



# Sunlight access to public parks modelling analysis report

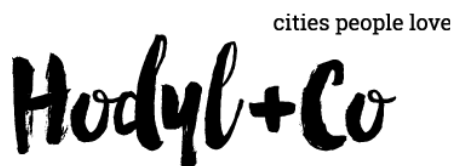
Prepared for the City of Melbourne

February 2018

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# Contents

	<b>Executive Summary</b>	<b>4</b>
<b>1</b>	<b>Introduction</b> Project scope Key resource material	<b>17</b>
<b>2</b>	<b>What level of sunlight access is wanted and needed?</b> Consultation findings Health impacts: the need for a balanced policy approach to sunlight exposure Ecological health How and when are parks currently being used?	<b>21</b>
<b>3</b>	<b>Existing policy settings</b> What sunlight access controls are in place now? How are the sunlight access controls being implemented?	<b>33</b>
<b>4</b>	<b>Existing conditions</b> Modelling analysis method What is the extent of overshadowing now?	<b>45</b>
<b>5</b>	<b>Setting priorities</b>	<b>61</b>
<b>6</b>	<b>Recommendations</b>	<b>89</b>
	<b>Appendices</b>	<b>95</b>
A	Health impacts	
B	Park usage data	
C	VCAT case studies	
D	Australian and international policy approaches	

# Executive summary

The City of Melbourne is one of the fastest growing municipalities in Victoria. Significant growth began in the 1990s within the urban renewal areas of the Docklands and Southbank. Local area planning undertaken in the past 5-10 years has identified additional urban renewal areas suitable for growth, such as City North and Arden-Macaulay. This planning has introduced new development controls in each of these areas which support development intensification. At the time of this planning, the accepted practice was to ensure that sunlight access to existing open spaces was provided for the equinox months of March and September.

In the past 2 years, this accepted practice has shifted as awareness of the importance of sunlight within high density urban environments has increased. Access to sunlight in the winter months has been identified as critical. This has resulted in winter sunlight access controls being introduced for parks in the Central City (via Amendments C270 - Central City Built Form Review, and C245 - Queen Victoria Market). This demonstrates that continued support for development intensification together with the protection of winter sunlight access is achievable.

The overall objective of this study is to establish appropriate sunlight levels for public parks across the remaining areas within the municipality (outside of the Hoddle Grid and Southbank area).

While the current Sunlight to Public Places Policy (Clause 22.02) defines public places as being parks and gardens, squares, street and lanes, the focus of this study is solely on public parks and consideration of streets is outside the scope.

## Key questions

This report considers sunlight from a user's perspective. It asks the following key questions:

- What levels of access to sunlight do people need to lead healthy, active lives?
- What are the appropriate policy settings to meet people's needs?
- How can the provision of good sunlight access be balanced with the need to accommodate development intensification to support population growth?

## Method

To answer these questions, this report synthesises two sets of evidence:

- Research - including existing literature into the importance of sunlight for health and the environment, park usage data as well as review of VCAT case studies and international and Australian policy settings
- Digital modelling - including a review of cumulative shadowing assessments (provided by the City of Melbourne) and additional testing of the current planning controls (undertaken by Hodyl + Co)

The following definitions are used in this report:

Categorisation of sunlight access	Degree of sunlight access/overshadowing
High levels of sunlight access	The whole park is in sunlight for the time period nominated. Marginal overshadowing occurs only at the perimeter of the park
Partial overshadowing	Parts of the interior of the park space are overshadowed for a portion of the time period nominated
Significant overshadowing	Large portions of the interior of the park are overshadowed across the time period nominated

Key findings

This research has identified that providing access to winter sunlight is considered international best practice. This builds on the recently adopted approach in the Hoddle Grid and Southbank.

This study investigated sunlight access to 157 open spaces across the municipality and found a clear divide between available sunlight within low-scale areas (those parts of the study area with height controls of 4 storeys or less) and growth areas (areas with height controls over 4 storeys).

The method and findings are illustrated in Figure 1.

Low-scale areas (4 storeys and below)

There are 133 parks located completely within low-scale areas. All of these parks have high levels of winter sunlight access. This will remain as new buildings built according to the existing height controls will generally retain high levels of sunlight access to these parks. Protecting winter sunlight access to these parks is therefore achievable with negligible effects on future development outcomes or capacity.

Growth areas (4 storeys and above)

There are 24 parks located within or immediately adjacent to growth areas. Providing winter sunlight access to these parks requires a more diversified response that considers the context of each park, the extent of existing overshadowing and the potential overshadowing from current height controls.

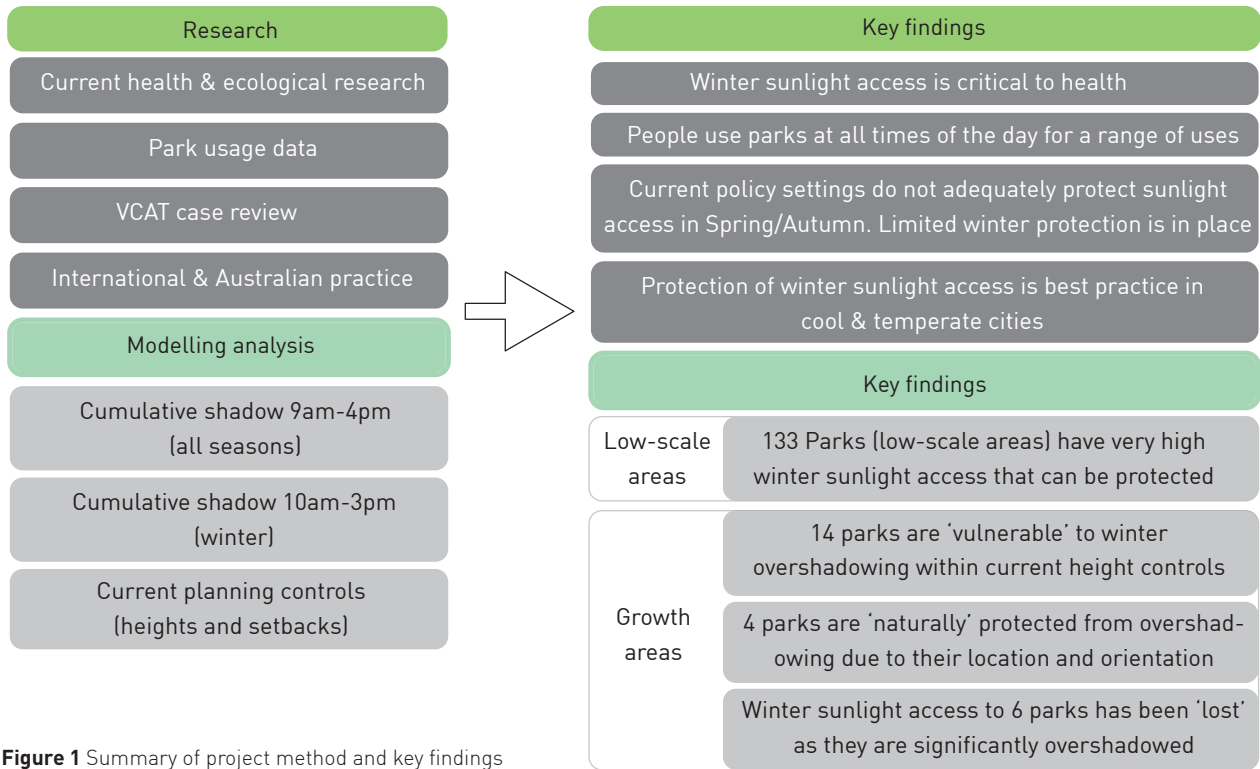


Figure 1 Summary of project method and key findings



Within the 24 parks the following levels of winter sunlight access are present:

*High levels of sunlight access in 'Naturally protected parks'*

There are 4 parks within the study area which are 'naturally' protected due to their location and orientation - for example waterfront parks in the Docklands that have uninterrupted solar access from the north.

*Partial overshadowing in 'Vulnerable parks'*

There are 12 parks that are already partially overshadowed in winter. An additional 2 parks (therefore 14 in total) are vulnerable to partial overshadowing in winter if the surrounding development is built to the existing height controls. The introduction of winter sunlight access controls for each of these parks will vary depending on the context and the current built form controls.

*Significant overshadowing in 'Lost parks'*

Within the growth areas there are 6 parks that are already significantly overshadowed in winter. The priority should be protecting the remaining amount of sunlight. Five of these are in the Docklands and one in Carlton.

## Setting priorities

This review has identified four overarching priorities to address sunlight access to existing parks which lead to specific recommendations for revised policy settings.

A fifth priority focuses on the need to identify future park locations so that sunlight protection for new public open spaces can be ensured.

### Priority 1: Support healthy, active living by protecting access to winter sunlight

#### Evidence base - research

While the importance of avoiding overexposure to the sun is well understood, the health impacts of insufficient sunlight exposure are not. Over 50% of Victorians are Vitamin D deficient in winter. This can have significant physical and mental health impacts. Providing people with the opportunity to lead healthy lives means providing them with the opportunities to access sunlight and shade as they need. A growing body of health research indicates that access to sunlight in winter is as important as access to shade in summer. This does not diminish the need for individuals to take responsibility for moderating exposure to UV.

Ensuring health benefits for all means that equitable access to winter sunlight is important. This means that people should be able to access their 'dose' of sunlight within walking distance from their home or workplace.

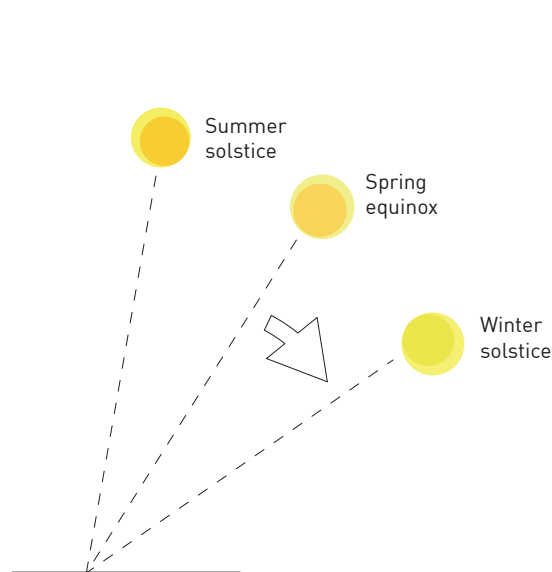
### Evidence base - modelling

The analysis of the modelling demonstrates that within low-scale areas high levels of winter sunlight access are already present and will generally remain.

Within the growth areas the level of winter sunlight access varies from high levels of sunlight access to significantly overshadowed.

### Existing policy position

Access to winter sunlight is only prioritised in the Central City. Elsewhere sunlight protection is in place for the Spring/Autumn equinox. In addition, a tiered system is in place with the controls providing certainty of sunlight access for some parks, while others are relatively unprotected from overshadowing. This leads to inequitable access to winter sunlight (see Figure 3).

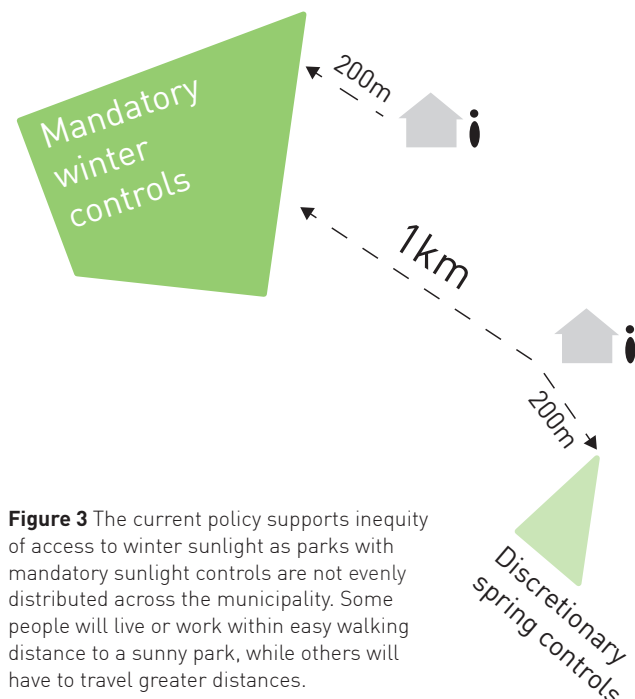


**Figure 2** Proposed policy shift from protecting sunlight access at the equinox to the winter solstice

### Proposed policy position - time of year

The following changes are proposed:

- Revise the current policy position to shift from protecting sunlight access at the equinox to maximising winter sunlight access to all parks across the municipality.
- Revise the current 'tiered approach' to protecting sunlight access to a 'flat' protection policy that maximises winter sunlight protection for all parks. This acknowledges that often the most important park is the one closest to where a person lives or works.



**Figure 3** The current policy supports inequity of access to winter sunlight as parks with mandatory sunlight controls are not evenly distributed across the municipality. Some people will live or work within easy walking distance to a sunny park, while others will have to travel greater distances.

## **Priority 2: Balance winter sunlight access to parks with the need to support development intensification**

Access to winter sunlight in growth areas is at the greatest risk and yet is where sunlight is most needed. In these areas, significant population growth is supported. People living in apartments or working in high density environments generally have very limited access to private green open space. As development intensification occurs, overshadowing of existing parks increases at the same time as more people are needing to use these spaces (see Figure 4). This raises a tension between supporting growth and maintaining winter sunlight access to parks.

Delivering new open spaces is difficult, even more so in growth areas where land values are high. It is therefore important that the existing spaces retain high levels of amenity to support this population growth.

### **Evidence base - modelling**

The modelling and testing demonstrates that winter overshadowing is typically a problem for parks located in these growth areas. The modelling also demonstrates that protecting the entire park from overshadowing in winter would often have an unreasonable impact given support for development intensification.

The testing illustrates that in growth areas a balanced approach is appropriate, where overshadowing that is created by the street wall height control or the overall height limit (whichever is lower) is considered acceptable. Any part of the building above this height would then need to be set back so that it does not create any additional shadow.

Parks in low-scale areas (those areas with height controls 4 storeys or lower) are generally well-protected due to the low height limits. Introducing a sunlight

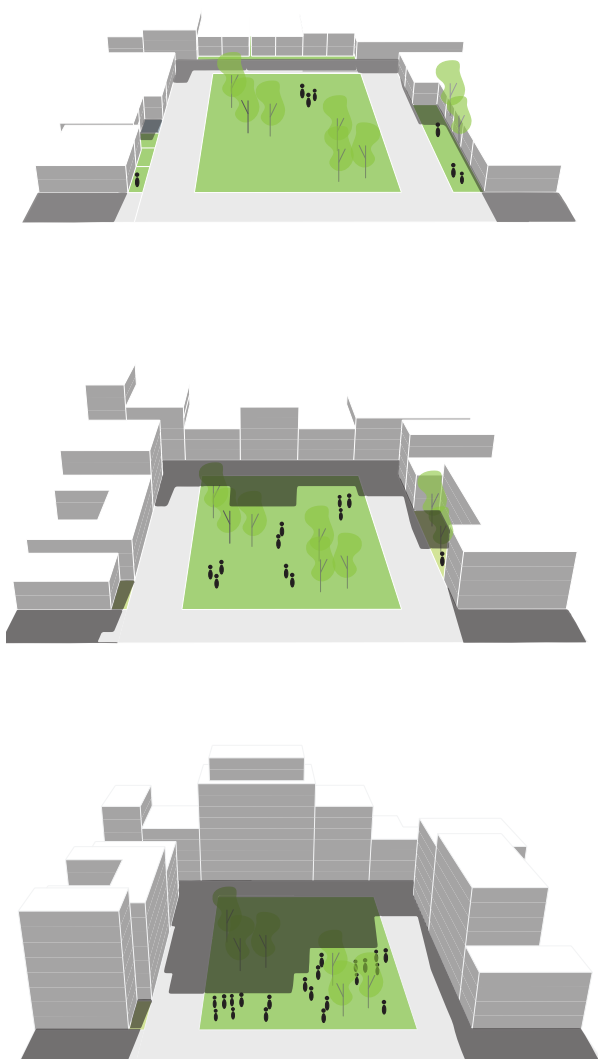
access control will ensure that this remains the case while having a negligible effect on development. As the potential overshadowing impact in these areas is minimal, not all buildings will need to be assessed for overshadowing impacts. Requiring a permit applicant to prepare overshadowing testing of a second floor addition on a single storey house, for example, would be overly onerous.

There are, however, a number of parks in low-scale areas that could be overshadowed even within the existing low-scale height limits. This is due to the park being located directly on a property boundary (together with its size or shape and/or orientation). In these instances a park can be overshadowed by the construction of a single storey building. It is unreasonable therefore to protect the entire park from overshadowing. A balanced approach is also needed which considers these parks on a site by site basis.

### **Existing policy position**

Current sunlight access protection is based around a tiered approach that nominates a hierarchy of spaces with graded levels of protection. This is generally related to the frequency of use and perceived importance of the park and is unrelated to the scale of development adjacent to the park.





**Figure 4** The tension caused by development intensification which can introduce increased overshadowing at the same time as increasing usage of the park

#### **Proposed policy position - acceptable overshadowing**

Introduce a sunlight protection policy that is directly related to the scale of development that has already been considered appropriate for the area. This enables a tailored approach that can balance sunlight access with support for development intensification.

For all parks in the study area adopt a No Additional Overshadowing mandatory control in winter. This can be moderated in the following circumstances only:

- Exemption 1: For parks immediately abutting areas with height limits over 4 storeys, limit any additional overshadowing to that cast by the planning scheme street wall height or the overall height limit of adjacent sites (whichever is lower). The extent of overshadowing that this allows applies to all sites, not just those immediately adjacent to the park.
- Exemption 2: Ron Barassi Snr Park - Limit additional overshadowing to within 40 metres offset from the southern boundary of the property line abutting the northern edge of the park

Minimise assessment requirements in all areas by not requiring a shadowing impact assessment for buildings 9 metres or lower in height.

### **Priority 3: Maximise opportunities for people to access sunlight throughout the day for a variety of uses**

#### **Evidence base - park usage data**

An analysis of existing park usage data demonstrates that people choose to use parks in a variety of ways throughout the day. The importance of sunlight will vary between activities and between different people undertaking the same activity as a result of personal comfort preferences.

The highest levels of park usage were recorded between 10am and 6pm. Usage varied between the weekday and weekend and was related to the design of the park and the types of facilities within the park (refer to Appendix B).

#### **Evidence base - modelling**

The modelling demonstrate, however, that providing sunlight access between 10am and 6pm is not realistic. The modelling shows that this would have a significant impact on development opportunities across the municipality. An analysis of shadow direction and length in winter demonstrates that there is a significant increase in overshadowing before 10am and after 3pm when the sun is much lower in the sky. While peak usage spans from 10am to 6pm, the proposed sunlight access controls are between 10am and 3pm to address this need for a balanced approach (see Figure 5 and Figure 6).

The orientation of existing street grids has a direct effect on the amount of sunlight reaching each park throughout the day. St Kilda Road is approximately aligned with angle of the sun at 2pm in winter. This means that the large parks east of St Kilda Road - Alexandra Gardens, Queen Victoria Gardens, The Domain and Botanical Gardens, are effectively protected from overshadowing up to 2pm. After this time, the shadows from significant buildings

in Southbank begin to fall across these parks. Considering the scale of development already in and anticipated for Southbank, it wouldn't be reasonable to require protection from overshadowing after this 2pm period.

#### **Existing policy position**

Sunlight access within the study area is generally protected between 11am and 2pm at the equinox.

#### **Proposed policy position - time of day**

- Maximise the opportunity for people to access and enjoy sunlight in parks by increasing sunlight protection hours from 10am - 3pm in winter.

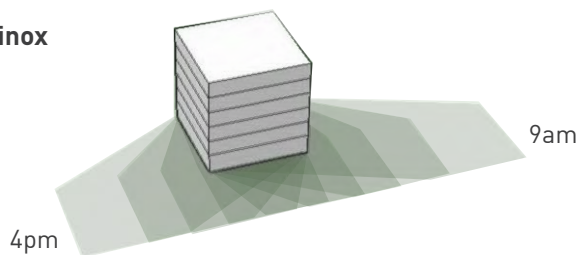
Apply an exemption to the standard No Additional Overshadowing mandatory control in winter for:

- Exemption 3: Parks east of St Kilda Road are an exception where sunlight protection should be provided between 10am and 2pm in winter

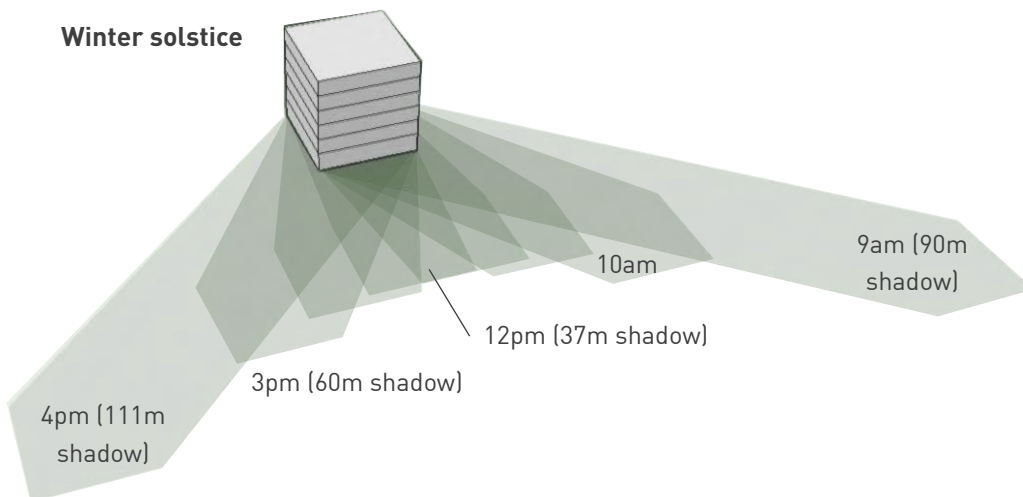
**Summer solstice** 20 metre high building



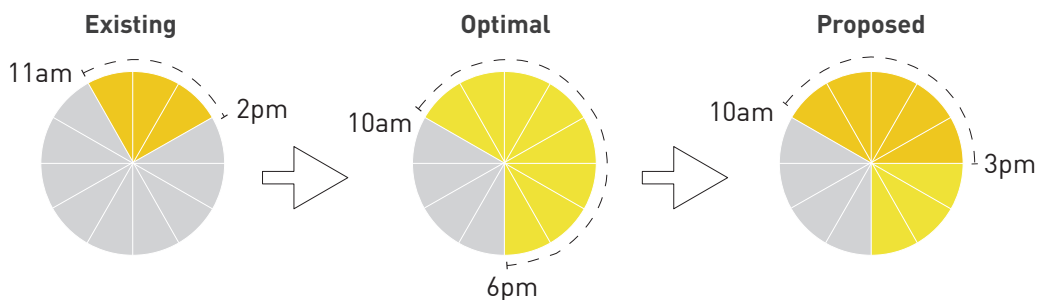
**Equinox**



**Winter solstice**



**Figure 5** Shadows cast for a 20 metre high building by the movement of the sun between 9am and 4pm for the summer solstice, equinox and winter solstice. Each shadow represents a one hour interval. There is a significant increase in shadow length in winter before 10am and after 3pm.



**Figure 6** Hours of existing sunlight protection are 11am to 2pm (far left); peak periods of park usage space from 10am to 6pm (centre); taking into account the potential impacts on development capacity, a balanced approach which provides winter sunlight access between 10am and 3pm is proposed.

## **Priority 4: Update the Melbourne Planning Scheme to establish an effective, easy to use policy that removes current inconsistencies and deficiencies and retains its currency as new parks are introduced**

### **Evidence base and existing policy position**

Protection for sunlight access to parks is distributed across a range of policies, zones and overlays. A number of issues have been identified with this current approach which fragments sunlight access policy controls across the Melbourne Planning Scheme. These are:

- An inconsistent policy approach across the municipality, with a mix of winter and equinox controls creating inequity of access to sunlight in parks
- The listing of protection for specific, nominated parks while all others fall under a blanket control. Those in the blanket control are generally regarded as less important and the existing sunlight protection controls are often compromised
- The controls have been developed on an incremental basis and are not supported by the evidence of what people need or want

- Parks that have current sunlight protection are still vulnerable to overshadowing due to the protection being located within a Design and Development Overlay (DDO). The method of applying a discrete sunlight access protection control to a bounded area (as defined by the DDO) means that a building can be approved and constructed outside of this area that may overshadow a park within the area (as the DDO requirements for overshadowing would not apply). This undermines the intention and effectiveness of existing sunlight access controls. It means that even parks with mandatory sunlight protection now are not effectively protected from overshadowing by buildings outside the DDO area
- It is difficult to provide protection for new parks that are created without a complicated and expensive planning scheme amendment process.

### **Proposed policy position - effective planning mechanisms**

- Introduce a simplified, coherent, defensible and effective sunlight to open space policy that is implemented via an overarching policy and one Design Development Overlay that applies to the whole municipality (see Figure 7)

Priority 5 has been identified to highlight the need to consider sunlight access to all parks within the municipality over the longer term.

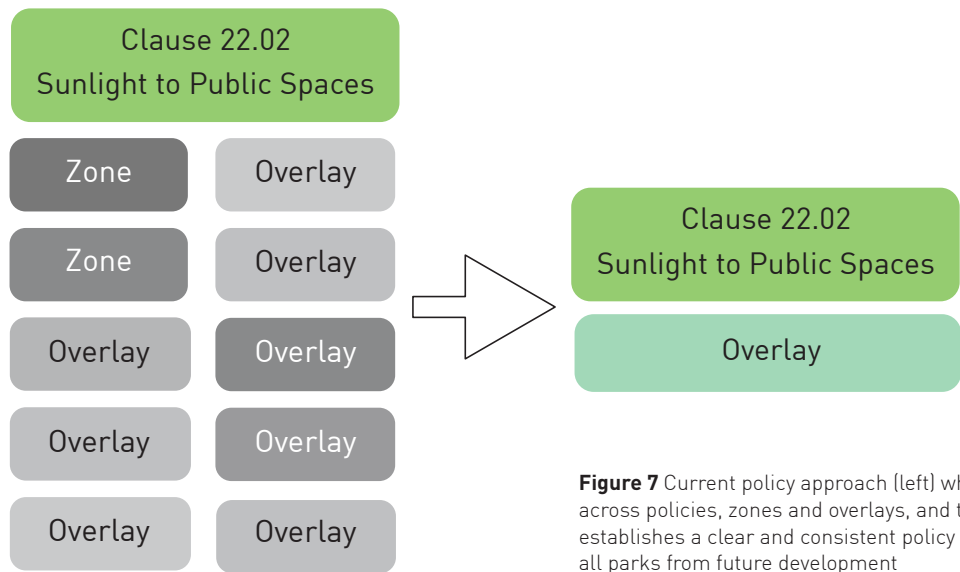
This priority is not relevant to protecting sunlight access to existing parks.

**Priority 5: Identify locations for new parks within the municipality**

The City of Melbourne’s Open Space Strategy identifies the need for a number of new parks across the municipality.

The largest of these parks are located within growth areas. They are therefore located within areas where the current height limit controls are likely to lead to overshadowing of these future parks in the winter months. This affects 12 proposed parks. The identification of preferred locations for these parks should be investigated as a priority in order to provide guidance for necessary sunlight access protection. The lack of certainty on future locations means that the opportunity to protect winter sunlight access could be lost.

Providing certainty on new park locations is the most meaningful way to influence future development proposals that may overshadow these new public open spaces.



**Figure 7** Current policy approach (left) which fragments sunlight protection across policies, zones and overlays, and the proposed approach (right) which establishes a clear and consistent policy position and provides protection for all parks from future development

## Summary of proposed policy recommendations

A summary of the proposed policy recommendations are:

- Revise the current 'tiered approach' to protecting sunlight access to parks to a 'flat' protection policy that maximises winter sunlight protection for all parks. This treats all parks as equal and acknowledges that often the most important park is the one closest to where someone lives or works
- Apply a No Additional Overshadowing winter sunlight access protection control between the hours of 10am and 3pm as the default setting across the municipality (outside of the Central City parks that have had sunlight overshadowing controls applied through recent amendments C245 and C270)
- Moderate the impact of this control in high growth areas (those with height limits over 4 storeys) to balance sunlight protection to parks with support for development intensification
- Moderate the impact of this control on parks east of St Kilda Road by reducing the time requirement to 10am to 2pm. This acknowledges that after 2pm winter shadows from the Hoddle Grid and Southbank, where the highest scale of development is supported in the city, will inevitably fall across these parks.

These controls should be incorporated (together with the recently approved Central City controls) into one municipal-wide DDO. This will ensure that all parks are protected from overshadowing regardless of the location of new development.

### Assessment process for developers and decision-makers

#### 1. Assess whether an overshadowing assessment is required:

- If the overall building height is 9 metres or less - no overshadowing assessment is required
- If the building height is above 9 metres - overshadowing assessment is required

#### 2. Identify category of control that applies to a park that may be affected by the development:

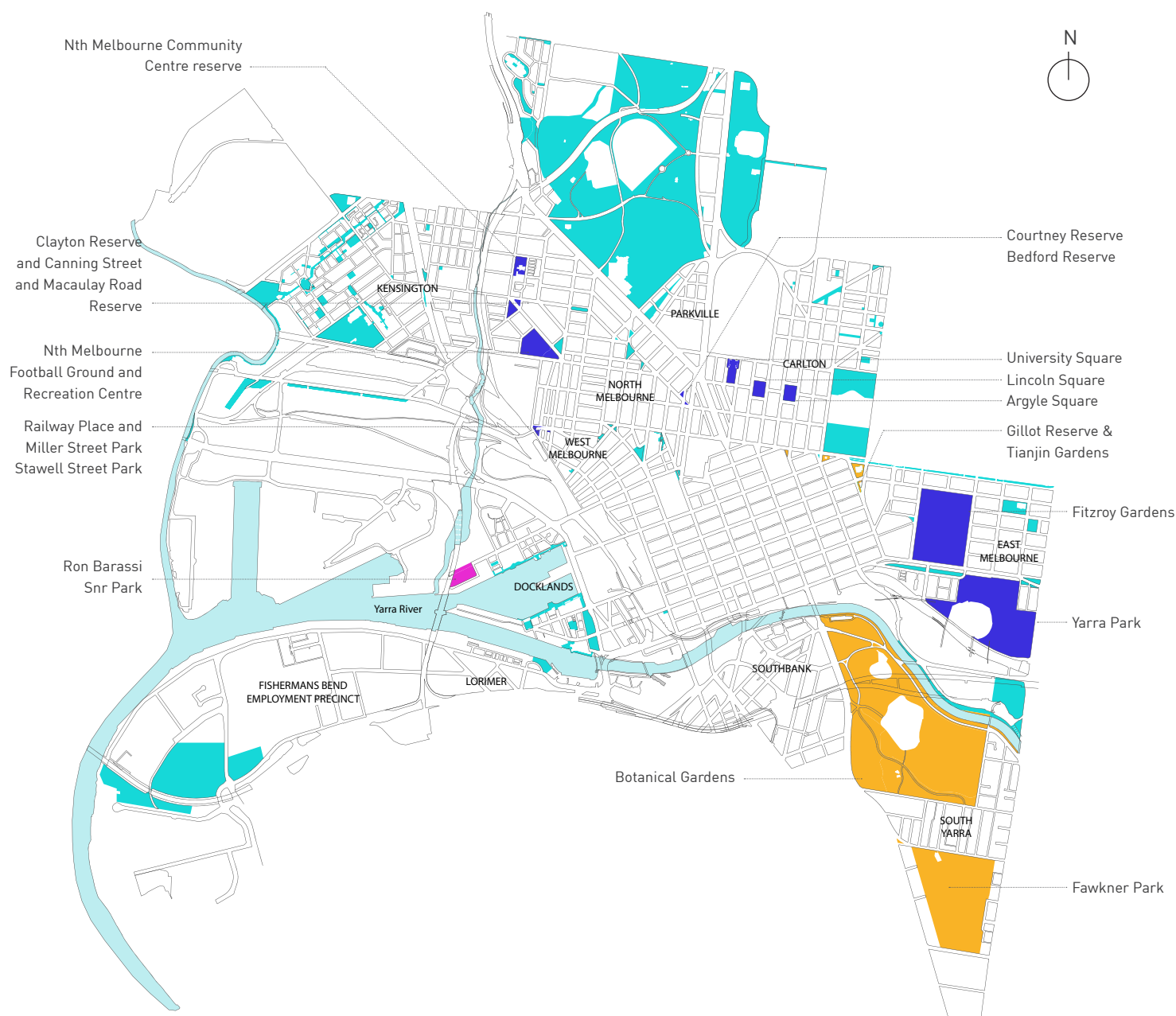
A mandatory No Additional Overshadowing control in winter is proposed between the hours of 10am and 3pm. This can be moderated in the following circumstances only (See Map 1):

- Exemption 1: For parks immediately abutting areas with height limits over 4 storeys, limit any additional overshadowing to that cast by the planning scheme street wall height or the overall height limit of adjacent sites (whichever is lower).
- Exemption 2: Ron Barassi Snr Park - Limit additional overshadowing to within 40 metres offset from the southern boundary of the property line abutting the northern edge of the park
- Exemption 3: Parks east of St Kilda Road No Additional Overshadowing applies between 10am and 2pm

#### 3. Developer to test the overshadowing impact of their development proposal to ensure that it complies with the designated control for the affected park.



## Proposed sunlight access controls for all parks



**Any building 9 metres or below across the municipality is not subject to an overshadowing assessment**

**Buildings taller than 9 metres will be assessed against the following controls for each park (as identified in the map above):**

- Standard condition: No additional overshadowing between 10am - 3pm on June 21
- Exemption 1: Reduced time period - no additional overshadowing between 10am-2pm on June 21
- Exemption 2: Partial overshadowing allowed for shadows cast by planning scheme height control or street wall height control (whichever is lower) between 10-3pm on June 21
- Exemption 3: Rob Barassi Snr Park - Partial overshadowing allows shadow to 40 metres within the park (measured from northern property boundary) between 10-3pm on June 21

**Map 1** Proposed sunlight access controls for all existing parks in the municipality





Carlton Gardens, September 2017



# 1. Introduction

## 1.1 Project scope

This project has the following scope:

- Analyse the current level of sunlight in parks using the cumulative solar map and the solargraphic contours investigative material prepared by Harrison and White (HAW)
- Analyse the level of sunlight that would result from existing planning controls compared to the current levels of sunlight access
- Discuss appropriate levels of sunlight access for public spaces across the municipality (outside of the Amendment C270 area - Hoddle Grid and Southbank) and recommend a justified level of sunlight protection across the municipality (times and dates)
- Based on the above analysis, discuss options for statutory planning controls that can best achieve the preferred level of sunlight access protection and recommend overshadowing provisions for all public spaces (excluding Hoddle Grid and Southbank).

This is illustrated in Map 2.

This work excludes consideration of sunlight to streets and lanes and focuses solely on public parks.

## Drivers of this policy review

The last comprehensive review of the Sunlight to Public Places policy occurred in 1999. The city has undergone transformational change since this time. This has included:

- A significant increase in residential population
- A significant increase in the number of workers
- A significant increase in the number of overall visitors to the municipality
- A significant transition in the scale of developments delivered across the municipality, in regards to density and height of buildings, in particular within identified urban renewal areas

## Key Council reference documents

The following City of Melbourne adopted strategies have been reviewed and assessed to ensure that this report considers established policy positions and the broader economic, social and environmental objectives sought by Council for the municipality.

- Open Space Strategy, 2012
- Open Space Strategy, Technical Background Report, 2012
- Homes for People: Housing Strategy, 2015
- Local areas plans, including:
  - Arden-Macaulay Structure Plan, 2012
  - City North Structure Plan, 2012
  - Southbank Structure Plan, 2010
  - West Melbourne Structure Plan, 2018
- Urban Forest Strategy, 2014



- Parks within scope of this review
- Parks outside of scope of this review. These parks were reviewed recently through the Central City Built Form Review (Amendment C270) and the Queen Victoria Market Review (C245). Both of these amendments introduced winter sunlight access controls to parks

**Map 2** Project scope - parks within and outside of this review

## 1.2 Key resource material

The following material has been provided by the City of Melbourne to inform this report.

### Minimum Solargraphic Contour Height

*Prepared by Harrison and White (Architect consultants)*

This shows the profile of allowable built form that would be possible if no shadows were cast onto existing public spaces (excluding streets) between 9am and 4pm between the 22 of April and the 22 September). In effect, this considers the impact of protecting sunlight access to parks on development.

### Composite Shadow Maps - 9-4pm

*Prepared by Harrison and White (Architect consultants)*

This communicates the cumulative effect of overshadowing within the municipality on existing public spaces at 22 April, 22 June, 22 September and 22 December. It illustrates the composite effect of all shadows that fall on the municipality between 9am and 4pm on these dates. In effect, this considers the impact of development on parks.

### Composite Shadow Maps - 10-3pm

*Prepared by City of Melbourne*

This communicates the cumulative effect of overshadowing within the municipality on existing public spaces at 22 June. It illustrates the composite effect of all shadows that fall on the municipality between 10am and 3pm on this date. In effect, this considers the impact of development on parks.

### Demographics Projections

*Prepared by the City of Melbourne*

Population projections for the municipality have been provided (based 2017 data). Additional information has been drawn from: <http://melbournepopulation.geografia.com.au/>.

### Consultation findings

*Prepared by the City of Melbourne*

Consultation findings from March-April 2016 outlining what was heard in the community engagement activities related to the Sunlight to Public Spaces Policy Review.

### Limitations of data provided

The data has some limitations which influence the key findings provided in this report. These include:

- The Composite Shadow Maps have been generated from a 3d model that is based on 2015 data. This means that it does not incorporate development that has been constructed since this time. Considering the scale of development in the city in the past 2 years this could have a significant impact on understanding the degree to which parks are currently overshadowed.
- The Composite Shadow Maps do not model the overshadowing impact of development outside of the municipality. This is particularly relevant for the northern and eastern boundaries of the municipality, as Royal Park, Princes Park, Carlton Gardens and Yarra Park all have direct interfaces to development and may be overshadowed to a greater extent than what is shown in these maps.

### Additional research

*Research prepared by Hodyl + Co to inform this report includes:*

- Review of existing scientific evidence for the relationship between sunlight and health
- Review of comparative Australian and international cities sunlight protection policies
- Review of recent VCAT cases in the City of Melbourne in regards to sunlight access protection
- Research into the relationship between sunlight and ecological health