presents a risk to the useability of the green infrastructure standards.

To mitigate this risk, we recommend that the City of Melbourne develop a design resource, like the Central Melbourne Design Guide, to assist development applicants and planners to develop and assess alternative pathways for meeting the green infrastructure standard. This resource can be a static document.

Risk: Green infrastructure standard and assessment tool do not support outcomes

As discussed throughout, mandatory green infrastructure standards are innovative for Australia. The standards and recommended tool were developed based on lessons learned from other jurisdictions that have introduced similar requirements. However, there remains the risk that the standards and tools drive unexpected negative outcomes, or do not deliver the benefits being sought.

To mitigate this risk, we recommend that the resources and tools that support the green infrastructure standards are regularly updated to reflect learnings.

⁶⁷ (Arup, 2018)

5 Testing the standards

5.1 Approach to scenario testing

5.1.1 Overview

We tested the draft (Stage 1) standards in two stages: a technical feasibility study, then a development viability study. The studies used 40% site area as green cover as a starting point for the reasons set out in Section 4.2.6. This target is based on a net gain approach, on the basis that more vegetation cover provides increasing benefits, particularly in relation to biodiversity and urban temperature regulation. This is in recognition that Melbourne's urbanisation has radically altered the thermal and ecological profile compared to adjacent non-CBD areas. As set out in Section 2, this leads to economic and social costs.

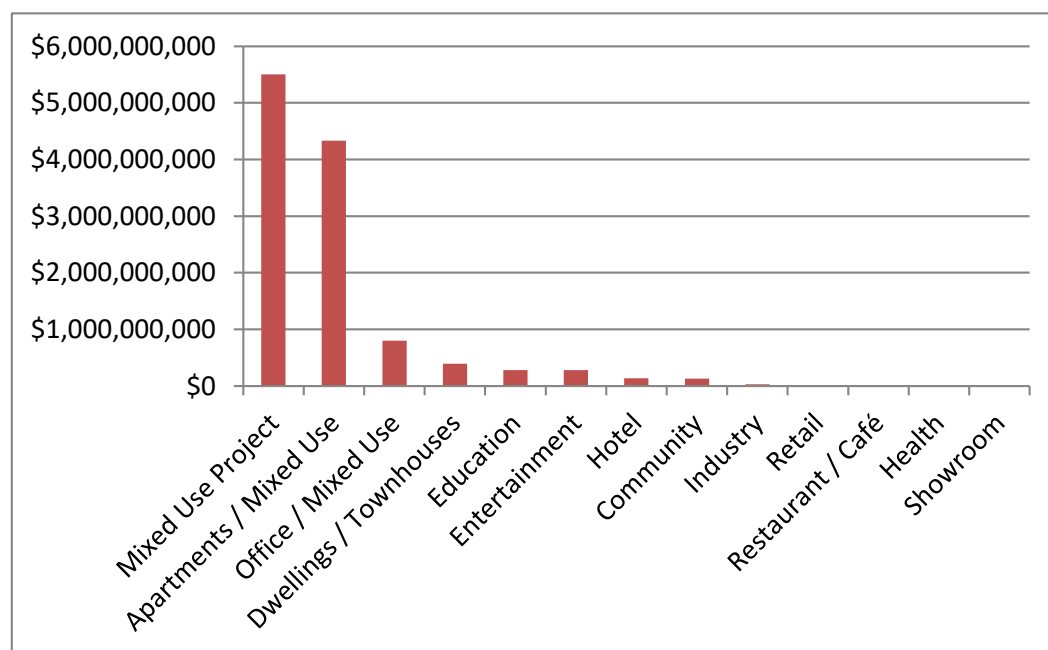
It is not possible to return Melbourne to its natural state. Therefore, setting a green cover benchmark becomes a matter of determining what provides meaningful benefit, what is technical feasible and what is financially viable.

The purpose of the technical feasibility study was to examine the green infrastructure standards in depth, and account for interactions with the other standards. While the other standards (e.g. climate change mitigation, stormwater and flood) could be established through benchmarking and precedent policies, the green cover standard has minimal Victorian-based evidence. The technical study contributes to filling this gap and it is expected that more modelling will be required.

5.1.2 Scenario selection

City of Melbourne and external stakeholders agreed that the technical feasibility studies should be representative of the forecasted development (Figure 3). Based on the profile of proposed development activity, this would be: mixed use projects; apartments/mixed use; and office/mixed use.

Figure 3 Profile of proposed development activity, City of Melbourne 2017-2018



Note: includes projects over \$200,000; excludes public domain and infrastructure works

Note: includes preliminary plans, development application and development approval

Source: Cordell Connect; HillPDA

City of Melbourne selected five current planning applications of these types. The project team selected four of these based on their geographic diversity. In terms of broad building types, this covers around 75% of new floorspace forecast to be built over the next 10 years. The remaining 25% that are not covered by these types are largely open space (e.g. courtyards) and transport (e.g. storage).

Table 7 Development applications selected for testing

Address	Site area (sqm)	Approximate gross floor area (sqm, % building use)		Floors	Car spaces	# dwellings
100 Franklin Street, Melbourne CBD	1,010	12,000	Residential 41%, Office 53%, Retail 6%	22 + 2 basement	11	72
86-94 Jolimont Street, East Melbourne	1,114	4,500	Office 100%	8 + 3 basement	64	0
543-547 Elizabeth Street, Melbourne CBD	812	8,800	Residential 75%, Office 22%, Retail 3%	14 + 3 basement	33	55
205-201 Roden Street, West Melbourne	1668	4,000	Residential 97%, Retail 3%	5 + 1 basement	52	56

5.1.3 Technical feasibility

The combined City of Melbourne, Arup, Oculus, Hill PDA and Jungleyfy team held a workshop to develop the methodology.

Arup developed spatial requirements of the proposed minimum requirements, covering plant and equipment, solar photovoltaics, rainwater and grey water, bicycle parking, waste facilities, ecological value and urban heat reduction.

Oculus then assessed the current planning application against the standards as proposed in Stage 1. Where the proposal did not meet the standards, Oculus proposed changes and new elements. The studies account for: deep soil; pedestrian links; communal open space; amenity; green cover (as it related to urban heat island effect); water sensitive urban design (WSUD) features; biodiversity, bicycle parking; waste; plant; rainwater collection; and heritage (if relevant). As described in Appendix E, pedestrian links and sunlight access were later removed from the scope of the GOCAP standards and the results in this section reflect their removal.

Oculus applied the Stage 1 version of the standards to an initial case study (Roden Street). Once the wider team provided feedback, Oculus proceeded to apply the standards to all case studies.

To apply the standards, the team agreed to:

- Comply with all the existing provisions of the Planning Scheme
- Meet the minimum requirement
- Minimise changes to the building massing and layout as set out in the planning application.

The purpose of this simplistic approach was to inform the external advisory workshop of the most straightforward way of achieving the Stage 1 standards.

Because of this approach, we note the following:

- A simplistic approach to the standards led to reductions in residential and commercial yield, which is the most conservative impact on development viability (see Section 5.3). A design process that included these standards within the initial brief could substantially mitigate impacts on yield. The results are therefore likely to overstate the financial impacts.
- The technical feasibility studies are based on 200 mm soil depth assumption, with additional trees in some cases.

5.1.4 Development viability

HillPDA applied the technical feasibility findings to a typical development model. Where the case study did not achieve the minimum requirements, the built elements required to meet the proposed minimum requirements were included and their costs and impact on development yield identified. This generated two development scenarios – without GOCAP elements and with GOCAP elements.

Development viability modelling was undertaken on the two scenarios for each of the four options.

A third feasibility model was also prepared for each of the options, showing the required price premium on property sales required to off-set impacts associated with GOCAP requirements. In all, 12 feasibility models were generated.

The development viability models used market research data obtained from recent sales in the areas of investigation.

Arup, Oculus and Junglefy provided the cost data for GOCAP elements to HillPDA. Costs data for other elements of the developments was sourced by HillPDA from cost guides including Rawlinsons Australian Construction Handbook 2019 edition and other costs from HillPDA industry experience.

The impact on price of GOCAP style elements is based on literature review and comparative market research for similar properties with and without GOCAP style elements. This information is indicative only because it is not possible to precisely isolate the value of GOCAP elements individually or in a package because of the inherent heterogeneity of properties and range of external factors that impact on property price.

5.2 Technical feasibility findings

The findings of the technical feasibility assessment are presented in this section, along with diagrammatical illustrations of the case study before and after the application of the proposed standards.

In summary, that the Stage 1 version of the standards were technically feasible with the following changes:

- The 40% of site as green cover standard needed to be met through a combination of horizontal and vertical cover
- The 25% (water-sensitive) permeability requirement needed to reduce to 20%.

The Franklin Street and Roden Street scenarios required the most changes to meet the minimum requirements, while the Jolimont Street and Elizabeth Street Scenarios were close to the proposed standards.

In terms of development types, the case study scenarios represent around 75% of future development in the next 10 years, located in high growth areas in the Melbourne municipality. Further testing could address less representative developments, such as community and transport infrastructure, small scale development and developments in suburbs experiencing less change.

A key limitation for consideration is the requirement for every building to have either vertical and/or horizontal greening without exceptions. While a high level of greening through private development is the aim for this project, it is possible that this may not be the best design outcome for every single development. The green infrastructure assessment tool is vital to provide alternative pathways that reflect the opportunities and constraints for each development site.

5.2.1 Roden Street

Figure 4 Roden Street case study prior to GOCAP proposed standards

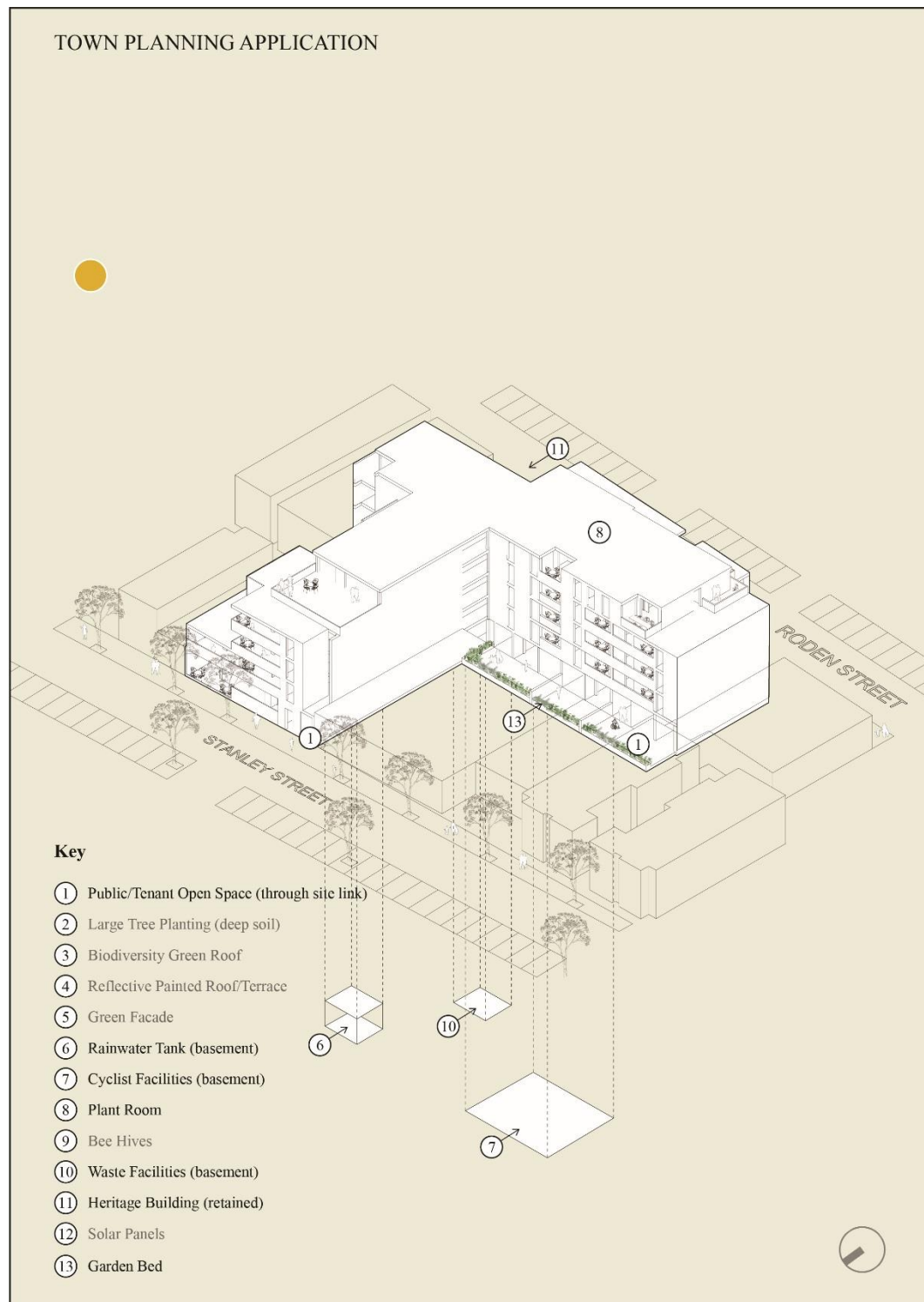


Figure 1 shows the Roden Street development as the current town planning application articulates, highlighting green infrastructure and sustainability

elements. As can be seen in the diagram at number 13, green cover is limited to ground floor private space.

Figure 5 Roden Street case study after GOCAP proposed standards

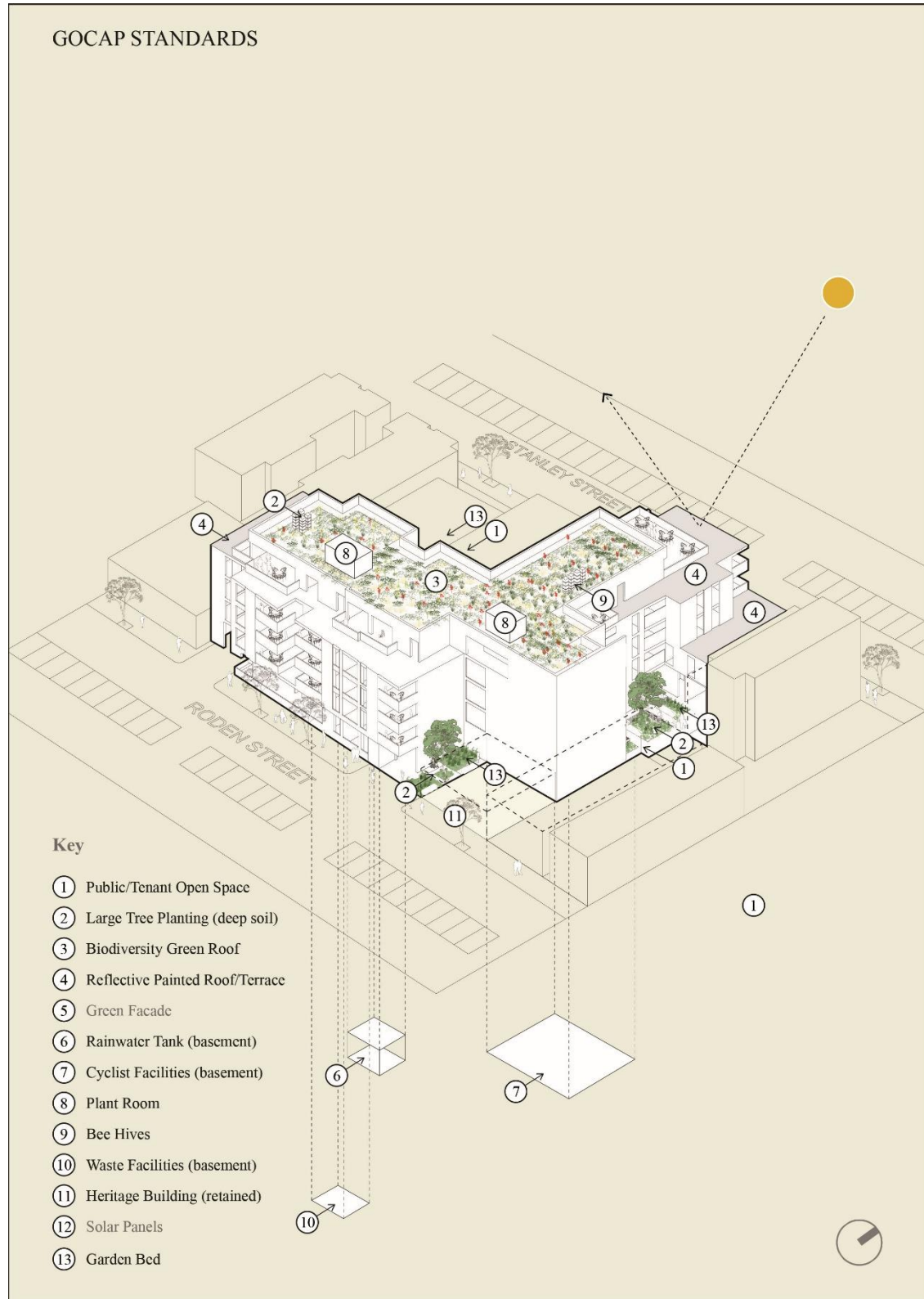


Figure 5 shows the Roden Street development with additional green infrastructure and sustainability initiatives following the application of the proposed standards. It is clear from the diagram that there has been an extreme increase in green cover, which has been achievable through inaccessible green roof, green façade or wall.

Table 8 specifies the areas required within the development to achieve the proposed standards.

Table 8 Impact of standards application – Roden Street

	Before application of standards	After application of standards
Site Area	1,668m ²	
GFA (Above Ground + Basement)	5,543m ² + 1,668m ²	5,543m ² + 1,568m ²
Deep soil	None	167m ²
Pedestrian Link	Covered and 1.75m wide	None
Communal Open Space (Private)	242m ² provided (private)	140m ²
Amenity	None	None
Urban Heat Island	53m ² total green cover (35m ² understory planting)	667m ² total green cover (133m ² understory planting)
WSUD	28m ²	417m ²
Biodiversity	None	Beehives and plant selection
Bike Parking	35 spaces	44 spaces
Waste	40m ²	
Plant	90m ²	
Rainwater tank for internal plumbing	22kL	30kL (20m ²)
Impact on construction cost per sqm	-	2.4%
Total estimated extra construction costs	-	\$384,020
Annual maintenance cost	-	\$22,496
Impact on development yield	-	No change
Impact on residual land value (assuming no price premium)	-	-4.4%
Estimated price premium on property sales to offset impact on land value	-	1.2%

This case study illustrates a high level of additional of greening, which has a large impact on the sustainability and green infrastructure contribution of the site.

Specific design decisions and assumptions

- Development height able to best accommodate a biodiversity green roof to tie into ecological context
- Green roof is inaccessible say for maintenance, to reduce loading capacity from the need for shade structures
- The green roof accounted for the majority of the 40% green cover to be achieved with the remainder being made up of deep soil areas on ground
- These areas were placed around existing publicly accessible open space adjacent to the heritage building and eastern laneway
- Basement GFA has been lost to deep soil area
- The balance of the up to 70% reflective materials has been achieved through reflectively painted surfaces on inaccessible podiums.
- Planting area accommodates for WSD standards in reducing runoff and infiltration of stormwater through porous surfaces
- Public open space was able to be accommodated while retaining private terraces and balconies

Findings

The current building mass provided opportunity to meet the standards with minimal need for GFA loss say for deep soil.

Limitations

Design decision were made as a base case scenario for this study and would be further refined through the design process in applying the standards

Building height were specified as maximum based on DDO20 Clause 2.0 and the scale of nearby developments.

All design decisions were made to keep the existing building mass untouched where possible, to maximise gross floor area while meeting the GOCAP requirements without extensive building redesign.

Design decisions were made to meet the minimum GOCAP target (e.g. 40% green cover) without exceeding that target unless as the result of meeting an additional target.

Where no GOCAP standard was stipulated standards were taken from current best practice guidelines. For example, deep soil and tree planting areas were taken from 'Better Apartment Design Standards'.

Public Open Space also taken from the Guidelines above.

All green roofs are extensive (200mm deep soil) to provide a base case for costing and for minimum required additional structural support for the development.

Recommended amendments or refinements

Increasing the amount of green cover area to reduce the need for reflective surfaces.

Recommendations for further testing

Further testing on how individual developments can tie into wider precinct green and blue masterplans.

5.2.2 Franklin Street

Figure 6 Franklin Street case study prior to GOCAP proposed standards

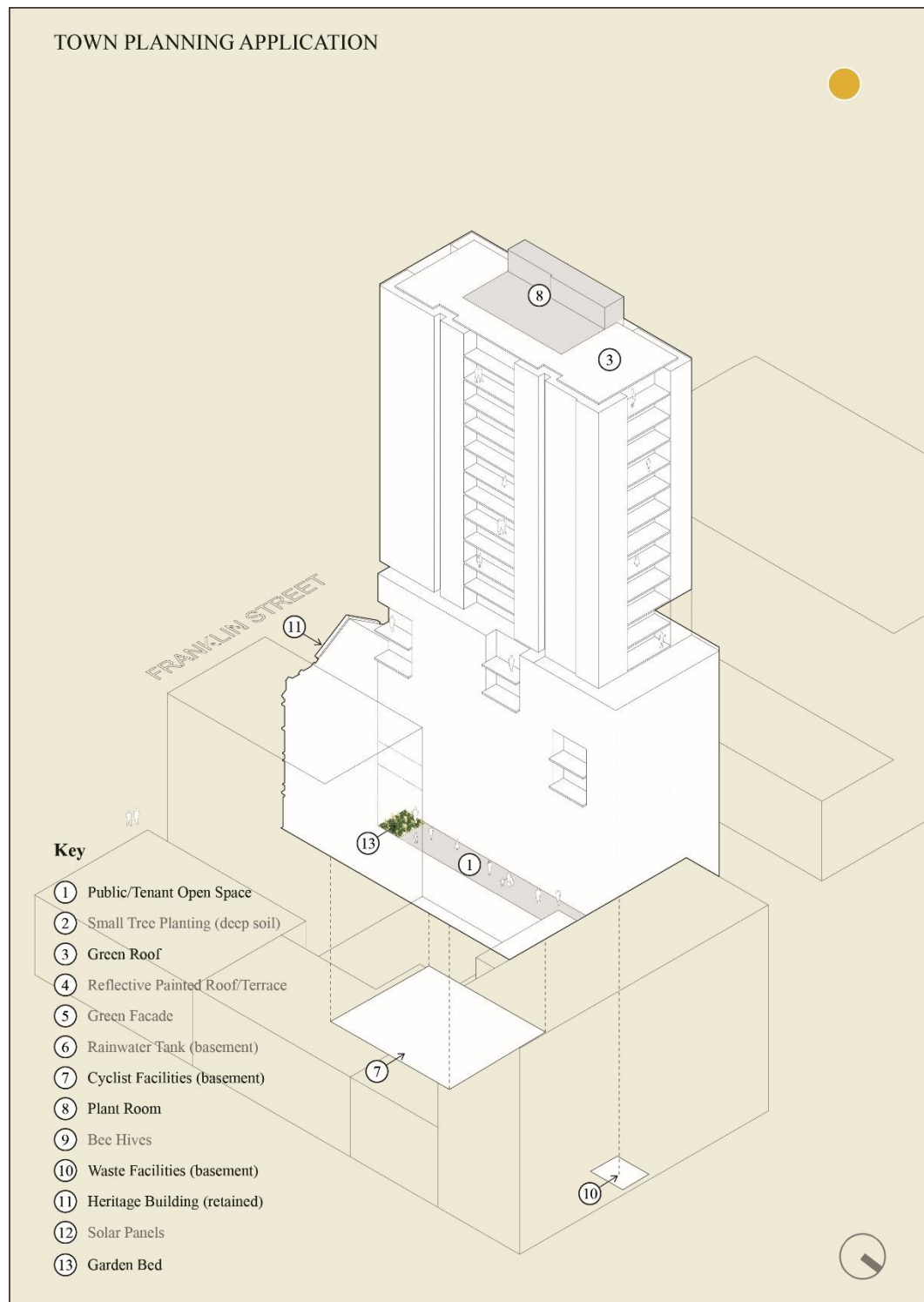


Figure 6 shows the Franklin Street development as the current town planning application articulates, highlighting green infrastructure and sustainability elements. As can be seen in the diagram at number 13, green cover is limited to a small area at ground and receiving little sunlight.

Figure 7 Franklin Street case study after GOCAP proposed standards

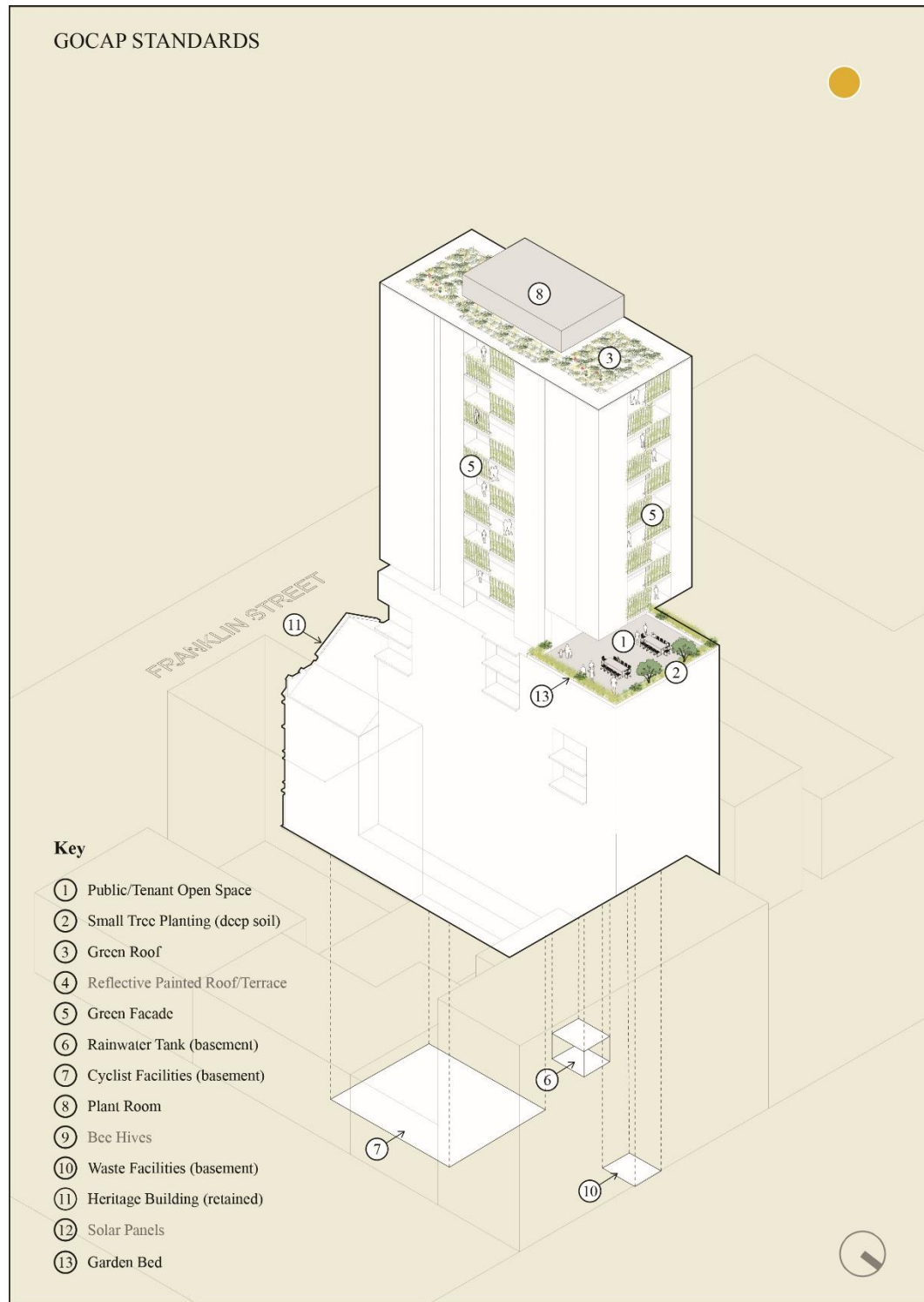


Figure 7 shows the Franklin Street development with additional green infrastructure and sustainability initiatives following the application of the proposed standards. The diagram shows introduction of rainwater tank, addition of communal, green open space, inaccessible green roof and green façade application.

Table 9 Impact of standards application – Franklin Street

	Before application of standards	After application of standards
Site Area	1,010m ²	
GFA (Above Ground)	13,709m ²	13,134m ²
Deep soil	None	75.75m ² required (2 trees)
Pedestrian Link	Not required	
Communal Open Space (Private)	159m ² provided	180m ² required
Amenity	None	2 hours target
Urban Heat Island	Unknown	404m ² total green cover (133m ² understory planting)
WSUD	10m ² raingarden	252.5m ²
Biodiversity	None	Plant selection
Bike Parking	62m ² enclosure (53 bike spaces)	257m ² (173 bike spaces)
Waste	21.1m ²	25m ²
Plant	115m ²	220m ²
Rainwater tank for internal plumbing	None	35m ² (50kL)
Heritage	Retained	Retained
Impact on construction cost per sqm	-	1.9%
Total estimated extra construction costs	-	\$660,945
Annual maintenance cost	-	\$41,588
Impact on development yield	-	6 less residential units
Impact on residual land value (assuming no price premium)	-	-9.1%
Estimated price premium on property sales to offset impact on land value	-	2.3%

This case study illustrates the potential value of applying the standards. The addition of green roof and accessible green space superficially adds to the development, although the quality has not been taken into consideration and green façades may or may not be well designed and maintained.

Specific design decisions and assumptions

- 40% green cover achieved through green façade and an inaccessible green roof. Using existing balconies as locations for planter boxes to allow climbing plants to grow up the façade.
- Open space moved from on ground where no sunlight would reach to on top of commercial podium facing north. This provides communal open space for residents above.

- Green roof inaccessible due to extreme winds prevalent on a development of this height. The green cover therefore gives prospect for adjacent developments of a similar height and could provide habitats for wildlife in the area.

Findings

This type of development lent itself to façade planting to achieve the required green cover.

As minimal green cover was provided as part of the town planning application it was more difficult to apply to the building without redesigning the massing.

Leading to the conclusion that having the GOCAP initiatives as a starting point for development would benefit the ease at which to meet them without a loss of GFA.

Limitations

Design decision were made as a base case scenario for this study and would be further refined through the design process in applying the standards.

Setbacks and building height comply with DD010, the development may be able to add 1-2 more storeys to the design, however a greater setback would be required in addition to a redesign of the tower. As a result, we have chosen to keep the building as outlined in the town planning application.

All design decisions were made to keep the existing building mass untouched where possible, to maximise gross floor area while meeting the GOCAP targets without extensive building redesign. This made clear the impact applying these standards would have on current building practices.

Design decisions were made to meet the minimum GOCAP target (e.g. 40% green cover) without exceeding that target unless as the result of meeting an additional target.

Where no GOCAP standard was stipulated standards were taken from current best practice guidelines. For example – deep soil and tree planting areas were taken from ‘Better Apartment Design Standards’.

Public Open Space also taken from the Guidelines above.

5.2.3 Elizabeth Street

Figure 8 Elizabeth Street case study prior to GOCAP proposed standards

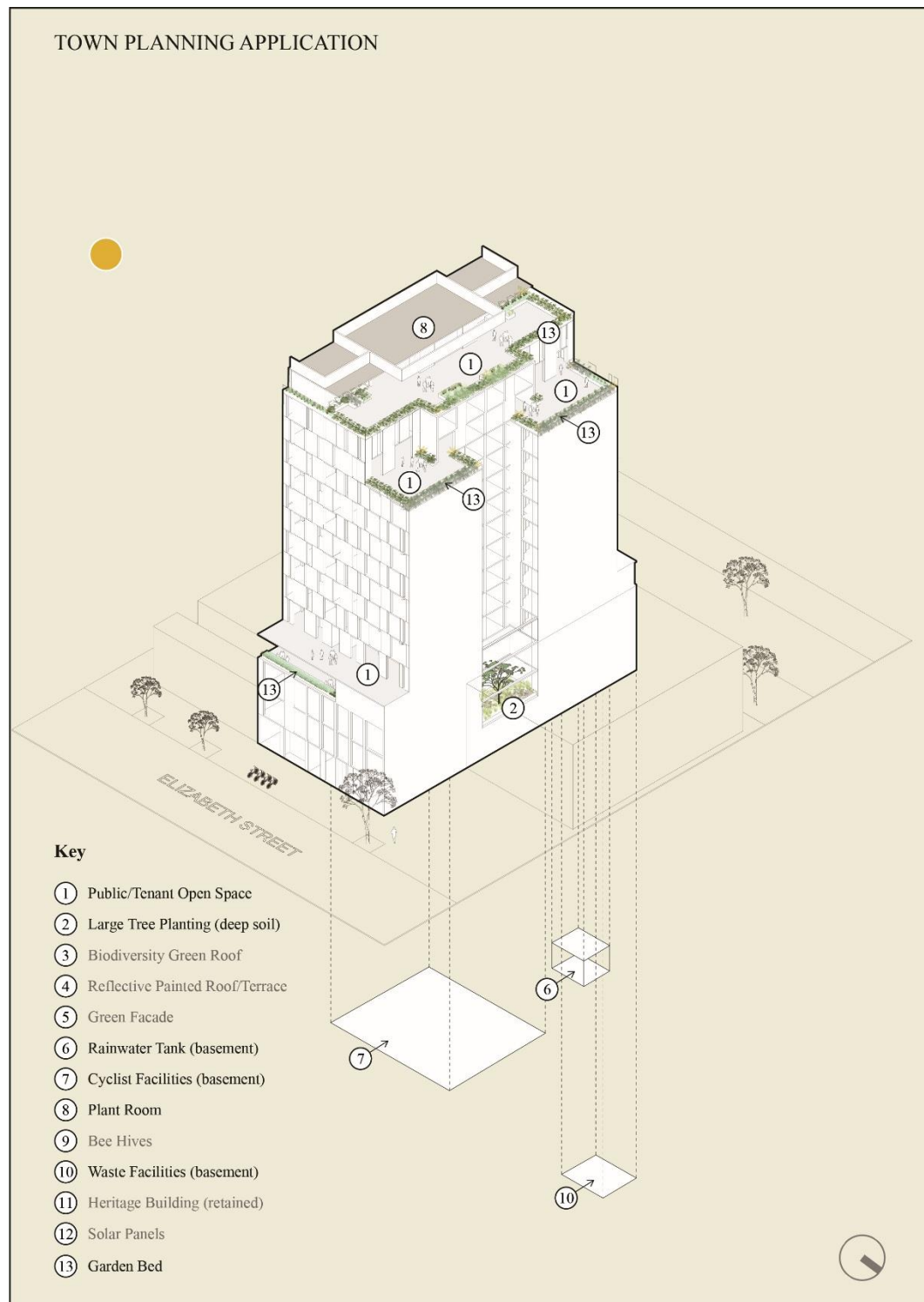


Figure 8 shows the Elizabeth Street development as the current town planning application articulates, highlighting green infrastructure and sustainability

elements. The diagram shows a high level of greening compared with the other case study developments.

Figure 9 Elizabeth Street case study prior to GOCAP proposed standards

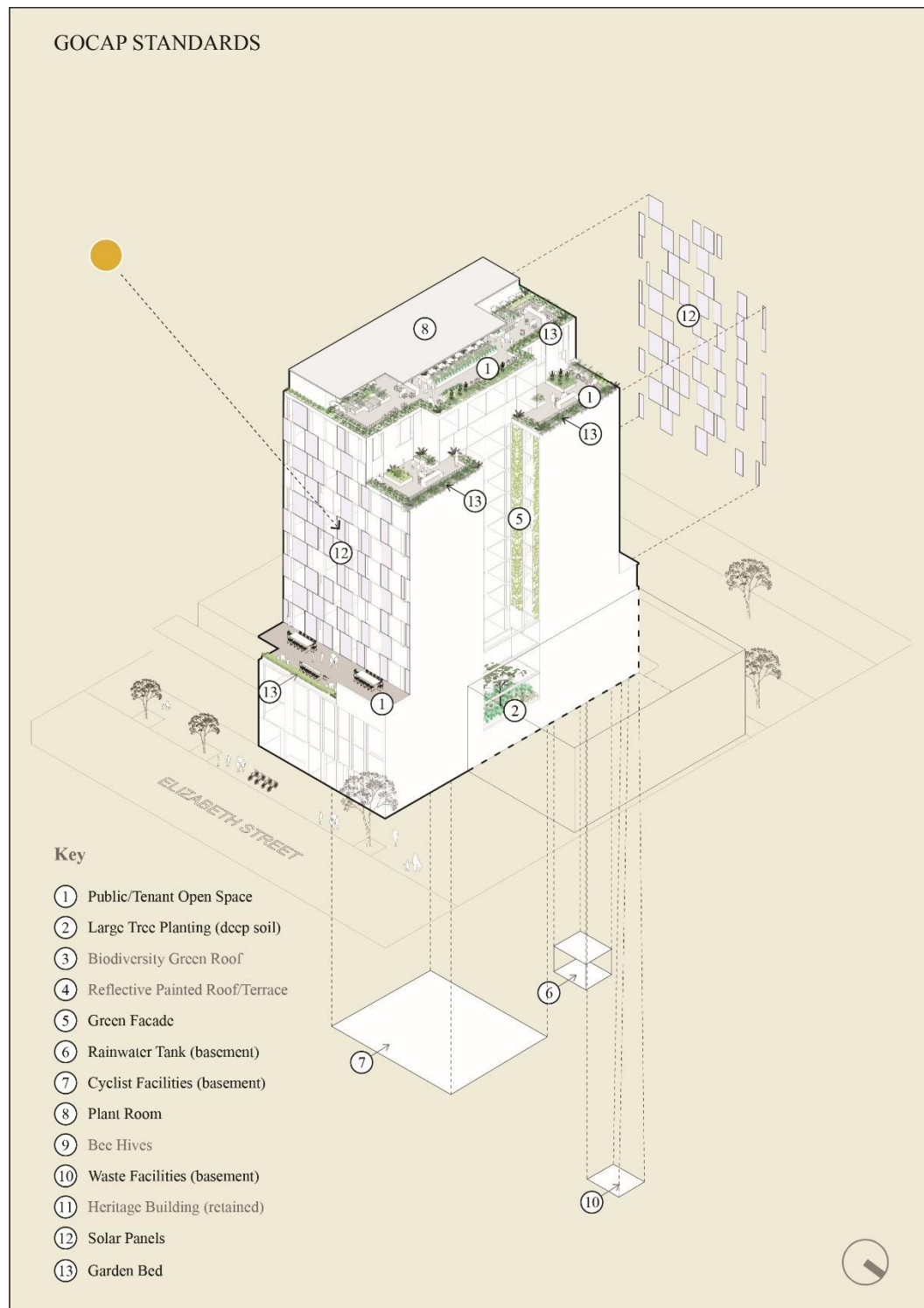


Figure 9 shows the Elizabeth Street development with additional green infrastructure and sustainability initiatives following the application of the proposed standards. The diagram shows additional green cover required and

requirement for solar panels integrated to façade to achieve balance of 70% of site with high solar reflectivity.

Table 10 Impact of standards application – Elizabeth Street

	Before application of standards	After application of standards
Site Area	812m ²	
GFA (Above Ground + Basement)	8,485m ² + 1,749m ²	8,485m ² + 1,709m ²
Deep soil	0m ²	40m ² on structure + 1 large tree
Pedestrian Link	Not required	Not appropriate
Communal Open Space (Private)	41m ²	135m ²
Amenity	More than 2 hours	2 hours target
Urban Heat Island	197m ² total green cover (197m ² understory planting)	325m ² total green cover (65m ² understory planting). 465m ² solar panels
WSUD	197m ²	203m ²
Biodiversity	None	Plant selection
Bike Parking	66 bike parking spaces provided with lockers and 1 shower	286m ²
Waste	Sufficient facilities provided	50m ²
Plant	680m ²	680m ²
Rainwater tank for internal plumbing	20kL tank provided	35m ² (40kL)
Heritage	None	None
Impact on construction cost per sqm	-	3.1%
Total estimated extra construction costs	-	\$710,078
Annual maintenance cost	-	\$31,220
Impact on development yield	-	250m ² less commercial/retail space
Impact on residual land value (assuming no price premium)	-	-16%
Estimated price premium on property sales to offset impact on land value	-	4.3%

The application of the standards has had the least impact on the development in terms of form and massing. Greening could be largely applied by providing more planting to usable rooftop spaces. It is difficult to ascertain from this study whether this is the best design outcome without analysing all aspects of the development in terms of balancing usable space with green space.

Specific design decisions and assumptions

- Meeting the green infrastructure standards through garden bed planting, and green facades, in addition to existing green infrastructure as part of the development
- Solar panels added on east and western facades to meet the 70% reflective material standard, these were unable to be accommodated on the optimal northern façade due to adjacent development opportunity
- Accessible open space achieved through an accessible rooftop and terraces
- Deep soil zone as proposed by the existing development

Findings

The current proposal already accommodated for a large area of green cover, deep soil and open space.

Through a material change on the eastern and western facades it was possible to apply solar panels to meet the reflective surface target without altering the existing balcony locations proposed.

Caveats

Design decision were made as a base case scenario for this study and would be further refined through the design process in applying the standards.

Setback and building height matches those of adjacent buildings.

All design decisions were made to keep the existing building mass untouched where possible, to maximise gross floor area while meeting the GOCAP targets without extensive building redesign. This made clear the impact applying these standards would have on current building practices.

Design decisions were made to meet the minimum GOCAP target (e.g. 40% green cover) without exceeding that target unless as the result of meeting an additional target.

Where no GOCAP standard was stipulated standards were taken from current best practice guidelines. For example – deep soil and tree planting areas were taken from ‘Better Apartment Design Standards’.

Open Space Area also taken from the Guidelines above.

Recommended amendments or refinements

Solar panels are not optimally placed on site because of adjacent developments

Proposing a change to the current deep soil standard to mandate tree planting/deep soil on ground in order to improve ecological systems and manage stormwater. The ability to currently offset this requirement with contained planting on structure, which, while having some environmental benefits could be taken further by needing to work with existing site ecology.

Recommendations for further testing

Further testing on how this development could tie into Council's integrated water management plans based on its location on Elizabeth Street.

5.2.4 Jolimont Street

Figure 10 Jolimont Street case study prior to GOCAP proposed standards

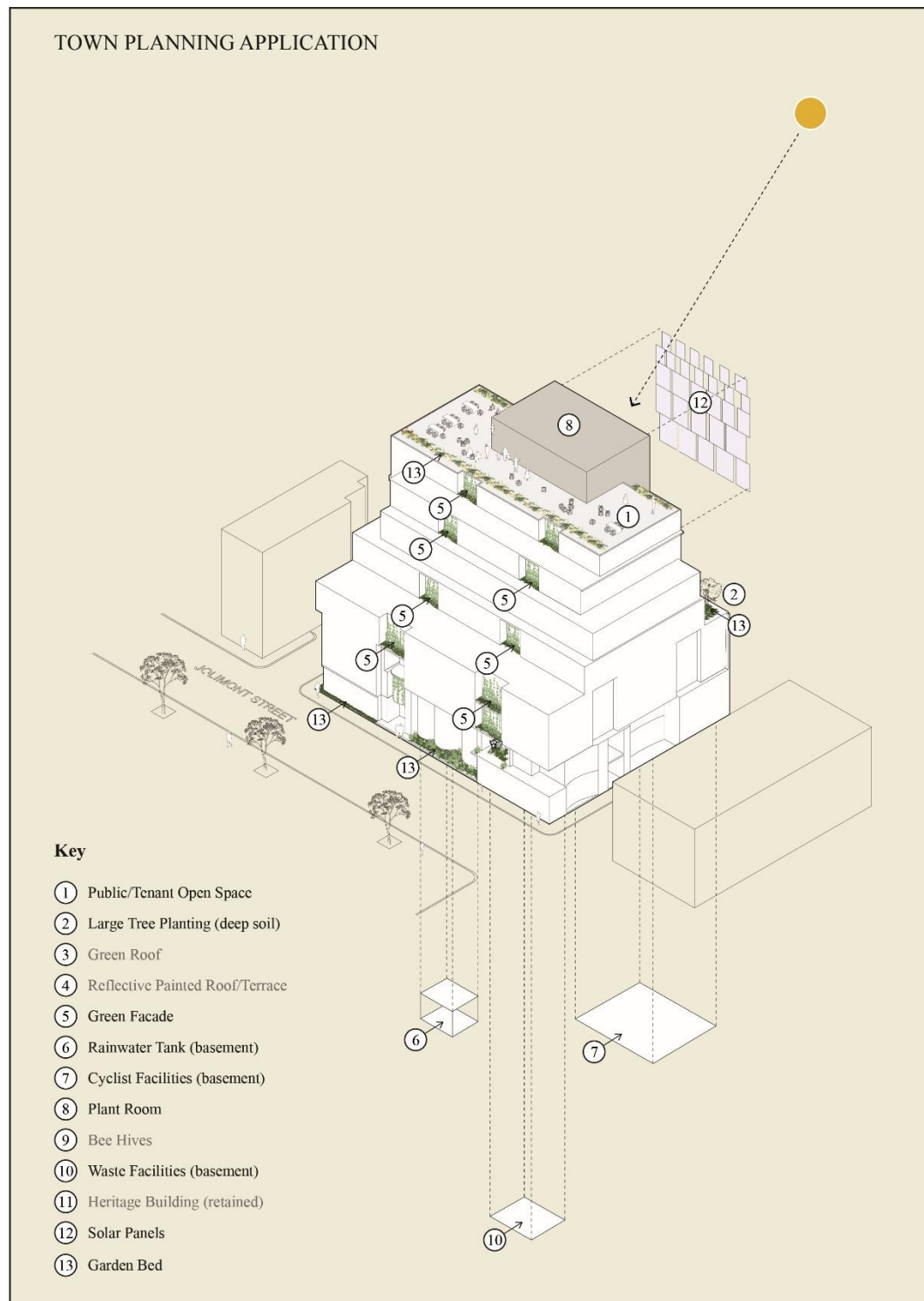


Figure 10 shows the Jolimont Street development as the current town planning application articulates, highlighting green infrastructure and sustainability elements. The diagram shows some deep soil planting, with green façade treatment and usable green rooftop space as well as application of solar panels.

Figure 11 Jolimont Street case study prior to GOCAP proposed standards

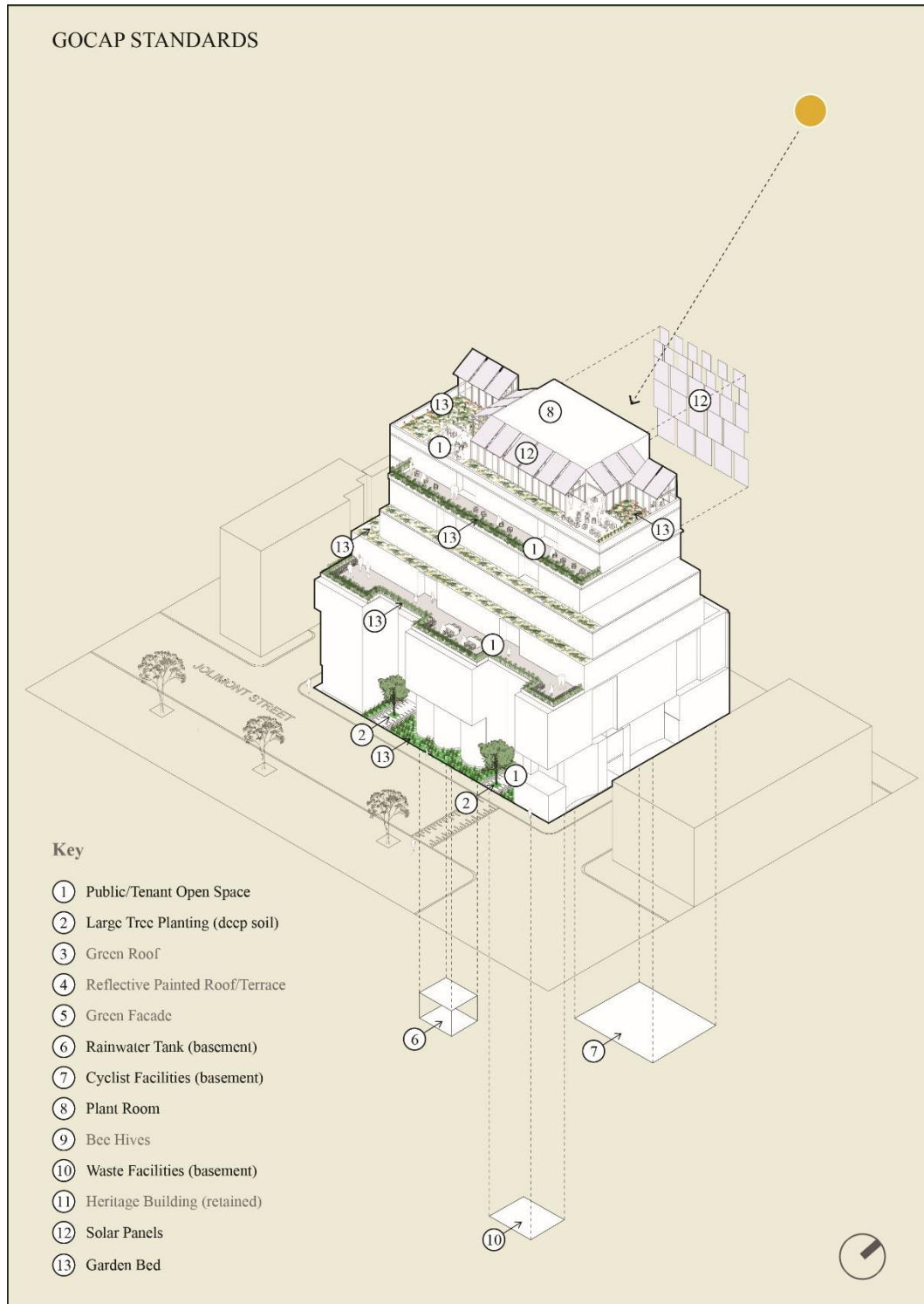


Figure 11 shows the Jolimont Street development with additional green infrastructure and sustainability initiatives following the application of the proposed standards. The diagram shows additional green cover required through horizontal greening rather than vertical and retractable solar panels.

Table 11 Impact of standards application – Jolimont Street

	Before application of standards	After application of standards
Site Area	1,114m ²	
GFA (Above Ground + Basement)	6,963m ² + 3,281m ²	6,713m ² + 3,198m ²
Deep soil	None	83.5m ² + 1 tree
Pedestrian Link	Not provided	Not appropriate
Communal Open Space (Private)	429m ²	250m ²
Amenity	None	2 hours required
Urban Heat Island	154m ² total green cover (154m ² understory planting)	445.6m ² total green cover (89m ² understory planting)
WSUD	154m ²	278.5m ²
Biodiversity	None	Plant Selection
Bike Parking	38 spaces currently provided without end of trip facilities	123m ²
Waste	20m ² space provided	25m ²
Plant	Rooftop plant area provided	950m ²
Rainwater tank for internal plumbing	Currently included	35m ²
Heritage	None	None
Impact on construction cost per sqm	-	0.6%
Total estimated extra construction costs	-	\$251,190
Annual maintenance cost	-	\$45,560
Impact on development yield	-	163m ² less commercial/retail space
Impact on residual land value (assuming no price premium)	-	-6.6%
Estimated price premium on property sales to offset impact on land value	-	4.4%

The notable impact of the application of the green infrastructure standards on this development is the conversion of greening from vertical to horizontal. While there may be many ways to apply to standards, the requirement for this greening may not necessarily lead to the best design outcome for the project, prioritising

greening over other design aspects which may not be anticipated through the superficial case study.

Specific design decisions and assumptions

- The adjacency to Yarra Park informed the location of tree planting and deep soil zone to bring the park in to the development.
- 40% green cover achieved through rooftop and terrace planting on both accessible and inaccessible terraces on both the southern and northern aspects.
- Rooftop solar panels and retaining proposed solar panels on the northern façade meet the 70% reflective material standard and were part of the existing proposal due to a single storey dwelling to the north

Findings

The current development layout and massing lent itself to be readily able to apply the standards, say for the need for deep soil on ground level.

Caveats

Design decision were made as a base case scenario for this study and would be further refined through the design process in applying the standards.

Setbacks and building height comply with the scale required to not overshadow Yarra Park between 11am and 2pm on March 22 and September 22.

All design decisions were made to keep the existing building mass untouched where possible, to maximise gross floor area while meeting the GOCAP targets without extensive building redesign. This made clear the impact applying these standards would have on current building practices.

Design decisions were made to meet the minimum GOCAP target (e.g. 40% green cover) without exceeding that target unless as the result of meeting an additional target

Where no GOCAP standard was stipulated standards were taken from current best practice guidelines. For example – deep soil and tree planting areas were taken from ‘Better Apartment Design Standards’.

Public Open Space also taken from the Guidelines above.

Recommended amendments or refinements

Refining plant and tree selection to tie into the character of Yarra Park

Recommendations for further testing

How this site could feed back further into Yarra Park’s ecology.

5.3 Development viability findings

5.3.1 Methodology

HillPDA investigated the four case studies with two development scenarios, without GOCAP elements and with GOCAP elements. Development viability modelling was undertaken on both development scenarios for each case, additionally a third model was used to show the required price premium on property sales (to off-set impacts associated with GOCAP requirements).

The feasibility models used market research data from recent sales in the precincts of each case study location. The impact on pricing is based on literature review of comparative market research of similar properties with and without GOCAP style elements. The limitations from this research is the difficulty in precision for identifying the exact value of each GOCAP element. This is due to differences in values based on outside external factors that could impact the property price.

We used a discounted cash flow methodology used for testing the feasibility of each case study. The best performing option is identified as it delivers the highest residual land value, which is the cash contribution the developer can pay to the landowner to acquire the site.

5.3.2 Summary

The proposed standards impact development viability in three main ways:

- Increase to development cost
- Reduction of development yield
- Change to price paid by buyers.

The impact on viability differs on a project-by-project basis.

Construction costs

These vary from less than 1% to just over 3% per square metre when GOCAP elements are added. Generally, a cost impact beyond 5% would be of concern to most development projects as many construction contingencies are set at the level. This shows the impact of the proposed standards on construction costs **does not significantly impact development costs**.

Maintenance costs

The maintenance costs associated with the addition of the GOCAP elements for each case study has been incorporated into the total sale price. These maintenance costs per annum range from \$22,000 to \$45,000 between each four case studies. This accounts for the public open space (garden beds), green roofs and green facades. This cost would form part of the annual owners' corporation fees of the developments.

Development yield

This differs significantly based on size and type of development. Franklin Street has a reduction of 6 residential units, and Elizabeth Street has a reduction of 250m² of commercial/ retail space.

Residual land value

If it is assumed that there is no change to the price paid for finished properties, the changes flow through to an impact on land value for all case studies. This varies between 4% and 16% depending on the cost and yield impacts. The Elizabeth Street scenario is the greatest impacted due to loss of commercial floorspace yield and increase to cost. As noted in Section 5.1, we believe that this loss of yield could be mitigated if the standards were incorporated into the initial design brief.

Price premium to offset impact

The impacts of the proposed standards can be off-set if buyers are willing to pay more for properties with green infrastructure and sustainability elements. Research undertaken by HillPDA, shows that a price premium in the order of 5% can be achieved by residential developments that include the types of features described in the proposed standards.

For the four case studies, the required premiums were: 4.4% (Jolimont Street); 4.3% (Elizabeth Street); 2.3% (Franklin Street); and 1.2% (Roden Street).

Table 7 Price premium on property sales to offset impact on land value

Case study	Change (% of price)
Roden Street	1.2%
Franklin Street	2.3%
Elizabeth Street	4.3%
Jolimont Street	4.4%

The full results of the development viability assessment are presented in Appendix G.

5.3.3 Implications for the planning scheme amendment

As described in Section 5.1, this analysis is likely to be conservative, as the design changes were made without affecting building massing. Future technical feasibility and development viability studies could redesign buildings in their entirety, potentially resulting in cost neutral or price-positive outcomes.

To assist development viability, the standards could incorporate the following.

- **Menu of options:** Having options that can be tailored to suit different development types (i.e. commercial, residential) could be viewed more favourably by developers. Rather than requirements being ‘fixed’, developers

could have the select different elements to achieve the best value for the minimum costs.

- **Scaling:** GOCAP elements could have scaled design requirements, this could incorporate the different impacts across a range of property development typologies.
- **Staged implementation:** Rather than require mandatory changes immediately, having the GOCAP elements staged could allow for a gentler transition period for buyers and developers. The additional notice would allow the elements to be factored into new designs and studies within a more reasonable time period. This could be achieved by having the standards exist as voluntary for an initial period before becoming mandatory.
- **Cash in lieu:** In some developments, it may prove unpractical to include GOCAP elements. Should this occur it could be considered whether cash in lieu of works contribution could be implemented. These payments could go towards a dedicated fund for the provision of Green Infrastructure elements elsewhere in Melbourne.
- **Transferable obligation:** Developers who are working across multiple project site could have the option to meet the GOCAP element requirements across multiple sites. It may be in some cases, where implementing the GOCAP elements on a development prove difficult, another site could have the elements ‘over-provided’ to make up the difference.

6 Stakeholder engagement

6.1 Engagement objectives

Two external advisory workshops were held during the development of the strategic justification. Full summaries of the workshops are included in Appendix H.

The intent of these workshops was to determine potential partnerships, synergies, and receive feedback on business case outputs and proposed draft planning scheme provisions from relevant specialists in the environmentally sustainable design, green infrastructure, planning, government and the development sector. In-depth discussions were also intended to identify industry champions of the policy and to gauge support for our application for a planning scheme amendment to the Minister for Planning.

Membership was categorised into two groups:

- **Organisations:** Group of representatives in the peak body and state government sectors to provide expert advice to City of Melbourne regarding potential partnerships, synergies and direction of GOCAP PSA implementation.
- **Industry:** Group of influential representatives in the development, GI industry sectors to provide advice to City of Melbourne regarding the impact of a planning scheme amendment.

Table 12 summarises the organisations and industries that were represented at the Stage 1 and 2 workshops.

Table 12 Stage 1 and 2 workshop attendees

Organisation	Stage 1 workshop	Stage 2 workshop
Australian Property Institute (API)		✓
Biomimicry Australia	✓	
Brimbank City Council	✓	
City of Melbourne	✓	✓
Department of Energy, Land, Water and Planning	✓	✓
Development Victoria	✓	
Council Alliance for a Sustainable Built Environment (CASBE)		✓
Facility Management Association of Australia		✓
Frasers Property Australia	✓	
Green Building Council of Australia (GBCA)		✓
Housing Industry Association (HIA)		✓
HillPDA	✓	✓
Inner Melbourne Action Plan (IMAP)	✓	✓

Organisation	Stage 1 workshop	Stage 2 workshop
Lendlease		✓
Municipal Association of Victoria	✓	
Oculus	✓	✓
Office of the Victoria Government Architect (OVGA)	✓	
Planning Institute of Australia (PIA)	✓	
Property Council of Australia (PCA)	✓	✓
University of Melbourne	✓	
Victorian Planning Authority (VPA)		✓

6.2 Stage 1 external advisory workshop

The Stage 1 workshop was held on 18th February 2019. Representatives across the green infrastructure and sustainability industry including developers, building managers, academics, development organisations and State and Local government were invited to provide feedback on the approach and business case outputs to date.

The approach was tested to understand the strengths and gaps in the proposed amendment. The range of people and organisations present at the workshop allowed Arup to examine how the amendment would affect various groups using the planning scheme who have crucial industry knowledge on understanding where improvement is needed.

The workshop featured three presentations from City of Melbourne representatives followed by a presentation and workshop activities from the Arup team, with the key aims being to outline the proposed changes to the GOCAP planning scheme amendment, acquire feedback on proposed changes and new standards, and the mechanisms for implementing the standards. Additionally, feedback was provided on the Stage 2 approach and the development viability of the planning standards.

Planning standards

The participants split into four groups to focus on different sections of the proposed standards.

- Group 1: Energy and greenhouse gas emissions and waste management
- Group 2: Biodiversity and active transport
- Group 3: Climate change adaptation and water use
- Group 4: Stormwater and flood and adaptive reuse

Across all four groups, common areas of feedback included:

- There needs to be further clarification around the intent of the standards and to ensure that these standards can be understood by the public.
- High level objectives need to be coupled with milestone objectives and outlined pathways to achieve the standards. As well as targets/action strategies defined e.g. the percentage of green required.
- Incentives should be embedded throughout to encourage the execution of the requirements
- A gap was identified as the current form draft standards do not have any indication or targets to retrofit existing buildings
- Need for greater reflection on how active transport is embedded into existing and future linkages for the planning amendment
- Discussions on the figures used in the planning requirements, there was concern over how these figures are justified and how the next stage of the planning amendment needs to address this
- Possibility of embedding Green Star credits could be embedded into the standards and how a green infrastructure assessment tool could be live and continuous

Preferred approach to planning controls

For the next activity, participants were asked to comment on the preferred approach to planning controls. At a high level, the two options were:

- **Integrated** – A new local policy and schedule to the design and development overlay to apply to the whole municipality or discrete precincts
- **Distributed** – A new local policy with amended or new schedules to the design and development overlay, environmental significance overlay, land subject to inundation overlay and heritage overlay.

There was a strong preference for green infrastructure to be a standalone component in the planning scheme. With regards to the type of mechanism used, an integrated approach was generally seen as the preferred option, though some hesitation existed on the basis that through an integrated approach, green infrastructure would add another layer of depth and complexity to the planning schemes.

Future opportunities

Lastly, participants discussed the implications of the implementation of the potential planning scheme amendment. Some of the key opportunities identified were alignment with CASBE, the addition of controls to monitor amendment progress and the need to upskill the development industry on green infrastructure in order to effectively implement the amendment to the planning scheme.

Stage 2 feedback

These areas of discussion have been used to help shape the planning scheme amendment. For the second stage of the GOCAP planning amendment, some of

the key feedback that helped shape the methodology for future was to focus on property economics and capture benefits to green infrastructure beyond economic benefits.

6.3 Stage 2 external advisory workshop

The Stage 2 workshop was held on 31st July 2019 at the Melbourne Town Hall. The workshop included presentations from City of Melbourne, Arup, Oculus, HillPDA and HIP V. HYPE.

Representatives across the green infrastructure and sustainability industry including developers, building managers, academics, development organisations and State and Local government were invited to provide feedback on the approach and business case outputs to date.

The aim of the workshop was to inform the group of the progress to the planning scheme amendments, acquire feedback on four case studies developed to test standards, acquire feedback on the effectiveness of the proposed standards on different building typologies. HillPDA provided the economic results of the standards and HIP V. HYPE gave an overview of the pilot green infrastructure assessment.

Case studies

The four case studies Jolimont Street, Franklin Street, Roden Street and Elizabeth Street were presented to the workshop. The projects comprised a mix of commercial and residential buildings, Oculus presented the initial designs and the re-created designs that implemented use of ESD and green roofs. Each case study was discussed and while the overall consensus was of the buildings being improved by the standards, there were questions raised surrounding:

- Concerns were raised around the flexibility of the 40% target for green infrastructure
- Drivers for these developments were discussed where a balance was sought between aspirational drivers and cost drivers
- Ongoing maintenance costs for the ESD
- How the new standards would overlap with existing policies and plans.

Success factors

This activity asked the participants to identify the key success factors for the planning standards by compiling a list that categorised each factor as ‘critical’, ‘useful’ or ‘not required’. The common themes among the critical success factors were formalised guidelines and resources, ongoing channels of support and ongoing monitoring and data collection of developments to assist developers throughout the process. Table 13 indicates how factors were ranked, where participants had different rankings for the success factors, both rankings have been recorded.

Table 13 Factors that could support the success of the planning scheme amendment

Success factors	Ranking		
	Critical	Useful	Not Required
Guidelines and resources must be formalised, properly worded and distributed to developers with ample notice.	✓	✓	
Mechanisms of publicity, education and awareness should be put in place to ensure success.	✓	✓	
Ongoing channels of support and communication should be available to developers / Support and advice	✓		
There should be consistency between jurisdictions in terms of policies and ESD advisory services / Consistency across jurisdictions	✓	✓	
Ramping up time	✓	✓	
Monitoring and data collection / Monitoring system / Systems should be put in place to provide ongoing monitoring and data collection of developments to assist developers throughout the process.	✓		
Enforcement / Statement of compliance checking point – holding developers to account / Compliance officers	✓		
Grants	✓	✓	
ESD advisory (pre-app; training staff) for councils / Additional resources with expertise	✓		
Wording of the policy	✓		
Pre-app meetings / Process requirements / Considering policy at application stage	✓	✓	
Bond / bank guarantee for meeting requirements	✓		
Maintenance planning	✓		
Campaign to buyers	✓	✓	
Data on how it is affecting the City of Melbourne	✓		
Floor area uplift		✓	✓
Awards programmes		✓	
Demonstration projects		✓	
Scalability		✓	

7 Summary and recommendations

City of Melbourne continues its leadership in regulating for sustainable new developments in the municipality. This investigation has brought together information and analysis across council's strategies and goals, the planning scheme, global experience, stakeholder engagement, technical studies and development viability studies.

This investigation has been a significant step forward in building the strategic justification for new standards for urban ecology; energy and greenhouse gas emissions; sustainable transport; waste and resources recovery; urban heat reduction; and integrated water management. The standards would apply to half of Melbourne's building stock over the next 20 years. The city continues its significant growth, and the way we design, and construct buildings today will affect the resilience and liveability of the city in the decades to come.

Summary of findings

While many sustainability themes were well represented in the planning scheme, green infrastructure, climate change adaptation and biodiversity were less defined in terms of clarity and objectivity. The GOCAP planning scheme amendment can fill this gap and drive the uptake of green infrastructure to deliver a wide range of council's goals.

The planning scheme amendment can also take advantage of industry-driven changes such as the requirement for As-Built certification under Green Star and the Green Star roadmap towards zero net emissions from buildings and precincts. These are both major industry initiatives that enable council to meet its own goals for securing sustainable outcomes.

Mandatory green infrastructure requirements are new to Victoria's planning scheme. The international research we undertook highlights the importance of working with the development sector to build knowledge and track progress.

The proposed standards as drafted have a broad base of stakeholder support, are technically viable and have acceptable impact on development viability. They provide a strong basis for proceeding with the GOCAP planning scheme amendment.

Recommendations

Throughout the report, we made recommendations in response to the evidence base. The following seven recommendations set out the way forward.

1. Refine urban ecology standards and the green infrastructure assessment tool

For green infrastructure, evidence from other jurisdictions shows that regulation is an important mechanism for accelerating uptake. The proposed standards for urban ecology will benefit from further testing across a wider array of development types and scales to ensure that sustainability performance outcomes

are achieved. Sustainability outcomes as defined in City of Melbourne's green infrastructure assessment tool are:

- Urban temperature regulation
- Habitat for biodiversity
- Run-off mitigation
- Recreation
- Air purification
- Place values and social cohesion
- Aesthetic benefits
- Food supply

We recommend investigations in the following sequence:

1. **Policy impact** – Establish clear links between the proposed prescriptive green cover target and sustainability outcomes. As many of these environmental outcomes extend beyond building scale (e.g. water catchments, ecological corridors, social infrastructure access), we recommend the cumulative impact of developments be modelled across precincts or the municipality. In discussion with City of Melbourne, we understand that the Water Sensitive Cities Scenario Tool could be used for the water and temperature regulation outcomes, which are critical to City of Melbourne's policy objectives.
2. **Further scenario testing** – Test the prescriptive green infrastructure targets for technical feasibility and development viability across a range of development types and scales, and identify any exemptions. The current investigation analysed impacts on four representative developments in high growth areas of Melbourne municipality. Further testing could address less representative developments, such as community and transport infrastructure, small scale development and developments in suburbs experiencing less change.
3. **Establish performance pathways** – The green infrastructure assessment tool is under development. Once the prescriptive target is set, the tool must be calibrated to establish equivalent performance-based standards. These provide alternative pathways that account for the opportunities and constraints of individual developments. The tool must guide developers and council to understand the equivalency between different greening typologies (e.g. green roofs versus green facades).

We believe that the green infrastructure assessment tool will be an important mechanism for encouraging site-specific design responses to the standards.

As the tool develops, we recommend the following:

- The proposed standards are translated into a consistent quantitative score in the tool for a range of development typologies.
- The tool is future-proofed to enable the prioritisation of different functions to meet the different needs in precincts of the municipality.

- The tool facilitates the collation of project data to inform future revision of the standards and tracking of potential greening contribution towards environmental goals.
- Access to the tool and its supporting documentation is provided to CASBE, the Victorian Government, the Green Building Council of Australia, the Infrastructure Sustainability Council of Australia, and that these stakeholders work together to make green infrastructure standards consistent.

2. Refine bicycle parking standards

As part of the active transport theme, we have recommended increasing bicycle parking rates across the municipality, as it has been demonstrated that not enough bicycle parking is being provided in new developments.⁶⁸ We recommend further work to document the rationale for the proposed rates and refine them if necessary.

The City of Melbourne should continue to advocate for changes to the Victorian Planning Provisions to allow a local schedule to introduce appropriate bicycle parking rates for the municipality.

3. Consider expanding sustainability standards for less developed themes

During this investigation, the following sustainability themes were excluded due to insufficient policy direction or evidence. We believe that it would be appropriate and beneficial for the Melbourne Planning Scheme to include standards for the following themes, once further analysis is undertaken.

- **Parking and electric vehicle readiness** – During this investigation, City of Melbourne was developing its Transport Strategy 2030. As a result, this investigation did not consider vehicle parking or electric vehicle readiness in its initial scoping. As set out in the Climate Change Mitigation Strategy and Transport Strategy, parking rates and electric vehicles play vital roles in climate change mitigation. If City of Melbourne wish to set municipality-wide standards for both these topics, we recommend that minimum requirements and proposed standards be developed. Standards would cover electrical supply, space and metering arrangements for car parking, and consideration of the electric vehicle load on electrical infrastructure. These standards could be part of the GOCAP planning scheme amendment or a transport-specific amendment.
- **Adaptive reuse** – Adaptive reuse of buildings and the benefits of the circular economy is an evolving policy area for the Victorian Government. We recommend the City of Melbourne develop an evidenced-based strategy for the circular economy, and that this incorporate adaptive reuse standards that could be incorporated into the planning scheme.
- **Pedestrian connections in support of walking** – There is opportunity to expand the C308 Planning Scheme Amendment pedestrian connections standard across the municipality. This requires additional testing outside the

⁶⁸ (City of Melbourne, 2019)

central city and Southbank context. Such standards could be part of the GOCAP planning scheme amendment or an urban design-focused amendment.

- **Occupant amenity** – City of Melbourne has not yet established goals for occupant amenity within buildings. Occupant amenity is affected by daylight provision, thermal comfort, air quality and acoustic environment. These areas are covered by: residential minimum standards in the Better Apartment Design Standards and ResCode (for other residential buildings); discretionary standards for other types of buildings through Green Star and BESS. Without council goals for occupant amenity, we have not proposed standards. There is the opportunity for council to set internal occupant amenity goals based on wellbeing and resource efficiency outcomes, then fill the gap in non-residential amenity standards. This could be part of the GOCAP planning scheme amendment or a design quality focused amendment.

4. Continue to pursue the GOCAP planning scheme amendment

This investigation shows that the benefits of enhanced sustainability standards are likely to outweigh the costs. Aside from urban ecology, the proposed standards for the other sustainability themes can be progressed to a planning scheme amendment.

As highlighted in Section 4.4, Victoria's planning scheme is undergoing significant reform. We recommend City of Melbourne work with the Department of Environment, Land, Water and Planning to understand the timeframe and scope of the reform. This will inform which planning controls will be most suitable and effective, using information we developed in Stage 1 of this project. Issues to address include:

- If the standards are presented in a single control or distributed throughout the planning scheme.
- Necessary flexibility to expand or revise referenced resources including the green infrastructure assessment tool, design guides, and green infrastructure masterplan.

In addition, City of Melbourne has highlighted the critical link between achieving sustainability outcomes and moving from stepped envelope controls to Floor Area Ratio controls (as opposed to stepped envelope controls). This is particularly relevant to planning for growth areas in the municipality. We recommend the City of Melbourne continues to move towards flexible building envelope controls that support the delivery of the community's sustainability goals.

5. Develop comprehensive support processes

During international interviews and workshops with Melbourne stakeholders, there was a consistent message that the development sector would benefit from resources that build the sector's capacity to design and construct green infrastructure.

In the Stage 2 advisory workshop, stakeholders nominated a wide range of success factors as being of 'critical' importance to the success of the GOCAP planning scheme amendment. These factors include:

- Availability of targeted written and illustrated guidelines
- Availability of advice and the requirement for early engagement with council during
- Policy consistency between jurisdictions
- Forward knowledge and timeframes for the introduction of new standards
- Enforcement and checking
- Financial support such as grants
- Requirements for maintenance planning
- Industry or council-led campaign to raise community's awareness and appreciation for proposed standards and their outcomes
- Monitoring and reporting of the impact of the standards on the city

We recommend that City of Melbourne implement a comprehensive suite of support processes alongside the new policy. In particular, City of Melbourne highlighted the ability of the Central Melbourne Design Guide to initiate productive conversations with developers at early planning stages. We recommend City of Melbourne adopt lessons from this resource in implementing the green infrastructure standards through the planning scheme.

Such a guide would also assist developers and planners to design and assess alternative pathways for meeting the green infrastructure standard. This mitigates risks associated with the ongoing governance of the green infrastructure assessment tool.

6. Collaborate with the Green Building Council of Australia

As we have nominated certification to the Green Star Design and As-Built tool as a minimum requirement, we recommend City of Melbourne work closely with the Green Building Council of Australia to:

- Account for changes to the rating tool
- Develop shared resources, calculators and other tools
- Plan for the project pipeline
- Establish precinct-wide certification approaches for urban renewal areas, which simplify the Green Star process for individual developers
- Collect and share data.

7. Monitor policy impact

In reviewing lessons learned from Victorian sustainability policies and international green infrastructure policies, jurisdictions raised the need to monitor the impact of policies and standards to refine regulations to build on learnings and assess community needs and shape regulations to meet them. City of Melbourne are particularly interested in developing a planning scheme amendment with elements that could be replicated by other councils.

We therefore recommend monitoring and reporting the outcomes of the planning scheme amendment. This includes establishing a baseline for green infrastructure

and building certifications (e.g. Green Star) prior to the planning scheme amendment. This could be in the form of a map or database of buildings.

We recommend that, over time, the City of Melbourne identifies the specific needs of growth precincts in relation to green infrastructure sustainability outcomes (urban temperature regulation, recreation, aesthetic benefits, place values and social cohesion, habitat for biodiversity and surface runoff). This would provide the evidence base for the green infrastructure assessment tool to weight these benefits more heavily so that individual developments are rewarded for higher value contributions.

Through green infrastructure assessment tool's online database, the City of Melbourne should collect and analyse how developments respond to the standards and have met community needs.

References

- AECOM. (2012). *Economic Assessment of the Urban Heat Island Effect*. Melbourne: City of Melbourne.
- Australian Sustainable Built Environment Council and ClimateWorks Australia. (2018). *Built to Perform*.
- Bowen, K., & Lynch, Y. (2017). The public benefits of green infrastructure: the potential for economic framing for enhanced decision-making. *Current Opinion on Environmental Sustainability*, 25, 90-95.
- Bowen, K., & Parry, M. (2015). *Green infrastructure and its tri-benefits: health, environment and economic*. Melbourne: City of Melbourne.
- Carter, T., & Fowler, L. (2008). Establishing Green Roof Infrastructure Through Environmental Policy Instruments. *Environmental Management*, 42(1), 151-164. doi:DOI:10.1007/s00267-008-9095-5
- CASBE . (2018). *Local ESD planning policies monitoring report*. Banyule, Port Phillip, Moreland, Stonnington, Whitehorse, Yarra: CASBE .
- Cinderby, S., & Bagwell, S. (2018). Exploring the co-benefits of urban green infrastructure improvements for businesses and workers' wellbeing. *Area*, 50, 126-135. doi:10.1111/area.12361
- City of Melbourne. (2018). *Climate Change Mitigation Strategy* . City of Melbourne .
- City of Melbourne. (2018, October 19). *Employment and floor space forecasts by small area*. Retrieved September 17, 2019, from <https://data.melbourne.vic.gov.au/Economy/Employment-and-floor-space-forecasts-by-small-area/gb88-t7zc>
- City of Melbourne. (2018). *Floor space by use by block*. Retrieved September 17, 2019, from <https://data.melbourne.vic.gov.au/Economy/Floor-space-by-use-by-block/234q-gg83/data>
- City of Melbourne. (2019). *Transport Strategy 2030*. City of Melbourne. Retrieved from <https://www.melbourne.vic.gov.au/SiteCollectionDocuments/transport-strategy-2030-city-of-melbourne.pdf>
- City of Melbourne. (2019). *Valuing Green Guide*. Melbourne: City of Melbourne.
- City of Toronto . (2018). *Toronto Green Standard Version 3* . Retrieved from City of Toronto: <https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/toronto-green-standard/>
- DELWP. (2016). *Water for Victoria*. State of Victoria.
- DELWP. (2019). *Cooling and Greening Melbourne Interactive Map*. DELWP. Retrieved from <http://mapshare.maps.vic.gov.au/coolinggreening/>
- Department of Planning & Development . (2015). *Standards for landscaping, including green factor* . Seattle: City of Seattle.
- Department of the Environment and Energy. (2018, June). *Trajectory for Low Energy Homes and NCC 2022*. Retrieved September 17, 2019, from <http://www.nathers.gov.au/newsletters/issue-6-june-2018/trajectory-low-energy-homes-and-ncc-2022>
- Emergency Management Victoria. (2016). *State Emergency Response Plan Flood Sub-Plan*. Melbourne: Victorian Government. Retrieved from <https://files-em.em.vic.gov.au/public/EMV-web/SERP-StateFloodSub-plan.pdf>

- Emergency Vic. (2019). *Preparing for Floods*. Retrieved 2019, from <https://www.emergency.vic.gov.au/prepare/#flood/preparing-for-floods>
- EU Strategy for the Baltic Sea Region . (2015). *Green Factor Tool* . Retrieved from Integrated Stormwater Management: <https://www.integratedstormwater.eu/material/green-factor-tool>
- Ewald, B. (2018). *Deteriorating air quality in NSW*. Environmental Justice Australia.
- forecast.id. (2019, April). *City of Melbourne Population, households and dwellings*. Retrieved September 17, 2019, from <https://forecast.id.com.au/melbourne/population-households-dwellings>
- GBCA. (2018). *A Carbon Positive Roadmap: for the built environment*. GBCA.
- GBCA. (2019). *Green Star for New Buildings: A Future Focus consultation paper*. Retrieved from <https://gbca-web.s3.amazonaws.com/media/documents/consultation-paper.pdf>
- GHD. (2013). *Green infrastructure and the private realm* . Melbourne: City of Melbourne.
- Global Commission on Adaptation. (2019). *Adapt Now: a global call for leadership on climate resilience*.
- Greater London Authority . (2019). *London Living Roofs and Walls: from policy to practice*. London: GLA .
- Green Building Council of Australia. (2013). *The Value of Green Star - A Decade of Environmental Benefits* . Green Building Council of Australia.
- Growing Green Guide. (2014). *Growing Green Guide*. Department of Environment and Primary Industries.
- Hip v Hype. (2019). *Insights and future directions: Green infrastructure assessment tool*. Melbourne: Hip v Hype.
- Inkiläinen, E., Tiihonen, T., & Eitsi, E. (2016). *Developing the City of Helsinki Green Factor Method*. Helsinki: City of Helsinki Environment Centre. Retrieved from https://www.integratedstormwater.eu/sites/www.integratedstormwater.eu/files/report_summary_developing_a_green_factor_tool_for_the_city_of_helsinki.pdf
- Irga, P., Braun, J., Douglas, A., Pettit, T., Fujiwara, S., Burchett, M., & Torpy, F. (2017). The distribution of green walls and green roofs throughout Australia: Do policy instruments influence the frequency of projects? *Urban Forestry & Urban Greening*, 24(1), 164-174.
- Juhola, S. (2018). Planning for a green city: The Green Factor tool. *Urban Forestry and Urban Greening*, 34(1), 254-258. doi:10.1016/j.ufug.2018.07.019
- Kruuse, A. (2001). *The green space factor and the green points system*. London: Town and Country Planning Association .
- Lee, K., Sargent, I., Williams, N., & Williams, K. (2018). Linking green micro-breaks with mood and performance. *Journal of Environmental Psychology*, 60, 81-88.
- Lennon, M. (2015). Green infrastructure and planning policy: a critical assessment. *Local Environment*, 20(8), 957-980. doi:10.1080/13549839.2014.880411

- Lynch, A. (2018). Creating effective urban greenways and stepping-stones: four critical gaps in habitat connectivity planning research. *Journal of Planning Literature*, 1-25. doi:10.1177/0885412218798334
- Moore, T., Moloney, S., Hurley, J., & Doyon, A. (2017). *Implementing sustainability in the built environment* . Melbourne: RMIT University .
- Natural Capital Economics. (2018). *Heatwaves in Victoria: a vulnerability assessment*. DEWLP.
- Ong, B., Hes, D., Fryd, O., Aye, L., & Ngo, T. (2013). *Report on urban greenery in the private realm for the City of Melbourne* . Melbourne : City of Melbourne .
- Parris. (2018). The seven lamps of planning for biodiversity in the city.
- Phillip Boyle & Associates. (2016). *Off-street bicycle and motorcycle parking review*. Melbourne: City of Melbourne.
- Phillip Boyle & Associates. (2018). *Transport Strategy: refresh Background paper Increasing the Use of Bicycles for Transport* . Melbourne: City of Melbourne.
- Rolfe, D. (2017). *Investigating the economic value of green infrastructure in urban development and planning*. Sydney: Macquarie University .
- Roodman, D. (1994). Our buildings, ourselves. *World Watch*, 7(6), 2-30.
- Seattle Department of Construction and Inspections. (2018). *Seattle Green Factor*. Retrieved from Codes: [http://www.seattle.gov/sdci/codes/codes-we-enforce-\(a-z\)/seattle-green-factor](http://www.seattle.gov/sdci/codes/codes-we-enforce-(a-z)/seattle-green-factor)
- SGS. (2016). *Local liveability cost benefit analysis*. Melbourne: City of Melbourne .
- Symons, J., Jones, R., Young, C., & Rasmussen, B. (2015). *Assessing the economic value of green infrastructure: literature review*. Melbourne : Victoria Institute of Strategic Economic Studies, Victoria University.
- The Nature Conservatory. (2016). *Planting healthy air*. Retrieved from <https://thought-leadership-production.s3.amazonaws.com/2016/10/28/18/10/13/a5d064ce-5790-439b-945d-70fe3b0b5e10/London.pdf>
- Threlfall. (2017). Increasing biodiversity in urban green spaces through simple vegetation interventions. *Journal of applied ecology*.
- United States General Services Administration. (2011). *The benefits and challenges of green roofs on public and commercial buildings* . Retrieved from https://www.gsa.gov/cdnstatic/The_Benefits_and_Challenges_of_Green_Roofs_on_Public_and_Commercial_Buildings.pdf
- Victoria Institute of Strategic Economic Studies. (2015). *Green infrastructure economic framework*. Melbourne: Victoria University.
- Victoria University . (2018). *Valuing green guide*. Melbourne: City of Melbourne.
- Vivid Economics. (2017). *Natural capital accounts for public green space in London*. London: Greater London Authority, National Trust, Heritage Lottery Fund.
- Williams, K., Lee, K., Sargent, L., Johnson, K., Rayner, J., Farrell, C., . . . Williams, N. (2019). Appraising the psychological benefits of green roofs for city residents and workers. *Urban Forestry and Urban Greening*, 44.

- Williamson, E. (2018). *Fishermans Bend draft Framework & Planning Controls Expert Witness Report - Sustainability*. Melbourne: Creative Environment Enterprises.
- Wilson, J., & Tagaza, E. (2006). Green Buildings in Australia: Drivers and Barriers. *Australian Journal of Structural Engineering*, 7(1), 57-63.
- Yew, J. (2012). Financing Low Carbon, Climate Resilient Infrastructure: The Role of Climate Finance and Green Financial Systems. *SSRN Electronic Journal*.

Appendix A

Wider benefits literature review

A limitation of these findings is that the dollar values reflect that of the year the source is from, not the real value in 2019. For sources outside of Australia, the dollar value is reflective of the currency of that country and has not been converted into AUD.

Resource	Benefits	Publish date and jurisdiction
Benefit: Surface water management		
Greater London Authority. <u>Living Roofs and Walls: from policy to practice</u>	Green Roofs: this report discusses the benefits of absorbing and slowing down stormwater. This lower end of the green roofs (60mm-100mm) can intercept 50% of annual rainfall whereas deeper soils (up to 500mm) can intercept up to 90%.	2019 UK
Cities of Banyule, Port Phillip, Moreland, Stonnington, Whitehorse and Yarra Local ESD planning policies monitoring Report	This report discusses the implementation of rainwater harvesting capacity (rainwater tanks) being added to homes that would have benefits such as: Reduced potable water consumption (through tanks being connected to toilets, and other home irrigation); Reduced strain on storm water drain systems; Reduced site run-off and flooding peaks through water retention; and Reduced impact on urban waterways (Melbourne Water, 2017).	2017 Melbourne, Australia
Victoria Institute of Strategic Economic Studies <u>Green Infrastructure Economic Framework Summary Report.</u>	The case study of the Brooklyn Industrial Precinct estimated that treating the water catchment of the precinct reduced potable water use by 29MI per year. Over a 30-year period these savings were estimated at \$1.3 million. This catchment also resulted in stormwater runoff reduction of 162 MI per year.	2015 Melbourne, Australia.
Ashley, Gersonius, Digman, Horton, Bacchin, Smith, Shaffer and Baylis. Demonstrating and Monetizing the Multiple Benefits from Using SuDS	Sustainable Drainage Systems (SuDS) refers to drainage systems that are not primary pipes buried underground. A case study within Leeds, developed 4 different options to assess the monetization from benefits of SuDS. Only one of the options had a positive NPV, this was £200,000. While improved amenity was the largest contributor to the positive NPV, flood risk reduction was the second largest. The benefits are enjoyed mainly by the property owners and those who live in the properties as opposed to the water company who were the primary funding for the SuDS implementation.	2017 Leeds, UK

Resource	Benefits	Publish date and jurisdiction
A. Marissa Matsler Making 'green' fit in a 'grey' accounting system	This report references a finding from the National Recreation and Parks Association that trees within cities in the US save \$400 billion in stormwater retention facility costs.	2019 Oregon, USA
Benefit: Urban Cooling		
University of Melbourne. <u>Urban Trees: Worth more than they cost</u> Found: AECOM Green Infrastructure Report	Urban Forest: In the City of Melbourne, 70,000 trees in streets and parks are estimated to provide \$14 million in value by offering shade and capturing and storing carbon. This value does not consider the multitude of other benefits provided by trees. While this more closely examines trees within parks, this information still shares relevance with trees and greenery added to and around buildings.	2009 Melbourne, Australia
Brisbane City Council. <u>Street Trees</u> Found: AECOM Green Infrastructure Report	Brisbane City Council estimates its street trees contribute \$1.67 million in value to the city by improving air quality, capturing rain and storing carbon. While this more closely examines trees within parks, this information still shares relevance with trees and greenery added to and around buildings. This figure is also reflected in carbon sequestration benefits.	(Accessed 2019) Brisbane, Australia
The Nature Conservatory. <u>Planting Healthy Air</u>	Heat waves contribute to the deaths of an estimated 12,000 people annually. The risk of heat waves will grow as increasing world temperatures will affect a quarter of a million people in 2050. Increased greenery such as trees help provide urban cooling due to the shade cast by trees and transpiration of water during photosynthesis. Beyond health benefits, this also offers residential monetary benefits as electricity costs can be reduced due to less demand for air conditioning with reduced outside temperatures. This report states that if cities were to invest \$4 (USD) per resident in the planting of urban trees, these benefits could be realised and assist in mitigating the heat island effect. While this more closely examines trees within parks, this information still shares relevance with trees and greenery added to and around buildings.	2016 US; Global perspective

Resource	Benefits	Publish date and jurisdiction
Green Building Council Australia Building with nature: Prioritising ecology and biodiversity for better building and cities	Trees and additional greenery can help offset the urban heat island effect. This is through absorption of less heat (by buildings), additionally light colours of buildings can help reflect sunlight. This is also reflected in the community and health benefits due to reduction of heat related deaths.	2018 Australia
GHD City of Melbourne- Rooftop Adaptation Study: Green Roofs, Cool Roofs and Solar Panels	This report reflects the range of suitable buildings within Melbourne that have rooftops that could be transformed into green roofs. It looks at 15 districts within Melbourne that have the potential for rooftops to be converted, with Melbourne city having the highest number of roofs that could become green roof intensive and green roof extensive. More so than solar due to the variety of building heights in Melbourne which make solar unfeasible for some city buildings. It is worth noting that the benefits of green roofs can be reduced when built on very tall buildings (not visible, biodiversity etc).	2015 Melbourne, Australia
Julian Sproul, Man Pun Wan, Benjamin H. Mandel and Arthur H Rosenfeld <u>Economic comparison of white, green, and black flat roofs in the United States</u>	This report discusses the costs and benefits between white, black and green roofs. The key cost findings show that white roofs are the most economically sound investment with a 50-year net saving of \$25 per m2. Green roofs were shown to have a 50-year negative net saving of \$71 per m2, this is despite lasting twice as long as white and black roofs as the installation costs are high. White roofs on air-conditioned buildings in hot climates can cut cooling energy use by 10–20% on the floor of the building immediately beneath the roof. White and black roofs have similar installation and maintenance costs (assuming the new white roofs are already weather with an SR of only 0.55 reducing the need for roof power washing to maintain the high solar reflectance.	2013 USA/ Singapore
Benefit: Biodiversity		
Department of Environment, Land, Water and Planning (published as Department of Environment and Primary Industries) Growing Green Guide (page 9)	Green roofs can contribute and enhance biodiversity. This is done through selection of plant life that is rare or important or is suitable for important species of animals, often insects or bird varieties. This is greater encouraged by multiple near located green roofs that provides a link for these animals across 'urban ecological deserts'. One example of this in Victoria is the biodiversity green roof at the Burnley Campus of University of Melbourne.	2014, Victoria, Australia

Resource	Benefits	Publish date and jurisdiction
<p><u>Garrard, G., N. Williams, L. Mata, J. Thomas, & S. Bekessy. Biodiversity Sensitive Urban Design. Conservation Letters 11(2)1-10</u></p> <p>Figure 1D.</p>	<p>“The biodiverse roof at The University of Melbourne [Burnley campus] provides a diverse range of habitats, including hollow logs, grassland, and an ephemeral stream.”</p> <p>This article exemplifies that capacity for urban design and development improvements to mitigate adverse urbanisation impacts. The article presents a framework for implementing biodiversity sensitive urban design to deliver and realise benefits to biodiversity.</p>	<p>2017 Australia</p>
<p>Ksiazek-Mikenas, Herrmann, Menke & Kohler</p> <p><u>If you Build It, Will They Come? Plant and Arthropod Diversity on Urban Green Roofs Over Time.</u></p>	<p>The diversity of plants, animals, fungi, and microorganisms supported by novel ecosystems contributes to resilient ecological communities and supports global conservation goals.</p> <p>This study notes that several rare and endangered animal species have been found to use intentionally designed “biodiverse roofs” however, no conclusive evidence was found to confirm the extent to which green roofs supported this biological diversity.</p>	<p>2018 USA & Germany</p>
<p>Green Building Council Australia</p> <p><u>Building with nature: Prioritising ecology and biodiversity for better building and cities</u></p>	<p>Over 500 of Australia’s at-risk species are found to occur within urban environments. This highlights the need for building and public spaces to better encourage biodiversity in both plant and animal life, otherwise there is risk of losing species that could have flow on negative effects to the environment.</p> <p>Biodiversity loss often leads to long term economic costs that are not often reflected quantitatively.</p>	<p>2018 Australia</p>
<p>United States General Services Administration</p> <p><u>The Benefits and Challenges of Green Roofs on Public and Commercial Buildings</u></p>	<p>This report discussed a Toronto study that estimated that using all the rooftop space in the city to grow crops could create a value return of CAN\$1.7 billion.</p> <p>Additionally, this report discusses the amount of oil that is used (300 gallons annually) for food production that may be reduced by using green roofs for agriculture.</p>	<p>2011 USA</p>

Resource	Benefits	Publish date and jurisdiction
Katherine Berthon, David Nipperess, Peter Davis and Matthew Bulber <u>Confirmed at Last: Green Roofs Add Invertebrate Diversity</u>	This report found quantitatively that green roofs host a greater number and variety of organisms than conventional bare roofs. To maximise overall invertebrate richness, total roof areas needs to be larger than 746 m ² and have at least 30% green cover (containing both vegetated and bare earth areas).	2015 Australia
Ives et al 2016 Ives, C.D., Lentini, P.E., Threlfall, C.G., et al. (2016). Cities are hotspots for threatened species. Glob. Ecol. Biogeogr., 25, 117-126.	In Australia, 30 per cent (503 out of 1643) of nationally threatened species occur in cities (including Melbourne), whilst those cities only cover 0.23 per cent of total land in Australia. This paper doesn't account for the State-listed threatened species under the Flora and Fauna Guarantee Act (1988), so the number of threatened species in Australian cities is likely to be much higher. Cities are hotspots for biodiversity – partly because there was a lot of biodiversity there before the city was built, and that's why the city was put there. Hence the need to conserve biodiversity in cities is greater because there more species are native to them.	2016 Australia
Fuller et al 2007 Fuller, R.A., Irvine, K.N., Devine-Wright, P., Warren, P.H. & Gaston, K.J. (2007). Psychological benefits of greenspace increase with biodiversity. Biol. Lett., 3, 390-394.	The psychological benefits of greenspace are greater when they are more species diverse. Species measured were plants, butterflies and birds. Although the study examined public greenspaces over 1 ha, the beneficial psychological response was more strongly related to plant species richness than site area. There was also a positive relationship between the number of habitats and psychological benefits. Therefore, authors state that "management emphasizing a mosaic of habitat patches [...] may enhance biodiversity levels, ecosystem service provision and the well-being of the human urban population." Lots of papers that have cited this paper are useful	2007 US; global perspective
<u>Green roofs provide habitat for urban bats 2015 Parkins and Clark Global Ecology and Conservation</u>	This study provides evidence that, in addition to well documented ecosystem benefits, urban green roofs contribute to urban habitat availability for several North American bat species.	2015 New York, USA

Resource	Benefits	Publish date and jurisdiction
Parris et al 2018 <u>The seven lamps of planning for biodiversity in the city</u>	Cities and towns offer important opportunities for the conservation of biodiversity. A paradigm shift that integrates biodiversity into the urban fabric is required. We present seven ecological principles to increase the biodiversity of cities through planning for the more-than-human.	2018 Australia
<u>Green Roofs as Urban Ecosystems: Ecological Structures, Functions, and Services</u> Erica Oberndorfer, Jeremy Lundholm, Brad Bass, Reid R. Coffman, Hitesh Doshi, Nigel Dunnett, Stuart Gaffin, Manfred Köhler, Karen K. Y. Liu, Bradley Rowe BioScience, Volume 57, Issue 10, November 2007, Pages 823–833,	“Green-roof habitats show promise for contributing to local habitat conservation. Studies have documented invertebrate and avian communities on a variety of living-roof types in several countries [refs]. Green roofs are commonly inhabited by various insects, including beetles, ants, bugs, flies, bees, spiders, and leafhoppers [refs]. Rare and uncommon species of beetles and spiders have also been recorded on green roofs [refs]. Species richness in spider and beetle populations on green roofs is positively correlated with plant species richness and topographic variability [refs].”	2007 Global perspective

Resource	Benefits	Publish date and jurisdiction
<u>Exposure to Urban Nature and Tree Planting Are Related to Pro-Environmental Behaviour via connection to Nature, the Use of Nature for Psychological Restoration, and Environmental Attitudes</u> Julie Whitburn , Wayne L. Linklater, and Taciano L. Milfont Environment and Behaviour 1–24, 2018	Pro-Environmental Behaviours increased with exposure to urban nature, including green infrastructure. Therefore, increasing people’s exposure to green infrastructure could increase propensity of city users to do other behaviours that benefit biodiversity, including goals in council, state and federal government and international goals and strategies.	2018 Wellington, New Zealand
The Value of Green Walls to Urban Biodiversity Rebecca Collinsa, , Marije Schaafsmab, Malcolm D. Hudsona	Assessed public’s willingness to pay for green walls. The paper found that “...the value of the green wall policies exceeds the estimated investment cost; so, our results suggest that implementation would provide net economic benefits.”	2018 United Kingdom

Resource	Benefits	Publish date and jurisdiction
<p><u>The coexistence of biodiversity and amenity in urban landscapes.</u></p> <p>Ives and Kelly 2016</p> <p>Ives, C and Kelly, A 2016, 'The coexistence of amenity and biodiversity in urban landscapes', Landscape Research, vol. 41, no. 5, pp. 495-509.</p>	<p>“This paper explores the concepts of amenity and biodiversity and investigates their compatibility in an urbanising world. Their historical expression in law and urban planning is considered, and empirical research on the links between human wellbeing, green environments and biodiversity is reviewed.”</p> <p>The authors explore the co-existence of biodiversity and amenity, pointing towards urban landscapes as a canvas to prioritise both benefits concomitantly.</p>	<p>2016</p> <p>Australian-based global perspective</p>
<p><u>A spatial framework for targeting urban planning for pollinators and people with local stakeholders: A route to healthy, blossoming communities?</u></p> <p>Chloe C. Bellamy, Alexander P.N. van der Jagt, Shelley Barboura, Mike Smith, Darren Moseleya</p>	<p>The article provides a modelling framework to inform green infrastructure planning as a nature-based solution with social and ecological benefits.</p> <p>Using Edinburgh, Scotland, as a case study city, this article demonstrates an approach for bumble bees and hoverflies, providing high resolution predictive maps that identify pollinator habitat hotspots and pinch points across the city. By combining this spatial HSM output with health deprivation data, the authors highlight ‘win-win’ opportunity areas in most need of improved green infrastructure to support pollinator connectivity, as well as societal health and well-being. In addition, in collaboration with municipal planners, local stakeholders, and partners from a local greenspace learning alliance, the article identified opportunities for citizen engagement activities to encourage interest in wildlife gardening as part of a ‘pollinator pledge’.</p>	<p>2017</p> <p>United Kingdom</p>
<p><u>Brenneisen, S. (2006) Space for urban wildlife: designing green roofs as habitats in Switzerland. Urban Habitats 4, 27–36.</u></p>	<p>“Extensive green roofs can provide suitable habitat for animal and plant species that are able to adapt to and develop survival strategies for extreme local conditions and are also mobile enough to reach habitats on roofs.”</p>	<p>2006</p> <p>Switzerland</p>

Resource	Benefits	Publish date and jurisdiction
<u>Urban green roofs provide habitat for migrating and breeding birds and their arthropod prey</u> Partridge et al 2018 PLoS One	“Establishing green roofs in urban landscapes increases the amount of habitat available for migrating and breeding birds and can partially mitigate the loss of habitat due to increasing urbanization.”	2018 New York, USA
<u>Insect species composition and diversity on intensive green roofs and adjacent level-ground habitats</u> MacIvor and Lundholm 2010	Paper concludes that “a wide variety of insects, including many uncommon species were collected from green roofs, supporting the idea that these habitats can contribute to sustaining biodiversity in cities.”	2010 Toronto, Canada
<u>The influence of native versus exotic streetscape vegetation on the spatial distribution of birds in suburbs and reserves</u> Ikin et al 2013 Diversity and Distributions, (Diversity Distrib.) (2013) 19, 294–306	“Native street trees provide foraging resources for birds that would be reduced or absent in exotic streetscapes, enabling native streetscapes to support a rich community of birds. Furthermore, native streetscapes increase bird richness and diversity in adjacent reserves. This result has important conservation implications for suburb and reserve management practices. Our study provides evidence that the establishment and retention of native suburban streetscapes is an important management strategy for improved bird conservation.”	2013 Canberra Australia
<u>Species richness in urban parks and its drivers: A review of empirical evidence</u> Anders Busse Nielsen & Matilda van den Bosch & Sreetheran Maruthaveeran & Cecil Konijnendijk van den Bosch	Improving the ecological quality of the urban matrix (built structures) can improve biodiversity in urban parks by facilitating ecological connectivity.	2013 Global perspective

Resource	Benefits	Publish date and jurisdiction
Novel urban ecosystems, biodiversity, and conservation Kowarik 2011	“One outstanding example is an old green roof on a filtration plant in Zurich, Switzerland, which provides a habitat for 170 plant species including 9 rare or endangered species of orchids (Chrisman, 2005).”	2011 Global perspective
<u>Increasing biodiversity in urban green spaces through simple vegetation interventions</u> Threlfall et al 2017 Journal of Applied Ecology	<p>“We found 30–120% higher occupancy for bats, native birds, beetles and bugs with an increase in understorey volume from 10% to 30%, and 10–140% higher occupancy across all native taxa with an increase in the proportion of native vegetation from 10% to 30%.”</p> <p>“Redressing the dominance of simplified and exotic vegetation present in urban landscapes with an increase in understorey vegetation volume and percentage of native vegetation will benefit a broad array of biodiversity.”</p>	2017 South-east Melbourne
Benefit: Air Quality		
Killicoat, Puzio and Stringer 2002, as referenced in Moore 2009 <u>People, Trees, Landscape and Climate Change</u> Found: AECOM Green Infrastructure Report	<p>Urban Forestry: Research in London has provided extensive insights into the air quality benefits, showing that trees remove an estimated 2,241 tonnes of carbon each year from the air.⁷</p> <p>While this more closely examines trees within parks, this information still shares relevance with trees and greenery added to and around buildings.</p>	2009 Australia
The Nature Conservatory <u>Planting Healthy Air Case Study - London</u>	<p>Large metropolitan cities can often struggle with air quality that would otherwise be improved by increased greenery to absorb carbon. The negative offset of poor air quality in London was found to contribute to the loss of 40,000 life years in 2010. In south east England, 4,000 deaths were attributed to particulate pollution.</p> <p>While this more closely examines trees within parks, this information still shares relevance with trees and greenery added to and around buildings.</p>	2016, UK; Global perspective
The Nature Conservatory, Planting Health Air (page 108)	<p>Use of trees and other greenery can help reduce PM by 7 – 24%. Particular matter (PM) are small particles (dust) that can be inhaled into lungs, this contributes to increased risk of asthma, stroke and heart attack.</p> <p>While this more closely examines trees within parks, this information still shares relevance with trees and greenery added to and around buildings.</p>	2016, Global perspective

Resource	Benefits	Publish date and jurisdiction
New York City Council <u>Climate Mobilisation Act</u> (additional)	The Climate Mobilisation Act encompasses a suite of measures to reduce GHG emissions in the city, with a centrepiece target for large and medium-sized buildings to reduce their emissions by 40% by 2030 and 80% by 2050. It requires roofs of certain buildings to be 100% covered in green roofs or solar PV. The council is looking to set legislation that would allow for greater tax abatements for green roof installation - \$15 per square foot. This helps incentivise green roofs for developers.	2019 New York, USA
United States General Services Administration <u>The Benefits and Challenges of Green Roofs on Public and Commercial Buildings</u> (page 53)	The reduction in nitrogen-oxide compounds by a green roof is calculated to be worth \$0.0008 to \$0.589 per square foot of green roof. The nitrogen-oxide costs assume either costs for replacement or addition of equipment, such as a flue gas scrubbing system, or human benefit costs that were evaluated as part of an EPA study. This same logic could be used for Particulate Matter less than 10 micrometers (PM10), sulfur-oxygen compounds and carbon monoxide, which would result in benefit of \$0.00115 per square foot of green roof, \$0.000002 per square foot of green roof, and \$0.000096 per square foot of green roof, respectively.	2011 US
Benefit: Health and wellbeing (community connectedness)		
Chen et al. <u>Urban vegetation for reducing heat related mortality</u>	This study estimated that by doubling the leaf canopy there would be up to 28 percent fewer heat-related deaths in Melbourne annually. While this more closely examines trees within parks, this information still shares relevance with trees and greenery added to and around buildings.	2014 Melbourne, Australia
Williams et al Appraising the psychological benefits of green roofs for city residents and workers Urban Forestry and Urban Greening 44(1)	This research reveals the capacity for green roofs to provide restorative experiences through providing opportunities for socialisation, physical activity and mindfulness.	2019 Global perspective
Lee et al 2018 Linking green micro-breaks with mood and performance	Opportunities to view and interact with nature in micro-breaks have been demonstrably linked to better moods, greater attention control, and improved task performance in the workplace	2018 Global perspective

Resource	Benefits	Publish date and jurisdiction
Lee et al Living roof preference is influenced by plant characteristics and diversity	This article found that: Living roofs with tall, green, grassy vegetation were highly preferred; Flowers increased living roof preference; Plant diversity increased preference overall, but decreased preference for most preferred vegetation; and Psychological restoration was associated with the most preferred living roof.	2014 Melbourne
Environmental Science and Pollution Research The basic role of indoor plants in human health and comfort (page 4-6)	This study notes the positive physiological and psychological benefits that are gained by greenery. Studies discussed benefits such as: <ul style="list-style-type: none"> • Lower anxiety; • Reduced stress; • Better work performance; • Increased attractiveness of the space; • Favourable attitude; and • Better productivity. It is worth noting this study was report was conducted with a focus of indoor plants, however the human benefits of greenery can still be applicable to greener buildings.	2018 China; Global perspective
Greater London Authority, National Trust and Heritage Lottery Fund Natural capital accounts for public green space in London	This report found that Londoners get £950 million worth of avoided health costs due to public parks and greenery. This cost is made from £580 million of avoided costs due to improved physical health and £370 million annually due to better mental health.	2017 London, UK
Bowen & Parry Green infrastructure and its tri-benefits: health, environment and economic	Access to natural environment creates stronger neighbourhood identities and improves community social health.	2015 Melbourne, Australia
Green Building Council Australia Building with nature: Prioritising ecology and biodiversity for better building and cities	Green spaces are found to improve both physical and mental health. Cities with well connected, healthy green spaces and green buildings contribute to healthier and more productive people.	2018 Australia

Resource	Benefits	Publish date and jurisdiction
Victoria Institute of Strategic Economic Studies <u>Green Infrastructure Economic Framework Summary Report.</u>	The case study of the Brooklyn Industrial Precinct highlighted the negative offsets from pollution. Within the precinct, it was estimated that health costs (asthma hospitalisation and early death) had direct health costs of \$7.1 million per year. The welfare costs to the broader community are estimated at \$15.5 million annually.	2015 Melbourne, Australia.
White et al. <u>Spending at least 120 minutes a week in nature is associated with good health and wellbeing</u>	This scientific report examines the health benefits associated with spending 120 minutes per week in nature. From this study individuals who reported spending ≥ 120 mins in nature last week had consistently higher levels of both health and well-being than those who reported no exposure. The model used found that those who had 'high' exposure (120 minutes+) per week in self reporting their positive feeling of health was consistent across gender, age, high/ low occupational social grad, with or without an illness or disability and those who did not meet recommended physical activity. The report does conclude that while the 120-minute mark is an important threshold for health and wellbeing in England, further studies are required to confirm these findings.	2019, UK
Green Roof Organisation <u>The GRO Green Roof Code</u> (page 12)	Green roofs can help improve water quality. Vegetation can filter out airborne particulates as air passes over plants, which then wash down into the growing substrate via rainfall or irrigation. The particulates being held within the green roof substrates limits their likelihood of reaching water courses. In urban area where heavy metals such as lead, zinc and copper are a recognised pollutant, these green roofs help reduce their ability to contaminate water supplies.	2014 UK
Benefit: Crime Reduction		
SGS Economics & Planning Local liveability cost benefit analysis	SGS Final Report, shows one of the anticipated benefits from improved urban development is a reduction in crime. This is a predicted result of great passive surveillance of the public domain as spaces are more welcoming due to amenity improvement associated with green and ESD inclusion. However, urban development and closely link housing with more accessible pathways were found to be a major contributor to this and ESD and greening cannot solely be responsible for this reduction. The total cost of crime per capita in Victoria is estimated to be around \$1,458 (total cost of crime as 2.42 of the GSP). This estimate does not include total costs of the criminal justice system (sentencing, incarceration etc) it is likely these costs are higher (John Walker Crime Trends Analysis, 2003).	2016 Melbourne, Australia

Resource	Benefits	Publish date and jurisdiction
<p>DCPC (Drugs and Crime Prevention Committee)</p> <p>Inquiry into the Application of Safer Design Principles and Crime Prevention through Environmental Design. Parliament of Victoria.</p>	<p>This inquiry found that environmental factors such as increased seating, trees and shrubbery when well maintained and enhanced, contributed to feelings of safety. However, it is worth noting that when these features acted in concealing views and physically obstructing people's movement it negated this. Therefore, placement of greenery and contributing spacing and lighting is essential when used in buildings and open spaces.</p>	<p>2013</p> <p>Victoria, Australia</p>
<p>Kuo & Sullivan. <u>Environment and crime in the inner city: Does vegetation reduce crime?</u></p>	<p>Less incidences of crime were reported in apartment buildings with greenery comparative to similar apartment blocks without greenery.</p>	<p>2001</p> <p>USA</p>
Benefit: Worker productivity		
<p>Journal of Physiological Anthropology,</p> <p>Interaction with indoor plants may reduce psychological and physiological stress by suppressing autonomic nervous system activity in young adults</p>	<p>This study found that stress in office workers was reduced and job satisfaction was enhanced due to proximity to green shrubbery.</p> <p>While this study focused around indoor plants, there will be similarities with other greenery on and around buildings and the benefits gained.</p>	<p>2015</p> <p>Japan</p>
<p>Bowen & Parry</p> <p>Green infrastructure and its tri-benefits: health, environment and economic</p>	<p>This report found that worker productivity increases due to stress-curbing effect of greening.</p>	<p>2015</p> <p>Melbourne, Australia</p>

Resource	Benefits	Publish date and jurisdiction
Greater London Authority, National Trust and Heritage Lottery Fund Natural capital accounts for public green space in London	London Parks were found to provide £2 billion worth of value to businesses in proximity due to improved worker mental health.	2017, London, UK
The Nature Conservancy <u>Planting Healthy Air Case Study - London</u>	This report (also discussed in air quality benefits) is also worth considering here for worker productivity. At a high-level it could be argued that lesser health contributes to lower productivity of workers and less economic activity generally due to shorter life spans of employees.	2016, UK; Global perspective
Green Building Council of Australia The Value of Green Star – A Decade of Environmental Benefits	This study estimated that over a decade of Green Star certified projects comparative to the minimum practise benchmark contributed to: Average of 2.88 fewer sick days annually. 15% employee productivity boost.	2013, Australia
Green Building Council Australia The Dollars and Sense of Green Buildings	A case study discussed in this report states that the environmental initiatives of a green building design for Bordo International will likely deliver salary savings of \$1.12 million per square metre annually due to increased employee productivity.	2006 Australia
Benefit: Noise Reduction		
SGS Economics and Planning Local liveability cost benefit analysis	This report found an increase in tree and other greenery canopies contributed to sound dampening effects. While this more closely examines trees within parks, this information still shares relevance with trees and greenery added to and around buildings.	2016 Melbourne, Australia
Adelaide City Council Sound Insulation for Exterior Walls and Façade Systems	This report discusses the noise issues that are common within Adelaide – particularly some residential areas where flight paths are directly over. Walls and roofing with under Rw 45 are generally sufficient for controlling outside/ background noise. Elsewhere insulation is recommended as further means of dampening sound pollution. An improvement of over 5 decibels is recommended for a noticeable difference.	(Accessed 2019) Adelaide, Australia
City of Darebin Darebin ESD Building Policy: Sustainable Design for Council Buildings	Darebin City Council is setting walls, roofs, floors and glazing to meet insulation R-values to be 25% above BCA requirements. While the aim is to improve general building efficiency, this is likely to contribute to lower levels of background noise throughout the council buildings.	2019 Victoria, Australia

Resource	Benefits	Publish date and jurisdiction
<p>United States General Services Administration</p> <p><u>The Benefits and Challenges of Green Roofs on Public and Commercial Buildings</u> (page 49)</p>	<p>This report references a 2004 study that found airport authorities could have savings through noise reduction by using green roof. This mitigation costs were \$0.43 per square foot.</p> <p>This does not take into account the local real estate market.</p>	2011 USA
Benefit: Potential for carbon sequestration		
<p>Greater London Authority, National Trust and Heritage Lottery Fund</p> <p>Natural capital accounts for public green space in London (page 20)</p>	<p>In London, the value of carbon storage gained from soil and trees within public park space is estimated at £18 million (Department of Business, Energy and Industrial Strategy, 2019) annually for 5.4 million tonnes of carbon (Rogers, Sacre, Goodenough & Doick, 2015).</p> <p>While this more closely examines trees within parks, this information still shares relevance with trees and greenery added to and around buildings.</p>	2017 London, UK
<p>Victoria Institute of strategic economic studies</p> <p>Assessing the economic value of green infrastructure: Literature review</p>	<p>In Washington USA, the value of trees within the urban forest were found to have a structural value of carbon storage at \$123 million and an annual functional value of \$393,000 for carbon sequestration.</p> <p>Additionally, this report discusses tree values within Melbourne using the i-Tree STRATUM. The environmental benefits of street trees within City of Melbourne were found to be equivalent to \$1 million dollars per year. Individually the trees in Melbourne were found to provide ecosystem services that were valued at \$163 per tree annually.</p>	2015 Melbourne, Australia & Global perspective
<p>Green Building Council Australia</p> <p><u>Building with nature: Prioritising ecology and biodiversity for better building and cities</u></p>	<p>City of Brisbane found that trees contributed \$1.67 million in value to the city from carbon storage, rain capture and improvement in the air quality.</p>	2018 Melbourne, Australia
Benefit: Property prices		

Resource	Benefits	Publish date and jurisdiction
Yew, J. (2012). Financing Low Carbon, Climate Resilient Infrastructure: The Role of Climate Finance and Green Financial Systems. SSRN Electronic Journal	<p>This study found that green roofs increased property values by 11% and surrounding properties by 2%. Additionally, green infrastructure in New York (such as the New York High Line) was found to uplift surrounding property values by \$100 million.</p> <p>In Seoul, a new green corridor from a previous freeway, encouraged more than \$2 billion worth of capital investment while values were raised by 50%.</p> <p>Another study referenced within this report is the introduction of tree canopy (and growth of tree canopy from power line removals) accounted for a 10-15% value in properties in Subiaco, Western Australia.</p>	2012 Global perspective
Brisbane City Council. <u>Street Trees</u>	Brisbane City Council valued additional trees as adding \$29.7 million in residential property value benefits.	(Accessed 2019), Brisbane, Australia
Green Building Council of Australia Valuing Green: How Green Buildings Affect Property Values and Getting the Valuation Method Right (page 15)	<p>This report references a study within the US where green buildings delivered a range of value and increased revenue streams:</p> <ul style="list-style-type: none"> • Operating costs decreased by 8% to 9%; • Building values increased by 7.5%; • Return on Investment (ROI) improved by 6.6%; • Occupancy ratio increased by 3.5%; and • Rent ratio increased by 3%. 	2008, Australia/ USA
Greater London Authority, National Trust and Heritage Lottery Fund Natural capital accounts for public green space in London	The estimated value of proximity to parks for the average household in London is estimated to be £900 per year. This does not take into account the additional benefits gained from proximity to park space (i.e. recreation and quality of life). While this more closely examines trees within parks, this information still shares relevance with trees and greenery added to and around buildings.	2017 London, UK
United States General Services Administration <u>The Benefits and Challenges of Green Roofs on Public and Commercial Buildings</u> (page 61)	An analysis to predict the market's valuation of a green roof estimated that they would have a real estate effect of \$13 per square foot of green roof nationally and \$10 in the Washington DC area. Net present value of 50 years of these savings amounted to \$110 and \$90 per square foot of roof, respectively. Data from real estate information provider Costar and the USGBC found that green buildings realize 5.7% more rent than conventional buildings nationwide, and 7.4% more rent in Washington DC.	2011 USA
Benefit: Property Spend/Savings		

Resource	Benefits	Publish date and jurisdiction
Green Building Council of Australia The Value of Green Star – A Decade of Environmental Benefits & Australian Energy Market Commission 2018 Residential Electricity Price Trends Review (page 80)	On average, Green Star certified buildings use 66% less electricity than average Australian buildings. In 2018, the residential electricity market offer annual bill in Victoria was approximately \$1,132 exclusive of GST (This is the weighted average of the retailer's lowest electricity market offers for the representative consumer in Victoria). This would result in a saving of \$747.12 annually for households. The higher the certified rating of a Green Star building (4, 5 or 6 Star Green Star) the greater the environmental savings across all key areas – greenhouse gas emissions, energy use, water consumption, and construction and demolition waste.	2013, Australia & 2018, Australia
Cities of Banyule, Port Phillip, Moreland, Stonnington, Whitehorse and Yarra Local ESD planning policies monitoring Report	Insulation, window glazing and window orientation within homes are all found to improve the indoor temperature and help lower electricity spend on heating. The planning policy of the joint councils found that having a NatHERS rating of 5-6 stars with this criterion resulted in dwellings being more energy efficient. This results in lesser costs for consumers and lower greenhouse gas emissions.	2017 Melbourne, Australia
Cities of Banyule, Port Phillip, Moreland, Stonnington, Whitehorse and Yarra <u>Local ESD planning policies monitoring Report</u>	The ESD planning policies have a commitment to installing 635kW of solar panels. This is the equivalent of powering roughly 162 homes in Victoria. The average solar generation in Melbourne is 4.6 hours per day and the average Australian energy use of 18kW hours/day per dwelling (Your Home, 2013).	2017 Melbourne, Australia
AECOM Green Infrastructure: A vital step to Brilliant Australian cities	Blacktown City Council proposed that the adjustment of trees within residential streets (both differing tree varieties and increased numbers) would reduce the average household by \$249 annually.	2017 Australia

Resource	Benefits	Publish date and jurisdiction
Green Building Council Australia Dollars and Sense of Green Buildings	The lower costs associated with green buildings are examined in this report. In the Kangan Bateman Tafe case study while capital costs were increased during the construction of the centre, the predicted operational costs savings were \$7,242 annually. With an increased cost of \$42,775 this allowed for the additional cost to be 'repaid' within 5.9 years.	2006 Melbourne, Australia
Rosasco and Perini Evaluating the economic sustainability of a vertical greening system	In this report, vertical greenery created not only saved value through energy cost reductions but actually allowed for a new revenue stream. The plants produced around 700kg of biomass annually, this was then used to produce 8.4kwh of electricity. The repurchase price of renewable energy is 0.10 €/kwh, so annually the benefit from the vertical greenery system is 2.12 €.	2018 Genoa, Italy
Dwaikat & Ali The economic benefits of a green building – Evidence from Malaysia	This report finds that savings from a green building (this case examined the Malaysia Energy Centre) resulted in: 71.1% energy use reduction (from industry baseline) Saves 5756kW h/m2 which corresponds to \$2,796,451 at 1% average annual increase in energy price and it is more than fourfold at 5% average annual increase in energy price and reaches around \$12,107,060.	2018 Malaysia
City of Darebin Darebin ESD Building Policy: Sustainable Design for Council Buildings	Darebin council set as part of their building policy for greater energy efficiency to only provide high energy efficient hand dryers, utilising no heat and minimising costs.	2019 Victoria, Australia
National Geographic Green Buildings Could Save Our Cities	This article found a 20% drop in maintenance costs for Leadership in Energy and Environmental Design (LEED) certified buildings and 17% higher occupancy rates. This does involve initially higher construction costs.	2017 Global perspective
United States General Services Administration <u>The Benefits and Challenges of Green Roofs on Public and Commercial Buildings</u> (page 70)	A cost benefit analysis found on a national level, roof sizes between 5,000 – 50,000ft2 had a return on investment of 220% - 247% within 6.4 – 5.6 years.	2011 USA

Resource	Benefits	Publish date and jurisdiction
Green Roof Organisation <u>The GRO Green Roof Code</u> (page 11)	This report finds that green roofs can extend the life of the roof, thus reducing costs of replacement/ or maintenance. This is because the green roof serves as a buffer between the waterproofing membranes and ultraviolet radiation, the daily temperature fluctuation from hot to cold causes the membrane to expand and contract which creates stress and effects it's long term performance. The buffer of the green roof minimises these impacts therefore extending the membrane's life.	2014 UK
Pitt & Sherry <u>Environmentally Efficient Design Planning Policies – Cities of Banyule, Moreland, Port Phillip, Stonnington, Whitehorse and Yarra. Expert Evidence: Benefit Cost Analysis – Phil Harrington</u>	This report focused on benefits and costs that could be attributed to buildings that incorporated the Environmentally Efficient Design (EED) planning policies. Looking at a building that used these policies, water efficiency and costs savings by having a 2000l rainwater tank increased to 5000l and having the 5-star WELS equivalent equipment (i.e. washing machines, dishwasher etc) improved from 3-star. This was assumed to save \$0.85 per sqm with \$0.29 per sqm to be assumed with lower hot water consumption (due to improved equipment).	2013 Melbourne, Australia
Climate Works Australia & Australian Sustainable Built Environment Council <u>Built to Perform</u>	This Climate Works report suggests that building improvements and changes to building standards to require this in building design could improve efficiency and reduce 19- 25% of the energy savings required to deliver a net zero energy (in new residential buildings). Measures such as: Improving air tightness Double glazed windows Increasing insulation Installing adjustable outdoor shading or larger eaves Including ceiling fans; and Increasing the efficiency of air conditioning, lighting and domestic hot water systems.	2018 Australia
Aecom <u>Economic Assessment of the Urban Heat Island Effect</u>	The impacts of this additional hot weather within the City is expected to produce a range of impacts on health, transport operation and infrastructure, energy demand and infrastructure, trees and animals, and crime. The vast majority of this economic impact is as a result of heat-related deaths, reflecting the dangerous effect that extreme temperatures can have on human life (particularly the elderly and disadvantaged). The total economic cost to the community due to hot weather is estimated to be approximately \$1.8 billion in present value terms. Approximately one-third of these impacts are due to heatwaves. Of the total heat impact, the Urban Heat Island effect contributes approximately \$300 million in present value terms.	2012 Australia
Benefit: Aesthetics		

Resource	Benefits	Publish date and jurisdiction
Department of Environment, Land, Water and Planning (published as Department of Environment and Primary Industries) Growing Green Guide (page 103-105)	The GGG report discusses green roofs and walls and the related benefits. One case study mentioned, is the Triptych Green Wall in Southbank, Melbourne. The green wall is highly visible from the street and not only assists in obscuring the view of the exterior of the multi-level car park which is aesthetically unappealing, but helps the building stand out. The visual impact of the wall assists in the selling of the building apartments.	2014 Victoria, Australia
Symons, Jones, Young and Rasmussen. <u>Assessing the Economic Value of Green Infrastructure: Literature Review.</u>	Trees and greenery are found to be significant influencers on amenity. Poor quality green space can negatively affect businesses and an area's perceived image. Urban areas are considered more aesthetically pleasing by the provision of green space.	2015 Melbourne, Australia
Green Building Council Australia <u>Building with nature: Prioritising ecology and biodiversity for better building and cities</u> (page 51)	City of Melbourne has over 55,000 mature trees, these are collectively valued at \$700 million for the amenity they provide – this does not take into account environmental or other benefits provided.	2018 Melbourne, Australia
Government policy implications		

Resource	Benefits	Publish date and jurisdiction
<p>Sara Wilkinson <u>Australian cities are lagging behind in greening up their buildings</u></p>	<p>This article examines the uptake of green roofs across 4 cities, London, Singapore, Toronto and Rotterdam across differing policies towards green roof infrastructure.</p> <p>In Toronto the Green Roof Bylaw sets a requirement for new developments (or building additions) that are larger than 2000m² in gross floor area to construct a green roof. The size of the green roof ranges dependant on the size of the building, with 20% coverage on the lowest end and 60% coverage as the highest required.</p> <p>Singapore has no mandatory policy but had a higher adoption of green roofs. This is due to the 'voluntary heavy' schemes that exist for the development sector such as incentives, grants, awards, certification schemes and government-led development.</p>	<p>2018 Australia; Global perspective</p>
<p>Grace Hood <u>Depending How You Look At It, Denver Green Roof Changes Are Simpler Or More Complex</u></p> <p>City and County of Denver</p> <p><u>Denver's Green Building Ordinance</u></p>	<p>Denver green roof ordinance (which is modelled after the Toronto bylaw mentioned above), adds mandatory requirements to new and existing building in Denver. All buildings over 25,000 square foot must have a 'cool roof' alongside a green roof, on-site solar, LEED silver certification, or pay into a green fund.</p>	<p>2018 Denver, USA</p>
<p>Elizabeth Hart Morris <u>Portland adopts a green roof requirement in the central city 2035 plan</u></p> <p>City of Portland <u>Portland's Eco roof incentive</u></p>	<p>The Portland Central City 2035 Plan includes a mandate for green roofing. From mid-2018, all buildings in the central city with over 20,000 square feet.</p> <p>From 2008- 2012, Environmental Services in Portland offered property owners and developers an eco-roof construction incentive. Almost \$2 million of incentives were granted that helped fund 8 acres of green roofs that manage an average of 4.4 million gallons of stormwater annually.</p> <p>The eco-roof target for Portland is 15% of the total area, which is the equivalent of 408 acres of green roof by 2035. Meeting this target would require \$178 million in construction costs.</p>	<p>2018 Portland, USA</p>

Resource	Benefits	Publish date and jurisdiction
<p>The Ecology Consultancy <u>Urban Greening Factor for London Research Report</u></p> <p>Greater London Authority <u>Policy G5 Urban greening</u></p>	<p>The London Policy G5 Urban Greening sets in place an Urban Greening Factor to help developers in determining the appropriate amount of urban greening in new developments (this is currently only applied to major applications). Each London borough has the opportunity to develop their own approach to the urban greening factor to best met their circumstances.</p> <p>The Urban Greening Factor assigns a value to infrastructure and greenery that is then calculated against the total area of a property.</p> <p>The implementation of the factor, and what the most appropriate target is are still in discussions in the policy. While 0.3 is found to be an appropriate target based of sample calculations for a variety of London buildings, it is noted that a target of 0.5 is more appropriate for residential areas.</p> <p>Helsinki, Finland when considering this tool for its Climate-Proof City – Tools for Planning project, set 0.5 as a target for residential areas.</p>	<p>2017 London, UK</p>

Appendix B

Council strategies, actions and targets scoped into this investigation

Theme	Consolidated actions from review of Melbourne strategies	Source strategy or plan
Energy and greenhouse gas emissions	<p>Renew and implement planning policies to support the development of zero emissions buildings and precincts.</p> <p>Facilitate the take up of the National Built Environment Rating Scheme for apartments across the municipality.</p> <p>Urban planning policies will encourage use of state-of-the-art building design, construction and management to ensure the sustainability and liveability of the city's built environment.</p>	<p>Climate Change Mitigation</p> <p>Heritage Strategy 2013</p>
Active transport	<p>Prioritise active and public transport through dedicated lanes, traffic light priorities, parking controls and road user pricing.</p> <p>Reallocate road space to create more space for walking, cycling and green infrastructure. The community is able to easily walk to open space within 300 metres of them, being approximately a 10-minute walk</p>	<p>Climate Change Mitigation</p> <p>Open Space Strategy</p>
Waste management	<p>Reducing amenity impacts from waste collection – extending our existing programs and finding new ways to reduce amenity impacts from residential and commercial waste collection operations on our streets and in waterways.</p> <p>85 per cent of all residential waste is diverted from landfill</p> <p>75 per cent of commercial and industrial waste is diverted from landfill</p>	<p>Waste and Resources Recovery Strategy</p>
Adaptive reuse	<p>Review and update Melbourne Planning Scheme and current policies in relation to adaptation and re-use</p> <p>Urban planning policies will encourage use of state-of-the-art building design, construction and management to ensure the sustainability and liveability of the city's built environment. As the city grows and develops, the diverse historical and cultural heritage that makes Melbourne special will be preserved and celebrated.</p>	<p>Heritage Strategy 2013</p> <p>Future Melbourne 2026 Plan</p>
Amenity	<p>Provisions will ensure that new built form positively responds to the outcome of good sunlight access to enhance social wellbeing</p>	<p>Sunlight access to public parks modelling analysis report Feb 2018</p>
Urban heat island	<p>Amend the Municipal Strategic Statement to include specific objectives, minimum standards and performance measures for climate change adaptation in the municipality's built environment.</p> <p>Enhance the Melbourne Planning Scheme to consider future flood, heat and drought impacts</p> <p>Further integrate our city with our waterways, both natural and man-made, in order to enhance the city and community's resilience to heat impacts.</p>	<p>Climate Change Adaptation Strategy</p> <p>Total Watermark: City as a Catchment Strategy</p> <p>Urban forest strategy</p>

Theme	Consolidated actions from review of Melbourne strategies	Source strategy or plan
	The City of Melbourne's canopy cover will be 40% by 2040.	
Stormwater and flood	<p>Replace asphalt and concrete with porous surfaces such as porous asphalt, turf, garden beds and rain gardens to reduce heat retention and encourage soil moisture retention</p> <p>Increase permeability across the municipality by introducing place-based permeability targets, building on those already in the Elizabeth Street Catchment Integrated Water Cycle Management Plan</p> <p>Green infrastructure is used to respond to current and future flood risk.</p> <p>Utilise green infrastructure as a response to current and future flood risk</p> <p>Incorporate flood, drought and heat risks into the development and implementation of structure plans and broader strategic plans.</p> <p>Design and upgrade the drainage network to cater for current and future flood risk. Consider the risk of flood in future design and re-design of the public realm</p>	<p>Urban Forest Strategy</p> <p>Climate Change Adaptation Strategy</p> <p>Total Watermark: City as a Catchment Strategy</p>
Water use	<p>20% of all water use sourced within the municipality is sourced from alternative sources</p> <p>Continue to implement the Energy, Water and Waste Efficiency Planning Policy, requiring all developments to meet water efficiency standards and to embed integrated water management design into drainage plans</p>	Total Watermark: City as a Catchment Strategy
Biodiversity	<p>Identify and mitigate threats that reduce the quality or extent of nature in the city, including of significant species, vegetation communities and habitats</p> <p>Improve ecological connectivity across the municipality in a systematic, comprehensive and coordinated manner, taking into account biodiversity corridors and actions identified in the Urban Forest and Open Space Strategies.</p> <p>Identify and implement opportunities to improve, create and connect small green spaces throughout Melbourne's most urbanised areas.</p> <p>Protect and enhance native vegetation and habitats by increasing the use of indigenous species and 'Caring for Country' management practices.</p> <p>Increase urban forest diversity: the City of Melbourne's urban forest population will be composed of no more than 5% of one tree species, no more than 10% of one genus and no more than 20% of any one family</p> <p>Undertake plantings to increase understorey habitat on City of Melbourne managed land by 20 per cent.</p> <p>The City of Melbourne's canopy cover will be 40% by 2040.</p>	<p>Nature in the City Strategy</p> <p>Urban Forest Strategy</p>

Theme	Consolidated actions from review of Melbourne strategies	Source strategy or plan
Green infrastructure	Utilise green infrastructure as a response to current and future flood risk 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 walls and vertical greening.	Total Watermark: City as a Catchment Strategy Green Our City Strategic Action Plan

Appendix C

Gap analysis of existing policies
and planning provisions

C1 Climate change mitigation

C1.1 Relevant strategies and targets

Climate Change Mitigation Strategy

- Renew and implement planning policies to support the development of zero emissions buildings and precincts.
- Facilitate the take up of the National Built Environment Rating Scheme (NABERS) for apartments across the municipality.

Future Melbourne Plan 2026 (2016)

- Urban planning policies will encourage use of state-of-the-art building design, construction and management to ensure the sustainability and liveability of the city's built environment.

C1.2 Existing policies and provisions

National regulations

National Construction Code (NCC)

State Policies

- Clause 13 Environmental risks and amenity
- 15.02-1S Energy and resource efficiency
- 19.01 Renewable energy

Municipal Strategic Statement

- 21.06-3 Sustainable Development,
- 21.10-1 Renewable energy and efficient water use

Local Policies

- 22.19 Energy, Water and Waste Efficiency
 - Outlines objectives and policy to guide the assessment of planning permit applications. Outlines energy efficiency performance measures.
- 22.27 Fishermans Bend Urban Renewal Area Policy
 - Outlines objectives and policy to guide the assessment of planning permit applications. Outlines energy-related standards.

Planning Controls

- Schedule 4 (Fishermans Bend Urban Renewal Area) to 37.04 Capital City Zone
 - Outlines application requirements for development permits and decision guidelines for development. Contains the standard for

building projects to attain a 4 Star Green Star Design and As-Built Rating.

- Schedule 3 (Flemington Green Comprehensive Development Plan) to 37.02 Comprehensive Development Zone
 - Contains objective to improve energy efficiency of buildings.
- Schedule 12 (Public Housing Renewal – Abbotsford Street) to 43.04 Development Plan Overlay
 - Establishes that an Ecologically Sustainable Development Plan must form part of any Development Plan and that all buildings must be designed to achieve a minimum 5 star Green Star rating.

Particular Provisions

- Better Apartment Design Standards as implemented in Victorian Planning Provisions 55.07 and 58.03
- ResCode design standards for low density residential development
- 56.06 Access and Mobility management
- 56-09 Utilities

C2 Active transport

C2.1 Relevant strategies and targets

Climate Change Mitigation Strategy

- Reallocate road space to create more space for walking, cycling and green infrastructure
- Prioritise active and public transport through dedicated lanes, traffic light priorities, parking controls and road user pricing.

C2.2 Existing policies and provision – cycle infrastructure

State Policies

18.02-1S Sustainable personal transport

Municipal Strategic Statement

21.09-1 Integrated transport

21-09-3 Cycling

Local Policies

- 22.24 Student Housing Policy
 - Establishes that it is policy to encourage at least one bicycle parking space per student and support applications that provide limited or no car parking for students.
- 22.27 Fishermans Bend Urban Renewal Area Policy

- Establishes that it is policy to design internal connections to give priority to bicycle and pedestrian movements, encourage developments to provide less than the preferred maximum number of car spaces and to provide for the future conversion of car parking to alternative uses.

Planning Controls

- Schedules 1 (Outside the retail core) and 2 (Retail core) to 37.04 Capital City Zone
 - Establishes that a permit is required to construct a building with fewer bicycle spaces than specified in the schedule.
- Schedule 4 (Fishermans Bend) to 37.04 Capital City Zone
 - Establishes bicycle, motorcycle and car share parking requirements.
- Schedule 12 (Public Housing Renewal – Abbotsford Street, North Melbourne) to 43.04 Development Plan Overlay
 - Establishes that the Development Plan should show bicycle parking at specified rates.

Particular Provisions

- Particular Provision 52.34 Bicycle facilities
 - Establishes the number and type of bicycle facilities required for different uses and that a permit may be generated to vary, reduce or waive these requirements.

C2.3 Existing policies and provision – walkability

Municipal Strategic Statement

21.09-1 Integrated transport

21.09-2 Walking and sections on local areas.

Local Policies

- 22.01 Urban Design within the Capital City Zone
 - Establishes the objective to develop pedestrian connections for Southbank
 - Establishes that it is policy that proposed developments are designed and assessed against the requirement that pedestrian through block connections should be provided where the average length of a street block exceeds 100 metres, for street blocks exceeding 200 metres in length, at least two connections should be provided and that connections should be located toward the centre of the street block, no more than 70 metres from the next intersection or pedestrian connection.
- 22.17 Urban Design outside the Capital City Zone
 - Establishes that it is policy that developments on large sites are encouraged to provide laneway and pedestrian through block links and that the design of new development is encouraged to provide

for new pedestrian links and laneways where there is an absence of such connections.

- 22.27 Fishermans Bend Urban Renewal Area Policy
 - Establishes that it is policy to assess proposals against criteria that new streets, laneways and pedestrian connections should be spaced in core areas not more than 50 to 70 metres in the preferred direction and 100 metres in the other direction, in non-core areas, not more than 100 metres apart and be orientated in the preferred direction and that sites of more than 3000 square metres should provide new streets, laneways or paths.

Planning Controls

- Schedule 3 (Flemington Green Comprehensive Development Plan) to the Comprehensive Development Zone 37.02
 - Establishes requirement that a section 173 agreement must be entered into requiring provision and enhancement of bicycle and pedestrian connections for two identified links.
- Schedule 11 (Queen Victoria Market Precinct) to 43.04 Development Plan Overlay
 - Establishes that a permit application must provide site layout plans that address and meet the design requirement for pedestrian links including as shown in the figure in the schedule.
- Schedule 13 (West Melbourne Waterfront) to 43.04 Development Plan Overlay
 - Establishes that the development plan must respond to objectives and principles including relating to the pedestrian network permeability including that street blocks including the northern interface with the railway line should not exceed 100 metres in length on any side and secondary streets or laneways should be included in blocks over 10 metres in length.

Proposed Policies

Proposed Planning Controls

- Proposed Schedule 1 (Urban Design in the Central City and Southbank) to 43.02 Design and Development Overlay
 - Establishes a design requirement to provide new pedestrian connections where the average length of a street block is greater than 100 metres, more within 200 metres of a rail station, at least two connections where the average length is greater than 200 metres, where possible less than 70 metres from the next connection.

C3 Waste and resources recovery

C3.1 Relevant strategies and targets

Waste and Resources Recovery Strategy

- 90 per cent of waste diverted from landfill
- 20 per cent reduction in household waste produced
- Strengthen Waste Management Plan guidelines and review and update waste generation rates to ensure higher recovery rates in new developments
- Implement successful organic waste solutions.
- Improve existing waste hubs and recycling facilities and expand the existing resource recovery hub network for city businesses.

C3.2 Existing policies and provisions

State Policies

15.02-1S Energy and resource efficiency

19.03-5S Waste and resource recovery

Municipal Strategic Statement

21.06-3 Sustainable Development

Local Policies

- 22.19 Energy, Water and Waste Efficiency
 - Establishes waste efficiency performance measures
 - Establishes that it is policy that developments in urban renewal areas should be capable of connecting to available and planned alternative waste collection and treatment systems
 - Establishes the application requirement that all applications must be accompanied by a Waste Management Plan prepared in accordance with the City of Melbourne's Guidelines for Waste Management Plans.
- 22.27 Fishermans Bend Urban Renewal Area Policy
 - Establishes waste management criteria that it is policy to assess proposals against. Waste management criteria suggests that developments should respond to any precinct waste management plan, and where possible, should create opportunities to optimise waste storage and efficient collection methods, combine commercial and residential waste storage, and separate waste collection.

Planning Controls

- Schedule 2 (Hobsons Road Mixed Use Precinct) to 43.03 Incorporated Plan Overlay

- Establishes that applications for a planning permit must comply with the requirement to incorporate sustainability features addressing considerations including waste management.
- Schedule 8 (Carlton Housing Precincts) to 43.04 Development Plan Overlay
 - Establishes the principle / objective that new development should incorporate core sustainability features addressing waste management.
- Schedule 12 (Public Housing Renewal – Abbotsford Street) to 43.04 Development Plan Overlay
 - Establishes a permit condition/ requirement for a Waste Management Plan which explores a waste management system that diverts organic waste from landfill and that an Ecologically Sustainable Development Plan form part of any Development Plan and include waste management.

Planning Provisions

- 55.07 Apartment Developments and 58.06 Detailed Design
 - Establishes waste and recycling objectives and standards.

C4 Adaptive reuse

C4.1 Relevant strategies and targets

Heritage Strategy 2013

- Review and update Melbourne Planning Scheme and current policies in relation to adaptation and re-use

C4.2 Existing policies and provisions

State Policies

15.03-1S Heritage conservation

Municipal Strategic Statement

21-13-2 Docklands. Establishes the strategy to encourage the reuse of heritage buildings and the reuse of existing buildings during the development phase.

Local Policies

- 22.04 Heritage places within the Capital City Zone and 22.05 Heritage places outside the Capital City Zone
- 22.27 Fishermans Bend Urban Renewal Area Policy
 - Establishes that where development in core areas provides less than the minimum employment floor area the responsible authority will consider as appropriate whether the buildings floor to floor heights,

layout and design will facilitate future conversion from residential or from car parking areas.

Planning Controls

- Schedule 3 (Southbank) to 37.04 Capital City Zone
 - Establishes that the responsible authority must consider, as appropriate, securing the floor area ratio across a site where a site is developed in part to ensure that a heritage building being retained that an agreement be entered into to conserve the heritage building.
- Schedule 60 (Southbank) to the 43.02 Design and Development Overlay
 - Establishes that buildings and works should meet the requirement that the ground floor of a building should have a floor to ceiling height of at least 4 metres.
- Schedule 6 (156-160 Leicester Street Carlton) to 43.03 Incorporated Plan Overlay
 - Establishes the permit condition/requirement that a Demolition and Construction Management Plan must be submitted and approved and consider waste and material reuse.
- Schedule 14 (Inclusionary housing pilot 87-103 Manningham Street) to 43.04 Development Plan Overlay
 - Establishes the permit condition/requirement that a Demolition and Construction Management Plan must be submitted and approved and consider waste and material reuse.

Proposed Policies

Proposed Local Policies

- Proposed 22.04 Heritage Places inside the Capital City Zone and proposed 22.05 Heritage Places outside the Capital City Zone.

Proposed Planning Controls

- Proposed Schedule 6 (West Melbourne) to 37.01 Special Use Zone
 - Establishes that an application to subdivide land must ensure that all car parking spaces are retained as common property and the application requirement that a report which addresses whether the subdivision provides for the transition of car parks and car spaces on common property to alternative uses over time accompany an application.
- Proposed Schedule 1 (Urban Design in the Central City and Southbank) to 43.02 Design and Development Overlay
 - Establishes an application requirement to demonstrate the capacity to adapt at or above ground car parking to alternative uses.
 - Establishes the mandatory requirement to design parking structures above level with floor to floor heights of at least 3.5 metres to allow future adaption.
- Proposed Schedule 14 (West Melbourne) to 45.09 Parking Overlay
 - Establishes the maximum number of car parking spaces that can be provided.

C5 Amenity

C5.1 Relevant strategies and targets

Sunlight access to public parks modelling analysis report Feb 2018

- Provisions will ensure that new built form positively responds to the outcome of good sunlight access to enhance social wellbeing

C5.2 Existing policies and provisions

Clauses relating to overshadowing of public space have been identified in the following section. Clauses related to overshadowing of private open space and streets have not been identified here.

State Policies

12.03-1R Yarra River protection

Municipal Strategic Statement

21.12 Hoddle Grid

21.13 Urban Renewal Areas

21.16 Other Local Areas

Local Policies

- 22.02 Sunlight to Public Spaces. Identifies key public spaces including the Yarra River Corridor, Federation Square, City Square and the State Library Forecourt
 - Sets out general requirements for all open space, including that development should not unreasonably "reduce the amenity of public spaces ... by casting additional shadows ... between 11.00am and 2.00pm on 22 September".
- 22.18 Urban Design Within the Docklands Zone
 - Establishes the design principle that development should provide sunlight access to important areas of the public domain and protect key public recreational spaces from overshadowing and the performance guideline that public spaces should generally be free of significant overshadowing between 11am and 3pm at the equinox (22 September / 20 March).
- 22.26 Public Open Space Contributions
 - Establishes criteria for as land for public open space contributions including whether the open space area receives adequate levels of sunlight (a minimum of 3 hours of direct sunlight between 9am and 3pm on June 22 and at least 5 hours of direct sunlight between 9am and 3pm on September 22).

Planning Controls

- Schedule 3 (Flemington Green Comprehensive Development Plan) to 37.02 Comprehensive Development Zone
 - Establishes that a Comprehensive Development Plan must be prepared and include a Public Open Space Plan which includes details of how the proposal achieves the objective of receiving a minimum of 3 hours of direct sunlight between 9am and 3pm during the winter solstice (22 June).
- Schedule 4 (550 Epsom Road Comprehensive Development Plan) to 37.02 Comprehensive Development Zone
 - Establishes Comprehensive Development Plan objectives to optimise solar access and minimise the effect of wind to streets and public open spaces to enhance amenity and function throughout the year and to limit minimise the extent of overshadowing of the Newmarket Reserve between 9am-3pm at the equinox (22 September) and to allow a minimum of 3 hours of direct sunlight between 9 am and 3 pm at the winter solstice (22 June).
- Schedules 1, 2, 3, 5, 6, 7 to 37.04 Capital City Zone
 - Establishes the application requirement for an urban context report including sunlight, daylight and wind effects on streets and other public spaces.
- Schedule 2 (Special Character Areas – Built Form (Hoddle Grid)) and Schedule 10 (General Development Area Built Form) to 43.02 Design and Development Overlay
 - Establishes that a permit must not be granted for buildings and works which would cast any additional shadow across the Yarra River corridor, Federation Square, City Square, State Library Forecourt and Bourke Street Mall south of tram tracks during dates and times specified and not be granted for buildings and works which would cast additional shadows across further spaces listed in the schedule during the dates and times specified unless the overshadowing will not unreasonably prejudice the amenity of the space.
- Schedule 40 (Special Character Areas Built Form (River Environs)) to 43.02 Design and Development Overlay
 - Establishes that a permit must not be granted for buildings and works which would cast any additional shadow across the Yarra River corridor, Federation Square during dates and times specified and not be granted for buildings and works which would cast additional shadows across further spaces listed in the schedule during the dates and times specified unless the overshadowing will not unreasonably prejudice the amenity of the space
 - Establishes that buildings and works must meet the built form objective for development that protects and enhances the Yarra River (including views to and from it), as an important natural, recreational and tourism asset of Melbourne.

- Schedule 50 (Victorian Harbour Precinct) to 43.02 Design and Development Overlay
 - Establishes that the Responsible Authority must consider building spacing and permeability, in order to allow views and access to the waterfront and sunlight access to the north bank of the Yarra River.
- Schedule 60 (Southbank) to 43.02 Design and Development Overlay
 - Establishes that a permit must not be granted for buildings and works which would cast any additional shadow across the Shrine of Remembrance and its northern forecourt, Boyd Park and other public spaces between hours and dates specified in the schedule
- Schedule 61 (City North) to 43.02 Design and Development Overlay
 - Establishes that the Responsible Authority must consider as appropriate whether the proposal achieves the design requirement that Buildings and works should not cast a shadow between 11.00 am and 2.00 pm on 22 March and 22 September over public space, public parks and gardens, public squares, major pedestrian routes including streets and lanes, and privately-owned plazas open to the public. A permit may only be granted if the overshadowing will not prejudice the amenity of those areas.
- Schedule 62 (Special Character Areas – Built Form (Bourke Hill)) to 43.02 Design and Development Overlay
 - Establishes that a permit must not be granted for buildings and works which would cast additional shadow across Parliament Gardens, Treasury Gardens, Gordon Reserve, Parliament Steps and Forecourt, Old Treasury Steps and spaces between the hours and dates listed in the schedule, unless the overshadowing will not unreasonably prejudice the amenity of the space.
- Schedule 67 (Fishermans Bend – Lorimer Precinct) to 43.02 Design and Development Overlay
 - Establishes that buildings must not cast any additional shadow above the shadows cast by hypothetical buildings built to the Maximum street wall height and existing buildings over the existing or proposed public open spaces or streets shown in Map 5 of this schedule for the hours specified in the schedule.
- Schedule 71 (2 St Andrews Place, East Melbourne (former Peter MacCallum Cancer Centre Site)) to 43.02 Design and Development Overlay
 - Establishes that buildings should not overshadow the Fitzroy Gardens and Treasury Gardens between dates and times stated in the schedule.
- Schedules 2, 10, 40, 60, 61 and 62 to the 43.02 Design and Development Overlay
 - Establishes the application requirement for an urban context report including sunlight, daylight and wind effects on streets and other public spaces.

Particular Provisions

- Better Apartment Design Standards as implemented in Victorian Planning Provisions 55.07 and 58.03
 - Establishes the standard that at least 50 per cent or 125 square metres, whichever is the lesser, of the primary communal outdoor open space should receive a minimum of two hours of sunlight between 9am and 3pm on 21 June.
- 53.01 Public Open Space Contribution and Subdivision
 - Establishes that a person who proposes to subdivide land must make a public open space contribution.

Proposed Policies

- The City of Melbourne has reviewed its Sunlight to Public Space policy and has prepared proposed Planning Scheme Amendment C278 to protect sunlight to all parks across the municipality. Amendment C278 will go through a public exhibition process later in 2019.

C6 Urban heat reduction

C6.1 Relevant strategies and targets

Climate Change Adaptation Strategy

- Amend the Municipal Strategic Statement to include specific objectives, minimum standards and performance measures for climate change adaptation in the municipality's built environment.

Total Watermark: City as a Catchment Strategy

- Further integrate our city with our waterways, both natural and man-made, in order to enhance the city and community's resilience to heat impacts.

Urban forest strategy

The City of Melbourne's canopy cover will be 40% by 2040.

C6.2 Existing policies and provisions

State Policies

- 11.03-2S Growth areas
- Clause 13 Environmental Risks and Amenities
- 12.01-2S Native vegetation management
- 12.03-1R Yarra River protection
- 15.01-2S Building design
- 15.02-1S Energy and resource efficiency
- 19.02-6S Open space

Municipal Strategic Statement

- 21.02-7 Eco-City
- 21.03 Vision
- 21.04 Settlement
- 21.05 Environment and Landscape Values
- 21.06 Built Environment and Heritage
- 21.10 Infrastructure
- 21.15 Potential Urban Renewal Areas
- 21.16 Other Local Areas

Local Policies

- 22.17 Urban Design Outside the Capital City Zone
 - Establishes that it is policy that new buildings are encouraged, where possible, to retain existing mature trees and to provide opportunities to enhance the landscape features of the area.
- 22.19 Energy, Water and Waste Efficiency
 - Establishes that it is Council policy to encourage the development of integrated precinct solutions to reduce greenhouse gas emissions and increase resilience to climate change
- 22.27 Fishermans Bend Urban Renewal Area Policy
 - Establishes that it is policy to assess proposals against criteria including at least 70 per cent of the total site area should comprise building or landscape elements that reduce the impact of the urban heat island effect and buildings should include deep soil zones and incorporate green facades and rooftop, podium or terrace planting.

Planning Controls

- Schedule 2 (Public Housing Renewal – Abbotsford Street, North Melbourne) to 32.02 Residential Growth Zone
 - Includes the design objective to minimise the loss of trees on the site.
- Schedule 4 (550 Epsom Road Comprehensive Development Plan) to 37.02 Comprehensive Development Zone
 - Establishes that a Comprehensive Development Plan must be prepared and include a Landscape Plan which retains existing significant vegetation where practicable.
- Schedule 2 (Exceptional Trees) to 42.01 Environmental Significance Overlay
 - Establishes that a permit is required to remove, destroy or lop the exceptional trees identified in the schedule.
- Schedule 15 (Royal Botanical Gardens) to 43.02 Design and Development Overlay
 - Includes the design objective to preserve the landscape qualities and amenity of the Royal Botanical Gardens and to foster vegetation growth in the Gardens.
- Schedule to 43.01 Heritage Overlay

- Identifies heritage trees and gardens. Establishes that a permit is required to remove, destroy or lop a tree identified in the schedule.
- Schedule 32 (North Melbourne Peripheral) to 43.02 Design and Development Overlay
 - Establishes that an application must be accompanied by a site analysis and urban context report which demonstrates how built form objective will be achieved including enhancement of the character of Peel Street by retaining the skyline dominance of the street trees along the median.
- Schedule 36 (Royal Parade Central) and Schedule 37 (Pharmacy College) to 43.02 Design and Development Overlay
 - Establishes the design objective to ensure that building siting creates spaces for tall canopied trees.
- Schedule 60 (Special Character Areas – Built Form (Southbank)) to 43.02 Design and Development Overlay
 - Includes a decision guideline to consider whether the development will provide a microclimate where street trees, green roofs, and green walls can flourish.
- Schedule 12 (Public Housing Renewal – Abbotsford Street, North Melbourne) to 43.04 Development Plan Overlay
 - Establishes that before granting a permit, the Responsible Authority must be satisfied that the permit will not prejudice the future use and integrated and orderly development of the site in accordance with the Development Plan requirements including an Arboricultural Assessment Report that addresses assessment of trees and recommendations for trees to replace the removal of any trees of moderate or high retention value and a Landscape and Open Space Plan that addresses new canopy trees and landscaping within the public realm and open space area.
- Schedule 14 (Inclusionary Housing Pilot – 87-103 Manningham Street, Parkville) to 43.04 Development Plan Overlay
 - Establishes that the development plan should demonstrate how the future use and development of the land responds to and achieves the following objective the retention of existing canopy trees wherever practicable and a landscape response that reflects the well vegetated character of the neighbourhood.

Particular Provisions

- 52.17 Native Vegetation
- 53.17 Residential Aged Care Facility
- 54.03 Site Layout and Building and Massing
- 55.03 Site Layout and Building Massing
- 55.07 Apartment Developments
- 56.04 Lot Design
- 56.05 Urban Landscape
- 58.03 Site Layout
- 59.01 Realign the Common Boundary Between Two Lots
- 59.06 Remove, Destroy or Lop a Tree

General Provisions

65.01 Approval of an Application or Plan

C7 Stormwater and flood

C7.1 Relevant strategies and targets**Urban Forest Strategy**

- Replace asphalt and concrete with porous surfaces such as porous asphalt, turf, garden beds and rain gardens to reduce heat retention and encourage soil moisture retention

Total Watermark: City as a Catchment Strategy

- Increase permeability across the municipality by introducing place-based permeability targets, building on those already in the Elizabeth Street Catchment Integrated Water Cycle Management Plan
- Green infrastructure is used to respond to current and future flood risk.
- Upgrade the drainage infrastructure in the central city and urban renewal areas to cater for a 1 in 20-year flood event by 2030
- Incorporate flood, drought and heat risks into the development and implementation of structure plans and broader strategic plans.
- Design and upgrade the drainage network to cater for current and future flood risk.

Total Watermark: City as a Catchment Strategy

- Consider the risk of flood in future design and re-design of the public realm

C7.2 Existing policies and provisions**State Policies**

- 13.03-1S Floodplain management
 - Avoid intensifying the impact of flooding through inappropriately located use and development.
- 14.02-1S Catchment planning and management
 - Undertake measures to minimise the quantity and retard the flow of stormwater from developed areas
 - Requires appropriate measures to filter sediment and wastes from stormwater prior to its discharge into waterways, including the preservation of floodplain or other land for wetlands and retention basins
 - Outlines the need to ensure that development at or near waterways provide for the protection and enhancement of the environmental qualities of waterways and their instream uses., Ensure planning is

coordinated with the activities of catchment management authorities.

- 19.03-3S Integrated water management
 - Establishes need to plan and coordinate integrated water management, bringing together stormwater, wastewater, drainage, water supply, water treatment and re-use, to: 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.

Municipal Strategic Statement

- 21.05 Environment and Landscape Values; 21.05 – 2 Significant environments and landscapes
 - Establishes objective to improve water quality in waterways and the bay.
 - Outlines need to ensure residential, commercial and industrial development adopts a best practice approach to stormwater treatment and management.
 - Encourages new developments to minimise stormwater run-off by reusing rainwater and recycling wastewater.
- 21.06 – 3 Sustainable development
 - Establishes objective to make the built environment resilient to heatwaves, water shortages, extreme storm events and sea level rise.
 - Outlines need to ensure that new development incorporates water sensitive urban design features including stormwater harvesting and flow attenuation, and water recycling and reuse.
 - Outlines need to ensure that flood risk by stormwater surges, waterway flooding and sea level rise is mitigated and managed.
- 21.13-3 Fishermans Bend Urban Renewal Area; Flooding, Sea Level Rise and Water Sensitive Design
 - Ensure the individual and combined impacts of sea level rise and flooding from storm events is appropriately managed through a combination of precinct wide and property specific physical and management measures.

Local Policies

- 22.23 Stormwater Management (Water Sensitive Urban Design)
 - Establishes objective to achieve the best practice water quality performance objectives set out in the Urban Stormwater Best Practice Environmental Management Guidelines, CSIRO 1999 (or as amended).
 - Establishes objective to minimise peak stormwater flows and stormwater pollutants to improve the health of water bodies, including creeks, rivers and bays.

- Establishes objective to reintegrate urban water into the landscape to facilitate a range of benefits including: microclimate cooling, local habitat and provision of attractive spaces for community use and wellbeing.
- 22.23-3 Policy
 - Establishes requirement for the use of stormwater treatment measures that improve the quality and reduce the flow of water discharged to waterways. This can include but is not limited to: collection and reuse of rainwater and stormwater on site, vegetated swales and buffer strips, rain gardens, installation of water recycling systems, multiple uses of water within a single manufacturing site, direction of flow from impervious ground surfaces to landscaped areas.
 - Encourages the use of vegetation, where practicable, (to be irrigated with rainwater/ stormwater) to manage the quality and quantity of stormwater.
- 22.27 Fishermans Bend Urban Renewal Area Policy; 22.27-4.5 Achieving a climate adept, water sensitive, low carbon, low waste community
 - Establishes that development and public realm layout and design should integrate best practice Water Sensitive Urban Design.

Planning Controls

- Schedule 4 to 37.04 Capital City Zone – Fishermans Bend Urban Renewal Area – Conditions on permits, Third pipe and rain tank
 - Sets out that a permit granted to construct a building or to construct or carry out works must include a condition that a rainwater tank must be provided that has a minimum effective volume of 0.5 cubic metres for every 10 square metres of catchment area to capture rainwater from 100% of suitable roof rainwater harvesting areas (including podiums) and be fitted with a first flush device, meter, tank discharge control and water treatment with associated power and telecommunications equipment approved by the relevant water authority. Rainwater captured from roof harvesting areas must be re-used for toilet flushing, washing machine and irrigation or, controlled release.
- Schedule 13 to 43.04 Development Plan Overlay - West Melbourne Waterfront – 156-232 Kensington Road, West Melbourne; Condition – Flood mitigation
 - Establishes that prior to the occupation of the works authorised by the permit, the owner of the land is to provide for safe pedestrian and vehicular access from the development during a peak flood event (1 in 100-year flood level) to the satisfaction of Melbourne Water and the Responsible Authority.
 - Requires that the finished floor level of any residential building be constructed to a minimum of 600 mm above the applicable 1 in 100-year flood level of 2.46 metres to AHD.
 - Requires that no polluted and / or sediment laden runoff is to be discharged directly or indirectly into Melbourne Water's drains or watercourses.

- 44.04 Land Subject to Inundation Overlay
 - Sets objective to identify land in a flood storage or flood fringe area affected by the 1 in 100 year flood or any other area determined by the floodplain management authority.
 - Sets objective to ensure that development maintains the free passage and temporary storage of floodwaters, minimises flood damage, is compatible with the flood hazard and local drainage conditions and will not cause any significant rise in flood level or flow velocity.
 - Sets objective to protect water quality in accordance with the provisions of relevant State Environment Protection Policies, particularly in accordance with Clauses 33 and 35 of the State Environment Protection Policy (Waters of Victoria).
 - Sets objective to ensure that development maintains or improves river and wetland health, waterway protection and flood plain health.
- 44.05 Special Building Overlay
 - Sets objective to identify land in urban areas liable to inundation by overland flows from the urban drainage system as determined by, or in consultation with, the floodplain management authority.

Particular Provisions

- 53.18 Stormwater Management in Urban Development
 - Sets objective to ensure that stormwater in urban development, including retention and reuse, is managed to mitigate the impacts of stormwater on the environment, property and public safety, and to provide cooling, local habitat and amenity benefits.
- 53.18-4 Stormwater management objectives for subdivision
 - Sets objective to encourage stormwater management that maximises the retention and reuse of stormwater.
 - Requires standard W1: The design of the local drainage network should: Ensure stormwater is retarded to a standard required by the responsible drainage authority
- Clause 54: One dwelling on a lot
- 54.03-4 Permeability
 - Sets objective to reduce the impact of increased stormwater run-off on the drainage system.
 - Establishes standard A6: The site area covered by pervious surfaces should be at least: the minimum area specified in a schedule to the zone; or If no minimum area is specified in a schedule to the zone, 20 per cent of the site.
- Clause 55: Two or more dwellings on a lot and residential buildings
- 55.03-4 Permeability and stormwater management
 - Sets objective to reduce the impact of increased stormwater run-off on the drainage system.
 - Sets objective to encourage stormwater management that maximises the retention and reuse of stormwater.

- Standard B9
 - Requires that the site area covered by the pervious surfaces should be at least: The minimum area specified in a schedule to the zone, or If no minimum is specified in a schedule to the zone, 20 percent of the site.
 - Requires that the stormwater management system should be designed to: meet the current best practice performance objectives for stormwater quality as contained in the Urban Stormwater - Best Practice Environmental Management Guidelines (Victorian Stormwater Committee, 1999); contribute to cooling, improving local habitat and providing attractive and enjoyable spaces.
- 55.07 Apartment Developments
- 55.07-5 Integrated water and stormwater management
 - Sets objective to encourage the use of alternative water sources such as rainwater, stormwater and recycled water.
 - Sets objective to facilitate stormwater collection, utilisation and infiltration within the development.
 - Sets objective to encourage development that reduces the impact of stormwater run-off on the drainage system and filters sediment and waste from stormwater prior to discharge from the site.
- Standard B39
 - Requires that the stormwater management system should be: designed to meet the current best practice performance objectives for stormwater quality as contained in the Urban Stormwater - Best Practice Environmental Management Guidelines (Victorian Stormwater Committee, 1999); designed to maximise infiltration of stormwater, water and drainage of residual flows into permeable surfaces, tree pits and treatment areas.
- Clause 56 Residential Subdivision
- 56.07-4 Stormwater management
 - Sets objective to minimise damage to properties and inconvenience to residents from stormwater.
 - Sets objective to ensure that the street operates adequately during major storm events and provides for public safety.
 - Sets objective to minimise increases in stormwater and protect the environmental values and physical characteristics of receiving waters from degradation by stormwater.
 - Sets objective to encourage stormwater management that maximises the retention and reuse of stormwater.
 - Sets objective to encourage stormwater management that contributes to cooling, local habitat improvements and provision of attractive and enjoyable spaces.
- Clause 58 Apartment Development
- 58.03-8 Integrated water and stormwater management
 - Sets objective to encourage the use of alternative water sources such as rainwater, stormwater and recycled water.
 - Sets objective to facilitate stormwater collection, utilisation and infiltration within the development.

- Sets objective to encourage development that reduces the impact of stormwater run-off on the drainage system and filters sediment and waste from stormwater prior to discharge from the site.

State Policies

- Clause 13 Environmental Risks and Amenity

Local Policies

- 21.06 – 3 Sustainable development
 - Sets objective to make the built environment resilient to heatwaves, water shortages, extreme storm events and sea level rise.
 - Aims to ensure that new development incorporates water sensitive urban design features including stormwater harvesting and flow attenuation, and water recycling and reuse.
 - Requires that flood risk by stormwater surges, waterway flooding and sea level rise is mitigated and managed.
- 22.26 Public Open Space Contributions; 22.26-5 Criteria for public open space
 - Determines whether the open space area will remain useable and functional as open space with sea level rise and larger storm events.
 - Determines whether the open space is restricted by services or easements including roadways, overhead structures, water and power supply, and flood mitigation and drainage infrastructure.
- 22.27 Fishermans Bend Urban Renewal Area Policy
- 22.27-4.5: Achieving a climate adept, water sensitive, low carbon, low waste community
 - It is policy to: only consider the raising of internal ground floor level above street level as a last resort, except where the implementation of other measures coupled with an evidence-based approach to risk management reasonably necessitates raising internal floor levels above street level.
 - It is policy to assess proposals in flood prone areas against the following criteria: design elements and materials should be resilient including water proof doors and windows, elevated power outlets and the like.
 - Sets out that land uses at ground floor level should be able to easily recover from the impacts of temporary flooding.
 - Sets out that any level change required between street level and internal ground floor should be integrated into the design of the building to maintain good physical and visual connection between the street and internal ground floor.
 - Sets out that essential services, such as power connections, switchboards and other critical services should be located to address potential flooding events.
- 22.27-4.7 Landscaping
 - It is policy to assess proposals against the following criteria:

- Sets out that landscape areas should: incorporate innovative approaches to flood mitigation and stormwater run-off, and best practice Water Sensitive Urban Design.

Planning Controls

- 44.04 Land Subject to Inundation Overlay
 - Outlines need to identify land in a flood storage or flood fringe area affected by the 1 in 100-year flood or any other area determined by the floodplain management authority.
 - Outlines need to ensure that development maintains the free passage and temporary storage of floodwaters, minimises flood damage, is compatible with the flood hazard and local drainage conditions and will not cause any significant rise in flood level or flow velocity.
 - Sets objective to protect water quality in accordance with the provisions of relevant State Environment Protection Policies, particularly in accordance with Clauses 33 and 35 of the State Environment Protection Policy (Waters of Victoria).
 - Sets objective to ensure that development maintains or improves river and wetland health, waterway protection and flood plain health.
- 44.05 Special Building Overlay
 - Aims to identify land in urban areas liable to inundation by overland flows from the urban drainage system as determined by, or in consultation with, the floodplain management authority.

Particular Provisions

- 53.18 Stormwater Management in Urban Development
 - Aim to ensure that stormwater in urban development, including retention and reuse, is managed to mitigate the impacts of stormwater on the environment, property and public safety, and to provide cooling, local habitat and amenity benefits.
- 53.18-4 Stormwater management objectives for subdivision
 - Encourages stormwater management that contributes to cooling, local habitat improvements and provision of attractive and enjoyable spaces.
- Clause 56 Residential Subdivision
- 56.07-4 Stormwater management
 - Sets objective to minimise damage to properties and inconvenience to residents from stormwater.
 - Sets objective to ensure that the street operates adequately during major storm events and provides for public safety.
 - Sets objective to minimise increases in stormwater and protect the environmental values and physical characteristics of receiving waters from degradation by stormwater.
 - encourages stormwater management that maximises the retention and reuse of stormwater.

- Encourages stormwater management that contributes to cooling, local habitat improvements and provision of attractive and enjoyable spaces.

C8 Water use

C8.1 Relevant strategies and targets

Total Watermark: City as a Catchment Strategy

- Municipal: 20% of all water use sourced from alternative sources
- Continue to implement the Energy, Water and Waste Efficiency Planning Policy, requiring all developments to meet water efficiency standards and to embed integrated water management design into drainage plans

C8.2 Existing policies and provisions

State Policies

- 15.02-1S Energy and resource efficiency
 - Aims to improve the energy, water and waste performance of buildings and subdivisions through environmentally sustainable development.
- 19.03-3S Integrated water management
 - Sets objective to sustainably manage water supply, water resources, wastewater, drainage and stormwater through an integrated water management approach.
 - Encourages use of alternative water sources such as rainwater, stormwater, recycled water and run-off from irrigated farmland.

Municipal Strategic Statement

- 21.05 Environment and Landscape Values
 - Sets objective to improve water quality in waterways and the bay.
 - Sets aim to ensure residential, commercial and industrial development adopts a best practice approach to stormwater treatment and management.
 - Encourage new developments to minimise stormwater run-off by reusing rainwater and recycling wastewater.
- 21.06 Built Environment and Heritage
- 21.06 – 3 Sustainable development
 - Aims to ensure that new development incorporates water sensitive urban design features including stormwater harvesting and flow attenuation, and water recycling and reuse.
 - Encourages all new development to maximise water efficiency.
- 21.10 Infrastructure
- 21.10 – 1 Renewable energy and efficient water use

- Sets objective to develop integrated precinct utilities to reduce greenhouse gas emissions and increase resilience to climate change.
- Encourages precinct wide integrated water management systems including water sourced from tri-generation power systems.
- Encourages precinct wide integrated tri-generation systems to distribute power, heating, cooling and water.

Local Policies

- 22.19 Energy, Water and Waste Efficiency
 - Sets objective to improve the water efficiency of buildings and encourage the use of alternative water sources.
 - It is policy to encourage buildings that: minimise mains potable water consumption and encourage the use of alternative water sources, such as rainwater and grey water.
- 22.19-5 Performance Measures
- 22.19-6 Urban Renewal Areas
 - It is policy that in addition to the performance requirements set out at Clause 22.19-5, when developing land within any urban renewal area, the development should be capable of connecting to available and planned alternative district water supply systems. Developers of precincts or large sites are encouraged to install alternative district water supply systems. Examples of Alternative District water supply systems that can be considered include, but are not limited to, the following: Alternative district water supply - Black and grey water treatment systems, stormwater harvesting systems and desalination.
- 22.23 Stormwater Management (Water Sensitive Urban Design)
 - Promotes the use of water sensitive urban design, including stormwater re-use.
- 22.27 Fishermans Bend Urban Renewal Area Policy
 - Sets objective to achieve a climate adept, water sensitive, low carbon, low waste community: Development and public realm layout and design should integrate best practice Water Sensitive Urban Design.

Planning controls

- Schedule 4 to 37.04 Capital City Zone – Fishermans Bend Urban Renewal Area – Conditions on permits, Third pipe and rain tank
 - Sets out that a permit granted to construct a building or to construct or carry out works must include conditions related to installing a third pipe for recycled and rain water to supply all non-potable outlets and that a rainwater tank must be provided that has a minimum effective volume of 0.5 cubic metres for every 10 square metres of catchment area to capture rainwater from 100% of suitable roof rainwater harvesting areas (including podiums).

Particular Provisions

- 53.18 Stormwater Management in Urban Development
 - Encourages stormwater management that maximises the retention and reuse of stormwater.
 - Sets objective to encourage stormwater management that maximises the retention and reuse of stormwater
- 55.07 Apartment Developments
 - Establishes Standard B39: Buildings should be designed to collect rainwater for non-drinking purposes such as flushing toilets, laundry appliances and garden use. Buildings should be connected to a non-potable dual pipe reticulated water supply, where available from the water authority.

C9 Biodiversity

C9.1 Relevant strategies and targets

Nature in the City Strategy

- Identify and mitigate threats that reduce the quality or extent of nature in the city, including of significant species, vegetation communities and habitats
- Undertake plantings to increase understorey habitat on City of Melbourne managed land by 20 per cent.
- Improve land management by improving soil health and reducing reliance on chemicals
- Develop and implement guidelines which focus on enhancing biodiversity and ecosystem health across the municipality and support the implementation of the Green Our City Action Plan
- Improve ecological connectivity across the municipality in a systematic, comprehensive and coordinated manner, taking into account biodiversity corridors and actions identified in the Urban Forest and Open Space Strategies.
- Develop a framework within which all projects in the City of Melbourne can consider impacts to ecological connectivity, with a view to enhancement wherever possible
- Create a range of effective models to engage the private realm in conserving biodiversity and enhancing ecosystem health
- Promote urban horticulture by supporting ‘wildlife gardening’ programs in community, school, home and rooftop gardens.
- Identify and implement opportunities to improve, create and connect small green spaces throughout Melbourne’s most urbanised areas.
- Protect and enhance native vegetation and habitats by increasing the use of indigenous species and ‘Caring for Country’ management practices.

- Develop and deliver flagship urban nature projects within the City of Melbourne, whilst reaching biodiversity targets set by international conventions and initiatives.

Urban Forest Strategy

- Increase urban forest diversity: the City of Melbourne's urban forest population will be composed of no more than 5% of one tree species, no more than 10% of one genus and no more than 20% of any one family

C9.2 Existing policies and provisions

State Policies

- 12.01-1S Protection of biodiversity
 - Establishes objective to assist the protection and conservation of Victoria's biodiversity.
 - Strategically plan for the protection and conservation of Victoria's important areas of biodiversity.
 - Ensure that decision making takes into account the impacts of land use and development on Victoria's biodiversity, including consideration of:
 - Cumulative impacts.
 - Fragmentation of habitat.
 - The spread of pest plants, animals and pathogens into natural ecosystems.
 - Avoid impacts of land use and development on important areas of biodiversity.
 - Assist in the identification, protection and management of important areas of biodiversity. Assist in the establishment, protection and re-establishment of links between important areas of biodiversity, including through a network of green spaces and large-scale native vegetation corridor projects.
- 12.01-2S Native vegetation management
 - Aims to ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation.
 - Establishes Clause 15.02-1S – "Encourage retention of existing vegetation and planting of new vegetation as part of development and subdivision proposals."

Municipal Strategic Statement

- 21.03 Environment and Landscape Values
 - Strives for continued protection of the health of ecological systems and the biodiversity they support continues to be relevant.
- 21.05 – 1 Biodiversity
 - Sets objective to protect and enhance the City's habitats and biodiversity.
 - Encourages the retention of native vegetation in the development of sites and enhance indigenous and remnant vegetation areas in the City including in parks and gardens and waterways.

- Encourages the use of indigenous vegetation in open spaces and roof top greening.
- Sets aim to minimise the impacts of introduced flora and fauna on indigenous vegetation.
- Encourages revegetation with predominantly indigenous species.
- Sets objective to create and enhance bio-links for native flora and fauna.
- 21.13-2 Docklands
 - Support the provision of an integrated network of parks and open spaces in Docklands.
- 21.15-3 Sports and Entertainment Area, Built Environment and Heritage
 - Sets objective to maintain the beauty, cultural values and functionality of the Royal Botanic Gardens and Domain Parklands and the institutions within them and support the maintenance of the natural state of Yarra Park by retaining and enhancing its native vegetation.
- 21.16-4 Parkville
 - Encourages the retention and re-growth of predominantly indigenous vegetation in Royal Park.

Local Policies

- 22.26 Public Open Space Contributions
- Establishes criteria for public open space including the location of the site and open space area having regard to biodiversity, habitat corridors, and the wider open space network.
- 22.27 Fishermans End Urban Renewal Area Policy
 - Requires consideration of landscaping for public open space, that interprets and celebrates heritage and culture, including aboriginal cultural heritage.
 - Requires that plant selection should:
 - Support the creation of complex and biodiverse habitat that includes native and indigenous flora and fauna.
 - Balance the provision of native and indigenous plants with exotic climate resilient plants that provide resources for biodiversity.
 - Support the creation of vegetation links within Fishermans Bend to surrounding areas of biodiversity through planting selection and design.

Planning Controls

- 37.01 Special Use Zone - Schedule 1 Flemington Racecourse
 - Requires that planting must use local native plants where possible and plantings of heritage significance should be conserved.
- Schedule 2 To 42.01 Environmental Significance Overlay
 - Requires statement of environmental significance for exceptional trees. These trees contribute to the character and culture of local

areas and collectively, to the valuable ecosystems of the City of Melbourne's Urban Forest.

- Schedule to 43.01 Heritage Overlay
 - Notes that a number of trees and gardens are identified as heritage places through the Heritage Overlay

Particular Provisions

- 52.16 Native Vegetation Precinct Plan
 - Sets objective to provide for the protection, management and removal of native vegetation through the use of a native vegetation precinct plan incorporated into this scheme.
 - Aim to ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation.
- 52.17 Native Vegetation
 - Aims to ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation. This is achieved by applying the following three step approach in accordance with the Guidelines for the removal, destruction or lopping of native vegetation (Department of Environment, Land, Water and Planning, 2017) (the Guidelines):
 - Avoid the removal, destruction or lopping of native vegetation.
 - Minimise impacts from the removal, destruction or lopping of native vegetation that cannot be avoided.
 - Provide an offset to compensate for the biodiversity impact if a permit is granted to remove, destroy or lop native vegetation.
 - To manage the removal, destruction or lopping of native vegetation to minimise land and water degradation.
- Clause 58 – Apartment Developments, 58.03-5 Landscaping objectives
 - Encourages development that maintains and enhances habitat for plants and animals in locations of habitat importance.
 - Aims to promote climate responsive landscape design and water management in developments that support thermal comfort and reduces the urban heat island effect.

C10 Green infrastructure

C10.1 Relevant strategies and targets

Total Watermark: City as a Catchment Strategy

- Green infrastructure is used to respond to current and future flood risk.

Green our City Strategic Action Plan

- 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 walls and vertical greening.

C10.2 Existing policies and provisions

Policies

- No specific planning scheme requirements for green infrastructure but use of green walls and vertical greening included as a consideration in implementing WSUD and landscaping policy requirements.

State Policies

- Clause 15.02-1S Energy and resource efficiency
 - Sets objective to reduce the urban heat island effect by greening urban areas, buildings, transport corridors and open spaces with vegetation.
 - Encourages retention of existing vegetation and planting of new vegetation as part of development and subdivision proposals.

Municipal Strategic Statement

- Clause 21.05-1 Biodiversity Strategy 1.2: Encourage the use of indigenous vegetation in open spaces and roof top greening.

Local Policies

- 22.23 Stormwater Management (Water Sensitive Urban Design)
 - Requires the use of stormwater treatment measures that improve the quality and reduce the flow of water discharged to waterways. This can include but is not limited to: vegetated swales and buffer strips, [and] rain gardens.
 - Encourages the use of vegetation, where practicable, (to be irrigated with rainwater/stormwater) to manage the quality and quantity of stormwater.

Particular Provisions

- Clause 55.07 Apartment Developments
 - Sets objective to promote climate responsive landscape design and water management in developments to support thermal comfort and reduce the urban heat island effect.
 - Establishes Standard B38: The landscape layout and design should:
 - Consider landscaping opportunities to reduce heat absorption such as green walls, green roofs and roof top gardens and improve on-site storm water infiltration. Maximise deep soil areas for planting of canopy trees. Integrate planting and water management.
 - Developments should provide the deep soil areas and canopy trees specified in Table B5. If the development cannot provide the deep soil areas and canopy trees specified in Table B5, an equivalent canopy cover should be achieved by providing either: canopy trees or climbers (over a pergola) with planter pits sized appropriately for the

mature tree soil volume requirements, or vegetated planters, green roofs or green facades.

- Clause 58 Apartment Developments
 - Establishes Standard D10 to consider landscaping opportunities to reduce heat absorption such as green walls, green roofs and roof top gardens and improve on-site stormwater infiltration.

Appendix D

Impact Review of 22.19 and
CASBE ESD policies
monitoring report

City of Melbourne

**City of Melbourne Planning
Scheme**

Impact Review of Local Policy 22.19

Issue | 22 January 2019

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number Job number

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Document Verification

ARUP

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Appendices

Appendix A

Review and interview templates

Appendix B

Building Review List

1 Overview

1.1 Purpose of this report

On behalf of City of Melbourne, Arup has undertaken a review of the impact of City of Melbourne's current *Energy, Water and Waste Efficiency Policy (22.19)*¹.

Local Policy 22.19 has been in place since April 4th, 2013. The current policy provides guidelines to ensure new developments are designed, operated and constructed in a way that contributes to Melbourne municipality becoming an environmentally sustainable city and achieving their eco-city goals.

The project responds to Action 4.1 of The City of Melbourne's Green Our City Strategic Action Plan 2017-2021 (GOCAP). This strategic action plan establishes a clear direction to increase the implementation of quality green infrastructure throughout the city. This strategic action plan comprises four focus areas and eleven actions. Action 4.1 of GOCAP states:

"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 walls and vertical greening."

The purpose of this project is to support GOCAP Action 4.1 by developing an evidence base and improved understanding of the effectiveness of current Local Policy 22.19. It is intended that this evidence will inform future amendments to Local Policy 22.19. This piece of work does not develop proposals for such an amendment.

1.2 Project objectives

This report summarises the findings of our investigation into the impact of Local Policy 22.19. Drawing on stakeholder interviews and document review, we address the following questions:

- Has this policy resulted in sustainable buildings on the ground?
- How has Policy 22.19 changed the level of awareness around building sustainability and Green Star in the sector?
- To what extent does Policy 22.19 act as a driver for sustainable building design within the City of Melbourne?
- To what extent does the sector have the capacity to deliver the outcomes sought by Policy 22.19?
- How effective does the industry perceive Policy 22.19 to be in driving better outcomes?

We used the following sources of information to answer these questions:

¹Melbourne Planning Scheme 2018, Policy 22.19, rev. C187, 04/04/2013, Melbourne.

- Documentation provided by the City of Melbourne, as well as publicly available records of building performance (Green Building Council of Australia (GBCA), National Australian Built Environment Rating System (NABERS)).
- Semi-structured interviews conducted by Arup with representatives from a cross section of relevant organisations in the sector.
- Engagement with the Property Council Sustainability and Wellness Committee.
- An internal workshop with the City of Melbourne.

Limitations of this project

Focus on policy design

This investigation aims to review the design of Policy 22.19 and how this has enabled or limited policy effectiveness. The scope of our work does not include gathering evidence relating to City of Melbourne organisational factors, implementation, enforcement, or other market factors including demand.

Sample bias

It is possible that this sample was not representative of the general pool of development occurring within the Melbourne municipality during this time. The local policy has been in place for around five years, which is a relatively short time period in development terms (permits are typically granted for two years, with a two year renewal). Therefore, the planning and design of buildings targeted in this investigation may have already been substantially underway by the time the policy was gazetted.

For this reason, we recognise a sample bias may have occurred. As more developments are built out in years following the implementation of the policy a stronger evidence base will develop. This could reveal new findings, which alter understandings as to the effectiveness of the policy.

Access to documentation

The Minister for Planning (State Government) is responsible for the approval of developments larger than 25,000 square metres. The final planning documents for these developments are held by the Department of Environment, Land, Water and Planning. As such, the City of Melbourne may not have complete or up-to-date documents for each of the case studies we selected. We recognise this may have impacted on our analysis of such developments as we may not have had access to the most accurate data.

Impact of decisions by the Victorian Civil and Administrative Tribunal (VCAT)

The Victorian Civil and Administration Tribunal hears, reviews and resolves disputes relating to decisions made by responsible authorities over the use and development of land. We recognise that VCAT decisions might have affected the delivery of sustainability features of a building, compared to commitments in the ESD planning report. It was not within the scope of this project to identify links between policy effectiveness, and constraints or changes to applications made by the Victorian Civil Administration Tribunal.

1.3 Overview of the Local Policy 22.19

1.3.1 Policy objectives and benchmarks

In this section, we summarise the objectives and key features of City of Melbourne's Local Policy 22.19.

City of Melbourne Local Policy 22.19 states the following objectives:

- To ensure buildings achieve high environmental performance standards at the design, construction and operation phases.
- To minimise the city's contribution to climate change impacts by reducing greenhouse gas emissions.
- To improve the water efficiency of buildings and encourage the use of alternative water sources.
- To minimise the quantity of waste going to landfill and maximise the recycling and reuse of materials
- To minimise the impacts of waste on the community
- To encourage the connection of buildings to available or planned district energy, water and waste systems in urban renewal areas to achieve additional energy, water & waste efficiency arising from a precinct-wide approach to infrastructure where appropriate.

Key features of the policy include:

- Quantitative benchmarks (expectations of performance) for energy efficiency expressed in terms of the National Australian Built Environment Rating System (NABERS), the Sustainable Design Scorecard (SDS) or the Green Star credit.
- Quantitative benchmarks for water efficiency, expressed in terms of the relevant Green Star credit.
- Requirement for a waste management plan.
- Requirement that all planning applications to submit an Environmentally Sustainable Design Statement. This must demonstrate that the building has the 'preliminary design potential' to achieve a set of relevant performance measures. It is noted that there is no requirement to ensure the building achieves these measures as built.
- The expectation that buildings above 5,000 square metres have the design potential to attain a 5 star rating under the Green Star.

1.3.2 Role of the policy

Local Policy 22.19 is part of the Melbourne Planning Scheme. Every local government municipality in the state of Victoria has their own planning scheme which governs the way land is used, developed and protected to meet current and future needs. The planning schemes of municipalities will vary. The Melbourne

Planning Scheme covers land in the City of Melbourne municipality and offers planning policies which are unique and specific to this area.

The State Government of Victoria explains that the role of a local planning policy is to guide decision-making in relation to a specific discretion in a zone or overlay. It helps the responsible authority and other users of the scheme to understand how discretion is likely to be exercised.²

A Local Planning Policy interacts with the Municipal Strategic Statement (MSS) as well as specific local planning policies. The Municipal Strategic Statement establishes the local strategic direction through outlining planning objectives and strategies for achieving the objectives.

Under Melbourne's Planning Scheme the Minister of Planning is responsible for making decisions on planning permit applications when the proposed development exceeds 25,000 square metres. For these applications, the City of Melbourne reviews the application in line with local policy and provides recommendations to the Minister. The Minister then reviews these recommendations and uses his or her discretion to make a final decision on the planning permit.

1.4 Summary of outcomes

Table 1.3 summarises the findings of our investigation. The remainder of the report then discusses these in greater depth.

Table 1.3: Summary of outcomes

Question	Summary
Has Policy 22.19 resulted in sustainable buildings on the ground?	Not in the commercial sector, potentially in the residential sector but it is hard to prove as there is little to no as built evidence of implementation.
How has Policy 22.19 changed the level of awareness around building sustainability and Green Star in the sector?	Not in the commercial sector, mildly in the residential sector. Developers and builders are generally upskilling in response to Client drivers.
To what extent does Policy 22.19 act as a driver for sustainable building design within the City of Melbourne?	Little to none for the high end commercial sector as other drivers such as the PCA requirements and tenant requirements have been listed as the key drivers that are equal to or surpass the policy requirements. Feedback shows that it is a driver in the residential sector at planning stage, but no evidence thereafter.
To what extent does the sector have the capacity to deliver the outcomes sought by Policy 22.19?	Both commercial and residential sectors have capacity to deliver on the requirements of 22.19. Questions were raised around

² State Government of Victoria. (2015). *Writing a local planning policy*. Retrieved from <https://www.planning.vic.gov.au/.../PPN08-Writing-a-Local-Planning-Policy.doc>

Question	Summary
	capability in very small and niche retail sectors.
How effective does the industry perceive Policy 22.19 to be in driving better outcomes?	Generally, that is has been a step in the right direction, however the targets set have been viewed as business as usual for the commercial sector, and there is no way to ensure implementation in the residential sector.

2 Methodology

2.1 Methodology overview

This section outlines the met approach we adopted for this investigation, as summarised in Figure 1.

Figure 1: Summary of methodological approach



The methodological approach we adopted for this investigation was developed in tandem with City of Melbourne and included four key components:

- A review of project documents.
- Semi-structured interviews with relevant industry professionals and developers of case studies.
- Discussion and review of a previous survey completed by Department of Environment, Land, Water and Planning (DELWP).
- High level discussions with internal City of Melbourne stakeholders.

2.2 Review of project documents

City of Melbourne provided the following data to us on 14 May 2018:

- List of completed buildings over 5,000 m² GFA with development applications since the current version of Local Policy 22.19 was implemented. This list was nominated and provided by the City of Melbourne. Full details can be found in Appendix B.
- Development applications, delegate reports and permits for a proposed shortlist of 11 projects, which have been completed since the policy was gazetted.
- CASBE Report '*Monitoring of ESD local planning policies*' July 2017.

In addition, we reviewed publicly available records of building sustainability performance and/or accreditation, from:

- Building permit lodgement information.
- The Green Buildings Council of Australia (GBCA) Green Star project directory.

- National Australian Built Environment Rating System records.

We then reviewed the documents against the research questions. This included identifying and recording key sustainability features proposed at the planning stage of each case study, and reviewing evidence relating to whether these features were delivered upon completion.

Alongside this, we reviewed the public Green Star accreditation and National Australian Built Environment Rating System performance ratings for each of the listed buildings completed since the implementation of Policy 22.19 and which had a ground floor area over 5,000m².

In addition to the documentation reviews, The GBCA has provided us with information on the buildings certified within the postcodes covered by City of Melbourne. Currently, they have provided date of certification, tool used, and rating level. We are currently working to get information regarding credits or credit categories targeted in order to assess any patterns during the implementation of the policy 22.19.

To assist in framing this analysis we established a template, included in Appendix A within which we recorded our findings.

2.3 Interviews with relevant industry professionals

To gain insight into the industry's perception of the effectiveness of Policy 22.19, we conducted semi-structured interviews with a range of industry players. We selected interviewees with the aim of attaining a cross-section of industry perspectives. To do so, we identified developers, architects, builders and consultants, across a range of building types, sizes and budgets. The final list of organisations to be interviewed was confirmed in consultation with The City of Melbourne during a workshop on the 14 May 2018.

Table 1 indicates the organisations interviewed, the role they play in industry, and the sectors in which they work.

Table 1: Summary of organisations interviewed

Organisation	Role	Market sectors
Aurecon	Consultants (Engineering, Sustainability)	Multi-sector
Probuild	Building Contractor	Multi-sector
Scape	Developer	Residential
Cundall	Consultants (Engineering, Sustainability)	Residential/Commercial
Ark Resources	Consultant (Sustainability)	Residential
Rothe Lowman	Architect	Residential
BatesSmart	Architect	Residential/Hotel

We interviewed each organisation for 30 minutes in a semi-structured format. Our interviews were guided by seven questions, as set out in Table 2.5. These questions enabled us to ensure the interviews covered the following four areas:

- **Awareness:** Level of industry awareness of sustainability principles and Green Star
- **Motivation:** Understand the drivers of sustainability in industry
- **Capability:** Understand how capable the industry is of delivering sustainability outcomes
- **Effectiveness:** Understand the industry's perception of the effectiveness of the policy

To ensure we captured the diverse experiences of the organisations, we encouraged the conversation to be open, flexible and at times depart from the anchor question.

We provide a summary of the findings of these interviews in the following section, where we maintain the anonymity of interviewees.

In addition to the interviews, Arup attended the Sustainability and Wellness Committee sub-committee of the Property Council of Australia, to seek high level discussion around the policy.

2.4 City of Melbourne internal stakeholders

On the 20 June 2018, we held a 'table of contents' workshop, inviting internal City of Melbourne stakeholders. The purpose of this workshop was to collaboratively develop the structure, content and key messages of the report. We also used this as an opportunity to gain perspectives from internal City of Melbourne stakeholders on the implementation and impacts of Local Policy 22.19.

2.5 How evidence was applied to the research questions

The following table summarises our methodological approach. Here we show the five questions which guided our research, and details of the approach and evidence source we used to answer it.

Table 2.5: Summary of methodological approach

Question	Evidence source	Approach
Has Policy 22.19 resulted in sustainable buildings on the ground?	Desktop review of documentation	<ul style="list-style-type: none"> • Review of list of completed buildings >5,000 m2 GFA against NABERS and Green Star databases. • Comparison of key sustainability features proposed at planning to evidence of as-built documentation for each of 11 case studies

Question	Evidence source	Approach
How has Policy 22.19 changed the level of awareness around building sustainability and Green Star in the sector?	Engagement with relevant industry professionals	<ul style="list-style-type: none"> Interview questions: <i>How would you have rated your company's knowledge of sustainability and Green Star before the policy?</i> <i>How has it changed since the policy and why?</i>
To what extent does Policy 22.19 act as a driver for sustainable building design within the City of Melbourne?	Engagement with relevant industry professionals	<ul style="list-style-type: none"> Interview questions: <i>What drivers, if any, for sustainability are there in your projects?</i>
To what extent does the sector have the capacity to deliver the outcomes sought by Policy 22.19?	Engagement with relevant industry professionals	<ul style="list-style-type: none"> Interview questions: <i>Who do you look to for help in responding to such things as the City of Melbourne's Green Star expectations?</i>
How effective does the industry perceive Policy 22.19 to be in driving better outcomes?	Engagement with relevant industry professionals	<ul style="list-style-type: none"> Interview questions: <i>How do you think the policy is going, in terms of increasing the sustainability of new buildings in the City of Melbourne?</i> <i>Which parts of the policy do you think work well?</i> <i>Which parts of the policy would you like to see improved?</i>

3 Findings

3.1 Document review

In this section, we summarise the findings of the document review within the context of whether policy 22.19 resulted in sustainable buildings on the ground. There were some strong clear themes across the documentation reviews. The most significant being that most projects provided an ESD statement with permit applications that showed compliance at planning. However, most compliance statements could not be verified with the information provided, and were not listed as either 'registered' or 'certified' on the GBCA website. The only exceptions to this were the commercial buildings reviewed. These were typically certified with a 5 Star rating under the relevant Green Star tool at the time of construction. Typically, these buildings were also listed on the NABERS website with 5 Star Energy ratings. Water ratings for these buildings varied between 2.5 Star and 5 Star. It was not clear from the documentation provided if any of the sample applications had RFI's through the planning process relating specifically to the policy.

3.2 Industry engagement

3.2.1 Awareness

In this section, we summarise the impact the local policy had on levels of awareness around building sustainability and Green Star in the sector.

Engineering and sustainability consultancies had a high level of awareness of building sustainability and Green Star. Some of the developers we interviewed stated they had a reasonable understanding of sustainability principles. We found that larger Tier A developers tended to have in-house capability and knowledge to implement sustainable approaches to development.

In comparison, we identified that residential developers had lower levels of knowledge. Some interviewees expressed that these developers often did not know what Green Star was, with few direct experiences in using the scheme.

One interviewee said that the knowledge and awareness in the residential sector was 'very, very low'.

We heard that once prompted by the local policy, at times smaller developers knew enough to realise they needed to hire a consultant to undertake a Green Star assessment.

Many organisations stated that they did not see much change in levels of awareness upon the adoption of the local policy. Organisations tended to attribute any change in awareness to the gradual accumulation of knowledge with the passing of time, rather than the policy. Some developers explained that the Green Star scheme had had a greater impact on their levels of knowledge, rather than planning policy.

One developer was prompted to introduce an in-house Sustainability manager, which they did not have prior to the policy's implementation. The developer explained, however, that the motivation for this was more related to a gradual change in client requirements, rather than resulting from the policy.

"Now it's a bit more tenant drive ... Less on technical sustainability, more on occupant focus"
"...prior to the policy knowledge in resi sector [was] very very low..."

3.2.2 Motivation

In this section, we explain our findings in regard to the extent to which the local policy acted as a driver for sustainable building design within the City of Melbourne.

Our research indicates that motivations differed between the commercial and residential markets.

Interviewees from the commercial sector explained that sustainability has become a part of a developer's brand and product. Large top-tier firms identified that implementing sustainability gives them the competitive advantage.

Tenants and clients are often the ones to set expectations around sustainability. Interviewees noted that government, education and premium office tenants often have their own minimum sustainability requirements, which drives the design of buildings.

Some of the interviewees distinguished between developers of commercial buildings that retained ownership of the building after construction from those that sold the building onwards. These developers are more motivated to secure the value of the asset in terms of National Australian Built Environment Rating System (NABERS) and Green Star Rating. They also expressed that they have a greater interest in the operational cost savings achieved through implementing principles of sustainability.

One interviewee identified that the Property Council Australia Grade A was a major driver of the implementation of sustainability principles for commercial office developments.

Interviewees mentioned a range of other drivers within the commercial sector. These included:

- Resilience
- Impact investors
- Performance driven: 'moved beyond green for green's sake, to show me the money, give me the evidence'
- Health and Wellbeing: 'enlightened self-interest'
- Zero carbon

Overall, we found a consensus among organisations that for the commercial sector market expectations, rather than Policy 22.19 drove adoption of sustainability.

Many interviewees expressed that the industry was ahead of the policy requirements.

In contrast, interviewees explained the residential market had far fewer drivers for sustainability. As such, they felt that the residential market relies far more heavily on the local policy to set the minimum requirements.

“Clients are probably making decisions based more on the drivers in the industry rather than the policy being a driver itself.”

3.2.3 Capability

The findings of our research revealed that generally there is an industry-wide expectation that to meet sustainability requirements in planning, a consultant is required.

We recognised that some clients had in-house sustainability capability. We found that this is generally only the case when the developer works on projects that ‘regularly seek to go beyond bare minimum policy compliance’.

“Now it’s a bit more tenant drive ... Less on technical sustainability, more on occupant focus”

“[We] would still implement 5 Star GS regardless of policy – good for marketing, [we] want to be on preferred [tenderer] list.”

3.2.4 Effectiveness

Within this section we discuss how effective the industry perceived Policy 22.19 to be in driving better outcomes. Through our qualitative research we found the discussion around perceived effectiveness was generally organised around six key themes. We provide a summary of these as follows:

Stringency

Some of the developers noted that Policy 22.19 represented a significant advancement on previous policy through the way it imposes a minimum requirement on sectors where there was previously little to no minimum requirement. This was particularly the case for residential development.

However, other interviewees noted that the policy does not mandate the inclusion of sustainable features or a Green Star Rating for buildings. Many interviewees commented that the policy meant developers are obliged to demonstrate ‘preliminary design potential’ rather than being obliged to achieve a green star Rating. Some explained the policy is missing a strong directive, such as the word “must”, to make the implementation of sustainable features compulsory.

Alongside this, sustainability consultants felt the planning approval process does not sufficiently challenge applications or ask questions regarding the robustness of sustainability commitments. They believed this compromises the efficacy of the

policy and explained that this process would assist them in further integrating sustainability into their projects.

“If it pushes the industry more towards well designed, well built, or innovative facades – it’s a good thing. Even if there is minor backlash at the outset.”

“[The policy] would only begin to affect them if it became much more stringent.”

Sector differences

Interviewees iterated a difference between commercial and residential development. Many noted that in the commercial sector, market forces mean there is pressure for developments to exceed the requirements of the local policy. As such, interviewees believed that sustainability principles were embedded into developments in the business as usual approach, and the policy is not effective for inducing change in the way these developments were built.

Contrastingly, we found that interviewees felt the residential sector had far fewer market or external pressures placed on them to achieve sustainable outcomes. As such they felt that the local policy was more effective in promoting sustainable outcomes in residential projects than commercial ones.

“Commercial – [the policy represents] less than BAU, Residential ... planning policy is driving discussions to a point, but driven by the end of the market we’re working in, Hospitality – no interest in any ESD rating. Policy has had direct impact on design changes as a result of the requirements.”

Closing the loop

Interviewees felt that discrepancies in the planning system impacted on the effectiveness of Policy 22.19. They believed that council does not address the different stages of development projects with equal weighting. Interviewees stated that the City of Melbourne placed greater emphasis on ensuring compliance with the policy during planning and design stages, rather than at the occupancy and building permit stage.

There was constant reference to ‘closing the gap’ to ensure that commitments made were implemented in practice. They felt that greater emphasis on ensuring compliance during and after construction would help ensure proposed sustainability features were built and hold developers to account.

“How is this being assessed post permit – it needs to be run through to keep the design honest.”

Green Star Rating

Interviewees recognised that the way local policy made use of an existing system, being the Green Star Rating improved the efficacy of the policy overall. They explained that this enabled the policy to set a strong baseline and made 5 Star

Green Star seem like a minimum requirement for compliance, rather than best practise.

Some suggested, however, that consideration needs to be given to the fact that the Green Star system is not entirely best suited as a planning stage tool. This was because they felt not all features can be seen on planning documentation.

Some also noted that the requirement of Green Star means Green Building Council Australia also have an obligation to check documentation.

“Done quite poorly due to lack of the close out circle – but if you had to get the accreditation it would be significantly easy.”

“Missing one crucial word ‘must’ or ‘mandatory’”

Areas of confusion

Some interviewees felt there were some areas of confusion relating to the existing policy which compromised its efficacy. Many explained that it was not clear what was compulsory and what was not, or where formal adoption of the Green Star Rating was required. Interviewees also identified that confusion was caused by the fact that the policy wording which referenced the Green Star Rating was out of date.

Alongside this, some interviewees identified that there was a lack of knowledge internally between branches of the City of Melbourne. They explained that key personnel who were knowledgeable about sustainability were not necessarily in charge of reviewing planning applications.

One organisation gave the example of a developer who highlighted the pieces of the policy they thought they had to comply with. They explained this demonstrated the fact that it is well within market capability.

Specific targets

Our research also returned comments relating to specific targets mentioned in Policy 22.19. Some interviewees explained that some of the targets were too hard to achieve such as the requirement for rainwater tanks, due to block size. Others explained that many of the targets were already the “business as usual approach”. Interviewees explained this limited the policies effectiveness as targets were unambitious.

3.3 City of Melbourne feedback

City of Melbourne’s own feedback on the effectiveness of the local policy related largely to appropriate tools and benchmarks for different development scales.

The view was that the policy may be difficult to apply to smaller developments, defined as being below 2000 square metres or extensions of existing buildings. This was attributed to lack of access to appropriate skills and knowledge. While

larger buildings have a far greater impact on sustainability overall, the majority of applications being processed are for these smaller developments and extensions.

4 Discussion

In general, the themes that were prevalent in the interviews were proven through the documentation reviews. Themes around the targets of 22.19 representing business as usual or lower for the commercial sector, but pushing the boundaries for the residential sector were clear in the ESD statements, levels of sustainability targeted in each development, and evidence that only the commercial buildings were found to follow through with full certification under the Green Star tool.

The comments around the efficacy of the policy related to the non-mandatory certification and to the absence of a requirement to submit as-built evidence at practical completion were also reflected in the documentation reviews. There was very little as-built evidence available, which made it difficult to determine whether the statements provided at planning were implemented.

This indicates that the policy has likely not been a driver for awareness, motivation or capability in the commercial sector, but has had a small impact in the residential sector. However, there is not a great deal of evidence that it has resulted in more sustainable buildings on the ground, particularly in the residential sector, due to there being no requirement for any form of documentation after the planning permit is granted.

As a result of the study to date, Arup recommend the following considerations in the City of Melbourne's next steps:

- Consideration of evidence required to be provided once construction is complete
- Consideration of how third party frameworks, such as Green Star, can be used to verify the robustness of the sustainability strategy proposed
- Consideration of how to keep the policy's targets relevant as the business as usual benchmarks in the industry increase over time
- Consideration of how capability and drivers are different across different sectors
- Consideration of clear mandatory and non-mandatory requirements
- Consideration of how the policy relates to developments at very small scales (e.g. less than 2,000m²)

Appendix A

Review and interview templates

Subject Impact review of CoM Policy 22.19 - Interviews

Date 15 May 2018

Job No/Ref XXXXXX

Name	<i>Name</i>
Relevant case study development/building (if relevant)	<i>Project</i>
Introduction (suggested points to cover)	<ul style="list-style-type: none"> • Have copy of policy to hand • Thank you for participating. We expect to take 30 minutes. • City of Melbourne have asked us to understand the impact of their local policy on energy, water and waste. This includes how it has impacted new buildings and also the capacity of the development sector. • We have some standard questions but are happy to have a broad discussion and check in on the questions at the end to see if we've covered them. • We will present your comments without any identification. We'd like to say that we spoke to your company, but won't link your input to your name or company. • If there's anything you'd like to say off the record, please just let us know. • Are you happy to go ahead?
Awareness	
How would you have rated your company's knowledge of sustainability and Green Star before the policy?	<i>Response</i>
How has it changed since the policy and why?	<i>Response</i>
Motivation	
What drivers, if any, for sustainability are there in your projects?	<i>Response</i>
Capability	
Who do you look to for help in responding to such things as the City of Melbourne's Green Star expectations?	<i>Response</i>
Perception of effectiveness	
How do you think the policy is going, in terms of increasing the sustainability of new buildings in the City of Melbourne?	<i>Response</i>
Which parts of the policy do you think work well?	<i>Response</i>
Which parts of the policy would you like to see improved?	<i>Response</i>
General	
Comments	<i>Response</i>

Subject [Click here to enter text.](#)

Date 15 May 2018

Job No/Ref

[Click here to enter text.](#)

Case Study Building/Development: Building X

Documents reviewed: Permit X, Plans X, Certificate X

Sustainability Feature Identified at Planning	Evidence at Planning	Comment (is the feature effective?)	Was this feature delivered in the constructed development?		Comment
Energy					
Double glazing	Plan X	Business as usual for this type of development		Plan X	As planned.
Solar array	Plan X	5 panels - <1% building energy consumption		No evidence found of this being built	N/A
Water					
Rainwater Tank	Report X	Unclear where water is reused		Plan X	As-Built tank is smaller
Feature 4					
Feature 5					
Feature 6					

Summary:

Appendix B

Building Review List

PA Number	Address	Committed ESD Hard Targets in the Planning Application	Suburb	Type	Size	Developer	Architect	PA - Applied	PA - Approved	Building/ Occ. Permit
TP-2013-493	323-331 La Trobe Street	No hard targets	Melbourne	Residential Apartments	205 Apartments, 115 m2 retail	Sinclair Brook	Rothe-Lowman	2/07/2013	12/09/2013	10/04/2017
TP-2014-1144	386-394 Spencer Street	6.5 Star NatHERS. 5 Star Design GS Manual as a guide.	West Melbourne	Residential Apartments	126 Apartments, some office tenancy	Alpha 14	Hayball	22/12/2014	18/03/2016	22/03/2018
TP-2014-934	393-397 Swanston Street	5 Star Green Star benchmark performance	Melbourne	Student Accom	763 student apartments, 253m2 retail, 178m2 café	Scape	DCM	24/10/2014	17/03/2017	27/03/2018
TP-2009-724_B	248-254 City Road	5 Star FirstRate	Southbank	Residential Apartments	228 Apartments, 146m2 retail	Salvo Property Group	Crone Partners,	7/07/2010	26/08/2014	20/11/2015
TPD-2007-14_B	14-24 Batmans Hill Drive	5 Star GS D&AB	Docklands	Mixed use, retail		Places Victoria	Bates Smart	3/06/2011	29/06/2011	none
TPD-2012-29_A	6-22 Pearl River Road	4 Star Green Star Multi Res.	Docklands	Apartments and Hotel	284 Hotel Rooms, 463 Apartments	Meteorite Development	dKO	29/01/2013	18/12/2013	14/02/2017
TPM-2010-13_A	57-77 Dudley Street	Equivalent 5 Star GS – specifically identified no commitment to certification	West Melbourne	Mixed use	Some apartments, retail arcade, office	Maxcon	Fender Katsalidis	25/06/2010	12/08/2011	30/08/2016
TPM-2013-20	28-44 Bouverie Street	> 4 Star GS Multi Res	Carlton	Residential apartments	216 apartments and some retail	Grocon	Studio 505	2/08/2013	20/01/2016	none
TPM-2014-50	452-472 Elizabeth Street	4 Star Green Star Multi Res. 5 Star was required in the permit.	Melbourne	Residential Apartments	622 apartments, 635 m2 retail	Golden Age Group	Elenberg Fraser	1/11/2013	30/06/2014	none
TPM-2014-50	889-897 Collins Street	5 Star GS D&AB	Docklands	Mixed use	1070 apartments, commercial floor space	Lend Lease	Koichi Takada Architects	28/11/2014	8/06/2015	6/06/2017
TPM-2015-6	11-49 Galada Avenue	None	Parkville	Residential Apartments	Commonwealth Games Village Site, apartments	Village Park Consortium Pty Ltd	SJB	22/09/2014	20/03/2015	1/03/2018



Local ESD planning policies monitoring Report

Cities of Banyule, Port Phillip, Moreland,
Stonnington, Whitehorse and Yarra

July 2017

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EXECUTIVE SUMMARY

We, the Joint Councils, represent the Cities of Banyule, Port Phillip, Moreland, Stonnington, Whitehorse and Yarra.

The environmentally sustainable development (ESD) policies are achieving demonstrable ESD outcomes, including: 635kW solar panels, 3,187kL of rainwater harvesting capacity, improved energy efficiency and the consistent use of the BESS tool.

All councils have experienced a high acceptance of the ESD policies within the development community. ESD has become accepted as part of the planning process and all councils have internal processes in place to ensure ESD reports are reviewed in a timely and efficient manner.

The ESD policies are crucial to allow councils to fulfil local, state and federal government environmental commitments. Additionally, these policies improve the efficiency of our infrastructure as populations grow, as well as positively influencing the quality of the built environment and the liveability of our communities as they undergo change.

If the ESD policies were to expire, this would create unnecessary disruption of an established and industry recognised process.

We therefore seek that the expiry date in the 6 policies is deleted.

The Joint Councils are committed to helping DELWP roll out an equivalent state ESD policy.

INTRODUCTION

The Environmentally Sustainable Development (ESD) local planning policy was introduced into the Banyule, Port Phillip, Moreland, Stonnington, Whitehorse and Yarra Planning Schemes in November 2015.

While the ESD local policies create additional application requirements, it is an industry accepted mechanism to deliver measurable outcomes and does not delay the processing of permit applications.

The six councils with the ESD Local Policy, referred to in this report as the 'Joint Councils', have been carefully monitoring the implementation of the local policy and have presented the findings in this report.

This report presents data collected by the Joint Councils, providing opportunity to evaluate how the ESD planning policies are being applied at these respective councils, whilst also providing a quantitative analysis of the positive environmental outcomes we are achieving, at a low cost to the development industry.

Through this discussion, we seek that the sunset clause within the ESD policies (being 31 December 2017¹) is removed, and in due time, an equivalent state-wide policy is progressed.

BACKGROUND

The ESD local policies seek to ensure that proposed developments are designed with the capacity of achieving best practice ESD. The local policies support and enable development applicants to consider the following ESD categories:

- Energy usage;
- Renewable energy generation;
- Water conservation;
- Sustainable stormwater management;
- Waste management;
- Urban ecology;
- Indoor environmental quality; and

¹ Note: Moreland City Council received a letter on 5 July 2017 stating the expiry had been extended to June 2019. At time of writing this report, the other 5 Joint Councils ESD officers had not received this letter.

- Transport.

The ESD local planning policies recognise that buildings produce 20% of Australia's greenhouse gas emissions through the use of energy during operation, whilst the construction of buildings, including demolition waste, contributes to 40% of all landfill material. Additionally, Victoria's buildings are responsible for a large amount of potable water usage for non-drinking purposes.

This report presents and discusses data collected by the Joint Councils from over a 6-month period, providing an opportunity to evaluate how the ESD local planning policies are being applied whilst also providing a quantitative analysis of the positive environmental outcomes the policies are achieving. This report also includes additional data about how the planning policies are being accepted and interpreted by the development community.

POLICY DEVELOPMENT

The ESD local policies are the culmination of over a decade of collaboration between local councils, including:

- Formation of the Sustainable Design in the Planning Process (SDAPP) to integrate environmental performance considerations into the planning permit process. This includes the creation of shared SDAPP fact sheets and establishment of consistent assessment methodologies.
- Establishment of the Council Alliance for a Sustainable Built Environment (CASBE) in 2009 as part of the Municipal Association of Victoria, to provide a forum for councils to promote consistent ESD together. Today, CASBE has over 22 member councils across Victoria².
- Creation of the *Built Environmental Sustainability Scorecard* (BESS) 2014-15. BESS enables planning permit applicants to generate free ESD reports for review in the planning assessment process. It replaced the STEPS tool (Sustainable Tools for Environmental Performance Strategy) and the (SDS) Sustainable Design Scorecard that have been in use by the development community since 1999.

² CASBE Member Council's as of May 2017 are: 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.

- Collaboration between CASBE councils to prepare shared ESD planning policies commenced in 2010 to give statutory weight to the SDAPP framework. It involved input from strategic planning, statutory planning and ESD teams within these councils and from numerous external stakeholder. This collaborative local policy development fostered a constructive cross-council network, facilitated by CASBE and involved the joint preparation of the local policy amendment material, as well as supporting materials such as the SDAPP Fact Sheets.
- Extended public co-exhibition for Planning Scheme Amendments for Banyule (C73), Moreland (C71), Port Phillip (C97), Whitehorse (C130) and Yarra (C133) Planning Schemes) for two months from 28 February 2013 to 29 April 2013, and public exhibition for one month from 4 April 2013 and 6 May 2013 for the Stonnington Amendment (C177). This process included formal notice and the preparation of an explanatory report that was sent to the prescribed Ministers, industry stakeholders, ESD consultants and planning permit applicants. Notices of the amendments appeared in the *Victorian Government Gazette* on Thursday, 28 February 2013 and also in municipal local newspapers.
- A joint industry briefing session was held on 15 March 2013 for key industry stakeholders such as the Municipal Association of Victoria, Housing Institute of Australia, the Building Commission of Victoria, the Plumbing Commission, the Building Design Association of Victoria (BDAV), the Property Council of Victoria, and Sustainability Victoria. A total of 30 stakeholders were invited to the briefing session. Key themes discussed aspects such as the enforcement of ESD measures, definition of 'best practice', and the proposed policy requirements.
- During the development of the ESD Local Policy, additional industry and public consultation activities were undertaken with developers, architects, building designers and ESD consultants such as; presentations to industry associations (including the BDAV and the Australian Institute of Architects), business breakfasts for applicants and their design teams, public speaking at seminars and forums, as well as direct communications with the development industry.

Panel findings

- Combined consideration of the 6 ESD planning policies was heard by an appointed Panel and Advisory Committee (PAC). The PAC had two roles: firstly, as an Advisor Committee, to advise on the merits and necessity of the ESD policies, and secondly as a Panel, to hear submissions received during the process. The combined Panel

and Ministerial Committee Hearing was held from 25 November 2013 to 9 December 2013. It reviewed considerations such as: ‘what is ‘best practice’ ESD?’, ‘what is the overlap between planning and building’, ‘costs and benefits of introducing sustainability in local policies’ and ‘non-regulatory initiatives to support sustainability’. It also heard submissions from peak bodies such as the Housing Industry Association, CASBE and large developers.

- Combined preparation of documentation for the PAC Hearing, including: commissioning of a Cost Benefit Analysis by *Pitt & Sherry* which found a clear economic benefit for buildings where ESD is applied; engagement of expert witnesses; and legal representation of the six Joint Councils at the Hearing.
- The PAC process also importantly tabled some of the concerns of industry and gave the opportunity for the Joint Councils to amend the policy wording and structure to address these concerns. The ESD local policies that emerged from this process with improved and clarified and gained the support of the Panel.

The PAC Report (7 April 2014) considers that a state-wide approach is the best way to facilitate the increased focus on sustainability. The PAC Report was supportive of the six Amendments and confirmed the role of ESD in the planning system, noting that:

“It is clear planning not only has role to play in achieving sustainability outcomes, it also has a clear obligation to do so” (49).

The PAC Report further remarked that:

“The Committee acknowledges that the Amendment Councils have developed these policies in response to a lack of Statewide approach and are to be commended for their vision and commitment...even if a Statewide policy is introduced, local policies may still be appropriate where municipalities seek to ‘raise the bar higher’ either in specific locations, or where the community has higher sustainability expectations” (50).

Through CASBE and council ESD referral processes, the 6 ESD councils continue to liaise with the development community. This includes bi-annual industry days (the latest was held in May 2017) where council ESD Advisors meet with architects, developers and private ESD consultants, and discuss ESD and the Policy.

The ESD local policies and their successful implementation is a culmination of hard-work and collaboration for over a decade to together improve the sustainability of our built

environment. This achievement was recently recognised by the Planning Institute of Australia's 2016 Awards for Planning Excellence, where the six Joint Councils received a Commendation for the category *Improving Planning Processes and Practices*, and by the LGPro 2017 Awards for Excellence, where we also received the winning award for the 'Sustainability' category.

HIGHLIGHTS FROM DATA COLLECTED

The attached spreadsheet contains updated data for the first and second rounds of monitoring and evaluation (or for applications lodged between 1 October 2016 – 31 December 2016 and 1 January 2017 – 31 March 2017 respectively).

The following items should be taken into account when reviewing the spreadsheet:

- Some data in various columns is incomplete due to the applications still being in the planning permit process (for example, planning permit conditions have not been finalised for all ESD referrals and data for ESD reports is collected at decision time for some councils);
- The trigger for the ESD policy within the Whitehorse Planning Scheme is for 3 or more dwellings – for the other 5 councils it is for 2 or more dwellings;
- The ESD categories 'Energy', 'IEQ', 'Water', 'Stormwater', 'Waste', 'Urban Ecology' and 'Transport' have been chosen for monitoring and evaluation due to their inclusion within the ESD planning policies.

The data shows that the policies are successfully achieving anticipated and desired environmental benefits, assuming all of the referrals reviewed are approved and constructed. Highlights include:

Installation of solar panels:

Approximately 635kW of solar panels have been committed to be installed as part of the ESD planning process over the 6 month period. This represents approximately 162 homes being taken off the wider electricity network grid (based on the average solar generation in Melbourne being 4.6 hours per day and the average Australian energy use of 18kW hours/day per dwelling).³ This is an excellent environmental achievement which is able to

³ 644kW x 4.6 hrs = 2938.5 / 18 kW hrs/day = 163 homes. The figure of 4.6 hours is claimed from the Australian Government 'Your Home' manual obtained at <http://www.yourhome.gov.au/energy/photovoltaic-systems>.

be further enhanced once battery technology is improved and readily affordable, demonstrating that in-fill development has the capacity to reduce its burden on the existing power network, especially during peak demand periods.

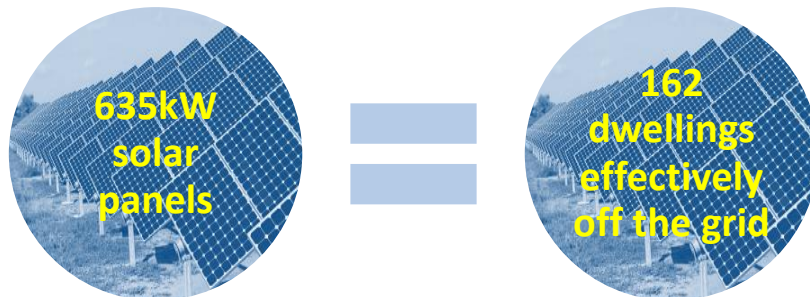


Figure 1: Renewable power achieved via solar panels being installed through the planning process.

Reduced potable water consumption and urban waterway benefits:

The data shows that approximately 3,187 kilolitres (3,187,340 litres) of rainwater harvesting capacity will be installed via the ESD process. This has many benefits as seen in figure 2 below. ⁴

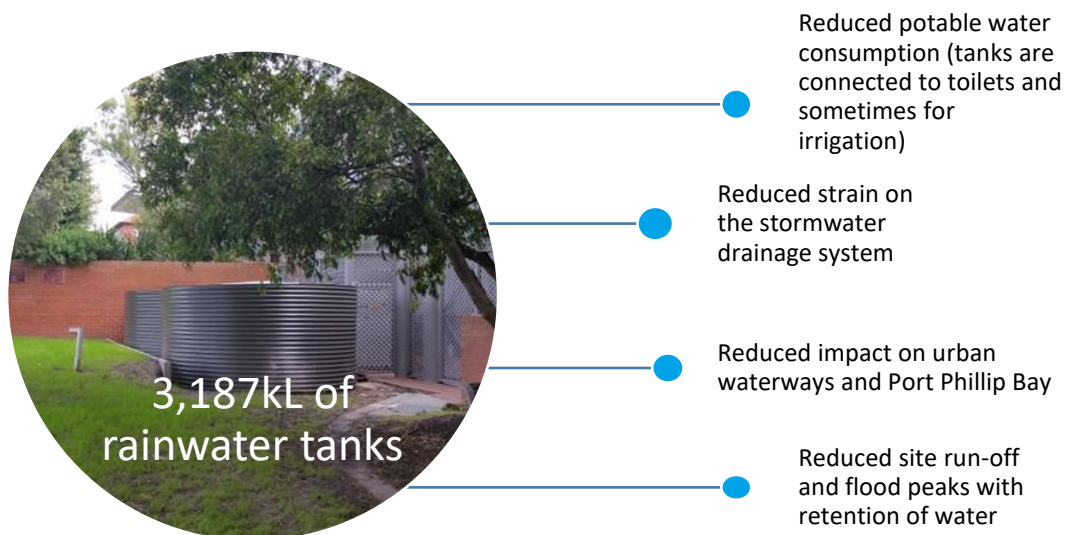


Figure 2: Benefits of rainwater harvesting tanks

⁴ Information about the benefits of rainwater tanks can be found on Melbourne Water's website at https://www.melbournewater.com.au/planning-and-building/stormwater-management/wsud_treatments/pages/rain-water-tanks.aspx

Improved energy efficiency of new dwellings

The collected data demonstrates that eligible dwellings assessed via the ESD planning process commonly exceed the minimum energy efficiency requirements of the National Construction Code (NCC). The NCC requires Class 2 dwellings to achieve a minimum NatHERS rating of 5 stars and an average of 6 stars. ESD encourages improving this energy efficiency by increasing building insulation, enhancing the performance of the glazing, assessing the orientation of windows and installing appropriate shading. The data shows that dwellings are commonly exceeding the 6 star average, as seen in figure 3 below.

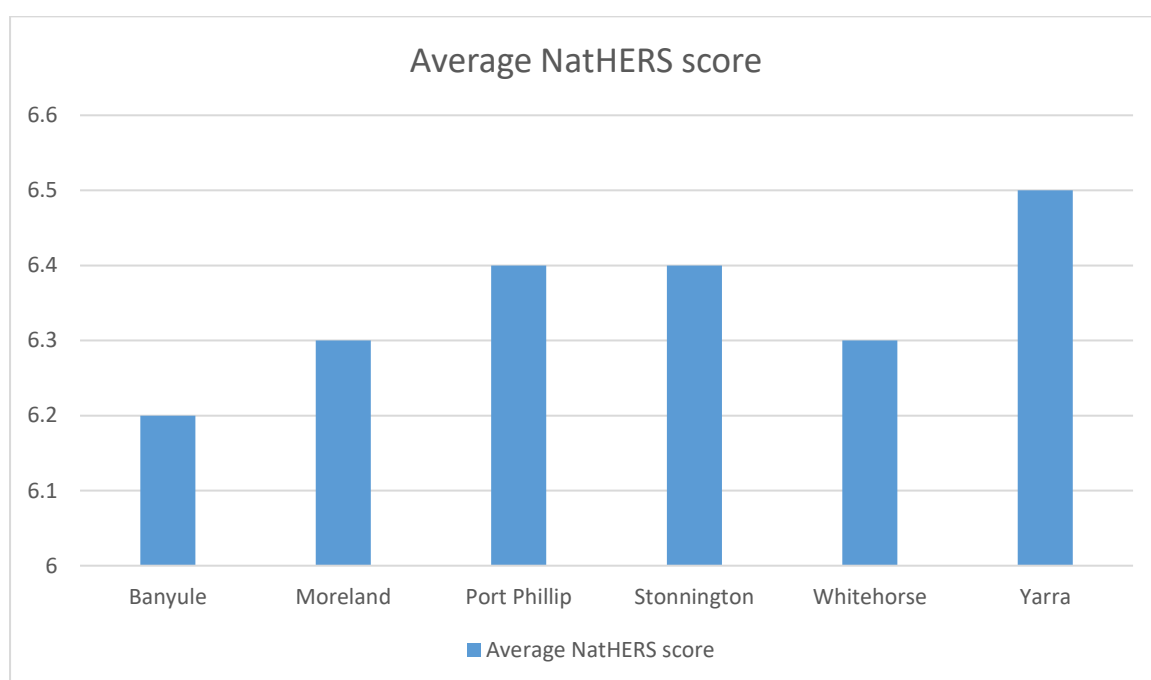


Figure 3: Graph showing average NatHERS scores for dwellings when lodged at council. The 6 star average score is required to comply with the NCC.

This is an excellent outcome as it will result in dwellings being more energy efficient and comfortable in both summer and winter. Dwellings will be cheaper to operate due to reduced heating and cooling demands, decreased burden on the electricity network and reduced overall greenhouse gas emissions.

Use of the BESS tool

The collected data shows that the BESS tool is commonly being used for ESD reports of both smaller and larger developments (SDAs and SMPs respectively). This is favourable, as BESS was created to provide a free ESD tool for planning permit applicants, and also to

provide a level of consistency across the industry, therefore greatly assisting ESD consultants and applicants.

THE ESD POLICY AND THE PLANNING PERMIT PROCESS

Have any planning permit applications been refused wholly on ESD grounds?

All Joint Councils indicate that there have not been any planning permit applications refused solely on ESD grounds. This illustrates that ESD matters are being successfully reviewed and mediated by ESD Officers and Urban Planners during the planning application process. Furthermore, the collected data shows that the best practice ESD categories (i.e. Stormwater, Urban Ecology, etc.) objectives are being met in the majority of planning applications. This reveals that the development community recognises the importance of ESD within the planning system and wider built environment.

Have any planning permit application been refused partially on ESD grounds:

The following applications have been refused on partial ESD grounds and provide useful interesting commentary of ESD in the Victorian Civil and Administrative Tribunal (VCAT) discussions:

- 74 – 76 Wattletree Road, Armadale (City of Stonnington): Date of the order is 16 February 2016. A refusal to grant a planning permit was upheld by the Tribunal. Council was concerned about poor daylight within proposed apartments amongst other grounds. Found online at <http://www.austlii.edu.au/cgi-bin/sinodisp/au/cases/vic/VCAT/2016/216.html?stem=0&synonyms=0&query=74%2076%20Wattletree%20Road>
- 14 – 18 Porter Street, Prahran (City of Stonnington): Date of the order is 27 April 2015. A refusal to grant a planning permit was upheld by the Tribunal. Poor internal amenity of proposed apartments, including lack of natural daylight, formed part of the upheld refusal grounds. Other refusal grounds included the mass and scale of the building; the layout and design of the car park; poor landscaping; and amenity impacts to adjoining dwellings. Found online at <http://www.austlii.edu.au/cgi-bin/sinodisp/au/cases/vic/VCAT/2015/553.html?stem=0&synonyms=0&query=14%20porter%20street>
- 19-21 Judd Street, Richmond (City of Yarra): Date of the order is 9 March 2016. This application was refused on a number of grounds, including a poor ESD response to

energy performance, lack of appropriate stormwater management and poor indoor environment quality (lack of natural daylight or ventilation). This application was approved by the Victorian Civil and Administrative Tribunal (VCAT) however was a Red Dot case on ESD grounds, with the Members supporting ESD initiatives required by council. Found online at <http://www.austlii.edu.au/cgi-bin/sinodisp/au/cases/vic/VCAT/2016/373.html?stem=0&synonyms=0&query=19%2021%20judd%20street%20red%20dot>

- 195 Bridge Road, Richmond (City of Yarra): ESD concerns include poor internal daylight amenity and poor natural ventilation.

183-189 Bridge Road, Richmond (City of Yarra). Date of order is 21 April 2015. At the hearing (which was appealed as Council did not make a decision within the 60 day statutory timeframe) Council argued it would have refused the application on a number of grounds including poor urban design and realm outcomes, a poor response to the heritage streetscape, poor amenity impacts to adjoining properties and an unacceptable ESD response including a lack of natural daylight and ventilation. Amended plans were approved which provided improved responses to the refusal grounds, including ESD. Found online at <http://www.austlii.edu.au/cgi-bin/sinodisp/au/cases/vic/VCAT/2015/506.html?stem=0&synonyms=0&query=183%200bridge%20road%20richmond> .

- 65 Sydney Road, Coburg (City of Moreland). A proposal for a six storey apartment building was refused on a number of grounds, including a poor response to the desired building envelope, poor urban design and poor ESD response, including inadequate internal amenity, water, energy or stormwater responses. The case has not been heard at the Tribunal as yet and is scheduled to be heard on 25 September 2017.

These applications demonstrate that, where the grounds for refusal have included ESD, it is often in conjunction with urban design, amenity and streetscape issues, thus indicating that the overall proposed development is a poor response to the overall respective Planning Schemes.

CASBE has observed that VCAT frequently upholds council ESD requirements and consideration of ESD, with cases even being 'red dotted' to confirm the importance of ESD. Four information sheets about ESD and VCAT commentary, including discussion of internal daylight amenity, zero car parking and equitable development, are found online at

<http://www.mav.asn.au/policy-services/planning-building/sustainable-buildings/council-alliance-sustainable-built-environment/Pages/default.aspx> and also in Appendix 3.

WHAT HAS BEEN THE EXPERIENCE OF COUNCILS SINCE THE ESD POLICIES WERE GAZETTED?

The gazettal of the ESD local planning policies largely formalised existing established practices at the Joint Councils. Before the gazettal of the policies, Port Phillip, Stonnington and Yarra Councils already had a high uptake of development applicants voluntarily lodging ESD reports as part of planning documentation. Participation before gazettal by both small and large development projects varied between 70 to 100% of eligible planning applications. This was due to a number of factors:

- The availability and ease of using the free BESS and STORM tools;
- The SDAPP process was well established over a number of years, providing consistent and clear ESD assessments and providing this feedback to development applicants.
- Supporting educational material was provided such as the SDAPP fact sheets.
- The assistance in writing submissions and using ESD tools was offered by ESD officers;
- An acceptance that ESD is integral to the planning process and was supported by the State Planning Policy Framework (SPPF) and the individual Municipal Strategic Statements in these Council (MSS); and
- The Port Phillip, Stonnington and Yarra planning schemes have identical *Stormwater Management (Water Sensitive Urban Design)* Clauses 22.12, 22.18 and 22.16 which had been in the planning scheme since 13 March 2014, establishing formal WSUD requirements for new buildings and extensions.

In Whitehorse Council, the gazettal of the ESD policy formalised the process of assessing sustainable design in the planning process that began in March 2010. Prior to gazettal, Whitehorse trialled assessing ESD for applications that involving three or more dwellings and those with a non-residential area of at least 500 square metres. In 2013, due to an increase in application numbers and resourcing constraints, this was adjusted to exclude developments with fewer than nine dwellings. With the local policy now place, Whitehorse has re-integrated the process of assessing three to nine dwellings.

At the City of Moreland the gazettal of the local policy formalised the ESD process which it had been progressing for many years. Prior to the policy, Moreland required best practice ESD for developments considered 'large', being 15 + dwellings, through the provisions of the SPPF and MSS. The ESD local policy formalised this process and also introduced new requirements for anything greater than 2 dwellings or non-residential development greater than 100m². The introduction of ESD requirements into the planning scheme reinforced existing processes.

The statutory planners and ESD officers of the Joint Councils have also noticed that the quality of ESD reports have improved since the ESD policies were introduced. Regular permit applicants who develop small to medium sized development (<10 dwellings) are preparing their own SDA's via the BESS and STORM tools. Over time, the quality of these has improved, and submissions are now legitimately surpassing minimum best practice expectations. The policies have also allowed ESD consultants greater ease at communicating council ESD expectations to their clients. This is driving better ESD outcomes in proposed buildings. We are commonly seeing new dwellings being built with greater energy efficiency and much improved natural daylight and ventilation.

The Joint Councils have observed a lack of complaints about the ESD policies. While in the early 2000's there were several appeals to VCAT on ESD grounds, this has not been in the case since the gazettal of the 6 ESD local planning policies. Council ESD officers and Urban Planners have also commented on the lack of complaints and acceptance of ESD as part of the planning process.

THE JOURNEY AN APPLICATION GOES THROUGH USING THE ESD POLICY

The ESD local planning policies provide a consistent and transparent framework for the preparation and consideration of planning permit applications. As the planning permit triggers for the policies are clearly defined (i.e. it applies for 2 or 3 + dwellings) and the requirements are clearly stated (a SDA or SMP), it is easy for a planning permit applicant to prepare this documentation upon initial lodgement of the planning permit application. Council statutory planning officers are also able to effectively communicate the ESD policy requirements at pre-application meetings due to the clear wording of the policies and are able to request ESD Advisor attendance at pre-application meetings, which often happens for large development sites. While applicants have largely accepted that either a SDA or a SMP, as appropriate, must accompany their planning permit application to obtain a planning

permit, if this information has not been lodged it can be easily requested pursuant to the Further Information provisions of the *Planning and Environment Act 1987* ('the Act').

The collected data shows the time lapse between an application lodgement date and when an ESD assessment occurred. It is important to note that this delay is common, and is due to factors not related to ESD, such as:

- An application may be lodged with fundamental design issues, such as those relating to zoning or use, which need to be addressed via amended plans;
- Amended plans may take several months to be lodged, and statutory planning officers will not refer the application to ESD, traffic or engineering until updated plans are lodged; and
- Initial applications may only include the minimum of information, as per Section 47 of the Act, and wait for councils request for further information before providing supporting reports addressing traffic management, heritage, acoustics or ESD.

Therefore whilst ESD reports are now a commonplace request alongside heritage and traffic reports, it's important to note that development applicant teams work in different ways and do not provide application material in a standard method for all applications.

Have ESD requirements delayed the overall planning application process?

All Joint Council's indicate that very few applications have been delayed due to statutory planning officers requesting additional ESD documentation at the 'Further Information' stage or the 'after advertising' of the planning permit application process. This is because when planning permit applications are lodged at Council, ESD documentation is either submitted with the initial application or requested pursuant to Further Information ('FI') provisions (s. 54 of the *Planning and Environment Act 1987*) prior to public notification.

The data recorded reveals that ESD information is rarely the sole item required pursuant to FI provisions. For example, an application requiring a SMP will very likely also require other consultant reports, such as a noise acoustic report, a traffic management plan report prepared by a Traffic Consultant or a disability access report.

Furthermore, applications that lack sufficient ESD data within a submitted ESD report and require substantial changes (usually by a condition of planning permit) tend to have other issues with the proposal unrelated to ESD (i.e. poor architectural design, issues with the selection of materials for the façade, poor neighbourhood character response, etc.).

The dates of the initial ESD referral and the completed referral provide insight into how long it takes for ESD officers across the 6 councils to review ESD information. It is important to note that whilst these referrals are taking place, the planning process continues (such as the application being within the overall further information stage or being advertised). There is a varying time elapse between councils and varying amount of recorded information. The data indicates the following approximate averages:

- Moreland takes an approximate 17 days to complete a referral
- Port Phillip takes an average 59 days
- Stonnington takes an average 21 days
- Whitehorse takes an approximate 45 days
- Yarra takes an approximate 14 days.

Banyule XXXX.

It should be noted that these timeframes are averages, and that several of these averages are high due to a small number of applications taking much longer. For example, the Whitehorse median referral timeframe is 26 days, however the average has been increased due to a handful of longer referral timeframes.

Below are two examples of typical applications which involve ESD as part of the planning process.

Example one: a small-scale residential development

Moreland City Council received a planning proposal for the construction of four double storey dwellings at 40 Richards Street, Coburg. The following is a summary of the key dates:

Action	Stage	Notes
Lodged with Council	17 October 2016	
Further Info requested	7 November 2016	Requested amended floor plans and elevations (i.e. ground levels) and SDA requested. Large design issues also raised.
FI info lodged with Council	20 December 2016	Including amended plans and SDA.
ESD referral	13 January 2017	

ESD referral completed	3 February 2017	Recommended plans to show external shading and bicycle spaces (as per BESS report) and stormwater treatments (as per STORM report) – no big ESD issues raised
Traffic referral	13 January 2017	
Traffic referral completed	27 March 2017	
Application advertised	23 January 2017	Several objections received
Notice of Decision issued	10 May 2017	
Planning permit issued	15 June 2017	ESD conditions are seen in Appendix 4.

Example two: a medium scale non-residential development

Moreland City Council received a planning proposal for the construction of 10 offices, 6 warehouses and a waiver of car parking at 60 Fallon Street, Brunswick. The following is a summary of the key dates:

<u>Action</u>	<u>Stage</u>	<u>Notes</u>
Lodged with Council	12 December 2016	
Further Info requested	5 January 2017	Requested amended floor plans and elevations (i.e. ground levels), landscape plan, traffic report, waste management report and SMP. Design issues also raised.
FI info lodged with Council	7 April 2017	Including SMP, traffic and waste reports, amended plans and landscape plan.
ESD referral	19 May 2017	
ESD referral completed	25 May 2017	ESD comments included a poor response to Urban Ecology, Stormwater management and Energy performance. Comments were sent to the Architect (planning permit applicant) and ESD Consultant.

Traffic referral	19 May 2017	
Traffic referral completed	5 June 2017	
Discussion with ESD Consultant and Council ESD Advisor	25 May– 20 June 2017	<p>Two revised SMP's and plans were sent to the Council ESD Advisor for review. By 20 June 2017, all ESD issues were addressed and ESD outcomes were improved.</p> <p>The applicant + consultant agreed to a condition on permit requiring additional energy modelling, the stormwater response was suitably justified, and the plans were amended to incorporate rooftop areas with planter boxes to improve the urban ecology response.</p>
Application advertised	Application is ready for advertising from 20 June 2017	

Both examples show that even if ESD documentation is not lodged with the initial application, it can still be referred to the relevant ESD Advisor for review early in the application process, thus allowing the ESD comments to be addressed and negotiated in the process prior to advertising. Both examples also highlight that various internal referrals (other than ESD) are commonly required. In both instances, the ESD process has not delayed the overall planning process unreasonably and has resulted in improved ESD outcomes.

CONSULTATION PROCESS PRECEDING INTRODUCTION OF THE POLICY

Whilst the gazettal of the local ESD policies occurred in November 2015, the six Joint Councils involved in the amendment were given approximately 4 weeks' notice from DELWP that gazettal would occur. This allowed councils to implement internal processes to allow the smooth roll-out of the ESD policy once gazetted.

When Moreland received word that gazettal was coming, it undertook the following proactive measures:

- The ESD team sent an email to regular applicants (all who had lodged more than 1 application in the previous 2 years) informing them about the policy, what were the planning permit triggers and what were the application requirements. Contact details of the ESD Advisor were also given to encourage discussion with the Council ESD Advisor.
- Internal report and letter templates were updated to aid Urban Planners, such as Further Information letter templates.
- The ESD team presented to the statutory planning team highlighting the purpose of the policy, policy expectations, answers to common questions, etc. A copy of this presentation can be provided upon request.⁵
- Information to be uploaded to the Moreland website the day gazettal occurred was prepared.
- Internal training with Urban Planners about ESD was conducted (i.e. energy efficiency training and BESS training).

At gazettal, the Moreland ESD Advisor attended pre-application meetings with Urban Planners and planning permit applicants to advise about the policy and Council's ESD expectations.

Yarra undertook additional proactive actions to engage the local community before and after the gazettal of the policy, including:

- A media release uploaded on Council's website was created to provide an understanding of the changes (after gazettal).
- An email notification sent to all regular applicants on Council's regular applicant list (before and after gazettal).

⁵ Not included due to size (24 slides).

- Council representatives spoke to major industry groups before and after gazettal (including BDAV and AIA), as well as conferences and seminars including:
 - ESD Business Breakfast where City of Yarra extended an invitation to architects and designers to discuss the technical aspects of the ESD policy and update on the amendment process.
 - Update to the BDAV members through their seminar series.
 - Update to AIA members through the Sustainability Forum.
 - Direct meetings with other key stakeholders to discuss the new local policy. Organisations included BDAV, UDIA, OVGA, universities, and individual architects, developers and ESD consultants.
 - Presentations to national conferences including Liveable Cities and International Urban Design Conference.

Prior to gazettal, the City of Stonnington:

- Held training sessions for Statutory Planners to support understanding and interpretation of the planners of the ESD Policy.
- Stonnington's ESD Officer met with regular ESD Consultants to educate them on the policy and Council's expectations.
- The policy formed the basis for making a case for a full-time ESD Officer position to support the Statutory Planners in assessing planning applications against the ESD Policy.

Once Stonnington's ESD Policy was introduced into the Planning Scheme, Council undertook proactive actions to engage the local community, including:

- Council recommended and offered to applicants for medium and large developments that they schedule a pre-application meeting with Council where further advice on the process and ESD measures could be provided by Council's ESD Officer.
- Examples of templates for medium and large developments provided online to assist applicants in developing Sustainable Design Assessment (SDA) reports and Sustainable Management Plans (SMP).

Council reported on the approval of the ESD Policy and BESS as the preferred tool in the *Sustainability Snapshot 2015/16* publication, which is an annual public report on Council's environmental performance.

ESD ASSESSMENT BY COUNCILS WHO LACK THE ESD POLICY

Moonee Valley City Council, like Port Phillip, Yarra and Stonnington councils, has a Stormwater Management Local Planning Policy at Clause 22.03 of the Moonee Valley Planning Scheme. This policy introduced in March 2014 requires best practice stormwater management for building and works in excess of 50sqm. The Moonee Valley Planning Scheme also includes Clause 21.04, 'Sustainable Development', which since March 2016, has instilled ESD within the planning process. Moonee Valley is also an active member of CASBE and has been actively promoting ESD principles in planning applications for many years.

Moonee Valley has been requesting ESD reports (SDA or SMP) for applications of 3 dwellings or greater. Recorded data since August 2016 to April 2017 has provided the following key observations:

- The overall industry response has been excellent. The BESS tool uptake has been very high and there has been a particular strong understanding of stormwater management requirements due to the complementary WSUD planning policy.
- ESD reports have been submitted for various development types, including an SDA for 3 – 9 dwellings, education buildings and warehouses, and SMP's submitted for larger residential and mixed use developments.

Moonee Valley have remarked that feedback from planning permit applicants is for consistency of planning requirements across all councils. They therefore echo CASBE and the Joint Councils in progressing a consistent, state-wide equivalent ESD policy. More information is found in Appendix 2.

THE DEVELOPMENT COMMUNITY'S RESPONSE TO THE POLICY

The development community and ESD consultant community has responded positively to the ESD policies for the following reasons:

- ESD is being recognised and accepted as being part of the planning process and 'good practice';
- The availability of council ESD Advisors to discuss ESD requirements and ESD technicalities with planning permit applicants;
- The 'up-skilling' of Statutory Urban Planners ESD knowledge and skills since the policy gazettal's;

- Consistency of how ESD is applied and assessed across the six Joint Councils; and
- Clear ESD objectives and council expectations.

RELEVANCE OF THE ESD POLICY WITH OTHER COMMITMENTS AND DOCUMENTS

Buildings are a key part of Victoria's climate change mitigation response and policies ensure that sustainability is considered holistically as part of the early design phase, when the opportunities are greatest. The local ESD policies are also essential in order to fulfil committed State, Federal and international targets and Agreements, including:

- The Victorian *Water for Victoria* strategy, including Actions within Chapter 2 Climate Change Chapters 3: Waterway and catchment health; and Chapter 5 Resilient and liveable cities and towns. For example, Action 3.1 'Protecting our waterways and catchments' aims to protect our urban waterways. The ESD policies 'Stormwater Management' and 'Water Resources' objectives are essential to achieving this action. Similarly, Action 5.2 'Better urban water planning to address key challenges' focusses on rainwater harvesting and water efficiency, which is delivered via the ESD policies.
- The *Climate Change Act 2017*, which commits Victoria to embed long-term emissions reductions to achieve a target of net zero emissions by 2050. This will not be achieved without actions such as increasing renewable energy and improving the energy efficiency of new buildings, which is facilitated by the ESD planning policies.
- Australia's international obligations pursuant to the United Nations Framework Convention on Climate Change *Paris Agreement*, which mandates Australia to act on reducing greenhouse gas emissions in line with other nations. Without local action in Victorians councils such as Banyule, Moreland, Port Phillip, Stonington, Whitehorse and Yarra, which have populations in excess of 790,000 persons, this target will not be reached.

Additionally, the Joint Councils have many internal strategies which rely on the local ESD planning policies, including:

City of Yarra

- City of Yarra's *Yarra Environment Strategy 2013-2017* provides strategic direction and actions to integrate sustainable practices in Council's operations. The strategy outlines several objectives to use Council influence to encourage sustainable design and to increase climate change resilience within the community. The ESD LPP is crucial to enacting these objectives as they provide consistent framework to introducing sustainable design into the Planning Scheme.
- The *Water Action Plan 2006* is a result of the City of Yarra's commitment to providing leadership in sustainable water management. Action 5.1.5 aims to introduce sustainable water management practices within the planning scheme. Currently Council's ESD local policy is the main tool for implementing this action.
- "The Liveable Yarra Community Engagement Exercise" was a deliberative community engagement exercise for the purpose guiding Council's Planning Scheme rewrite. Environmental sustainable design was a key element to the discussions and a main aspiration for the community. Action 2 of the report is "to encourage housing development with high environmental qualities". Without the current ESD local policy Council would not be able to meet these agreements, as the ESD is the most efficient tool use by Council's planning team.
- City of Yarra's *Urban Design Strategy* aims to achieve good design outcomes and develop a coherent and appealing built environment. A large element of the Urban Design Strategy is to integrate and promote ESD into new development within Yarra. Council has made a commitment within the strategy to introduce an ESD local policy within the planning scheme (Action 8.1.4) making it necessary to extend the sunset clause in lieu of a State planning framework.
- City of Yarra's Housing Strategy 2010-2013 acknowledged the importance of considering environmental sustainable design with new developments. These aspirations were acknowledged in a series of actions promoting Yarra's sustainable values. Most importantly action 8.1.4 was to introduce an ESD policy into the local planning scheme.

City of Moreland

- The Moreland *Zero Carbon Evolution* strategy which introduced in 2014, aims to reduce the carbon emissions across the Moreland municipality by 22% by 2020. It identified major sources of carbon emissions across the municipality and focusses on 5 key strategies, being: generating local renewable energy; using energy efficiently; increasing low-emissions transport; minimising the urban heat island effect; and

activating the Moreland community. The ESD policy is integral to achieving this 22% target.

- The Moreland *Urban Heat Island Effect Action Plan 2016/2016 – 2025-2026*, which finalised in 2016, aims to respond to the devastating UHIE in Moreland and transition the municipality to a cooler and more liveable city by 2026. Actions underpinning this strategy include crating cooler buildings, green spaces and strengthening green infrastructure. These actions are all achievable by improving new buildings via mechanisms such as the local ESD policy.
- The Moreland *WaterMap 2020* strategy which released in 2014, aims to transition Moreland to a water sensitive city. Key targets include a 25% reduction in community potable water consumption based on the 2001 baseline data, all residential development of 2 or more dwellings incorporate best practice stormwater management and for 50% of Moreland's households to have an installed rainwater harvesting tank by 2020. All of these targets rely on the water and stormwater management objectives in the local ESD policy.

City of Banyule

- City of Banyule's *Environmental Sustainability Policy and Strategy 2013-2017* recognises the intrinsic value of the environment and has 5 key goals: protecting and enhancing our natural environment; conserving water and improving stormwater quality; delivering action on climate change; avoiding waste generation; and encouraging environmental stewardship. The ESD local policy facilitates these policies.

City of Port Phillip

- City of Port Phillip's various environmental strategies ranging from: the *Climate Change Adaptation Plan*, the *Sustainable Transport Strategy: a connected and liveable city*; the *Greenhouse Plan: low carbon city* which aspires to a 50% reduction of emissions by 2050; and the *Water Plan: toward a water sensitive city*. All of these policies focus on the private realm and require new development to be designed and constructed with ESD principles, in order to achieve their overarching strategy targets and aspirations.

City of Stonnington

- City of Stonnington's overarching *Sustainable Environment Strategy 2013-2017* provides a strategic approach to improving the local environment and its influence on

the health and sustainability of the city. It outlines Council's priorities for enhancing the local environment and improving both community and corporate sustainability. The ESD Policy specifically addresses the (1) Energy Conservation and (2) Minimising Waste and Maximising Resource Recovery strategic priorities; supporting the community to reduce energy consumption and corresponding greenhouse gas emissions, and to inform and support the community to implement correct waste disposal practices.

City of Whitehorse

- The Whitehorse *Climate Change Adaptation Plan, Sustainability Strategy 2016-2022* and the *Whitehorse Peak Oil Action Plan 2011*, which have broad sustainability objectives, including efficient buildings, renewable energy and waste reduction, all of which are achieved by the local ESD policy. Without the ESD policies, key initiatives from these 3 strategies will be undelivered.

CONCLUSION

The ESD local policies provide a robust, consistent policy that optimises ESD outcomes at the planning stage of development. Although ESD is a keystone principle in Victoria's planning system, embedded in the strategic objectives of State and Local Planning provisions, the main tools and statutory provisions for ESD have traditionally operated outside the planning system.

The collected data demonstrates that the ESD policies are achieving substantial environmental benefits, and are contributing to maintaining and enhancing the liveability of Melbourne, without encumbering the existing planning application process.

Prior to the gazettal of the Policy, it was clear that a consistent approach to ESD was lacking. It was also clear that the consideration of environmental issues within the planning stage of the building process is a value held by residents of Banyule, Port Phillip, Moreland, Stonnington, Whitehorse and Yarra councils.

The expiry of the ESD Local Policies on June 2019, without introduction of an equivalent provision in the Victoria Planning Provisions, would create an unnecessary disruption in an established and industry recognised planning system. The loss of the ESD policies would create huge disruption in the planning system. It would eliminate the consistent approach achieved by the six Joint Councils, again putting developers, ESD consultants, architects,

urban planners and residents, into a state of uncertainty and give rise to an inconsistent pursuit of ESD, which is a key concern of industry.

The environmental outcomes associated with the policies would also be significantly reduced, as would the capacity for councils to respond to the various local, state, federal and international commitments they are bound to. The deletion of the sunset clause and the continuation of the local policies, in lieu of a state-wide framework, is therefore integral for councils in honouring these commitments.

Actions and recommendations

1. We seek that the expiry date in our 6 local ESD policies is removed.
2. We would also be pleased to discuss the progression towards and equivalent state-wide policy and how this can be implemented.

APPENDIX 1: ESD CONSULTANTS

List of applicants who regularly submit SDA's to ESD councils who are not ESD consultants (i.e. They are architects, building designers, developers, etc.):

- Archsign <http://www.archsign.com.au/>
- EJ Gretch <http://www.ejgretch.com.au>
- MAP Architecture <http://maparchitecture.com.au/>
- Mavi Designs <http://www.mavidesigns.com.au/index.html>
- Planning & Design - 9018 1529 (no website).
- Time Architects <http://www.timearchitects.com.au/>

List of ESD Consultants who regularly prepared SMP's for submission at the ESD councils:

- Ark Resources <http://www.ark-resources.com.au/> website/
- Edefice <http://www.edefice.com.au>
- EnergyLab <http://www.energylab.com.au>
- Frater Consulting Services <http://www.fratergroup.com.au/consulting/>
- GIW Environmental Solutions <http://giw.com.au/>
- Low Impact Development Consulting (LID) <http://lidconsulting.com.au/>
- Norman Disney Young <http://ndy.com/>
- Northern Environmental Design (no website – contact Jonathan Duverge)
- Simpson Kotzman <http://st.com.au/>
- Sustainable Built Environments (SBE) <http://www.sbe.com.au/>
- Sustainable Development Consultants (SDC) <http://www.sdconsultants.com.au/>
- Sustainability House <http://www.sustainabilityhouse.com.au/>
- Wood and Grieve <http://wge.com.au/>

Attention is also drawn to the list of BESS trained professionals obtained at <http://bess.net.au/support/bess-trained-professionals/> .

APPENDIX 2: DATA COLLECTED BY MOONEE VALLEY FROM AUGUST 2016 – APRIL 2017

Summary of applications where ESD has been part of the planning assessment:

194 applications, consisting of:

- 3-9 dwellings – 153 (79% of all BESS applications, of which 3 dwellings make up 43%, and 4 dwellings make up 25%)
- 10+ dwellings & mixed use – 32 (approx. 16.5% of all BESS applications)
- Education & sport – 6 (approx. 3% of all BESS applications)
- Warehouse – 3 (approx. 1.5% of all BESS applications)

Experience of Moonee Valley - Jennifer Hocking from Moonee Valley has noted the following:

“It is my feeling that the good uptake of BESS submissions reflects the following initiatives:

- *MVCC having had the WSUD LPP in operation for the past 3.5yrs it has alerted applicants to the council’s interest in pursuing and taking ESD related concerns seriously with planning applications.*
- *With 6 other city councils implementing an ESD LPP along with a handful of other metropolitan city councils, like MVCC, also requesting ESD responses/reports for development applications this has established an environment where the building industry generally now has an expectation of having to meet these policies.*
- *The consumer is now looking for, & coming to expect, the inclusion of ESD initiatives to be provided in their building purchases and the market is beginning to reflect this”.*

Over the 2016/17 financial year, a total of 872 applications⁶ were lodged at Moonee Valley Council (Note – the ESD data was collected from August 2016 – April 2017). The ESD policy is applied only for applications of 3 dwellings or greater. Therefore many applications lodged were not applicable for ESD, such as single dwelling extensions, signage, subdivisions, etc.

⁶ 766 new applications and 106 amendment applications. Source: Planning Permit Activity Quarterly Reports obtained at <https://www.planning.vic.gov.au/publications/planning-permit-activity-in-victoria/planning-permit-activity-quarterly-report>.



Council Alliance for a
Sustainable Built Environment

CASBE PLANNING Information Sheet 1

Version 1—November 2016

Sustainable Design Assessment in the Planning Process (SDAPP) at VCAT

In 2016, CASBE reviewed all hearings before VCAT relevant to SDAPP between 2003 and 2016. Presented here are some of the broader findings from that review. This is the first in a series of information sheets which will cover individual topics in more detail.

Generally, there have been three overarching themes to the challenges which SDAPP faces at VCAT. The first challenge involves establishing that there is a valid role at all for sustainability within the sphere of planning. The second challenge is centred on the level of policy support found in planning schemes. The third challenge is justifying measures based on the characteristics of a specific proposal. In order to successfully implement SDAPP all three of these challenges must be met, as they have all been used as reasons to avoid or reduce sustainability requirements on a proposal. While there is a logical progression to the three challenges, this has not necessarily been observed chronologically through VCAT. Although VCAT has a tendency to be consistent with previous rulings it is not bound to do so, and thus there are cases of an issue being decided in contradicting ways within short periods of time, or an argument being supported which was thought settled previously. This presents both the opportunity to forge new ground with strong arguments in a previously contested area, as well as the challenge to defend the gains which have been made.

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, 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.

Overview

In total CASBE reviewed 1715 VCAT decisions to June 2016. This list was built both from speaking to practitioners about cases they thought significant, and using numerous search terms to identify hearings of potential interest through the Australasian Legal Information Institute (AustLII).

Covering multiple planning schemes makes it difficult both to form a cohesive timeline for the attitudes of VCAT, as well as identifying where decisions have only local implications, or wider ones.

There was a great deal of variation and inconsistency in terminology used both by VCAT and councils.

One area identified as particularly relevant was the standing of ESD reports as a requirement at VCAT:

- 51 hearings covered the applicant challenging the need for an ESD report.
- 33 of these resulted in VCAT removing the requirement, while in 18 hearings the requirement was retained. Since the beginning of 2011, the results are 7 removals and 13 retentions.
- A clear trend has emerged at VCAT over time, reinforcing the legitimate role of SDAPP.





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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.

Challenge Three: Site Specific Considerations

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.

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.

National Trust Principle

One particular case not relating to ESD nonetheless emerges as potentially relevant. In *Boroondara CC v 1045 Burke Road* ([2015] VSCA 27), the Court of Appeal presented a significant reinterpretation of the National Trust Principle. The National Trust principle was a long held understanding that within the Victorian planning system, a decision-maker is limited to considering matters directly related to the need for a planning permit. This was previously interpreted to mean for example that if a proposal needs planning permission only due to a heritage overlay, non-heritage considerations are irrelevant to the decision making process.

In this case, the Court ruled that while the principle stands, it has been misinterpreted. The decision maker must be guided by only those matters presented in the clause for which a permit is required, but triggering clauses often contain broad areas for consideration. Heritage Overlays for example include as relevant considerations the implementation of state and local planning policies. Due to this any permit application, even if required solely on heritage grounds, must respond to among other things the policies found in the Local Planning Policy Framework.

This significantly increases the scope of applications which may potentially be required to address sustainability, but it falls to council officers to make the argument that such requirements are suitable to individual proposals.

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Daylight Assessment at VCAT

The following cases are instructive of VCAT's most recent positions on equitable development, internal and external amenity with regard to assessing daylight.

Nguyen v Darebin CC [2016] VCAT 665

Shepherd v Yarra CC [2016] VCAT 588

Denson v Boroondara CC [2016] VCAT 504

Lifestyle Living Pty Ltd v Knox CC [2016] VCAT 446

G3 Projects Pty Ltd v Yarra CC (Red Dot) [2016] VCAT 373

CBD Developments Pty Ltd v Moreland CC [2016] VCAT 325

11-15 Brunswick Road Pty Ltd v Moreland CC [2016] VCAT 67

Third Street Pty Ltd v Stonnington CC [2015] VCAT 1768

Jezmac Pty Ltd v Glen Eira CC [2015] VCAT 1074

Gesher Pty Ltd v Yarra CC [2015] VCAT 506

Internal Amenity

In *Nguyen*, the tribunal upheld that the appeal and application process is not the appropriate place for significant redesigns. The application was refused due to the degree of change which would be required to achieve acceptable internal amenity.

In *Shepherd*, a distinction was drawn between daylight and direct sunlight, having been misunderstood by an objector. This emphasizes the importance of communication with non-practitioners over issues of language.

In *Denson*, an applicant sought relaxation on internal amenity requirements. Due to proximity to a university, the applicant suggested that dwellings may be used as student accommodation. The tribunal noted that some applications are explicitly for student accommodation, but in this development dwellings could be occupied by anyone, and thus no concessions should be made.

In *G3 Projects*, the tribunal stated that the appropriate measures for best practice are derived from reference documents such as BESS in the Yarra scheme. With regards to best practice, it should be pursued where it does not have a significant adverse effect on other design elements. More broadly, a proposal's response to ESD objectives should be assessed with regard to the constraints it faces.

In *CBD Developments*, the tribunal used modelling provided by Dr Phillip Greenup in the absence of consistent state policy. Contrasting this with *G3 Projects* builds a strong case for putting assessment tools into local policy.

External Amenity

While ResCode does not provide strict standards when assessing external amenity impacts in a C1Z, the tribunal regarded it as useful guidance in *Shepherd*.

In another C1Z development, **11-15 Brunswick Road**, the tribunal found that in areas with high development potential, such as Commercial 1 Zones, buildings cannot reasonably expect secondary outlooks to be protected from development.

Equitable Development

In *Lifestyle Living*, council suggested that a future neighbouring development which mirrored the height and light courts of the review site would not be able to provide for equitable development of the neighbouring site. The tribunal accepted that it is reasonable to expect a neighbouring site to adopt similarly configured if not mirrored light courts, and to take advantage of sections of blank wall on the review site.

In *CBD Developments*, the tribunal expressed a preference for contextual responses to equitable development, rather than adhering strictly to setbacks, enabling constrained sites to be developed, with neighbouring less constrained sites shouldering a greater burden of amenity.

Given this, it is important to refer to this practice when assessing less constrained sites to ensure that an appropriate overall level of amenity is found, otherwise less constrained sites will be allowed to satisfy bare minimum requirements, and more constrained sites will fail to meet even those.

In *Third Street*, the tribunal found that where a site is particularly constrained, there is a need for clever design solutions to approach this. In the applicant's proposal the tribunal found this lacking and refused to grant a permit.

In *Jezmac*, an adjoining lot was subject to an application to develop at three storeys, and this three storey development would provide acceptable amenity to both sites. Tribunal held however that three storeys was "not the reasonable potential of the adjoining property". Given the location in an activity centre, and other development nearby, a neighbouring development of six to eight storeys was considered a real possibility, which would result in unacceptable amenity for the review site. As a result of this VCAT affirmed the decision of the responsible authority to refuse a permit.

Principles of Equitable Development

As summarized in *Gesher*, the guidelines for assessing equitable development rights are:

1. *Equitable does not mean equal.*
2. *Development should not be too dependent on borrowing from neighbouring sites for its amenity.*
3. *Development should not unreasonably fetter redevelopment opportunities on adjoining sites.*
4. *The site size, proportion and context will influence how amenity can be equitably shared between adjoining sites.*
5. *In the absence of a specific proposal for an adjoining property, development should not have to satisfy a speculative or hypothetical worst case scenario on an adjoining property.*

This last point on development scenarios for adjacent properties was raised again in *Jezmac*, and based on that it seems the key words are "speculative or hypothetical", in *Jezmac* a standard of "reasonable potential" is applied to assess against future development.

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Green Travel Plans and Zero Parking at VCAT

The following cases are instructive of VCAT's most recent positions on Green Travel Plans (GTPs) and Zero Parking

Lifestyle Living Pty Ltd v Knox CC [2016] VCAT 446

Vincent Corporation Pty Ltd v Moreland CC [2015] VCAT 2049

Third Street Pty Ltd v Stonnington CC [2015] VCAT 1768

Chaucer Enterprises Pty Ltd v Moreland CC [2015] VCAT 1615

Maier Corp Pty Ltd v Maribyrnong CC [2015] VCAT 946

Schatzl v Port Phillip CC [2015] VCAT 5

Green Travel Plans

In **Maier**, the tribunal found that requiring a Green Travel Plan was inappropriate because the development did not seek a reduction in parking requirements. In the Maribyrnong planning scheme a significant reduction in parking requirements is one of the triggers for requiring a Green Travel Plan, along with dwelling yield (this proposal did not exceed that yield) and developments which "generate significant travel demand". The tribunal also expressed the view that Green Travel Plans are unable to assist in accommodating visitor travel.

In **Chaucer** (also known as Nightingale), the tribunal criticised Green Travel Plans as potentially burdensome requirements which may be abandoned by the body corporate in future.

In **Lifestyle**, the tribunal found that Green Travel Plans were impractical to condition on serviced apartments and deleted a condition requiring them. This was despite the proposal including four dwellings in addition to the 32 serviced apartments. The tribunal also rejected both an s173 agreement conditioned by council, and later a secondary consent condition proposed by the applicant, ensuring that serviced apartments would not be used as dwellings in the future.

Green Travel Plans in the Planning Scheme

At this stage there is no consistent standard for applying Green Travel Plans.

The six ESD policies gazetted in November 2015 require a GTP on non-residential buildings above 1000m²

Four member councils mention GTPs in their MSS. Of these, Moonee Valley and Maribyrnong implement triggers to require GTPs: 100 trips per day generated; and 60-200 dwellings/significant parking dispensation requested / significant travel demand generated respectively.

Only Maribyrnong lists "Guidelines for the Development of Green Travel Plans and Transport Access Guides" as a reference document.

Councils often incorporate Green Travel Plans into schedules to zones and overlays: One to the Priority Development Zone, two to the Activity Centre Zone, three to the Development Plan Overlay, two to the Design and Development Overlay, and two to the Parking Overlay.

Some CASBE member councils do not mention GTPs at all in their planning schemes.



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Zero Parking Initiatives

Schatz is significant, because it is a case where a full parking waiver was approved for a site 1.5km by foot from the nearest train station. Bus routes operate outside the site which connect it to higher order activity centres. The provision of a share car pod was assessed as being of net benefit to the wider community, rather than just residents of the development, and alterations were sought improving community access to it. Finally, the tribunal stated that the policy of not issuing new residential permits in a controlled parking area should reduce the likelihood of future residents owning cars.

In **Chaucer**, the tribunal drew significant distinctions between a reduction in parking requirements (even a substantial reduction) and a complete waiver, focusing on grounds of equity. Based on this, there is a case for making local policy more explicit in support of zero parking, rather than just reductions generally.

The tribunal also found that implications for on-street parking supply must be assessed across a broader area. While the nearest on-street parking was controlled by permit, there were neighbouring areas which were not and may have been affected by flow-on parking as a result of the development.

In response to the applicant planning to screen potential buyers to encourage a car free culture, the tribunal noted that there were no controls in place to maintain this culture past the initial sale.

Due to other factors, no permit was issued in **Third Street**, but the tribunal supported a full waiver of parking requirements. Parking could have been provided, but would have been at the detriment of providing an activated street front, and was thus contrary to the objectives of the activity centre the development was in.

In **Vincent**, the tribunal stated that parking overlays represent an alteration to the standard rate of parking applied, rather than an absolute maximum or minimum. Contrary to **Chaucer**, the tribunal took the position that in an area of limited on-street supply, it is reasonable for the council to control parking through the issue or non-issue of permits. Furthermore, while it may be expected that visitors generate some demand for on-street parking, this can only be considered a grounds for refusal where the scheme would require visitor parking be provided by the proposal.

Full Waiver Standards

As reiterated in **Vincent**, the key points in assessing full waivers of parking requirements are:

- *Assessing parking across a whole centre, rather than purely on a per proposal basis.*
- *The planning scheme forms only one part of managing parking supply and demand.*
- *Alternative travel methods suggest lower empirical demands can be expected in the future.*
- *On-street management in areas of existing high demand and low supply reduces the relevance of future residents impacting on-street parking.*
- *Each site does not necessarily need to meet empirical demand, particularly constrained sites.*
- *Assessment of public transport access should include timing, frequency and route diversity.*
- *Walkable access to daily needs.*
- *Access to other transport options including bicycle infrastructure and share cars.*
- *Ultimately, a test of net community benefit should be applied.*

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Council Alliance for a
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CASBE PLANNING Information Sheet 4

Version 1—November 2016

Equitable Development at VCAT

The following cases are instructive of VCAT's most recent positions on equitable development.

Aitken Properties Pty Ltd v Hobsons Bay CC [2016] VCAT 1484

TAB Developments Pty Ltd v Port Phillip CC [2016] VCAT 1469

Samal Pty Ltd v Bayside CC [2016] VCAT 1143

Marshwell Pty Ltd v Moreland CC [2016] VCAT 1068

Crete Developments Pty Ltd v Darebin CC [2016] VCAT 1044

Tierney Properties Pty Ltd v Melbourne CC [2016] VCAT 1008

Jinshan Investment Group Pty Ltd v Melbourne CC [2016] VCAT 626

Lifestyle Living Pty Ltd v Knox CC [2016] VCAT 446

Jezmac Pty Ltd v Glen Eira CC [2015] VCAT 1074

Gesher Pty Ltd v Yarra CC [2015] VCAT 506

Highbury Venture Pty Ltd v Melbourne CC [2013] VCAT 2094

Equitable development is concerned with retaining reasonable opportunities for future development on adjacent sites. This is increasingly important as housing strategies focus more on intensification and infill as opposed to greenfield development. The concept of reasonable expectations of development is a critical one and is discussed below.

There are two central considerations for equitable development:

Does the proposal restrict the ability of a reasonable future adjacent development to achieve adequate amenity?

Does the proposal achieve adequate amenity in a way which is vulnerable to a reasonable future adjacent development?

Reasonable Future Development

In *Gesher* the tribunal stated that "In the absence of a specific proposal for an adjoining property, development should not have to satisfy a speculative or hypothetical worst case scenario on an adjoining property." There have however been cases prior to and since then in which the tribunal has asserted the nature of equitable development requires speculation on the part of the responsible authority. This should be based on what the reasonable expectations of development on adjacent sites are, including recent applications and development, as well as the strategic context of the area (*Highbury Venture*, *Jezmac*).

Existing Buildings

On numerous occasions (*Tierney Properties*, *Marshwell*, *TAB Developments*) the tribunal has made the point that equitable development must be forward rather than backward looking. That the review site may have been encroached upon by inequitable development in the past should not be taken into account when considering equitable development in the future. This highlights the importance of properly assessing the equitable development implications of every development as it occurs.

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Blank Walls

In some situations a blank wall as a site interface may be a suitable response to equitable development concerns, as articulated in *Lifestyle Living*. A blank wall means that future development will not have to protect daylight access or outlook to that interface. This is particularly relevant for areas where neighbouring sites would find it hard to source adequate daylight for inboard dwellings, such as the narrow lots covered in *Samal* and *Crete Developments*. In some cases windows may be built to these interfaces under a Section 173 agreement which would see them filled in to create a blank wall at the time of neighbouring development, as was implemented in *Jinshan Investment Group*.

Transition to Better Apartments

The Victorian Government has released the *Better Apartments Draft Design Standards*, with the aim to introduce them in late 2016. The standards seek to replace the existing *Guidelines for Higher Density Residential Development* in guiding design for apartments within the state.

Explicit support for equitable development is found in Objective 2.6 of the *Guidelines for Higher Density Residential Development* which reads "To ensure areas can develop with an equitable access to outlook and sunlight."

This is potentially important, in *Highbury Venture* the tribunal stated that equitable development was a relevant matter due to support found in both local policy and the guidelines.

In contrast, equitable development is not mentioned specifically in the *Better Apartments Draft Design Standards*, and there is no reference to either future or potential development.

Better Apartments does include standards for light wells, which the existing guidelines do not. They state that adjacent land should not be used in calculating the area of light wells, and also that light wells should not be the primary source of light for living areas.

An explicit focus on setbacks to achieve primary amenity for daylight and outlook may result in acceptable development outcomes. Whether they do, and whether compromises on setbacks should be granted, should be assessed on a case by case basis.

Where equitable development principles are not met there is still potential precedent to push for them without explicit policy support. In *Aitken Properties* the tribunal found equitable development was a valid consideration due to the strategic context of the site, even in the absence of explicit policy support for equitable development when considering proposals of less than five storeys.

Principles of Equitable Development

In *Gesher*, the tribunal summarized existing positions on the principles of equitable development. While cases presented elsewhere in this document are more recent (with the exception of *Highbury Venture*), and thus potentially more relevant in the case of contradictions, it is worthwhile repeating those principles as a convenient starting point.

1. *Equitable does not mean equal.*
2. *Development should not be too dependent on borrowing from neighbouring sites for its amenity.*
3. *Development should not unreasonably fetter redevelopment opportunities on adjoining sites.*
4. *The site size, proportion and context will influence how amenity can be equitably shared between adjoining sites.*
5. *In the absence of a specific proposal for an adjoining property, development should not have to satisfy a speculative or hypothetical worst case scenario on an adjoining property.*

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APPENDIX 4: ESD COMPONENTS OF PLANNING PERMIT MPS/2016/781



Moreland City Council

Moreland City Council
Municipal Offices
90 Bell Street
Coburg
Victoria 3058

PLANNING PERMIT

Permit No. MPS/2016/781

Planning Scheme: Moreland Planning Scheme

Responsible Authority: Moreland City Council

ADDRESS OF LAND: 40 Richards Street, COBURG VIC 3058

WHAT THE PERMIT ALLOWS: Construction of four dwellings (three double storey and one single storey), in accordance with the endorsed plans

THE FOLLOWING CONDITIONS APPLY TO THIS PERMIT:

1. Before the development commences, amended plans to the satisfaction of the Responsible Authority must be submitted to and approved by the Responsible Authority. When approved, the plans will be endorsed and will then form part of the permit. The plans must be drawn to scale with dimensions and three copies must be provided. The plans must be generally in accordance with the plans advertised 13 January 2017, but modified to show:
 - a) The amended plans are to show the parking space outside dwellings 3 and 4 (to the south) removed. In an area not shown as the turning circle, a canopy tree is to be shown in accordance with Condition 3 and 1k) below.
 - b) The existing vehicle crossing to be shown reconstructed and with 1 metre straight splays on both sides commencing where the footpath meets the nature strip and finishing at the kerb in accordance with Council's Standard Vehicle Crossing design, and 3 metres in width at the footpath matching the location of the accessway.
 - c) The storage shed removed from the secluded private open space of Dwelling 1 and shelving no wider than 0.3 metres shown alongside the car space in the garage.
 - d) The north-south dimension of the secluded private open space of Dwelling 1 increased from 5.042 metres to 5.642 metres deep (to allow 22 square metres of secluded private open space).
 - e) The accessway with a demonstrated corner splay or area at least 50 per cent clear of visual obstructions extending at least 2 metres along the frontage road from the edge of an exit lane and 2.5 metres along the exit lane from the frontage, to provide a clear view of pedestrians on the footpath of the frontage road. The area clear of visual obstructions may include an adjacent entry or exit lane where more than one lane is provided, or adjacent landscaped areas, provided the landscaping in those areas is less than 900mm in height.

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DATE ISSUED


SIGNATURE FOR THE RESPONSIBLE AUTHORITY

- f) The meterbox or mailbox, or any similar structure not exceeding 1.5 metres within the front setback, and not within the visibility splay. If located on the south fenceline, located against the fence without removing part of the fence.
- g) The south elevation plan amended to show the development with the fence dotted across it, rather than shown as solid.
- h) The south boundary fence labelled as the existing fence retained. Where there was not an existing fence at the garage wall, any new fence must extend past the height of the existing fence by at least 0.5 metres, and be constructed of a typical feature style timber at least above the height of the existing fence.
- i) The north facing windows of bedroom 2 of Dwellings 2 and 3 labelled as a minimum 50% transparent.
- j) The south facing first floor habitable room windows noted as obscured and not openable below 1.7 metres above the floor level.
- k) A landscape plan in accordance with Condition 3 of this permit.
- l) All existing tree(s) and vegetation on site and adjoining land, including the tree protection zone(s).
- m) A schedule of all proposed exterior decorations, materials, finishes and colours, including colour samples (3 copies in a form that can be endorsed and filed).
- n) The plans updated with the address of the site shown as 40 Richards Street (not 40-42).
- o) The amended plans are to show the garage door at least 2.8 metres wide, as required by the Australian Standard for Off-Street Parking (AS2890.1).
- p) Changes in accordance with Clause 22.08 best practice requirements:
 - i. Additional shading devices to North facing glazing for all units, and West facing glazing for Unit 4 to prevent peak summer heat gains
 - ii. Bicycle spaces as per amended BESS report
 - iii. Any additional WSUD devices required by updated STORM report, required by Condition 6.

6. Prior to the endorsement of plans, an amended Sustainable Design Assessment (SDA) must be submitted to and approved by the Responsible Authority. The amended SDA must demonstrate best practice environmentally sustainable design and address the following areas assessed to require amendment:

- a) 4 Bicycle spaces in line with Clause 22.08 best practice requirements
- b) Amended STORM report including all impervious surfaces on site

When submitted and approved to the satisfaction of the Responsible Authority, the SDA and associated notated plans will be endorsed to form part of this permit.

7. All works must be undertaken in accordance with the endorsed Sustainable Design Assessment report to the satisfaction of the Responsible Authority. No alterations to the Sustainable Design Assessment report may occur without the written consent of the Responsible Authority.

Appendix E

Evolution of standards

E1.1 Energy and greenhouse gas emissions

We made the following changes in response to stakeholder feedback and Arup technical review.

- Non-residential building alterations rating – **Revised** from NABERS Energy to BESS to seek a holistic sustainability rating, rather than focus on Energy.
- No connection to gas infrastructure – **Moved** this minimum requirement to preferred standard to allow flexibility for cooking and emergency gas, in line with Green Building Council of Australia zero carbon pathway.
- 10% energy improvement against National Construction Code, additional requirements for building fabric, lighting, lifts and services – **Revised** this to reflect National Construction Code 2022 trajectory.
- Threshold for certification against Green Star Design & As-Built – **Increased** this from 2000 sqm to 5000 sqm to align with Local Policy 22.19 trigger.
- Readiness to connect to precinct energy sources – **Removed** this, as district heating technologies now superseded.

E1.2 Sustainable transport

We made the following changes in response to Arup technical review.

- Residential parking requirement – **Revised** to express as per bedroom.
- Non-residential parking requirement – **Reduced** to reflect benchmarking

As a result of City of Melbourne feedback and development viability studies, we removed the Stage 1 minimum requirement for pedestrian connections through large blocks.

The standard as drafted below is consistent with Planning Scheme Amendment C308 (urban design in the central city and Southbank). In development feasibility studies, this standard had the most substantial impact on the land value of the Roden Street scenario.

Standard as presented in Stage 1:

For street blocks exceeding 200 metres in length, at least two pedestrian connections should be provided.

Pedestrian connections should be located centrally within the street block and where possible, less than 70 metres from the next intersection or pedestrian connection.

New or redeveloped pedestrian connections which are:

- Safe, direct, attractive, well-lit and provide a line of sight from one end of to the other
- Publicly accessible and appropriately secured with a legal agreement

- At least six metres wide
- Open to the sky
- Lined by active frontages.

Development with a frontage to two or more streets or lanes should provide for pedestrian connections where this improves walkability of the block.

Development should provide direct and convenient pedestrian connections that align with other lanes or pedestrian connections on nearby sites through the following:

- Partial pedestrian connections which can be completed when adjacent site development occurs.
- Connect or extend existing or proposed adjacent pedestrian connections on an adjoining site.

E1.3 Waste and resources recovery

This standard has been unchanged throughout this investigation.

E1.4 Adaptive reuse

Based on City of Melbourne feedback, we have removed the adaptive reuse theme. We presented it in both Stage 1 and Stage 2. As discussed in Section 3.2.2 standard requires a stronger policy basis and evidence base to establish sustainability standards.

We note that stakeholders at the Stage 1 workshop advocated for stronger consideration of circular economy and adaptive reuse in Melbourne's Planning Scheme.

Adaptive reuse standard, as presented in Stage 1:

- **Minimum requirement:** New development must develop an approach to future adaptation to other uses.
- **Preferred standard:** In addition to mandatory requirements, specify floor-to-floor heights that enable future adaptation to other uses.
- Adaptive reuse standard, as presented in Stage 2:
- **Minimum requirement:** Establish the capacity for at or above ground car parking on common property to transition to alternative uses over time. Design parking structures above level with floor to floor heights of at least 3.5 metres to allow future adaption.
- **Preferred standard:** All car parking spaces are retained as common property.

E1.5 Amenity

Based on City of Melbourne feedback, we have removed this theme as there is no specific strategy for private sunlight access (see Section 4).

The standards as presented in Stage 1 and 2 applied the Planning Scheme Amendment C278 standards for parks to private open space, as well as generalised the Better Apartment Design Standards for communal outdoor open space to other types of development.

The four case studies presented in Section 5 do respond to the minimum requirement. It would be possible to reintroduce these standards if there is a clear policy basis.

Amenity standard, as presented in Stages 1 and 2:

- **Minimum requirement:** All proposed open spaces to have winter sun access. Sunlight protection hours are 10am to 3pm in winter on June 21, from the current 11am to 2pm on September 21. No additional overshadowing across the municipality, excluding the Hoddle Grid and Southbank. In areas of growth, allow limited overshadowing of parks within certain circumstances, using the existing controls in the Design and Development Overlay, in terms of street wall height or overall building height, as the basis for the sunlight control.
- **Preferred standard:** In addition to the mandatory requirements, communal outdoor open space should be located on the north side of a building, if appropriate. At least 50 per cent or 125 square metres, whichever is the lesser, of the primary communal outdoor open space should receive a minimum of two hours of sunlight between 9am and 3pm on 21 June.

E1.6 Urban heat reduction

We made the following changes in response to City of Melbourne feedback, Arup technical review and technical feasibility studies.

- Green cover requirement – **Moved** this to the urban ecology theme.
- Understorey habitat requirement – **Moved** this to the urban ecology theme.
- Heat impacts of vertical surfaces – **Revised** this wording. In Stage 1, we set a benchmark based on vertical reflectivity. This was technically incorrect and has now been updated to nominate green wall, green façade and integrated shading for façade areas.

E1.7 Integrated water management

Stormwater management

Based on Arup technical review, we have **removed** the minimum requirement of ‘Maintain discharges up to the 5-year ARI event at pre-development levels’.

Based on the technical viability study, we **reduced** the porous surfaces standard from 25% to 20%. This brings the standard in line with existing policies and provisions.

We **moved** the porous surfaces standards from minimum requirement to preferred standard after receiving advice that it would be very difficult to achieve.

Water use

Based on Arup technical review, we have made the following changes to the standards.

- Threshold for use of NABERS Water – **Increased** this from 2,000 sqm to 5,000 sqm to align with climate change mitigation standard threshold.
- Flexibility to increase water use to sustain green infrastructure – **Added** wording that allows for additional water use for green infrastructure.
- Percentage on water demand supplied by rainwater – **Reduced** this from 20% to 10% to make target more achievable.
- NABERS for alterations – **Removed** this requirement and applied the BESS standard.

Flood proofing

Based on Arup technical review, we have **moved** requirements for flood proofed built elements and ground floor uses from the minimum requirement to the preferred standard, to provide discretion based on the risk exposure of the site to flood.

E1.8 Urban ecology

We have introduced urban ecology as a new theme in Stage 2 based on discussions with City of Melbourne. There is a strong policy basis for the establishment of urban ecology green infrastructure as a standalone goal, given that it provides benefit under multiple sustainability themes.

Biodiversity

We have **moved** the standard for 20% site area to provide understorey habitat from minimum requirement to preferred standard following City of Melbourne feedback.

Green infrastructure

Based on Oculus technical review, we have reduced the site green cover standard from 50% to 40% site area (horizontal equivalent). This benchmark is based on precedent, technical feasibility and development viability. We have recommended municipal-wide assessment on the policy impact of this standard, as expressed through ecosystem service outcomes.

Appendix F

Ecosystem service benefits of
green infrastructure elements

Developing the evidence base

	FOOD SUPPLY	URBAN TEMPERATURE REGULATION (COOLING EFFECT)	RECREATION	AESTHETIC BENEFITS	PLACE VALUES AND SOCIAL COHESION	HABITAT FOR BIODIVERSITY	SURFACE RUNOFF
Mechanism for delivery of function's benefit	Food production, connection with broader food system	Shade Evapo-transpiration	Doing (active) and being (passive) in accessible green space: physical activity (walking, gardening), play	Visible (sensory) connection, biophilia: psychological benefits, stress reduction, recovery; sense of wellbeing;	Emotional and spiritual connections; cultural landscapes; sense of place; shared interests, participation	Shelter Food 'Benevolence' (conditions to enable completion of life cycle)	Soil permeability/percolation Canopy interception
Key determinants of relative delivery	Species: productive food		Accessibility	Individual wellbeing Visibility	Community scale/ social cohesion Visibility Accessibility	Species: indigenous Structural complexity No pesticides or pollutants; minimise noise, disturbance, night time light	Substrate volume Substrate permeability Leaf area Canopy volume
Higher value	Irrigation with stormwater	Structural complexity Irrigation with stormwater	Irrigation with stormwater	Structural complexity	Structural complexity Irrigation with stormwater	Structural complexity	WSUD>5% catchment ratio +1 WSUD>10% catchment ratio +2
Lower value		Unirrigated				> 5 storeys above ground level	Not connected to natural soil; small container size

Developing the evidence base

GI ELEMENT							
Large Tree (includes canopy trees)	Community gardens and domestic food growing can make a significant contribution, with potential for high levels of productivity from relatively small domestic spaces (Zainuddin and Mercer 2014).	An increase in the area of shrub or trees is associated with a larger cooling effect than an increase in the area of grass (Duncan et al. 2019)	Trees – provide shade, and create more attractive OS which encourages walking (Davern et al. 2017).	Trees can form important parts of cultural landscapes (Davern et al. 2017). Trees in private gardens important for providing indirect nature experiences (Cox et al. 2019).	Trees are associated with the mental health and wellbeing benefits of green space; Street trees encourage a sense of community (Davern et al. 2017).	Old trees with hollows offer habitat for birds and mammals (Davern et al. 2017). Importance of tree cover / connectivity across the urban matrix (Threlfall et al. 2012)	Plants species with greater root mass density and root diameter, tree species in particular, are most suitable for this function (Dagenais et al. 2018) Canopy interception (Kermavnar and Vilhar 2017)
	0	3	3	3	3	3	1
Medium Tree	Community gardens and domestic food growing can make a significant contribution, with potential for high levels of productivity from relatively small domestic spaces (Zainuddin and Mercer 2014).	An increase in the area of shrub or trees is associated with a larger cooling effect than an increase in the area of grass (Duncan et al. 2019)	Trees – provide shade, and create more attractive OS which encourages walking (Davern et al 2017)	Trees can form important parts of cultural landscapes (Davern et al. 2017). Trees in private gardens important for providing indirect nature experiences (Cox et al. 2019).	Trees are associated with the mental health and wellbeing benefits of green space; Street trees encourage a sense of community (Davern et al. 2017).	Importance of tree cover / connectivity across the urban matrix (Threlfall et al. 2012) Habitat quality increased with greater structural complexity (Threlfall et al. 2016)	Plants species with greater root mass density and root diameter, tree species in particular, are most suitable for this function (Dagenais et al. 2018) Canopy interception (Kermavnar and Vilhar 2017)
	0	3	3	3	3	3	1
Small Tree	Community gardens and domestic food growing can make a significant contribution, with potential for high levels of productivity from relatively small domestic spaces (Zainuddin and Mercer 2014).	An increase in the area of shrub or trees is associated with a larger cooling effect than an increase in the area of grass (Duncan et al. 2019)	Trees – provide shade, and create more attractive OS which encourages walking (Davern et al 2017)	Trees can form important parts of cultural landscapes (Davern et al. 2017). Trees in private gardens important for providing indirect nature experiences (Cox et al. 2019). The addition of trees, shrubs, native plants can amplify the biophilic draw to urban gardens (Lin et al. 2018).	Trees are associated with the mental health and wellbeing benefits of green space; Street trees encourage a sense of community (Davern et al. 2017).	Importance of tree cover / connectivity across the urban matrix (Threlfall et al. 2012) Habitat quality increased with greater structural complexity (Threlfall et al. 2016)	Plants species with greater root mass density and root diameter, tree species in particular, are most suitable for this function (Dagenais et al. 2018)
	0	2.5	2.5	3	3	2.5	1
Large Shrub	Community gardens and domestic food growing can make a significant contribution, with potential for high levels of productivity from relatively small domestic spaces (Zainuddin and Mercer 2014).	An increase in the area of shrub or trees is associated with a larger cooling effect than an increase in the area of grass (Duncan et al. 2019)	Shrubs provide less shade than trees (reducing their contribution to walking), but still provide other recreation co-benefits, including gardening	The addition of woody trees and shrubs, native plants, and culturally appropriate crops are all additions that can amplify the biophilic draw to urban gardens (Lin et al. 2018).	Cultural ecosystem services from urban green space are important for city dwellers (Dickinson and Hobbs 2017).	Habitat quality increased with increasing volume of understorey vegetation (Threlfall et al. 2017) and greater structural complexity (Threlfall et al. 2016)	The major factors to minimise runoff quantity are substrate volume and permeability (Livesley et al. 2016).
	0	2	1	2	2	2	0.5

Developing the evidence base

Small Shrub	Community gardens and domestic food growing can make a significant contribution, with potential for high levels of productivity from relatively small domestic spaces (Zainuddin and Mercer 2014).	An increase in the area of shrub or trees is associated with a larger cooling effect than an increase in the area of grass (Duncan et al. 2019)	Shrubs provide less shade than trees (reducing their contribution to walking), but still provide other recreation co-benefits	The addition of woody trees and shrubs, native plants, and culturally appropriate crops are all additions that can amplify the biophilic draw to urban gardens (Lin et al. 2018).	Cultural ecosystem services from urban green space are important for city dwellers (Dickinson and Hobbs 2017).	Habitat quality increased with increasing volume of understorey vegetation (Threlfall et al. 2017) and greater structural complexity (Threlfall et al. 2016)	The major factors to minimise runoff quantity are substrate volume and permeability (Livesley et al. 2016).
	0	2	1	2	2	2	0.5
Ground Cover	Community gardens and domestic food growing can make a significant contribution, with potential for high levels of productivity from relatively small domestic spaces (Zainuddin and Mercer 2014).	an increase in the area coverage of grass, shrubs, or trees reduces LST, holding all else equal (Duncan et al 2019)	Groundcovers may allow walking recreation; provide other recreation co-benefits, including gardening	The addition of woody trees and shrubs, native plants, and culturally appropriate crops are all additions that can amplify the biophilic draw to urban gardens (Lin et al. 2018).	Cultural ecosystem services from urban green space are important for city dwellers (Dickinson and Hobbs 2017).	Habitat quality increased with increasing volume of understorey vegetation (Threlfall et al. 2017) and greater structural complexity (Threlfall et al. 2016); unmanaged long grass can provide important habitat for insects (Davern et al 2017)	The major factors to minimise runoff quantity are substrate volume and permeability (Livesley et al. 2016).
	0	1.5	1	2	2	1.5	0.5
Climbers	Community gardens and domestic food growing can make a significant contribution, with potential for high levels of productivity from relatively small domestic spaces (Zainuddin and Mercer 2014).	An increase in the area of shrub or trees is associated with a larger cooling effect than an increase in the area of grass (Duncan et al. 2019)	Trees – provide shade, and create more attractive OS which encourages walking (Davern et al 2017)	Trees can form important parts of cultural landscapes (Davern et al. 2017). Trees in private gardens important for providing indirect nature experiences (Cox et al. 2019). The addition of trees, shrubs, native plants can amplify the biophilic draw to urban gardens (Lin et al. 2018).	Trees are associated with the mental health and wellbeing benefits of green space; Street trees encourage a sense of community (Davern et al. 2017).	Importance of tree cover / connectivity across the urban matrix (Threlfall et al. 2012) Habitat quality increased with greater structural complexity (Threlfall et al. 2016)	Plants species with greater root mass density and root diameter, tree species in particular, are most suitable for this function (Dagenais et al. 2018)
	0	2.5	2.5	3	3	2.5	0.5
Lawn / turf	n.a.	Irrigated grass can provide cooling benefits (Davern et al 2017); irrigation required to maximise cooling effect	Grassed areas provide areas for active and passive recreation (Davern et al 2017)	Parks with scattered trees in lawn are generally preferred; Lawns are an important part (cultural preference) of some western landscapes in cool-temperate regions (Davern et al. 2017).	Lawns are an important part (cultural preference) of some western landscapes in cool-temperate regions (Davern et al. 2017).	mown lawn provides minimal habitat (Davern et al 2017); decreasing the frequency and altering the timing of mowing can increase invertebrate diversity (Parris et al. 2018)	The major factors to minimise runoff quantity are substrate volume and permeability (Livesley et al. 2016).
	0	1.5	2	2	1	0.5	0.5

Developing the evidence base

GI SUPPORTING STRUCTURE							
Raingardens	The impact against this ecosystem service is related to the vegetation elements (so rewarded above).	The impact against this ecosystem service is related to the vegetation elements (so rewarded above).	The impact against this ecosystem service is related to the vegetation elements (so rewarded above).	The impact against this ecosystem service is related to the vegetation elements (so rewarded above).	The impact against this ecosystem service is related to the vegetation elements (so rewarded above).	The impact against this ecosystem service is related to the vegetation elements (so rewarded above).	Raingardens reduce stormwater runoff (Richards et al. 2015). The major factors to minimise runoff quantity are substrate volume and permeability (Livesley et al. 2016).
	0	0	0	0	0	0	3
Soil depth > 0.5							The major factors to minimise runoff quantity are substrate volume and permeability (Livesley et al. 2016).
	0	0	0	0	0	0	2
Soil depth 0.2 - 0.5							The major factors to minimise runoff quantity are substrate volume and permeability (Livesley et al. 2016).
	0	0	0	0	0	0	2
Soil depth < 0.2							The major factors to minimise runoff quantity are substrate volume and permeability (Livesley et al. 2016).
	0	0	0	0	0	0	0.5

Notes

- _ Native and Productive plants are 0.5 less impact rating than indigenous for Habitat (Biodiversity)
- _ Exotic plants are 1 less impact rating than indigenous for Habitat (Biodiversity)
- _ Green infrastructure above 20m (high rise) is 0.5 less impact rating than ground or low rise for urban heat
- _ Green infrastructure above 20m (high rise) is 0.5 less impact rating than ground or low rise for Habitat (biodiversity)
- _ Place value and social cohesion receive 0.5 times the impact rating when exotic with the exception of lawn / turf

Appendix G

Development viability studies

GREENING OUR CITY

Property Economics Assessment of Case Studies



Prepared for Arup and City of Melbourne

Stage 2 Report

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Key Terms

GOCAP	Greening Our City Action Plan: The City of Melbourne’s four-year plan aiming to improve the quality and quantity of green roofs and vertical greening in the municipality to support amenity, liveability and adapt to climate change.
DCF	Discounted cash flow: a valuation method that seeks to determine the feasibility of an investment by examining projected future income and costs, or cash flow from the investment, and then discounting that cash flow at a selected rate to arrive at an estimated current value of the investment.
RLV	Residual land value: the amount a developer is able to pay for the land given the assumed value of the development, the assumed project costs, and the developer’s desired profit.
IRR	Internal rate of return: the percentage of interest earned from a project over the life of the investment.
NSA	Net sellable area: a measurement of area of floorspace that can be sold under a purchase transaction; excludes common areas and service areas of a building.
GFA	Gross floor area: a measurement of the total building area including net sellable area and common areas and service areas.

1.0 INTRODUCTION

1.1 Purpose

This report was commissioned to provide technical inputs into the Greening Our City Strategic Action Plan Business Case. The overall project was prepared by Arup for the City of Melbourne.

This report considers the likely impacts of selected GOCAP initiatives on development viability. This report is focused on the property economic impacts of potential changes on individual developments, from a developer's perspective.

1.2 Report Structure

This report is structured as follows:

- Assessment method;
- Overview of case studies;
- Indicative feasibility analysis findings; and
- Findings and discussion.

Appendix A contains market research data relating to case study property prices.

Appendix B contains literature review material and market research data relating to property price variations associated with green infrastructure.

2.0 ASSESSMENT METHOD

2.1 Overview of Approach

The approach adopted for this assessment is as follows:

- The project team, led by design firm Oculus, assessed four hypothetical case studies for GOCAP compliance.
- Where the case study did not achieve GOCAP compliance, these elements were included and their costs and impact on development yield identified.
- This generated two development scenarios – without GOCAP elements and with GOCAP elements.
- Development feasibility modelling was undertaken on the two scenarios for each of the four options.
- A third feasibility model was also prepared for each of the options, showing the required price premium on property sales required to off-set impacts associated with GOCAP requirements. In all, 12 feasibility models were generated.
- The development feasibility models utilise market research data obtained from recent sales in the areas of investigation.
- The cost data for GOCAP elements was supplied by the Arup team. Costs data for other elements of the developments was sourced by HillPDA from cost guides including Rawlinsons Australian Construction Handbook 2019 edition and other costs from HillPDA industry experience.
- The costs specific to GOCAP elements were estimated by Oculus, Junglefy and Arup.
- The impact on price of GOCAP style elements is based on literature review and comparative market research for similar properties with and without GOCAP style elements. This information is indicative only because it is not possible to precisely isolate the value of GOCAP elements individually or in a package because of the inherent heterogeneity of properties and range of external factors that impact on property price.

2.2 Feasibility Modelling Qualifications

The information within this report is provided for the purpose of the project brief only and should not be used for any other purpose or by any other party. This report does not provide a formal valuation.

All feasibility information within this report is indicative and based on supplied information and stated assumptions. This includes pre-architect building yield assumptions and pre-quantity surveyor and pre-engineering cost assumptions.

2.3 Feasibility Modelling Approach

It is assumed that a developer will seek to purchase and develop the relevant case study site for a short-term return, by selling the finished units / floorspace as soon as possible post construction.

The method selected for feasibility testing is discounted cash flow (DCF) analysis of project revenues and costs over time to identify the best performing option. Discounted cash flow (DCF) analysis is an appropriate method when project timelines extend beyond one year and time value of money considerations are included in the analysis.

The best performing option is the one that delivers the highest residual land value (RLV).

RLV is the cash contribution the developer can pay to the landowner to acquire the relevant site. RLV is calculated from the subtraction of project costs and target profit from project revenue.

The Estate Master Development Feasibility model is used for this evaluation.

The modelling generates various measures of performance. In this case the target IRR is fixed at 16% for all 12 models.

The models show a summary of:

- Project revenue, which is escalated to point of sale (this includes an assumed 50% pre-sale requirement);
- Project costs including construction, professional fees, charges, taxes and finance escalated if required to point of payment; and
- Calculation of profit margin and residual land value.

The key figure in this assessment is residual land value (under the hypothetical development concepts shown for each site).

The residual land value is assessed under the three scenarios:

- Without GOCAP;
- With GOCAP but with all other elements held constant, and this shows the impact on residual land value as a result of this scenario; and
- With GOCAP and a percent change added to price paid for the finished properties (end value of apartments and non-residential space) to return the residual land value to 'without GOCAP' scenario. This is the price premium scenario.

The price premium required to return residual land value to the base model is compared to findings in literature and other market research to determine if such as premium is within the realms of possibility.

2.4 Maintenance Costs Capitalised in Sale Values

The case study and literature research of developments with green infrastructure elements show prices achieved that includes the market assessment of maintenance costs and other elements in sale prices. That is, the ongoing costs are capitalised into the sale price.

3.0 OVERVIEW OF CASE STUDIES

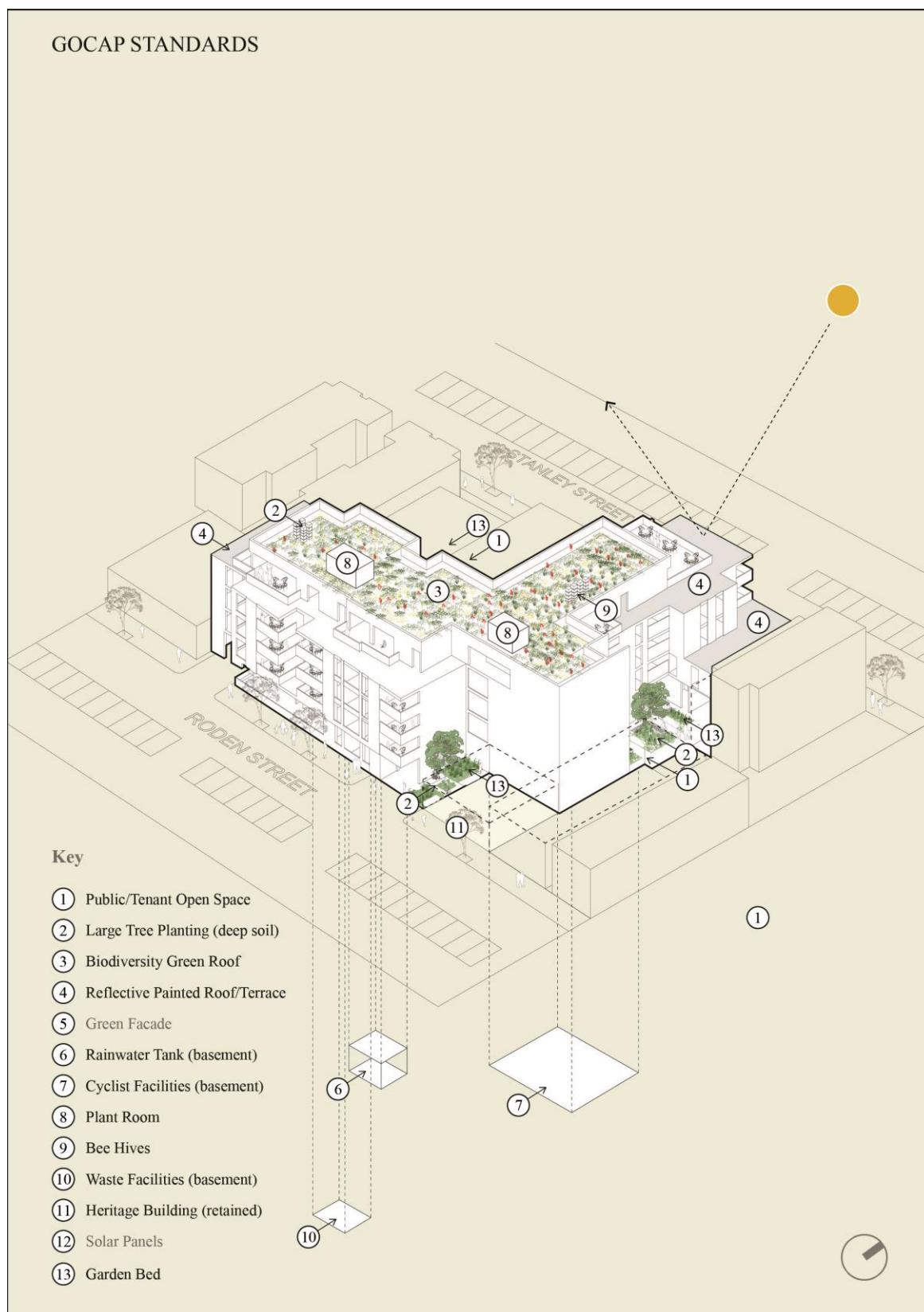
3.1 Case Studies

The case studies selected for testing are as follows:

- Roden Street, West Melbourne - base project has 56 apartments and 122 sqm of commercial space;
- Franklin Street, Melbourne - base project has 72 apartments and 7,358 sqm of commercial space;
- Elizabeth Street, Melbourne - base project has 55 apartments and 1,382 sqm of commercial space; and
- Jolimont Street, East Melbourne - base project has 4,531 sqm of commercial space.

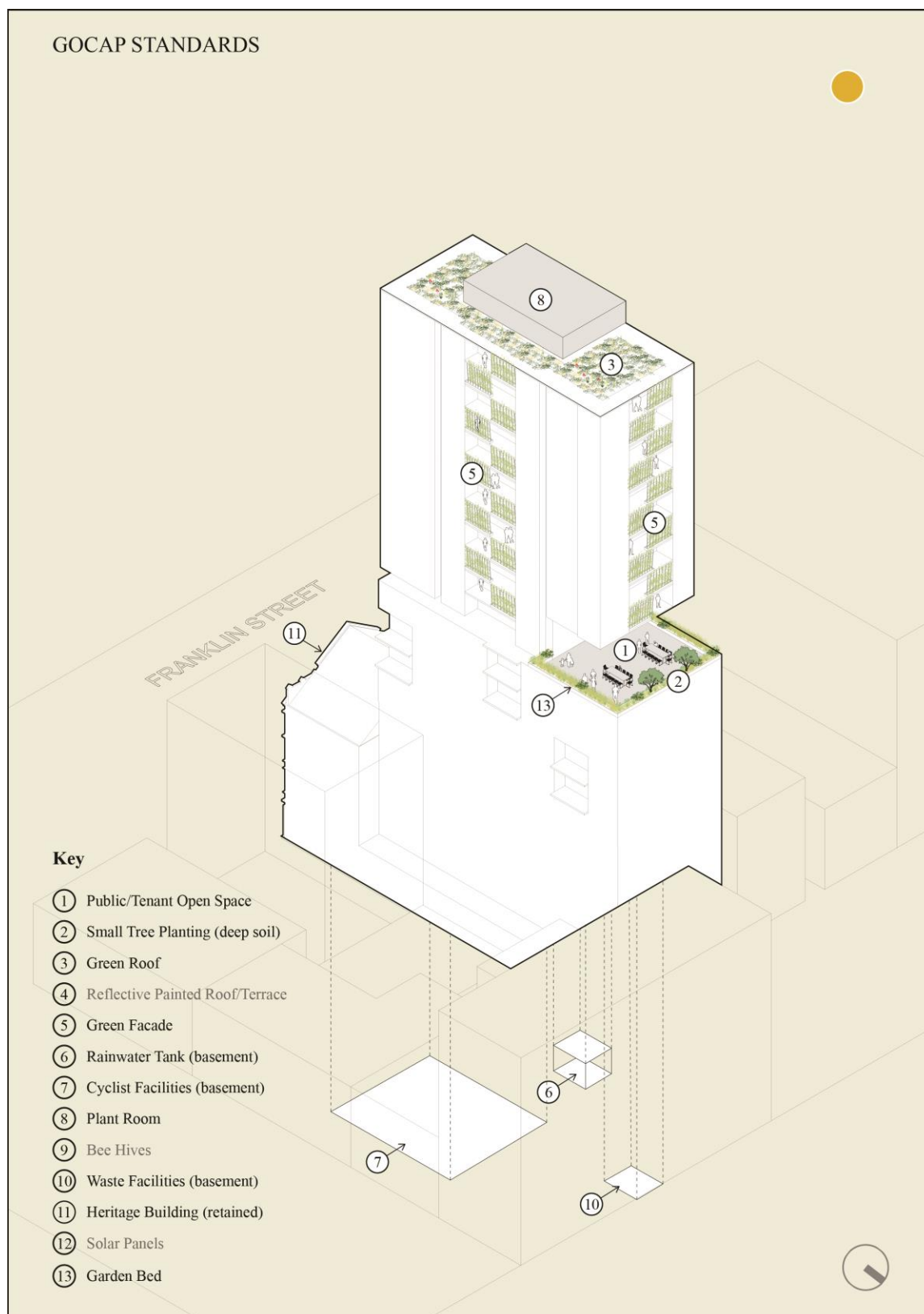
A summary image of each case study with GOCAP elements noted is shown below. Refer to Oculus concept drawings and specifications for further details regarding the case studies.

Figure 1: Roden Street Hypothetical Case Study



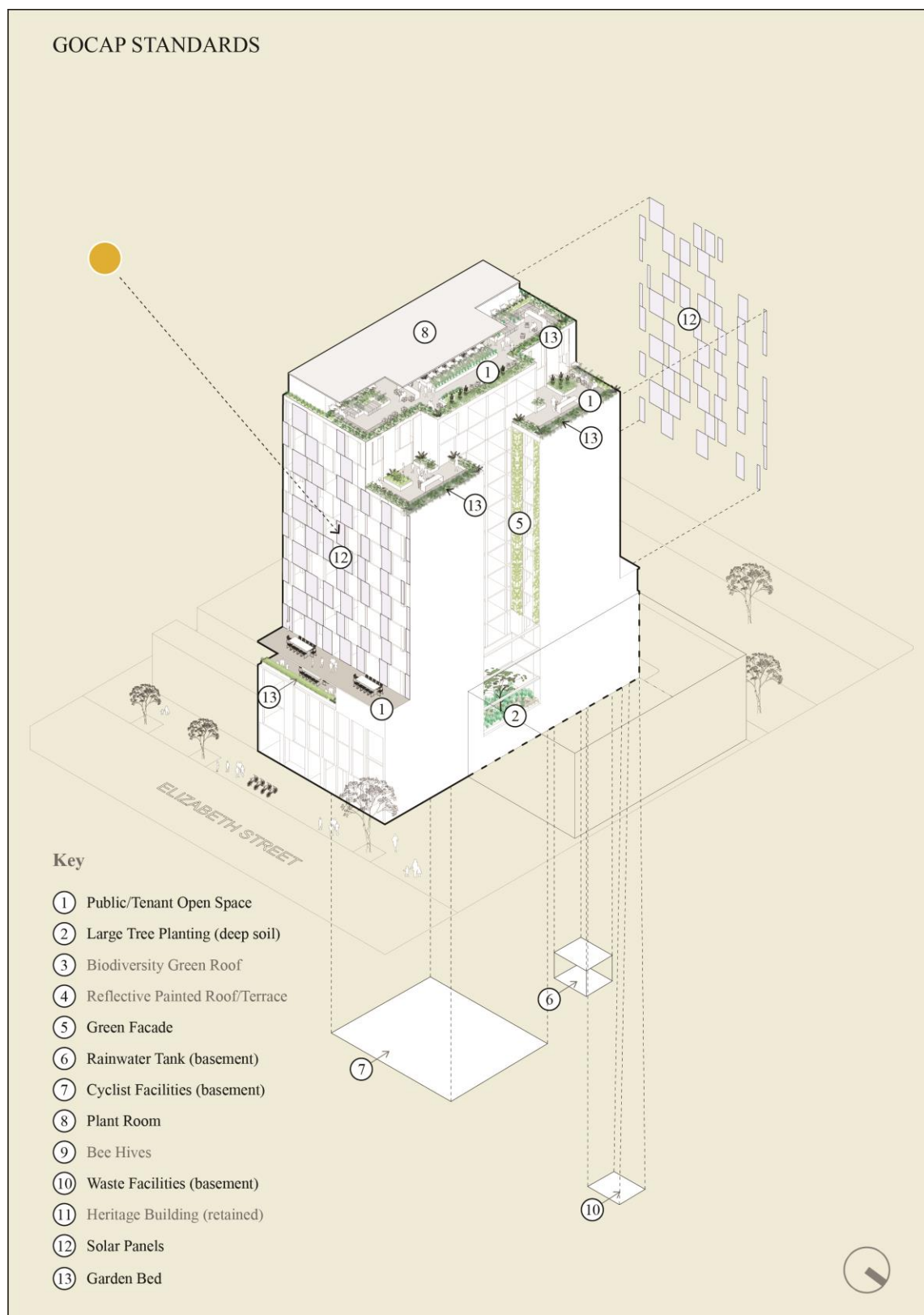
Source: Source: Oculus

Figure 2: Franklin Street Hypothetical Case Study



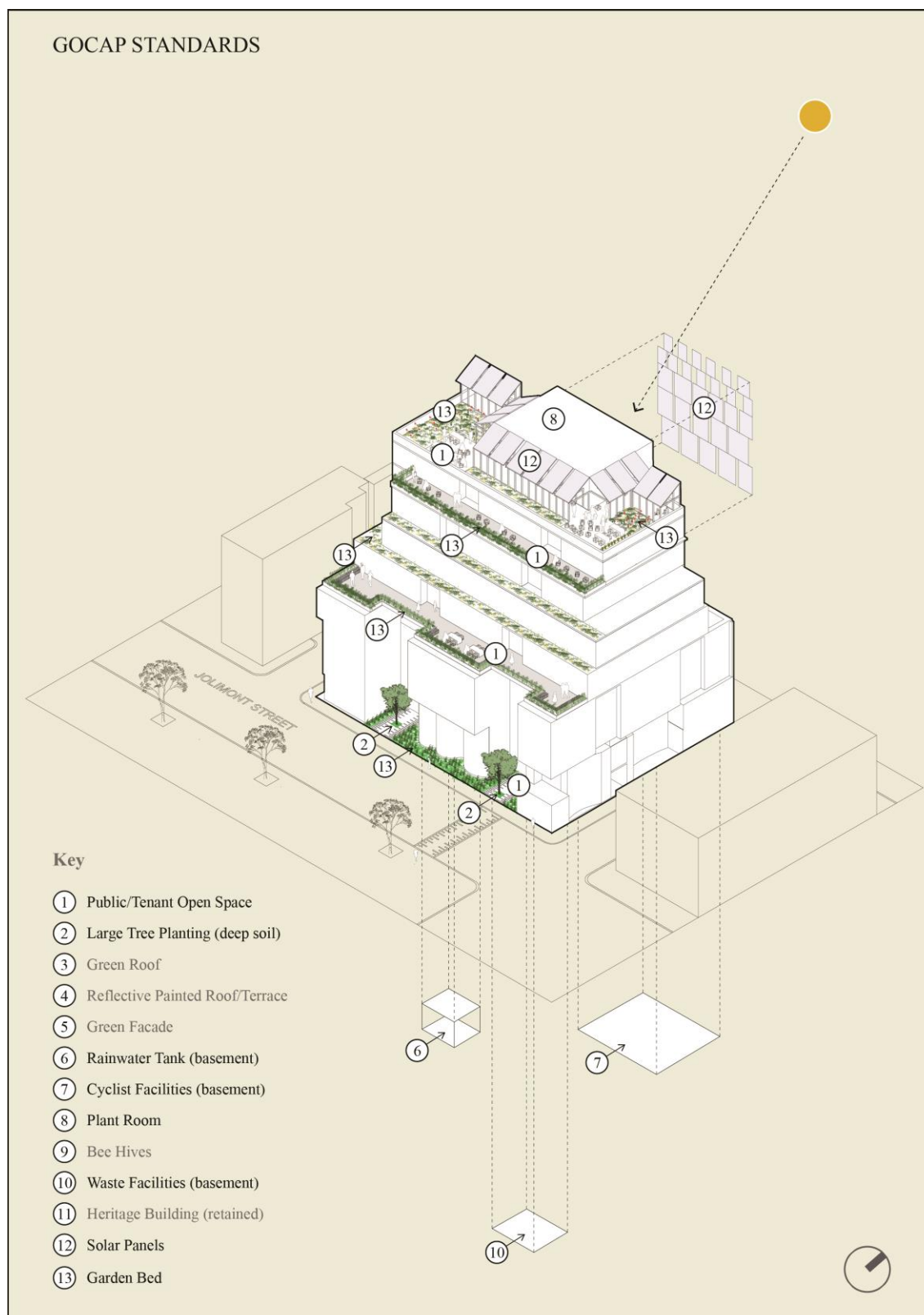
Source: Oculus

Figure 3: Elizabeth Street Hypothetical Case Study



Source: Oculus

Figure 4: Jolimont Street Hypothetical Case Study



Source: Oculus

4.0 INDICATIVE FEASIBILITY ANALYSIS FINDINGS

4.1 Summary of Feasibility Models

A summary of the three feasibility models for each of the sites is shown below in the next four tables.

Table 1: Roden Street Hypothetical Case Study

PROJECT		Site 1 Roden Street		Site 1 Roden Street with GOCAP		Site 1 Roden Street with GOCAP and Premium	
		Mixed Use - Development Application Without GOCAP		Mixed Use - Development Application With GOCAP		Mixed Use - Development Application With GOCAP and Price Premium	
	Units (No.)	57 Units		57 Units		57 Units	
	Gross Floor Area (SQM)	5,543 GFA		5,421 GFA		5,421 GFA	
	Site Area	1,668 SQM		1,668 SQM		1,668 SQM	
	Type	Mixed Use		Mixed Use		Mixed Use	
REVENUE							
	Gross Sales Revenue	\$42,108,585		\$41,895,465		\$42,379,714	
	Less Selling Costs	-\$1,188,262		-\$1,181,229		-\$1,194,714	
	NET SALES REVENUE	\$40,920,322		\$40,714,236		\$41,185,000	
	TOTAL REVENUE (before GST paid)	\$40,920,322		\$40,714,236		\$41,185,000	
	Less GST paid on all Revenue	-\$3,828,053		-\$3,808,679		-\$3,852,701	
	TOTAL REVENUE (after GST paid)	\$37,092,269		\$36,905,557		\$37,332,299	
COSTS							
	Land Purchase Cost	\$6,020,713		\$5,755,169		\$6,022,287	
	Land Acquisition Costs	\$361,243		\$345,310		\$361,337	
	Construction (inc. Construct. Contingency)	\$23,993,007		\$24,227,740		\$24,227,740	
	Professional Fees	\$1,963,899		\$1,982,492		\$1,983,018	
	Statutory Fees	\$465,280		\$446,234		\$465,661	
	Land Holding Costs	\$49,577		\$47,388		\$49,588	
	Pre-Sale Commissions	\$216,996		\$216,996		\$219,491	
	Finance Charges (inc. Line Fees)	\$20,000		\$20,000		\$20,000	
	Interest Expense	\$470,476		\$463,492		\$469,743	
	TOTAL COSTS (before GST reclaimed)	\$33,561,190		\$33,504,822		\$33,818,865	
	Less GST reclaimed	-\$3,037,544		-\$3,035,673		-\$3,061,578	
PERFORMANCE INDICATORS							
	Gross Development Profit	\$6,568,623		\$6,436,408		\$6,575,012	
	Project Internal Rate of Return (IRR)	16.0%		16.0%		16.0%	
	Residual Land Value (NPV)	\$5,473,375		\$5,231,972		\$5,474,806	
	Residual Land Value (NPV) / SQM	\$3,281		\$3,137		\$3,282	
YIELD ANALYSIS		Qty	Area	Qty	Area	Qty	Area
	Commercial	0	0	0	0	0	0
	Retail	0	122	0	122	0	122
	1 Bedroom Apartment	16	0	16	0	16	0
	2 Bedroom Apartment	37	0	37	0	37	0
	3 Bedroom Apartment	3	0	3	0	3	0
	4 Bedroom Apartment	0	0	0	0	0	0
	TOTAL	56	122	56	122	56	122

Table 2: Franklin Street Hypothetical Case Study

PROJECT		Site 2 Franklin Street		Site 2 Franklin Street with GOCAP		Site 2 Franklin Street with GOCAP and Premium	
		Mixed Use - Development Application Without GOCAP		Mixed Use - Development Application With GOCAP		Mixed Use - Development Application With GOCAP and Price Premium	
	Units (No.)	99 Units		93 Units		93 Units	
	Gross Floor Area (SQM)	13,709 GFA		13,249 GFA		13,249 GFA	
	Site Area	1,010 SQM		1,010 SQM		1,010 SQM	
	Type	Mixed Use		Mixed Use		Mixed Use	
REVENUE							
	Gross Sales Revenue	\$123,444,391		\$119,562,809		\$122,366,557	
	Less Selling Costs	-\$3,471,164		-\$3,362,291		-\$3,440,537	
	NET SALES REVENUE	\$119,973,227		\$116,200,518		\$118,926,020	
	TOTAL REVENUE (before GST paid)	\$119,973,227		\$116,200,518		\$118,926,020	
	Less GST paid on all Revenue	-\$11,222,217		-\$10,869,346		-\$11,124,232	
	TOTAL REVENUE (after GST paid)	\$108,751,010		\$105,331,172		\$107,801,787	
COSTS							
	Land Purchase Cost	\$17,091,628		\$15,540,256		\$17,090,822	
	Land Acquisition Costs	\$1,025,498		\$932,415		\$1,025,449	
	Construction (inc. Construct. Contingency)	\$70,038,891		\$69,202,414		\$69,202,414	
	Professional Fees	\$5,731,910		\$5,660,789		\$5,663,832	
	Statutory Fees	\$1,323,138		\$1,209,356		\$1,322,124	
	Land Holding Costs	\$138,565		\$125,922		\$138,486	
	Pre-Sale Commissions	\$629,726		\$608,857		\$623,134	
	Finance Charges (inc. Line Fees)	\$20,000		\$20,000		\$20,000	
	Interest Expense	\$1,487,855		\$1,439,943		\$1,480,940	
	TOTAL COSTS (before GST reclaimed)	\$97,487,210		\$94,739,951		\$96,567,201	
	Less GST reclaimed	-\$8,822,616		-\$8,586,574		-\$8,736,927	
PERFORMANCE INDICATORS							
	Gross Development Profit	\$20,086,416		\$19,177,794		\$19,971,513	
	Project Internal Rate of Return (IRR)	16.0%		16.0%		16.0%	
	Residual Land Value (NPV)	\$15,537,843		\$14,127,505		\$15,537,110	
	Residual Land Value (NPV) / SQM	\$15,384		\$13,988		\$15,383	
YIELD ANALYSIS		Qty	Area	Qty	Area	Qty	Area
	Commercial	0	6,761	0	6,761	0	6,761
	Retail	0	597	0	597	0	597
	1 Bedroom Apartment	24	0	22	0	22	0
	2 Bedroom Apartment	48	0	44	0	44	0
	3 Bedroom Apartment	0	0	0	0	0	0
	4 Bedroom Apartment	0	0	0	0	0	0
	TOTAL	72	7,358	66	7,358	66	7,358

Table 3: Elizabeth Street Hypothetical Case Study

PROJECT		Site 3 Elizabeth Street		Site 3 Elizabeth Street with GOCAP		Site 3 Elizabeth Street with GOCAP and Premium	
		Mixed Use - Development Application Without GOCAP		Mixed Use - Development Application With GOCAP		Mixed Use - Development Application With GOCAP and Price Premium	
	Units (No.)	57 Units		57 Units		57 Units	
	Gross Floor Area (SQM)	8,485 GFA		8,101 GFA		8,101 GFA	
	Site Area	812 SQM		812 SQM		812 SQM	
	Type	Mixed Use		Mixed Use		Mixed Use	
REVENUE							
	Gross Sales Revenue	\$59,759,433		\$56,749,122		\$59,175,147	
	Less Selling Costs	-\$1,802,420		-\$1,703,080		-\$1,775,216	
	NET SALES REVENUE	\$57,957,013		\$55,046,042		\$57,399,931	
	TOTAL REVENUE (before GST paid)	\$57,957,013		\$55,046,042		\$57,399,931	
	Less GST paid on all Revenue	-\$5,432,676		-\$5,159,011		-\$5,379,559	
	TOTAL REVENUE (after GST paid)	\$52,524,338		\$49,887,031		\$52,020,372	
COSTS							
	Land Purchase Cost	\$8,357,070		\$7,021,600		\$8,357,206	
	Land Acquisition Costs	\$501,424		\$421,296		\$501,432	
	Construction (inc. Construct. Contingency)	\$34,403,975		\$34,000,899		\$34,000,899	
	Professional Fees	\$2,813,075		\$2,777,953		\$2,780,493	
	Statutory Fees	\$647,082		\$549,480		\$646,615	
	Land Holding Costs	\$69,536		\$58,426		\$69,540	
	Pre-Sale Commissions	\$185,316		\$185,316		\$193,238	
	Finance Charges (inc. Line Fees)	\$20,000		\$20,000		\$20,000	
	Interest Expense	\$643,159		\$590,850		\$619,190	
	TOTAL COSTS (before GST reclaimed)	\$47,640,636		\$45,625,821		\$47,188,613	
	Less GST reclaimed	-\$4,327,604		-\$4,156,723		-\$4,286,258	
PERFORMANCE INDICATORS							
	Gross Development Profit	\$9,211,305		\$8,417,934		\$9,118,017	
	Project Internal Rate of Return (IRR)	16.0%		16.0%		16.0%	
	Residual Land Value (NPV)	\$7,597,336		\$6,383,273		\$7,597,460	
	Residual Land Value (NPV) / SQM	\$9,356		\$7,861		\$9,356	
YIELD ANALYSIS		Qty	Area	Qty	Area	Qty	Area
	Commercial	0	1,238	0	1,038	0	1,038
	Retail	0	144	0	94	0	94
	1 Bedroom Apartment	22	0	22	0	22	0
	2 Bedroom Apartment	30	0	30	0	30	0
	3 Bedroom Apartment	1	0	1	0	1	0
	4 Bedroom Apartment	2	0	2	0	2	0
	TOTAL	55	1,382	55	1,132	55	1,132

Table 4: Jolimont Street Hypothetical Case Study

PROJECT		Site 4 Jolimont Street		Site 4 Jolimont Street with GOCAP		Site 4 Jolimont Street with GOCAP and Premium	
		Mixed Use - Development Application Without GOCAP		Mixed Use - Development Application With GOCAP		Mixed Use - Development Application With GOCAP and Price Premium	
	Units (No.)	4 Units		4 Units		4 Units	
	Gross Floor Area (SQM)	6,962.70 GFA		6,712.70 GFA		6,712.70 GFA	
	Site Area	1,114 SQM		1,114 SQM		1,114 SQM	
	Type	Mixed Use		Mixed Use		Mixed Use	
REVENUE							
	Gross Sales Revenue	\$59,058,200		\$56,937,679		\$57,869,399	
	Less Selling Costs	-\$1,632,301		-\$1,573,732		-\$1,599,466	
	NET SALES REVENUE	\$57,425,899		\$55,363,947		\$56,269,933	
	TOTAL REVENUE (before GST paid)	\$57,425,899		\$55,363,947		\$56,269,933	
	Less GST paid on all Revenue	-\$5,368,927		-\$5,176,153		-\$5,260,854	
	TOTAL REVENUE (after GST paid)	\$52,056,971		\$50,187,794		\$51,009,078	
COSTS							
	Land Purchase Cost	\$7,845,777		\$7,329,172		\$7,845,507	
	Land Acquisition Costs	\$470,747		\$439,750		\$470,730	
	Construction (inc. Construct. Contingency)	\$34,521,396		\$33,606,056		\$33,606,056	
	Professional Fees	\$2,824,294		\$2,748,800		\$2,749,817	
	Statutory Fees	\$610,049		\$571,431		\$608,983	
	Land Holding Costs	\$62,781		\$58,647		\$62,778	
	Pre-Sale Commissions	\$317,720		\$306,312		\$311,324	
	Finance Charges (inc. Line Fees)	\$20,000		\$20,000		\$20,000	
	Interest Expense	\$672,506		\$647,755		\$659,659	
	TOTAL COSTS (before GST reclaimed)	\$47,345,268		\$45,727,923		\$46,334,854	
	Less GST reclaimed	-\$4,289,156		-\$4,145,520		-\$4,195,582	
PERFORMANCE INDICATORS							
	Gross Development Profit	\$9,000,859		\$8,605,391		\$8,869,806	
	Project Internal Rate of Return (IRR)	16.0%		16.0%		16.0%	
	Residual Land Value (NPV)	\$7,132,525		\$6,662,884		\$7,132,279	
	Residual Land Value (NPV) / SQM	\$6,403		\$5,981		\$6,402	
YIELD ANALYSIS		Qty	Area	Qty	Area	Qty	Area
	Commercial	0	4,531	0	4,368	0	4,368
	Retail	0	0	0	0	0	0
	1 Bedroom Apartment	0	0	0	0	0	0
	2 Bedroom Apartment	0	0	0	0	0	0
	3 Bedroom Apartment	0	0	0	0	0	0
	4 Bedroom Apartment	0	0	0	0	0	0
	TOTAL	0	4,531	0	4,368	0	4,368

4.2 Construction Costs

The increase to construction cost in the four case studies as a result of GOCAP conditions ranges from less than 1% per square metre up to approximately 3% per square metre (on a unit rate basis).

As a general rule, a cost impact beyond 5% would be of concern to most development projects. This is because many construction contingencies are set at around this level.

Table 5: Cost of GOCAP Elements

Estimated Impact on Construction Cost \$/Square Metre (SQM)		
<i>Before Contingency and GST and Other Development Costs</i>		
	Cost Per SQM	Estimated Cost
Roden Street	2.4%	\$384,020
Franklin Street	1.9%	\$660,945
Elizabeth Street	3.1%	\$710,078
Jolimont Street	0.6%	\$251,190

*Arup, Oculus, Jungleyf

4.3 Maintenance Costs

The GOCAP initiatives can increase ongoing costs as well.

The following table shows the estimate ongoing costs for the GOCAP case studies. This cost would form part of the annual owners corporation fees of the developments.

Table 6: Maintenance Cost Summary - Per Annum

Site	Public Open Space – Garden Beds	Green Roof Extensive	Green Façade	Total
Roden Street	\$15,300	\$7,196	Nil	\$22,496
Franklin Street	\$23,100	\$2,828	\$15,660	\$41,588
Elizabeth Street	\$19,700	Nil	\$11,520	\$31,220
Jolimont Street	\$45,560	Nil	Nil	\$45,560

Source: Ongoing costs provided by Arup, Oculus, Jungleyf

Establishing and servicing gardens beds in public open spaces costs \$100/sqm. Extensive green roof maintenance costs are 10% of the capital cost, and 5% for roofs larger than 100 sqm. Green facades have an ongoing cost of 8 to 10% of the capital cost per annum.

4.4 Development Yield

The GOCAP assessment has estimated the impact on development yield for the case study projects.

The design team has advised that GOCAP elements can be designed into most projects without impacting on development yield to a significant extent.

The most impacted project is Franklin Street, which loses 6 apartments (or 8.3% of units).

In the assumptions it is assumed Roden Street loses 4 car parks as a result of GOCAP that would otherwise be purchased.

Table 7: Development Yield Changes

Estimated Impact on Development Yield						
	Residential Units Before GOCAP	Residential Units With GOCAP	Change to Number of Residential Units	Commercial / Retail SQM Before GOCAP	Commercial / Retail SQM With GOCAP	Change to Commercial / Retail SQM
Roden Street	56	56	0	122	122	0
Franklin Street	72	66	-6	7,358	7,358	0
Elizabeth Street	55	55	0	1,382	1,132	-250
Jolimont Street	0	0	0	4,531	4,368	-163

4.5 Residual Land Value Under the Scenarios

Assuming there is no change to price paid for the finished properties, the changes would flow through to an impact on residual land value (for the selected concepts).

The impact on residual land value has been assessed between 4% and 16% for the hypothetical case studies.

The biggest impact is observed on the Elizabeth Street case study, because of loss of commercial floorspace yield (250 sqm) and increase to cost of approximately \$710,000 on this project.

Table 8: Residual Land Value Scenarios (Estimates)

Site	Residual Land Value (Estimate)	Residual Land Value / SQM
Site 1 Roden Street	\$5,473,375	\$3,281
Site 1 Roden Street with GOCAP	\$5,231,972	\$3,137
Change	-\$241,403	-\$145
Percent Change	-4.4%	-4.4%
Site 2 Franklin Street	\$15,537,843	\$15,384
Site 2 Franklin Street with GOCAP	\$14,127,505	\$13,988
Change	-\$1,410,338	-\$1,396
Percent Change	-9.1%	-9.1%
Site 3 Elizabeth Street	\$7,597,336	\$9,356
Site 3 Elizabeth Street with GOCAP	\$6,383,273	\$7,861
Change	-\$1,214,063	-\$1,495
Percent Change	-16.0%	-16.0%
Site 4 Jolimont Street	\$7,132,525	\$6,403
Site 4 Jolimont Street with GOCAP	\$6,662,884	\$5,981
Change	-\$469,641	-\$422
Percent Change	-6.6%	-6.6%

4.6 Required Price Premium to Off-Set Impact

Some planning or building standards have the potential to increase property value whereas others are sunk costs that add no value. The latter can include changes to unseen elements that provide no additional space or amenity. GOCAP standards however have the potential to increase amenity and as such it is important to consider the potential for value uplift as a result of such standards.

On that basis the assessment below considers two points:

- First, what level of price increase would be required to fully off-set the residual land value impacts shown above?
- Second, is the scale of required price growth possible having regard to literature and case study evidence?

GOCAP impacts can be off set if buyers of properties pay more for properties with GOCAP elements.

The required premium for the four hypothetical case studies ranges from approximately 1% and 5%.

This is considered achievable based on market research and case study research, which shows that a price premium in the order of 5% can be achieved by higher quality residential based developments that include GOCAP style features. Refer to Appendix A and B for more information.

Table 9: Required Price Premium

Estimated Price Premium on Property Sales to Offset Impact on Land Value	
	Percent Change
Roden Street	1.2%
Franklin Street	2.3%
Elizabeth Street	4.3%
Jolimont Street	4.4%

5.0 FINDINGS AND DISCUSSION

5.1 Potential Impacts on Development

GOCAP initiatives can impact development viability in three primary ways:

- Increase to development cost;
- Reduction of development yield (e.g. residential units and / or non-residential floorspace); and
- Change to price paid by buyers.

All GOCAP elements will require some change or increase to construction costs, although as shown in the case studies this could be minor in some cases.

The same applies to development yield. The impact can be nil or minor if designed-in upfront.

5.2 Potential Impacts on Ongoing Costs

Some GOCAP elements will require an increase to maintenance costs, such as green walls.

Some elements will produce a saving to operational costs, such as solar panels.

5.3 Capitalised Value of GOCAP Elements

Each GOCAP element will have a value or perceived value to property owners and occupiers in terms of:

- Adding to amenity and / or image value of a property; and
- Adding or subtracting to ongoing maintenance and operational costs.

The perceived value of the package of changes from the perspective of property users will determine how the elements impact on property value.

The market research undertaken for this report examined property prices (for sold properties) and thus it is assumed ongoing costs are capitalised into the price paid along with perceptions of amenity and image.

It was not possible in this assessment to individually value each GOCAP element separately.

5.4 Impact on Price for Case Studies

Change to price will be variable by project. The assessment in this report has modelled the price premium required to off-set GOCAP impacts on development yield and construction costs.

The required premium is between 1% and 5% for the four case studies.

This is considered achievable based on market research and case study research, which shows that a price premium in the order of 5% can be achieved by higher quality residential and commercial based developments that include GOCAP style features.

5.5 Menu of Options

Selecting GOCAP elements from a menu of options that can be tailored to suit a development type is likely to be viewed more favourably than a fixed list of requirements.

This could enable developers to select the options that best deliver value and minimise costs for their property type.

5.6 Viability Impacts

The impact on viability will vary on a project by project basis.

Smaller, lower value projects may be impacted the most, because such projects may not otherwise include GOCAP type elements, whereas larger and higher value projects may already include them.

The highest negative impact would likely fall on projects that target the lower end of the market and where the ongoing costs of maintenance of GOCAP elements is perceived as negative.

Further testing is required to explore impacts on smaller projects and other land use scenarios.

5.7 Scaling of GOCAP Requirements

It may be necessary to design GOCAP requirements on a sliding scale of requirements to account for the differential impacts on a range of property development typologies.

5.8 Staged Implementation

Implementation of GOCAP elements would preferably be staged over a period of time so as to provide notice to developers that the standards will change and enable the costs and benefits of the changes to be factored into concept development and feasibility studies.

The changes could be deemed voluntary for a period of time and then mandatory after two years for example.

5.9 Potential Cash in Lieu Scheme

In some situations, it may not be possible or practical to include required GOCAP elements within a project. Where this is the case, the option to provide a cash in lieu of works contribution is worth considering. Cash payments could be pooled into a dedicated fund for the provision of Green Infrastructure elements elsewhere in the City.

Nevertheless, it is likely that most developers would prefer to use funds to design in value adding features into their own projects.

5.10 Transferable Obligation Option

Another option could be to consider allowing developers to meet obligations across multiple sites or stages. It may be preferable to over-provide GOCAP elements on one project or stage for some reason. The extent of over-provision could be deemed as a credit for allocation to another project or stage undertaken by the same developer.

APPENDIX A: MARKET RESEARCH

Roden Street, West Melbourne

Retail Sales Evidence

The table below shows recent strata-titled and freehold transactions which indicate a range of \$7,933 to \$17,814/sqm of NSA.

Recent Retail Transactions in West Melbourne

Address	Sale date	Sale price	NSA (sqm)	\$/sqm of NSA	Comment
75 Peel St, West Melbourne	Oct-18	\$4,400,000	247	\$17,814	Warehouse with retail ground floor and office above
9 Cobden St, North Melbourne	Sep-18	\$3,610,000	350	\$10,314	Ground-floor heritage warehouse for retail or office use
73 Dudley St, West Melbourne	Jul-18	\$1,024,857	119	\$8,612	New-build retail with street-frontage
420 Spencer St, West Melbourne	Jun-19	\$412,500	52	\$7,933	New-build retail with street-frontage
424 Spencer St, West Melbourne	Jun-19	\$1,705,000	145	\$11,759	New-build retail with street-frontage
375 King St, West Melbourne	Mar-19	\$460,000	57	\$8,070	Good footfall, serviced for restaurant or retail

Source: RPData, Jul-18 to Jul-19

The subject site provides 122sqm of commercial space. The take up will most likely be a retail tenant, e.g. café. The property has heritage significance and is ground floor with frontage to Stanley Street, which captures some local foot traffic.

Recent ground floor new-build retail properties are sold for over \$8,000/sqm and heritage warehouses are sold at a premium. The subject site offers conditions for a boutique café, restaurant or retail store tenant supported by new residents.

Residential Sales Evidence

Our research has revealed that there is a fair amount of development activity occurring in West Melbourne. The sold and asking prices for several developments were analysed.

9 Dryburgh Street, West Melbourne



This development is nearing completion and is located directly opposite the North Melbourne Train Station.

Type	Price range	NSA (sqm)	\$/sqm of NSA
1 Bed 1 Bath	\$385,000 - \$450,000	52 - 56	\$6,875 - \$8,653
2 Bed 1 Bath	\$585,000 - \$625,000	63 - 73	\$8,018 - \$9,841

Source: RPData, Jul-18 to Jul-19

392 Spencer Street, West Melbourne



392 Spencer Street is a city-fringe development, recently completed with mid-range finish.

Type	Price range	NSA (sqm)	\$/sqm of NSA
1 Bed 1 Bath	\$396,200 - \$438,000	46-56	\$7,050 - \$9,500
2 Bed 1 Bath	\$507,250 - \$688,000	74-76	\$6,700 - \$9,300
3 Bed 2 Bath	\$710,000	87	\$8,150

Source: RPData, Jul-18 to Jul-19

133 Rosslyn Street, West Melbourne



Type	Price range	NSA (sqm)	\$/sqm of NSA
1 Bed 1 Bath	\$395,000 - \$470,000	50 - 66	\$5,985 – \$7,900
2 Bed 2 Bath	\$650,000 - \$723,000	63 - 83	\$7,594 - \$8,710

Source: RPData, Jul-18 to Jul-19

Other Comparable Residential Sales

Address	Sale date	Sale price	NSA (sqm)	\$/sqm of NSA	Comment
1 Bed 1 Bath					
104/15-31 Batman Street	Sep-18	\$448,500	56	\$8,155	CBD-fringe location
609/108 Haines Street	Feb-19	\$390,000	47	\$8,298	Views over park

Franklin Street

Office Sales Evidence

Melbourne is experiencing an increased demand for office space in the CBD. Melbourne's demand cannot keep up with current supply as tenants must compete for limited spaces or look to fringe locations. As of June 2019, average A-grade capital values are \$11,300/sqm, up 13% from the last financial year.¹ Strong growth in demand for office floor space is reflected in a low vacancy rate (3.2% across the CBD)² and high net absorption levels (135,290sqm or 3.1% in the past 12 months)³.

Recent Office Sales Transactions

Address	Sale date	Sale price	NSA (sqm)	Rate (\$/sqm)	Comments
80 Collins St (Eastern core)	Feb-19	\$1.476b	105,000	\$14,057	35-storey premium office and hotel building on Collin St's east end.
818 Bourke St (Docklands)	Oct-18	\$223.3m	23,322	\$9,575	Large floor-plate office in Docklands business district with water views.
160 Harbour Esp (Docklands)	Jun-18	\$100m	7,980	\$12,531	Decade-old 4-storey building fronting water
60 Collins St (Eastern core)	Sep-18	\$160m	13,817	\$11,580	B-grade building on Collin St's east end. Potential development site.
555 Collins St (Spencer)	Oct-18	\$140m	22,743	\$6,156	B-grade building on Collin St's west end.
383 La Trobe St (Flagstaff)	Sep-18	\$122m	10,200	\$11,961	7-storey, B-grade listed tower within a heritage precinct. Potential development site.
277 William St (Flagstaff)	Jul-18	\$93.88m	12,080	\$7,772	Fully leased, 12-storey, B-grade office building in Melbourne's legal precinct.
520 Collins St (Western core)	Feb-19	\$78m	8,554	\$9,119	B-grade 16-storey building in Melbourne's legal precinct. Has some vacancies.
52 Collins St (Eastern core)	Sep-18	\$70m	3,454	\$20,266	Boutique office above heritage building on Collins St's east end. Tenants include ANU, Netwealth Investments, Optus and Medici Capital.
104 Exhibition St (Eastern core)	Dec-18	\$37.1m	2,550	\$14,549	B-grade building in Melbourne's east end. Tenants include QIC Group, GSA and Multiplex.
288 Queen St (Flagstaff)	Jan-19	\$25.9m	2,728	\$9,494	B-grade, six-storey mixed use building in legal precinct.
85 Spring St (Eastern core)	Apr-19	\$112m	10,299	\$10,874	B-grade 16-storey office building above Parliament station

¹ Savills Research, 2019. *Briefing Notes – Melbourne CBD*. Savills: Melbourne. 2019.

² Colliers International, 2019. *CBD Office First Half 2019 Research and Forecast Report*. Colliers: Melbourne, 2019. p. 10

³ Savills Research, 2019. *Quarter Time – National Office Q1/2019*. Savills: Sydney, 2019. p. 11.

Source: Preston Rowe Paterson, *Transactions in review*, July 2018 – May 2019; Savills Research, *Briefing: Melbourne CBD Office*, June 2019

Retail Sale Evidence

Over the year to June 2019, there was a total of \$192.7m in retail building sales, or 16 retail buildings sold in the CBD. In addition to this, there were 31 retail units (e.g. one shop in a building) sold, for a total value of \$130.4m. The average sale price was \$18,581/sqm.

Recent Retail Sales Transactions

Address	Sale date	Sale price	NSA (sqm)	Rate (\$/sqm)	Comments
85 A'beckett St	Oct-18	\$1.45m	60	\$24,167	Retail with Elizabeth Street frontage with restaurant
199 William St	Jan-19	\$5.05m	369	\$13,686	Ground floor gym in western core
349 Elizabeth St	Oct-18	\$6.81	237	\$28,692	Two-storey building opposite Melbourne Central

Source: Preston Rowe Paterson, *Transactions in review*, July 2018 – May 2019

Residential Sales Evidence

Our research has revealed that there is a strong level of development activity occurring in the Melbourne CBD and surrounding areas. The tables below show recent residential sales in comparable developments.

La Trobe Street, Melbourne



This building is situated in the northern part of the CBD, with some north-western views over Carlton Gardens. The build quality, fittings and fixtures are of a standard quality, and there is no gym, or other amenities.

Type	Price range	NSA (sqm)	\$/sqm of NSA
1 Bed 1 Bath	\$385,000 – \$438,700	46 - 48	\$8,125 - \$9,141
2 Bed 2 Bath	\$480,000 - \$530,000	52 – 61	\$8,315 - \$9,231

Source: RPData, Jul-18 to Jul-19

23 Mackenzie Street, Melbourne



23 Mackenzie Street is a high-end apartment building on the north-east side of the CBD. Some apartments have north-west views over Carlton Gardens. The roof of the building has a pool and BBQ area, and it is located 500m from Melbourne Central and Parliament stations. Fittings are of medium-standard.

Type	Price range	NSA (sqm)	\$/sqm of NSA
1 Bed 1 Bath	\$395,000 - 493,000	45 - 48	\$8,778 - \$10,478

Source: RPData, Jul-18 to Jul-19

296-300 Little Lonsdale Street, Melbourne



This is a recently-built apartment building with gym, lounge and terrace

Type	Price range	NSA (sqm)	\$/sqm of NSA
2 Bed 1 Bath	\$508,750 - \$666,200	61 - 66	\$8,340 - \$10,180

Source: RPData, Jul-18 to Jul-19

Other Comparable Residential Sales

Address	Sale date	Sale price	NSA (sqm)	Rate (\$/sqm)	Comment
1 Bed 1 Bath					
1213/135 A'Beckett St	Mar-19	\$420,000	46	\$9,130	East-facing with carpark and balcony
2212/135 A'Beckett St	May-19	\$353,000	46	\$7,674	East-facing in high-amenity building with balcony
1605/442-450 Elizabeth St	Aug-18	\$380,000	46	\$8,261	South-facing apartment in CBD north with balcony
3908/462 Elizabeth St	Sep-18	\$320,000	42	\$7,619	Upper floor apartment in CBD north
4806/568-580 Collins St	Nov-18	\$348,000	53	\$6,566	Upper floor apartment on Collins' west end
3901/568-580 Collins St	Sep-18	\$381,800	49	\$7,792	Upper floor apartment on Collins' west end
4401/228 La Trobe St	Jun-19	\$426,500	49	\$8,704	Upper floor apartment next to Melbourne Central
1001/35-47 Spring St	Jul-18	\$592,000	65	\$9,108	Luxury apartment with views over Fitzroy Gardens
2 Bed 1 Bath					
1909/442-450 Elizabeth St	Nov-18	\$550,000	65	\$8,462	Mid-range north-facing with balcony
1409/462 Elizabeth St	Mar-19	\$520,000	55	\$9,454	North-west-facing with a carpark
1010/228 La Trobe St	Jul-18	\$666,320	63	\$10,577	Wide views with carpark and no balcony
1502/228 La Trobe St	Jul-18	\$653,950	63	\$10,380	Wide views with carpark and no balcony

Source: RPData, Jul-18 to Jul-19

Elizabeth Street, Melbourne

Office Sales Evidence

Although the subject site has a Melbourne CBD postcode, its geographic location is better characterised as CBD fringe. Bordered by Carlton to the east and North Melbourne to the west, this area is home to the University of Melbourne and the Melbourne Biomedical Precinct. Elizabeth Street north's commercial environment will continue to shift from warehouse and big box retail outlets to more institutional office uses and supporting biomedical businesses.

Demand for CBD-fringe office space has increased significantly as a growing workforce and declining CBD options push businesses to suburbs such as Carlton, East Melbourne, Richmond and South Melbourne. Savills Research has calculated CBD-fringe A-grade office space capital values at \$8,000/sqm, up 17.6% from the previous financial year.⁴

CBD-Fringe Office Recent Sales Transactions

Address	Sale date	Sale price	NLA (SQM)	Rate (\$/SQM)	Comments
225 Queensberry St, Carlton	Oct-18	\$6,175,000	646	\$9,559	Two-storey converted warehouse
594-600 Church St, Richmond	Jun-18	\$50m	5,674	\$8,812	Purchased by Bayley Stuart
105 York St, South Melbourne	Sep-18	\$49m	5,101	\$9,606	Purchased by Patterson Cheney Holdings
501 Church St, Richmond	Feb-19	\$7m	502	\$10,853	Two-level commercial building with showroom and offices
115 Batman St, West Melbourne	Sep-18	\$22.1m	853	\$7,918	Four-level converted warehouse office building
8/100 Dover St, Cremorne	Apr-19	\$1,340,000	165	\$8,121	Converted warehouse office
87-91 Palmerston Cr, South Melbourne	Mar-18	\$3,900,000	458	\$8,515	B-grade office building built in 1990s

Source: Knight Frank, *Melbourne Metropolitan Office Market - Overview - April 2019*

Retail Sales Evidence

In the past decade, ground floor retail properties have been selling for around \$6,179 to \$9,537/sqm in the northern end of Elizabeth Street, while further south, ground floor retail properties have sold for \$14,090 to \$17,048/sqm.

With reference to the CBD retail sales evidence in the Franklin Street market research, the property at 547-549 Elizabeth St offers a mid-range retail component suited to uses such as a café or small restaurant. The retail outlet would be supported by office and residential uses above, which is an asset.

Residential Sales Evidence

⁴ Savills Research, *Briefing Melbourne Fringe Office*, June 2019

The northern area of the Melbourne CBD is subject to a fair amount of development; however, this is mostly student housing or institutional commercial development. The tables below show recent residential sales in comparable developments.

151 Berkeley Street, Melbourne



Located on Elizabeth Street, this apartment building is close to the university and medical precincts, facing onto the tram line with mid-range finish.

Type	Price range	NSA (sqm)	\$/sqm of NSA
2 Bed 1 Bath	\$469,000 - \$554,000	56 – 74	\$7,444 - \$9,364

Source: RPData, Jul-18 to Jul-19

160 Victoria Street, Carlton



160 Victoria Street is a 72-storey residential building in the northern end of the CBD. Facilities include a lap pool, private cabanas, spa, steam rooms, grand dining rooms, garden room, library and cinema. It will be completed in late 2019, and car spaces were purchased separately from apartments.

Type	Price range	NSA (sqm)	\$/sqm of NSA
1 Bed 1 Bath	\$425,000 - \$500,000	46 – 56	\$8,045 - \$9,615
2 Bed 2 Bath	\$662,000 - \$688,000	69 – 74	\$9,297 - \$9,594

Source: RPData, Jul-18 to Jul-19

Other Recent Sales

Address	Sale date	Sale price	NLA (SQM)	Rate (\$/SQM)	Comment
1 Bed 1 Bath					
2708/31 A'beckett St	Mar-19	\$300,500	46	\$6,533	
1213/135 A'beckett St	Mar-19	\$420,000	46	\$9,130	
2212/135 A'beckett St	May-19	\$353,000	46	\$7,674	
3901/568-580 Collins St	Sep-18	\$381,800	49	\$7,792	
1605/442-450 Elizabeth St	Aug-18	\$380,000	46	\$8,261	
3908/462 Elizabeth St	Sep-18	\$320,000	56	\$5,714	
4806/568-580 Collins St	Nov-18	\$348,000	53	\$6,566	
1201/36-40 La Trobe St	Jan-19	\$390,000	48	\$8,125	
1401/36-40 La Trobe St	Aug-18	\$390,000	48	\$8,125	
2706/36-40 La Trobe St	Jul-18	\$438,780	48	\$9,141	
807/36-40 La Trobe St	Feb-19	\$405,000	46	\$8,804	
1101/36-40 La Trobe St	Feb-19	\$385,000	43	\$8,953	
607/36-40 La Trobe St	Dec-18	\$390,000	47	\$8,298	
4401/228 La Trobe St	Jun-19	\$426,500	49	\$8,704	
703/23 Mackenzie St	Jul-18	\$470,500	45	\$10,456	
902/23 Mackenzie St	Jul-18	\$493,000	48	\$10,271	
1103/23 Mackenzie St	Apr-19	\$395,000	45	\$8,778	
1001/35-47 Spring St	Jul-18	\$592,000	65	\$9,108	
803/23 Mackenzie St	Aug-18	\$471,500	45	\$10,478	
2 Bed 1 Bath					
1101/31 Abeckett St	May-19	\$440,000	56	\$7,857	
2509/31 Abeckett St	Mar-19	\$520,800	65	\$8,012	
1909/442-450 Elizabeth St	Nov-18	\$550,000	65	\$8,462	
1409/462 Elizabeth St	Mar-19	\$520,000	76	\$6,842	
1010/228 La Trobe St	Jul-18	\$666,320	63	\$10,577	
1502/228 La Trobe St	Jul-18	\$653,950	63	\$10,380	
304/296-300 Little Lonsdale St	Feb-19	\$567,800	61	\$9,308	
702/296-300 Little Lonsdale St	Feb-19	\$508,750	61	\$8,340	
1103/296-300 Little Lonsdale St	Apr-19	\$666,200	66	\$10,094	
1904/296-300 Little Lonsdale St	Nov-18	\$587,750	61	\$9,635	
3004/296-300 Little Lonsdale St	Jan-19	\$621,000	61	\$10,180	
3403/36-40 La Trobe St	Sep-18	\$480,000	52	\$9,231	
2 Bed 2 Bath					
3506/36-40 La Trobe St	Mar-19	\$473,950	57	\$8,315	
1102/36-40 La Trobe St	Aug-18	\$518,000	61	\$8,492	
1201/36-40 La Trobe St	Feb-19	\$530,000	57	\$9,298	
4304/462 Elizabeth St	Sep-18	\$708,000	73	\$9,699	
1308/23 Mackenzie St	Mar-19	\$829,000	66	\$12,561	

Source: RPData, Jul-18 to Jul-19

There are limited project sales for three- and four-bedroom apartments which may indicate that developers perceive limited marketability for this unit typology, therefore we have also referred to established three- and four-bedroom apartment sales in the CBD to support our market parameters. These are seen below.

The below sales evidence is considered to be inferior second-hand stock. The adopted unit size for three- and four-bedroom units in Case Study 3 are on the higher end for three-bedroom (at 125sqm of NSA) and on the lower end for four-bedroom (132sqm). Therefore, altered values are warranted for our feasibility models.

Address	Sale date	Sale price	NLA (SQM)	Rate (\$/SQM)	Comment
3 Bed 2 Bath					
1005/23 Mackenzie St	Sep-18	\$936,500	82	\$11,421	Built in 2017
2607/442-450 Elizabeth St	Dec-18	\$840,000	84	\$10,000	Built in 2018
224-252 La Trobe St	Jul-19	\$700,000	91	\$7,692	Tbc. 2020
173/299-319 Queen St	Jul-19	\$707,500	150	\$4,716	Built in 2002
235/538 Little Lonsdale St	Jun-19	\$725,000	107	\$6,776	Built in 2000
1102/265-273 Exhibition St	May-19	\$750,000	97	\$7,732	Built in 1997
401/108 Queensberry St	May-19	\$1,250,000	106	\$11,792	Built in 2017
209/1-19 Bouverie St	Dec-18	\$825,000	86	\$9,593	Built in 2002
4 Bed					
28 Mclean Alley	Dec-18	\$2,000,000	217	\$9,217	Renovated house
2601/70 Lorimer St	Sep-18	\$1,715,000	167	\$10,269	Built in 2017

Source: RPData, Jul-18 to Jul-19

Jolimont Street, East Melbourne

Office Sales Evidence

As identified in the Elizabeth Street market research, in the past 12 months offices in the CBD-fringe have been selling from \$7,918 to \$10,853/sqm. Particularly Richmond and Cremorne (neighbouring the Jolimont area of East Melbourne) are

CBD-fringe rental prices identified by Colliers are at \$493/sqm/pa, with incentives at 12%.⁵ The city-fringe is set to deliver 62,200sqm of office floorspace over the next 12 months to account for the demand not met by the CBD. A commercial building such as 86-94 Jolimont Street is considered A-grade office space. The community workshop and theatre on the lower floors adds value to the property, as does the park frontage, with better views on upper floors. It is located 300m from Jolimont Station and in a high-amenity area, fronting Brunton Park. Surrounding businesses include research institutes, non-profit organisations, real estate agents and consulting firms.

Savills Research has calculated CBD-fringe A-grade office space capital values at \$8,000/sqm, up 17.6% from the previous financial year.⁶ With growing demand for CBD-fringe properties, a single occupant building would expect a sale value of \$9,500 to \$10,500/sqm.

Retail Sales Evidence

The subject site provides 144sqm of commercial space. The take up will most likely be a retail tenant, e.g. café. The ground floor property has frontage to Jolimont Street, which captures some local foot traffic. Recent ground floor new-build retail properties are sold for around \$9,000/sqm and park frontage offers a premium. The subject site offers conditions for a café tenant supported by the office space above.

⁵ Colliers, *Metro Office Research and Forecast Report, First Half 2019*

⁶ Savills Research, *Briefing Melbourne Fringe Office*, June 2019

APPENDIX B: GREEN INFRASTRUCTURE PRICE VARIATION

Methodology

Literature has been reviewed to assess the possible property value impacts of green infrastructure, and to specifically examine whether previous research has found a link between a price premium paid for properties with green infrastructure and / or energy-efficient design that would lower ongoing costs for the buyer.

A summary of the findings is shown in the table below.

Green Infrastructure Price Variation in Existing Literature

Research Title	Category of Green Infra.	Premium
Residential		
<i>San Francisco Living Roof Cost-Benefit Study</i> Arup, 2016	Inaccessible green roof	<ul style="list-style-type: none"> • \$US27/sq ft of roof • Net 0.96%
Valuing Green Guide: green roofs, walls and facades in the City of Melbourne	Inaccessible green roof	<ul style="list-style-type: none"> • \$172.56/sqm of roof • 7-20%
	Accessible green roof	<ul style="list-style-type: none"> • \$234.32/sqm of roof • 7-20%
	Walls and facades	<ul style="list-style-type: none"> • 1.4-3.9% of property value
Environmentally Efficient Design Planning Policies Pitt & Sherry (2013)	Energy efficiency, water efficiency, stormwater, urban ecology, innovation	<ul style="list-style-type: none"> • \$105/sqm GFA of large multi-unit residential buildings
Commercial		
<i>San Francisco Living Roof Cost-Benefit Study</i> Arup, 2016	Inaccessible green roof	<ul style="list-style-type: none"> • US\$40/sq ft of roof • Net 0.96%
<i>The Benefits and Challenges of Green Roofs on Public and Commercial Buildings, Washington DC</i> United States General Services Administration, 2011	Inaccessible green roof	<ul style="list-style-type: none"> • 2.5% nationally • 3.3% in Washington DC • US\$130/sqm of roof nationally • US\$108/sqm of roof in Washington DC
Valuing Green Guide: green roofs, walls and facades in the City of Melbourne	Inaccessible green roof	<ul style="list-style-type: none"> • Sole occupant: \$132.14/sqm NLA • Multiple occupants: \$156.67/sqm NLA
	Accessible green roof	<ul style="list-style-type: none"> • Sole occupant: \$196.12/sqm NLA • Multiple occupants: \$229.28/sqm NLA

Residential

All residential sales data is sourced from RP Data.

58 Breese Street, Brunswick

58 Breese Street

Completion by August 2020



Breese Street apartments have a communal rooftop garden with beehives and vegetable patches, a 7.5 star NatHERS energy rating, solar panels, a rainwater tank and deep soil zones. This building was designed by Milieu Architects and has high quality fittings.

Type	Price range	Internal area (sqm)	\$/sqm of NSA
1 Bed 1 Bath 1 Car	\$485,000 - \$495,000	58.2	\$7,039 - \$8,333
2 Bed 2 Bath 1 Car	\$750,000 - \$855,000	75.9 - 86.6	\$8,935 - \$10,149
3 Bed 2 Bath 1 Car	\$1,025,000	123.2	\$8,320

Comparison with similar sales

1 Bed 1 Bath 1 Car

	Sale price	NSA	\$/sqm of NSA
204A/58 Breese Street, Brunswick	\$485,000	58.2	\$8,333
313/288 Albert Street, Brunswick	\$390,000	51	\$7,647
414/8 Logon Street Brunswick East	\$360,000	52	\$6,923
215/300 Victoria Street, Brunswick	\$496,000	51	\$9,725
Premium value for green infrastructure			\$176/sqm or 2%

2 Bed 2 Bath 1 Car

	Sale price	NSA	\$/sqm of NSA
306A/58 Breese Street, Brunswick	\$855,000	94	\$9,096
207/300 Victoria Street, Brunswick	\$515,000	62	\$8,306
401/85 Nicholson Street, Brunswick East	\$540,000	68	\$7,941
309/8 Lyon Street, Brunswick East	\$708,000	75	\$9,440
502/8 Hope Street, Brunswick	\$751,000	87	\$8,632
Premium value for green infrastructure			\$413/sqm or 5%

3 Bed 2 Bath 1 Car

	Sale price	NSA	\$/sqm of NSA
401A/58 Breese Street, Brunswick	\$1,025,000	123.2	\$8,320
905/288 Albert Street, Brunswick	\$830,000	102.2	\$8,121

506/11-15 Brunswick Road, Brunswick East	\$963,000	120.8	\$7,974
Premium value for green infrastructure			\$182/sqm or 2%

One Central Park, Sydney

One Central Park Sydney Completed 2013



One Central Park is characterised by its low-emission central thermal tri-generation power plant, water recycling plant, light reflecting heliostat, rooftop gardens, smart metering systems and wide open green spaces. The building is coated in green walls which moderate temperature. It is located 200m from Central Station and is on a major bus route. It was designed by Jean Nouvel and PTW Architects and has won numerous awards for ESD and architecture. Strata fees are approximately \$10,000 p.a.

Type	Price range (sale year 2012)	Internal area (sqm)	\$/sqm of NSA
1 Bed 1 Bath	\$750,000 - \$956,000	47 - 63	\$8,523 - \$10,690
2 Bed 1 Bath	\$765,000 - \$960,000	72 - 95	\$8,723 - \$11,118
2 Bed 2 Bath	\$865,000 - \$1,205,000	83 - 94	\$8,008 - \$11,928

Comparison with similar sales

1 Bed 1 Bath 1 Car

	Sale price (2012)	NSA	\$/sqm of NSA
1202/3 Carlton Street, Chippendale	\$750,000	59	\$12,712
1103/178 Thomas Street, Haymarket	\$623,000	66	\$9,439
1310/8 Park Lane, Chippendale	\$565,000	52	\$10,865
402/3 Park Lane, Chippendale	\$575,000	50	\$11,500
814/349-357 Bulwara Road, Ultimo	\$585,000	47	\$12,447
Premium value for green infrastructure			\$ 1,319/sqm or 11.6%

2 Bed 1 Bath 1 Car

	Sale price (2012)	NSA	\$/sqm of NSA
1413/3 Carlton Street, Chippendale	\$880,000	66	\$13,333
1207/178 Thomas Street, Haymarket	\$984,900	83	\$11,866
1005/8 Park Lane, Chippendale	\$1,085,000	91	\$11,923

Premium value for green infrastructure

\$959/sqm or 7.8%

2 Bed 2 Bath 1 Car

	Sale price (2012)	NSA	\$/sqm of NSA
512/3 Carlton Street, Chippendale	\$990,000	83	\$11,928
709/178 Thomas Street, Haymarket	\$870,000	74	\$11,757
404/8 Park Lane, Chippendale	\$800,000	84	\$9,524
82/849 George Street, Ultimo	\$680,000	74	\$9,189
Premium value for green infrastructure			\$1,329/sqm or 12.5%

Illura Apartments, West Melbourne

Illura Apartments, West Melbourne

Completed 2013



The building has multiple green walls of native grasses, plus a deep soil zone in the rear courtyard of the property.

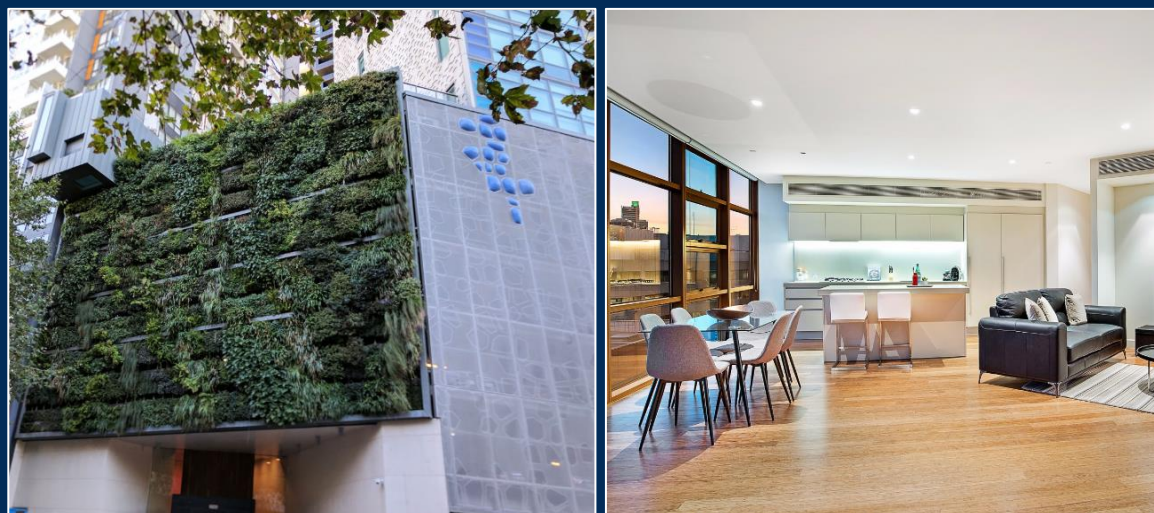
Comparison with similar sales

1 Bed 1 Bath 1 Car

	Sale price (2011/12)	NLA	Price/sqm
211/89 Roden St, West Melbourne	\$415,000	49.5	\$8,384
215/89 Roden St, West Melbourne	\$435,000	42.3	\$10,283
202/118 Dudley St, West Melbourne	\$365,000	44	\$8,295
402/118 Dudley St, West Melbourne	\$400,000	44	\$9,090
111/97-103 Flemington Rd, North Melbourne	\$335,000	42	\$7,976
Premium value for green infrastructure			\$528/sqm or 6%

Triptych Apartments, Southbank

Triptych Apartments, Southbank Completed 2011



This is a high-end apartment building with a street-facing green wall and internal climbing plants. It is located adjacent to the Arts Precinct and 500m from Flinders St station.

Comparison with similar sales

1 Bed 1 Bath 1 Car

	Sale price (2010/11)	NSA	\$/sqm of NSA
1209/8-10 Kavanagh St	\$785,000	89	\$8,865
1111/118 Kavanagh Street	\$406,000	44	\$9,227
1209/135 City Rd	\$435,000	53	\$8,207
1112/283 City Road	\$335,000	43	\$7,790
Premium value for green infrastructure			\$343/sqm or 4%

2 Bed 2 Bath 1 Car

	Sale price (2010/11)	NSA	\$/sqm of NSA
1303/8-10 Kavanagh St	\$910,000	109	\$8,349
1305/118 Kavanagh St	\$605,000	69	\$8,768
1803/135 City Rd	\$715,000	70	\$10,214
1304/241-243 City Rd	\$689,000	84	\$8,202
1305/283 City Rd	\$577,000	76	\$7,592
Premium value for green infrastructure			-\$276/sqm or -3%

The Quays, Docklands

The Quays Docklands
Completed 2013



This apartment complex includes a lap pool, spa, sauna, gym, library, cinema, boardrooms, tennis court and rooftop barbeque areas. There is over 200sqm of rooftop area with a mix of low substrate grass and garden beds.

Comparison with similar sales

1 Bed 1 Bath No Car – No Water views

	Sale price (2011)	NSA	\$/sqm of NSA
409/241 Harbour Esplanade	\$361,000	46	\$7,848
611/8 Marmion Place	\$395,000	56	\$7,054
1020/55 Merchant Street	\$410,000	55	\$7,455
4D/8 Waterside Place	\$480,000	64	\$7,500
Premium value for green infrastructure			\$384 or 5%

2 Bed 2 Bath 1 Car - Water views

	Sale price (2011)	NSA	\$/sqm of NSA
1107/241 Harbour Esplanade	\$908,000	62.5	\$14,528
2207/8 Marmion Place	\$995,000	102	\$9,754
1004/9 Waterside Place	\$1,060,000	96	\$11,042
Premium value for green infrastructure			\$2,753 or 23%

Findings

- Properties with GOCAP-style elements sold for between -3% and 23% greater than the average of comparable transactions.
- Premiums below 5% may not be directly attributed to the green infrastructure products and may be attributed to small variations in location, NSA, fixtures and fittings, views or design quality.

- Properties with green infrastructure tended to have a larger NSA and higher quality fittings, indicating that green infrastructure is often part of a high-end or luxury apartment product.
- The Triptych apartments in Southbank saw conflicting price variations. The apartment sizes in Triptych are larger than the comparable developments, and they did not sell for proportionally higher under a luxury branding. Southbank had a large supply of apartments during this period, which may have led purchasers elsewhere. While this was only a marginal variation of -3% to 4%, this example shows that green infrastructure is often associated with higher NSA apartments, which at the time sold for lower per sqm.
- One Central Park, Chippendale, had more green wall features in the development compared to a GOCAP-style development. The development was a landmark building designed by an award-winning architect, and therefore a premium can be attributed to design excellence when compared to comparable sales.
- For transactions in 2019 comparable to 58 Breese Street in Brunswick, a premium of 2 to 5% was seen.
- Notwithstanding some outlying results, premiums achievable in central Melbourne are expected to be between 2 to 8%.

Commercial

Lifestyle Working, Docklands

Lifestyle Working, Docklands

Completed 2013



Lifestyle Working by Lendlease is a four-storey apartment building in Docklands business district, with frontage onto a community garden and public open space. There are no basement levels or car parks, and there is an internal atrium with plantings, and solar panels on the roof.

Type	Price range (2012)	Internal area (sqm)	\$/sqm of NSA
Office	\$395,000 - \$1,044,230	48 - 249	\$4,194 - \$8,690

Comparison with similar sales

	Sale price (2012)	NSA	\$/sqm of NSA
110/838 Collins St, Docklands	\$462,000	59	\$7,831
128/757 Bourke St, Docklands	\$348,750	56	\$6,228
8 Doepel Way, Docklands	\$650,000	106	\$6,132
5/198 Harbour Esp, Docklands	\$270,000	40	\$6,750
Premium value for green infrastructure			\$1,069/sqm or 16%

Office Transactions by Date

Price variations for GOCAP-style green infrastructure in office buildings are generally associated with premium and A-grade products. In the year to Dec-18, 90.3% of stock additions were Premium or A-grade office space.⁷ Green infrastructure is often packaged with other amenities in new prime office stock. A higher NABERS and Green Star rating is coupled with GOCAP-style products in the NAB Building 700 Bourke Street and 839 Collins Street. A retail offering is combined with GOCAP-style open space provision for Melbourne Quarter. The green premium for office space can be attributed to worker productivity,

⁷ Savills Research, 2019. *Briefing Notes – Melbourne CBD*. Savills: Melbourne. 2019.

company image or the cost savings associated with a higher NABERS rating (which accompanies Premium/A-grade space).

Savills Research has found that pre-committed tenancies represent 85% of floorspace across eleven new developments slated for completion between 2019 and 2021.⁸ To understand this market, recent office leases in the CBD are seen in the table below, where green-highlighted transactions represent GOCAP-style products.

Recent Office Leases

Address (CBD Submarket)	Date	Tenant	NLA (sqm)	Net rent (\$/sqm/p.a.)	Type
222 Exhibition St (North eastern)	Aug-18	WeWork	5,250	\$595	Direct
697 Collins St (Docklands)	Jan-19	Spaces	3,000	\$600	Precommit
414 La Trobe St (Western core)	Jul-18	Fair Work Ombudsman	4,304	\$460	Direct
L48/525 Collins St (Western core)	Mar-19	Jones Day Lawyers	1,000	\$925	Direct
L9/179 Collins St (Eastern core)	Apr-19	Gatekeeper Vetting	82.5	\$400	Direct
L10/379 Collins St (Western core)	Feb-19	Furla Australia	202	\$520	Direct
447 Collins St (Western Core)	Apr-19	ESuperFund	10,500	\$670	Precommit
525 Collins St (Spencer)	Mar-19	Public Transport Victoria	10,000	\$550	Precommit
839 Collins St (Docklands)	Feb-19	QBE	5,700	\$550	Precommit
130 Lonsdale St (North eastern)	Feb-19	Servicenow	3,800	\$650	Precommit
130 Lonsdale St (North eastern)	Sep-18	Telstra Super	3,300	\$535	Precommit
130 Lonsdale St (North eastern)	Dec-18	Australian Financial Complaints	7,600	n.a.	Precommit
130 Lonsdale St (North eastern)	Sep-18	CBus Super	9,600	n.a.	Precommit
477 Collins St (Western core)	Mar-19	Urbis	5,300	n.a.	Precommit

Source: Preston Rowe Paterson, *Transactions in review*, July 2018 – May 2019; Savills Research, *Briefing: Melbourne CBD Office*, June 2019

Precommitted tenants may prefer GOCAP-style office space. The price variation of leases of GOCAP-style buildings would indicate tenant preference for green infrastructure. Given the

⁸ Savills Research, 2019. *Briefing Notes – Melbourne CBD*. Savills: Melbourne. 2019.

variation in transactions plus different incentives, a premium is indiscernible in the above table.

Given the high tenancy rates in Melbourne currently, there are only a handful of transactions from which to assess a premium. Some recent transactions in the Docklands and Western Core are seen below.

Docklands/Western Core Transactions

	Completion date	Sale date	Sale price	NLA	Price/sqm
NAB Building 700 Bourke Street	2013	Sep-14	\$433.5m	63,000	\$6,880
Gauge Building	2008	Nov-16	\$72m	10,000	\$7,200
839 Collins St	2019	Dec-16	\$430m	39,000	\$11,026
Olderfleet	2020	Jul-17	\$800m	52,000	\$15,385
MQ Tower 2	2020	Mar-18	\$550m	46,000	\$11,957
800 Collins St	2010	Sep-18	\$295.2m	28,619	\$10,314
Victoria Police	2020	Nov-18	\$280m	26,000	\$10,769
Bendigo Bank HQ	2005	Feb-19	\$80m	8,300	\$9,638

Source: Preston Rowe Paterson, *Transactions in review*, July 2018 – May 2019; Savills Research, *Briefing: Melbourne CBD Office*, June 2019

The office sales market preferences numerous factors of which green infrastructure is marginal. Green infrastructure is often packaged with amenities such as childcare centres, gyms, retail, restaurants a high NABERS and Green Star rating or views as part of a premium and A-grade product.

Most of the existing stock with green infrastructure assets are single-tenant or owner-occupied buildings. Often, they are occupied by institutions. Examples include:

- Bendigo Hospital, Bendigo
- Parliament of Victoria Annex, East Melbourne
- Victorian Cancer Centre, Parkville
- RMIT University Building 21
- Minifie Park Early Childhood Centre
- Burnley Living Roofs, UniMelb Burnley Campus
- NAB Building, Docklands
- Melbourne Quarter, Docklands
- Kangan Institute, Docklands
- Growing Up Rooftop Garden, Melbourne CBD

Some premium and A-grade office tenants are currently paying a premium for green infrastructure. The ability to deliver this cost-effectively is dependent on the site.

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Appendix H

External advisory workshop summaries

H1 Overview of Workshop 1

On 18 February 2019, a three-hour workshop was held to review draft standards and tools for a proposed integrated suite of sustainable design and green infrastructure standards, to potentially be embedded into the Melbourne Planning Scheme.

Representatives across the green infrastructure and sustainability industry including developers, building managers, academics, development organisations and State and Local government were invited to provide feedback on the approach and business case outputs to date.

The workshop featured three presentations from City of Melbourne representatives followed by a presentation and workshop activities from the Arup team, with the aim to:

- Provide an overview of the current progress of City of Melbourne's Green Our City Strategic Action Plan (GOCAP)
- Outline the key target areas and actions to change the current planning scheme
- Acquire feedback on the general approach of the GOCAP planning scheme amendment business case
- Acquire feedback on the proposed standards to be embedded in the planning scheme
- Acquire feedback on the proposed planning scheme mechanism for implementing the standards
- Provide feedback on the proposed approach to the next phase of the project looking at the economic feasibility of the planning standards

This document summarises the key outcomes of the workshop which will be embedded in Stage 2: refining standards, economic feasibility and case study analysis.

H1.1 General feedback

The project methodology to date was outlined during the workshop. Participants were then asked to write down on sticky-notes what they thought the strengths of the approach were and where improvements could be made.

The main strengths identified by participants were:

- Wide consultation with international stakeholders
- Appropriate use of rating tools to add an element of governance and improve industry acceptance
- Practical, systematic and evidence-based approach

- Potential use of incentives to encourage compliance
- Multiple targets were seen as ideal and were measurable to track and benchmark performance

The main areas for improvement identified by participants were:

- Potential to differentiate standards by scale and building type
- Clarify terms and specific requirements to ensure that they are clearly communicated
- Quantify the benefits for both the city and individual developments
- Inclusion of case studies for other municipalities across a variety of locations (including rural), not just inner Melbourne
- Include different development types in case studies e.g. residential, industrial etc as their contributions to greening vary e.g. residential equals 23% but makes a contribution of 24% to greening
- Provide guidance notes - update the Growing Green Guide to provide further guidance, guidance like the Apartment Design Guidelines for Victoria
- Introduce training requirements in the standards
- Potential to add a verification process
- Demonstrate the benefits beyond economic incentives
- Many participants believed that Green Infrastructure should be a standalone component in the planning scheme
- Refine targets and introduce success factors



Figure A1 Strengths and improvements of the methodology

H1.2 Standards feedback

The next activity focused on the proposed standards, with the draft list of standards divided into four groups. Participants allocated themselves to the group of standards they were most interested in and proceeded to provide commentary on them. The standards were categorised into the following groups:

- Group 1: Energy and greenhouse gas emissions and waste management
- Group 2: Biodiversity and active transport
- Group 3: Climate change adaptation and water use
- Group 4: Stormwater and flood and adaptive reuse

Across all four groups, common areas of feedback included:

- There needs to be further clarification around the intent of the standards and to ensure that these standards can be understood by the public.
- High level objectives need to be coupled with milestone objectives and outlined pathways to achieve the standards. As well as targets/action strategies defined e.g. the percentage of green required.
- Incentives should be embedded throughout to encourage the execution of the requirements.

H1.2.1 Group 1: Energy and greenhouse gas emissions and waste management

The discussion around energy and GHG emissions in the planning requirements primarily revolved around the status of existing gas infrastructure and the retrofitting possibility of buildings. The discussion group raised the question of how gas networks will play a role (if any) in the future of new and existing building developments.

Another key point raised was that the current draft standards do not have any indication or targets to retrofit existing buildings. This was identified as a gap in the standards which should be addressed in the next version.

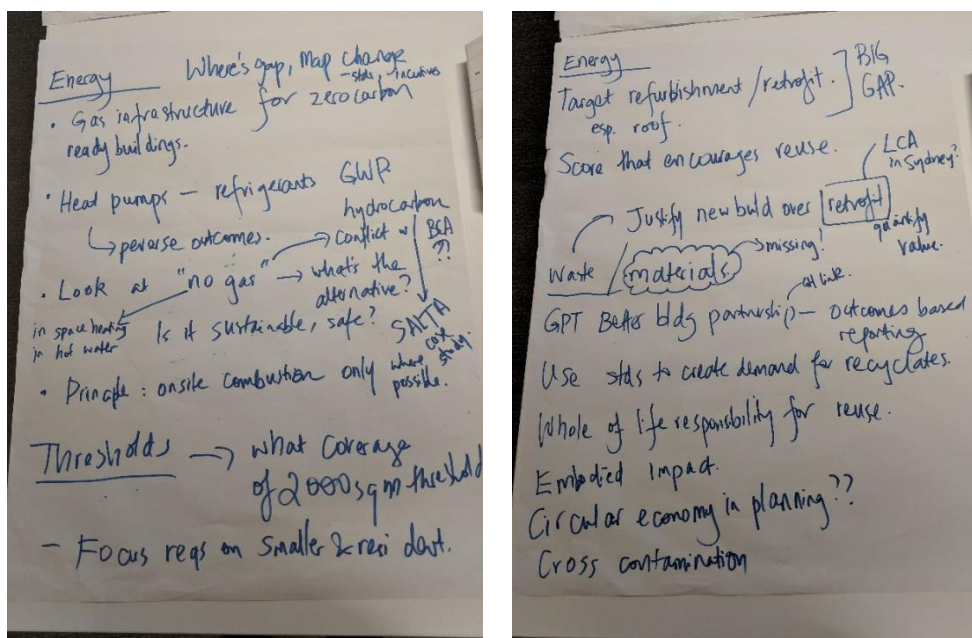


Figure A2 Energy, GHG and waste discussion

H1.3 Group 2: Biodiversity and active transport

Conversation regarding biodiversity standards determined there were gaps between local incentives and the wider benefits of biodiversity, such as the role biodiversity can play in impacting overall wellbeing through initiatives such as encouraging greater shading, less water use and more pollen producing vegetation. This was discussed in the context of the standards being able to encourage greater ties between people and place through indigenous plantings.

With regards to Active Transport, much of the conversation focused on how market expectation and design outcomes often differ and need to be balanced. The example of car parking requirements being unbundled from apartment sales was discussed at length. Additionally, the conversation regarding active transport raised concerns about how future changes in transport modes would be addressed, particularly increasing use of carshare and future use of drones or flight. There

were concerns about how active transport is to be embedded into existing and future linkages.

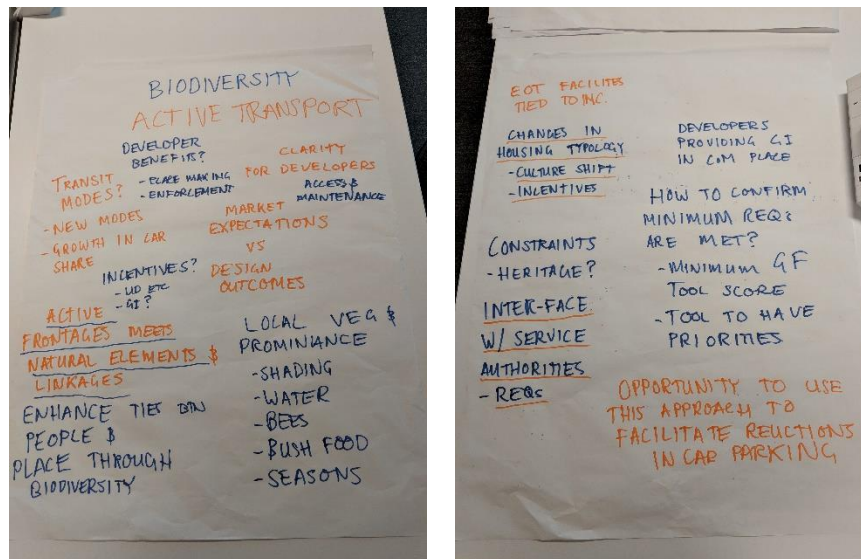


Figure A3 Biodiversity and active transport discussion

H1.4 Group 3: Climate change adaptation and water use

The main query regarding climate change adaptation was the use of seemingly arbitrary figures in the planning requirements. There were concerns around where this number was acquired from and that there needs to be more testing in a Melbourne context required to justify the figures. This being said, there was a strong support for a number to be achieved, it is just not certain how. The relationship between the tool and the 50% green cover target needs to be elaborated on. The application of the green factor tool was deemed important to be able to implement the green infrastructure in a variety of ways.

There were also queries in regard to the height of the building and whether this could be taken into account. There was concern about the relevancy of green on a 200m tall building for example. There was suggestion for a height to area ratio to also be used to understand how much surface can be green.

There was acknowledgement that specific microclimates and context is important. There should be a location-based trigger incorporated into the standard and/or tool. Mappings could be incorporated but this would require up front work which may be limiting in introducing the standards in a timely manner.

Further conversations identified the limitation of measuring climate change adaptation as reduced temperatures only and not taking into account the multiple benefits that green infrastructure may have including measures of stormwater detention, food security etc. (although other standards may pick these up).

The group also discussed the difficulty of ensuring the quality of green cover. There were suggestions of further technical requirements that may be mandated. A maintenance plan could be required although was acknowledged that this would be difficult to regulate.

In terms of water use, it was widely agreed that there are multiple solutions to saving water which varies by building scale and building use. Water from alternative sources could also be viable such as onsite stormwater capture and use.

Note that collection and reuse of water is on site and installation of water recycling systems is also covered in 22.23 Stormwater Management (Water Sensitive Urban Design).

Similarly, to the above standard, the number achievable was deemed to need more rigorous testing and 20% considered to be substantial and possibly not achievable.

There was discussion around the requirement for a tank to be an expensive solution rather than an outcome for the action. There was also discussion in regard to providing performance-based solutions considering the use of water as well as the source.

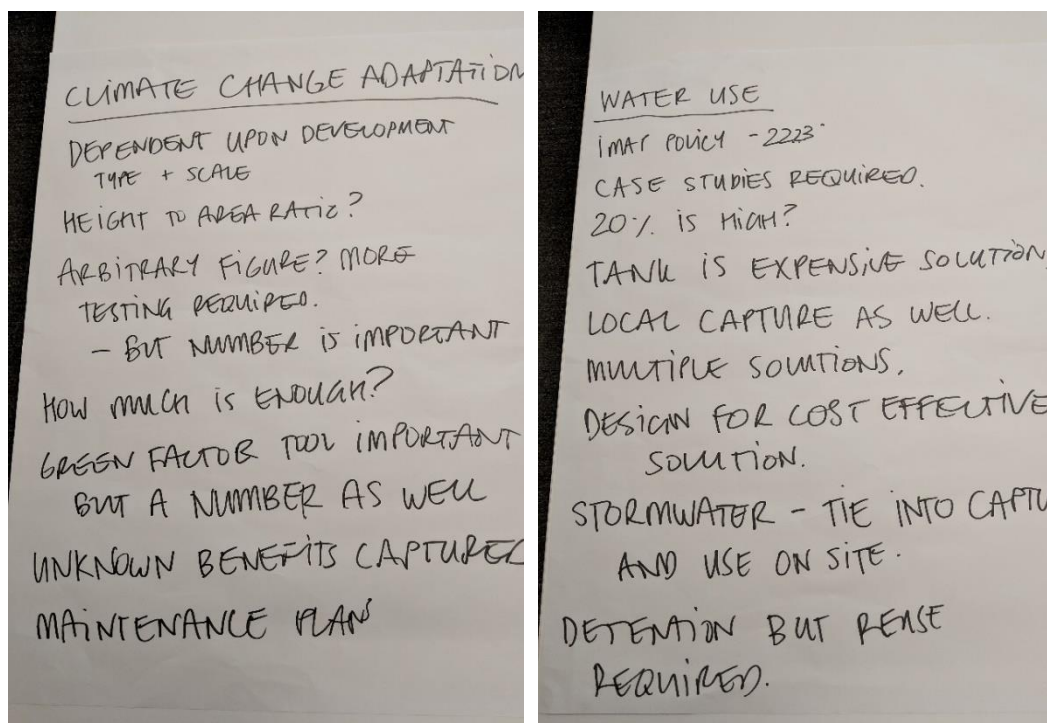


Figure A4 Climate change adaptation and water use discussion

H1.5 Group 4: Stormwater, flood and adaptive reuse

The requirements for stormwater and flood require more clarity around the wording and specifications of the target numbers, considers roofs not just vertical surfaces. The group also raised the interdependencies between water use and green infrastructure. One example provided was the impact of green roofs on

water quality and capture potential. In terms of adaptive reuse there were concerns about the limited relationship to one strategy. Opportunity to consider adaptive reuse in term of buildings designed now for future re-use and e.g. specifying minimum loads for green roofs. The group mentioned how Green Star credits could be embedded into the standards or how the Green Factor tool could be live and continuous.

There was a discussion around whether stormwater would be more easily managed in the public realm than the private realm and whether it would be possible or more beneficial for water to generally be directed off site to be managed through the public realm (in the City of Melbourne through Lincoln Square and Argyle Square for example). The context is quite different for the City of Melbourne compared to Helsinki where there is more built up area and so less private area for permeability/detention/biofiltration, however this is why there may be more need to require developments to incorporate deep soil areas etc.

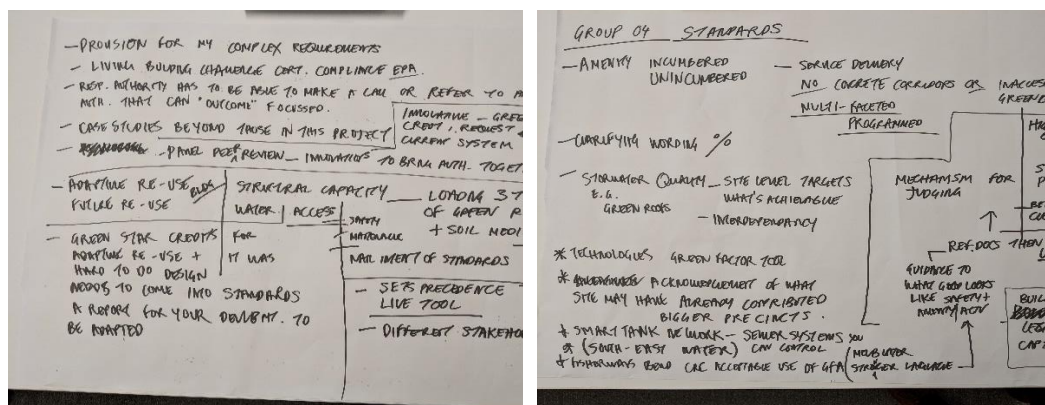


Figure A5 Stormwater, flood and adaptive reuse discussion

H1.6 Planning feedback

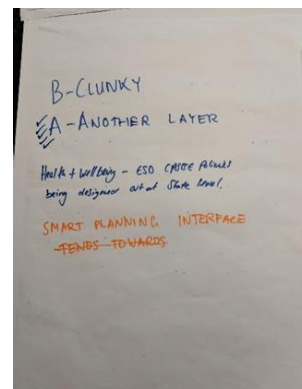
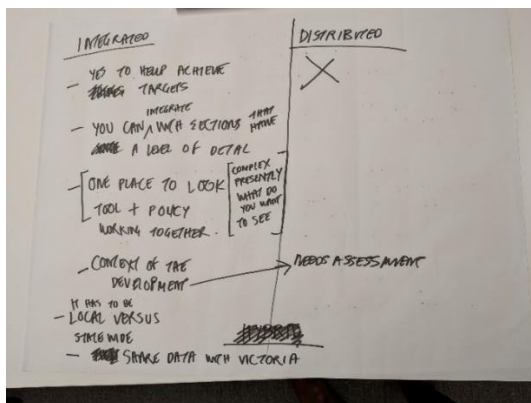
For the next activity, participants were asked to comment on the preferred approach to planning controls. At a high level, the two options were:

- **Integrated** – A new local policy and schedule to the design and development overlay to apply to the whole municipality or discrete precincts
- **Distributed** – A new local policy with amended or new schedules to the design and development overlay, environmental significance overlay, land subject to inundation overlay and heritage overlay.

There was a strong preference for green infrastructure to be a standalone component in the planning scheme. With regards to the type of mechanism used, an integrated approach was generally seen as the preferred option, though some hesitation existed on the basis that through an integrated approach, green infrastructure would add another layer of depth and complexity to the planning schemes.

General discussion points for an integrated approach included:

- More prominent green infrastructure requirements to help accelerate the transition
- A distributed approach is seen as disjointed
- Developers would prefer to go one section of the planning requirements to find their green infrastructure needs
- Newer smart planning tools that integrate sustainable design guidelines into smart planning would have been lost
- DDO over whole municipality goes against smart planning policy
- Integrated approach could be used but specific requirements could be captured elsewhere
- Future local planning policies could make old policies redundant, therefore a state-wide planning policy framework was often seen as necessary
- Relating to green roofs suggestion that it could be good to look at how we make provision for maintenance e.g. same provision as local bylaws for maintaining laneways or nature strips within private property so not unsightly, use strata laws, etc.
- Mid-sized developers don't have the choice to build 'eco-friendly' buildings without regulation or knowledge of the cost of green infrastructure, as they would operate at a competitive disadvantage.



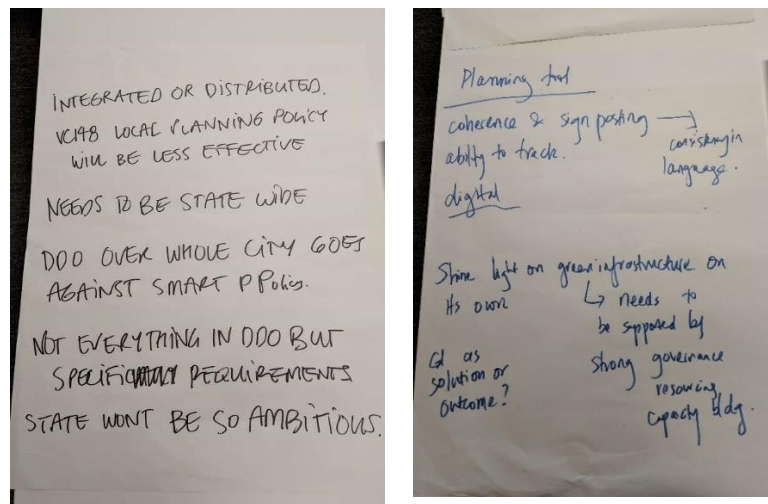


Figure A6 Planning controls discussion

H1.7 Opportunities

For the final activity, participants were separated by industry and organisations to discuss the implications of the potential planning scheme amendment. The workshop group was divided between those representing or working for industry bodies and organisations. Each group was prompted by the following questions:

Industry

Assuming the planning scheme is amended, how do you see this changing the industry over the next:

- a) 1-2 years*
- b) 5 years*
- c) 10 years.*

Organisations

- a) How does this project align with your priorities and work plans?*
- b) What are the opportunities to collaborate?*

Main opportunities identified were:

- Alignment with Council Alliance for Sustainable Built Environment (CASBE)
- Potential to be rolled out into other municipalities, with the City of Melbourne leading the reform as a 'pilot program'
- Added controls to monitor the progress of the amendments
- Opportunities for research and collaboration with other organisations such as Green Building Council of Australia (GBCA)
- DELWP to provide the links between municipalities through overall strategy which is extremely important for a systems-based approach to Green Infrastructure
- The need to upskill the development industry on Green Infrastructure, in particular, to be able to effectively implement new planning scheme requirements
- Educate the current/future residents to want more sustainable buildings
- Develop a suite of education and advocacy events along with the planning scheme amendment.

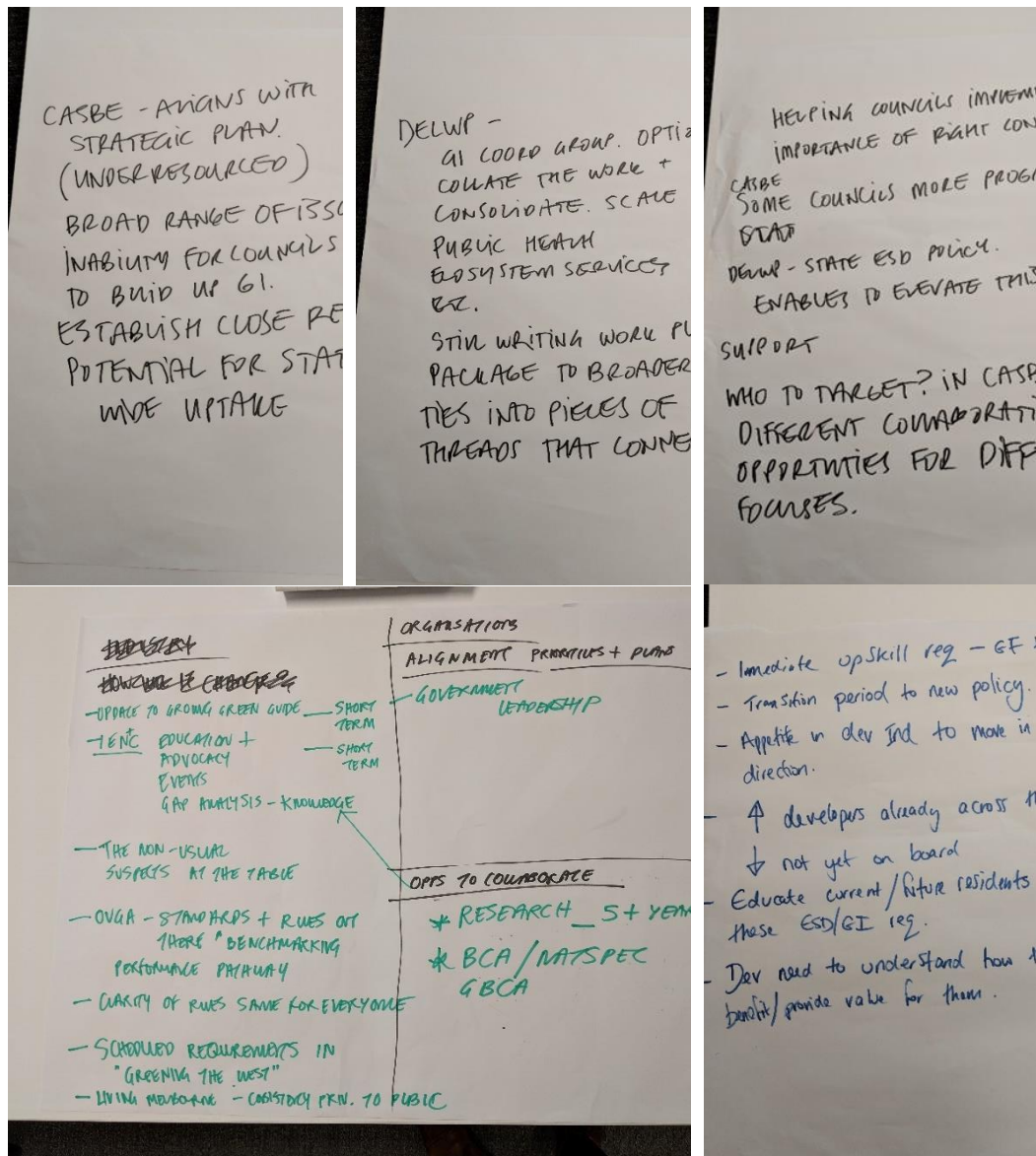


Figure A7 Opportunities discussion

H1.8 Stage two feedback

An overview of stage two steps was outlined for workshop participants. Comments on the methodology going forward included:

- Distinguish between capital and operating costs in Green Infrastructure, as discussed within Stage one
- Quantify the value of the Growing Green Guide
- Focus on property economics
- Stage two needs to capture all the other benefits to green infrastructure other than economic benefits, through a sensitivity analysis of qualitative factors
- For the scenario modelling both accessible and inaccessible Green Infrastructure scenarios need to be modelled (publicly accessible green roof versus biodiversity only green roof)
- Modelling shouldn't be limited to high value sites as there may be more area covered by other development types
- The number of projects and determination of site areas, based on trends in development
- Potential to include modelling for other municipalities outside of City of Melbourne, including rural and rural interface areas.

H2 Overview of Workshop 2

On the 31st of August 2019, a four-hour workshop was held to review the updated draft sustainable design and green infrastructure standards. These standards will potentially be embedded into the Melbourne Planning Scheme.

Since the first workshop on the 18th of February 2019, the standards have been refined, targets have been established, and a pilot assessment tool developed. Representatives across the green infrastructure and sustainability industry including developers, building managers, academics, development organisations and State and Local government were invited back to provide feedback on these developments to date.

The workshop hosted by the City of Melbourne and Arup at the Melbourne Town Hall aimed to:

- Provide an overview of the current progress of City of Melbourne's Green Our City Strategic Action Plan (GOCAP)
- Provide an overview and acquire feedback on the four business cases developed to test the standards
- Acquire feedback on the effectiveness of the proposed standards on different building typologies
- Provide results of the economic implications of the standards

- Provide an overview of the pilot Green Factor Tool
- Acquire feedback on partnership opportunities and communication methods

This document summarises the key outcomes and learnings of the workshop which will be incorporated into the project moving forward.

H2.1 Testing the standards through scenarios

Four scenarios were developed to test the proposed green infrastructure standards based off existing proposed projects. These projects comprising of mixed use residential, commercial and varying in scale were chosen to be the most representative of City of Melbourne developments. The projects were:

- 86-90 Jolimont Street (1,114 m²)
- 95-102 Franklin Street (1,010 m²)
- 201-205 Roden Street (1,668 m²)
- 543 – 547 Elizabeth Street (812 m²)

Using these examples, the planning standards were implemented to see how it would impact the design and development. A ‘naïve’ approach to greening these developments was applied to represent the worst-case scenario of greening efforts.

Oculus presented the 4 case studies and discussed the before and after of the developments with ESD, showing the changed use of the total area and differences in sites allowing for differing implementation of ESD. HillPDA then presented their findings on costs of each site and how this altered with the implementation of ESD based on similar buildings within Australia.

Participants were divided into four groups with a unique case study and were asked to discuss the impact of the standards on the development. The following discussions were had in each case study:

Jolimont Street:

- Concerns were raised around the flexibility of the 40% target for green infrastructure.
- There is potential for the performance of the building to inform and assist the overall targets of the municipality.
- Query as to how the targets assist each other and how they could potentially incentivise a cultural and behavioural change to drive changes and attitude and promote innovation.
- The possibility of introducing an offset scheme within the precinct to provide the same benefit was discussed.
- It is important for planning requirements to impact culture and perception, one example provided was C308 which utilised good design guides that influenced public perception.
- It was discussed that the new policy should provide an indication of process for the applicant to go through. An application process should

welcome applicants to meet with councils to discuss opportunities within the development and wider precinct.

Franklin Street

- Drivers for these developments were discussed where a balance was sought between aspirational drivers and cost drivers.
- Assessment of greenery should also consider the quality of construction as well as the area of construction.
- There may be opportunities for small scale developers which may arise from the planning scheme amendments, economies of scale need to be considered.
- Discussion around governance was had and it was noted that it should be considered upfront. Identifying who has governance over ESD and how the amendments grow with the industry.
- Concerns were raised around the issue of timing and the amount of warning the industry would have for the new standards.

Roden Street

- Potential for both solar panels and green roofing to be embedded into the development. The initial thoughts were that the design seems to incorporate a one or the other approach between green roofs and solar panels, whereas design could incorporate both solar panelling and greenery within the same roof area.
- Concerns around maintenance of green infrastructure was raised regarding who would be responsible for the upkeep and costs of greenery.
- Opportunities to have water irrigation in the building which could improve design and create more opportunities from a water perspective.
- Plant boxes could be included in apartment balconies to increase the greenery. However as these were within private residences the responsibility lies with the individual resident to maintain this, making it difficult to include within the total area of greening as it is not guaranteed to be maintained.
- This option had the greatest loss of dwellings, in part due to the creation of the pedestrian walkway which divided the L shape building into two buildings. There was some discussion on whether the pathway could be maintained but have the buildings join 1-2 stories above ground level, creating a bridge between the two buildings. However, the reasoning behind this is that the walkway is required to be open air (cannot be covered).
- Ultimately the group felt the new green design was an improvement from the original design.

Elizabeth Street

- The new standards should have overlap with existing policies and plans.

- An integrated system approach should be applied to the development i.e. waste management of biomass should be used and managed on site rather than disposed elsewhere.
- It was discussed that the standards should be coupled with mandated maintenance and management requirements.

Overall, there was a positive response towards these case studies and that the developments were improved by the standards. Collectively, the main discussion points were around maintenance of the green infrastructure, its impact on the wider municipality and having an integrated approach applied to the whole building. These key issues will be noted for the future stages of developing the standards.

H2.2 Success factors

In the next activity, participants were asked to identify the key success factors for the planning standards. These factors were then prioritised into ‘critical’, ‘useful’ and ‘not required’. The working group choose from the following categories and were invited to add in any factors they felt were relevant.

Information

- Demonstration projects
- Guidelines and resources
- Campaign to buyers to value the standards

Policy implementation

- Consistency across jurisdictions
- Ramping up time
- Support and advice

Incentives

- Grants
- Floor area uplift
- Expedited application processes
- Publicity

Critical Success Factors

Among the critical success factors, the common themes were:

- Guidelines and resources must be formalised, properly worded and distributed to developers with ample notice.
- Mechanisms of publicity, education and awareness should be put in place to ensure success.

- Ongoing channels of support and communication should be available to developers.
- There should be consistency between jurisdictions in terms of policies and ESD advisory services.
- Systems should be put in place to provide ongoing monitoring and data collection of developments to assist developers throughout the process.

Other areas discussed as a critical success factor were:

- Ramping up time
- Monitoring and data collection
- Support and advice (combined with enforcement)
- Monitoring system
- Statement of compliance checking point – holding developers to account
- Grants
- Considering policy at application stage
- ESD advisory (pre-app; training staff) for councils
- Wording of the policy
- Pre-app meetings
- Additional resources with expertise
- Bond / bank guarantee for meeting requirements
- Maintenance planning
- Campaign to buyers
- Compliance officers
- Data on how it is affecting the City of Melbourne- Publicity and education and advocacy

Useful success factors

Among the useful success factors were:

- Expedited application processes
- Floor area uplift
- Grants (depending on what they are for – some could be critical)
- Campaign to buyers to value the standards
- Awards programmes (new and existing awards)
- (2 post-its) Consistency across jurisdictions
- Guidelines and resources
- (2 post-its) Demonstration projects

- Scalability – good practice example?
- Process requirements
- Ramping up time

Not required:

- Floor uplift – as this can sometimes be a negative.

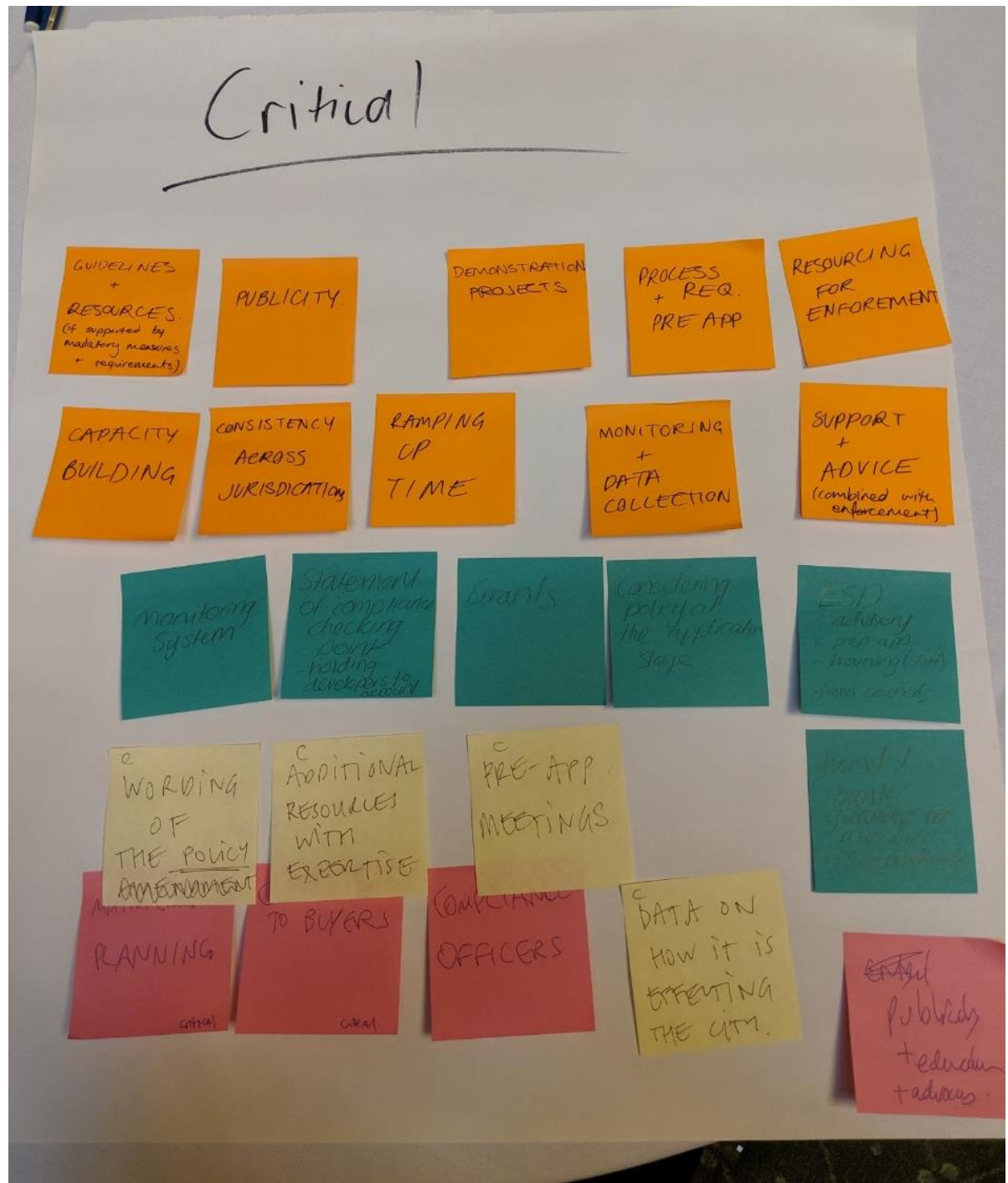


Figure A8 Critical success factors

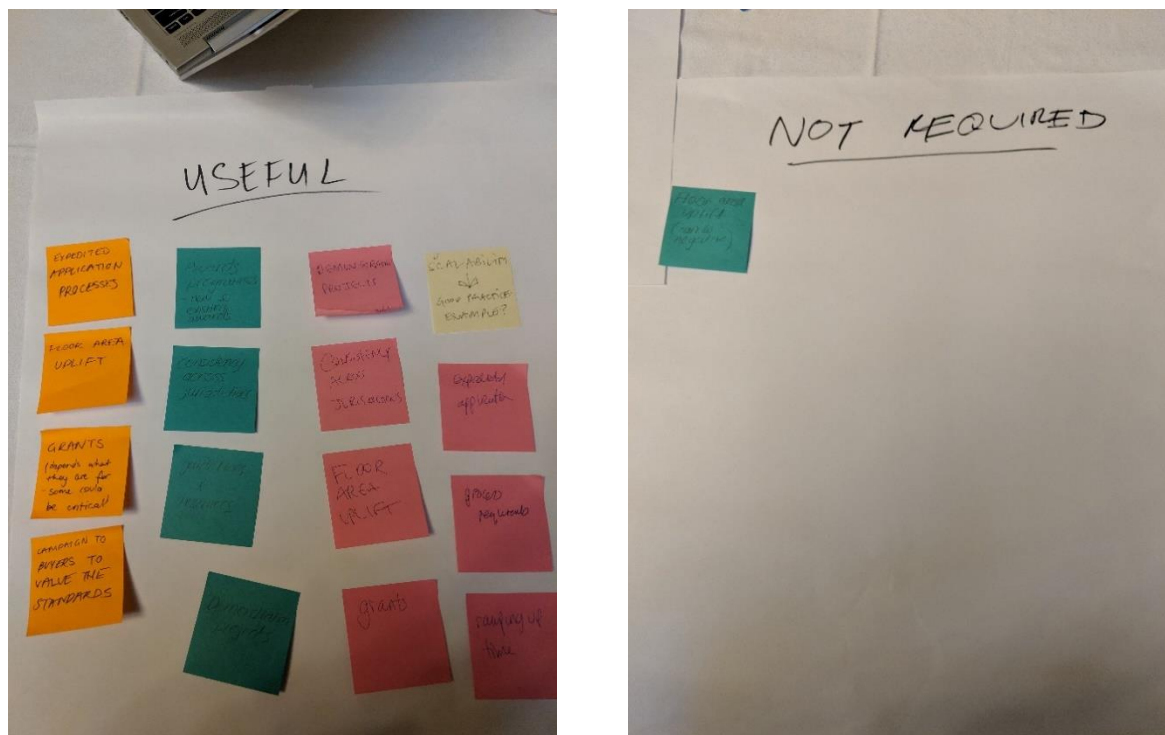


Figure A9 Success factors that were useful and not required

H2.3 Partnerships

In the last activity, participants were asked to discuss what communication methods were most effective and beneficial moving forward. Participants voted on a suite of various collaboration methods and partnership arrangements. The following list represents what groups and individuals were keen to be involved with moving forward.

Partnerships and support

Involvement in testing Green Factor Tool

- DELWP Development Approvals Team
- Oculus
- HillPDA
- Lendlease
- CASBE
- IMAP

Partnering to help develop GF Tool (\$, hosting, other geographical areas)

- VPA
- GBCA
- CASBE

Support for developing further scenarios with different development typologies (\$)

- Property Council
- IMAP
- HIA
- HillPDA
- CASBE

Submission to PSA

- Property Council
- GBCA
- PIA
- HIA
- CASBE

Voluntary use of minimum expectations within planning applications

- Lendlease
- Oculus
- Joint application for a PSA on Sustainability + GI
- IMAP
- CASBE

Make connections with industry

- API
- PIA
- FMA

Promotion and dissemination of materials to industry

- FMA
- PIA
- API

Precinct – green infrastructure masterplan for (e.g. Arden, Elizabeth St Catchment, Melbourne Water, Box Hill, Caulfield / Monash)

- Arup (w/ VPA)

Working together

The working group also discussed the best means of working together in future, with the majority voting to establish reference groups. Continuing workshops was discussed as something that was useful, but the high volume and length of workshops were of concern. There was need to consider at workshops and meetings whether the right people were in the room. The voting is listed below:

- Continue workshops – 0 votes
- Develop reference group – 7 votes (two marked Hill PDA)
- 1-1 briefings – 2 votes
- Email updates – 0 votes

- City of Melbourne to go to board or committee meetings and time for feedback after presentation – 6 votes (comment made about Council meetings vs property meetings)
- City of Melbourne briefings at established industry panels - 1 vote from Illan Waseloff API
- Technical advisory groups – 0 votes
- Email for distribution to industry body lists – 2 votes (Hayden, Oculus; NB – FMA)
- More regulator and shorter workshops (Anne City of Melbourne).

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