



URBAN HEAT REPORT

SOUTH CREEK WEST BELMORE ROAD PRECINCT

Prepared for CKDI
July 2022

EXECUTIVE SUMMARY

This report has been prepared on behalf of CDKI Bringelly Pty Ltd (**CKDI, the proponent**) to provide an assessment of the heat impacts associated with the rezoning of the site at located on The Northern Road which forms part of Precinct 2 in South Creek West Land Release Area and is referred to as the **Belmore Road Precinct**.

The Belmore Road Precinct comprises 190ha of land and will accommodate up to approximately 10,500 people and builds on the NSW Government's vision and aspirations under the Western Sydney Growth Areas program. In line with the NSW Government's vision, a diverse range of housing typologies will be planned, targeted for and delivered to meet the residential market demands in south west Sydney. In addition, the precinct will integrate the delivery of a high amenity environment, focused around the principles of achieving a distribution of open space, community facilities, retail and other related non-residential land uses that directly correlates with the needs for the incoming population, but also responsive to the constraints and opportunities of the site. It will promote pedestrian walkability and connectivity to public places and spaces across the precinct, and fundamentally build on the green and blue grid objectives.



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1. INTRODUCTION

Urban Heat is an increasingly problematic issue in the urban areas of Sydney and Australia. With the increasing temperatures from climate change, it will only continue to have a greater impact. Planning for urban heat is and will become an increasing priority for development in NSW.

Western Sydney is heating up twice over as fast as the eastern parts of the city and experience 6 times the number of days over 35 degrees (WSROC, 2021). Identifying measures and priorities to mitigate urban heat will be especially relevant to the Western Sydney growth areas as these parts of the city are greatly overrepresented when it comes to negative urban heat effects.

The Camden Local Government area is currently the fastest growing LGA in Australia, with more than 100 residents calling Camden home each week (Camden Council, 2021). With this growth, there are challenges to overcome and opportunities to be realized to ensure we create a liveable environment for residents and visitors for years to come.

This Urban Heat Report has been prepared by Urbis on behalf of CKDI (**the Proponent**) to address the urban heat issues associated with the proposed amendments to the Precincts SEPP to facilitate the redevelopment of the site known as the 'Belmore Road Precinct' (**the Precinct**) located on The Northern Road in the South Creek West Growth Area (**SWGA**).

VISION STATEMENT

The Belmore Road Precinct celebrates its natural environment through conservation of trees and riparian corridors. The precinct will provide open space opportunities connecting the precinct and broader green and blue grid. This precinct will create a sustainable place which protects residents from urban heat island effects, promotes resilience to climate change, and encourages an active, healthy and engaged community.

THE AIMS OF THE URBAN HEAT REPORT

As part of planning for new urban areas, Camden Council have identified the following specific aims of an Urban Heat Report:

- To understand the impact that new development will have on the physical environment and its communities in relation to Urban Heat Island.
- To ensure that precinct design further explores the distribution of ambient and surface temperatures whilst, seeking to minimise these to assist in improved thermal comfort.
- To assess the cooling potential of the nominated mitigation strategies and demonstrate how they can be implemented from a precinct level.
- To assist Council in providing qualitative and quantitative data that better supports and validates these strategies when addressing urban heat.
- Reporting the recommended measures to reduce the impacts of the Urban Heat, and providing further updates during development and a follow up report post development addressing whether these strategies were successful or could be enhanced.

This report seeks to specifically respond to these requirement, establishing a framework for future urban development.

2. SITE CONTEXT

2.1 PLANNING BACKGROUND

Current Planning Proposal

A Planning Proposal was formally lodged with Camden Council in April 2021 seeking to rezone South Creek West Growth Area Sub-Precinct 2, formally now referred to known as the **Belmore Road Precinct**.

The objectives and intended outcomes of the Planning Proposal will be facilitated through amendments to the *State Environmental Planning Policy (Precincts - Western Parkland City) 2021 (Precincts SEPP)* and associated land use mapping provisions.

The indicative proposed SEPP amendments include:

- Rezoning the land to part:
 - E1 Local Centre
 - E3 Productivity Support
 - C2 Environmental Conservation
 - RE1 Public Recreation
 - R2 Low Density Residential
 - R3 Medium Density Residential
- Inclusion of dwelling density bands for residential uses across the precinct;
- Floor Space Ratio (FSR) provisions where required within the local centre; and
- Height of building controls where appropriate across the precinct ranging from 9.5m to 16m.

Urban Heat Report

Council have requested the preparation of an Urban Heat Report which demonstrates how the Planning Proposal, ILP, DCP and Urban Design Report and Landscape Masterplan have considered measures to mitigate the effects of Urban Heat. Council requested that the report also address the relevant actions and priorities nominated by relevant strategic planning policies.

This report has been prepared by Urbis and peer-reviewed by Civile. The structure and recommendations have been prepared with consideration of the draft Urban Heat Report prepared by Camden Council and the WSROC Urban Heat Planning Toolkit.

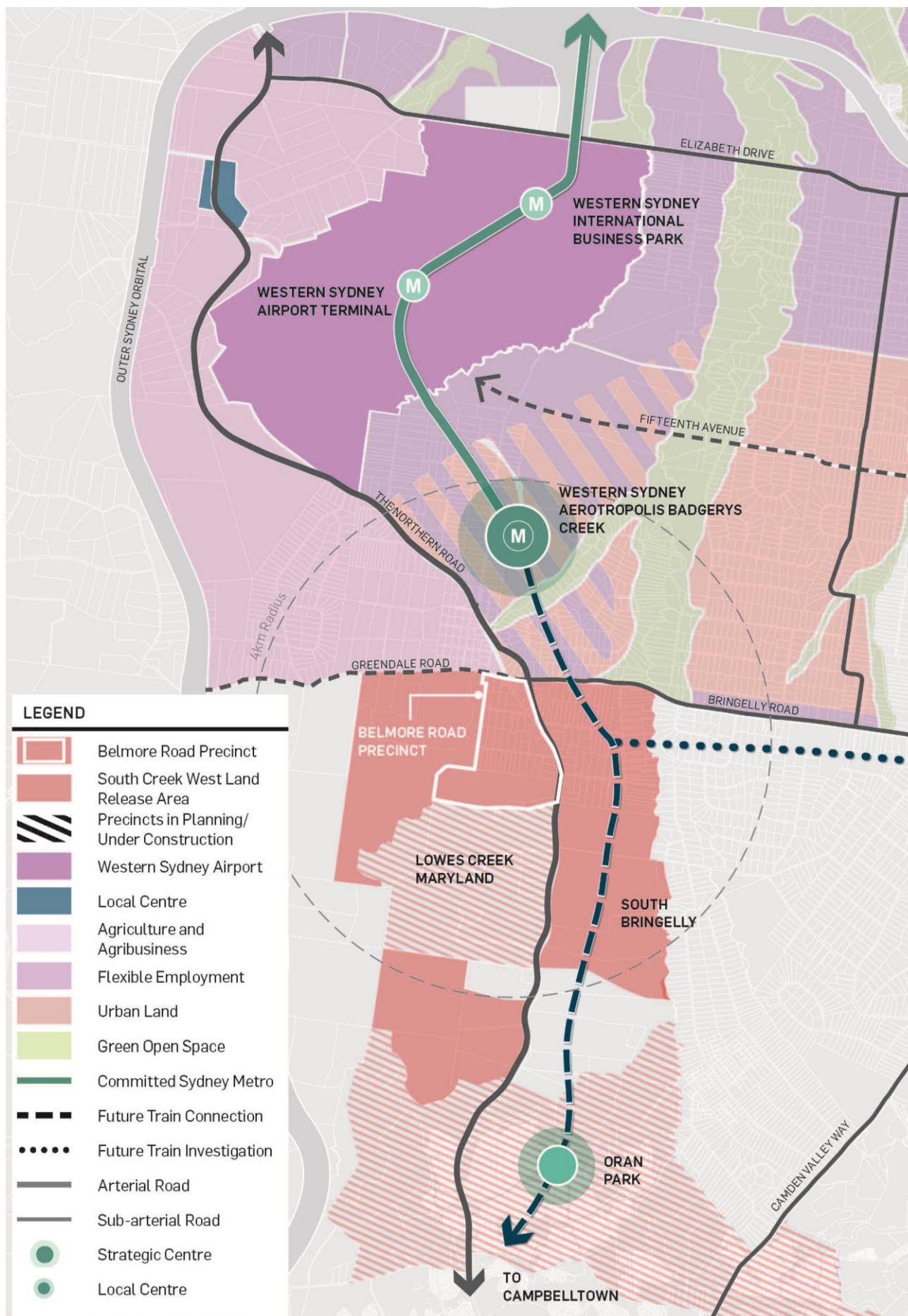


Figure 1 South West Growth Centre and surrounding context

2.2 PHYSICAL CONDITIONS

The Site

The Belmore Road Precinct is located at the north-west of South Creek West Land Release Area. The Precinct comprises an approximate area of 190 hectares.

The Precinct shares the border with Badgery's Creek Aerotropolis, being Greendale Road and Bringelly Road at the north. The Precinct immediately adjoins the new planned precinct, Lowes Creek Maryland, to the south.

Landform Characteristics

The site is undulating in character with an elevation between 72m at the east and 132m at the south-west.

Bringelly Precinct has two ridgelines transverse across the site, with one traversing from the west to north-east, and the other traversing from the south-west to the east.

Two of these ridgelines fall towards the central of the site, forming a creek corridor at the core of the Precinct.

Road Infrastructure

The main access to the Belmore Road Precinct is via The Northern Road, which lies on the eastern boundary of the Precinct.

The Northern Road has recently been realigned and upgraded strengthening the connection of the Precinct with two key centres - Badgery's Creek Aerotropolis to the north and Oran Park to the south. Both of these centres are within 10 to 15 minutes driving distance from the site.

The Northern Road also provides access to Parramatta CBD and Sydney CBD. Greendale Road and Bringelly Road to the north provides major east-west connection between the Northern Road, Camden Valley Way and South Western Freeway.

Climate

The Badgerys Creek Automatic Weather Station (AWS) is located approximately 6 kilometres north of the Precinct. Data has been collected by the Bureau of Meteorology since October 1995 and is summarised below.

Temperature averages and extremes

January is the warmest month on average at Badgerys Creek AWS (mean maximum temperature of 30.2°C), and July the coldest month (mean maximum temperature of 17.5°C).

The highest temperature ever recorded at the site was 47.6 °C on January 4 2020 and the lowest maximum temperature 8.5°C on June 10 2021. Seasonally, mean maximum temperatures range from 29.1 °C in summer with a decile 9 of 35.7 °C, to 18.1 °C in winter with a decile 9 of 21.3 °C.

Annually, an average of 15.1 days are recorded where the temperature exceeded 35 °C.

Wind Speeds

Mean wind speeds at Badgerys Creek are relatively consistent throughout the year, ranging from approximately 7 to 10 km/hr. The strongest wind gust ever recorded at the site was 104 km/hr on 24 September 2006, from a north-northwest direction.

The predominant wind direction in all seasons is south-westerly.

Humidity

Approximate average relative humidity (rh) is measured at both 9.00am and 3.00pm. It is defined as the amount of moisture in the air expressed as a percentage of the amount of moisture present if the air was saturated at that temperature.

Generally, humidity at Badgerys Creek AWS is higher at 9.00am than 3.00pm.

June is the most humid month on average with a mean 9.00am relative humidity of 84% which lowers to 56% by 3.00pm.

In summer, an average humidity of 74% is reached at 9.00am which reduces down to 50% at 3.00pm.

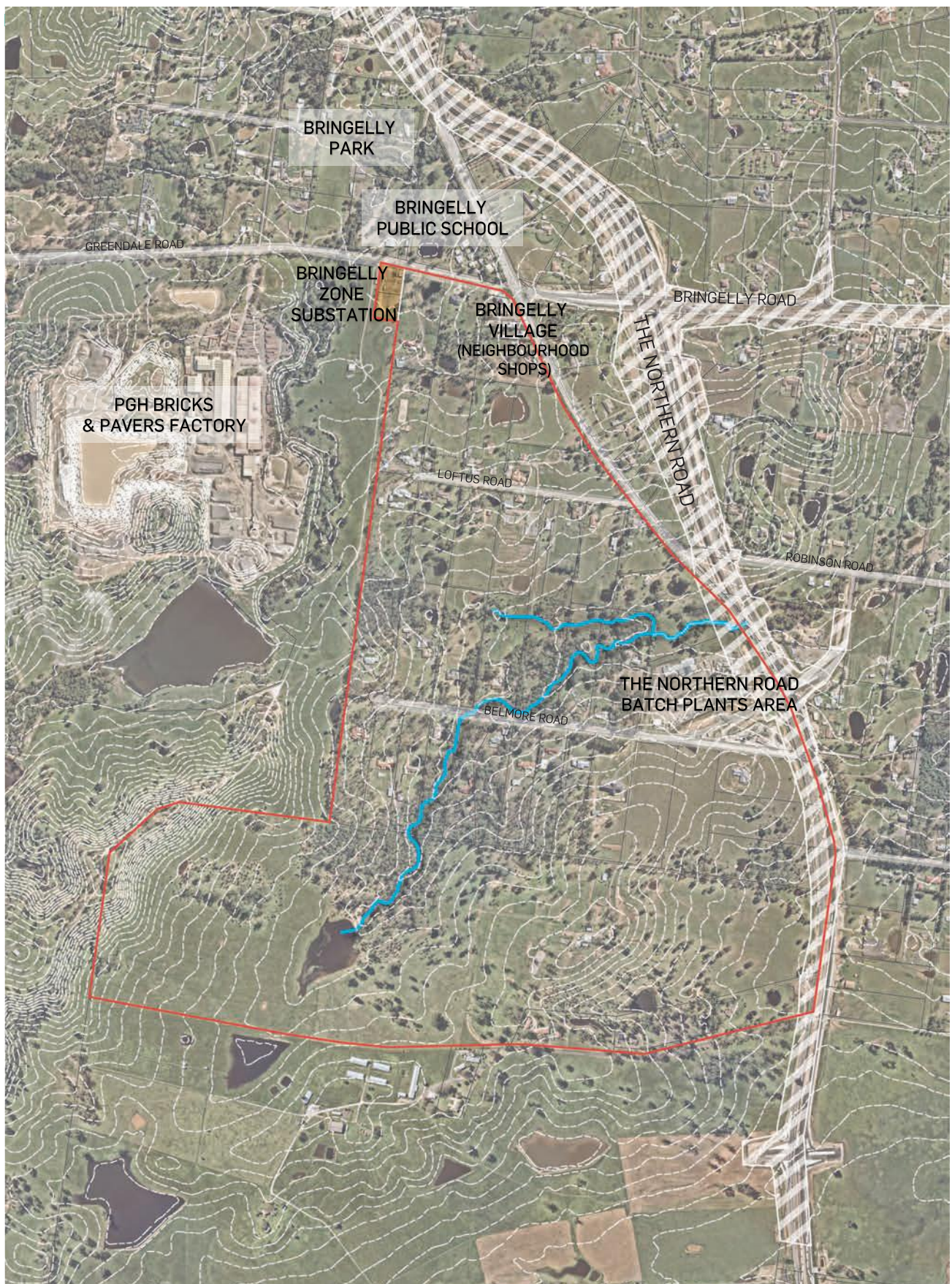


Figure 2 Key existing features of the precinct on aerial photo

3. STRATEGIC CONTEXT

3.1 STATE WIDE STRATEGIC DOCUMENTS

GREATER SYDNEY REGION PLAN: A METROPOLIS OF THREE CITIES

The Greater Sydney Region Plan (**Region Plan**) is a strategy prepared by the Greater Sydney Commission (GSC) for managing growth and change to guide integrated land use planning and infrastructure delivery for Greater Sydney to 2056. The Region Plan is built on a vision of three cities where most residents live within 30 minutes of their jobs, education and health facilities, services and great places. The vision brings new thinking to land use and transport patterns to boost Greater Sydney's liveability, productivity and sustainability by spreading the benefits of growth.

The South West Growth Area is an identified area for anticipated growth and acceleration of housing growth. The Region Plan also identifies that development along the spine of South Creek and its tributaries will 're-imagine liveability and sustainability, providing new cool and green neighbourhoods and centres with generous open space in a parkland setting.'

The Urban Heat Report aims to support the achievement of **Strategy 38.1** of the Region Plan which is to mitigate the urban heat island effect and reduce vulnerability to extreme heat.

GREATER SYDNEY REGION PLAN: A METROPOLIS OF THREE CITIES

Five District Plans were also prepared by the GSC as guides for implementing the Region Plan at a District level. Each plan is structured around priorities in relation to infrastructure and collaboration, liveability, productivity, sustainability and implementation. The Belmore Road Precinct is located within the Western City District.

The greatest increase in population in the Western District is expected in Camden Local Government Area (LGA), mostly in the South West Growth Area and strong growth across all age groups.

The proposed Urban Heat Report aims to respond to the following priorities of the Western City District Plan:

- **Priority W15**
Increasing urban tree canopy cover and delivering Green Grid connections
- **Priority W20**
People and places adapt to climate change and future shocks and stresses
Exposure to natural and urban hazards is reduced
Heatwaves and extreme heat are managed

GREENER PLACES DESIGN GUIDE

In November 2017, the GANSW released the Draft Greener Places Design Guide, the NSW Government's policy for green infrastructure in NSW. The guide presents a collection of priorities and four (4) principles and four (4) outcomes to guide design and planning in the delivery of green infrastructure in NSW, with a focus on open space for recreation, urban tree canopy and bushland and waterways. Fundamentally, the policies seek to respond to the following NSW challenges:

- Health
- Climate resilience
- Rapidly growing population
- Changing lifestyle and demographics
- Infrastructure and urban renewal
- Biodiversity loss

Built upon the principles of integration, connectivity, multifunctionality and participation the draft Guide seeks to achieve the following outcomes:

1. Conservation of the natural environment
2. Increased access to open space
3. Improved connectivity to promote active living
4. Increase urban greening to ameliorate climate extremes

The draft Guide provides recommendations for planning new development in greenfield sites to maximise opportunities for well-located and accessible parks and public open spaces that provide for a diverse range of recreational activities. The desired outcome for greenfield areas is to base public open space around natural systems, which support connectivity, active transport and a diversity of settings which enhance the local character. Additionally, such practice offers opportunities for improved water-sensitive urban design and habitat conservation, ultimately creating a stronger blue and green grid.

3.2 CAMDEN COUNCIL STRATEGIC DOCUMENTS

CAMDEN LOCAL STRATEGIC PLANNING STATEMENT

The Camden Local Strategic Planning Statement (**LSPS**) was endorsed by the Greater Sydney Commission in March 2021. The LSPS identifies the vision for land use planning over the next 20 years.

The overall vision for Camden is underpinned by four key themes: infrastructure and collaboration, liveability, productivity and sustainability. These mirror the priorities of the Region Plan and District Plan and are critical to how Camden will grow and evolve. The LSPS Structure Plan identifies a significant portion of the northern part of Camden (generally land identified in the South West Growth Centre) for future urban development. This area is expected to account for majority of residential growth with associated infrastructure required to be delivered in this area.

The proposed Urban Heat Report aims to respond to the following priorities of the LSPS:

- **Local Priority S5**
Reducing emissions, managing waste and increasing energy efficiency
- **Local Priority S6**
Improving Camden's resilience to hazards and extreme weather events

CAMDEN LOCAL HOUSING STRATEGY

The Camden Local Housing Strategy (**LHS**) was endorsed by Camden Council in December 2021 and was prepared in response to the region, district and local planning policy objectives to establish an evidence-based plan for housing in the Camden LGA over the next 10 and 20 years. Over the next 20 years, the LGA is forecasted to have the largest housing growth of any metropolitan Sydney council with a forecast demand for an additional 49,625 dwellings with most residential growth set to occur in the SWGA. Oran Park is identified as an establishing Town Centre that will continue to grow and evolve with a developing retail offering, civic precinct and emerging office floorspace.

The site is identified in the 'New Urban North' Precinct which includes growing and evolving land release precincts. Housing within this precinct comprises mainly of detached housing and dual occupancies.

The proposed Urban Heat Report aims to respond to the following priorities and actions of the LHS:

- **Priority 2**
Delivering resilient, healthy and connected communities
- **Action 12**
Advocate for the development of guidelines that promote sustainability principles in the provision of infrastructure and utility services
- **Action 15**
Establish urban tree canopy targets and advocate for opportunities to increase Camden's green cover and urban tree canopy

CAMDEN SUSTAINABILITY STRATEGY

The Camden Council Sustainability Strategy is a four-year plan that brings together actions Council will implement to work towards creating a Sustainable Camden. The Sustainability Strategy is a whole-of-Council approach, linked to the key directions outlined in the Camden Community Strategic Plan and the local priorities of the Camden Local Strategic Planning Statement.

The proposed Urban Heat Report aims to respond to a range of actions and priorities aiming to embed sustainability into urban planning and design and create sustainable and resilient urban environments:

- **URB1 – Embed sustainability into urban planning and design**
 - Undertake a review of planning controls to ensure sustainability principles are embedded and local climate is considered.
 - Develop a Sustainable Homes program, identifying energy and water efficiency retrofit opportunities as well as Camden specific sustainability information for new and existing homes.
 - Ensure new release areas have adequate space for street trees.
 - Increase the use of water sensitive urban design
 - Create a water efficient landscape standard for use in public and private development.
 - Work with water service providers to design and deliver infrastructure, water servicing and development approaches that best contribute to local and regional water supply and water cycle management.
- **URB2 – Deliver sustainable precincts**
 - Investigate planning and development controls and the use of incentives to encourage improvements in water and energy efficiency and the use of renewable energy in growth precincts.
 - Advocate for the development of low carbon precincts within the South West Growth Area, with Leppington Town Centre as a pilot precinct.
 - Ensure Green and Blue Grid principles are considered in the master planning and design of new precincts.
- **URB3 – Maximise connectivity and Accessibility to the River**
 - Increase physical and visual connection to waterways and green spaces including linking cycling and walking network to the green corridor.
- **URB4 - Increase urban tree canopy coverage**
 - Identify opportunities to implement improved canopy cover on public and private land.
- **RES1 – Understand climate risks for Camden LGA**
 - Mitigate the urban heat island effect and reduce vulnerability to extreme heat.
 - Work with Western Sydney District councils to develop standardized engineering specifications to address liveability and urban heat.
- **RES2 - Minimise the impact of urban heat**
 - Review planning and development controls to assist with minimizing urban heat including the use of green roofs and walls, and water sensitive urban design.
 - Encourage and promote green infrastructure such as green roofs and walls and water sensitive urban design.
- **RES3 – Deliver climate mitigation and adaptation initiatives**
 - Develop and implement a climate mitigation and adaptation plan for Council and the community.
 - Develop a risk and resilience action plan, addressing priority shocks and stresses identified in Resilient Sydney - A Strategy for City Resilience.

4. INDICATIVE LAYOUT PLAN




















Urbis has prepared a draft Indicative Layout Plan (Draft ILP) for the site, illustrated in **Figure 2**, which has informed the planning provisions proposed under this SEPP amendment.

The Draft ILP has been shaped by a comprehensive site analysis and identification of the site opportunities and challenges, ensuring the appropriate and considered use of land.

The primary objective of the redevelopment of the site is to deliver compatible land uses within its unique natural ecological setting. The arrangement of land uses has been situated to celebrate the natural site assets and mitigate the site challenges, including taking advantage of local views, providing activation along riparian corridors and areas of vegetation, and consideration of areas with high Aboriginal sensitivity.

The distribution of land uses across the site takes advantage of the large scale of the site whilst also ensuring an efficient and sensitive development of the landholding. The development strategy varies across the site depending on the local context, with the residential areas promoting a walkable and highly amenable residential community, balanced by the employment lands along the Northern Road.

LEGEND:

	SOUTH CREEK WEST BRINGELLY SUB-PRECINCT 2 (PRECINCT 2) SITE BOUNDARY		RAINGARDEN
	RIPARIAN CORRIDORS		LOW DENSITY RESIDENTIAL BAND 1 (10-20DW/HA)
	PLAYING FIELDS		LOW DENSITY RESIDENTIAL BAND 2 (20-25DW/HA)
	LOCAL PARKS		MEDIUM DENSITY RESIDENTIAL BAND 1 (25-35DW/HA)
	VILLAGE CENTRE		MEDIUM DENSITY RESIDENTIAL BAND 2 (35-60DW/HA)
	SCHOOL		THE NORTHERN ROAD
	EMPLOYMENT		SUB-ARTERIAL ROAD
	DRAINAGE		COLLECTOR ROAD
	FUTURE INVESTIGATION AREA		500M VILLAGE CENTRE WALKING CATCHMENT
	HERITAGE SITE		

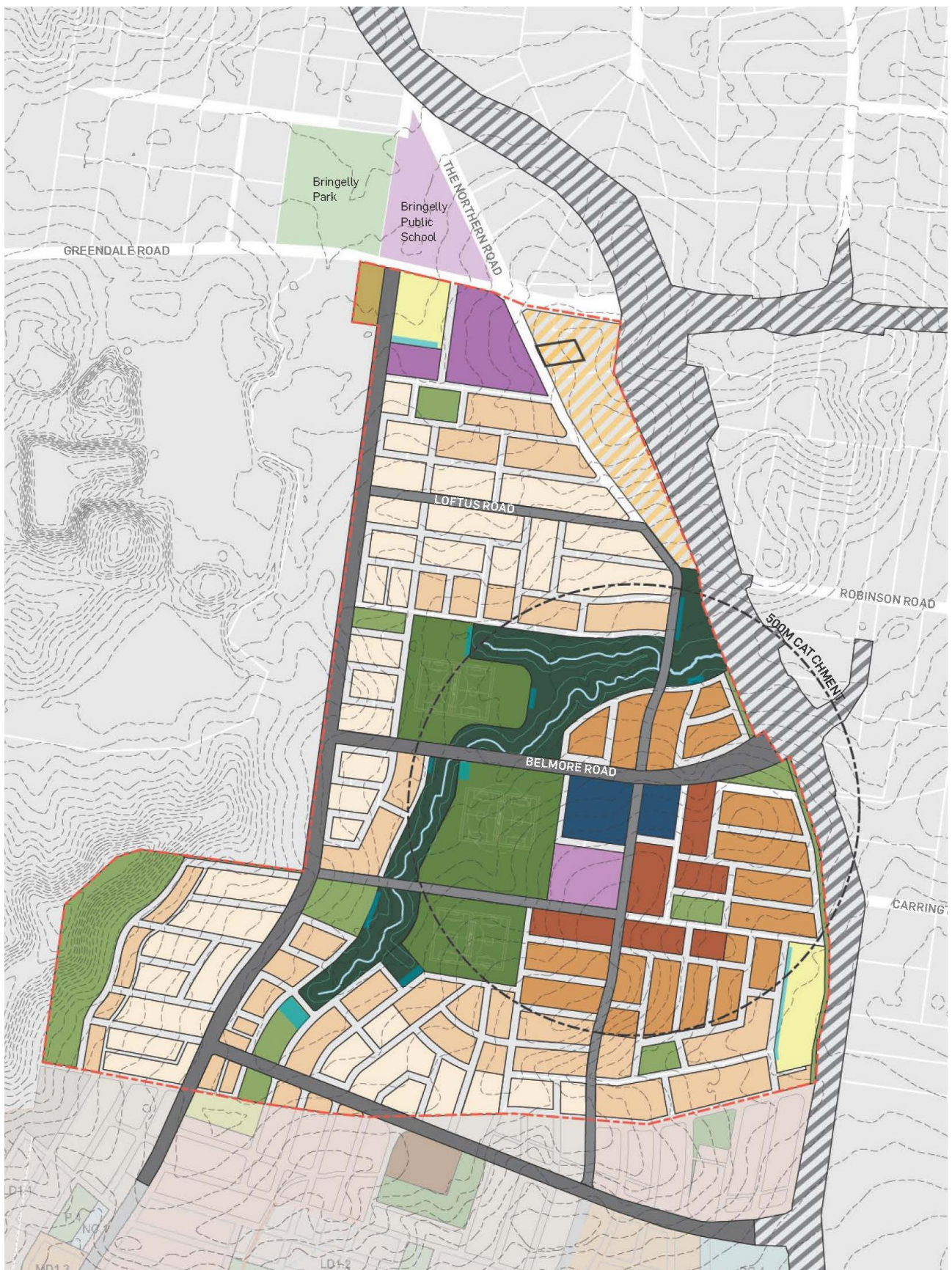


Figure 3 Indicative Layout Plan

4.1 LAND USES AND DISTRIBUTION

The distribution of land uses across the site takes advantage of the large scale of the site whilst also ensuring an efficient and sensitive development of the landholding. The development strategy varies across the site depending on the local context, with the residential areas promoting a walkable and highly amenable residential community, balanced by the employment lands along the Northern Road.

Use	Area (HA)/ Percentage of Precinct
Residential	110 (57.7%)
Low Density 1	41.6 (21.8%)
Low Density 2	35.4 (18.6%)
Medium Density 1	25.7 (13.5%)
Medium Density 2	7.3 (3.8%)
Local Centre	3.6 (1.9%)
Educational Establishment	2.0 (1%)
Roads	14.8 (7.7%)
Substation	0.8 (0.4%)
Employment Land	4.9 (2.6%)
Riparian Corridor	14.0 (7.3%)
Open Space Connection (Landscape Buffer)	1.0 (0.5%)
Local Parks	11.4 (6.0%)
Playing Fields	17.0 (8.9%)
Drainage Basins	4.2 (2.2%)
Sub-total	190.66 (100%)

4.2 LANDSCAPE MASTERPLAN

In collaboration with the Draft ILP, Urbis has also prepared a draft Landscape Masterplan, illustrated in **Figure 4**.

With consideration to the overall landscape character and open space demand identified in the Demographic, Social Infrastructure and Community Needs Assessment, an Open Space Strategy has been designed for the precinct and is underpinned by the following principles:

- Protect Environmental Quality
- Active Lifestyles
- Connectivity within and Beyond
- A Green Heart

The Belmore Road Landscape Masterplan proposes approximately 46.5 ha of open space, with approximately 37ha (80%) as usable open space across an extensive network of connected open space that conserves and reflects the landscape character and biodiversity of the precinct.

Overall, the landscape masterplan comprises of:

- 11.4ha passive open space.
- 17ha active open space/playing fields (including provision for sports fields within this space).
- 14ha riparian open space, of which 7ha is usable and provides connectivity to other open spaces.
- 4.2ha of open space associated with drainage basins, of which 2.11ha is usable.

A Street Tree Masterplan has also been developed for the precinct which provides an indicative layout of street trees and landscaping. The Street Tree Masterplan will help provide shade, comfort and amenity, particularly for pedestrians and to create visual order for the streetscapes.



Figure 4 Landscape Masterplan

4.3 ANTICIPATED TREE CANOPY

Based on the current distribution of uses and the Landscape Masterplan prepared by Urbis, it is anticipated the Belmore Road Precinct is capable of achieving **31% tree canopy coverage**.

Use	Area (HA)	Tree Canopy Assumption	Tree Canopy (HA)
Residential	110	20%	22.0
Local Centre	3.6	20%	0.7
Educational Establishment	2	40%	0.8
Roads	14.8	50%	7.4
Substation	0.8	10%	0.1
Employment Land	4.9	20%	1.0
Riparian Corridor	14	100%	14.0
Landscape Buffer	1	100%	1.0
Local Parks	11.4	80%	9.1
Playing Fields	17	10%	1.7
Drainage Basins	4.2	30%	1.26

While this is below the benchmark 40% tree canopy for the site, it is noted that the proposed Landscape Masterplan maintains an extensive tree canopy within the public domain and open spaces where trees can be planted early in the development of the Precinct and are likely to be better maintained. This ensures that the Precinct is not relying on private market housing within the Precinct to maintain the overall tree canopy long-term.

	Area (HA)	Tree Canopy (%)
Total Precinct Area	190.66	59.06 (31.0%)
Total Superlot Area	120.5	24.60 (20.4%)
Total Street Area	14.8	7.40 (50%)
Total Open Space Area	46.5	25.94 (55.7%)

ASSUMPTIONS

Residential Land

To anticipate the potential tree canopy and permeability of residential development within the precinct, an assessment has been undertaken of the relevant provisions of the Housing Code incorporated in *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* for residential dwellings as this is the likely planning pathway for the redevelopment of the site.

Lot Size	Lot area	Maximum GFA	Minimum Open Space
Attached -Semi detached / Rear (150 – 350sqm)	200m ² –250m ²	78% of lot area	44sqm to 55sqm
	>250m ² –300m ²	75% of lot area	62.5sqm to 75sqm
	>300m ² –350m ²	235m ²	65sqm to 115sqm
Detached (350 – 450sqm)	>350m ² –450m ²	25% of lot area + 150m ²	112.5sqm to 187.5sqm
Detached Large (450 – 600sqm)	>450m ² –560m ²	290m ²	160sqm to 270sqm
	>560m ² –600m ²	25% of lot area + 150m ²	270sqm to 300sqm

Based on minimum open space and the inclusion of driveways/pathways etc, an assumption of 20% tree canopy has been used as a minimum for residential land. This assumption ensures that the Precinct is not relying on private development to maintain tree canopy within the Precinct, with reliance focused on the public domain, streetscape and public parks.

ASSUMPTIONS

Educational Establishment

Schools Infrastructure NSW have prepared *Guidelines for School Site Selection and Development* (October 2020) which identifies metrics which are used by the State government in identifying school sizes and capacity. The urban design guidelines for site selection require 10sqm of open space per student based on maximum school enrolments for new schools.

The current Demographic, Social Infrastructure and Community Needs Assessment prepared by WSP anticipates the future educational establishment will have a demand of approximately 1,000 students. Based on the above metrics, approximately 50% of the identified school site (1 hectare) will be used as open space. To allow for pathways and other outdoor facilities, an assumption of 40% tree canopy is assumed for the school site.

Local Centre and Employment Land

An indicative design for the Local Centre and Employment Lands has been prepared by Urbis and is enclosed as part of the Draft Site Specific Development Control Plan for the Belmore Road Precinct. Based on the indicative design, the local centre will provide approximately 950sqm of communal open space associated with residential flat buildings and an addition 65sqm associated with the 3 metre vegetation buffer.

Based on the current DCP controls, the employment lands will provide a minimum 15% pervious surfaces and a 3 metre vegetated setback which will result in approximately 1 hectare of green space which can be considered as part of the green coverage of the site.

Based on the above numbers, an assumption of 20% tree canopy has been used for both the Local Centre and Employment Land

Roads

An indicative road network has been prepared by Urbis as part of the Draft Site Specific Development Control Plan for the Belmore Road Precinct. Based on the current street sections incorporated in to the DCP, street tree planting is required for all roads in the precinct. Based on a review of street sections, an estimate of 30% of road sections is dedicated to street trees and planting. This results in an assumed tree canopy of 50% for the road network.

Riparian Corridors and Local Parks

Riparian corridors and local parks have been designed to maintain existing mature trees and ensure additional planting can be provided across the site.

Playing Fields

While trees will not be located within playing fields, it is anticipated some tree coverage will be provided surrounding playing fields to provide shelter for spectators and the like. As such, an assumption of 10% is anticipated for playing fields.

Drainage Basins

The Belmore Road Draft ILP proposes a water management system that is integrated with the open space network. There are five (5) basins proposed across the Precinct, with three (3) integrated with the riparian corridor. Given the high level of integration with the open space and riparian network, an 90% rate of green coverage has been associated with drainage basins for the Precinct.



Figure 5 Indicative design for Sporting Fields

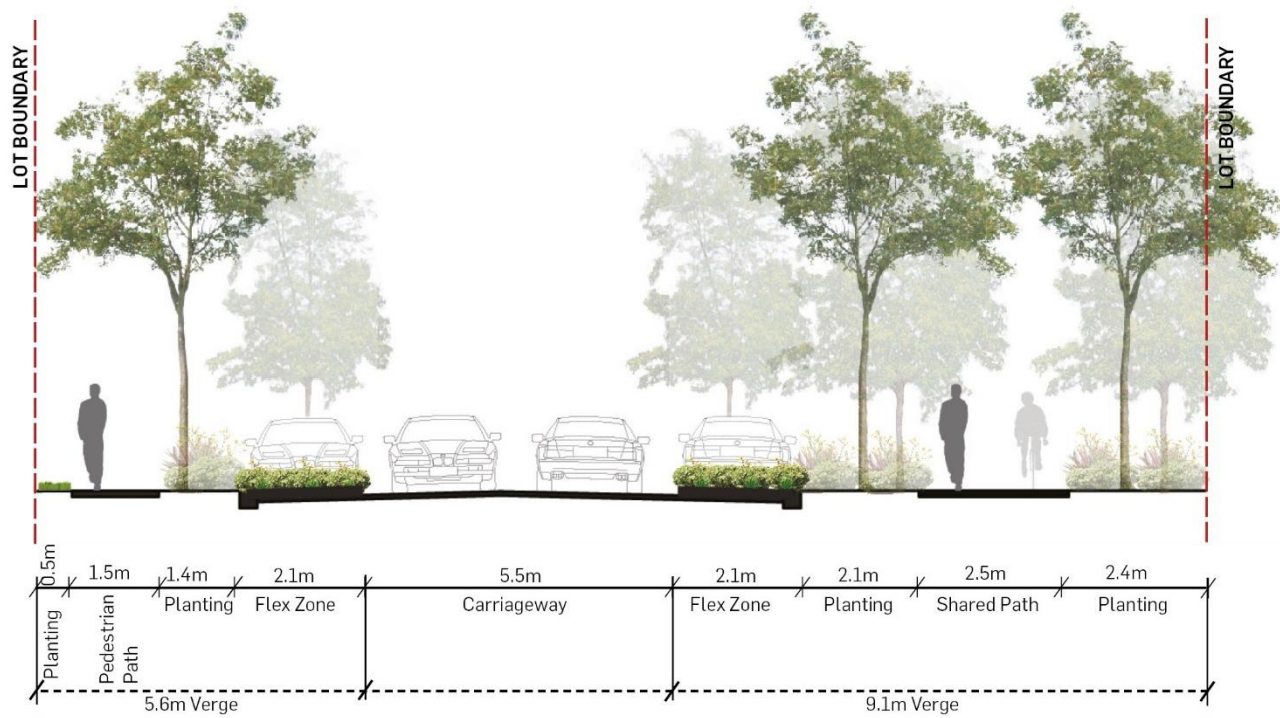


Figure 6 Typical street section (16.7 metre) with flex zones for parking and planting

5. POTENTIAL MEASURES TO ADDRESS URBAN HEAT

Local planning provisions are important mechanisms to influence built environment outcomes, and improved controls have the potential to reduce the impacts of urban heat. But this is also a new and complex space.

To inform the recommendations provided in this report, Urbis have reviewed the WSROC Urban Heat Planning Toolkit and Cool Suburbs tool to identify best-practice approaches which can be implemented into the overall design of the Belmore Road Precinct.

COOL SUBURBS TOOL

The Cool Suburbs Tool (CST) is a voluntary, industry-based performance (ratings) tool prepared by WSROC in 2022 for place-based heat resilience. The CST has been designed for use by both developers and government, with the goal of supporting improved heat-mitigation outcomes.





The CST is intended to inform and guide planning and development decisions by providing a synthesis of urban heat science in an easy-to-use platform.

The CST's objectives include:



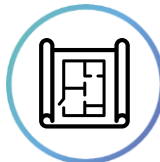

- Setting out a broad range of measures (represented by credits in the CST) that guide improved place-based urban heat resilience.
- Identifying specific measures that should be considered at different stages of the development process; supporting the Tool's use in early stages of planning and design.
- Scoring (via a rating system) the urban heat resilience of a range of developments from precinct to lot scale.
- Providing guidance for the assessment of urban heat resilience in existing, transforming, and new suburbs.

The following measures to address urban heat have been based on the design elements outlined in the Cool Suburbs Toolkit.

5.1 GREEN INFRASTRUCTURE

		Performance Measure	Recommendation
Green Cover 	<p>Greater green cover such as tree canopy and vegetation has shown to have a major impact on urban heat by increasing evapotranspiration and shading adjacent surfaces.</p>	<ul style="list-style-type: none"> ▪ Increase the amount of green cover including green spaces/parks and mature trees ▪ Retain existing trees where possible ▪ Increase tree canopy within the public domain 	<p>The current ILP has incorporated a range of green open spaces. Section 2.6 of the draft DCP provides details of open space network. Additional controls regarding tree retention are recommended</p>
Permeable and cooling surfaces 	<p>Roads and non-permeable surfaces have been identified as major heat sources in urban areas.</p>	<ul style="list-style-type: none"> ▪ Incorporate cool and permeable paving rather than impervious heat absorbing surfaces 	<p>Additional controls are recommended to encourage permeable and cool paving.</p>
Water Sensitive Urban Design 	<p>Urban heat mitigation starts with retaining water in the landscape.</p>	<ul style="list-style-type: none"> ▪ Incorporate green infrastructure such as passive irrigation systems, stormwater wetlands and rain gardens which provide a high level of water retention 	<p>WSUD measures are incorporated into the current draft DCP. Additional controls should encourage water retention within private properties, streetscapes and parks - e.g. with passively watered street trees</p>
Heat Resilient Social Infrastructure 	<p>Residents vulnerable to extreme heat include the elderly, people living with disability or chronic illnesses, and young children who do not have access to air conditioning.</p>	<ul style="list-style-type: none"> ▪ Provide a network of Council and community-run venues and associated services to support residents during a significant heatwave event such as heat refuges, covered bus shelters, as well as water bubblers and water play 	<p>Consideration of heat resilient social infrastructure should form part of the Landscape Masterplan and relevant DCP controls.</p>

5.2 DESIGN MEASURES

		Performance Measure	Recommendation
Roof colour and surfaces 	<p>The concentration of many houses with dark roof colours not only contributes to increased urban heat but they can also increase the temperature inside the individual houses.</p>	<ul style="list-style-type: none"> Roof colour selected for new developments should avoid dark colours in order to not attract and store heat 	<p>Introduce additional DCP controls relating to building design and materials.</p>
Solar Control Systems (Shading) 	<p>Outdoor shading is useful in reducing both ambient air temperature and surface temperature.</p>	<ul style="list-style-type: none"> Outdoor shading structures at parks and outdoor recreational facilities should be used where tree canopy cannot provide cover. 	<p>Review current DCP controls to ensure shading is encouraged</p>
Orientation 	<p>Prevailing winds and sun direction/exposure should be considered when developing building designs and street orientation.</p>	<ul style="list-style-type: none"> Encourage building design which takes advantage of prevailing winds, natural ventilation, and solar access 	<p>Introduce additional DCP controls relating to building design and materials.</p>
Thermally Safe Housing 	<p>Achieving cool homes is an essential element in mitigating the impacts of urban heat. Houses are a refuge during extreme weather, therefore houses must be able to maintain safe temperatures without the need for air-conditioning or heating (passive thermal performance).</p>	<ul style="list-style-type: none"> Encourage building design which takes advantage of prevailing winds, natural ventilation, and solar access 	<p>While BASIX will prevail for all residential housing, additional DCP controls relating to building design and materials for non-residential development should also be encouraged</p>

5.3 LOW CARBON PRECINCTS

Reducing energy use in building



Building more energy efficient housing and buildings is imperative for mitigating the effects of urban heat on the population. This also important for thermally safe housing

Performance Measure

- Incorporate maximum efficiency appliances

Recommendation

Introduce additional DCP controls relating to building design and materials for non-residential development.

Increasing renewable electricity generation



Reducing our reliance on fossils fuels is imperative if we want to reduce the effects of climate change.

- Encourage rooftop solar panels and residential battery storage

Introduce additional DCP controls relating to building design and materials for non-residential development.

Reducing transport emissions



Transport contributes to a significant amount of carbon emissions in Australia. It also contributes to air pollution levels, especially in urban areas

- Encourage active and public transport use
- Encourage EV vehicles

The ILP and Landscape Masterplan have been designed to provide a walkable community. Additional DCP controls are recommended to ensure that public facilities can be used during high heat events.

6. RECOMMENDATIONS

Council's Sustainability Strategy identify the need for planning controls for new development to mitigate urban heat and the urban heat island effect.

The Camden Local Strategic Planning Statement and Local Housing Strategy also includes priorities to ensure future development within Camden:

- Embeds sustainability into urban planning and design;
- Deliver low carbon precincts;
- Maximises connectivity and accessibility to riparian corridors; and
- Increases urban tree canopy coverage.

To achieve better building and design responses to urban heat and the urban heat island effect, the following recommendations are:

- **Introduce a new local provision the Precincts SEPP relating to Urban Heat**
- **Include measures in the site-specific draft DCP that address Urban Heat, with a particular focus on the street network and public domain.**
- **Introduce additional controls into the draft site-specific draft DCP that relate to specific development controls aimed at achieving sustainable and resilient buildings through building design and material choice.**

6.1 SEPP AMENDMENT

Cumberland Council and Penrith Council have recently introduced local provisions into their Local Environmental Plans (LEPs) to ensure that new development incorporates effective design and ongoing operation to reduce and remove urban heating from the environment and protect community health and wellbeing.

It is acknowledged that Camden Council is considering proposing a similar local provision with the *Camden Local Environmental Plan 2010* (Camden LEP). Given the site is located in the South-West Growth Centre, the intention of the current Planning Proposal is to rezone the site under the Precincts SEPP which would override any controls in the Camden LEP.

To ensure that urban heat is addressed by future controls, it is recommended that Appendix 5 Camden Growth Centres Precinct Plan of the Precincts SEPP incorporates a local provision relating to Urban Heat. Recommended wording is provided below (based on the gazetted provision from the Cumberland LEP, published in November 2021):

Appendix 5 Camden Growth Centres Precinct Plan – Clause 6.9 Urban Heat

(1) The objective of this clause is to ensure new development incorporates effective design and ongoing operation to –

- (a) reduce and remove urban heating from the environment, and*
- (b) protect community health and wellbeing.*

(2) In deciding whether to grant development consent for the purposes of commercial premises, industries or residential accommodation, the consent authority must consider whether –

- (a) the facade and roof of the proposed building and paved surfaces are designed to reduce adverse effects of solar heat on the surrounding land, including private open space and the public domain, and*
- (b) the awnings and eaves of the building are designed to provide shelter from the sun and improve public comfort at street level, and*
- (c) the heating, ventilation and air conditioning systems of the building are designed to minimise the release of heat in the direction of private open space and the public domain, and*
- (d) the development maximises the use of green infrastructure that is strategically designed and managed to support a good quality of life in an urban environment, and*
- (e) the development accommodates sufficient tree canopy, open space and deep soil zones to achieve urban cooling benefits, and*
- (f) the building is designed to achieve high passive thermal performance.*

In this clause –

deep soil zone -

- (a) means the soft landscaped part of a site area used for growing trees, plants and grasses that –*
 - (i) is unimpeded by buildings or structures above and below ground, and*
 - (ii) provides opportunities for groundwater infiltration and canopy trees, and*
- (b) does not include basement car parks, services, swimming pools, tennis courts and impervious surfaces including car parks, driveways and roof areas.*

green infrastructure means the network of green spaces, natural systems and semi-natural systems that support sustainable communities and includes waterways, bushland, tree canopy and green ground cover, parks and open spaces.

solar heat means radiant heat contained in the full spectrum of sunlight.

6.2 UPDATES TO CURRENT DCP CONTROLS

It is noted a Draft Development Control Plan has been prepared by Urbis as part of the original Planning Proposal Package currently being reviewed by Camden Council. Based on the initiatives and measures identified in **Section 5** of this report and updates to the ILP, the following updates are recommended to the draft Development Control Plan.

Current Draft Control	Recommended Updates
Section 2.4 Street Network	
	<p>Objectives</p> <ul style="list-style-type: none"> To ensure that new streets provide street trees and canopy cover to reduce the urban heat island effect.
<p>1. Consistency with the following cross sections and Table 3 is expected for all sub arterial, collector and local roads to ensure consistency of road layout and cross-section across the precinct.</p>	<p>Controls</p> <p>1. Consistency with the following cross sections and Table 3 is expected for all sub arterial, collector and local roads to ensure consistency of road layout and cross-section across the precinct.</p> <p>*Updates to the street sections have been recommended by Council to reflect other precincts in the SCW – these have been incorporated into the DCP</p> <p>2. Use pavements which are permeable and have low heat conductivity, resulting in less solar absorption. When using permeable pavers, it must be demonstrated there is no impact on the salinity or sodicity of underlying soils.</p> <p>3. Mature trees should be retained and incorporated into the subdivision and public domain design, where possible to contribute to the mature tree canopy cover in the neighbourhood, to provide visually interesting streetscapes, improve public amenity, improve air quality, and enhance tree canopy cover.</p> <p>4. Appropriate plant species are to be selected for the site conditions with consideration given to trees providing shade in summer and allowing sunlight in winter and to provide habitat.</p> <p>5. Lighting for streets should use energy efficient LED lighting</p>

6.2 UPDATES TO CURRENT DCP CONTROLS

Current Draft Control	Recommended Updates
Section 2.6 Open Space and Recreation Network	
	Objectives <ul style="list-style-type: none"> • <i>Design open space with measures that contribute to a reduction in the number of very strong and extreme heat stress days.</i> • <i>Harness the effects of blue and green infrastructure to enable urban cooling.</i>
<p>5. <i>The detailed design of local sporting fields, neighbourhood parks, recreation activity nodes are to be generally in accordance with the following:</i></p> <ul style="list-style-type: none"> a) <i>the need for a range of play spaces and opportunities to cater for all ages</i> b) <i>the provision of adequate parking, lighting and waste management facilities</i> c) <i>the inclusion of interpretative signage detailing local history, Aboriginal cultural values, environmental education themes and the like</i> d) <i>the provision of amenities such as seating and shade structures, drinking fountains, street lighting, street information signs, planter boxes, feature fencing and the like.</i> 	Control <p>5. <i>The detailed design of public domain including but not limited to local sporting fields, neighbourhood parks, recreation activity nodes should encourage the following design initiatives and features:</i></p> <ul style="list-style-type: none"> a) <i>a range of play spaces and opportunities to cater for all ages</i> b) <i>provision of adequate parking, lighting and waste management facilities</i> c) <i>inclusion of interpretative signage detailing local history, Aboriginal cultural values, environmental education themes and the like</i> d) <i>provision of amenities such as seating with adequate shading, drinking fountains, forms of evaporative cooling, street lighting, street information signs, planter boxes, feature fencing and the like.</i> ... 8. <i>For all public domain, use pavements which are permeable and have low heat conductivity, resulting in less solar absorption. When using permeable pavers, it must be demonstrated there is no impact on the salinity or sodicity of underlying soils.</i> 9. <i>Mature trees should be retained and incorporated into the subdivision and public domain design and retained to contribute to the mature tree canopy cover in the neighbourhood, to provide visually interesting streetscapes, improve public amenity, improve air quality, and enhance tree canopy cover.</i> 10. <i>Appropriate plant species are to be selected for the site conditions with consideration given to trees providing shade in summer and allowing sunlight in winter and to provide habitat.</i> 11. <i>Lighting for streets, parks and any other public domain spaces should use energy efficient LED lighting</i>

6.3 ADDITIONAL DCP CONTROLS

To ensure buildings and the public domain minimise cooling demand and to encourage sustainable design across the Precinct, the following updates are recommended to be incorporated in **Section 2 Development Planning** of the current draft Development Control Plan.

Recommended Controls

Mitigating Urban Heat

Objectives

- *Design built form and open space with measures that contribute to a reduction in the number of very strong and extreme heat stress days.*
- *Manage urban heat island effects to ensure a high level of comfort for workers and residents throughout the year, with a focus on hot days and the summer period.*
- *Minimise cooling demand indoors and heat absorbance through orientation, the design of roofs and facades and materials*

Controls

Building Orientation and Design

1. Subdivision is to maximise opportunities for solar access to lots taking account of slope and aspect and prevailing winds including consideration of required maximum building heights, building separation, setbacks and likely future orientation of dwellings and green infrastructure, including open space areas.
2. Orientate buildings to take advantage of prevailing winds, natural ventilation, and solar access to maximise passive cooling and where practical, minimise the need for air conditioning. Where possible, buildings should be orientated to include a north facing roof where a solar hot water system or collector can be installed.
3. Western and northern building facades should be designed to incorporate eaves, awnings or external shading devices to shield the building from hot summer sun, while allowing direct sunlight in winter.
4. Where possible, tree planting should be encouraged on western and northern building facades to shade external walls.
5. The building includes maximum efficiency appliances (4 star NABERS applicable to office development and Green Star to all other), such as 100% energy efficient lighting and 5-star efficient cooling and heating systems.
6. To minimise energy use, buildings should incorporate the following thermal design principles:
 - a) Seek to incorporate on-site renewable energy sources to supplement energy needs;
 - b) Use high levels of insulation as a simple means of reducing energy consumption; and
 - c) Provide effective metering systems to monitor the energy performance of buildings.

6.3 ADDITIONAL DCP CONTROLS

Recommended Controls

Building Materials

1. The following should be considered in the choice of building materials in all developments:
 - a) Energy efficiency;
 - b) Use of renewable resources;
 - c) Maintenance cost and durability;
 - d) Recycled or recyclable materials;
 - e) Minimal PVC content; and
 - f) Ideally locally sourced materials.
2. External finishes should contain a combination of non-reflective materials and light colours to minimise reflection and heat retention. Dark or black external wall colours (including roofs) should not exceed 10% of the total wall space in developments.
3. 50% of rooftops are either vegetated, light coloured or irrigated using harvested stormwater within the Local Centre and Employment Precinct.
4. Integrate green infrastructure into buildings, including healthy vegetation, green walls, and irrigation in open spaces
5. Encourage water retention in irrigation systems used.

7. CONCLUSION

This Urban Heat Report has been prepared to support the rezoning of the Belmore Road Precinct within the South West Growth Area. The site is identified as a strategic local for urban development.

This report has assessed the current Planning Proposal package to identify how the current design has addressed the effects of urban heat and to recommend any further measures which should be considered by Council.

Having considered all relevant matters, the proposal represents a sound development outcome that fulfils the vision to develop Belmore Road Precinct into a high-quality master planned community in Western Sydney.

