



Carlton Gardens, September 2017

2. What level of sunlight access is wanted and needed?

2.1 Consultation findings

The community was consulted on how they use parks and the importance of sunlight to their use in early 2016. 275 people responded to an online survey with the highest number of respondents aged 30-39.

The key messages that came through from this consultation were:

- An overwhelming number of participants consider sunlight in public spaces across various times of the day to be extremely important
- If the sun is out, people want to have the opportunity to enjoy it
- Access to parks should be available year round for smaller and larger parks
- No more sunlight should be lost
- The degree of sunlight in parks greatly influences people's level of enjoyment and the likelihood of spending time in public spaces. Enjoyment of public spaces is diminished by overshadowing caused by buildings, but sun protection from trees is very important in summer.
- People want the choice of sun or shade to meet their preferred levels of personal comfort in response to the temperature
- Being outside in the fresh air and sunlight has powerful physical health and mental wellbeing benefits

2.2 Health impacts: the need for a balanced policy approach to sunlight exposure

The health impacts from sunlight are due to exposure to one type of ultraviolet (UV) radiation. Sunlight is made up of three types of UV radiation – UVA, UVB and UVC. The ozone layer effectively filters out UVC and most of UVB radiation preventing it from reaching the earth's surface, however UVA and some UVB pass through.

Most Australians understand that too much time in the sun is bad for their health. It causes sunburn, premature ageing, eye damage and, more devastatingly, can lead to skin cancer. Australia has one of the highest rates of melanoma in the world: each year, skin cancer kills nearly 2,000 Australians and over 12,000 new diagnoses of melanoma are made.

Recognition of these negative effects has led to global recommendations to minimise sun exposure during hours when the UV radiation index is highest. In Australia, this typically translates to between 10am and 3 pm, and/or when the UV radiation index reaches 3.

Fortunately, skin cancer is preventable. Skin protection can be provided through clothing, a hat, wrap-around sunglasses, using sunscreen and seeking shade. This has been the key message of the Cancer Council's SunSmart campaign which has been effective in improving policy, promoting awareness and changing behaviour and attitudes towards sun exposure (Cancer Council Victoria).

Exposure of unprotected skin to the UVB in sunlight is the principle way our bodies produce Vitamin D, a hormone with many important roles in maintaining and promoting good health. While the health risks of too much sun exposure are well known, far less is known of the risks of too little sun exposure. This can

The consultation demonstrated that sunlight was considered of paramount importance to the way people use and enjoy the city's parks.

Some exposure to UVB is essential for our health

Sensible sun exposure strategies are required to balance Vitamin D production without increasing the risk of skin cancer.

50% of Victorians are Vitamin D deficient in winter which can have serious health consequences

People need 30-60 minutes a day of direct exposure to UV light in winter to maintain healthy levels of vitamin D.

lead to Vitamin D deficiency which is associated with a number of poor physical and mental health outcomes. The negative and positive health impacts of sunlight exposure are outlined in greater detail in Appendix A.

While skin protection is and should remain a priority, some direct exposure of the skin to sunshine is needed for optimal health. The length of this exposure varies across seasons and latitude, and with skin colour and age.

This highlights the need for sensible sun exposure strategies that provide options for individuals to moderate their own behaviour in the sun. Planning policies should be developed that support these strategies.

Adequate levels of Vitamin D

Vitamin D adequacy is assessed according to serum levels of 25-OHD. In a combined consensus statement, leading medical bodies of Australian and New Zealand outlined definitions for Vitamin D status (Nowson et al., 2012). This statement defined Vitamin D adequacy as serum 25-OHD levels greater than 50nmol/L at the end of winter (Nowson et al., 2012).

Vitamin D status of Victorians

Low vitamin D is a significant health issue in Australia, with over 30% of adults demonstrating Vitamin D deficiency (Daly et al., 2012). In Victoria, this figure increases to over 50% in winter and spring (Daly et al., 2012). This represents a major public health concern given that an increasing number of health conditions are associated with low Vitamin D levels. These include poor bone health, cardiovascular disease, cancer, diabetes, severe asthma, sleep problems, cognitive function and mental health.

Direct exposure of UVB to unprotected skin is the best source of Vitamin D. UVB cannot penetrate through glass, sunscreen and most clothing. Shade provided by trees and umbrellas cuts down exposure to UVB by

approximately 50% (Turnbull, Parisi, & Kimlin, 2005), providing some protection from excessive UV radiation.

Factors affecting Vitamin D levels from sun exposure include:

- Skin pigmentation - darker skin has higher amounts of melanin, which impedes production of Vitamin D
- Proportion of skin covered by clothing - clothing prevents Vitamin D production through blocking UVB access to skin
- Age - the ability to produce Vitamin D from UVB decreases with age

How much sun exposure is needed to provide adequate Vitamin D levels in Melbourne?

Estimates have been generated to determine the duration of sunlight exposure required to achieve sufficient Vitamin D levels in Melbourne at different times of the year. These figures were derived through modelling 11 years of retrospective hourly UV radiation data with a measure of vitamin D synthesis.

While in the Melbourne summer, less than 30 minutes of exposure was required to obtain minimal Vitamin D synthesis between 8am and 6pm, this period co-occurred with the UV radiation index exceeding 3 (the recommended threshold to minimise skin cancer risk). Outside of these hours, when the UV index was less than 3, more than 60 minutes of sun exposure was required to produce adequate Vitamin D levels.

In winter, 30-60 minutes of sun exposure was required between 11 and 2pm to produce adequate Vitamin D levels (see Figure 8). Outside of these hours more than 60 minutes is required.

It is important to note these estimates were modelled for people with fair skin and assuming 11% of skin exposure (equivalent to one side of the hands, arms and neck). These figures therefore represent an underestimate of the minimal length of sun exposure required for people with darker skin and those whose clothes provide greater skin coverage (Stalgis-Bilinski et al., 2011).

Figure 8 Duration of sun exposure estimated for adequate Vitamin D production in Melbourne, based on fair-skin and 11% body exposure. Colour code refers to minimum time required: red less than 30 minutes, orange 30-60 minutes, green greater than 60 minutes. Figure adapted from Stalgis-Bilinski, 2011.



Sunlight is critical to supporting biodiversity within the city.

As urban areas become more densely built up and populated, biodiversity typically declines.

Sunlight exposure to open spaces is important for the growth of vegetation, particularly vegetables (important for community gardens) and flowers.

Urban landscapes with full sun exposure are shown to attract and generate a greater diversity of bees and butterflies (Matteson and Langellotto, 2010).

Is it Sunlight or Vitamin D that affects health?

While sunlight is the most efficient method of Vitamin D production, different methods exert independent effects on health. Vitamin D supplementation in patients with Vitamin D deficiency can improve some health conditions (e.g. bone health, upper respiratory tract infections and asthma), but has no effect on a number of other conditions, including cardiovascular disease, glucose metabolism, type 1 diabetes, most cancers (Autier et al., 2017) and multiple sclerosis (Kampman, Steffensen, Mellgren, & Jorgensen, 2012). These studies support a dual benefit of adequate sunlight exposure and sufficient Vitamin D levels for optimal health.

Increased exposure to sunshine has indirect health benefits

Sunshine is associated with greater engagement in healthy lifestyle behaviours, including increased physical activity. This in turn leads to reduced Body Mass Index (BMI), decreased risk of metabolic and cardiovascular disease and cancer, and increased bone health and muscle mass. Increased physical activity also improves mental health, reducing symptoms of anxiety and depression (Penedo & Dahn, 2005).

Physical activity also increases Vitamin D levels, irrespective of exposure to sunlight (Al-Othman et al., 2012; Daly et al., 2012). Vitamin D deficiency is 1.3 times more likely in those who are physically inactive versus active (Wanner, Richard, Martin, Linseisen, & Rohrmann, 2015). One study suggests the combination of increased activity and exposure to sunlight increases Vitamin D levels in children and adolescents higher than either exposure alone (Al-Othman et al., 2012).

2.3 Ecological health

Biodiversity in urban environments

Natural habitats in cities are increasingly eroded resulting in an extreme form of habitat loss for plants and animals. The remaining pockets of natural and semi-natural habitats such as parks become critical for animal survival as places for food and respite from the urban environment. Typically, built up areas are associated with a reduction in the diversity of plants and animals (Park, 2016). Parks that support diverse plant species create a rich food resource that allows wildlife to survive in the city.

Sunlight and plants

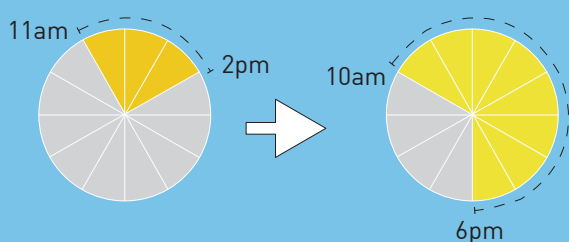
Plants need sunlight for the process of photosynthesis. During photosynthesis, the energy of sunlight in combination with water and carbon dioxide is used to create glucose. This glucose can be used later by the plant for energy or by the animals that eat them. Without light, plants are not able to produce the energy they need to grow. The number of hours plants require to grow varies depending on the type of species. Most garden vegetables require full sun, which is six to eight hours of direct sunlight daily. To support a diverse number of plant species in the city, variable access to sun is required. Parks in the cities are some of the few places where full sun exposure can be secured for plants. Limiting building overshadowing creates the conditions for plant species that require greater levels of sun exposure.

Bees and sunlight

Bees are important for their role in pollination in which pollen is transferred from plant to plant allowing fertilization to take place. Over the past ten years there has been a reduction in the number of pollinators which has raised concerns about the potential impact on plant reproduction. Direct sunlight and floral abundance are key determinants of bee and butterfly species in urban environments (Matteson & Langellotto, 2010).

Current policy assumes that peak periods of park usage are between 11am and 2pm.

The evidence demonstrates that peak periods of use vary but are generally between 10 and 6pm, depending on the activities supported within the park.



The way people choose to use the city's parks varies significantly and plays an important role in supporting social and physical activity critical to enhancing the city's liveability and people's overall wellbeing.

2.4 How and when are parks currently being used?

The importance of open space

Open space is important for a wide range of reasons which vary for different people's needs. Those identified in the City of Melbourne's Open Space Strategy are:

- Social Connectedness
 - Social contact
 - Community events and festivals
 - Meeting places, particularly associated with high density living
- Mental health and wellbeing
 - Spaces to relax and unwind
 - Restorative places
 - Social development in children
- Physical health and wellbeing
 - Participating in organised sport
 - Exercising informally
 - Contact with nature
 - Being outside in the fresh air and sunlight
- Events and arts
 - Permanent and temporary installations
 - Performances

This diversity of reasons for using open space is demonstrated in the community consultation conducted by Council as part of this policy review, and through the recent audit on park usage commissioned by Council for Flagstaff Gardens, Birrarung Marr and Carlton Gardens. A one hour site visit to Carlton Gardens on September 21st, 2017 provides an effective visual demonstration of the significant diversity of uses of parks even within a limited time period (see Figure 9). It also demonstrates that people choose to undertake the same activity in full sun, dappled sunlight or shade according to personal preference and comfort.

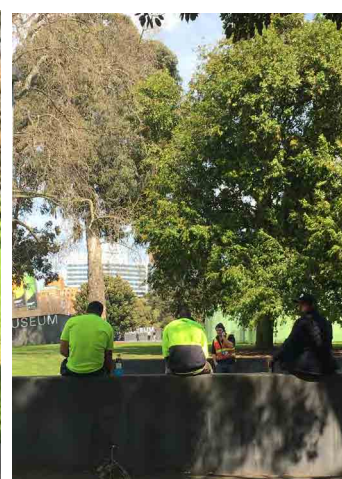
Figure 9 (This page and overleaf): Diverse uses of Carlton Gardens within a one hour period on 21st September, 2017.



Skateboarding (Sun/shade)



Sitting / lunch alone (Shade)



Group work lunch (Dappled)



Photography (Mixed)



Photography (Dappled)



Sitting / lunch alone (Dappled)



Group lunch (Full sun)



Sitting (Full sun)



Sleeping (Full sun)



Team sport (Full sun)



Tennis (Full sun)



School trip (Mixed)



Kid's play (Dappled)



Walking through (Dappled)
Basketball (Dappled)



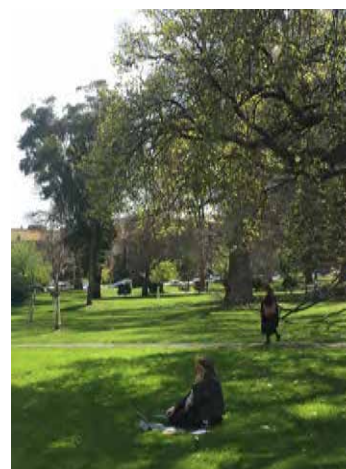
Fitness camp (Full sun)



Sitting / lunch (Dappled)



Exploring park (Full sun)



Phonecalls / computer work
(Dappled)

When are people accessing parks?

Three data sources have been analysed to better understand when people are accessing parks.

Community engagement findings

Respondents to the community engagement survey nominated the highest times of usage between 12 and 6pm.

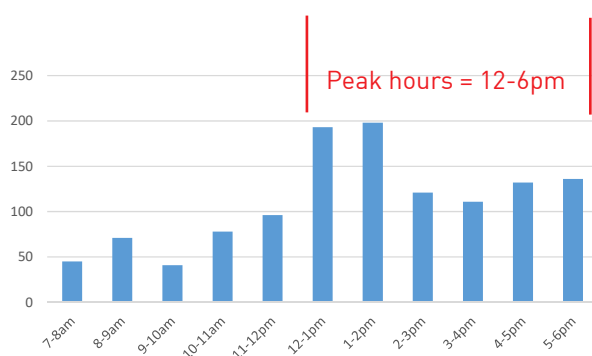


Figure 10 Park usage as reported in community consultation, April 2016 (City of Melbourne, 2016)

Park usage audit

Detailed counts of people using Flagstaff Gardens, Birrarung Marr and Carlton Gardens were conducted in 2017. The patterns of use for Flagstaff Gardens is demonstrated in figure 11. For weekday and weekend data on these three parks see Appendix B.

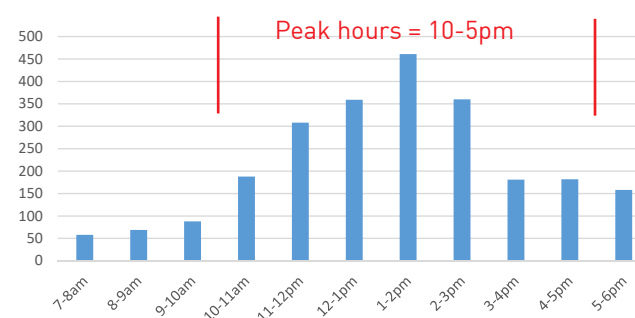
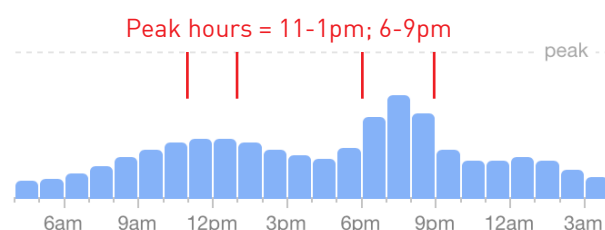


Figure 11 Park usage in Flagstaff gardens - weekday (People Counting and Park Usage, IOSS, 2017)

Online data (google maps)

Google maps provides data that demonstrates the relative popularity of places and the average length of time that someone spends in each place. An example of the data available is illustrated in Figure 12 for Ron Barassi Snr Park. For all available parks in the City of Melbourne see Appendix B.

Wednesday: Average time - 1 hour



Saturday: Average time - 1 hour

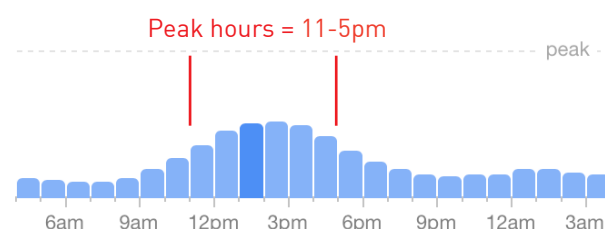


Figure 12 Example of relative usage data provided by Google Maps - Ron Barassi Snr Park - weekday and weekend.

Collective patterns of park usage

Collectively, these three data sets provide insight into the overall patterns of usage. This is demonstrated in Figure 13 and Figure 14.

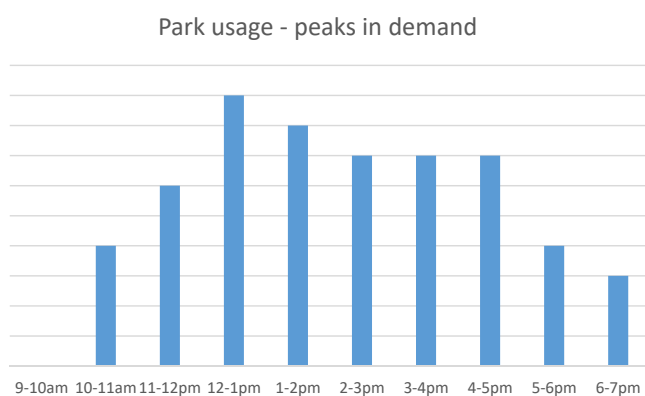


Figure 13 Park usage weekday demand collated from community consultation findings, google data and IOSS People Counting and Park Usage reports

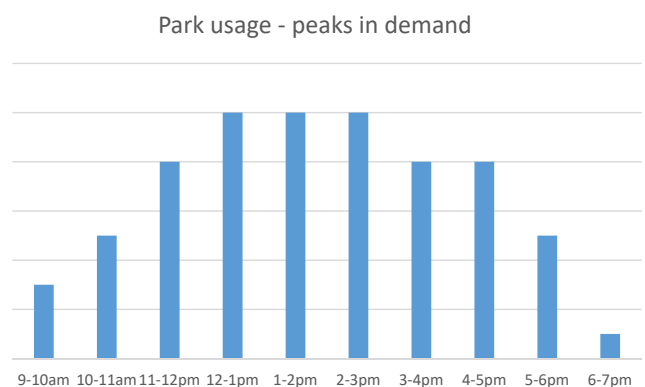


Figure 14 Park usage weekend demand collated from community consultation findings, google data and IOSS People Counting and Park Usage reports

Why are people choosing to be in parks?

The reasons for using parks at different times of the day varied as follows:

Early morning

- Walking the dog
- Training/exercise
- Enjoying the quiet of the park before school
- Work commitments the rest of the day-enjoy the still of the park and the light which is more appealing
- Morning sun is peaceful-a great way to start the day
- Great time to enjoy the sun without the summer heat

Mid- morning

- Fits into work breaks
- Walking the dog
- Community activities in the park
- Taking children to the playground and park
- Best time for kids to play
- Walking on the way to meetings
- Enjoy the crisp air
- More relaxing than later in the day
- Relaxation in group exercise classes-stress relief and time for reflection
- Work from home-reason to get out of the house is to walk in the park

Lunchtime

- Lunchtime escape-place to eat lunch in peace or with friends
- Only chance to get a break from work
- Chance to get out and get some sun and fresh air in the lunch break
- Excited to get outside –improves mood and makes me happy in my lunch break
- Chance to escape from the urban environment
- Late afternoon
- Fits into work breaks
- Fair skinned-looking for shade (dappled light under the trees)
- Sunnier and less crowded with commuters
- Playing competitive sport
- Best time to see the birds in the park
- Nice time to stretch out on the grass and relax/ sleep or read
- Increases alert for the remainder of the day
- Especially in the winter months, spending time outdoors in the sun to increase vitamin D levels and exercise for weight loss

Evening

- Exercise after work
- After work, walking home-relaxing, reflective time-time to unwind
- Great warmth from a summer's evening
- Like to walk the dog
- Great time to socialise
- Like to enjoy the setting of the sun-relaxing