



Planning controls for living
infrastructure and urban heat in the
community facility zone

Final Supplementary Report

Prepared for ACT Government Environment,
Planning and Sustainable Development
Directorate, Sustainability Policy Section

29 June 2022

This report has been prepared in collaboration by
Civille, Tait Network, Edge Environment and UNSW.



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Project name:

Planning controls for living infrastructure and urban heat in the community facility zone

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DOCUMENT HISTORY AND STATUS

Revision	Status	Date	Checked
A	Draft options report	3 May 2022	AMcA
B	Draft report	30 May 2022	AMcA
C	Final draft report	27 June 2022	AMcA
D	Final report	29 June 2022	AMcA

This report should be cited as:

McAuley A, Tait O, Kane L, Moleta J, Marchant J and Osmond P (2022) *Planning controls for living infrastructure and urban heat in the community facility zone*. Final Supplementary Report prepared for ACT Government Environment, Planning and Sustainable Development Directorate, Sustainability Policy Section, June 2022.

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EXECUTIVE SUMMARY

The Community Facility Zone includes important education, health, residential care and other community facilities where living infrastructure and mitigating the impacts of urban heat should be a high priority. These facilities provide critical services, cater to vulnerable community members and could take on critical roles during extreme weather.

Schools represent a significant proportion of the land use in the CFZ and the ACT’s specifications for public schools already address urban heat with specific requirements. There are also requirements covering vegetation and water. However, these specifications are only applicable to public schools.

Planning provisions for living infrastructure and urban heat would give these topics more prominence and ensure they are considered in all development in the CFZ.

This report (refer to Section 4) proposes a set of planning provisions relevant to development in the CFZ. These are

consistent with those in the main report, organised into provisions for living infrastructure, urban heat and water in the landscape. This report explains how these should be applied in the CFZ.

Some of the proposed planning provisions are performance-based, where design criteria are accompanied by a quantitative measure against which compliance should be assessed. The main performance-based measures are:

- Benchmarks for canopy cover and permeable surface area in all development types, summarised in the table below.
- A requirement for schools and child care facilities to provide certain shaded areas.
- Cool roof and cool paving requirements.

Further details on all the proposed new design criteria are included in the technical guidance document which is a separate report completed as part of this project.

Summary of the recommended canopy cover and permeable surface area benchmarks

Development type	Recommended approach	Sub-types	Block benchmarks		Surface open space/movement network benchmarks		Surface car park benchmarks	
			Canopy	Permeability	Canopy	Permeability	Canopy	Permeability
Schools	Block benchmarks that vary depending on the inclusion of an oval	With ovals	30%	45%	-	-	-	-
		Without ovals	30%	30%	-	-	-	-
Hospitals	Minimum benchmarks for carparks and open space/movement networks		-	-	35%	15%	30%	10%
Aged Care	Block benchmarks using a similar format to DV369, however more ambitious due to the high amounts of vulnerable people		35%	30%	-	-	-	-
Places of Worship and Other Community Services	Minimum benchmarks for carparks and open space/movement networks		-	-	35%	15%	30%	10%
Public Roads in the CFZ	Minimum canopy benchmark for all streets, minimum permeability benchmark based on classification. Subject to future project.		X%	X%				

1 INTRODUCTION

This report explores the options for planning controls to address living infrastructure and urban heat in the Community Facility Zone

ACT's Environment, Planning and Sustainable Development Directorate (EPSDD) is working on various actions in the Living Infrastructure Plan. This report is part of a project focused on planning controls for living infrastructure and urban heat in estates, commercial development and the community facility zone. This report is focused on the community facility zone.

This report should be read in conjunction with the Final Report "Planning controls for living infrastructure and urban heat in estates and commercial development" (McAuley et al 2022). The Final Report for estates and commercial development is the main project report, and includes substantial background information on the physical and policy context, policy and planning objectives.

This report is a supplement to the Final Report for estates and commercial development. It takes the same framework of policy and planning objectives and applies them to the Community Facility Zone. This report includes the following:

- Section 2 provides background information on the nature of existing development in the community facility zone, and relevant existing development codes.
- Section 3 looks at policy options in terms of existing and proposed examples around Australia.
- Section 4 recommends a set of planning provisions, including design criteria and quantitative measures, to relevant to the community facility zone.
- Section 5 presents a recommended set of canopy cover and permeable surface area benchmarks for various development types in the Community Facilities Zone.
- Section 6 summarises the recommended approach that ACT government can apply to the development of planning controls for living infrastructure and urban heat in the community facility zone.

2 BACKGROUND

Development in the community facility zone includes a wide range of facilities with different land uses.

2.1 DEVELOPMENT CONTEXT: COMMUNITY FACILITIES

The ACT's Community Facility Zone (CFZ) covers a wide range of development types, including:

- Educational facilities including child care centres and other educational establishments
- Community buildings including community activity centres, community theatres, cultural facilities, and places of worship
- Health facilities including hospitals, health hubs, drug and alcohol services, aged care and respite services, palliative care services and mental health services
- Recreational facilities including indoor and outdoor facilities and parkland
- Residential accommodation including residential care accommodation, retirement complexes, and supportive housing
- Offices of certain types
- Emergency facilities

In many of these settings, there are strong drivers to address urban heat and provide quality green infrastructure:

- Green infrastructure has health benefits (physical and mental health) which are highly relevant in health, residential care and educational settings.
- Community buildings, child care centres, health facilities and residential care facilities cater to vulnerable people. Older adults, young children and people with underlying health conditions are particularly vulnerable to heat stress.
- There is an opportunity for community facilities to demonstrate leadership and showcase good design.

Heat needs particular attention in the design of child care facilities, as infants are particularly vulnerable to heat stress. According to a review article in *The Lancet Planetary Health* (Helldén et al 2021), multiple studies have emphasised an increased overall mortality risk from heatwaves in children,

particularly infants. Also, emergency department visits by children in cities increase during heatwaves, especially among infants. The article notes that heatwaves increase negative health outcomes in the whole population and the evidence for children is not as strong as for infants, however a precautionary approach would suggest that children could be at higher risk than the general population. Therefore schools should also be designed to maintain comfortable conditions during heatwaves and hot weather.

In residential settings, particularly where residents are vulnerable, it is particularly important to keep residents safe from heat stress. While some buildings can be vacated during extreme heat, residential buildings provide a critical place of refuge from environmental stress. Health and residential care facilities need to be designed to maintain safe temperatures, even during heatwaves and blackouts (including when these occur together).

Some of the facilities in the CFZ are essential services (e.g. health and emergency services), which need to remain functional through heatwaves, providing safe and comfortable conditions for workers.

Community facilities can take on a critical role as places of refuge during natural disasters (McShane and Coffey 2022). This could include a role as cool refuges during extreme heat and heatwaves. When people can't stay comfortable in their homes, they might seek relief in community buildings and recreational facilities. Some people might seek out indoor malls, cinemas and entertainment venues, but ideally, cool refuges should include public places which are freely accessible and open day and night.

ANALYSIS OF EXISTING DEVELOPMENT

Using data available from ACT Government on canopy cover and pervious area, we have analysed how community facilities zoning compares with other land use zones within ACT (Figure 1). These values are comparing on block canopy and permeability percentages between zones. It can be seen

community facilities typically outperform other zones within ACT in these areas.

We gathered the community facilities asset data found on the ACT Government GeoHub as well as the block level canopy and permeability data that was provided. We then cross-referenced this data to understand which assets corresponded to particular blocks. This was used to understand how much area each typology contributed to the total community facilities area and allowed for comparison of each typology’s canopy and permeability performance currently within the ACT.

Figure 2 shows which development types cover the most area within community facilities zoning. Note that where a block

contains more than one development type the data was moved to the asset with the highest site coverage. Where no development type data was available the block was excluded from the dataset.

Figure 2 shows that schools make up 61% of the investigation area. This suggests that schools are particularly significant to community facilities zoning and should be investigated in more detail going forward.

Figure 3 compares how different development types currently perform in terms of total canopy coverage and permeability. This will become relevant when creating achievable benchmarks going forward.

Canopy and Permeability% by Land Use Zone

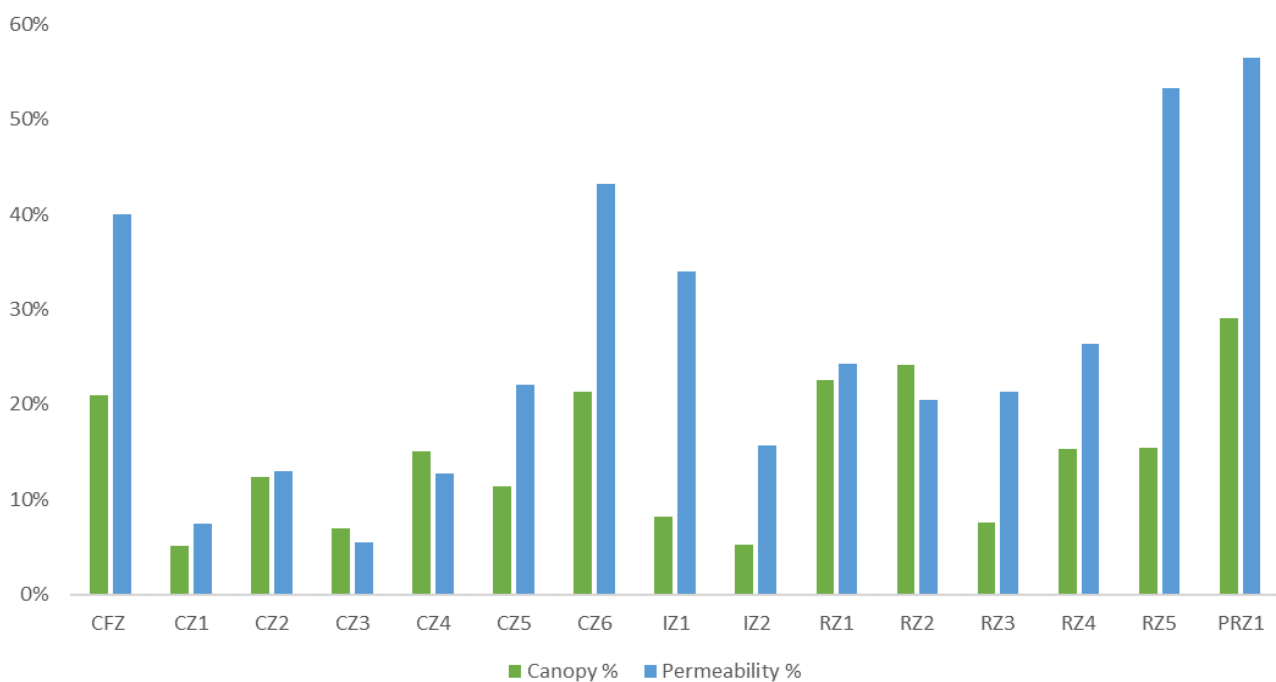


Figure 1: Canopy cover and pervious area by Land Use Zone

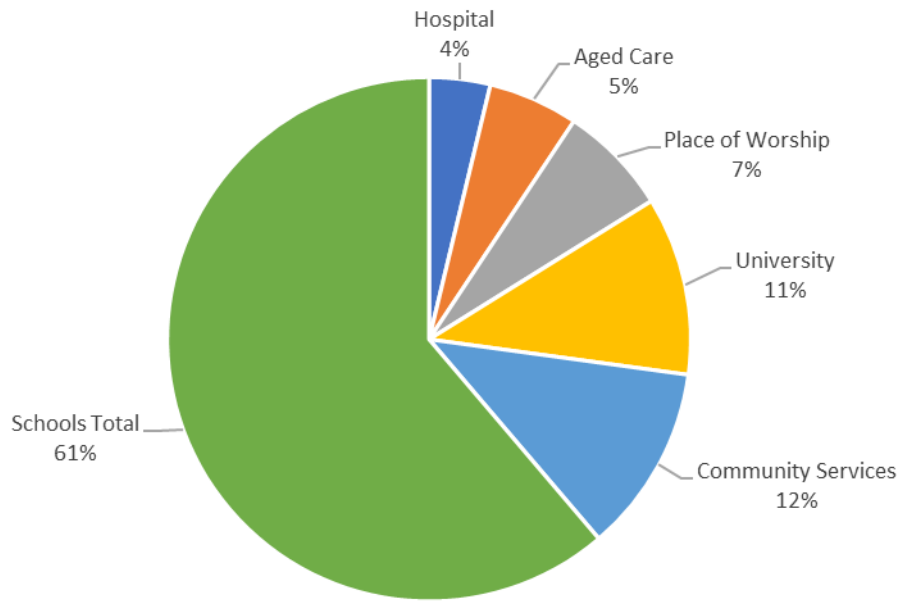


Figure 2: Area breakup of community facilities zoned blocks by development types, note: "Community Services" field includes childcare, indoor sports, skate parks, arts/cultural, basketball courts, libraries, aquatic facilities, supportive housing and health hubs

Typologies Within Community Facilities

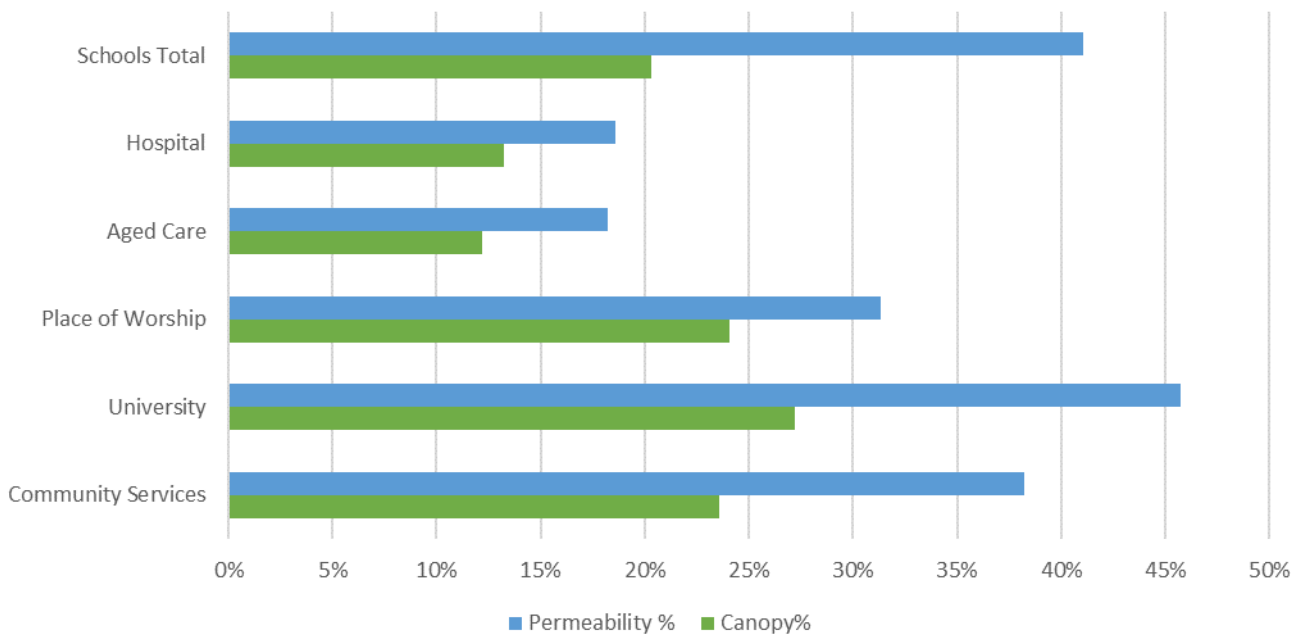


Figure 3: Canopy cover and permeability by development type

2.2 POLICY CONTEXT: COMMUNITY FACILITY ZONE DEVELOPMENT CODE

The CFZ Development Code includes some basic tree protection provisions, which refer the development to the Conservator of Flora and Fauna if it has a potential impact on a protected tree.

It also includes some WSUD requirements, however these do not include stormwater retention. There is a rule requiring storage of stormwater (at least 1.4 kL per 100 m² of impervious area) but this can then be released over a period of 1-3 days, there is nothing to encourage on-site retention for infiltration or reuse.

There is a single setback rule: minimum setback of buildings to boundaries of blocks in a residential zone is 6m.

There are no specific landscape requirements in the CFZ Code.

In addition to the CFZ Code, residential care accommodation, retirement villages and supportive housing in the CFZ also need to comply with the Single Dwelling Housing Development Code and the Multi Unit Housing Development Code (whichever is applicable).

DETAILED SPECIFICATIONS

Note that some of the development types in the CFZ would need to comply with more specific requirements, for example there are detailed specifications for public schools (ACT Education Directorate 2021). These include requirements that are relevant to living infrastructure and urban heat. Box 1 summarises the relevant requirements in the latest version of the Education Directorate's Infrastructure Specification (EDIS) Part C – Master Planning and Architecture Specification.

Note that Part D – Technical Specification is currently under review and will include more detailed and specific requirements to address the heat island effect.

Relevant requirements in EDIS Part C: Master Planning and Architecture Specification

Section 3.5 Ecologically Sustainable Design (ESD) states that "The Contractor must incorporate ESD principles into the design, construction and operation of the Facilities". The ESD principles include the following two related to urban heat:

"Climate Resilience – building design is to consider the risks presented by the likely increase in extreme temperatures and weather events such as fires, drought and storm events resulting from Climate Change. Considerations include but are not limited to, passive design, air tightness/fresh air modulation, insulation and stormwater capacity."

"Landscape Climate Resilience and Adaptation – landscape design is to consider the risks of a changing climate and opportunities for the landscape and external environments to contribute to the safety, liveability, amenity, and resilience of the whole site. Resilient landscape will integrate water sensitive urban design, natural canopy cover and permeability targets, and plant species selection to create landscapes that provide coolth and minimise urban heat generation."

Section 5 External Environments includes several requirements that must be integrated into the design of external environments, including:

"Integrate the 30 percent canopy cover and 30 percent permeable surface targets of the Canberra Living Infrastructure Plan. It is noted that some sites will have exclusion zones that may constrain the ability to meet the targets."

"Provide shelter from the prevailing winds and weather during the different seasons to extend the range of days during which the external spaces are comfortable."

Section 5.3 Shade Areas includes a requirement to provide shade to outdoor areas:

"The Contractor's design must support the School's capacity to seek SunSmart status, particularly by the provision of built and natural shade. (Refer EDIS Part D - Technical Specification for requirements). The Contractor must provide areas of built shade and natural shade accessible to all students and staff and ensure that where outdoor play areas are provided for Pre-School or students with additional needs, that those areas are also provided with suitable playground shade."

There are also various other shading strategies to be considered in the school's design, including the following:

- **3.5.1:** External shading of east-facing, west-facing and north-facing windows. Shading can consist of fixed or operable shade structures or living infrastructure features, for example external tree planting or vegetated pergolas
- **5.1:** Deciduous trees to be planted to provide shade to building walls (prioritising north and west facing walls) and external areas to aid in providing thermal comfort in summer while maximising natural light into internal building spaces in winter
- **5.2.1:** For all external public spaces, consideration must be given to temperature control through wind protection, cross-ventilation, the capture of sunlight during cooler months, shading during warmer months.

Box 1: Relevant requirements in ACT Education Directorate (2021), Part C

3 OPTIONS FOR PLANNING PROVISIONS

An exploration of requirements in place in other jurisdictions suggests how ACT might align with existing approaches and requirements in place elsewhere.

Two types of approaches are identified in the following two sections:

- Relatively few jurisdictions are (yet) applying broad planning provisions for living infrastructure and urban heat, however Penrith City Council is one exception where provisions are in draft.
- In NSW and Victoria, several types of community facilities (including educational, health and residential aged care facilities) are covered by detailed design guidelines.

The former (broadly applicable planning provisions) is the preferred approach in ACT, to set strong, clear and consistent requirements across a broad range of development types. By including requirements in the planning system, they are prominent and enforceable.

Design guidance allows more nuanced approaches to different development types to be captured in detail. For example, ACT has done this with their public school specifications mentioned in Section 2.2 (ACT Education Directorate 2021). Some jurisdictions have published design guidance for other development types such as child care centres and residential aged care, however ACT is a small jurisdiction and it would not be realistic for ACT to create a full set of equivalent guidelines of their own. These examples are included because they illustrate how others are addressing urban heat in similar types of development.

3.1 PLANNING PROVISIONS FOR ALL DEVELOPMENT TYPES

Around Australia, existing planning provisions for community facilities tend to be similar to Canberra's CFZ Development Code – they provide fairly brief, basic requirements but nothing specifically addressing living infrastructure or urban heat objectives.

One way heat could be addressed is to have a set of urban heat provisions that apply to all development types, similar to the way

the ACT's WSUD Code works at present. This is what has been proposed by Penrith Council in a proposed amendment to their DCP, with an urban heat chapter that applies to most zones (only excluding waterways, conservation and rural zones). Penrith's proposed provisions were discussed in the main report.

3.2 DESIGN GUIDELINES FOR SPECIFIC DEVELOPMENT TYPES

For several of the development types in the CFZ, what exists elsewhere are specific guidelines and standards, which go beyond the requirements of general planning provisions. For example, education, health and residential care facilities are often covered by detailed guidelines.

Some of these existing guidelines and standards specifically address living infrastructure and urban heat (or at least shade and thermal comfort). Several examples are outlined below. Victoria and NSW have the most up-to-date and comprehensive requirements.

EDUCATIONAL FACILITIES

The NSW Government Architect (2018) has published a guideline for "Environmental design in schools", which includes basic guidelines for passive design, biophilic design and sustainable design. There are some high-level principles in here which touch on urban heat and the benefits of green infrastructure, however there is very little detail.

NSW also has a detailed "Design Guide" for educational facilities (NSW Department of Education and Training, n.d.) This includes a substantial set of design objectives and strategies relating to:

- Shade (section 90.05.03) – including some measurable benchmarks (e.g., "at least 50% of seating is shaded by trees or building elements")
- Thermal comfort (section 90.07)
- Water sensitive urban design (section 90.07)

- Cool roofs (section 27.12) including a clear requirement specifying minimum Solar Reflectance Index (SRI) values

The Victorian School Building Authority (2021) also provides a prescriptive set of design requirements for schools. These include a specific section addressing the heat island effect (p.31), which is shown in Box 2.

There is also a substantial set of design criteria related to shade (section 5.1.4, p.53). These do not include a minimum shaded area but are quite clear that shade should be designed to “offer the greatest protection during peak UV radiation times” and “cover the play equipment area for all facilities”.

Building orientation is covered in a specific section (3.5.4) and avoiding overheating is among the design considerations, connected with windows and skylights.

HEAT ISLAND EFFECT REDUCTION

To reduce ‘heat island effect’, at least 75% of the whole site area **should** comprise one or a combination of the following, when assessed in plain view:

- vegetation
- roofing materials, including shading structures
- unshaded hard-scaping elements with a three-year SRI of minimum 34 or an initial SRI of minimum 39
- hardscaping elements shaded by overhanging vegetation or roof structures, including solar hot water panels
- water bodies and/or water courses
- areas directly to the south of vertical building elements, including areas shaded by these elements at the summer solstice.

For roofing materials and shade structures:

- roofs pitched $<15^\circ$ require a three-year Solar Reflectance Index (SRI) of minimum 64
- roofs pitched $>15^\circ$ require a three-year SRI of minimum 34.

Only where the three-year SRI for products is not available, use the following:

- roofs pitched $<15^\circ$ — an initial SRI of minimum 82
- For roof pitched $>15^\circ$ — an initial SRI of minimum 39.

Box 2: heat island effect requirements in the Victorian School Building Authority (2021) quality standards

Thermal comfort has a few mentions in connection with heating, natural ventilation, and energy efficiency, but is not mentioned in connection with extreme heat or the section on heat island effect.

The NSW Planning and Environment (2017) “Child Care Planning Guideline” briefly mentions thermal comfort and passive thermal design, and includes a whole section on shade, with design guidance for solar access, built shade and natural shade. It recommends “shade in the form of trees or built shade structures giving protection from ultraviolet radiation to at least 30 per cent of the outdoor play area” (p.36). There is a requirement to provide shade in the Education and Care Services National Regulations, which is a strong driver to consider shade in design.

Victoria’s child care design guidelines are older (Victorian Department of Human Services, 2005) and also cover thermal comfort and shade, but in less detail.

HEALTH FACILITIES

The Victorian Health Building Authority (2021) has published “Guidelines for sustainability in health care capital works”, which cover urban heat with some specific details. There are also some principles relating to ecology and landscape design, but these are high level only.

To address rising temperatures and extreme heat, the following design criteria are suggested:

- Orient building for passive design
- Provide for natural shade through landscape design
- Use light colour materials and heat reflective coatings
- Select roof, wall and floor materials for increased durability and water resistance
- Improve building insulation and design out thermal bridging
- Include high performance glazing
- Increase passive or natural ventilation where possible
- Include fixed external shading and internal blinds
- External materials designed to be touched have low conductivity such as wood or recycled plastic (such that they are not extremely hot after prolonged sun exposure)
- Increase efficiency or capacity of HVAC systems, demand control ventilation per AS1668.2
- Include strategies to reduce operational energy

The guideline also asks, “For sites and/or buildings with a significant climate risk, [prepare] a draft Climate Adaptation Plan in line with the requirements of Green Star Communities Credit 04: Adaptation and Resilience” (Victorian Health Building Authority, 2021, p.14).

RESIDENTIAL CARE ACCOMMODATION

The Australian Government is developing aged care design standards. A 2021 discussion paper briefly covers ‘safer design

standards', and this includes some discussion of indoor thermal comfort. It mentions that "Recent studies have shown that the temperature or air quality of aged care homes could be improved to enhance the comfort and health of aged care residents" (Australian Government Department of Health 2021, p.13).

The Victorian Government has recently published an interim guideline "Public Sector Residential Aged Care Services [Interim]

Facility design guidelines" (Victorian Health and Human Services Building Authority 2020). This includes some landscape design guidance and refers to the Victorian Health Building Authority (2021) for environmental design guidance, however the only mention of designing for heat is in relation to disaster preparedness.

4 PROPOSED PLANNING PROVISIONS

As recommended for estates and commercial development, a framework of design criteria and measures are recommended for the CFZ.

4.1 DESIGN CRITERIA

This section recommends a set of design criteria and measures which address objectives for enhancing living infrastructure, reducing urban heat, and retaining water in the landscape. Refer to the main report for an explanation of the thinking behind the objectives.

The design criteria are intended for consideration for incorporation into the Territory Plan as development controls. Higher-level goals and objectives (from the main report, and included below to provide a structure within which the design criteria are organised) are potentially useful for incorporation into the Territory Plan as high-level policy objectives, however these are not intended as development controls.

These design criteria and measures are organised into three groups:

1. Living infrastructure (Table 1)
2. Urban heat (Table 2)
3. Water in the landscape (Table 3)

These reflect the three groups of goals shown in Figure 4. Within each of these groups, design criteria are organised to align with the numbered goals listed in Figure 4.

Design criteria are further organised into existing rules, performance-based criteria and principles for consideration. Where a criterion is performance-based, then a quantifiable benchmark is recommended against which performance can be measured. These benchmarks are not intended to be mandatory,

as flexibility will be required for sites that cannot achieve them. For example, at some sites, it may not be possible to achieve tree canopy benchmarks due to constraints such as biodiversity, bushfire protection or contamination that limit tree planting. In these cases, alternative measures should be proposed to meet the same objectives.

Note that there is also a third type of design criteria, which is covered by existing rules. These are included for a complete picture of all the relevant planning provisions related to each objective.

The final column of each table include key points about how each criterion is to be applied, and refers to further information available in the separate technical guidance document.

Figure 5 illustrates the structure of the provisions. This format, organised into design criteria supported by quantifiable measures where appropriate, and more detailed technical guidance material provided separately, is intended to suit the ACT Government's current Planning System Review and Reform Project, however drafting and format will need to be adapted by the ACT Government prior to adoption.

Two key new measures recommended in this report are canopy and permeability benchmarks for different parts of development. These are explored further in Section 5.

Other new measures recommended include cool roofs, cool paving and cool façades. These are defined in the technical guidance.

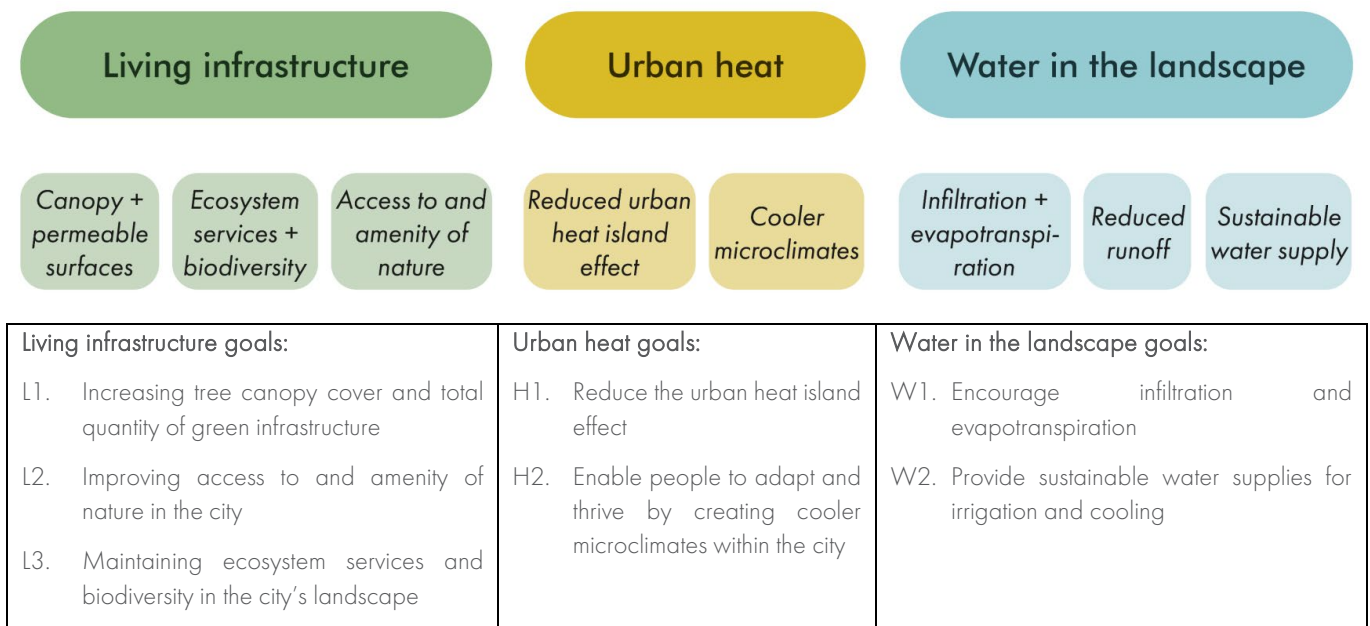


Figure 4: Framework of high-level goals from the main report

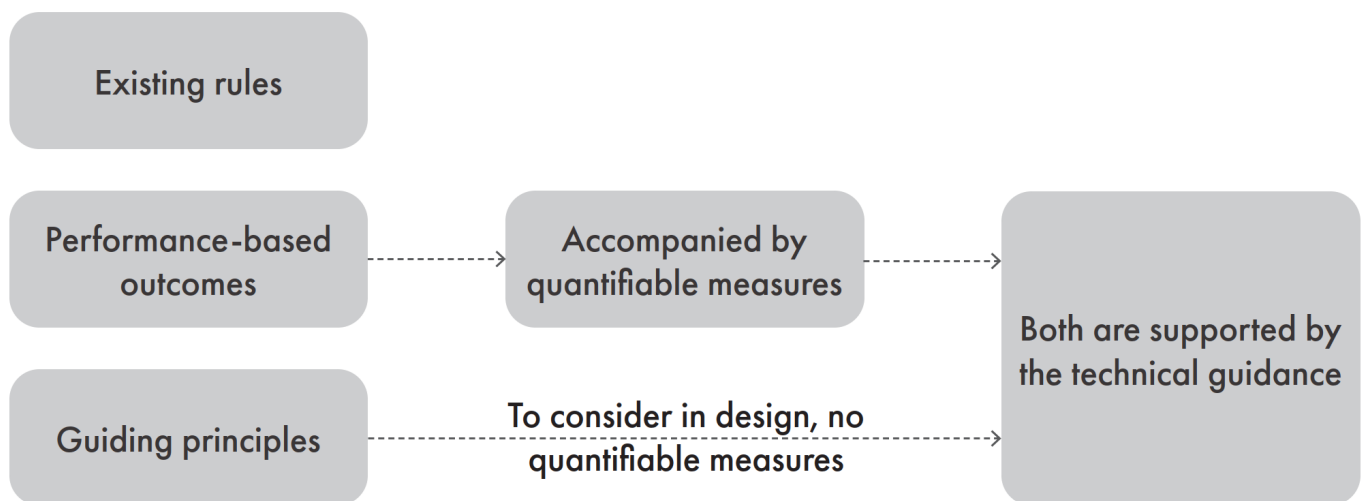


Figure 5: Types of design criteria included in the proposed planning provisions

Table 1: Living infrastructure design criteria relevant to the community facility zone

Objectives relevant to development in the CFZ	Design criteria	Where applicable	Type of criteria	Benchmarks against which performance-based criteria should be measured	Notes and further information
L1.1 Contribute to the ACT's tree canopy cover target of 30% by 2045	Include sufficient trees in the development to meet the relevant canopy cover benchmark for the development type when trees reach maturity.	Any development on CFZ blocks (refer to notes in Section 4.2 below)	Performance-based outcome	Canopy benchmarks for community facility zone development – refer to Section 4.2	Estimate future canopy cover using the tree dimensions given in R39 in DV369. Refer to Technical Guidance Section 2.2 for further information.
	Protect existing high value trees	Anywhere existing vegetation is present	Existing/revised legislation	The <i>Tree Protection Act 2005</i> includes relevant requirements.	Note that this legislation is under review as part of a separate project.
	Plant trees into sufficient soil volume and soil quality for good growth and long-term health, including soils of sufficient depth and room for roots to spread laterally. Where there are constraints: <ul style="list-style-type: none"> Consider providing extended soil zones under paved areas to enable larger trees On structures, consider large planter beds sufficient to support trees 	Anywhere new trees are planted to meet canopy benchmarks	Performance-based outcome	Soil volume requirements as per R39 in DV369.	Refer to Technical Guidance Section 2.4 for further information.
	Place trees where they can grow to a large size while minimising conflict with other infrastructure, both underground and overhead.	Anywhere new trees are planted	Guiding principle		
	In general, select tree species which will provide dense, contiguous summer canopy coverage. In selecting trees, also consider: <ul style="list-style-type: none"> Retaining existing trees that provide immediate canopy cover Planting some fast-growing species and advanced stock to provide greater canopy cover sooner Planting some species which may be slower growing but will provide greater canopy cover in the long term. 	Anywhere new trees are planted	Guiding principle		Refer to the Technical Guidance Section 2.5 for further information.

Objectives relevant to development in the CFZ	Design criteria	Where applicable	Type of criteria	Benchmarks against which performance-based criteria should be measured	Notes and further information
L1.2 Maximise total green cover and vegetation density in the urban environment.	<p>Maximise <i>planted area</i>. Aim to meet as much as possible of the relevant <i>permeable area</i> benchmark for the development type with planted area.</p> <p>Where opportunities for planted area are limited, permeable paving</p> <p>The remainder can be made up of permeable paving.</p>	Any development on CFZ blocks (refer to notes in Section 4.2 below)	Performance-based outcome	Permeable area benchmarks for different development types – refer to Section 5	<p>Refer to the Technical Guidance Section 2.3 for further information.</p> <p>As noted in the proposed definition in the main report, all planted areas should be counted in the total permeable area, even when the vegetation density and soil volume are relatively low – i.e. shallow planter beds on structures should be counted in the total permeable area.</p>
	<p>Maximise vegetation cover by considering every possible opportunity to provide planted areas, including:</p> <ul style="list-style-type: none"> • Planter beds on structures • Green roofs <p>However, also consider maintenance of planted areas to ensure their long-term sustainability. Design for simpler maintenance and avoid features unlikely to be maintained.</p>	Any development on CFZ blocks	Guiding principle		Refer to the Technical Guidance Section 2.3 for further information.
	Maximise vegetation density by prioritising planting where there is access to sufficient soil volume, soil quality and water to support dense growth of trees, shrubs and understorey vegetation.	Anywhere new vegetation is planted	Guiding principle		
L2.1 Provide green infrastructure where it is easily accessible to people in their everyday activities.	<p>Prioritise canopy cover and other planting in places where people are more likely to be present – for example, around play areas, picnic areas, seating, amenities, along paths.</p> <p>Where space is limited, consider features such as green walls and planter boxes to increase access to green infrastructure.</p>	Any development on CFZ blocks	Guiding principle		
L2.2 Improve equity of access to green infrastructure by considering the needs, values, motivations, uses, and barriers to	Design green infrastructure that is accessible and appealing to the specific residents, visitors and user groups expected to inhabit the site, including people with limited mobility and other special needs.	Any development on CFZ blocks	Guiding principle		Consider detailed guidance for specific facility types, available from other jurisdictions beyond ACT – refer to Section 3.2

Objectives relevant to development in the CFZ	Design criteria	Where applicable	Type of criteria	Benchmarks against which performance-based criteria should be measured	Notes and further information
engagement with various cultures and user groups.	<p>In the CFZ, consider the groups who will use these facilities and their specific needs and preferences. For some people, community facilities will provide the main opportunity in their daily lives to access green infrastructure. This is likely to be true of places where people spend a lot of time, particularly people with limited mobility, including:</p> <ul style="list-style-type: none"> Residential aged care Hospitals and other health care settings where people may spend periods in residence Child care centres and schools, where children attend for long hours (some schools may also include boarding facilities) 				
L2.3 Provide quality green infrastructure that encourages positive engagement with nature in the urban environment.	<p>Development in the CFZ includes facilities which have a role to play in providing opportunities for engagement with nature. Consider the following:</p> <ul style="list-style-type: none"> In schools and child care centres: outdoor learning environments and nature play areas In residential aged care and health facilities: sensory gardens Where there is interest in active involvement: community gardens 	Any development on CFZ blocks	Guiding principle		<p>Consider detailed guidance for specific facility types, available from other jurisdictions beyond ACT – refer to Section 3.2.</p> <p>Consider the ACT's 'Guide to Community Gardens in the ACT' (ACT Government 2016).</p>
L3.1 Plant a diverse range of locally native species, considering species likely to thrive in a changing climate.	Select species likely to thrive in the local site context (e.g., soil conditions, moisture, solar exposure, frost exposure, room for roots and canopy to spread). For trees and other vegetation expected to have a long lifespan, select species that are tolerant of heat and other stresses.	Anywhere new trees or other vegetation is planted	Guiding principle		Refer to the Technical Guidance Section 2.5 for further information.
L3.2 Create habitat for a range of locally native wildlife	Protect existing high value vegetation	Anywhere existing vegetation is present	Existing/revised legislation	The <i>Tree Protection Act 2005</i> and the <i>Nature Conservation Act 2014</i>	Note that tree protection legislation is under review as part of a separate project.

Objectives relevant to development in the CFZ	Design criteria	Where applicable	Type of criteria	Benchmarks against which performance-based criteria should be measured	Notes and further information
	Wherever possible, include shrubs and understory planting to support trees and to cover areas where trees can't be provided.	Anywhere new trees or other vegetation is planted	Guiding principle	include relevant requirements.	Refer to the Technical Guidance Section 2.3 for further information.
L3.3 Link blue and green infrastructure.	<p>Where stormwater treatment is required, use vegetated stormwater treatment systems that combine the benefits of stormwater treatment with green infrastructure and water in the landscape.</p> <p>Smaller developments that do not trigger the WSUD Code requirements should still consider where they can use vegetation that would filter stormwater and reduce pollutant loads.</p>	Any development that triggers WSUD Code requirements	Existing rule + guidelines on how to meet it.	WSUD Code Rule R6	ACT Practice Guidelines for Water Sensitive Urban Design.

Table 2: Urban heat design criteria relevant to the community facility zone

Objectives relevant to development in the CFZ	Design criteria	Where applicable	Type of criteria	Benchmarks against which performance-based criteria should be measured	Notes and further information
H1.1 Across the urban area as a whole, maximise green cover and minimise impervious areas.	Refer to: L1.2 Maximise total green cover and vegetation density in the urban environment. W1.1 Contribute to the ACT's permeable surfaces target of 30% by 2045.				
H1.2 Where hard surfaces are required (e.g. roofs and paved areas), use 'cool materials' which reduce heat absorption.	Where paving is required and particularly where it cannot be shaded, use <i>cool paving</i>	Any development on CFZ blocks	Performance-based outcome	At least 75% of paved surfaces should be <i>cool paving</i>	Refer to the technical guidance for a definition of cool paving
	Provide <i>cool roofs</i> to all buildings	Any development on CFZ blocks	Performance-based outcome	At least 75% of the roof area is to meet nominated Solar Reflectance Index (SRI) values	Refer to the technical guidance for SRI values
	Consider light coloured materials for walls/vertical surfaces. However, also consider their potential negative effects and preferably use light coloured materials only where heat can be absorbed by surrounding vegetation	Any development on CFZ blocks	Guiding principle		Refer to the technical guidance for more information.
H1.3 Where green cover is provided, maximise its cooling effect by maximising soil volume, maximising vegetation density, and ensuring that vegetation has access to water.	Refer to: L1.2 Maximise total green cover and vegetation density in the urban environment.				
	Where practical, provide an irrigation system. However, note that irrigation systems require a long-term investment in operation and maintenance therefore are not suitable everywhere.	Anywhere new vegetation is planted	Guiding principle		
	Design for passive irrigation, where runoff from hard surfaces is directed into vegetated areas and allowed to soak into soils.	Anywhere new vegetation is planted	Guiding principle		Refer to the Technical Guidance Section 4.1 for more information.

Objectives relevant to development in the CFZ	Design criteria	Where applicable	Type of criteria	Benchmarks against which performance-based criteria should be measured	Notes and further information
H2.1 Orient site features to minimise exposure to hot summer sun, buffer exposure to hot winds and maximise access to cooling breezes.	Prioritise canopy trees and shade structures on the northern and western sides of buildings.	Any development on CFZ blocks	Guiding principle		Refer to the Technical Guidance Section 3.2 for more information.
	Orient site features to make the most of cool easterly evening breezes, to help remove stagnant, heated air.	Any development on CFZ blocks	Guiding principle		
	Block or redirect hot summer winds using vegetation and/or built form features such as fences and walls.	Any development on CFZ blocks	Guiding principle		
	Where space allows, buffer hot westerly/north-westerly winds with urban forest and/or waterbodies (e.g., ponds or wetlands) on the upwind side of the site to reduce local air temperatures.	Any development on CFZ blocks	Guiding principle		Refer to the Technical Guidance Section 3.3 for more information.
H2.2 Maximise shade, particularly where people are likely to be active in hot weather.	Provide summer shade over features such as play areas, seating areas, and other outdoor spaces people will actively use. provide adequate solar access to ensure comfort in winter.	Any development on CFZ blocks	Performance-based outcome for child care facilities and schools Guiding principle elsewhere	Child care facilities and schools should include at least one play area and one covered outdoor learning area that is fully shaded in summer.	Refer to the Technical Guidance Section 3.4 for more information. Also consider detailed guidance for child care facilities and schools available from other jurisdictions beyond ACT – refer to Section 3.2
	Where facilities cater to those more vulnerable to heat stress (i.e. older adults and infants), also consider providing shade to areas such as: <ul style="list-style-type: none"> • Accessible car parking spaces • Main/accessible building entrance • Walkway between parking area and building entrance 	Any development on CFZ blocks	Guiding principle		Refer to the Technical Guidance Section 3.4 for more information.
	In general, prioritise shade over hard surfaces, to reduce their heating effect.	Any development on CFZ blocks	Guiding principle		
	Integrate structures into building design to shade north and west facing walls	Any development on CFZ blocks	Guiding principle		Refer to the Technical Guidance Section 3.6 for more information.

Objectives relevant to development in the CFZ	Design criteria	Where applicable	Type of criteria	Benchmarks against which performance-based criteria should be measured	Notes and further information
	Provide shade over reflective façades	Any development on CFZ blocks	Performance-based outcome	Reflective façades need to meet a cool façade standard	Refer to the Technical Guidance Section 3.6 for more information. Note that this is expected to apply to relatively few cases in the CFZ.
H2.3 Use water in the landscape to provide evaporative cooling.	<p>Create outdoor ‘cool zones’, which provides an opportunity to access the outdoors during hot weather while avoiding heat stress. A cool zone should include:</p> <ul style="list-style-type: none"> • Orientation for protection from hot winds and access to cool breezes • Comprehensive shade cover in summer. • At least one water feature where people can get close to the water, preferably including some water movement. 	Any development on CFZ blocks	<p>Performance-based outcome for residential aged care</p> <p>Guiding principle elsewhere</p>	Residential aged care facilities should include at least one outdoor cool zone, located in a common area accessible to all.	<p>Cool zones should be considered for other development types, particularly where vulnerable people may have few other options to access the outdoors.</p> <p>Refer to the Technical Guidance Section 3.8 for more information.</p>
	Consider fountains, water play features and/or misters to provide active cooling in cool zones. However, active water features require a long-term investment in operation and maintenance, therefore are not suitable everywhere.	Any development on CFZ blocks	Guiding principle		Refer to the Technical Guidance Section 4.3 for more information.

Table 3: Water in the landscape design criteria relevant to the community facility zone

Objectives relevant to development in the CFZ	Design criteria	Where applicable	Type of criteria	Benchmarks against which performance-based criteria should be measured	Notes and further information
W1.1 Contribute to the ACT's permeable surfaces target of 30% by 2045.	Include sufficient <i>permeable area</i> to meet the relevant <i>permeable area</i> benchmark for the development type.	Any development on CFZ blocks (refer to notes in Section 4.2 below)	Performance-based outcome	Permeable area benchmarks for community facility zone development – refer to Section 4.2	Permeable area can include planted area and permeable paving. Refer to the Technical Guidance Section 2.5 for more information.
	Planted areas are the preferred type of permeable area, as plants naturally maintain the permeability of soils. Wherever possible, maximise planting density, as planting density is generally correlated with greater capacity to intercept rainfall and reduce runoff.	Anywhere a permeable area benchmark applies	Guiding principle		
	Permeable paving can be used to contribute to the total permeable surface area. Where permeable paving is proposed, there needs to be a viable plan for its long-term maintenance, to ensure that its permeability can be maintained.	Anywhere a permeable area benchmark applies	Guiding principle		Refer to the Technical Guidance Section 4.1 for more information.
W1.2 Minimise 'directly connected' impervious areas by directing runoff from hard surfaces into planted areas, where it can soak into soils.	Wherever possible, provide a vegetated buffer between impervious areas and drainage systems, so that runoff has an opportunity to soak into soils before overflowing into the drainage system. <ul style="list-style-type: none"> For small impervious areas (e.g. paths), this could simply involve directing runoff into adjacent planted areas For larger impervious areas, use a buffer strip, swale, or rain garden. 	Any development on CFZ blocks	Guiding principle		Refer to the Technical Guidance Section 4.1 for more information.
	Improve infiltration with soil improvements, deep rooted plants and capacity for water detention.	Anywhere new vegetation is planted	Guiding principle		Refer to the Technical Guidance Section 4.1 for more information.

Objectives relevant to development in the CFZ	Design criteria	Where applicable	Type of criteria	Benchmarks against which performance-based criteria should be measured	Notes and further information
	In urban environments, there is a need to address the potential negative impacts of infiltration on surrounding infrastructure. Allow a sufficient buffer or use a physical barrier between infiltration zones and underground structures.	Anywhere passive irrigation or infiltration is proposed	Guiding principle		Refer to the Technical Guidance Section 4.1 for more information.
W1.3 Retain water in features like ponds and wetlands, from where it can evaporate.	Consider WSUD features such as ponds and wetlands, which retain water for evaporation. Size these features appropriately for the site, considering how much water will be captured from the catchment area, how much will be lost to evaporation, and the potential to provide top up from a sustainable water supply.	Large CFZ blocks with sufficient open space for ponds or wetlands	Guiding principle		Not all stormwater treatment systems retain water. Refer to ACT Practice Guidelines for Water Sensitive Urban Design for more information.
W2.1 Capture rainwater or treated stormwater and store for reuse, to enable flexible, unrestricted water use for irrigation and cooling purposes.	Harvest either rainwater or treated stormwater for reuse.	Any development which triggers the existing WSUD Code	Existing rules	Existing requirements for stormwater retention in the WSUD Code (Rule R2).	ACT Practice Guidelines for Water Sensitive Urban Design
	Connect rainwater/treated stormwater to irrigation systems, to top up water features and other outdoor water use.	Any development on CFZ blocks	Guiding principle		Refer to the Technical Guidance Section 4.2 for more information.

4.2 APPLYING THE PROVISIONS

Most of the planning provisions in Table 1, Table 2 and Table 3 could be applied to a wide range of different developments in the CFZ. However, there will be some small-scale developments (e.g. alterations and additions, development applications for signage or only for change of use) where it does not make sense to apply the provisions.

Table 4 recommends specific situations when and how proposed planning provisions should apply. Note that existing rules mentioned in the tables above (e.g. WSUD Code rules) already have defined thresholds where they apply, and no changes to these are recommended.

Note that where performance-based outcomes are recommended, it is intended that the quantitative benchmarks

define one way to meet the performance outcome, without precluding alternative options. At some sites, the ‘benchmark solution’ may not be feasible due to site-specific constraints (e.g., biodiversity, bushfire protection or contamination that limits tree planting).

If a development will deviate from the benchmarks, then evidence should be provided how it will meet the intent of the objectives. It will be up to each developer to demonstrate how their proposed approach would achieve equivalent outcomes. Currently, available guidance and tools provide relatively little information to support the assessment of alternative approaches – this is a future need that is discussed in more detail in the main report (Section 9).

Table 4: Development to which proposed planning provisions should apply

Development types to which provisions should apply	Applicable planning provisions	Specific situations when and how provisions should apply
Development on CFZ blocks	Canopy and permeable area benchmarks and soil volume requirements	When development includes building/landscaping works which will change the site’s canopy cover and/or permeability: <ul style="list-style-type: none"> • If the new development maintains block-level canopy and permeability at or above the relevant benchmarks, then it should be considered to comply with the benchmarks. • If the new development would reduce the block-level canopy area or permeable surface area below the benchmarks, then it will need to include measures elsewhere on the block, that bring the block up to the benchmarks. • If the existing block is below the benchmarks, then the new development should rectify this in proportion to the area being developed. i.e., the benchmarks should be applied to the part of the block being developed <p>Development Applications not involving building or landscaping works (e.g. signage) should be excluded.</p>
	Cool materials benchmarks	These should apply whenever a substantial area of new roofing or new paving is constructed. This could be defined with its own specific threshold, however there are already a range of thresholds to define when a new building or area of paving would trigger the need for a development application, and therefore the best approach may simply be to say that any time a new roof or new paved area is part of a development application, then it needs to meet the cool roof or cool paving standard.
	Cool façade benchmark	The proposed cool façade standard is written in such a way that it defines within it that it needs to be applied when the Reflective Surface Ratio (RSR) of the proposed façade is greater than 30%.
	Other provisions (guiding principles) relevant to CFZ blocks	Whenever any of the above are triggered, then the relevant guiding principles should be applied as well.

5 CANOPY AND PERMEABILITY BENCHMARKS

A set of canopy and permeability benchmarks are recommended based on assessment of existing development and test cases

The Community Facilities Zone is seen as an opportunity to make an important contribution to ACT's canopy and permeability. This zone is expected to deliver canopy and permeability beyond the 30% (by 2045) targets set for ACT's urban area as a whole, helping to make up for some other zones that are more constrained.

However the CFZ still needs a nuanced approach to benchmarks, to allow for the range of development types within the zone and ensure that essential facilities are not inappropriately constrained.

This means setting benchmarks which are:

- Differentiated for each development type (schools, hospitals, aged care, places of worship and other community services).
- Higher than existing below-average practice.
- Wherever possible, higher than 30% (and >30% in enough categories to make up for those where <30% is recommended).
- Achievable through good design.

The benchmarks in the following sections follow this approach. Note that schools are the largest land use in the CFZ (61% of the total zone area, refer to Figure 2) and many of the schools include an adjacent oval, also within the CFZ. These sites naturally allow more space for canopy and permeability than

other land uses in the CFZ, and therefore schools are expected to have a significant influence over canopy and permeability outcomes for the zone as a whole.

In all categories, an appropriate set of benchmarks was considered for all development types within CFZ. There may be some developments (e.g. larger scale, government-led projects) which should be held to higher standards. ACT Government should consider applying 'stretch targets' to major government projects. We have not proposed stretch targets in the recommendations below.

5.1 OPTIONS INVESTIGATED

A variety of potential canopy and permeability benchmarks have been investigated. The options investigated were sourced from Australian precedents, stakeholder feedback and the test sites investigation included in Appendix A.

The following section outlines the options investigated and a series of recommendations derived from this investigation.

Table 5 lists the options that have been considered for controlling canopy and permeability within community facility blocks.

Options have also been considered for public streets within community facility zoning, noting that the benchmarks will need to be determined through a future body of work.

Table 5: Options considered for development blocks within community facility zoning.





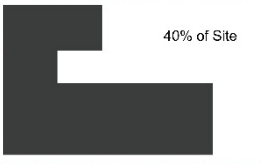

	Benefits	Risks	Action	Reference Image
Benchmarks by Precinct	Allows individual blocks within a precinct to have different requirements while achieving a precinct wide benchmark	Difficult to implement a block benchmark without knowing the other typologies and benchmarks within the precinct	Not recommended	
Place and Movement Framework	Opportunity to prioritise canopy coverage in areas with higher movement and place metrics	Requires the classification of streets and civic spaces based on place and movement, not currently within the ACT system	Not recommended	
One size fits all benchmark by Land Use Zone	Uses an existing land use category within the Territory Plan	Many developments typologies can be built within the community facilities zoning, complex to apply a one size fits all set of benchmarks	Not recommended	
Benchmarks by Development Type	Controls can vary based on a particular built form typology on-block, may be suitable for community facilities with similar requirements	May not work for typologies that vary substantially	Recommended	
Benchmark by Block	This may work well for types that have similar requirements	Will likely become a pseudo site coverage control which will impact footprint, may not be appropriate for certain typologies	Recommended	
Benchmark by on Block Elements (Streets, Open Space, Carpark)	Allows for a simple set of controls for similar elements across a variety of land use zones	Will require definitions that don't currently exist in the Territory Plan	Recommended	

Table 6: Options considered for public streets within community facilities zoning

	Benefits	Risks	Action
Benchmarks by Classification	Groups roads using an existing classification	Road typologies can be similar between zones	Recommended for permeability benchmark only
Benchmarks Based on Hierarchy	Groups roads using an existing classification	Road typologies in community facilities zoning are largely Access Roads which have a similar typology	Not recommended
Benchmarks by Place and Movement Framework	Prioritises areas with higher movement and place	Requires the classification of streets and civic spaces based on place and movement	Not recommended
Benchmarks Based on Hierarchy + Land Use	Controls would vary depending on hierarchy and urban context	Not applicable as there is only one zone type for community facilities	Not recommended
Total Streets Benchmarks	Provides a simple minimum across all street types	May cause issues for particularly constrained streets	Recommended for canopy benchmark only

5.2 RECOMMENDED FRAMEWORK

Having established the preferred approach through the assessment of the options above, the following framework is recommended.

Table 7: Summary of the recommended framework

	Schools	Hospitals	Aged Care	Places of Worship and Other Community Services	Public Roads
Type	Block benchmarks that vary depending on the inclusion of an oval	Minimum benchmarks for carparks and open space/movement networks	Block benchmarks using a similar format to DV369, however more ambitious due to the high amounts of vulnerable people	Minimum benchmarks for carparks and open space/movement networks	Minimum canopy benchmark for all streets, minimum permeability benchmark based on classification. Subject to future project.

5.3 EXPLORATION OF THE RECOMMENDED FRAMEWORK

Having established the recommended framework we investigated the development context for community facilities.

The following sections cover the categories of development in the CFZ: schools, hospitals, aged care, places of worship and other community services. Public streets within the CFZ are also examined below., noting that the further investigation of this is recommended as a future project.

SCHOOLS

Given that schools make up the majority of CFZ areas they have been assessed in the most detail. The schools have been separated into categories based on the range of year groups taught and if the school includes an oval within the block boundary. For reference, some examples of school sites within ACT have been investigated and can be seen in Appendix A. The schools have been categorised and compared in terms of canopy coverage and permeability as per Figure 6 below.

Schools in Community Facilities Zones Recommendation

The data shows canopy coverage is consistently averaging approximately 20% across the categories, ranging from 15% to 30%, regardless of the year group range. However, when a school includes an oval within its block the permeability is increased significantly. For this reason, it is recommended that the canopy benchmark be the same for all schools and that the permeability benchmark varies depending on the inclusion of an oval.

Table 8: Recommended benchmarks for schools in the Community Facilities Zone

Schools	Recommended Canopy Coverage Benchmark	Recommended Permeability Benchmark
Block Benchmark – school without oval	30%	30%
Block Benchmark – school with oval	30%	45%

Schools with ovals have a higher permeable surfaces benchmark than schools without ovals, as a turf oval will make a significant contribution to the site’s permeability.

Schools Canopy and Permeability

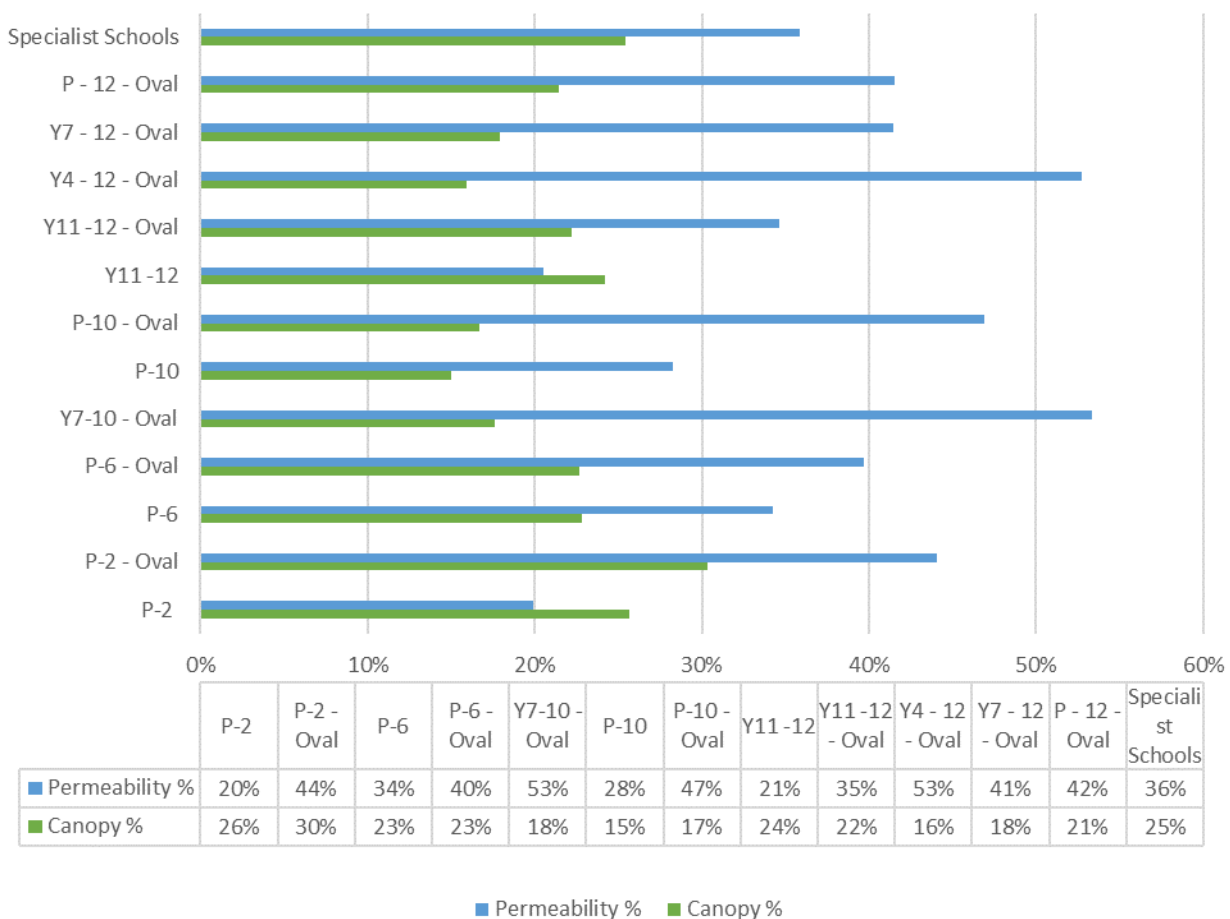


Figure 6: Permeability and canopy coverage of schools within investigation area

HOSPITALS

Hospitals have been identified through stakeholder feedback as a development type within community facilities zoning that has potentially different requirements to other types of development. Hospitals are often upgraded to meet growing needs of the community and it is considered that living infrastructure requirements should not prevent this growth. For this reason, we are recommending that hospitals be treated similarly to the commercial development recommendations where benchmarks only apply to areas outside the building's footprint.

Table 9: Recommended benchmarks for Hospitals in Community Facilities Zone

Hospitals	Recommended Canopy Coverage Benchmark	Recommended Permeability Benchmark
Surface Open Space/ Movement Networks	35%	15%
Surface Carpark	30%	10%
Building footprint	0%	0%

Hospitals in Community Facilities Zones Recommendation

It is recommended that the benchmarks for Hospitals vary depending on the block's required building footprint. This would be done by only controlling living infrastructure requirements within surface carparks and open space/movement networks. The positive impacts of living infrastructure include amenity, cooling and mental health. These factors are particularly relevant in hospitals and the benchmarks in these areas could be even more ambitious.



- - - Subject Site Block Boundary
- Open Space/Movement Network
- Surface Car Park

Figure 7: Shows how Canberra Hospital could be split into surface car park and movement network

AGED CARE

For the purposes of the recommendations in this section, the term aged care refers to the Territory Plan definitions *retirement village, supportive housing and residential care accommodation*.

Aged care has been highlighted as an area where living infrastructure benchmarks may be particularly beneficial. This is because residents and visitors are often more sensitive to heat. A majority of aged care within the ACT is delivered in residential zones and as a result subject to DV369 requirements. However, some aged care facilities are delivered within the Community Facilities Zone.

Examples of aged care developments throughout ACT have been investigated and can be seen in Appendix A. From these examples it was found that some blocks had particularly low canopy coverage and permeability. One such example can be seen in Figure 8.

Figure 8 shows that current planning controls are allowing for low canopy and permeability outcomes in aged care housing that are zoned CFZ. This may be in part due to the lack of any plot ratio requirements for this typology/planning condition – see Figure 9.



The Grove Ngunnawal
Existing Conditions



Figure 8: Shows a recently completed retirement village in Ngunnawal

The current recommended DV369 provisions if applied to the block shown in Figure 8 would require 6% canopy coverage, as per the proposed R40 in Figure 10 below.

In addition, DV369 lists no requirements for private open space or planting areas in community facilities zoning. These requirements are currently only applied to residential and commercial zoning. However, the block would be required to achieve 20% permeability as per R9 of the Water Sensitive Urban Design Code.

If the same aged care housing shown in Figure 8 was built within RZ3 zoning instead of CFZ, DV369 would require the block to have 20% canopy coverage and 25% planting area/permeability.

It is recommended that the benchmarks proposed through this work apply to aged care development regardless of the land use zone it is built upon.

It is recommended that due to the particular importance of urban cooling for vulnerable older adults, the benchmarks should be higher in aged care housing than is currently proposed within other residential development.

Aged Care in Community Facilities Zones Recommendation

Aged care housing within community facilities zoning is currently allowing for poor living infrastructure outcomes. It is recommended that benchmarks for aged care be higher than that of other residential development. This would be an appropriate response to the increased heat sensitivity of the residents within aged care.

Table 10: Recommended benchmarks for aged care facilities in the Community Facilities Zone

Aged care	Recommended Canopy Coverage Benchmark	Recommended Permeability Benchmark
Block Wide Benchmark	35%	30%

<p>R5</p> <p>For a <i>standard block</i> containing <i>supportive housing</i> or <i>retirement village</i> the maximum <i>plot ratio</i> for the whole block is specified in table 2.</p>	<p>This is a mandatory requirement. There is no applicable criterion.</p>
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Table 2: Plot ratios

zone	RZ 1	RZ 2	RZ 3	RZ 4	RZ 5
<i>plot ratio</i>	35%	50%	65%	80%	not specified

Figure 9: Excerpt from the Residential Zones Development Code that shows no plot ratio requirements for CFZ

Substitute

<p>R40</p> <p><i>Development</i> provides a minimum level of tree planting, with associated planting requirements as described in table A7b, consistent with the following:</p> <ul style="list-style-type: none"> a) for large blocks less than or equal to 800m², one small tree and one medium tree b) for large blocks more than 800m²: <ul style="list-style-type: none"> i) one medium tree and one large tree, and ii) one additional large tree or two additional medium trees for each additional 800m² block area. 	<p>C40</p> <p>Tree planting provided in the development ensures:</p> <ul style="list-style-type: none"> a) planting in deep soil zones, including minimum dimensions for deep soil zones, to support healthy canopy tree growth, and provide adequate room for canopy trees b) planting of canopy trees with appropriate species and with semi-advanced stock and minimum heights at maturity c) landscaping to provide substantial shade in summer and admit winter sunlight to outdoor and indoor living areas.
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Figure 10: Shows tree requirement that would apply to aged care housing in community facilities zoning

PLACES OF WORSHIP AND OTHER COMMUNITY SERVICES

Other Community Services refers to the remaining typologies that exist within community facilities zoning. When combined these types make up 12% of the area within CF zoning. This category is primarily made up of childcare, youth/seniors centres, indoor sports/aquatic facilities. These typologies often have unique requirements and make up a small amount of CF zoning. They have been grouped together, and with places of worship, for the purposes of this investigation. It can be seen in drawing SK-70 in Appendix A there are many types of developments within these remaining typologies that vary significantly regarding living infrastructure performance. For this reason, it is recommended that the benchmarks be applied to areas outside the building's footprint, allowing for requirements to vary depending on a facility's needs.

Surface car parking has been identified as an area across all development types that is currently contributing to poor living infrastructure outcomes. For this reason, it is recommended that provisions be placed on surface carparks to ensure a minimum canopy across all carparks in CF zoning.

The example on left in Figure 11 shows that some car parks within ACT are currently being designed with no new trees, only keeping what is existing. Whereas by contrast, the example on the right shows that car parks can be designed to provide up to 45% canopy coverage.

Places of Worship and Other Community Services in Community Facilities Zones Recommendation

Due to the high variability in development types within community services and places of worship it is recommended that living infrastructure benchmarks focus on open space, movement networks and surface car parking. This will ensure increased canopy and permeability within these areas while allowing a development to meet its functional requirements.

Table 11: Recommended benchmarks for places of worship and other community service facilities in the Community Facilities Zone

	Recommended Canopy Coverage Benchmark	Recommended Permeability Benchmark
Surface open space / movement networks	35%	15%
Surface carparks	30%	10%
Building footprint	0%	0%

CF : Phillip
Canopy : 12.5% Permeability : 24%



CZ2 : Deakin, Canberra Central
Canopy : 45.3% Permeability : 3.9%



Figure 11: Examples of tree canopy coverage within surface car parking

PUBLIC STREETS

As with commercial zones, public streets make up a significant portion of CF zones. Street typologies in these zones are typically an extension of the typology designed to meet the needs of the surrounding area. Whilst these areas are outside of this project’s scope, it is important that they provide appropriate canopy coverage and permeability to serve the diverse and often vulnerable user groups that are frequenting the adjacent community facilities.

Table 12: Recommended assessment framework for public streets in commercial zones

	Recommended Canopy Benchmark	Recommended Permeability Benchmark
CF	X%	X%

Public Streets in Community Facilities Zones Recommendation

It is recommended that the streets within Community Facilities zoning follow the same framework as outlined for commercial development. This recommends a common canopy benchmark for all streets and a permeability benchmark dependent land use zone. As streets in community facilities will pass through suburban and urban environments we recommend a minimum benchmark is established. The benchmarks should be determined following further investigations, subject to future project.

6 REFERENCES

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- Victorian Health and Human Services Building Authority (2020) Public Sector Residential Aged Care Services [Interim] Facility design guidelines.
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- Victorian School Building Authority (2021) Building quality standards handbook.

APPENDIX A EXAMPLES OF EXISTING DEVELOPMENT IN THE COMMUNITY FACILITIES ZONE

The following examples show composition and living infrastructure performance of various development types within community facilities zoning in ACT



Site Plan



Surface Condition

Legend

- - - Subject Site Block Boundary
- Surface Open Space

Area	m2
Building Footprint	22865
Surface Open Space	39449
Surface Carpark	0
Overall Block	62313

Category	DV369 + WSUD		Draft CZ Controls		DV369 Equivalent RZ3		DV369 Equivalent RZ1	
	m2	% of Block	m2	% of Block	m2	% of Block	m2	% of Block
Canopy	3972.563	6	7890	13	12463	20	9347	15
POS	N/A	N/A	N/A	N/A	12463	20	24925	40
Planting Area	12462*	20*	1972	3	15578	25	21810	35

*WSUD Control is for Permeable Area not Planting Area

The Grove Ngunnawal
Existing Conditions



2.3%



13.9%



Living Infrastructure
Aged Care Facilities
Grove Ngunnawal

Tait Network

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SK-030



Site Plan

Surface Condition

Legend

- - - Subject Site Block Boundary
- Surface Open Space

Area	m2
Building Footprint	16797
Surface Open Space	27890
Surface Carpark	0
Overall Block	44687

Category	DV369 + WSUD		Draft CZ Controls		DV369 Equivalent RZ3		DV369 Equivalent RZ1	
	m2	% of Block	m2	% of Block	m2	% of Block	m2	% of Block
Canopy	2871	6	5578	12	8937	20	6703	15
POS	N/A	N/A	N/A	N/A	8937	20	17875	40
Planting Area	8937*	20*	1395	3	11172	25	15640	35

*WSUD Control is for Permeable Area not Planting Area

Isabella Gardens
Existing Conditions

2.6%

6.4%



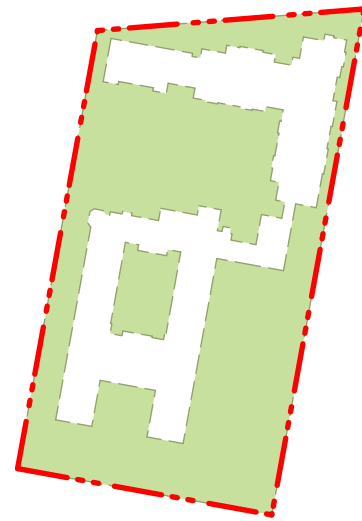
Living Infrastructure
Aged Care Facilities
Isabella Gardens

Tait Network

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SK-031



Site Plan



Surface Condition

Legend

- - - Subject Site Block Boundary
- Surface Open Space

Area	m2
Building Footprint	4455
Surface Open Space	9098
Surface Carpark	0
Overall Block	13553

Category	DV369 + WSUD		Draft CZ Controls		DV369 Equivalent RZ3		DV369 Equivalent RZ1	
	m2	% of Block	m2	% of Block	m2	% of Block	m2	% of Block
Canopy	925	7	1820	13	2711	20	2033	15
POS	N/A	N/A	N/A	N/A	2711	20	5421	40
Planting Area	2711*	20*	455	3	3388	25	4744	35

*WSUD Control is for Permeable Area not Planting Area

Canberra Aged Care Facility, Lyneham
Existing Conditions



16.5%



11.4%



Living Infrastructure
Aged Care Facilities
Canberra Aged Care Facility

Tait Network

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SK-032

Ngunnawal
Canopy : 2.6%
Permeability : 13.9%



Belconnen
Canopy : 11.4%
Permeability : 27%



Page
Canopy : 29.2%
Permeability : 14.1%



Lyneham
Canopy : 16.5%
Permeability : 11.4%



Griffin
Canopy : 17%
Permeability : 22.1%



Redhill
Canopy : 29.2%
Permeability : 12.6%



Living Infrastructure
Aged Care Facilities

Tait Network

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SK-033

Weston

Canopy : 21.5%

Permeability : 13.5%



Stirling

Canopy : 10.1%

Permeability : 16.3%



Stirling 2

Canopy : 3.8%

Permeability : 40.8%



Monash

Canopy : 3.9%

Permeability : 15.1%



Isabella Plains

Canopy : 2.6%

Permeability : 6.4%



Calwell

Canopy : 4.4%

Permeability : 21.5%



Living Infrastructure
Aged Care Facilities

Tait Network

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SK-034

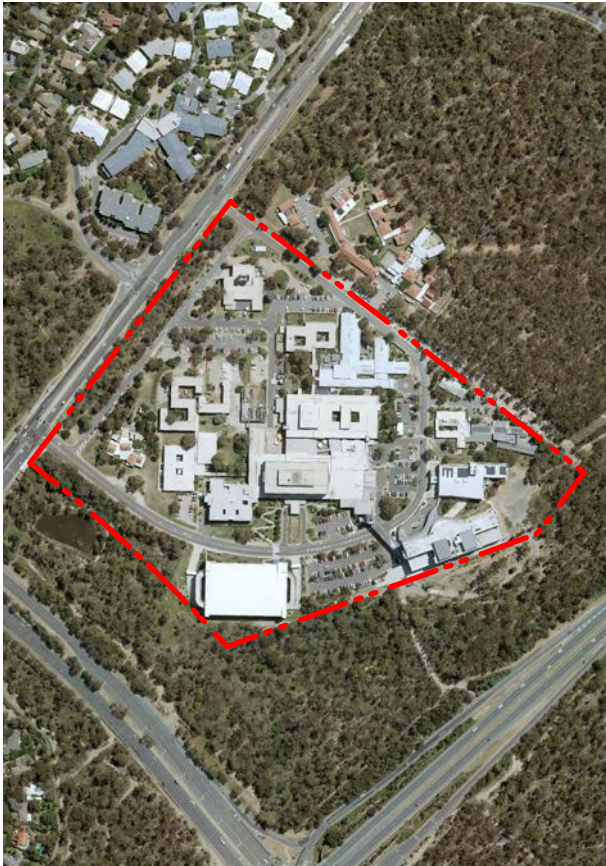
UC Hospital
Canopy : 3.9%
Permeability : 38.6%



Canberra Private Hospital
Canopy : 23.1%
Permeability : 6.4%



Calvary Hospital
Canopy : 18.3%
Permeability : 17.8%



Canberra Hospital
Canopy : 9.7%
Permeability : 11.0%



Living Infrastructure
Community Facilities
Hospitals

Tait Network

SCALE AT A4
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SK-050



Site Plan



Surface Condition

Legend

- - - Subject Site Block Boundary
- Surface Open Space
- Surface Car Park

Area	m2
Building Footprint	59519
Surface Open Space	77327
Surface Carpark	10255
Overall Block	147521

Notes:

- WSUD Permeability Requirement:
20% Minimum of Site to be Permeable Surface
- CZ Controls:
20% Canopy in Surface Open Space
35% Canopy for Surface Carparks
5% Planting Area in Surface Open Space

Category	Draft CZ Controls	
	m2	% of Block
Canopy	19055	13
POS	N/A	N/A
Planting Area	3866	3

Canberra Hospital
Existing Conditions



9.7%



11.0%



Living Infrastructure
Community Facilities
Canberra Hospital

Tait Network

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SK-051



Site Plan



Surface Condition

Legend

- - - Subject Site Block Boundary
- Surface Open Space
- Surface Car Park

Area	m2
Building Footprint	33927
Surface Open Space	84077
Surface Carpark	8762
Overall Block	126918

Notes:

- WSUD Permeability Requirement:
20% Minimum of Site to be Permeable Surface
- CZ Controls:
20% Canopy in Surface Open Space
35% Canopy for Surface Carparks
5% Planting Area in Surface Open Space

Category	Draft CZ Controls	
	m2	% of Block
Canopy	19882	16
POS	N/A	N/A
Planting Area	4204	3

Calvary Hospital
Existing Conditions



Living Infrastructure
Community Facilities
Calvary Hospital

Tait Network

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SK-052



Site Plan



Surface Condition

Legend

- - - Subject Site Block Boundary
- Surface Open Space
- Surface Car Park

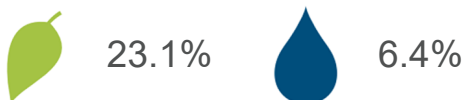
Area	m2
Building Footprint	12977
Surface Open Space	15501
Surface Carpark	11738
Overall Block	40097

Notes:

- WSUD Permeability Requirement:
20% Minimum of Site to be Permeable Surface
- CZ Controls:
20% Canopy in Surface Open Space
35% Canopy for Surface Carparks
5% Planting Area in Surface Open Space

Category	Draft CZ Controls	
	m2	% of Block
Canopy	7209	18
POS	N/A	N/A
Planting Area	775	2

Private Hospital
Existing Conditions



Living Infrastructure
Community Facilities
Private Hospital

Tait Network

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SK-053



Site Plan



Surface Condition

Legend

- - - Subject Site Block Boundary
- Surface Open Space
- Surface Car Park

Area	m2
Building Footprint	13280
Surface Open Space	31213
Surface Carpark	3546
Overall Block	48039

Notes:

- WSUD Permeability Requirement:
20% Minimum of Site to be Permeable Surface
- CZ Controls:
20% Canopy in Surface Open Space
35% Canopy for Surface Carparks
5% Planting Area in Surface Open Space

Category	Draft CZ Controls	
	m2	% of Block
Canopy	7484	16
POS	N/A	N/A
Planting Area	1561	3

UC Hospital
Existing Conditions



Living Infrastructure
Community Facilities
UC Hospital

Tait Network

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SK-054

200 Florey Drive, Charnwood

Canopy : 17.5%

Permeability : 21.3%



107 Wanganeen Avenue Ngunnawal

Canopy : 28.5%

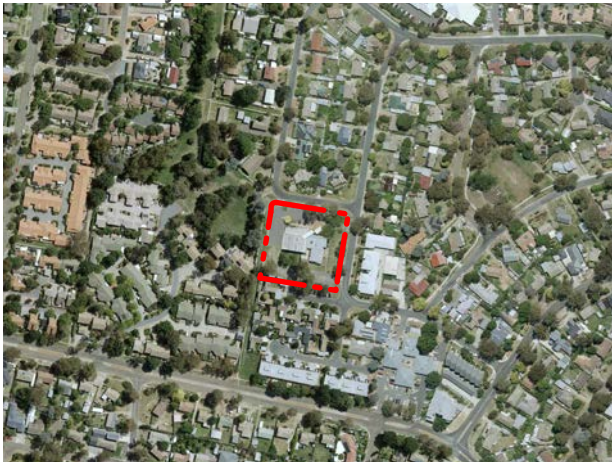
Permeability : 36.7%



18 Dallachy Street Page

Canopy : 24.3%

Permeability : 19.5%



8 Nuyts Street Red Hill

Canopy : 41.0%

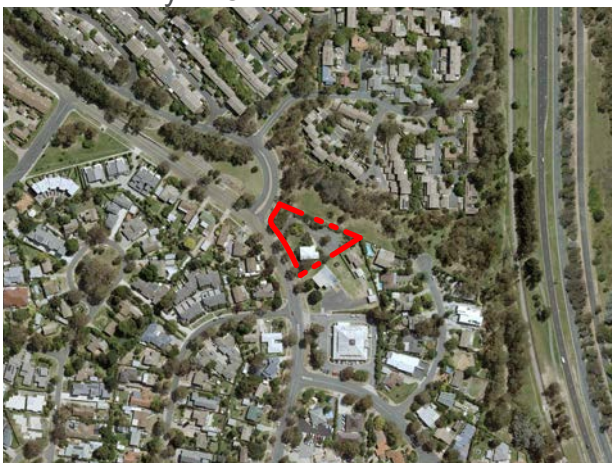
Permeability : 19.5%



88 Ainsworth Street Mawson

Canopy : 41.0%

Permeability : 15.4%



152 Langdon Avenue Wanniasa

Canopy : 25.6%

Permeability : 47.9%



Living Infrastructure
Community Facilities
Places of Worship

Tait Network

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Library, Holt
Canopy : 22.9%
Permeability : 2.3%



Childcare, Gowrie
Canopy : 26%
Permeability : 17.7%



Community and Arts Centre, Belconnen
Canopy : 6.3%
Permeability : 9%



Childcare, Mawson
Canopy : 38.4%
Permeability : 10.2%



Aquatic Centre, Kambah
Canopy : 7%
Permeability : 9%



Health Hub, Gungahlin
Canopy : 2.1%
Permeability : 3.6%



CF : Gungahlin - Community Care
 Canopy : 0% Permeability : 19%



CF: Red Hill - Early Learning Centre
 Canopy : 33% Permeability : 43%



CF: Kingston - Greek Orthodox Church
 Canopy : 24% Permeability : 3%



CF: Nicholls - Early Childhood Centre & Community House
 Canopy : 6.7% Permeability : 28.2%



CF : Phillip (1:5000)
 Canopy : 12.5% Permeability : 24%



CF: Deakin - Hospital
 Canopy : 19% Permeability : 14%



P-2, Southern Cross School, Belconnen
 Canopy : 32% Permeability : 43%



P-2, Narrabundah School, Canberra Central
 Canopy : 21% Permeability : 21%



P-6, Fadden School, Tuggeranong
 Canopy : 16% Permeability : 60%



P-6, Gilmore School, Tuggeranong
 Canopy : 27% Permeability : 42%



Y7-10, Calwell High School, Tuggeranong
 Canopy : 16% Permeability : 51%



Y7-10, Belconnen High School, Belconnen
 Canopy : 14% Permeability : 60%



P-10, Harrison School, Gungahlin
 Canopy : 13% Permeability : 21%



P-10, Kingsford Smith School, Belconnen
 Canopy : 22% Permeability : 30%



Specialist School, Malkara School, Woden
 Canopy : 28% Permeability : 25%



Specialist School, Cranleigh, Belconnen
 Canopy : 27% Permeability : 34%



Y4-12, Marist College Canberra, Tuggeranong
 Canopy : 13% Permeability : 33%



Y4-12, St Edmund's College, Canberra Central
 Canopy : 17% Permeability : 60%



Y7-12, Brindabella Christian College, CC
 Canopy : 14% Permeability : 10%



Y7-12, Merci College, Canberra Central
 Canopy : 20% Permeability : 20%



P-12, Radford College, Belconnen
 Canopy : 21% Permeability : 40%



P-12, Burgmann Anglican School, Gungahlin
 Canopy : 9% Permeability : 54%



Y11-12, Canberra College, Woden Valley
 Canopy : 37% Permeability : 20%



Y11-12, Narrabundah College, CC
 Canopy : 28% Permeability : 37%

