



Interdisciplinary Conservation Science
Research Group, RMIT
GPO Box 2476
Melbourne 3001
Victoria, Australia

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About ICON Science

RMIT University's Interdisciplinary Conservation Science Research Group is a team of researchers from a range of disciplines working to understand the interaction between society and our environment. We recognize that managing biodiversity demands a multidisciplinary approach that reconciles ecological, social and economic concerns.

Over the last 14 years, members of ICON Science have been involved in research relating to urban greening, threatened species and ecological communities.

We have assisted with guidelines and decision support tools related to urban greening policies and programs at local, state and national levels. Our funding sources include the Australian Research Council, the Australian Government's National Environmental Science Program through the Threatened Species Recovery Hub, and the Clean Air and Urban Landscapes Hub.

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We welcome the opportunity to provide a submission to into Environmental Infrastructure for Growing Populations. For further information on this submission, please contact Thami Croeser (thami.croeser@rmit.edu.au)

Executive Summary

As noted by the Committee Chair, the enormous value of local parks in urban areas has been starkly demonstrated by the current COVID-19 emergency. Currently, green spaces are underprovided in many parts of the city, both in terms of quantity of space, and its proximity to residences. Tree canopy, a vital aspect of urban environmental infrastructure, has actually declined as Melbourne has grown.

Given the health and social benefits of access to green spaces, it is key that we ramp up efforts to systematically deliver more parks, street trees and smaller green spaces. What is perhaps less obvious are the vital contributions made by ensuring that accessible green spaces are also *biodiverse* spaces. This is our key contention: we not only need more green space, but we also need to make sure it brings Victorians into contact with nature.

The good news is that plans to increase tree canopy and open space already exist; they just need to be fast-tracked through increased funding, resourcing and removal of institutional roadblocks. The implementation of these plans could be both an investment and stimulus; planning and delivery of street trees and parks will generate much-needed jobs and economic activity in a highly localised way. Such investments will support Victoria's recovery, as well as building our resilience to future shocks such as heatwaves and flooding.

Key Messages

- All Victorians should have access to a nearby park which includes habitat for biodiversity, as well as a shaded walking corridor to reach these places. Currently, access is highly variable and in a number of low-income areas, walkable access is quite limited.
- Street trees should be recognized as valuable environmental infrastructure. Investment should be made into protecting existing street trees and increasing street tree numbers in urban areas.
- Government can facilitate more extensive uptake of Biodiversity Sensitive Urban Design (BSUD) by specifying BSUD principles in building regulations and precinct planning.
- Tools exist to ensure that future development produces more environmental infrastructure. These must be scaled up in planning schemes, supported by significant improvements in local government planning staff allocations to ensure compliance with these rules.
- We are not starting from square one; high-quality strategies for street trees (the Living Melbourne Strategy) and parks (The draft Metropolitan Open Space Strategy) already exist for Melbourne. We need to accelerate and properly resource implementation of these existing plans.

Detailed recommendations

Recognize the diverse value of environmental infrastructure

It is increasingly common knowledge amongst policy makers that urban green spaces contribute myriad ecosystem services such as ameliorating the heat island effect (McPherson 1994), alleviating peaks in stormwater runoff (Xiao & McPherson 2002), absorbing air pollution (Nowak et al. 2006), reducing energy consumption for cooling and heating (Coutts & Beringer 2007), and providing shelter from extreme weather events (Abdollahi et al. 2000).

It may be less well-known that beyond this, urban green spaces deliver a remarkable range of human well-being benefits including reduced mortality from cardiovascular disease (Donovan et al. 2013), improved healing times (Ulrich 1984), reduced respiratory illness and allergies (Lovasi et al. 2008, Hanski et al. 2012), improved cognitive development in children (Dadvand et al. 2015), reduced stress (van den Berg & Custers 2011), reduced risk of poor mental health (Mitchell 2013), improved social cohesion (Shinew et al. 2004), improved self-esteem and empowerment (Maller 2009), and improved cognitive ability (Lee et al. 2015). Just the view of vegetation from a hospital window can increase recovery rates (Ulrich, 1984) and suburbs with greater provision of green spaces have lower crime rates (Kuo and Sullivan, 2001).

Further, there is increasing recognition that green spaces with a higher diversity of species deliver greater well-being and social benefits than less diverse spaces (e.g. Fuller et al. 2007). For example, respondents report greater psychological benefits from use of green spaces with higher biodiversity (Fuller et al. 2007, Schebella et al. 2019), and exposure to biodiverse green spaces has been linked to improved immune function (Rook, 2013, Mills et al. 2020). Interaction with biodiversity is an important reason that people visit green spaces (Palliwoda et al. 2017), and often promotes spiritual and emotional well-being (Sandifer et al. 2014). More biodiverse green spaces are also more resilient to climate change (Thompson et al. 2009). This means that it is not just 'greenness' but also 'biodiversity' that matters to properly understanding the value and contribution of our green infrastructure (Schwartz 2002).

Recommendation 1: recognize the diverse values of environmental infrastructure, especially the human health benefits associated with green spaces with higher levels of biodiversity.

Recognize the value of environmental infrastructure to protect biodiversity

In addition to the diverse functions performed by urban greenspaces, they provide habitat for threatened species and offer a unique opportunity to contribute to global conservation outcomes (Dearborn & Kark 2010). Cities themselves can be important biodiversity hotspots requiring recognition and protection in their own right (Maclagan et al. 2018). In Australia,

thirty percent of threatened species occur in cities (Ives et al. 2016), meaning our urban spaces present important opportunities for conservation and the prevention of future extinctions.

Despite increasing recognition of the importance of Australian cities for conserving biodiversity (Soanes et al. 2019; Soanes & Lentini 2019), biodiversity preservation and habitat creation are not well considered in current planning and development instruments. Current development frameworks have led to a lack of documentation of biodiversity assets within cities, as well as offsetting policies that continue to displace ecosystems and services to areas outside the city.

The rapid growth and sprawl of Australia's cities means integration of biodiversity into cities is reliant on mechanisms and incentives to include biodiversity sensitive urban design principles in new developments (Garrard et al. 2018). Biodiversity-sensitive urban design (BSUD) is a planning and development approach that aims to regenerate biodiversity while also improving liveability by enhancing comfort, health and well-being, and connection to nature (Garrard et al. 2018). BSUD provides a flexible framework for developers and planners to consider biodiversity alongside other socio-economic goals. The development industry recognises the value of this approach and is now using BSUD to inform building design and precinct plans.

There is scope to more fully integrate this approach across all new development. Government can facilitate this by specifying BSUD principles in building regulations and precinct planning. The inclusion of BSUD principles into policy and planning frameworks would enable identification and protection of sensitive urban habitats against development, as well as provide guidelines for creation of new habitats.

Recommendation 2: recognize the value of green infrastructure to support biodiversity. This should include guidance for preservation of native vegetation resources, particularly urban-specific amendments/clauses for protection where cover or species composition benchmarks cannot be used.

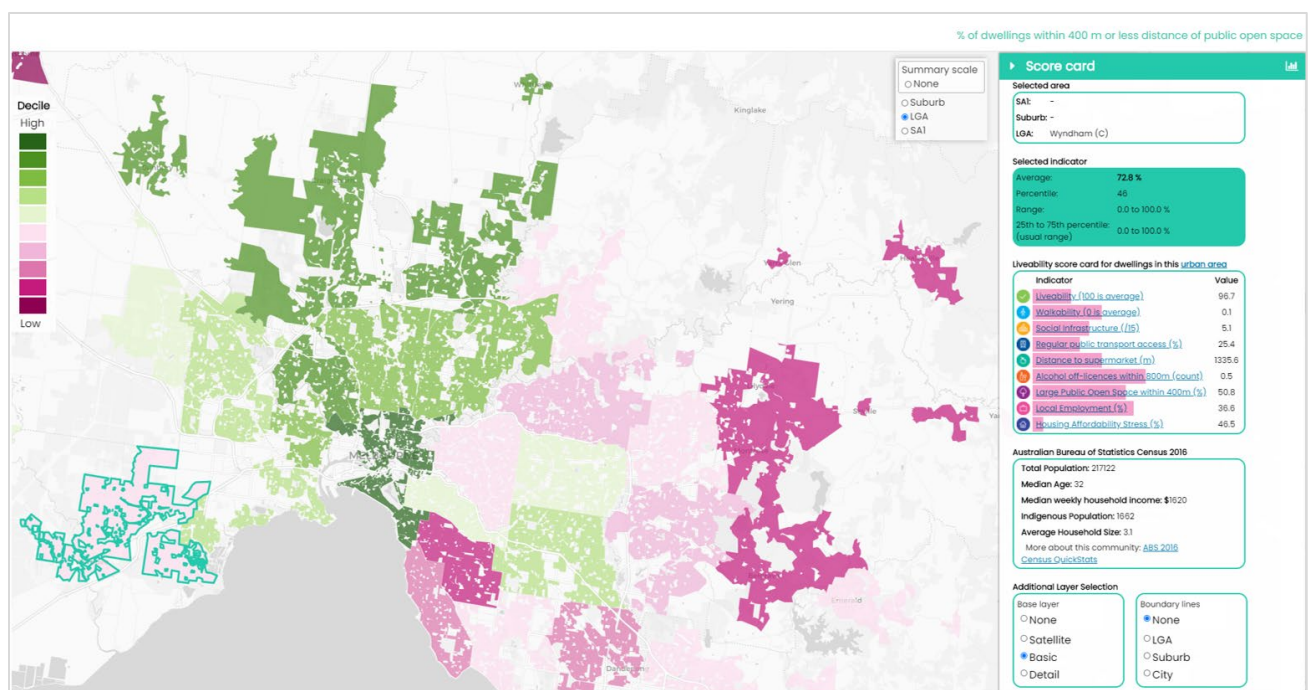
Recommendation 3: Use green infrastructure to support threatened species. This could include:

- a) An integrated, nation-wide urban biodiversity plan to provide an overarching vision and strategic spatial planning to re-nature cities for the benefit of threatened species.
- b) Promotion of the uptake of Biodiversity Sensitive Urban Design (BSUD) by specifying BSUD principles as a priority in post-COVID stimulus packages.

We need more environmental infrastructure, and it needs to become more accessible, equitable and biodiverse.

COVID has changed our lifestyles. We live more locally, and with the likely continuation of work from home for many Victorians, as well as the '20-minute neighborhood' concept central to Plan Melbourne, it is important that environmental infrastructure is locally accessible. In some parts of the city access is good (though these parks may be crowded) and in other areas it is limited.

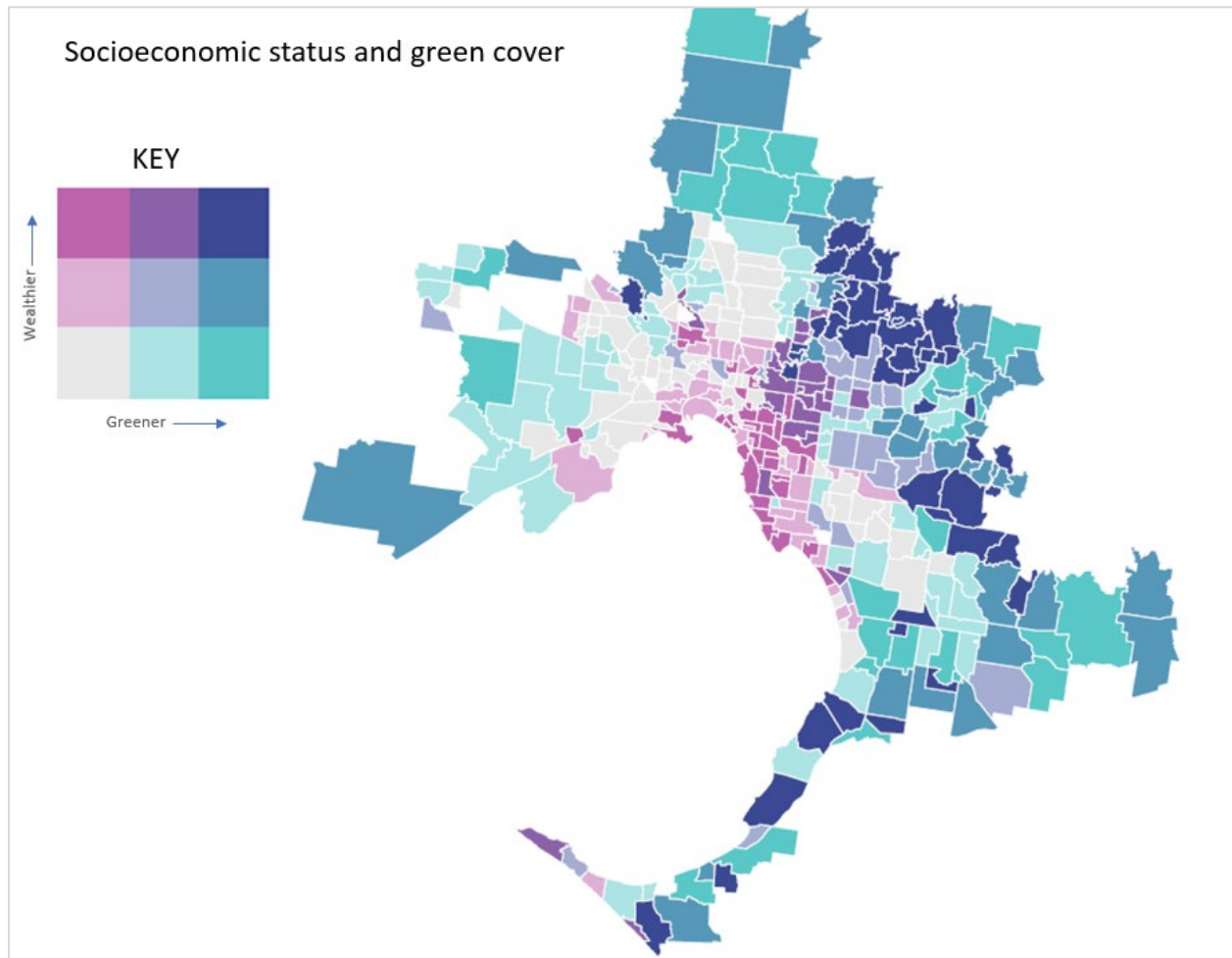
Research by the Australian Urban Observatory shows that within Melbourne local governments, easy walking access to open space ranges between around 50% in Glen Eira (Dark Purple) to 95% in the City of Melbourne (Dark Green) in the figure below. The city of Wyndham is highlighted with a blue outline, with 72.8% of dwellings within a 400m walk.



The Victorian Government's draft Metropolitan Open Space Strategy is yet to be put to full public consultation, but we understand that in some consultations a target of 95% has been discussed; we consider this a reasonable goal for a vital urban service. Only three councils are close to this target, these being City of Yarra, City of Melbourne and City of Port Philip (all >90%). It's important to note that these metrics don't consider the quantity of these open spaces; crowding may be an issue in these areas as they have grown very rapidly in recent years.

A few suburbs of significant social disadvantage coincide with low rates of open space access. By mapping green cover as well as social disadvantage, we are able to produce the map below. Grey shaded suburbs are parts of the city with the least green space and the lowest

socioeconomic status, as mapped by the ABS Index of Relative Socioeconomic Disadvantage. These areas of compound disadvantage are particularly common in key growth areas of Casey, Wyndham and Dandenong.



This means that there are thousands of Victorians that are struggling with both social disadvantage and a lack of environmental infrastructure – compounding their wellbeing problems. The fact that this coincides with areas in which we plan to direct much of the city’s growth highlights the urgency of providing adequate environmental infrastructure.

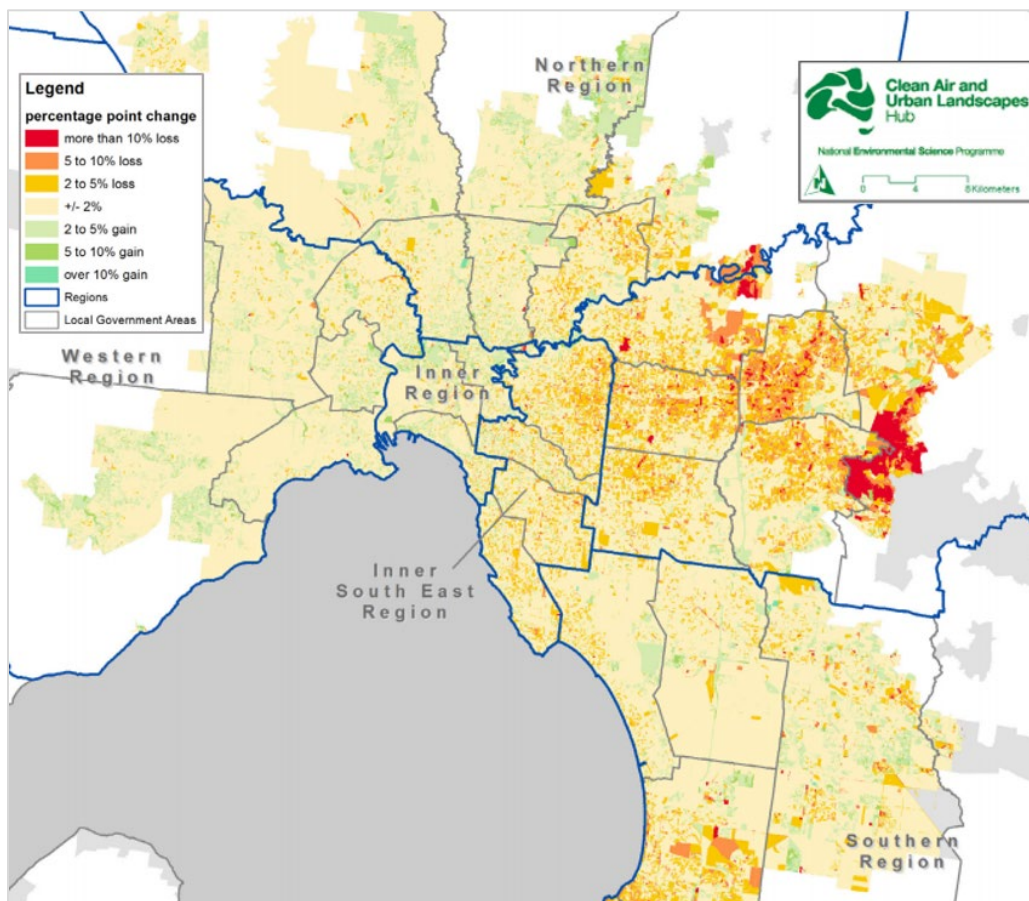
Tree canopy cover is another key piece of environmental infrastructure, with quite modest cover across the city, and significant east-west differences. This is an important local environmental asset, particularly in providing local amenity, shade and enabling walking in neighbourhoods. This is especially important as activity localises in the wake of COVID-19.

Tree Canopy Cover Changes between 2014-2018 (Hurley et al., 2019).

Region	Tree Canopy Cover 2014 (ha)	Tree Canopy Cover 2018 (ha)	Tree Canopy Loss/gain 2014 - 2018 (ha)	Tree Canopy Cover 2014 (%)	Tree Canopy Cover 2018 (%)
Inner	915	981	65	11.8%	12.6%
Inner South East	2,952	2,821	131	18.3%	17.4%
Western	2,206	2,573	367	5.0%	5.8%
Northern	6,180	6,546	366	11.0%	11.7%
Eastern	13,103	11,900	1,202	24.9%	22.6%
Southern	7,625	7,474	151	11.7%	11.5%
Metro wide (Total)	32,980	32,295	686	13.6%	13.4%

Melbourne has lost significant amounts of tree canopy as the city has grown, with some areas of modest growth in the West (from a very low base) and more significant losses in the East.

A recent RMIT/NESP study by Hurley et al. (2019) found that between 2014 and 2018, a total of over 2000 hectares of tree canopy has been lost – this is an area the size of a whole suburb.



Losses to residential development are especially significant; as trees on private property are lost to infill, tree canopy creation in the public realm becomes even more important. It also serves to remind us that as backyards are replaced by apartments, the need for public open spaces increases.



Further, well-being benefits delivered by green space are also greater when residents need to travel less to access suitable places (Giles-Corti et al., 2005), and when the density of visitors is lower (Ekkel and de Vries, 2017), indicating a need for equitable spatial distribution and appropriate quantities of green space per capita. Therefore, ready access to appropriately biodiverse green infrastructure is fundamental to community wellbeing.

- **Recommendation 4:** Expand uptake and support the use of policy tools to mandate provision of gardens, trees, and raingardens which are already available in the planning scheme. In many cases, local government planning schemes already include some of these tools but to date enforcement has been limited due to capacity constraints as Councils struggle in rate-capped operational environments.
- **Recommendation 5:** Additional mechanisms such as mandating or incentivising green roofs and walls in dense areas are ready to be scaled up after substantial policy development in the City of Melbourne. There are many successful global precedents for this approach. Implementation could utilize the planning scheme (as demonstrated by Amendment C376, currently being exhibited by the City of Melbourne) and/or through use of incentives.

Protect and enhance what we already have

Long-term protection of existing green infrastructure is vital, ensuring that what is presently in place remains in place into the future. This may involve legal protections, but also close collaboration with local governments to ensure the quality and extent of this green infrastructure is sustained. Existing initiatives offer lessons; plans to secure native grasslands in Melbourne's west are an example of a poor policy outcome, both as a failure to protect environmental infrastructure and a subsequent failure to maintain the resulting 'offset' areas.

Enhancing the quality of existing green infrastructure (for example planting indigenous species and improving disability access) is another means to improve the benefits that environmental infrastructure offers. Greater attention needs to be provided to the design and maintenance of such spaces to ensure they support local community needs. This is an opportunity to engage local communities in the designing of their public spaces, an important measure that can garner social cohesion and empowerment and develop place identity, a factor particularly important in greenfield areas where place identity often requires development and social disadvantage is disproportionately significant.

Recommendation 6: Invest in enhancements to existing parks to increase their recreational value, habitat value and disability access. These should include investments in both new capital works and maintenance.

Recommendation 7: Review existing mechanisms that should be retaining urban environmental infrastructure. In particular, tree retention outcomes must be improved through improvements to policy and compliance. Existing offsetting agreements should be much more thoroughly enforced, and future use of this tool should be limited.

Prioritize implementation of existing plans for delivery of parks and street trees, with a focus on walkable access and habitat provision.

There are a number of existing high-quality strategies and tools that can deliver environmental infrastructure if their resourcing is ramped up considerably. Here we offer a few practical options for their implementation:

Accelerate the delivery of existing plans, with a focus on local access, equity and biodiversity.

Plans for open space and tree canopy at the metropolitan scale already exist. The Metropolitan Open Space strategy is in an advanced draft form. While we are not aware of the details of this plan, we recommend it as an engine to drive expanded delivery of urban parks and green infrastructure, particularly in communities with low levels of or limited access to existing green infrastructure. This may require new policy initiatives, such as a fund to support the acquisition

of private land (particularly for established areas), increased requirements from developers to contribute to green infrastructure in the community, or the repurposing, rezoning, or reallocation of land in public ownership to meet green infrastructure needs.

The Living Melbourne Strategy which could guide an acceleration of shade planting to support access to local open spaces. Projects such as RMIT's Shadeways project can further support pleasant, shaded access to a new network of high-quality local parks. Accelerating delivery of these projects must involve improved funding for capital works and staffing; rate capping and the expense of providing services in growing urban areas has left Local Governments with limited capacity. Implementation could be significantly accelerated by a funding injection, which could also help direct a focus on local delivery and biodiverse planting. Improving access in areas of social disadvantage should be especially prioritised.

Institutional reforms could be led by the Victorian Government to further facilitate this delivery. Restrictions on use of state land reserved for utilities and services could be revised to enable managed access, unlocking thousands of hectares of green space. Existing laws around overhead and underground utilities in streetscape should also be reconsidered, as these restrict tree planting and mandate lopping, effectively prioritising the interests of utility companies above communities rather than encouraging risk management and problem solving to ensure both needed services can coexist. Much major infrastructure work is undertaken by agencies of the Victorian Government; should it wish to do so the government can ensure its agencies are model developers by committing themselves to being 'no net loss developers', if not of native vegetation, than at least of environmental infrastructure.

Ensure development adds environmental infrastructure locally, instead of removing it.

This should involve a commitment from the Victorian Government and local governments to maintain minimum thresholds of access to green infrastructure for all communities across Melbourne, enshrined by a quantitative standard (e.g. 95% of households should be within a 5-minute walk of a quality open space).

In growth areas, this means increasing the existing minimum green space provided from the current VPA standard of 10% (residential) and 3% (industrial/commercial), and more closely considering walkable access and biodiversity in the provision of these assets.

In infill areas, this means using the existing set of fragmented tools in the planning system better. Existing levers include garden area requirements in some residential zones, canopy tree requirements in schedules to these zones, and water sensitive urban design requirements in some local policy. These are currently difficult to enforce given heavy pressure on local government planning staff in rate-capped operational environments. The coverage of these existing requirements should be increased to all residential zones in all local governments, and resources should be increased to support their enforcement. Finally, closer scrutiny of Open

Space Contributions levied during subdivisions could ensure this funding is spent locally and promptly could further support open space delivery in the public realm.

New planning tools are being developed at the City of Melbourne to encourage green roofs and walls. These 'green factor' tools calculate a certain amount of site that must be covered by tree canopy, green roof or green wall, based on the site cover of the development. This kind of tool could further ensure onsite environmental infrastructure is part of future development in higher-density developments and urban renewal sites. This tool has proven highly effective in Singapore, one of the world's greenest cities. A [tool for Melbourne](#) has recently been developed and work is underway to include it in the planning scheme. This could be replicated citywide relatively quickly as much of the groundwork has been completed. This kind of tool could also be of utility in ensuring that wherever new housing, transport or other infrastructure eliminates or alters existing green infrastructure within a community, that this is replaced with new green infrastructure that is at least equivalent to that lost, and located within the same community. Notably, these concepts are key elements of best practice biodiversity offsetting – an innovative approach pioneered by Victoria in 2002 to arrest our historic legacy of land clearance. Perhaps a similarly bold initiative for green infrastructure, particularly biodiverse green infrastructure, will help ensure Melbourne remains a most liveable city for all Melbournians into the future.

We must look beyond traditional 'trees and lawns' parks to a wider suite of options. It is important to shift our thinking away from planning purely for green spaces as isolated patches of urban nature. Urban green space has been shown to provide many social and environmental benefits when dispersed throughout the urban environment as opposed to concentrated in a small number of high-quality parks. Increasing the quantity of quality green throughout the entire urban environment can be achieved by maximising the use of underutilised space throughout the city.

Much attention has been placed on the greening of walls and roofs, which needs to continue to be investigated and encouraged where possible. However, there are a myriad of other underutilised spaces within the urban environment that have largely remained under considered in urban greening policies. One such space includes suburban nature strips, which may constitute as much as 7% of all urban space and 36.7% of urban green space within the urban environment (Marshall et al. 2019). To maximise the potential benefits of urban green space for urban residents, policy needs to stop considering urban green space as principally provided through clearly demarcated open space areas and need to start looking at further ways to maximise the use of underutilised space throughout urban environment.

Recommendation 8: Prioritize implementation of the Living Melbourne Strategy and fast-track the finalization and implementation of the Metropolitan Open Space strategy. Implementation must be complemented by supportive allocations of resourcing, and state-led institutional reforms to remove existing institutional barriers to greening.

Thank you for the taking the time to read our submission. We would be happy to further discuss with you any points made herein.

Yours sincerely,

Interdisciplinary Conservation Science Research Group, RMIT

Ana Backstrom

Katherine Berthon

Thami Croeser (Coordinating author)

Dr Georgia Garrard

Dr Ascelin Gordon

Emily Gregg

Marco Gutiérrez

Lindall Kidd

Dr Holly Kirk

Dr Alex Kusmanoff

Dr Matthew Selinske

Roshan Sharma

Dr Freya Thomas

Professor Sarah Bekessy

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