

# Urban Cooling with Green Infrastructure

DECEMBER, 2018



## NSW Healthy Planning Action Resource No. 1

Prepared by the NSW Healthy Planning Expert Working Group

[www.activelivingnsw.com.au/resources](http://www.activelivingnsw.com.au/resources)



## The NSW Healthy Planning Expert Working Group

The Healthy Planning Expert Working Group (HPEWG) is an independent NSW expert group which provides advice and guidance to government agencies and healthy planning stakeholders on strategic opportunities to utilise the NSW planning and transport planning systems to promote human health across the State. The HPEWG is comprised of representatives from a range of disciplines including health, planning, transport, urban design and architecture, and across various sectors including local government, state government, professional bodies, non-government entities (NGOs) and education and academia. For more information on members, see Appendix 1.

This is the first in a series of action resources designed to support those working to create places that deliver better health outcomes.



## 1. Introduction

Urban areas across NSW are experiencing significant challenges as a result of the “urban heat island” effect (UHI) which causes temperatures in urban areas to be higher compared to their rural surroundings (Low Carbon Living CRC, 2017).<sup>1</sup> The UHI effect occurs when natural permeable surfaces such as grass, plants or bush land are replaced with concrete, asphalt and infrastructure. Inner urban areas can be 3.5 – 4.5 °C warmer than surrounding rural areas.<sup>2</sup> It is expected that warming associated with urban development will be exacerbated in future years by climate change, making urban heat a significant issue for cities across Australia.<sup>3</sup>

### Green Infrastructure

Urban green infrastructure (GI) refers to all of the vegetation that provides environmental, economic and social benefits such as clean air and water, climate regulation, food provision, erosion control and places for recreation. GI includes urban parks and reserves, wetlands and stream corridors, street trees and roadside verges, gardens and vegetable patches, bikeways and pedestrian trails, wall and rooftop gardens, orchards and farms, cemeteries and derelict land.<sup>4</sup> Implementing GI into the urban landscape has the potential to cool the urban microclimate by providing shade and evapo-transpirative cooling whilst also reducing heat retention.<sup>5</sup>

## 2. The need for action

### Health Impacts of Extreme Heat

Extreme heat events can have severe effects on human health. The health impacts of heat include both direct heat illnesses (e.g. heat exhaustion) and indirect illnesses (e.g. cardiovascular failure). Those most at risk include the very old, the very young, those with existing disabilities, lower socio-economic, remote or marginalised communities, socially isolated individuals, the homeless, and those who work outdoors. People who suffer from existing health conditions are also more vulnerable to health impacts of extreme heat events. Health conditions, such as heart and kidney disease and diabetes can be exacerbated by higher temperatures and the additional burden they place on the body. Individuals with mental or behavioural illnesses, those who are suffering from obesity, and those who are less mobile or dependent on carers to provide a cooling response are also vulnerable.<sup>6</sup> As extreme heat events worsen, due to climate change, the risk of adverse human health impacts is increasing. Moreover, while skin cancer is the most common cancer in Australia, it is also one of the most preventable. Ultra-violet (UV) radiation is responsible for over 95% of all the skin cancers experienced in Australia<sup>7</sup>, meaning efforts to reduce population UV exposure will reduce skin cancer incidence.

For implementation tips please refer to page 6.

<sup>1</sup> Low Carbon Living CRC, 2017, Guide to Urban Cooling Strategies

<sup>2</sup> <http://www.vcccar.org.au/sites/default/files/publications/VCCCAR%20Urban%20Heat%20Island%20WEB.pdf>, p 1

<sup>3</sup> Office of Environment and Heritage, 2015, Urban Heat Climate Change Impact Snapshot, <https://climatechange.environment.nsw.gov.au/Impacts-of-climate-change/Heat/Urban-heat>

<sup>4</sup> <https://www.csiro.au/en/Research/LWF/Areas/Resilient-cities-21C/Green-infrastructure>

<sup>5</sup> [http://www.vcccar.org.au/sites/default/files/publications/VCCCAR\\_GreenInfrastructure\\_PolicyBrief-2015.pdf](http://www.vcccar.org.au/sites/default/files/publications/VCCCAR_GreenInfrastructure_PolicyBrief-2015.pdf)

<sup>6</sup> Climate Council, 2016, The silent killer: Climate change and the health impacts of extreme heat, <https://www.climatecouncil.org.au/uploads/b6cd8665c633434e8d02910eee3ca87c.pdf>

<sup>7</sup> Armstrong BK, Kricger A. 1993. How much melanoma is caused by sun exposure? *Melanoma Research* 3(6):395-401

## Equity

Research shows that lower socioeconomic and ethnic minority groups are more likely to live in warmer neighborhoods with greater exposure to heat stress. These groups are more vulnerable to heat exposure because they have fewer social and material resources to cope with extreme heat. It is essential that any policies to reduce urban heat should specifically target vulnerable residential areas and take into account equitable distribution and preservation of environmental resources.<sup>8</sup>

## Co-benefits of Green Infrastructure

GI not only reduces heat but also provides additional health co-benefits; protection from UV radiation, air filtration, reduction of respiratory illness, improved wellbeing and mental health, and the promotion of active lifestyles and use of active transport modes, reducing cardiovascular disease and obesity.<sup>9</sup> Public GI projects can also reduce stormwater runoff, enhance property values, increase urban liveability, walkability and amenity and help communities become more resilient to the impact of climate change.<sup>10</sup>

## Reducing Heat for Healthy, Liveable Communities

Liveable cities are characterised by healthy communities, environmental sustainability, social capital and social cohesion.<sup>11</sup> Urban warming has significant health, environmental and economic impacts.<sup>12</sup> Addressing the urban heat island effect and cooling our cities and neighbourhoods is essential for maintaining and promoting urban liveability and healthy communities.

## 3. Current research, evidence and data to support action

Research shows that the UHI effect results in higher air temperatures in urban areas (2–5°C higher on average but in some cases more than 10°C higher) than those in surrounding vegetated or undeveloped areas.<sup>13</sup> Studies have reported a [significant increase in mortality](#) for every 1°C rise in air temperatures above a mortality-temperature threshold (typically around 32°C for Australian cities).<sup>14</sup> This applies particularly for the [population aged 65 years and older](#).<sup>15</sup>

The NSW Office of Environment and Heritage have produced AdaptNSW<sup>16</sup>, a website containing research, reports and resources dedicated to understanding and adapting to climate change impacts in NSW, including urban heat. Some useful reports include the [Urban Heat Technical Report](#) and the [Urban Heat Climate Change Impact Snapshot](#).<sup>17</sup>

The Low Carbon Living Cooperative Research Centre (CRC)<sup>18</sup> have also published a number of papers, guides and research on this issue including [Cooling Cities: Strategies and Technologies to Mitigate Urban Heat \(Discussion Paper\) 2017](#).<sup>19</sup>

The Urban Microclimates in Australia project website ([www.urbanclimates.org](http://www.urbanclimates.org)) also has extensive research and data to inform best practice for urban heat mitigation and adaptation.

Increasing tree canopy cover and total green space is one of the most cost-effective strategies for cooling buildings and local neighbourhoods.<sup>20</sup> The NSW Office of Environment and Heritage has modelled the influence of vegetation cover on land surface temperature in the Sydney basin finding that urban structures increase land surface temperature by 1.5°C during summer mornings.

<sup>8</sup> Harlan, S.L. et al, 2006, "Neighborhood microclimates and vulnerability to heat stress", *Social Science & Medicine*, 66(11):2847-2863. Accessed on 20/11/18 at <https://www.sciencedirect.com/science/article/abs/pii/S027795360600373X>

<sup>9</sup> [http://www.vcccar.org.au/sites/default/files/publications/VCCCAR\\_GreenInfrastructure\\_PolicyBrief-2015.pdf](http://www.vcccar.org.au/sites/default/files/publications/VCCCAR_GreenInfrastructure_PolicyBrief-2015.pdf)

<sup>10</sup> <https://www.epa.gov/green-infrastructure/benefits-green-infrastructure>

<sup>11</sup> Greater Sydney Commission, 2017, Liveability Framework ([http://gsc-public-1.s3.amazonaws.com/s3fs-public/30-03-2017\\_LiveabilityFramework\\_Final.pdf](http://gsc-public-1.s3.amazonaws.com/s3fs-public/30-03-2017_LiveabilityFramework_Final.pdf))

<sup>12</sup> Low Carbon Living CRC, 2017, Cooling Cities: Strategies and Technologies to Mitigate Urban Heat Discussion Paper, [http://www.lowcarbonlivingcrc.com.au/sites/all/files/event\\_file\\_attachments/discussion\\_paper\\_cooling\\_cities\\_final.pdf](http://www.lowcarbonlivingcrc.com.au/sites/all/files/event_file_attachments/discussion_paper_cooling_cities_final.pdf)

<sup>13</sup> Adams, M., Duc, H., Trieu, T., 2015, Impacts of land-use change on Sydney's future temperatures, Office of Environment and Heritage

<sup>14</sup> Nicholls, N. et al, 2008, "A simple heat alert system for Melbourne, Australia", *Int J Biometeorol*, 52(5):375-84. <https://www.ncbi.nlm.nih.gov/pubmed/18058138>

<sup>15</sup> Loughnan, M., Nicholls, N., Tapper, N., 2010, "Mortality-temperature thresholds for ten major population centres in rural Victoria, Australia", *Health Place*, 16(6):1287-90. <https://www.ncbi.nlm.nih.gov/pubmed/20797898>

<sup>16</sup> [www.climatechange.environment.nsw.gov.au](http://www.climatechange.environment.nsw.gov.au)

<sup>17</sup> <https://climatechange.environment.nsw.gov.au/Impacts-of-climate-change/Heat/Urban-heat>

<sup>18</sup> [www.lowcarbonlivingcrc.com.au](http://www.lowcarbonlivingcrc.com.au)

<sup>19</sup> [http://www.lowcarbonlivingcrc.com.au/sites/all/files/event\\_file\\_attachments/discussion\\_paper\\_cooling\\_cities\\_final.pdf](http://www.lowcarbonlivingcrc.com.au/sites/all/files/event_file_attachments/discussion_paper_cooling_cities_final.pdf)

<sup>20</sup> <http://www.vcccar.org.au/sites/default/files/publications/VCCCAR%20Urban%20Heat%20Island%20-WEB.pdf>, p 7

<sup>21</sup> NSW Office of Environment and Heritage, 2015, Urban Green Cover in NSW: Technical Guidelines.

<sup>22</sup> Bush, J., Aye, I., Hes, D., 2015, Cooling Cities with Green space: a policy analysis framework, State of Australian Cities Conference. <https://minerva-access.unimelb.edu.au/bitstream/handle/11343/116379/Bush..pdf?sequence=1>

However, every 10% increase in tree cover can reduce land surface temperatures by more than 1°C.<sup>21</sup> Research has shown that even a small reduction in urban temperature (between 0.5°C and 2°C) can significantly reduce heat-related mortality.<sup>22</sup>

Vegetation cools microclimates by shading heat-absorbing materials, increasing the reflectivity of surfaces, providing cooling via evapotranspiration and altering wind patterns.<sup>23</sup> It also provides a range of benefits in addition to mitigating the urban heat island effect, including mental and physical health benefits, economic benefits, social benefits and environmental benefits.<sup>24</sup> The contribution of urban green space to liveability is well recognised in current NSW state policies and strategies (Region Plans, District Plans, Better Placed and Greener Places).

[AECOM's Green Infrastructure](#)<sup>25</sup> report details the costs and benefits of street trees, including the economic value in increased property prices and the health value in fewer heat-related deaths.<sup>26</sup> While US research found that, for every dollar invested in planting trees, cities see an average \$2.25 return on their investment each year.<sup>27</sup>

Other relevant research papers include:

- [Planning for cooler cities: A framework to prioritise green infrastructure to mitigate high temperatures in urban landscapes](#),<sup>28</sup> 2015
- [A review of benefits and challenges in growing street trees in paved urban environments](#),<sup>29</sup> 2015
- [Urban Vegetation for reducing heat related mortality](#),<sup>30</sup> 2014
- [Urban greening to cool towns and cities: A systematic review of the empirical evidence](#),<sup>31</sup> 2010

## 4. The NSW legislative and policy context

Various pieces of legislation and State, Regional and District Plans, strategies, policies and guides support and promote the implementation of green infrastructure to reduce the impact of urban heat and climate change. Some key ones are listed below.

### Legislation

#### [Environmental Planning and Assessment Act \(EP&A\) 1979](#)<sup>32</sup>

Relevant [objects of this Act](#):

- (a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,
- (b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,
- (e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,
- (g) to promote good design and amenity of the built environment.

#### [State Environmental Planning Policies \(SEPPs\)](#)<sup>33</sup>

Relevant SEPPs include:

- [State Environmental Planning Policy No 19—Bushland in Urban Areas](#)<sup>34</sup>
- [State Environmental Planning Policy \(Vegetation in Non-Rural Areas\) 2017](#)<sup>35</sup>

### [Regional and District Plans](#)

Many of the regional and district plans across NSW include actions around liveability and sustainability, including reference to mitigating and reducing the impacts of climate change, heatwaves and natural hazards.

<sup>23</sup> <http://www.vcccar.org.au/sites/default/files/publications/VCCCAR%20Urban%20Heat%20Island%20-WEB.pdf>, p 1

<sup>24</sup> Bush, J., Aye, I., Hes, D., 2015. Cooling Cities with Green space: a policy analysis framework. State of Australian Cities Conference. <https://minerva-access.unimelb.edu.au/bitstream/handle/11343/116379/Bush..pdf?sequence=1>

<sup>25</sup> <http://www.aecom.com/content/wp-content/uploads/2017/04/Green-Infrastructure-vital-step-brilliant-Australian-cities.pdf>

<sup>26</sup> <http://www.aecom.com/content/wp-content/uploads/2017/04/Green-Infrastructure-vital-step-brilliant-Australian-cities.pdf>

<sup>27</sup> <https://theconversation.com/we-calculated-how-much-money-trees-save-for-your-city-95198>

<sup>28</sup> <https://www.sciencedirect.com/science/article/pii/S0169204614002503?via%3Dihub>

<sup>29</sup> <https://www.sciencedirect.com/science/article/pii/S016920461400245X?via%3Dihub>

<sup>30</sup> <https://www.sciencedirect.com/science/article/pii/S0269749114001882>

<sup>31</sup> <https://www.sciencedirect.com/science/article/pii/S0169204610001234?via%3Dihub>

<sup>32</sup> <https://www.legislation.nsw.gov.au/#/view/act/1979/203/full>

<sup>33</sup> <https://www.legislation.nsw.gov.au/#/browse/inForce/EPs/S>

<sup>34</sup> <https://www.legislation.nsw.gov.au/#/view/EPI/1986/014>

<sup>35</sup> <https://www.legislation.nsw.gov.au/#/view/EPI/2017/454>

For example, the Greater Sydney Regional Plan: [A Metropolis of Three Cities](#) includes the following objectives to support green infrastructure:

Objective 7: Communities are healthy, resilient and socially connected

Objective 26: A cool and green parkland city in the South Creek corridor

Objective 27: Biodiversity is protected, urban bushland and remnant vegetation is enhanced

Objective 30: Urban tree canopy cover is increased

Objective 31: Public open space is accessible, protected and enhanced

Objective 32: The Green Grid links parks, open spaces, bushland and walking and cycling paths

Objective 36: People and places adapt to climate change and future shocks and stresses

Objective 37: Exposure to natural and urban hazards is reduced

Objective 38: Heatwaves and extreme heat are managed

### [Local Strategic Planning Statements](#)<sup>36</sup>

Local councils are required to prepare and make a local strategic planning statement and review the statement at least every seven years. The statement must include or identify the basis for strategic planning in the area, having regard to economic, social and environmental matters.

### [Local Environmental Plans](#)<sup>37</sup>

The Standard Instrument – Principal Local Environmental Plan (LEP) prescribes the form and content of all LEPs throughout NSW. All local councils are required to prepare an LEP for their local government area in accordance with the standard LEP instrument which contains standard definitions, zones, clauses and land-use tables as well as a standard format.

### [Local Development Control Plans](#)

A Development Control Plan (DCP) provides detailed planning and design guidelines to support the planning controls in the LEP developed by a council. Some councils have DCPs related to tree and vegetation management and this provides an opportunity for councils to implement urban cooling strategies.

### [Local Government Act 1993](#)<sup>38</sup>

Relevant [Principles of this Act](#):

#### **8A Guiding Principles for Councils**

- (c) Councils should consider the long term and cumulative effects of actions on future generations.
- (d) Councils should consider the principles of ecologically sustainable development.

#### **36 Preparation of Draft Plans of Management for Community Land**

- (1) A council must prepare a draft plan of management for community land.
- (2) A draft plan of management may apply to one or more areas of community land, except as provided by this Division.

#### **402 Community Strategic Plan**

- (1) Each local government area must have a community strategic plan that has been developed and endorsed by the council. A community strategic plan is a plan that identifies the main priorities and aspirations for the future of the local government area covering a period of at least 10 years from when the plan is endorsed.
- (2) A community strategic plan is to establish strategic objectives together with strategies for achieving those objectives.



<sup>36</sup> [http://www5.austlii.edu.au/au/legis/nsw/consol\\_act/epaaa1979389/s3.9.html](http://www5.austlii.edu.au/au/legis/nsw/consol_act/epaaa1979389/s3.9.html)

<sup>37</sup> <https://www.legislation.nsw.gov.au/#/view/EPI/2006/155a/full>

<sup>38</sup> <https://legislation.nsw.gov.au/#/view/act/1993/30/full>

<sup>39</sup> <http://www.governmentarchitect.nsw.gov.au/policies/greener-places>

<sup>40</sup> <http://www.governmentarchitect.nsw.gov.au/policies/greener-places>, p 11

<sup>41</sup> <https://www.activelivingnsw.com.au/assets/Uploads/Draft-Urban-Tree-Canopy-Guide-2018-07-11.pdf>

## Other NSW Strategies and Documents

### Government Architect NSW (GANSW)

The GANSW's [Greener Places](#)<sup>39</sup> sets the policy framework for creating a network of 'green infrastructure' including parks, rivers, bushland and private gardens that are strategically planned, designed and managed to support a good quality of life in an urban environment.<sup>40</sup> The policy states that green infrastructure is essential infrastructure and should be integrated into all community planning. The policy seeks all suburbs having an established tree canopy, well-designed parks, and connected open spaces.

The GANSW has also produced a number of relevant Guides to support Greener Places:

- The draft [Urban Tree Canopy Guide](#)<sup>41</sup> provides information on the importance of the urban tree canopy, and its capacity to improve urban climate, ecosystem and human health, and enhance wellbeing for communities across NSW. It includes guidance on how to develop an Urban Tree Canopy Plan and addresses the challenges for urban tree canopy.
- The draft [Bushland and Waterways Guide](#) provides an overview of the importance and benefits of urban habitat, as well as a toolkit of proposed strategies, actions, processes, and targets to better connect urban habitat and people, and to protect, restore, and enhance ecological systems.
- The draft [Open Space for Recreation Guide](#) provides information on the importance of providing open space for recreation, and sets out a new performance-based approach to planning and providing opportunities for outdoor recreation across different urban settings.



## 5. Implementation tips

### Local Government Integrated Planning and Reporting (IP&R) framework

The IP&R framework allows NSW councils to draw their various plans together, understand how they interact and get the maximum leverage from their efforts by planning holistically and sustainably for the future. Each local council must prepare a Community Engagement Strategy based on the social justice principles of access, equity, participation and rights to engage the local community for the development and review of the Community Strategic Plan (CSP). A local council can address the issue of urban cooling strategies and green infrastructure by including objectives, priorities and actions in council documents such as the CSP, Delivery Program and Operational Plan (OP). An action may include developing a green infrastructure / urban tree plan to facilitate and implement urban cooling outcomes, for example, the [North Sydney Council Street Tree Strategy 2016](#).<sup>42</sup> Council is encouraged to provide sufficient resources and staffing to effectively deal with the urban cooling issue.

### Strategic Land Use Planning under the EP&A Act

Councils are encouraged to address urban cooling issues within Local Strategic Planning Statements, LEPs and DCPs. Councils are required to reflect regional plan and district plan objectives related to urban cooling within their local plans. It is suggested that councils advocate to the Department of Planning and Environment to amend the Standard Instrument for Local Environmental Plans to incorporate urban cooling issues.

### Plans of Management

The Local Government Act requires councils to prepare Plans of Management for community land and this presents a significant opportunity for councils to implement urban cooling strategies within publicly owned land.

<sup>42</sup> [https://www.northsydney.nsw.gov.au/Waste\\_Environment/Trees/Tree\\_Policies\\_amp\\_Strategies](https://www.northsydney.nsw.gov.au/Waste_Environment/Trees/Tree_Policies_amp_Strategies)

<sup>43</sup> <https://www.activelivingnsw.com.au/assets/Uploads/Draft-Urban-Tree-Canopy-Guide-2018-07-11.pdf>

<sup>44</sup> <https://www.perrithcity.nsw.gov.au/Waste-and-Environment/Sustainability/Beat-the-heat---Cooling-the-City/>

<sup>45</sup> <https://www.governmentarchitect.nsw.gov.au/policies/greener-places>

<sup>46</sup> <https://climatechange.environment.nsw.gov.au/Adapting-to-climate-change/Green-Cover>

<sup>47</sup> NSW Office of Environment & Heritage, 2016, Minimising the impacts of extreme heat: A guide for local government

<sup>48</sup> [http://www.lowcarbonlivingcouncil.com.au/sites/all/files/publications\\_file\\_attachments/rp2024\\_guide\\_to\\_urban\\_cooling\\_strategies\\_2017\\_web.pdf](http://www.lowcarbonlivingcouncil.com.au/sites/all/files/publications_file_attachments/rp2024_guide_to_urban_cooling_strategies_2017_web.pdf)

## Community and Industry Education and Enforcement/Compliance

Councils are encouraged to provide education to the community and industry regarding the “urban heat island” effect and appropriate strategies to deal with the issue. In addition, councils are encouraged to invest appropriate resources in enforcement and compliance to ensure that council policies and development approvals are complied with.

The GANSW’s (draft) [Urban Tree Canopy Guide](#) suggests a number of actions for local government to increase urban tree canopy: (p39-40).<sup>43</sup>

Penrith City Council have developed a comprehensive [“Cooling the City” Strategy](#), including actions for implementation. The actions are divided into low cost actions for immediate implementation and medium to long term implementation across policy and planning, community engagement, green infrastructure, water sensitive urban design, increased reflectivity and social actions (p23-27).<sup>44</sup>

Other useful resources for implementation include:

- Government Architect NSW, [Greener Places](#)<sup>45</sup>
- Office of Environment and Heritage, [Technical Guidelines for Urban Green Cover in NSW](#)<sup>46</sup>
- Office of Environment and Heritage, [Minimising the impact of extreme heat: A guide for local government](#)<sup>47</sup>
- Low Carbon Living CRC [Guide to Urban Cooling Strategies 2017](#)<sup>48</sup>



## Relevant Funding Opportunities

### State

#### [Metropolitan Greenspace Program \(MGP\)](#)<sup>49</sup>

The MGP supports local councils in Greater Sydney and the Central Coast to improve regional open space by co-funding projects that enhance open spaces, parks, bushland, natural areas, waterway corridors and tree-lined streetscapes.

#### [Open Spaces and Greener Sydney Grants](#)<sup>50</sup>

\$290 million funding from the NSW Government to make NSW communities more liveable and green. This funding includes the Everyone Can Play Grant Program<sup>51</sup> and the Five Million Trees for Greater Sydney Grant Program<sup>52</sup> which supports local councils in Greater Sydney to enhance urban tree canopy by co-funding tree planting projects in public spaces such as streets, parks and plazas. Funds are awarded to councils on a matched dollar-for-dollar basis.

#### [NSW Office of Environment and Heritage \(OEH\)](#)<sup>53</sup>

OEH administers a number of funding programs and initiatives.

#### [Climate Change Fund Grants](#)<sup>54</sup>

NSW councils can apply for grants to plant trees, put up shade clothes and install water-misting systems in public places under the state government’s \$3.5 million grant program under the Climate Change Fund.

Further information on funding opportunities can be found at: <https://www.nswpcalipr.com.au/resources/funding-opportunities/>

<sup>49</sup> <https://www.greater.sydney/metropolitan-greenspace-program>

<sup>50</sup> <https://www.planning.nsw.gov.au/openspace>

<sup>51</sup> <https://www.planning.nsw.gov.au/Policy-and-Legislation/Open-space-and-parklands/Everyone-Can-Play-in-NSW/Everyone-Can-Play-in-NSW-grant>

<sup>52</sup> <https://www.planning.nsw.gov.au/Policy-and-Legislation/Open-space-and-parklands/5-million-trees/Five-Million-Trees-grant>

<sup>53</sup> <https://www.environment.nsw.gov.au/grantsandfunding/index.htm>

<sup>54</sup> <https://www.environment.nsw.gov.au/grants/ccfund.htm>

## 6. Further reading

### International

- Urban Green Spaces: A Brief for Action (World Health Organization, 2017) [Link](#)
- Cities Alive: Rethinking Green Infrastructure (ARUP, 2014) [Link](#)

### National

- Urban Guide to Cooling Strategies (Low Carbon Living Cooperative Research Council, 2017) [Link](#)
- Where are all the trees?: An analysis of tree canopy cover in Urban Australia (Vision 202020, 2013) [Link](#)
- Where should all the trees go? (Vision 202020, 2017) [Link](#)
- Vision 202020 – Urban Greening Resources (Vision 202020, 2016) [Link](#)
- Green Star Communities Rating Tool (Green Building Council of Australia, 2014) [Link](#)
- 20 Million Trees Program (National Landcare Program) [Link](#)

### NSW

- Greener Places (Government Architect NSW, 2018) [Link](#)
- Urban Tree Canopy Guide (Government Architect NSW, 2018) [Link](#)
- Technical Guidelines for Urban Green Cover in NSW (NSW Office of Environment and Heritage, 2015) [Link](#)
- Urban Heat Climate Change Impact Snapshot (NSW Office of Environment and Heritage, 2015) [Link](#)
- Five Million Trees Program (NSW Department of Planning and Environment, 2016) [Link](#)
- Landcom Street Tree Design Guidelines (Landcom, 2008) [Link](#)

### NSW Local Council Policies/Strategies/Initiatives/Case Studies

- Penrith City Council - Cooling the City Strategy [Link](#)
- North Sydney Council Urban Forest Strategy and Street Tree Strategy [Link](#)
- Newcastle Urban Forest Policy [Link](#)
- City of Sydney: Urban Forest Strategy and Street Tree Master Plan [Link](#)
- City of Botany Bay Street Tree Masterplan [Link](#)
- Blue Mountains City Council Street Tree Masterplan [Link](#)
- Arncliffe & Banksia Green Plan [Link](#)
- Resilient Sydney – A Strategy for City Resilience [Link](#)

- Blacktown City Council – “Cool Streets” Pilot Project [Link](#)
- Sutherland Shire Council – Green Streets Program [Link](#)
- Liverpool City Centre and Penrith – Green Cover Demonstration Project (OEH) [Link](#)
- Western Sydney Regional Organisation of Councils – Turn Down the Heat initiative [Link](#)
- Inner West Council – The GreenWay [Link](#)
- Parramatta City Council – Cool Parramatta and Parramatta Ways [Link](#)

### International Case Studies

- Greener City Fund (London, UK) [Link](#)
- Madrid + Natural by ARUP (Madrid, Spain) [Link](#)
- City of Toronto, Canada – compulsory green roofs [Link](#)
- Malmö, Sweden - Bo01 development [Link](#)

## Appendix 1: HPEWG Members

### Agencies/organisations:

- Active Living NSW
- Australian Institute of Landscape Architects NSW (AILA)
- Cancer Council NSW
- City Wellbeing Program, City Futures Research Centre, University of NSW
- Council on the Ageing (COTA)
- Government Architect NSW
- Hunter New England Local Health District
- Landcom
- National Heart Foundation
- Northern NSW Local Health District
- Northern Sydney Local Health District
- NSW Council of Social Service (NCOSS)
- NSW Ministry of Health
- NSW Office of Sport
- Office of Local Government NSW
- Planning Institute of Australia (PIA)
- South Eastern Sydney Local Health District
- South Western Sydney Local Health District
- Sydney Local Health District
- Transport for NSW
- University of Sydney
- Western Sydney Local Health District
- Willoughby City Council

### Individuals:

- Peter Sainsbury
- Danny Wiggins



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**Contact:**

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**or**

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Active Living NSW is a partnership between NSW Ministry of Health and the National Heart Foundation of Australia to support the physical activity and healthy built environment deliverables of the NSW Healthy Eating and Active Living Strategy. Under this partnership agreement, Active Living NSW coordinates and provides the secretariat for the HPEWG.



The NSW Government, Active Living NSW, National Heart Foundation of Australia and NSW Healthy Planning Expert Working Group acknowledges the Traditional Owners and custodians of Country throughout Australia and their continuing connection to land, waters and community. We pay our respect to them and their cultures, and Elders past, present and future.

