Dear Mr Lennon

Re: Draft Planning and Design Code Phase 3 (Urban Areas)

Thank you for providing the Adelaide and Mt Lofty Ranges (AMLR) Natural Resources Management Board (the Board) the opportunity to comment on the draft Planning and Design Code Phase 3 (Urban Areas).

The primary object of the Planning, Development and Infrastructure Act 2016 (PDI Act) is ‘to support and enhance the State’s liveability and prosperity in ways that are ecologically sustainable…’ Under the Natural Resources Management Act 2004 (the NRM Act) the Board is responsible for ensuring that policies developed under the PDI Act are consistent with the NRM Act and complement the region’s NRM Plan. The Board recognises that the South Australian Planning and Design Code, as a designated instrument under the PDI Act, will play a significant role in supporting and regulating planning and development in South Australia.

The State is also currently undergoing NRM reform, with the new Landscape South Australia Act 2019 (Landscape SA Act) to replace the NRM Act on 1 July 2020. The Landscape SA Act will enable the establishment of new regional landscape boards and reform natural resource management in South Australia. Like the NRM boards, regional landscape boards will have a role in ensuring consistency between landscape management and the new planning system, including the Code. As regional landscape boards are yet to be established, the comments in this submission reflect the interests of both the current AMLR Natural Resources Management Board and the future regional landscape boards that will manage the Adelaide and Mt Lofty Ranges area.

The Board recognises that Adelaide’s population is increasing and we support the State Government’s target for 85 per cent of all new housing to be built in established urban areas by 2045 (as set out in the 30 Year Plan for Greater Adelaide). This infill target will help to contain our urban footprint and protect our natural resources. However, this progress needs to be carefully managed to ensure a healthy balance of public green space, backyard habitats for wildlife, and management of water, including stormwater. The Board supports a planning system which provides positive infill outcomes for both the community and the environment.

Our submission on Phase 3 of the Code consists of several overarching comments, as well as detailed feedback on individual sections of the Code at Attachment A.
References to the NRM Act

The draft Code includes multiple references to the NRM Act. From 1 July 2020 the NRM Act will be repealed and the Landscape SA Act will become fully operational. As such, from this date all references in the Code to the NRM Act should be removed and replaced with references to the Landscape SA Act.

Structure of the new planning system

The Board commends the Commission for developing a more consistent, clearer, simpler and more equitable planning process. We support the concept of the Code as an integrated tool that provides information up-front to those seeking to develop rather than requiring a series of approval steps. The Board supports the efforts of the Commission and the Department of Planning, Transport and Infrastructure (DPTI) working with the Department for Environment and Water (DEW) to ensure that there are multiple natural resource related overlays (e.g. native vegetation, water resources) in the Code that enables these matters to be considered up-front when planning rather than being perceived as another obstacle after development approval.

The Board notes that information relating to some environmental legislation (e.g. the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and the National Parks and Wildlife Act 1972) are not reflected in the overlays or the SA Planning Atlas. We continue to encourage DPTI to consider including this information in the SA Planning Atlas where it will not be a legal impediment but can inform and educate users about potential regulatory barriers up-front rather than environmental assets being perceived as ‘blocking’ development after development approval has occurred.

Climate Change

The consequences of climate change can already be observed in Adelaide through more extreme weather, rising sea levels, diminishing average rainfall, and increasing temperatures. The Board notes that the while the Code includes a number of policies that will contribute to climate change mitigation and adaptation, it does not explicitly include addressing climate change as an objective in desired outcomes and performance outcomes (with some minor exceptions). Furthermore, the Code does not consider climate change implications over the lifetime of developments. We recommend that the Commission and DPTI work with DEW, the Green Adelaide Board, and other relevant stakeholders on this matter for Generation 2 of the Code to better articulate climate change risks and to make clear references to mitigation/adaptation outcomes in relevant policies.

Biodiversity

Habitat destruction has been a major driver of biodiversity decline and species loss in Australia, and is being compounded by the impacts of climate change. Urban growth can severely impact on native species and our ability to maintain flora and fauna in the city. Urban infill can cause habitat loss, introduction of exotic species, attract abundant species, increase pollution, and create urban heat islands. It is vital for the planning system to acknowledge the importance of biodiversity to both ecosystem and human health, and to implement policies to protect it.
The Board is supportive of the Conservation zone and the native vegetation overlays that have been included in the draft Code, however we consider that there are still policy gaps related to biodiversity. We recommend that further work be undertaken to better recognise and protect biodiversity in Generation 2 of the Code. In particular, there needs to be consideration of environmental assets that are located outside of areas of environmental significance, such as roadside vegetation, remnant native vegetation and habitat, and urban habitat in trees and gardens. Biodiversity is also associated with a broad range of habitats which may not be vegetated (e.g. mudflats, rocky outcrops), may not be primarily native vegetation (e.g. certain types of production landscapes), or that may comprise areas of non-recognised native vegetation (e.g. non-woody vegetation such as grasslands or sedgelands). We encourage the Commission and DPTI to work closely with DEW, the Green Adelaide Board, and other relevant stakeholders to develop more integrated planning approaches for biodiversity and ecological processes in Generation 2 of the Code.

Green Adelaide

Green Adelaide will be one of the new regional landscape boards that will replace the Adelaide and Mt Lofty Ranges NRM Board under the Landscape SA Act. Green Adelaide will aim to drive the greening and cooling of our capital city, build strong connections between Adelaide residents and their natural environments, and support initiatives that adapt the urban landscape to our changing climate. The Green Adelaide Board will focus on seven key priorities:

- Coastal management
- Water resources and wetlands
- Green streets and flourishing parklands
- Biodiversity sensitive and water sensitive urban design
- Fauna, flora, and ecosystem health in the urban environment
- Controlling pest plants and animals
- Nature education

The Board recognises that the new planning system, particularly the Code, will be instrumental in enabling Green Adelaide to achieve many of these priorities.

The Board commends the inclusion of water sensitive urban design (WSUD) and greening policies for new developments in the Code. These policies will contribute to a number of Green Adelaide and State Government priorities, including the canopy cover target set out in the 30 Year Plan for Greater Adelaide, and will contribute to making Adelaide a cooler, greener city. We have provided specific comments and suggested amendments on individual policies in the table at Attachment A.

With regards to greening, it should be noted that many tree species require decades of growth before maturing to a state where they are able to provide a full and shady canopy. Replacing an existing mature tree with one or even several new trees does not account for this interim loss in canopy cover. We recommend that the Code provide incentives to ensure that the retention of existing trees (as well as the planting of new/replacement trees) occurs wherever possible. We also
encourage consideration of additional methods to retain existing trees and improve urban canopy cover (e.g. broadening the definition of regulated trees to protect mature trees of a smaller size).

The Board also encourages the adoption of biodiversity sensitive urban design (BSUD) principles in the Code. While many of the proposed WSUD and greening policies will help to achieve BSUD outcomes, we suggest that this be made explicit in several of the performance outcomes in the Code. Specific comments on individual policies are included in the table at Attachment A.

For Green Adelaide to realise its ambition to become an ecologically vibrant city, it will require Generation 2 of the Code to include a framework, possibly including incentives, to protect and enhance biodiversity across metropolitan Adelaide. With recognition of the value of complementary biodiversity and natural character in surrounding public and private areas, the approach should value existing vegetation and habitats throughout the planning lifecycle of projects.

Finally, we recommend that the new WSUD and greening policies are closely monitored and reviewed so that improvements can be identified and adopted in Generation 2 of the Code. Consideration should also be given to compliance of these policies and the future application across all types of development to strengthen WSUD and greening outcomes. We encourage the Commission and DPTI to work closely with the Green Adelaide Board, DEW, and other relevant stakeholders on any future improvements to these policies.

**Generation 2**

The Board acknowledges that the timeframes for this reform have been challenging and that Generation 1 of the Planning and Design Code is largely a policy-neutral conversion and consolidation of existing policies into the new framework. Whilst disappointed that the opportunity to progress the improvement of policies and design rules during Generation 1 is limited, we support the proposal that there will be a Generation 2 reform process for the Code that will move the planning system closer towards best practice. We look forward to working with the Commission and DPTI in the implementation of Generation 1 of the reforms to avoid potential inadvertent adverse outcomes to natural resources from the speedy transition, and in the development of Generation 2 of the Code, particularly to enhance environmental sustainability, and climate change mitigation and adaptation considerations in planning and design.

**Regional Planning**

Finally, the Board understands that the Code does not set the strategic long-term vision and plan for how and where development occurs across the State. Instead, this will remain the work of the Regional Plans. Many current environmental and land management issues are legacies of planning decisions that have been made in the past, including around water courses, beaches, native vegetation and fire. The Board has conducted regional and subregional planning with communities, and we hope that this information can be fed into the work that will be undertaken in the development and amendment of Regional Plans to ensure natural resources and landscape values can be maintained through good planning. Furthermore, we encourage the positive work in the 30 Year Plan for Greater Adelaide, in having complimentary themes and recognising that there can be mutually beneficial outcomes for food production and biodiversity, to be strengthened in future Plans.
We hope that this submission provides useful feedback on Phase 3 for your consideration, including our detailed comments at Attachment A. Should you require further information about the Board’s comments, please contact Ms Alison Campbell, Senior NRM Policy Officer on [redacted].

Yours sincerely

David Greenough
PRESIDING MEMBER

Date: 27/02/2020
## Overlays

<table>
<thead>
<tr>
<th>Overlay</th>
<th>Comment</th>
</tr>
</thead>
</table>
| Hazards (Bushfire – General Risk) Overlay | General Comments
Throughout these overlays the term ‘unacceptable bushfire risk’ is used. This is a value-laden term that is not defined. We suggest that this term is defined, potentially using Bushfire Attack Level (BAL) ratings, acknowledging that under climate change scenarios a conservative estimate may need to be taken as a currently acceptable BAL may be unacceptable for some developments under more extreme bushfire weather. For developments with highly vulnerable residents such as hospitals, nursing homes and childcare centres, the BAL rating considered to be ‘acceptable’ may be one that means the development does not need to be evacuated in the event of a bushfire. |
| Hazards (Bushfire – Medium Risk) Overlay | |
| Hazards (Bushfire – High Risk) Overlay | |
| Hazards (Bushfire – General Risk) Overlay | Discussion
The clearance of vegetation to increase levels of bushfire risk reduction contribute to the ongoing decline of biodiversity values. |
| DO 1 | Recommendation – Generation 1
Amend DO 1 to read “…impact of bushfires on life and property without contributing to the loss of native vegetation and associated biodiversity values.” |
| Development responds to the general level of bushfire risk by siting and designing buildings in a manner that mitigates the threat and impact of bushfires on life and property. | |
| PO 1.1 | Recommendation – Generation 1
Suggest that “adequate asset protection zone” is defined by referring to the CFS Zoning Standard for an asset protection zone. Amend PO to read “e. inability to provide an adequate asset protection zone without the need to clear native vegetation;” |
| Buildings and structures are located away from areas that pose an unacceptable bushfire risk as a result of:
  a. vegetation cover comprising trees and/or shrubs and/or unmanaged grasslands;
  b. poor access;
  c. rugged terrain;
  d. isolated location (e.g. more than 600m from a public road); | |
| e. inability to provide an adequate asset protection zone; and/or  |
| f. inability to provide a suitable site for an adequate supply of water for firefighting purposes. |

**Hazards (Bushfire – General Risk) Overlay**

**DTS/DPF 3.2**

Development meets the following requirements:

- a. an asset protection zone with a minimum width of 50m already exists and can continue to be maintained around the accommodation; and
- b. the asset protection zone is contained wholly within the allotment of the development.

**Recommendation – Generation 1**

Suggest defining “asset protection zone” by referring to the CFS Zoning Standard.

Amend DTS/DPF to read “a. an asset protection zone with a minimum width of 50m already exists and can continue to be maintained around the accommodation without the need to clear native vegetation.” Otherwise, areas that have recently been burnt will meet the asset protection zone standard but will not continue to meet this standard unless they are cleared or burnt repeatedly in future.

Amend DTS/DPF to read ‘b. the asset protection zone is contained wholly within the allotment of the development and the bushfire risk surrounding the development is not so high as to also necessitate a buffer zone (according to the CFS) that extends beyond the development or that requires anything but minimal native vegetation clearance.”

**PO 4.1**

Land division is designed to:

- a. minimise fire risk danger to residents, other occupants of buildings and firefighting personnel;
- b. minimise the potential risk of damage to buildings and other property during a bushfire; and
- c. ensure each allotment contains a suitable building envelope that is located away from any vegetation; and
- d. that would pose an unacceptable risk in the event of bushfire.

**Recommendation – Generation 1**

Suggest defining the term “away from any vegetation” by referring to the guidelines set out in the CFS Zoning Standard.
### Hazards (Bushfire – High Risk) Overlay

**DO 1**

**Hazards (Bushfire – Medium Risk) Overlay**

**DO 1**

The Board’s comments on these DOs are the same as per the comparable DO under the Hazards (Bushfire – General Risk) Overlay.

### Hazards (Bushfire – High Risk) Overlay

**PO 2.1**

**Hazards (Bushfire – Medium Risk) Overlay**

**PO 1.1**

The Board’s comments on these POs are the same as per the comparable PO under the Hazards (Bushfire – General Risk) Overlay.

## General Development Policies

<table>
<thead>
<tr>
<th>General Development Policy</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design in Urban Areas</strong></td>
<td></td>
</tr>
</tbody>
</table>

**ALL DEVELOPMENT**

**PO 3.1**

Landscaped (including trees), permeable open spaces incorporated to:

(a) minimise heat absorption and reflection;
(b) maximise shade and shelter;
(c) maximise stormwater infiltration; and
(d) enhance the appearance of land and streetscapes.

PO 3.1 is supported.

**Discussion**

The performance outcome is simple yet comprehensive enough and defensible. The performance outcome will also contribute to the broader state government objective to increase urban tree canopy cover. Implementation effectiveness will depend on other factors such as the suitability of the soil supporting the landscaping (such as surface area, oxygen exchange capabilities at the surface, soil quality, soil compaction, soil depth and plan area to support appropriate trees, and so on).

Landscaping has the potential for a significant contribution to biodiversity and this should be recognised in the performance outcome.

In the future, private and public landscaped open spaces may be considered for the formalised cross-boundary management of stormwater utilising appropriate mechanisms.

**Recommendation – Generation 1**

Add a new dot point to PO:
“(x) contribute to biodiversity;”

**Recommendation – Generation 2**

Explore the potential for landscaped open spaces in both the private and public realms to be utilised for cross-boundary stormwater management approaches utilising appropriate formalised mechanisms. For example, stormwater managed within a private property in excess of minimum authority requirements may offset other authority requirements.

Explore mechanisms such that landscaped open spaces are planned and developed to discourage the prevalence of pests and/or known abundant species.

<table>
<thead>
<tr>
<th>ALL DEVELOPMENT</th>
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</thead>
<tbody>
<tr>
<td><strong>PO 4.1</strong></td>
</tr>
<tr>
<td>Buildings sited, oriented and designed to maximise natural sunlight access and ventilation to main activity areas, habitable rooms, common areas and open spaces.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PO 4.1 is supported.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discussion</strong></td>
</tr>
<tr>
<td>Particular benefits to human health and wellbeing will flow from maximising spatial and visual access to living/green/landscaped open space.</td>
</tr>
</tbody>
</table>

In the future, excellent guidance will be available to proponents on built form typologies which maximise the achievement of this performance outcome in an economic manner.

**Recommendation – Generation 1**

Amend PO to read “…common areas and green [or landscaped] open spaces.”

**Recommendation – Generation 2**

Establish guidelines for new infill built form typologies, drawing upon the work of:

(i) University of SA (Damien Madigan) to achieve density in established (heritage) suburbs, while retaining neighbourhood character.

(ii) The Cooperative Research Centre for Water Sensitive Cities (CRCWSC) draft *Infill typologies catalogue* that offers alternative designs for small-scale infill, including dual occupancies, one lot into three or four, row townhouses, apartments, and stacked cluster developments. The designs demonstrate ways that these development types can deliver increased urban green cover, better usable outdoor spaces, better ventilation, and greater connection between habitable rooms and private or communal green spaces. The designs will also provide for higher quality integration with the streetscapes, and better management of stormwater runoff quality and quantity.

(iii) The CRCWSC draft *Infill performance evaluation framework* offers a scale to assist the assessment of the relative contribution of private open space to householder quality of life/liveability.
All Development

PO 4.2
Buildings sited and designed to maximise passive environmental performance and minimise energy consumption and reliance on mechanical systems, such as heating and cooling.

PO 4.2 is supported.

Discussion
CRCWSC research provides evidence of the cooling benefits and improved human thermal comfort provided by trees, irrigated turf, raingardens and water bodies:

- A study of a single isolated tree in Melbourne Cemetery showed that on very hot days in 2014, the air temperature below the tree canopy was 0.6 to 1.2 degrees Celsius cooler than immediately upwind of the tree.
- 10% increase in vegetation cover will decrease air temperature by approximately 0.2 degrees Celsius in a heatwave (Jacobs, Gallant and Tapper, 2017).
- 100% increase in vegetation cover will decrease air temperature by approximately 1.0 degrees Celsius in a heatwave (Jacobs, Gallant, Tapper, 2017).
- Increasing vegetation cover from 20% to 80% can reduce surface temperature by up to 6 degrees Celsius on a typical summer day (Nury, 2016).
- Air temperature will reduce by 1 degrees Celsius above and downwind of a wetland or waterway, by the water body diameter width (Broadbent, Coutts, Tapper and Demuzere, 2017).
- Light irrigation of public open space/turf on a typical summer day can reduce air temperature by approximately 1 degree Celsius and human thermal comfort by up to 10 degrees Celsius (Motazedian, 2016).
- Low to moderate irrigation of public open space/turf during a suburban heatwave can reduce air temperature by approximately 0.5 degrees Celsius (Broadbent, Coutts, Tapper and Demuzere, 2017).
- Very heavy irrigation of public open space/turf during a suburban heatwave can reduce air temperature by approximately 2.5 degrees Celsius and surface temperature by up to 20 degrees Celsius (Broadbent, Coutts, Tapper and Demuzere, 2017).

Large-scale irrigation can be achieved independent of potable mains water in many jurisdictions in South Australia with the economic availability of fit-for-purpose recycled water including the Glenelg to Adelaide Pipeline and stormwater recycling schemes in the north, south, east and west.

Recommendation – Generation 1
Amend PO to read “Buildings, including landscaping, sited and designed...”.

Recommendation – Generation 2
Establish guidelines for proponents drawing from the abovementioned evidence base.
<table>
<thead>
<tr>
<th>ALL DEVELOPMENT PO 4.3</th>
<th>Buildings incorporate climate responsive techniques and features such as building and window orientation, use of eaves, verandahs and shading structures, water harvesting, at ground landscaping, green walls, green roofs and photovoltaic cells. PO 4.3 is supported with recommended amendment.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discussion</strong></td>
<td>The objective is robust but would be strengthened by making plainer the purpose of the example of <em>water harvesting</em>, which is to <em>use</em> the water so captured for the purposes of on-site benefits such as better plant growth, and off-site benefits such as reducing loads on drainage systems. Green walls and roofs can provide habitat for wildlife and encourage biodiversity in urban areas. The inclusion of these elements in the performance outcome are commended.</td>
</tr>
<tr>
<td><strong>Recommendation – Generation 1</strong></td>
<td>Amend PO to read “…water harvesting <em>and use</em>….”.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALL DEVELOPMENT PO 5.1</th>
<th>Development sited and designed to maintain natural hydrological systems without negatively impacting: (a) the quantity and quality of surface and groundwater; (b) the depth and directional flow of surface and groundwater; or (c) the quality and function of natural springs. PO 5.1 is supported with recommended amendment.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discussion</strong></td>
<td>As well as <em>quantity</em> and <em>quality</em>, the <em>timing</em> of flows is important in natural hydrological systems, and urban development typically introduces significant changes to the timing of flows, including the <em>seasonality</em> and <em>frequency</em> of flow events.</td>
</tr>
</tbody>
</table>
| **Recommendation – Generation 1** | Amend PO to read “…quantity and quality *and timing of flows* of surface…”.

**Recommendation – Generation 2**

Draw on the significant guidance for the implementation of water sensitive urban design available from Water Sensitive SA, South Australia’s water sensitive urban design capacity building program.

<table>
<thead>
<tr>
<th>ALL DEVELOPMENT PO 6.4</th>
<th>Street level vehicle parking areas that are open to the sky are landscaped to provide shade and reduce solar heat absorption and reflection. PO 6.4, DTS/DPF 6.4 are supported.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discussion</strong></td>
<td>Street-level vehicle parking areas that are open to the sky present significant opportunities to use rain falling on hard surfaces to passively irrigate the associated landscaping with benefits for the plants and the environments downstream that would otherwise receive that stormwater.</td>
</tr>
<tr>
<td><strong>Recommendation – Generation 1</strong></td>
<td></td>
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</tbody>
</table>
Vehicle parking areas that are open to the sky and comprise 10 or more car parking spaces include a shade tree with a mature canopy of 4m diameter spaced for each 10 car parking spaces provided and a landscaped strip on any road frontage of a minimum dimension of 1m.

Amend PO to read “…landscaped to provide shade, maximise passive use of rainfall and reduce solar…”.
Amend DTS to read “…of 1m and direct stormwater to shade trees and landscaped strip.”

**Recommendation – Generation 2**

Draw on the significant guidance for the implementation of water sensitive urban design available from Water Sensitive SA, South Australia’s water sensitive urban design capacity building program.

<table>
<thead>
<tr>
<th>ALL DEVELOPMENT</th>
<th>PO 6.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle parking areas are landscaped along public frontages, allotment boundaries and between double rows of parking spaces.</td>
<td></td>
</tr>
</tbody>
</table>

**Amendment**

PO 6.5 is supported.

**Discussion**

Vehicle parking areas may present significant opportunities to use rain falling on hard surfaces to passively irrigate the associated landscaping, depending on the particular arrangement of the parking area.

**Recommendation – Generation 1**

Amend PO to read “…between double rows of parking spaces, and are passively watered with local rainfall run-off where practicable.”

**Recommendation – Generation 2**

Draw on the significant guidance for the implementation of water sensitive urban design available from Water Sensitive SA, South Australia’s water sensitive urban design capacity building program.

<table>
<thead>
<tr>
<th>ALL DEVELOPMENT</th>
<th>PO 6.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle parking areas and associated driveways are landscaped to shade and positively contribute to amenity.</td>
<td></td>
</tr>
</tbody>
</table>

**Amendment**

PO 6.6 is supported.

**Discussion**

Vehicle parking areas and associated driveways may present significant opportunities to use rain falling on hard surfaces to passively irrigate the associated landscaping, depending on the particular arrangement of the parking area and driveway.

<table>
<thead>
<tr>
<th>ALL DEVELOPMENT</th>
<th>PO 6.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle parking areas and accessways incorporate integrated stormwater management techniques such as permeable or porous surfaces, infiltration systems, drainage swales or</td>
<td></td>
</tr>
</tbody>
</table>

**Amendment**

PO 6.7 is supported.

**Discussion**

Vehicle parking areas are amongst the most straightforward development types to integrate living/green infrastructure and apply water sensitive urban design, as there are generally limited conflicts with underground services or footings of structures. Vehicle parking areas represent “easy wins” for green and water sensitive urban design implementation and these opportunities should be taken to the maximum practicable extent.
Vehicle parking areas that fail to reach minimum standards represent “underperforming asphalt”. Local parks and recreational areas must carry the load of every missed opportunity to better manage stormwater in vehicle parking areas, through increased inundation to manage flood events. Vehicle parking areas must manage their stormwater onsite so open spaces can better provide their primary functions to the community, offering amenity and recreation.

**Recommendation – Generation 2**

Draw on the significant guidance for the implementation of water sensitive urban design available from Water Sensitive SA, South Australia’s water sensitive urban design capacity building program.

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<table>
<thead>
<tr>
<th><strong>ALL DEVELOPMENT - 4 OR MORE BUILDING LEVELS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PO 10.1</strong></td>
</tr>
<tr>
<td>Development facing a street provides a well landscaped area that contains a deep soil space to accommodate a tree of a species and size adequate to provide shade, contribute to tree canopy targets and soften the appearance of buildings.</td>
</tr>
<tr>
<td><strong>DTS / DPF 10.1</strong></td>
</tr>
<tr>
<td>Buildings provide a 4m by 4m deep soil space in front of the building to accommodate a medium to large tree, except where no building setback from front property boundaries is desired.</td>
</tr>
</tbody>
</table>

**PO 10.1, DTS/DPF 10.1 are supported.**

**Discussion**

Deep soil zones and the trees they support present excellent opportunities for passive watering with local rainfall run-off, with benefits for the trees themselves, local soil moisture conditions, and downstream environments that would otherwise have received the resulting stormwater.

**Recommendation – Generation 1**

Amend PO to read “…well landscaped area *passively watered with local rainfall run-off where practicable* that contains…”.

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<table>
<thead>
<tr>
<th><strong>ALL DEVELOPMENT - 4 OR MORE BUILDING LEVELS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PO 10.2</strong></td>
</tr>
<tr>
<td>Deep soil zones provided to retain existing vegetation or provide areas that can accommodate new deep root vegetation, including tall trees with large canopies to provide</td>
</tr>
</tbody>
</table>

**PO 10.2 is supported.**

**Discussion**

Deep soil zones and the trees they support present excellent opportunities for passive watering with local rainfall run-off, with benefits for the trees themselves, local soil moisture conditions, and downstream environments that would otherwise have received the resulting stormwater.

**Recommendation – Generation 1**
<table>
<thead>
<tr>
<th>Shade and soften the appearance of multi storey buildings.</th>
<th>Amend PO to read “Deep soil zones, passively watered with local rainfall run-off where practicable, provided to retain...”.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL DEVELOPMENT - 4 OR MORE BUILDING LEVELS</td>
<td>PO 10.3 is supported.</td>
</tr>
<tr>
<td><strong>PO 10.3</strong></td>
<td><strong>PO 10.4</strong></td>
</tr>
<tr>
<td>Deep soil zones provided with access to natural light to assist in maintaining vegetation health.</td>
<td>Unless separated by a public road or reserve, development sites adjacent to any zone that has a primary purpose of accommodating low rise residential development incorporate a deep soil zone along the common boundary, to enable medium to large trees to be retained or established to assist in screening new buildings of 3 or more storeys in height.</td>
</tr>
<tr>
<td>ALL DEVELOPMENT - 4 OR MORE BUILDING LEVELS</td>
<td>PO 10.4 is supported.</td>
</tr>
<tr>
<td><strong>PO 11.1</strong></td>
<td><strong>PO 11.1 is supported.</strong></td>
</tr>
<tr>
<td>Development minimises detrimental micro-climatic impacts on adjacent land and buildings.</td>
<td><strong>Discussion</strong></td>
</tr>
</tbody>
</table>
| **CRCWSC research provides evidence of the cooling benefits and improved human thermal comfort provided by trees, irrigated turf, raingardens and water bodies:** | - A study of a single isolated tree in Melbourne Cemetery showed that on very hot days in 2014, the air temperature below the tree canopy was 0.6 to 1.2 degrees Celsius cooler than immediately upwind of the tree.  
- 10% increase in vegetation cover will decrease air temperature by approximately 0.2 degrees Celsius in a heatwave (Jacobs, Gallant and Tapper, 2017).  
- 100% increase in vegetation cover will decrease air temperature by approximately 1.0 degrees Celsius in a heatwave (Jacobs, Gallant, Tapper, 2017). |
Increasing vegetation cover from 20% to 80% can reduce surface temperature by up to 6 degrees Celsius on a typical summer day (Nury, 2016).

Air temperature will reduce by 1 degree Celsius above and downwind of a wetland or waterway, by the water body diameter width (Broadbent, Coutts, Tapper and Demuzere, 2017).

Light irrigation of public open space/turf on a typical summer day can reduce air temperature by approximately 1 degree Celsius and human thermal comfort by up to 10 degrees Celsius (Motazedian, 2016).

Low to moderate irrigation of public open space/turf during a suburban heatwave can reduce air temperature by approximately 0.5 degrees Celsius (Broadbent, Coutts, Tapper and Demuzere, 2017).

Very heavy irrigation of public open space/turf during a suburban heatwave can reduce air temperature by approximately 2.5 degrees Celsius and surface temperature by up to 20 degrees Celsius (Broadbent, Coutts, Tapper and Demuzere, 2017).

Large-scale irrigation can be achieved independent of potable mains water in many jurisdictions in South Australia with the economic availability of fit-for-purpose recycled water including the Glenelg to Adelaide Pipeline and stormwater recycling schemes in the north, south, east and west.

**Recommendation – Generation 2**

Establish guidelines for proponents drawing from the abovementioned evidence base.

### ALL DEVELOPMENT - 4 OR MORE BUILDING LEVELS

**PO 11.2**

Development incorporates sustainable design techniques and features such as window orientation, eaves and shading structures, water harvesting, green walls, and roof designs that enable the provision of rain water tanks (where they are not provided elsewhere on site), green roofs and photovoltaic cells.

PO 11.2 is supported with recommended amendment.

**Discussion**

The objective is robust but would be strengthened by making plainer the purpose of the example of *water harvesting*, which is to *use* the water so captured for the purposes of on-site benefits such as better plant growth, and off-site benefits such as reducing loads on drainage systems.

**Recommendation – Generation 1**

Amend PO to read “…water harvesting *and use*…”.

### RESIDENTIAL DEVELOPMENT - 3 BUILDING LEVELS OR LESS

**PO 21.1**

PO 21.1 is supported.

**Discussion**

Soft landscaping has the potential for a significant contribution to biodiversity outcomes and this should be made clear in this performance outcome, rather than coupling it with stormwater infiltration.
Soft landscaping incorporated into development to:
(a) minimise heat absorption and reflection;
(b) contribute shade and shelter;
(c) provide for stormwater infiltration and biodiversity; and
(d) enhance the appearance of land and streetscapes.

<table>
<thead>
<tr>
<th>Recommendation – Generation 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amend PO to read “…(c) provide for stormwater infiltration; (d) contribute to biodiversity; and …”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommendation – Generation 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explore mechanisms such that soft landscaping is utilised to discourage the prevalence of pests and/or known abundant species.</td>
</tr>
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</table>

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<thead>
<tr>
<th>RESIDENTIAL DEVELOPMENT - 3 BUILDING LEVELS OR LESS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PO 21.2</strong> Tree planting provided to:</td>
</tr>
<tr>
<td>(a) contribute shade and shelter;</td>
</tr>
<tr>
<td>(b) improve outlook for occupants of buildings;</td>
</tr>
<tr>
<td>(c) reduce the apparent mass of buildings;</td>
</tr>
<tr>
<td>(d) contribute to biodiversity;</td>
</tr>
<tr>
<td>(e) mitigate urban heat; and</td>
</tr>
<tr>
<td>(f) improve the amenity and character of streetscapes and contribute to attractive vistas.</td>
</tr>
</tbody>
</table>

| PO 21.2, DTS/DPF 21.2 are supported. |

<table>
<thead>
<tr>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees present excellent opportunities for passive watering with local rainfall run-off, with benefits for the trees themselves, local soil moisture conditions, and downstream environments that would otherwise have received the resulting stormwater.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommendation – Generation 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add a new dot point to the PO:</td>
</tr>
<tr>
<td>“(x) allow infiltration of rainfall run-off;”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommendation – Generation 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explore mechanisms such that tree-planting contributes to discouraging the prevalence of pests and/or known abundant species.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RESIDENTIAL DEVELOPMENT - 3 BUILDING LEVELS OR LESS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PO 22.1</strong> Residential development designed to capture and re-use stormwater to:</td>
</tr>
<tr>
<td>(a) maximise conservation of water resources;</td>
</tr>
<tr>
<td>(b) manage peak stormwater runoff flows and volume to ensure the carrying capacities of downstream systems are not overloaded; and</td>
</tr>
</tbody>
</table>

| PO 22.1, DTS/DPF 22.1 are supported. |

<table>
<thead>
<tr>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>As well as <em>quantity</em> and <em>quality</em>, the <em>timing</em> of flows is important in natural hydrological systems, and urban development typically introduces significant changes to the timing of flows, including the <em>seasonality</em> and <em>frequency</em> of flow events.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Recommendation – Generation 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amend a new dot point to the PO:</td>
</tr>
</tbody>
</table>
(c) manage stormwater runoff quality.

"(x) manage stormwater runoff frequency;"

Recommendation – Generation 2
Draw on the significant guidance for the implementation of water sensitive urban design available from Water Sensitive SA, South Australia’s water sensitive urban design capacity building program.

<table>
<thead>
<tr>
<th>RESIDENTIAL DEVELOPMENT - 3 BUILDING LEVELS OR LESS</th>
<th>PO 22.2, DTS 22.2 are supported.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PO 22.2</strong> Development creating 5-19 dwellings includes stormwater management systems that minimise the discharge of sediment, suspended solids, organic matter, nutrients, bacteria, litter and other contaminants to the stormwater system, watercourses or other water bodies.</td>
<td></td>
</tr>
</tbody>
</table>
| **DTS 22.2** Development creating 5-19 dwellings is accompanied by an approved Stormwater Management Plan that achieves the following stormwater runoff outcomes:
(a) 80 per cent reduction in average annual total suspended solids;
(b) 60 per cent reduction in average annual total phosphorus; and
(c) 45 per cent reduction in average annual total nitrogen. |

Discussion
Terminology: the term “approved Stormwater Management Plan” has particular significance under the Local Government Act, Schedule 1A, being a plan prepared in accordance with that Act that has been approved by the Stormwater Management Authority. An alternative term should be adopted throughout the Code.

Existing tools: the Water Sensitive SA InSite Water Tool has been developed to demonstrate compliance with selected stormwater management objectives, and an accompanying suite of resources has been developed to guide proponents in the application of water sensitive urban design.

Recommendation – Generation 1
Amend the DTS to read “…accompanied by a site stormwater management plan approved by the authority that achieves…”.

<table>
<thead>
<tr>
<th>RESIDENTIAL DEVELOPMENT - 3 BUILDING LEVELS OR LESS</th>
<th>PO 22.3, DTS 22.3 are supported.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PO 22.3</strong> Development creating 5-19 dwellings includes a stormwater management system designed to mitigate peak flows and manage the rate and</td>
<td></td>
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</tbody>
</table>

Discussion
The Water Sensitive SA InSite Water Tool has been developed to demonstrate compliance with selected stormwater management objectives, and an accompanying suite of resources has been developed to guide proponents in the application of water sensitive urban design.
duration of stormwater discharges from the site to ensure the carrying capacities of downstream systems are not overloaded.

**DTS 22.3**
Development creating 5-19 dwellings
(a) maintains:
  i. a pre-development peak flow rate from the site based upon a 0.35 runoff coefficient for the 5-year ARI (18.1% AEP) 30 minute storm; and
  ii. the stormwater runoff time to peak to match that of the pre-development condition; or
(b) capture and retain the difference in pre-development runoff volume (based upon a 0.35 runoff coefficient) vs post development runoff volume from the site for a 5-year ARI (18.1% AEP) 30 minute storm; and
(c) manage site generated stormwater runoff up to and including the 100-year ARI flood event (1% AEP) to avoid flooding of buildings.

**Recommendation – Generation 1**
Draw on the significant suite of tools and guidance for demonstrating compliance and implementing water sensitive urban design available from Water Sensitive SA, South Australia’s water sensitive urban design capacity building program.

**ALL NON-RESIDENTIAL DEVELOPMENT**

**PO 41.1**
Development likely to result in risk of export of sediment, suspended solids, organic matter, nutrients, oil and grease include stormwater management systems designed to minimise pollutants entering stormwater.

**DTS/DPF 41.1**
Development includes stormwater management systems designed to achieve the following gross pollutant outcomes:
(a) 80 per cent reduction in average annual total suspended solids;
(b) ...;
(c) ...;
(d) ...;
(e) ...;
(f) ...;
(g) ...;
(h) ...;
(i) ...;
(j) ...;
(k) ...;
(l) ...;
(m) ...;
(n) ...;
(o) ...;
(p) ...;
(q) ...;
(r) ...;
(s) ...;
(t) ...;
(u) ...;
(v) ...;
(w) ...;
(x) ...;
(y) ...;
(z) ...

**Recommendation – Generation 2**
Amend the DTS to read “…achieve the following gross pollutant outcomes….”.

**Discussion**
Terminology: in the DTS text, the term “gross pollutants” is used incorrectly when “pollutants” is clearly the intent.

Existing tools: the Water Sensitive SA InSite Water Tool has been developed to demonstrate compliance with selected stormwater management objectives, and an accompanying suite of resources has been developed to guide proponents in the application of water sensitive urban design.

**Recommendation – Generation 1**
Amend the DTS to read “…achieve the following gross pollutant outcomes….”.

**Recommendation – Generation 2**
(b) 60 per cent reduction in average annual total phosphorus;
(c) 45 per cent reduction in average annual total nitrogen;
(d) 90 per cent reduction of litter/gross pollutants compared to untreated stormwater runoff; and
(e) no visible oils/grease for flows up to the 1-in-3 month average return interval flood peak flow.

**ALL NON-RESIDENTIAL DEVELOPMENT**

**PO 41.2**
Water discharged from a development site to be of a physical, chemical and biological condition equivalent to or better than its pre-developed state.

Draw on the significant suite of tools and guidance for demonstrating compliance and implementing water sensitive urban design available from Water Sensitive SA, South Australia’s water sensitive urban design capacity building program.

PO 41.2 is supported.

**Discussion**
The Water Sensitive SA InSite Water Tool has been developed to demonstrate compliance with selected stormwater management objectives, and an accompanying suite of resources has been developed to guide proponents in the application of water sensitive urban design.

**Recommendation – Generation 1**
Draw on the significant suite of tools and guidance for demonstrating compliance and implementing water sensitive urban design available from Water Sensitive SA, South Australia’s water sensitive urban design capacity building program.

**ALL NON-RESIDENTIAL DEVELOPMENT**

**PO 41.3**
Development includes stormwater management systems to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure the carrying capacities of downstream systems are not overloaded.

DTS / DPF 41.3
Development includes stormwater management systems that:
(a) maintain a pre-development peak flow rate from the site, based upon a 0.35 runoff coefficient for the 20-year ARI (5% AEP) 30 minute storm,

PO 41.3, DTS/DPF 41.3 are supported.

**Discussion**
The Water Sensitive SA InSite Water Tool has been developed to demonstrate compliance with selected stormwater management objectives, and an accompanying suite of resources has been developed to guide proponents in the application of water sensitive urban design.

**Recommendation – Generation 1**
Draw on the significant suite of tools and guidance for demonstrating compliance and implementing water sensitive urban design available from Water Sensitive SA, South Australia’s water sensitive urban design capacity building program.
unless a lower performance measure is specified in an approved catchment based Stormwater Management Plan; (b) maintains the stormwater runoff time to peak to match that of the pre-development; and (c) manages up to and including the 100-year ARI flood event (1% AEP) to avoid flooding of buildings.

### Design in Rural Areas

<table>
<thead>
<tr>
<th>PO 3.1</th>
<th>PO 4.1</th>
<th>PO 4.2</th>
<th>PO 4.3</th>
<th>PO 5.1</th>
<th>PO 7.4</th>
<th>PO 7.5</th>
<th>PO 16.1</th>
<th>PO 16.2</th>
<th>PO 29.1</th>
<th>PO 29.2</th>
</tr>
</thead>
</table>
| The Board’s comments on these POs/DTSs/DPFs are the same as per the comparable POs/DTSs/DPFs under Design in Urban Areas.

### Housing Renewal

<table>
<thead>
<tr>
<th>PO 12.1</th>
<th>PO 13.1</th>
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</table>
| The Board’s comments on these POs/DTSs/DPFs are the same as per the comparable POs/DTSs/DPFs under Design in Urban Areas.

### Land Divisions in Urban Areas

**ALL LAND DIVISION**

<table>
<thead>
<tr>
<th>PO 3.6</th>
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</thead>
<tbody>
<tr>
<td>Road reserves accommodate stormwater drainage and public utilities.</td>
</tr>
</tbody>
</table>

**PO 3.6** is supported only with recommended amendment.

**Discussion**

The text of the PO includes the term “stormwater drainage” which serves to promulgate the historical single-objective management of stormwater as a waste product to be discharged without due regard for its potential beneficial uses or impacts on receiving environments. The Board strongly recommends that a more inclusive term
such as "stormwater management" be adopted to reflect the contemporary multi-objective approach to managing rainfall run-off that is necessary to ensure development can be undertaken sustainably.

**Recommendation – Generation 1**
Amend PO to read “…accommodate multi-objective stormwater management infrastructure and…”.

<table>
<thead>
<tr>
<th>ALL LAND DIVISION</th>
<th>PO 3.10</th>
<th>Public streets include tree planting to provide shade and enhance the amenity of streetscapes.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PO 3.10</td>
<td>PO 3.10 is supported.</td>
</tr>
<tr>
<td></td>
<td>PO 5.1</td>
<td>PO 5.2</td>
</tr>
<tr>
<td></td>
<td>PO 7.1</td>
<td>PO 7.2</td>
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<tr>
<td></td>
<td>PO 9.1</td>
<td>PO 9.2</td>
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<tr>
<td></td>
<td>PO 9.3</td>
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</table>

**Discussion**
Street trees offer significant opportunities for passive watering using rainfall run-off from road surfaces, with significant benefits for the trees themselves and downstream environments receiving road run-off. The City of Mitcham offers significant experience, amongst other local governments, in passive watering of street trees.

**Recommendation – Generation 1**
Amend PO to read “…include tree planting with integrated passive watering from road run-off where practicable to provide…”.

<table>
<thead>
<tr>
<th>PO 5.1</th>
<th>PO 5.2</th>
<th>PO 7.1</th>
<th>PO 9.1</th>
<th>PO 9.2</th>
<th>PO 9.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Board’s comments on these POs/DTSs/DPFs are the same as per the comparable POs/DTSs/DPFs under <em>Design in Urban Areas</em>.</td>
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<table>
<thead>
<tr>
<th>Land Division in Rural Areas</th>
<th>PO 3.6</th>
<th>PO 3.10</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Board’s comments on these POs are the same as per the comparable POs under <em>Land Division in Urban Areas</em>.</td>
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</table>

<table>
<thead>
<tr>
<th>PO 7.1</th>
<th>PO 7.2</th>
<th>PO 9.1</th>
<th>PO 9.2</th>
<th>PO 9.3</th>
</tr>
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<tbody>
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<tr>
<td>Open Space and Recreation</td>
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<tr>
<td><strong>New PO suggested</strong></td>
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</table>

**Discussion**

Trees and other vegetation are critical to open space and recreation facilities, and water is critical for maximising the health, resilience and functionality of trees and other vegetation. Open space and recreation facilities are therefore critical opportunities for the integration of water sensitive design especially where the passive watering of trees and other vegetation using site rainfall run-off can serve to increase vegetation health and/or reduce mains or bore water irrigation.

**Recommendation – Generation 1**

Insert a new PO:

"PO 8.4
Landscaping including large trees and other vegetation in open space and recreation facilities benefits from passive watering from the infiltration of site rainfall run-off."