

# S5 - NEXTDC DATA AND INNOVATION CENTRE | SSSA Architectural Report

April 2024

Revision: CP01 - SSSA ISSUE



## Executive Summary

This NEXTDC Data Centre Shiraz 5 Architectural Design Report has been prepared by HDR on behalf of NEXTDC Limited to accompany a detailed State Significant Development Application (SSDA) for the data centre development at 269 Lane Cove Road. The legal description of the site is Lot 3 in Deposited Plan (DP) 1129811.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD-63168959).

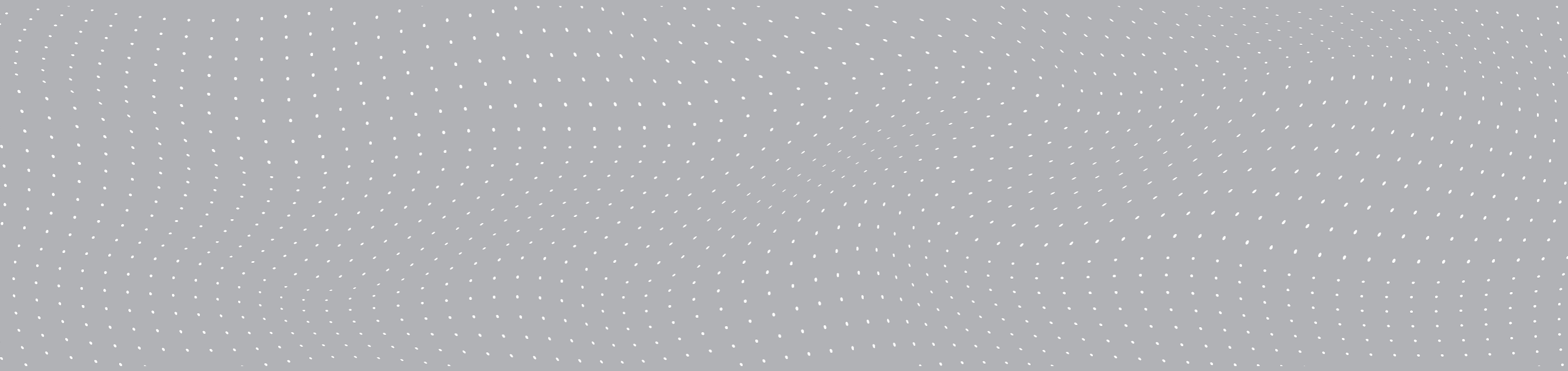


## Acknowledgement of Country

We acknowledge that Macquarie Park sits on the local land belonging to the Wallumattagal people of the Dharug Nation whose culture and customs have nurtured, and continue to nurture this land.

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# 01\_ Overview

## 1.1. Project Introduction

This report has been prepared to accompany a detailed SSDA for the proposed data centre development at 269 Lane Cove Road, Macquarie Park (SSD-63168959).

The application seeks consent for construction and operation of a data centre development and includes site preparation works, bulk earthworks and infrastructure, and construction of the buildings, ancillary facilities, and associated site works. The application also includes the delivery of two internal roads and an urban plaza adjacent to the Macquarie Park Metro Station entrance.

### **Specifically, the Project comprises the redevelopment of the site as summarised below:**

- Site preparation works including demolition and removal of existing structures, tree removal and bulk earthworks.
- Staged construction and operation of two data centre buildings (Building A and Building B), each with a maximum height of 65 metres and a combined total gross floor area (GFA) of 46,935m<sup>2</sup> comprising 33,643m<sup>2</sup> of technical data hall floor space and 13,292m<sup>2</sup> of office, retail and innovation hub floor space.
- Building A will be delivered in Stage 1, comprising:
  - Basement parking for 105 cars including four accessible spaces and 10 EV spaces.
  - Two retail tenancies at ground level: 335m<sup>2</sup>.
  - Lobby and innovation hub including auditorium and training rooms: 3,192m<sup>2</sup>.
  - NEXTDC and mission critical (MCX) office floor space: 9,765m<sup>2</sup>.
  - Seven storeys of technical data floor space accommodating seven data houses: 17,258m<sup>2</sup>
  - Utilities including diesel generators (2MWe), above-ground water tanks for industrial water (460kL each), above-ground diesel storage tanks (110kL each) and an above-ground water tank for fire water (350kL each).
  - Business identification signage facing Waterloo Road and Lane Cove Road.
- Building B will be delivered in Stage 2, comprising:
  - Seven storeys of technical data floor space accommodating seven data halls: 16,385m<sup>2</sup>.
  - Construction of a sky bridge which will connect with Building A, providing direct access between the data halls.
  - Utilities including diesel generators (2MWe), above-ground water tanks for industrial water (460kL each), above-ground diesel storage tanks (110kL each) and an above-ground water tank for fire water (350kL each).
  - Business identification signage on the western and southern building facades.
- Landscaping across the site in accordance with the project staging, delivering a mix of native and endemic plant species, shrubs and grasses, including 93 additional trees within a total area of 4,835m<sup>2</sup> deep soil and a resultant tree canopy cover of 6,211m<sup>2</sup>.
- Staged delivery of public domain works, including:
  - Stage 1: construction of the northern extent of Road 13 from Waterloo Road and urban plaza between Building A and Waterloo Road.
  - Stage 2: construction of the remaining southern extent of Road 13 and the full extent of Road 5.
- Delivery of 90 megawatts of power (via a separate application with Ausgrid) with a 33kV switching station to be accommodated on site, as well as other site services, including stormwater infrastructure.

# 01\_ Overview

## 1.1. Project Introduction

Descriptor	Project Details
<b>Project Area</b>	The site has a total area of approximately 22,381m <sup>2</sup> . The entire site area will be disturbed as a result of the Project. The site does not contain any environmental constraints
<b>Proposed Use</b>	Data centre with ancillary office and innovation space. Two retail premises at ground level
<b>Project Description</b>	<ul style="list-style-type: none"> <li>Demolition of existing buildings and structures.</li> <li>Site preparation works including tree removal, bulk earthworks, excavation and construction of retaining walls.</li> <li>Staged construction of two data centre buildings including technical data hall floor space, ancillary office and innovation space and two ground floor retail premises.</li> <li>Vehicle access via Waterloo Road with on-site car parking and loading within basement.</li> <li>Associated landscaping including a trees, shrubs and grasses.</li> <li>Business identification signage.</li> <li>Staged delivery of public domain works via a Planning Agreement, including construction of Road 5 and Road 13 and an urban plaza between Building A and Waterloo Road.</li> <li>Provision of required utilities, including an on-site switching station.</li> </ul>
<b>Gross Floor Area</b>	Total GFA of 46,935m <sup>2</sup> , broken down as follows: <ul style="list-style-type: none"> <li>Data halls/technical: 33,643m<sup>2</sup></li> <li>Lobby and innovation hub: 3,192m<sup>2</sup></li> <li>MCX office: 9,765m<sup>2</sup></li> <li>Retail including BOH 335m<sup>2</sup></li> <li>Total number of data houses: 14 data houses</li> </ul>
<b>Building Height</b>	<ul style="list-style-type: none"> <li>Building A: office and innovation hub – 49 metres over 10-storeys</li> <li>Building A: data centre – 65 metres over nine-storeys</li> <li>Building B: data centre – 65 metres over nine-storeys:</li> </ul>
<b>Proposed Floor Space Ratio</b>	2.1:1



# 01\_ Overview

## 1.1. Project Introduction

<b>Deep Soil Area</b>	4,825m <sup>2</sup> of deep soil area (21.6% of site area or 27.7% of developable site area)
<b>Car Parking</b>	105 car spaces including 4 DDA spaces and 10 EV spaces
<b>Motorbike Spaces</b>	11 Spaces
<b>Bicycle Spaces</b>	12 Spaces
<b>Utilities</b>	<p>Provision of required utilities including:</p> <ul style="list-style-type: none"> <li>• 60 x diesel generators (2MWe).</li> <li>• 12 x above-ground diesel storage tanks (110kL each).</li> <li>• Eight above-ground water tanks for industrial water (460kL each).</li> <li>• Two above-ground water tanks for fire water (350kL each).</li> <li>• 33kV switching station.</li> </ul>
<b>Power Consumption</b>	90 megawatts
<b>Operations and Management</b>	The facility will be constructed and operated by NEXTDC. The site will be operated on a 24-hour, 7 day a week basis.
<b>Existing Services and Infrastructure</b>	The site is fully serviced; however, existing services and infrastructure will be extended, adapted and augmented to meet the demands of the Project. A new 33kV switching station will be required to provide power to the site in the event of an emergency blackout to facilitate power to the generators.
<b>Staging/Phasing</b>	<p>The Project will be constructed in two stages:</p> <ul style="list-style-type: none"> <li>• Stage 1 will include the early works for the entire site, construction of Building A, the urban plaza and the northern section of Road 13.</li> <li>• Stage 2 will include construction of Building B, including a skybridge connection to Building A, Road 5, and the remainder of Road 13.</li> </ul>



## 01\_ Overview

### 1.2. SEARs Response

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 8 November 2023 issued for the SSDA (SSD-63168959). Specifically, this report has been prepared to respond to the SEARS requirement issued below

Item	Description of Requirement	Section Reference
<b>Design options</b>	Identify design options considered during the iterative process and demonstrate the proposed development has been optimised to provide an integrated landscape design and to minimise amenity impacts by having regard to the relevant evaluation criteria in Better Placed (Government Architect NSW, 2017)	Section 4_Built Form and Design Strategies
<b>Site Analysis</b>	Explains and illustrates the proposed built form, including a detailed site and context analysis to justify the proposed site planning and design approach	Section 2_Site Context & Analysis Section 3_Site Design
<b>Built Form</b>	Demonstrates how the proposed built form (layout, height, bulk, scale, separation, setbacks, interface and articulation) addresses and responds to the context, site characteristics, streetscape and existing and future character of the locality	Section 3_Site Design
<b>Building and Facade Design</b>	Demonstrates how the building design will deliver a high-quality development, including consideration of facade design, articulation, materials, finishes, colours, any signage and integration of services	Section 5_Materiality and Facade
<b>Better Placed</b>	Demonstrates how the development will achieve good design in accordance with the seven objectives for good design in Better Placed (Government Architect NSW, 2017)	Section 7_Better Placed
<b>DDA</b>	Assesses how the development complies with the relevant accessibility requirements.	Refer to SSDA Access Review Report

# 01\_ Overview

## 1.3. Project Vision

### A new approach to Data and Innovation Centre Design

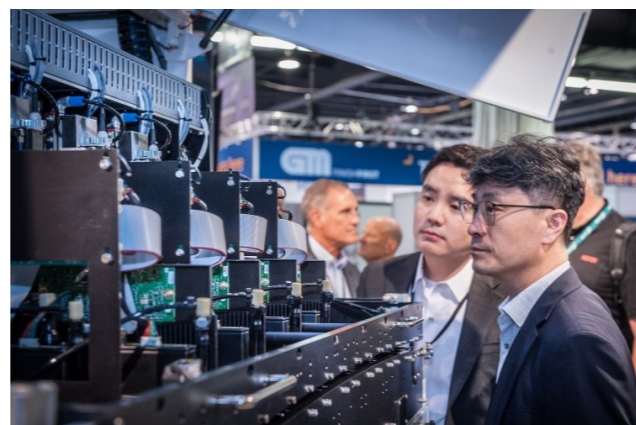
The Shiraz 5 facility is a true mixed use facility and is unlike any other Data Centre. It takes a significantly different approach to standard industry security design for the sake of the public domain, landscape and active publicly accessible uses.

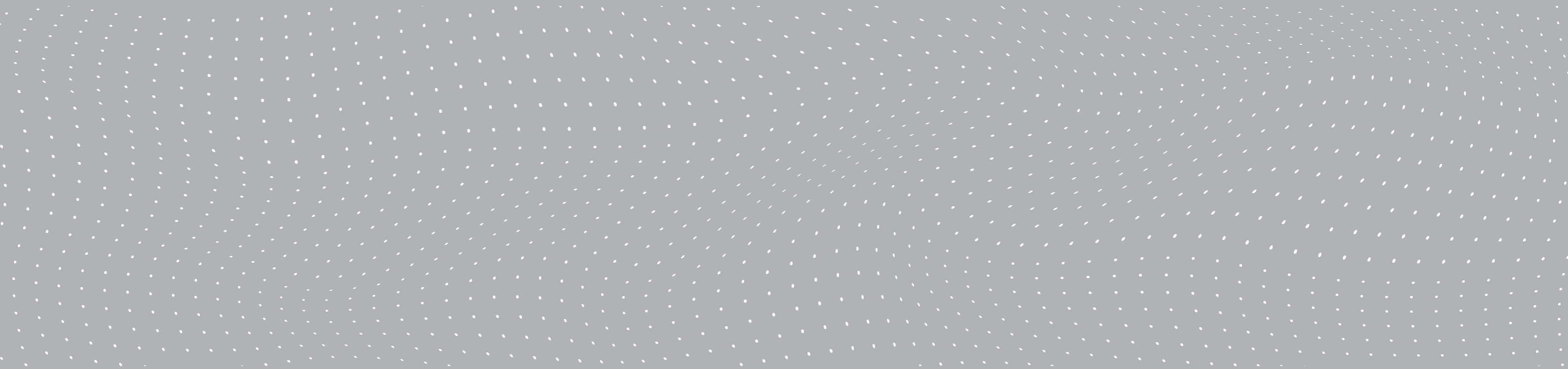
Within the facility are display areas for technology showcases such as; communications and security technology, advanced batteries and energy systems, computer cooling technology as well as new types of computers and microprocessors underpinning neural networks and artificial intelligence.

The auditorium and support spaces allow for industry seminars, conferences, workshops and other learning and training opportunities for tenants, clients, consultants and contractors as well as broader industry partners and stakeholders in government and universities.

The data halls and mission critical centre offices provide specially designed, resilient spaces for tenants and agencies which require guaranteed levels of uptime such as; telecommunications, banking, commercial cloud, defence and disaster recovery.

With its broad glazed frontage to a large public forum, sky gardens, public transport integration, generous unfenced landscape curtilage, public streets and ways crossing the campus and retail shops embedded in the envelope, Shiraz 5 inverts the standard model of a ring fenced fortress to deliver critical digital infrastructure in a way which is completely new, different and engaging.





# 02\_ Site Context & Analysis

## 2.1. Regional Context



### Legend

- S5 Site
- Sydney CBD
- Other Data Centres

## 02\_ Site Context & Analysis

### 2.2. Site Description

The site is located at 269 Lane Cove Road, Macquarie Park and is legally described as Lot 3 in Deposited Plan (DP) 1129811. It is located on the corner of Lane Cove Road and Waterloo Road and is made up of a single rectangular lot and is approximately 22,381m<sup>2</sup> in size. An aerial photograph of the site is provided at Figure 1.

The site is located in the City of Ryde Local Government Area (LGA) within the Macquarie Park corridor, an established employment precinct with a particular focus on innovation. Macquarie Park is a nationally significant research and employment centre and includes the head offices for some of Australia's leading companies including Foxtel, Optus and Siemens. The site is approximately 2km southeast of Macquarie University, and 1.5km southeast of Macquarie Shopping Centre.

Existing development includes a two-storey office furniture store (Work Arena) at the northern end of the site and offices and studios associated with Foxtel in the southern portion of the site. Scattered trees exist along the site boundaries, particularly within the western setback to Lane Cove Road, along the southern boundary and the eastern boundary.

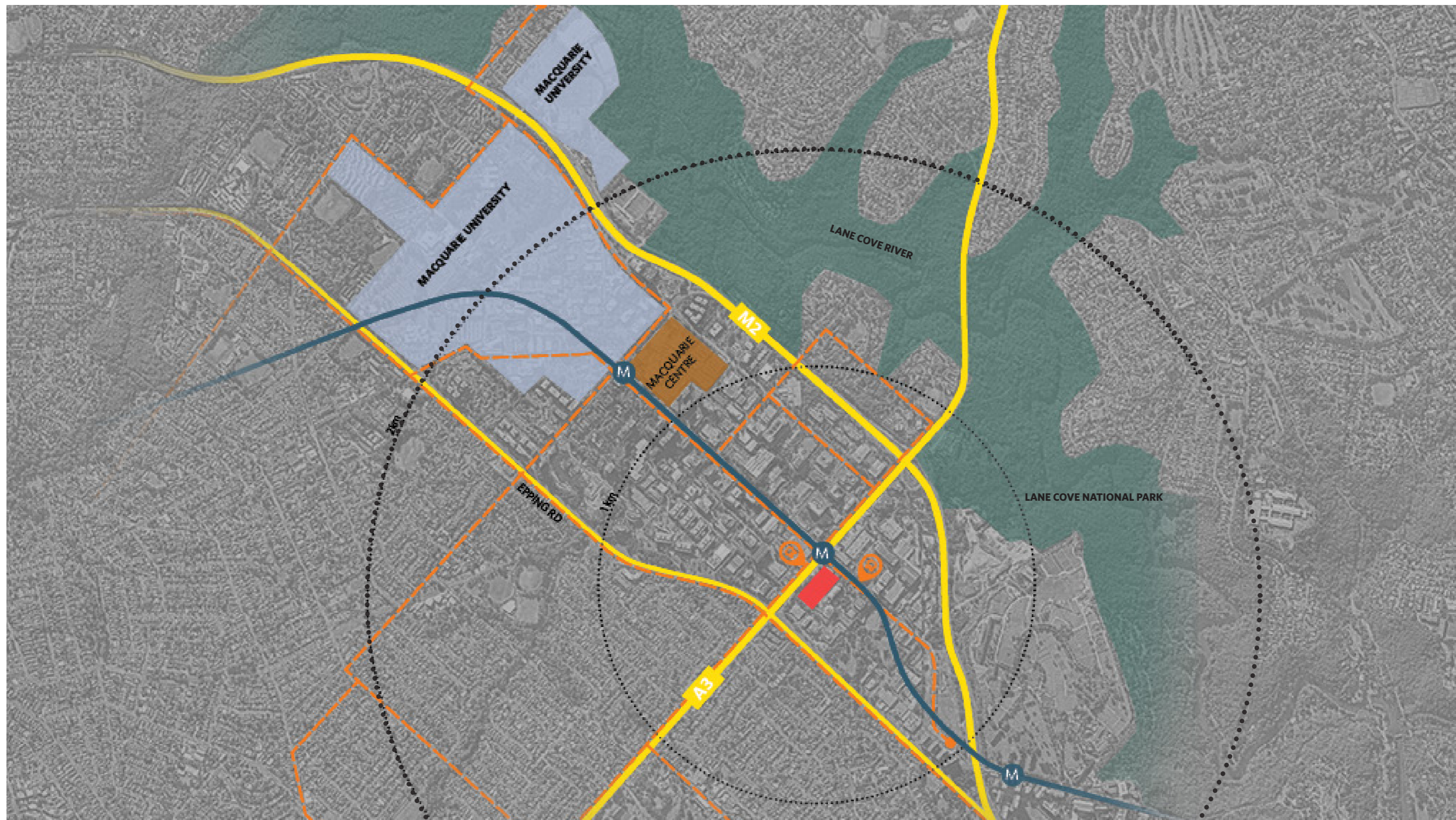
Vehicle access to the site is currently provided from Waterloo Road with an internal driveway providing access to several at-grade parking areas. A further vehicle crossover has been constructed along the Lane Cove Road frontage; however, it is not currently in use and barriers have been installed prohibiting access.

The site is well serviced by public transport with several bus routes operating along Lane Cove Road and Waterloo Road. The entrance to Macquarie Park Metro Station is immediately to the north of the site. The site includes a lengthy frontage to Lane Cove Road which provides access to the M<sup>2</sup> Hills Motorway and Epping Road.



# 02\_ Site Context & Analysis

## 2.3. Site Access



### Legend

- Site
- Bus
- Metro
- Arterial Roads

## 02\_ Site Context & Analysis

### 2.4. Solar Study

The subject site is located within Macquarie Park, and forms part of the strategic centre of the Macquarie Park Corridor.

The subject site is bound to the north by Waterloo Road, and to the west by Lane Cove Road (which connects directly to the M<sup>2</sup> Motorway) generating significant traffic noise.

The site has its major façades facing east-west which will increase exposure to heat loads to the future built form.

Macquarie Park train station is located in the NW corner of the site providing great public transport connectivity.

The site has a significant fall from south down to the north-east of approximately 14m. A landscaped berm exists along Lane Cove Road.

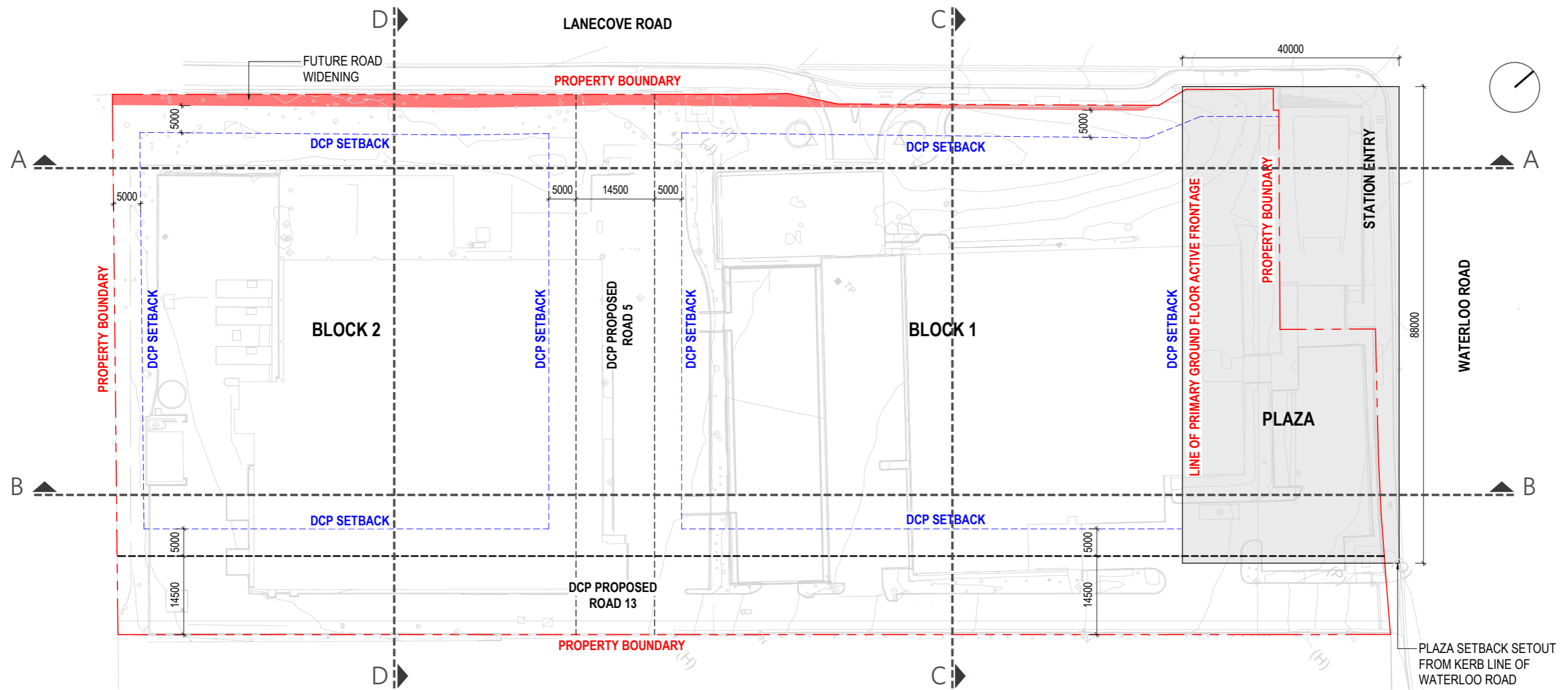
Upper levels of the MCX/Office will provide district views and views to the Lane Cove National Park to the north of the site.

The Macquarie Park Corridor is already a key economic contributor for the wider catchment, with further strategic intent to evolve as a health and education precinct, providing an important economic and employment centre for Sydney's Northern District.



# 02\_ Site Context & Analysis

## 2.5. Site Topography and Site Constraints



Site Section A



Site Section B



Site Section C



Site Section D

### Legend

- Site Boundary
- DCP Setback
- Proposed Widening Lane Cove Road
- Public Plaza

# 02\_ Site Context & Analysis

## 2.6. Planning Control Summary

- Deliver a series of high-quality open spaces
- Connectivity between the open spaces and providing woven ways and through-site access
- Urban tree canopy covers 35% commercial Core
- Locate taller buildings where they have least shadow impact on public realm spaces and take advantage of views
- Encourage innovative, creative, and high-quality building design that positively contributes to the public domain
- Achieve a high-level of sustainable development
- Taller building avoid visual bulk when viewed from the public domain
- Ensure active frontages are prioritised to address open spaces and human scale at the street level

<p>1.4 km of new road connectivity 2.3 km of new fine grain pathways</p> <p>1 Macquarie Park to Randwick via Train Link</p> <p>2 Pedestrian crossings - Lane Cove Rd/Waterloo Rd</p> <p>3 Grade separated pedestrian crossing of Lane Cove Rd at Waterloo Rd</p> <p>4 BPIP Stage 1 and 2 improvements</p> <p>5 Waterloo Rd improvements: bus lanes, fine grain street access</p> <p>6 Lower speed limits - Waterloo Rd, Lane Cove Rd</p> <p>7 Pedestrian grade separated overpass/landbridge over Lane Cove Rd at Hyundai Drive</p>	<p><b>Legend</b></p> <p><b>Movement</b></p> <ul style="list-style-type: none"> <li>Arterial roads</li> <li>Road network</li> <li>Proposed new roads</li> <li>Proposed pedestrian footpaths</li> </ul> <p><b>Open Space</b></p> <ul style="list-style-type: none"> <li>Waterloo Road linear park</li> <li>Existing open space</li> <li>New open space</li> <li>Fine grain open space</li> <li>Woven ways</li> </ul>	<p><b>Land Use</b></p> <ul style="list-style-type: none"> <li>Metro station</li> <li>Commercial core</li> <li>Previously Rezoned Precincts</li> <li>Activity hub</li> <li>Activity hub (commercial focus)</li> <li>Fine grain active frontages</li> </ul> <p>7,000 - 8,000sqm of enhanced open space 2,000 - 3,000sqm of new open space</p> <ul style="list-style-type: none"> <li>A Thomas Holt Drive park</li> <li>B Local plaza</li> <li>C Corridor square</li> </ul>
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# 02\_ Site Context & Analysis

## 2.7. Macquarie Park Place Strategy

### GARI NAWI (SALT WATER CANOE) MACQUARIE LIVING STATION

Gari Nawi, meaning the saltwater canoe, is the Southern end of Nawi or Waterloo Corridor.

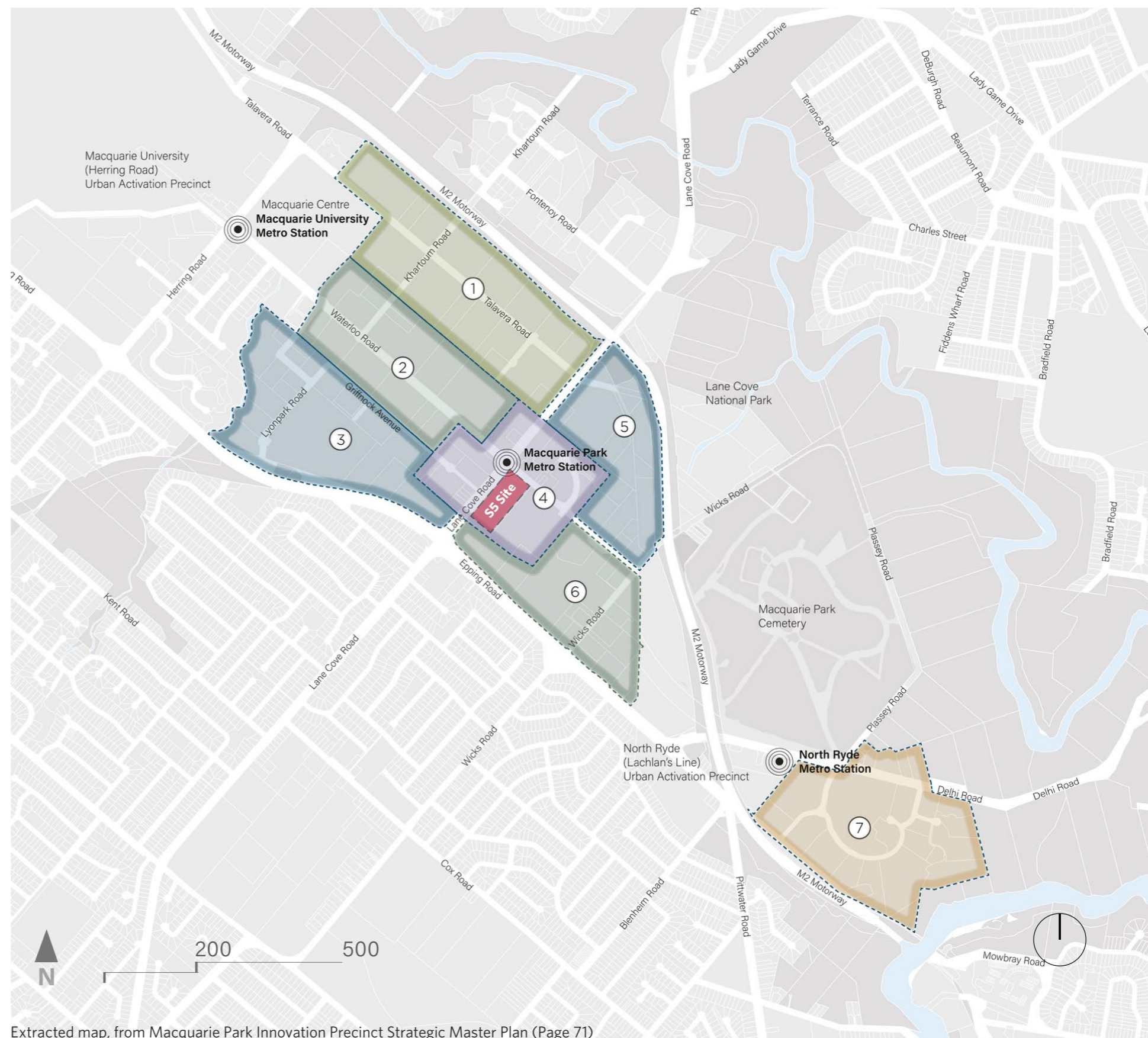
The Macquarie Living Station is characterised by high levels of metro connectivity and access to strategic bus routes. The neighbourhood has capacity to develop into a denser and more integrated place to support economic vitality.

The approach to each neighbourhood is underpinned by a series of key moves which build upon the structure plan – these key moves cover:

-  **Anchors** - Commercial anchors or differentiating business cluster with a range of scales of business type
-  **Connections to Ngurra** - An accessible natural asset and connections to Ngurra, specifically the creeks
-  **Spaces for Culture** - Cultural anchors or potential to form new cultural places of gathering and/or learning
-  **Focus of Movement** - A movement structure / interchange that can encourage public transport usage and support walking\*
-  **Collaborative Partners** - Aligned and assembled landowners and stakeholders working towards the delivery of the vision
-  **Residential Opportunity** - An approximate number of dwellings that will be introduced

The seven neighbourhoods are:

1. *Ngalawala (Reciprocity)* - North Park
2. *Butbut (Heart)* - Waterloo Park
3. *Waragal BIRRUNG (Evening Star)* - Shrimptons Quarter
4. *Gari Nawi (Saltwater Canoe)* - Macquarie Living Station
5. *Burbigal (Morning)* - Porters Creek
6. *Garungul (Unbreakable)* - Wicks Road South
7. *Narrami Badu-Gumada (Connecting Water Spirit)* - North Ryde Riverside

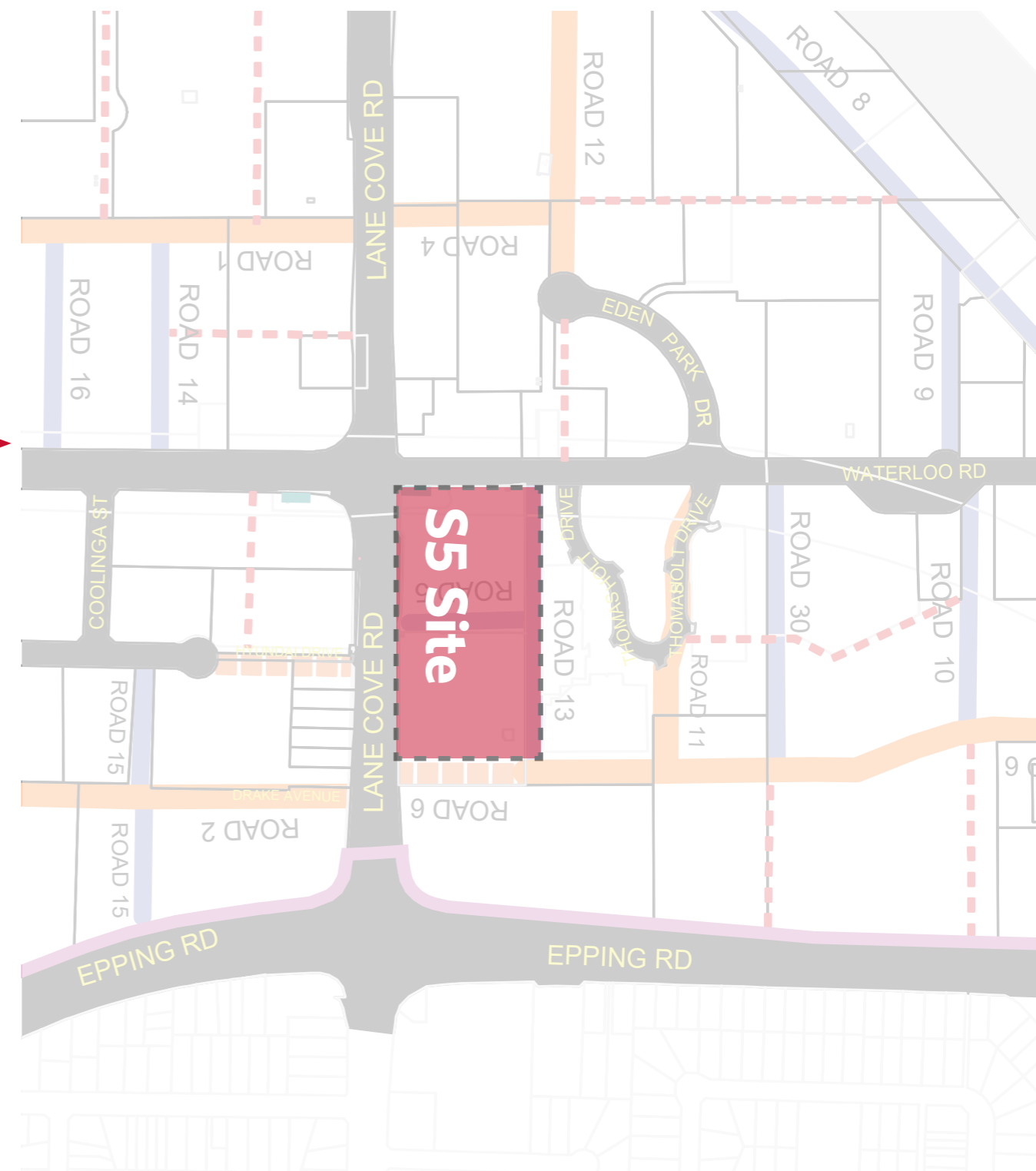
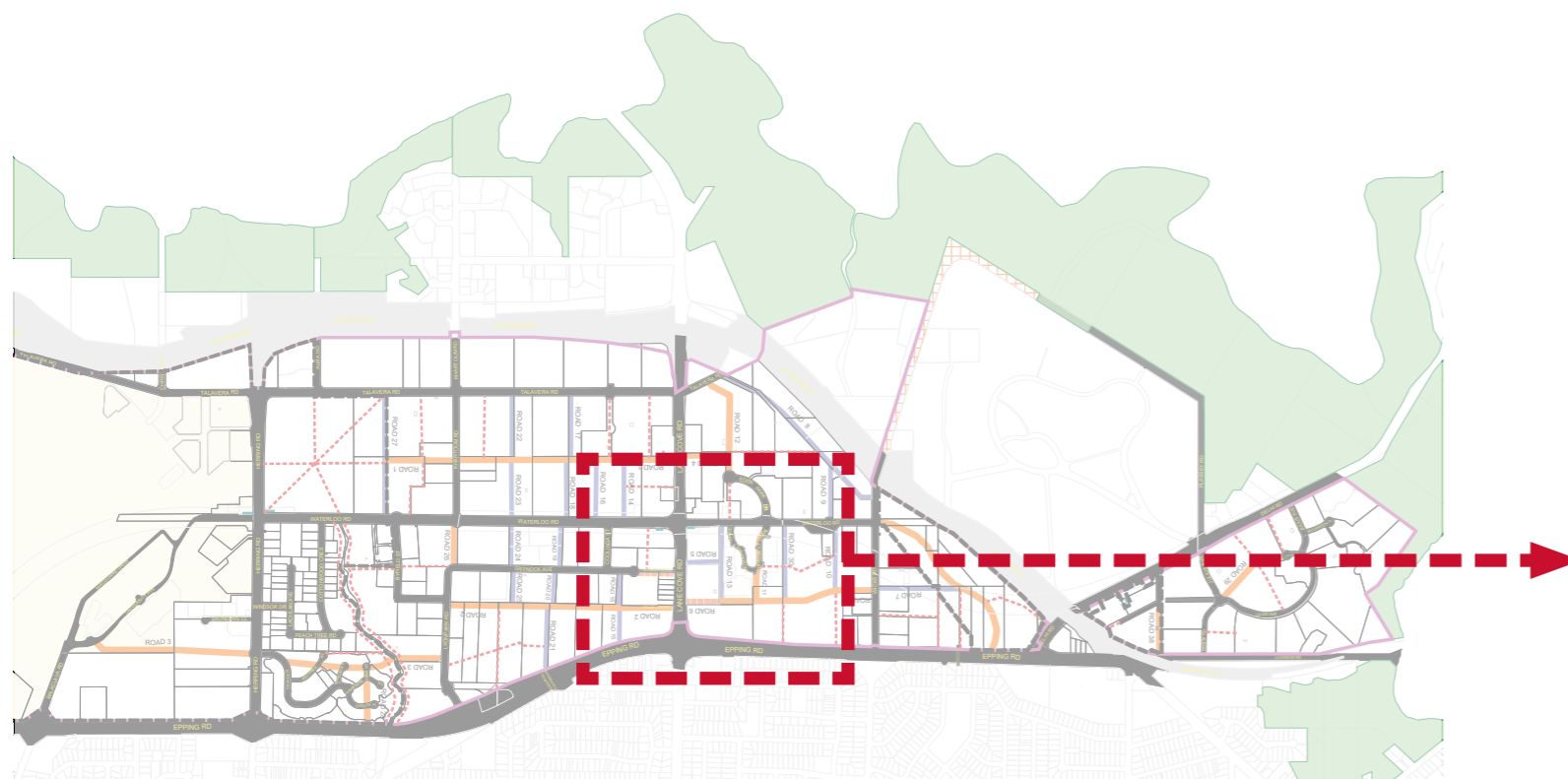


Extracted map, from Macquarie Park Innovation Precinct Strategic Master Plan (Page 71)

# 02\_ Site Context & Analysis

## 2.8. Development Incentives

### Fine Grain Road Network 5 & 13



- Legend**
- Existing motorway
  - Existing Road
  - Proposed new 14.5m Road
  - Proposed new 16m Road
  - Proposed new 20m Road
  - Required pedestrian connections
  - Wicks Road - Plassey Rd. to be investigated
- Cadastre**
- Cadastre 1/02/2014
  - Herring Road & North Ryde Station Priority Precincts
  - Macquarie University
- Additional information**
- Macquarie Park Corridor boundary
  - Rail station entry
  - Lane Cove National Park

# 02\_ Site Context & Analysis

## 2.9. Public Plaza and Primary Active Frontage

### 5.7 Rail Station Plazas

#### Objectives

1. To provide a square/ plaza, with active building frontages.
2. To provide clear unimpeded views and access from station square from surrounding streets.
3. To address level changes by creating a series of terraces that tie into adjoining footpath levels.

#### Controls

a. Provide the following Station plazas (including fittings):

- i. Macquarie Park Station Plaza - West  
Area: Provide minimum 0.35 ha  
Dimensions: Provide minimum 88 x 40m  
Install minimum 10 park benches and 10 bicycle parking spaces.
- ii. Macquarie Park Station Plaza – East  
Area: Provide minimum 0.35 ha  
Dimensions: Provide minimum 88 x 40m as shown in Figure 5.7.3.  
Install minimum 10 park benches and 10 bicycle parking spaces.
- iii. Macquarie University Station Plaza – East  
Area: Provide minimum 0.67 ha  
Dimensions: Provide minimum 80 x80 m as shown in Figure 5.7.4.  
Install minimum 10 park benches and 10 bicycle parking spaces.

Note: The Macquarie University Station Plaza - West has an approximate area of 0.5 ha

- b. Station plazas are to be privately owned public space. Station plazas are to be accessible at all times.
- c. Provide Continuous Active frontage to station plazas refer also Figure 5.7.3, 5.7.4, and 5.7.5.
- d. Minimise large banks of stairs. If stairs are used to provide alternative access to ensure equitable access for all.
- e. Provide unimpeded and generous entrances and circulation paths into and through the plaza.
- f. Provide infrastructure (such as gas, power and water supply) and subject to consent, appropriately scaled kiosks, vendor stalls, cafes and restaurants) that will enhance the rail station plazas as meeting places and support activities such as markets, community events, leisure and recreation.
- g. Provide wireless internet connection to all publicly accessible space, particularly station plazas.

#### Station Plaza Setbacks

- h. Provide building setbacks for adequate pedestrian circulation space around train stations.

#### Paving and Park Furniture

- i. Provide paving, lighting bins and directional and information signage in accordance with Macquarie Park Public Domain Technical Manual.
- j. Install lighting to contribute to public safety.
- k. Locate bins at square entries/exits.

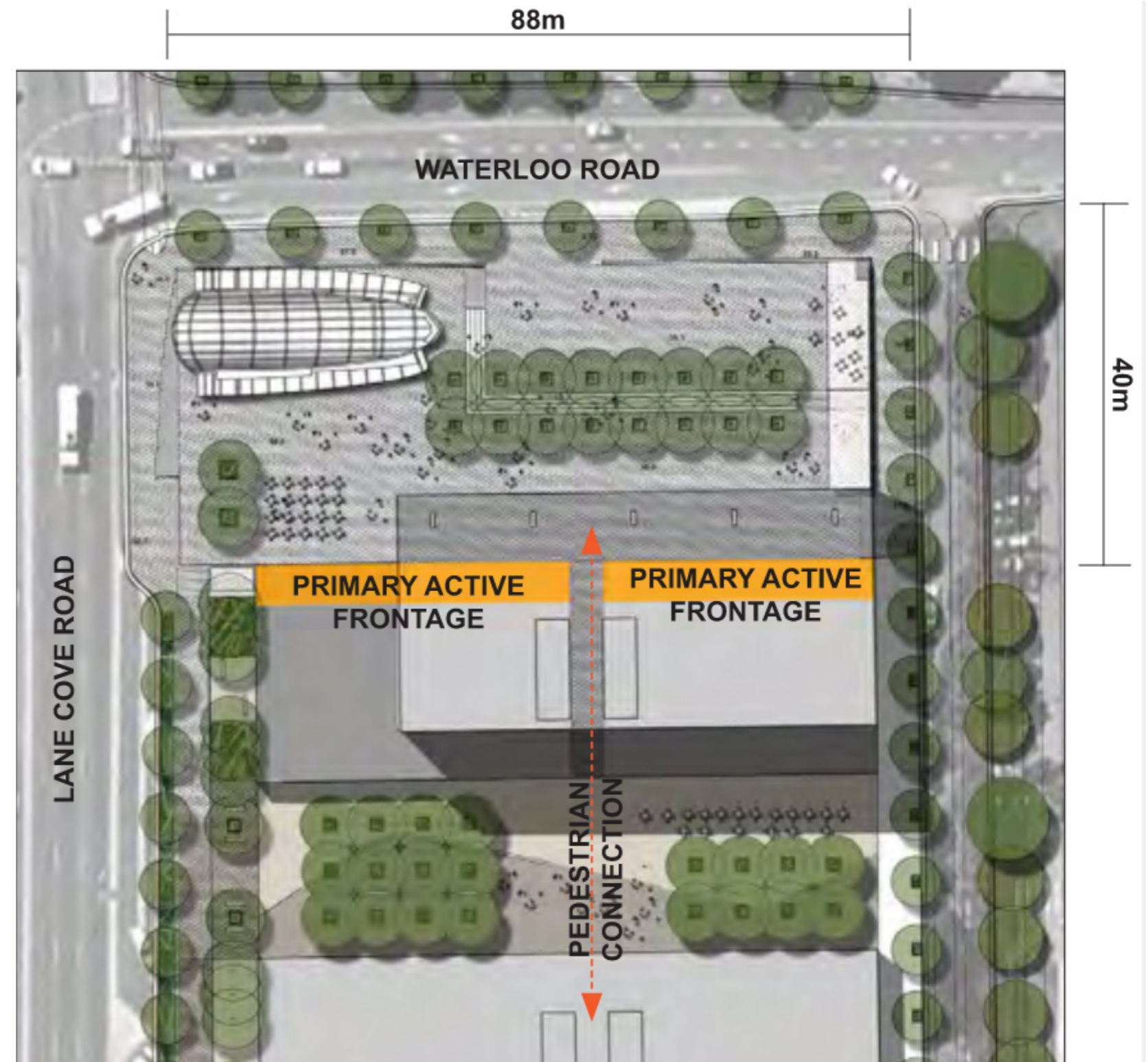
Development Control Plan 2014

Final

Adopted

Extracted from City of Ryde DCP 2014, Part:4.5 Macquarie Park Corridor (Page 35)

NEXTDC - SHIRAZ S5

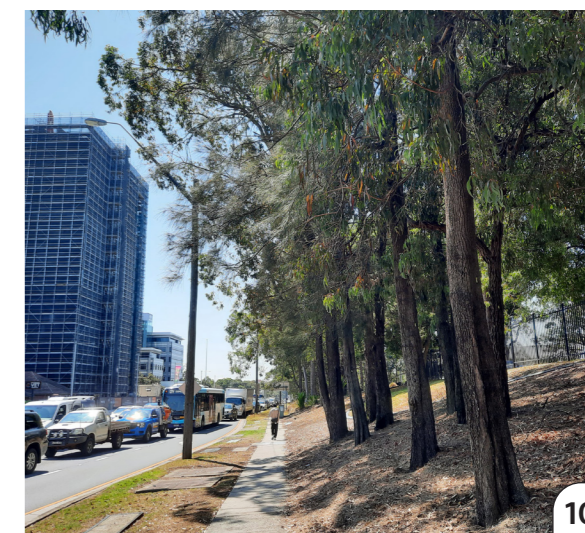
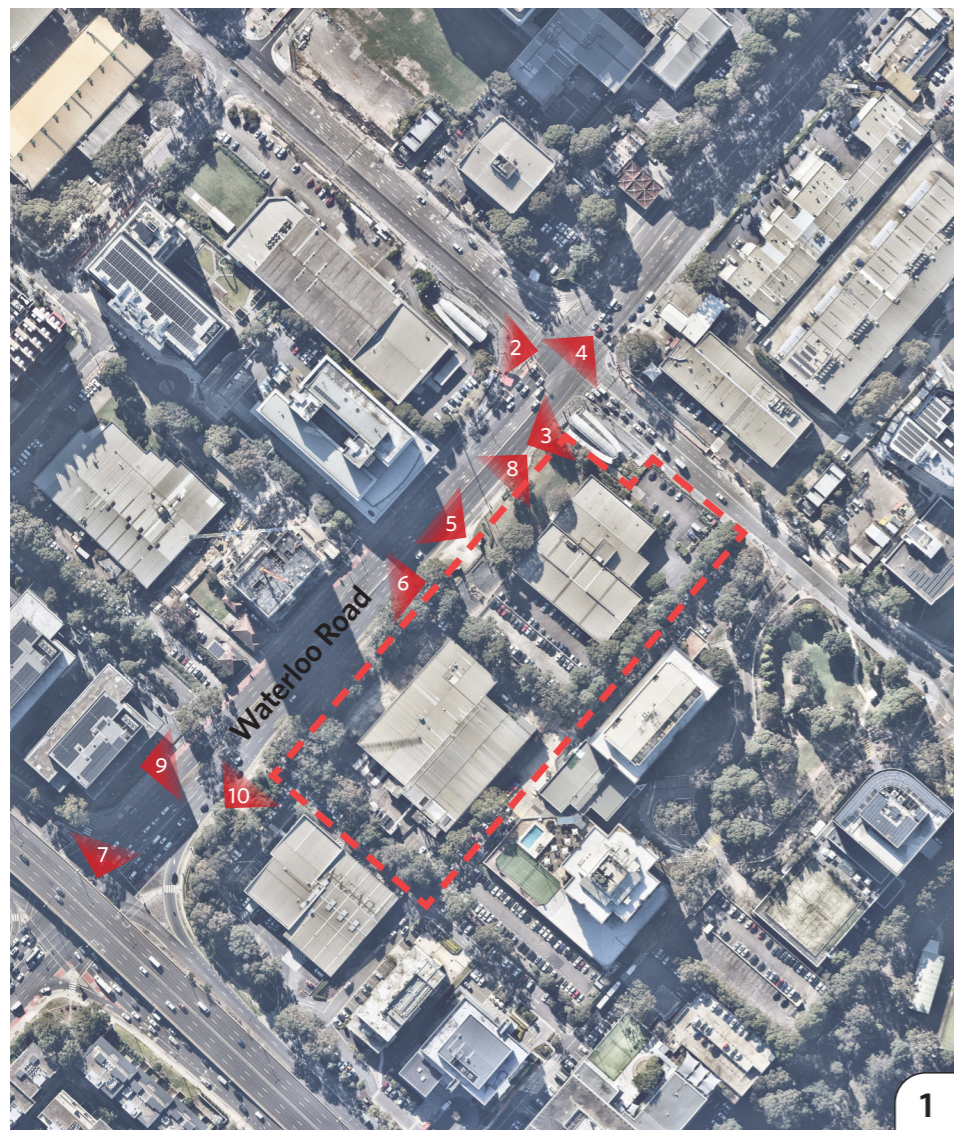


Extracted map from City of Ryde DCP 2014, Part:4.5 Macquarie Park Corridor (Page 36)

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# 02\_ Site Context & Analysis

## 2.10. Site Character - Existing



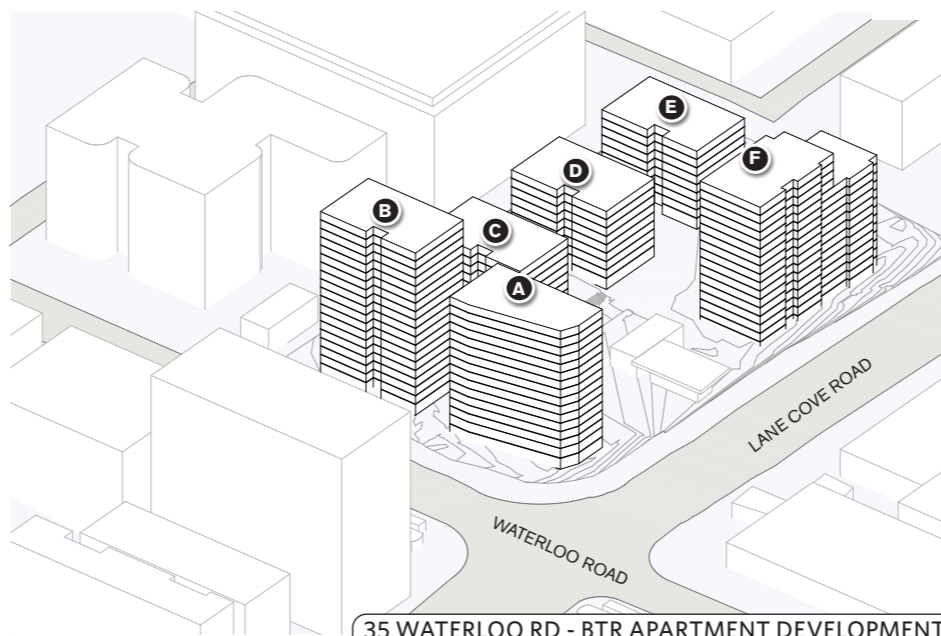
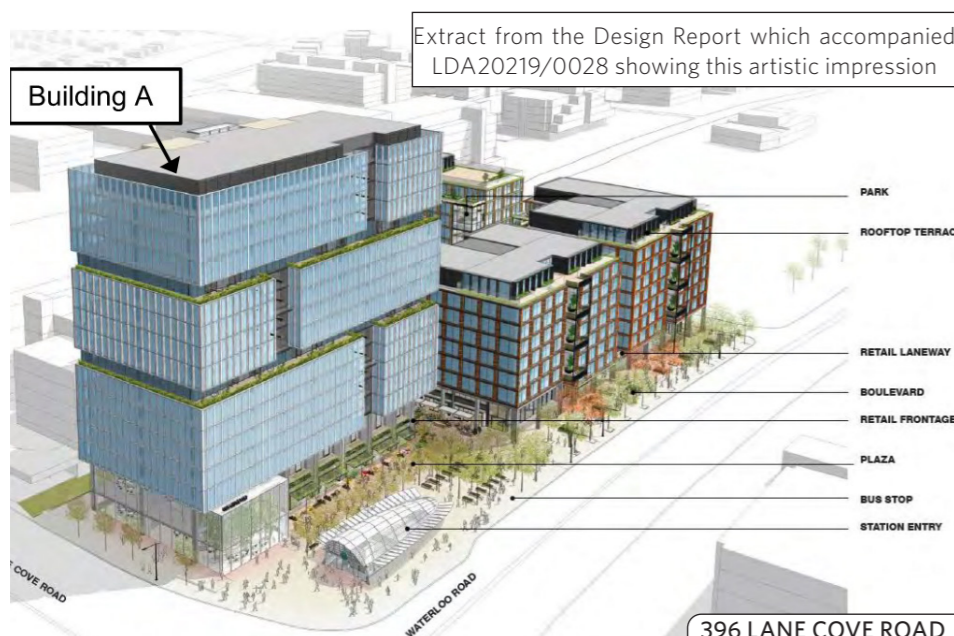
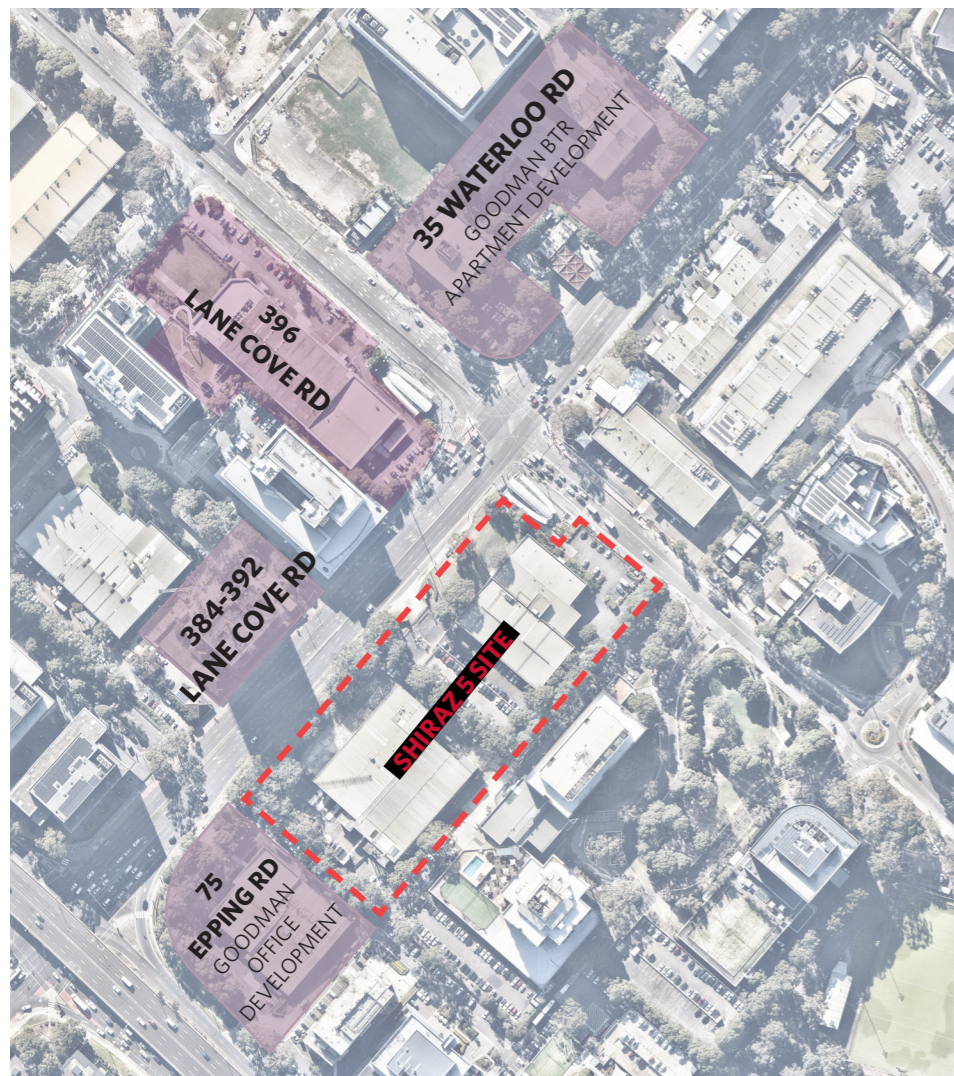
# 02\_ Site Context & Analysis

## 2.10. Site Character - Existing



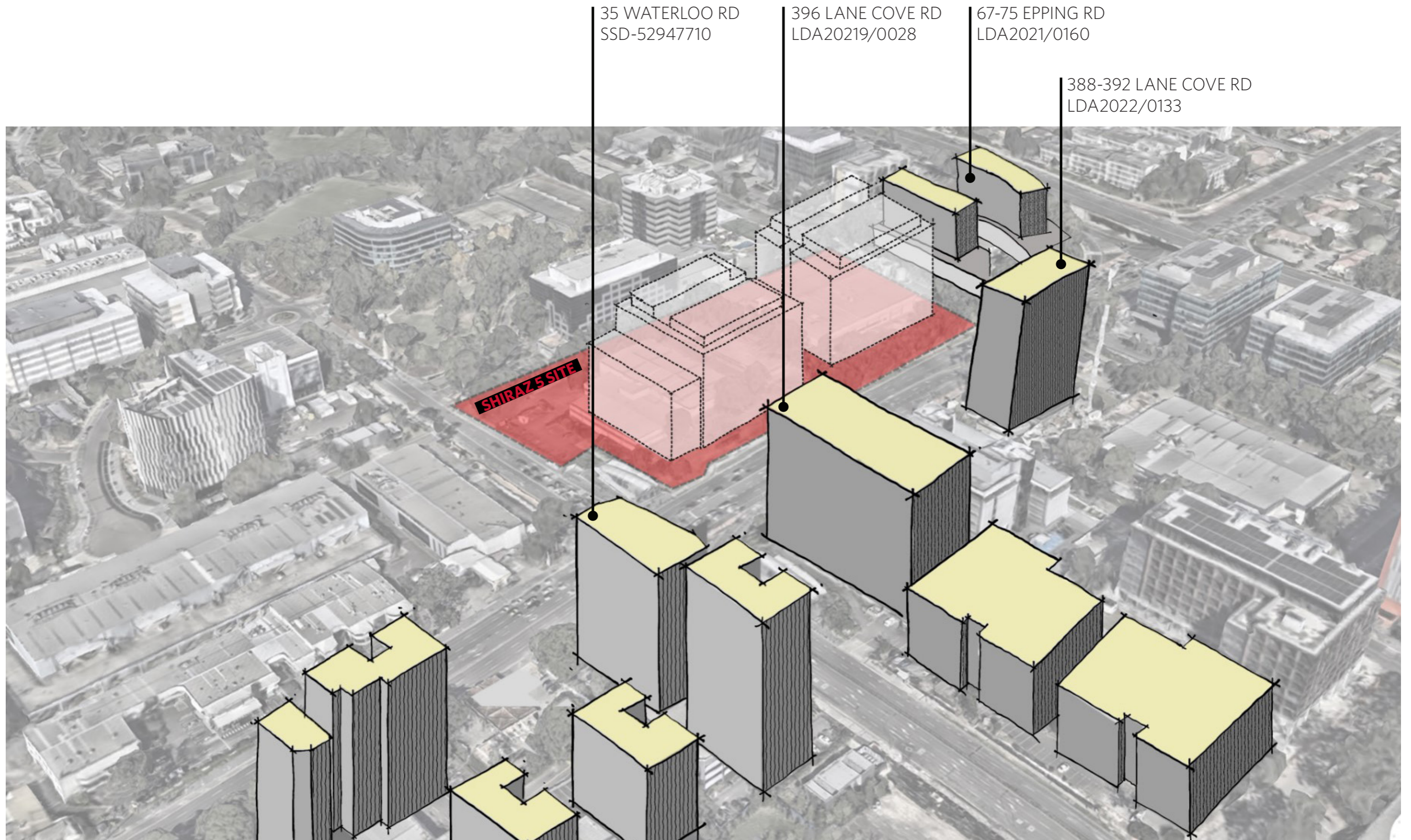
# 02\_ Site Context & Analysis

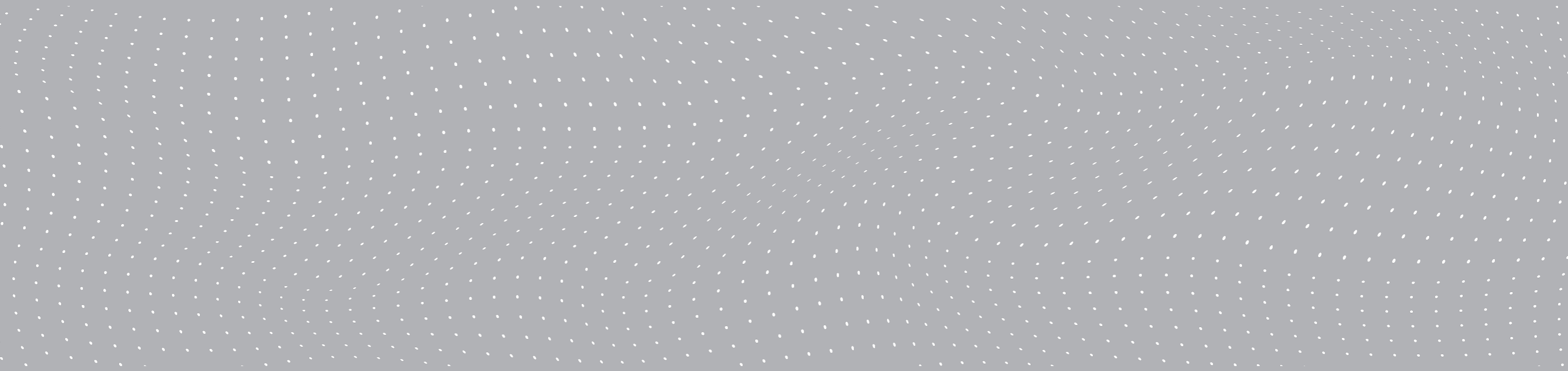
## 2.11. Site Character - Future Development



# 02\_ Site Context & Analysis

## 2.11. Site Character - Future Development





# 03\_ Site Design Response

## 3.1. Key Design Principles

**1**

Create an Active Civic Plaza



**2**

Reinforce Future Street Pattern



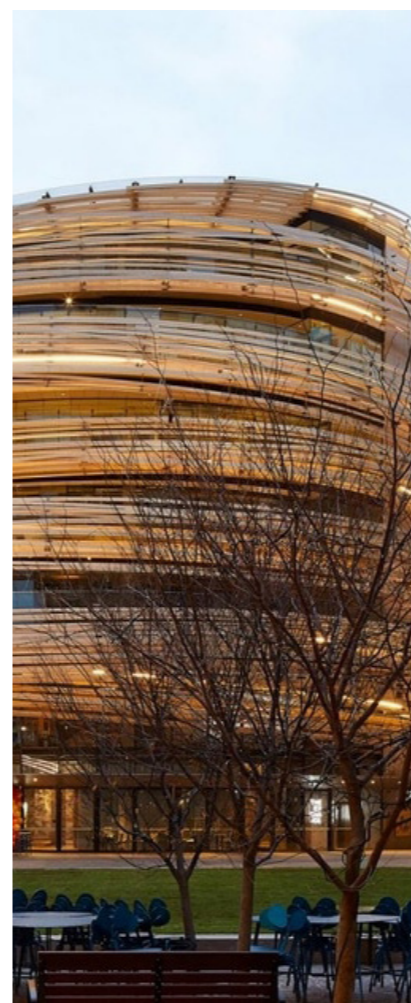
**3**

Extending the Green Network



**4**

Landmark Gateway Building



**5**

Sustainability



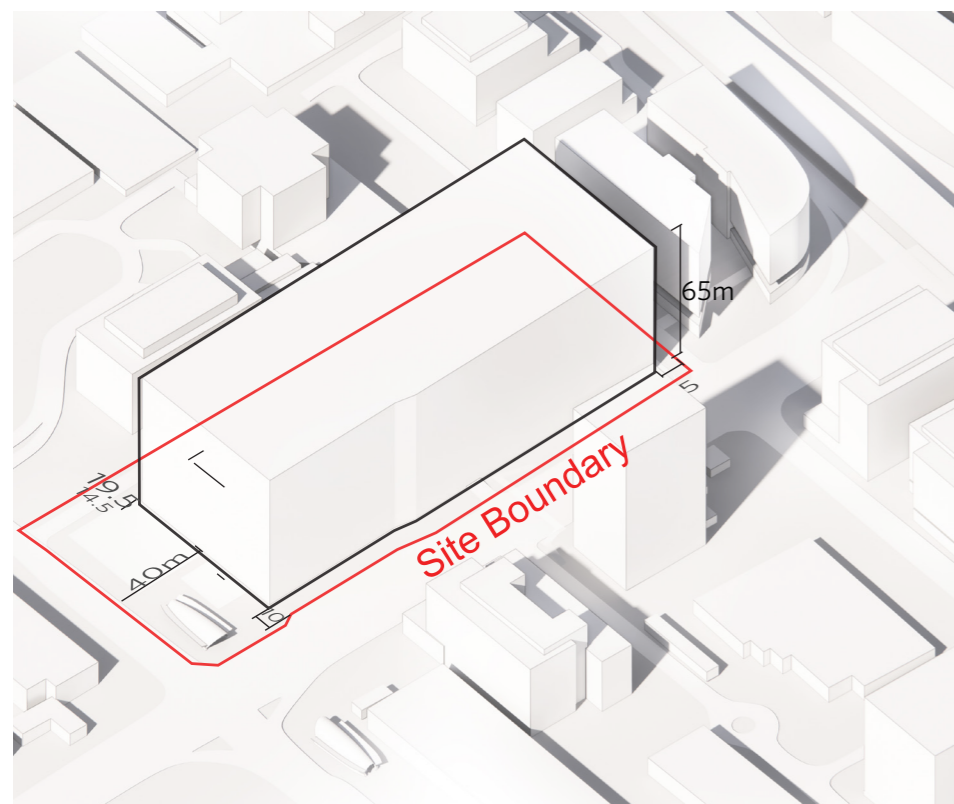
**6**

Connection to Country



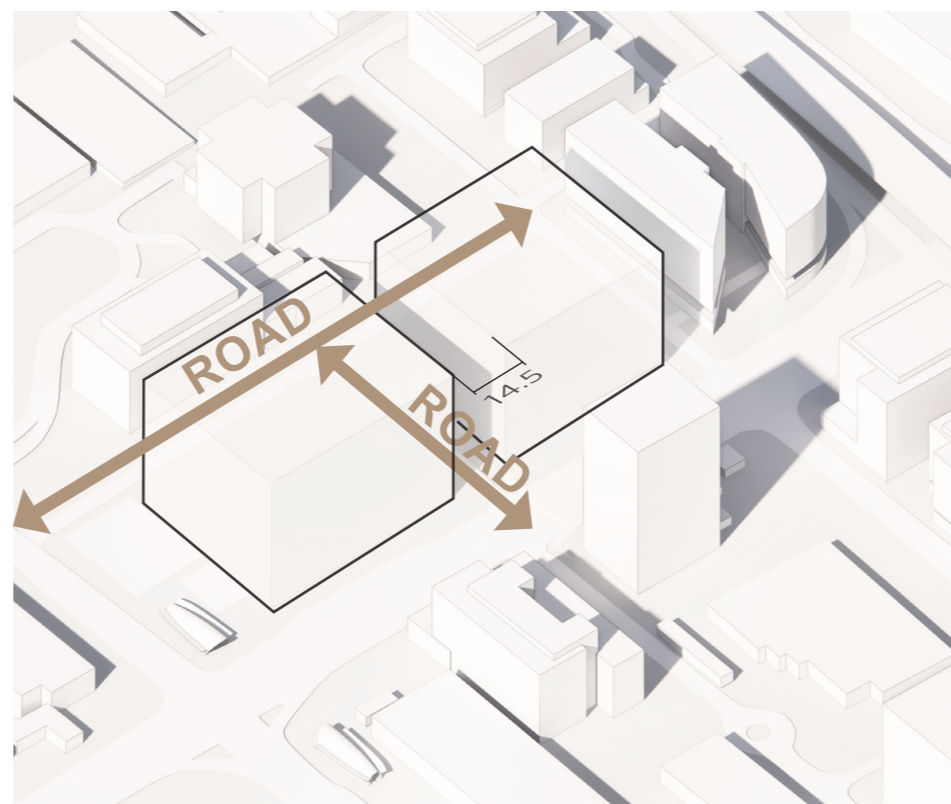
# 03\_ Site Design Response

## 3.2. Urban Design Response



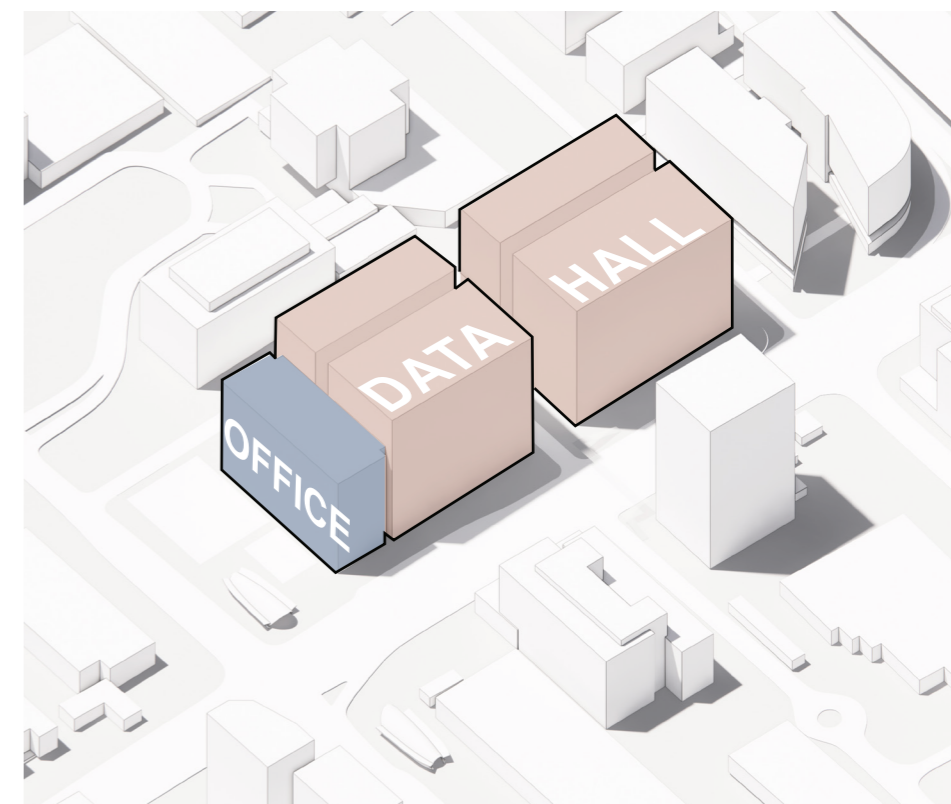
**Maximum Building Envelope**

The above diagram indicates the maximum permissible planning envelope for the site. The proposed design for the site sits entirely within this permissible envelope



**Through Site Links**

The proposed massing has been divided into two distinct building blocks, to allow for a centrally located through site link. This provides increased urban connectivity and site porosity and aligning with the DCP controls for the site.

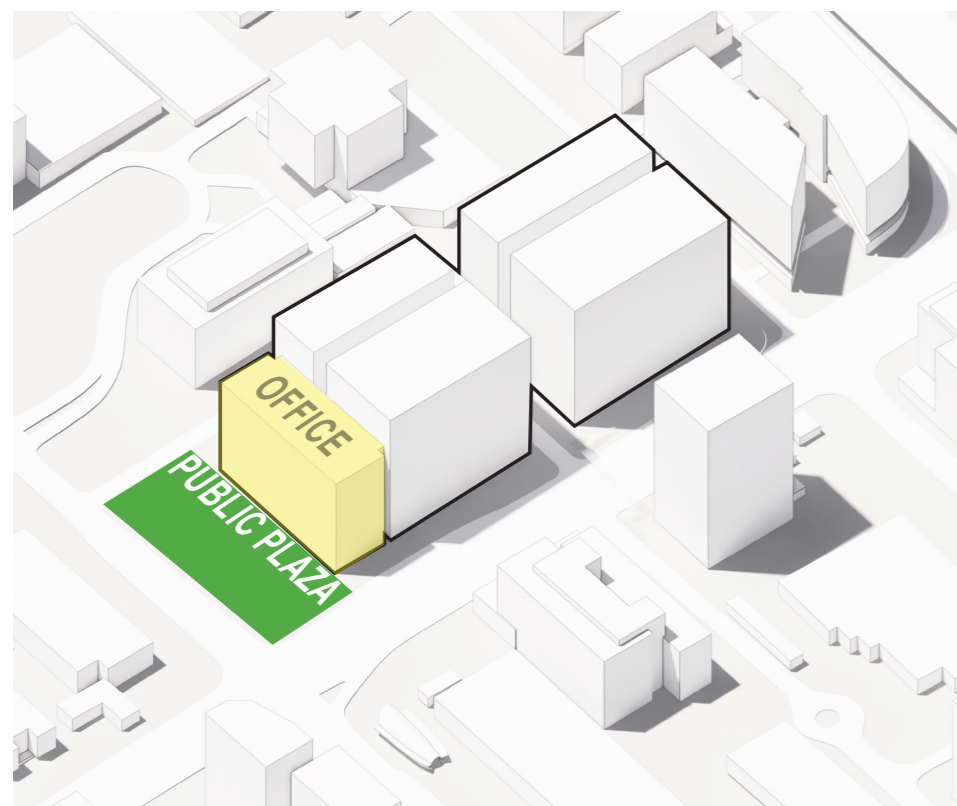


**Clear Articulation of the Building Components**

The overall massing has been arranged and articulated to reflect the primary building functions. The office building is located to the North East, with the data halls located behind and to the South West

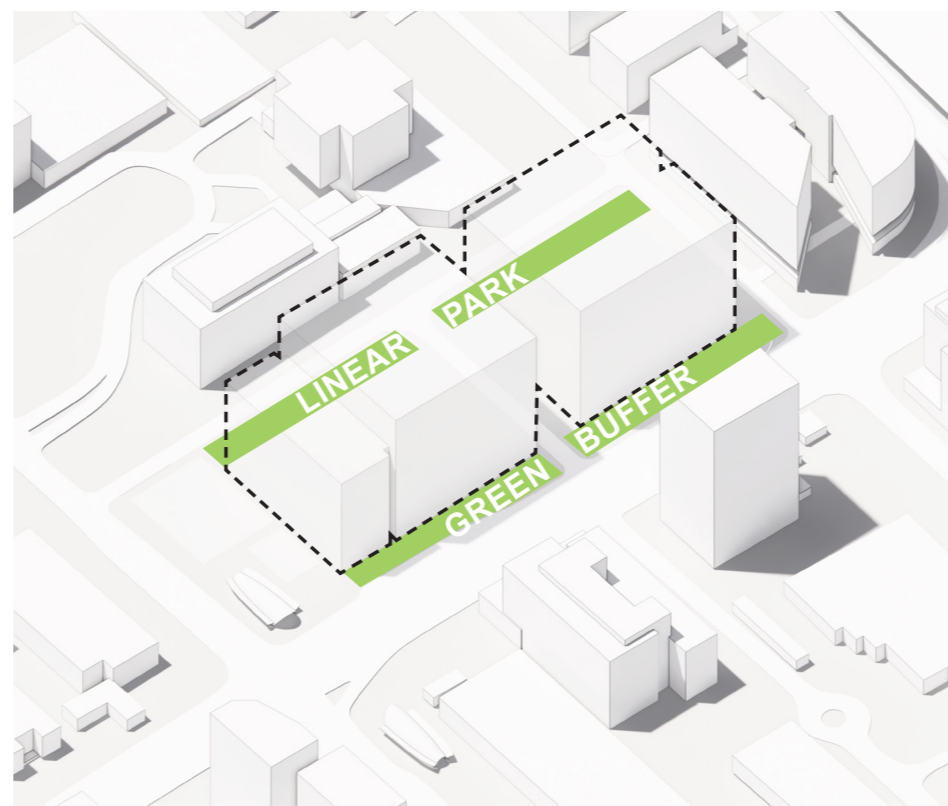
# 03\_ Site Design Response

## 3.3. Respond to Urban Environment



**The Public Plaza**

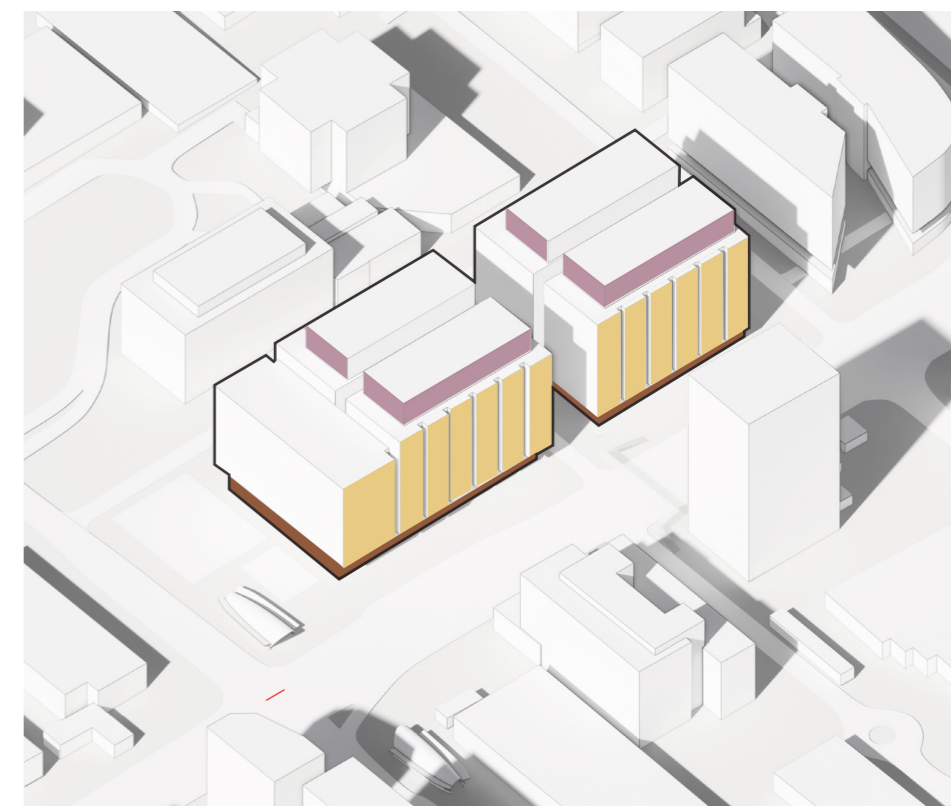
The office component of the proposal has been located to front onto, and activate, the new public plaza that anchors the north eastern corner of the site. This plaza provides public and community amenity at the intersection of Waterloo and Lane Cove Roads, and directly adjacent the Macquarie Park Metro Station entrance.



**Quality of Streetscapes**

Emphasis has been placed on the quality and generosity of the bounding streetscapes. To the South East, the proposed building envelope has been pulled 8.5m away from the adjacent roadway to allow for a new linear park and enhanced urban amenity.

To Waterloo Road, mature existing trees have been retained and will be complemented by new plantings to create a green edge and to enhance the quality, visual amenity and comfort of this streetscape.



**Mass articulation**

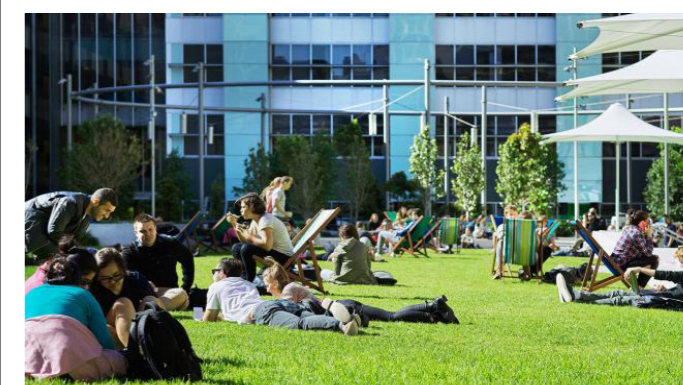
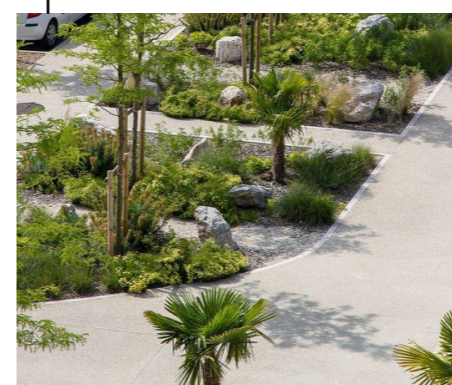
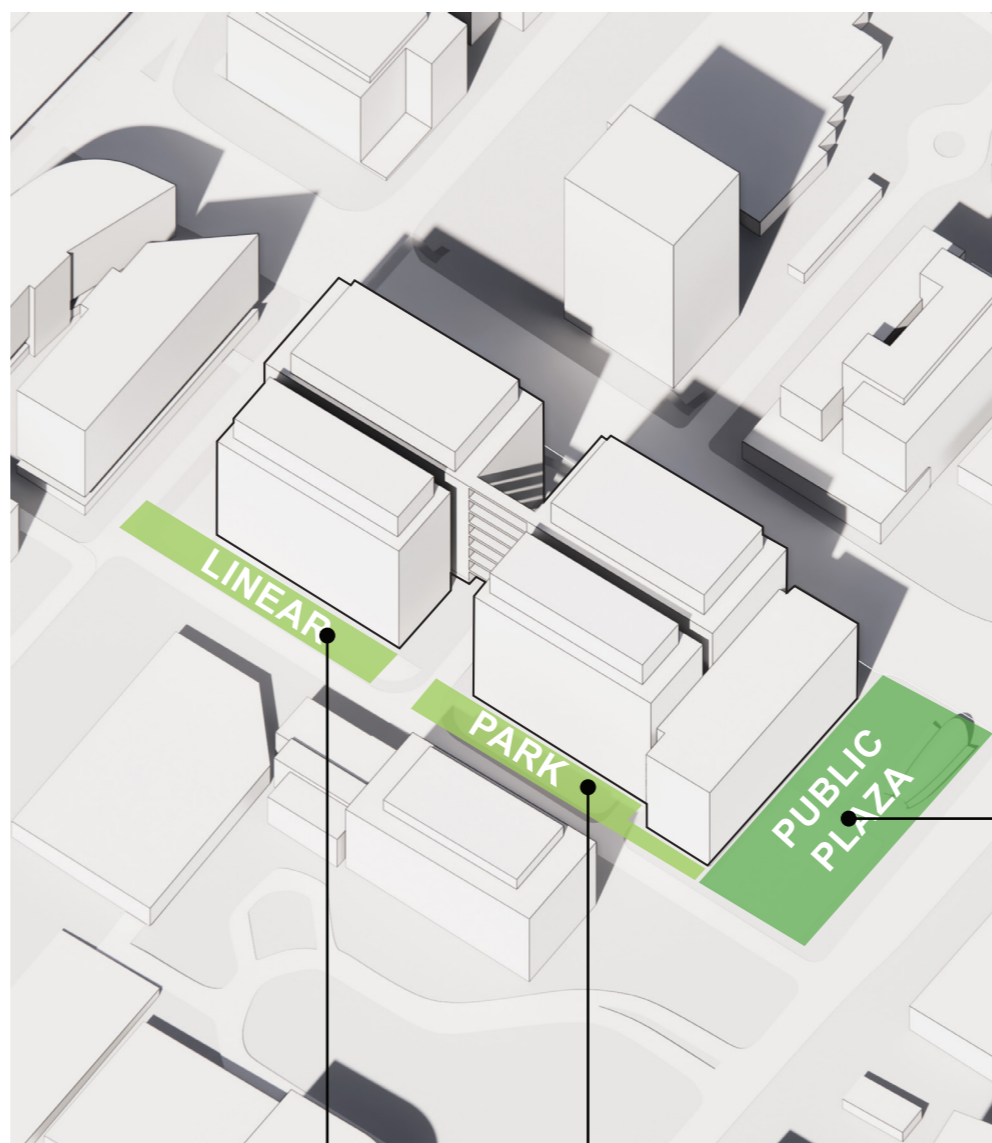
The overall mass of the data halls has been broken down to provide a more considered urban scale and finer grained architectural response.

Key moves include the establishment of a 2 storey base (reflecting the articulation of adjoining developments), a finer grained vertical expression to the primary side elevations, and a recessive roof plant enclosure top to the internal elevations and a cladding material change to the primary side elevations addressing lane cove road & road 13, that reduces the perceived height and scale of the proposal.

# 03\_ Site Design Response

## 3.4. Public Open Space

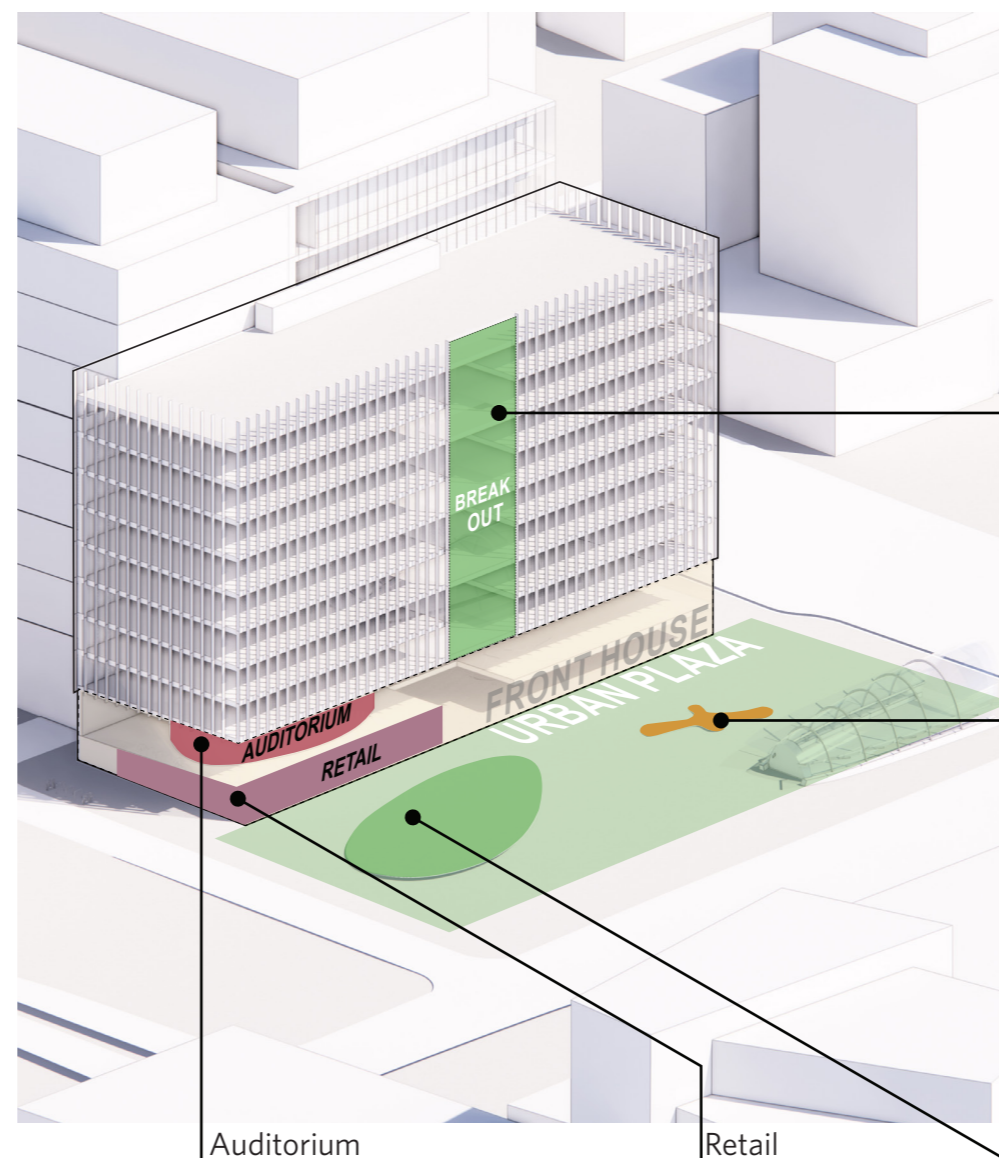
- Prioritizing inclusivity and accessibility, the Linear Park features covered walkways connecting to the civic plaza and public transport stops for commuters' convenience.
- With pockets of seating, shaded areas, and verdant landscaping, the park fosters social engagement and tranquillity.
- The civic plaza fronting the data centre embodies a spirit of civic generosity and community enrichment.
- Integrated with public transport bus stops and the metro station, the plaza enhances accessibility and convenience for the public, employees, and commuters.
- Boasting a variety of seating options, verdant landscapes, and sheltered areas, the plaza fosters a welcoming atmosphere conducive to social cohesion.
- Enhanced by robust lighting and security measures, it provides a safe and inviting space for communal gatherings and leisure activities.
- Retail spaces further establish the plaza as a vibrant economic and social hub, catering to diverse community needs.



# 03\_ Site Design Response

## 3.5. Civic Presence

- Breakout terraces feature gardens and biophilic design with improved natural day lighting and ventilation, providing tranquil spots for connection and collaboration for relaxation, networking, and enhancing the well-being for the building occupants.
- Redefines workplace comfort by bridging the gap between work and leisure.
- The civic plaza visually connects the indoor office areas with outdoor tranquillity, enhancing productivity and fostering a stronger sense of community.
- The amphitheatre provides a dynamic space for events, further enhancing the site's appeal as a hub for interaction and collaboration.



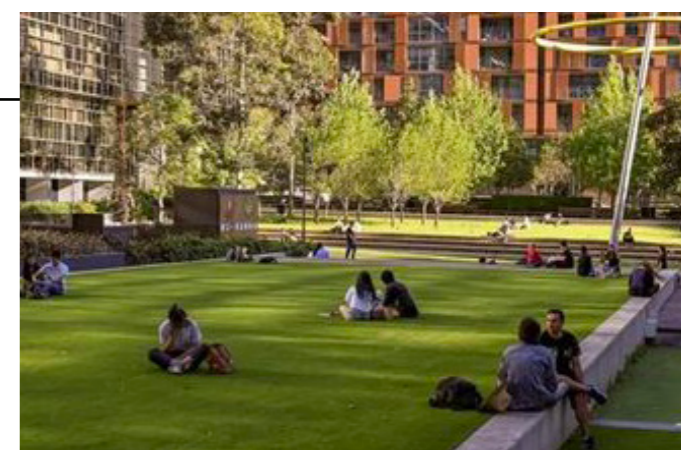
Breakout

Pavilion

Auditorium

Retail

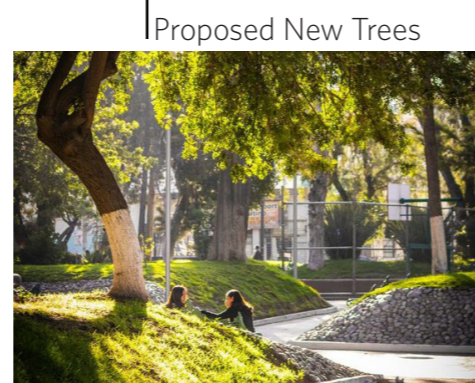
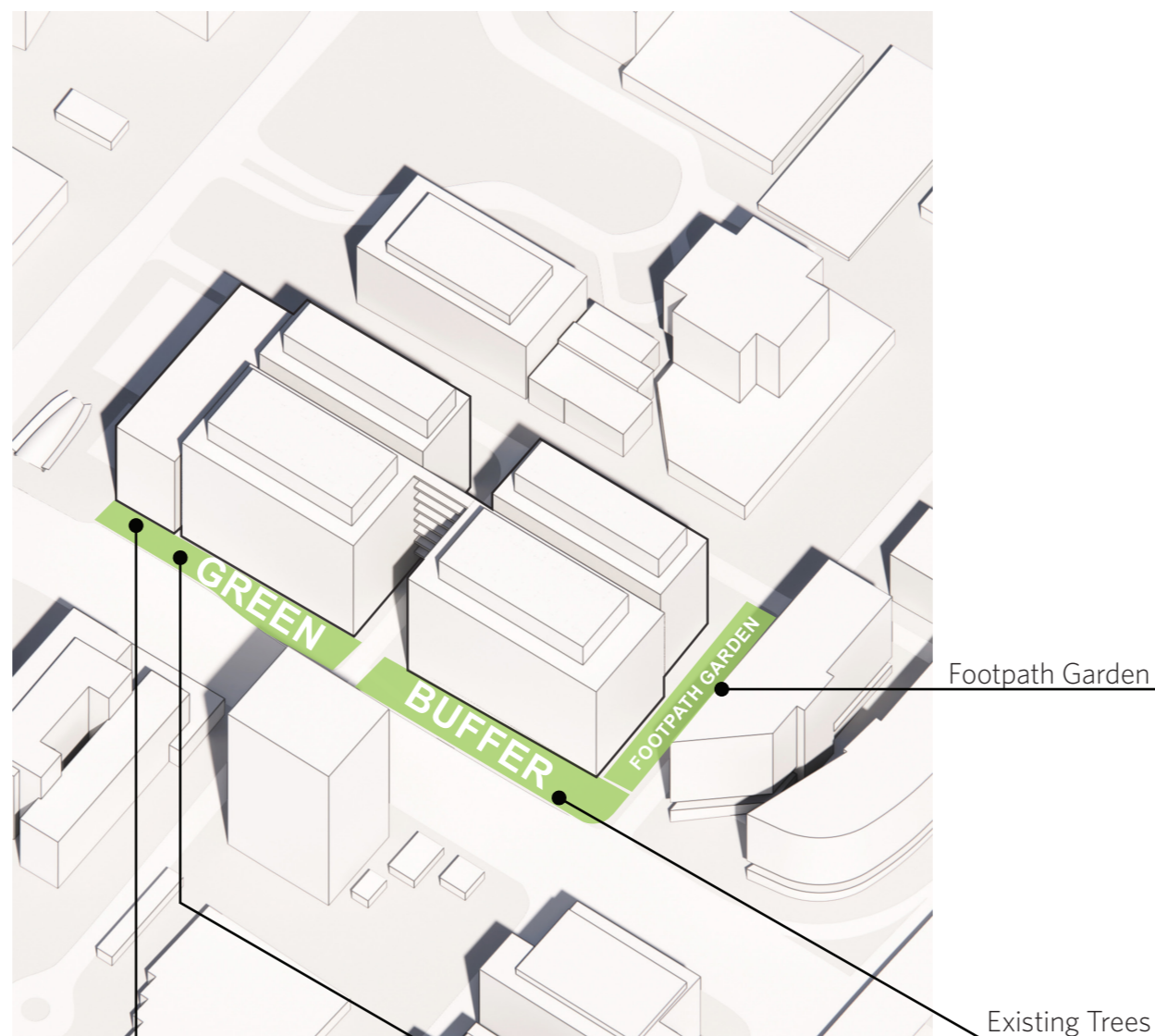
Lawn



# 03\_ Site Design Response

## 3.6. Green Buffer

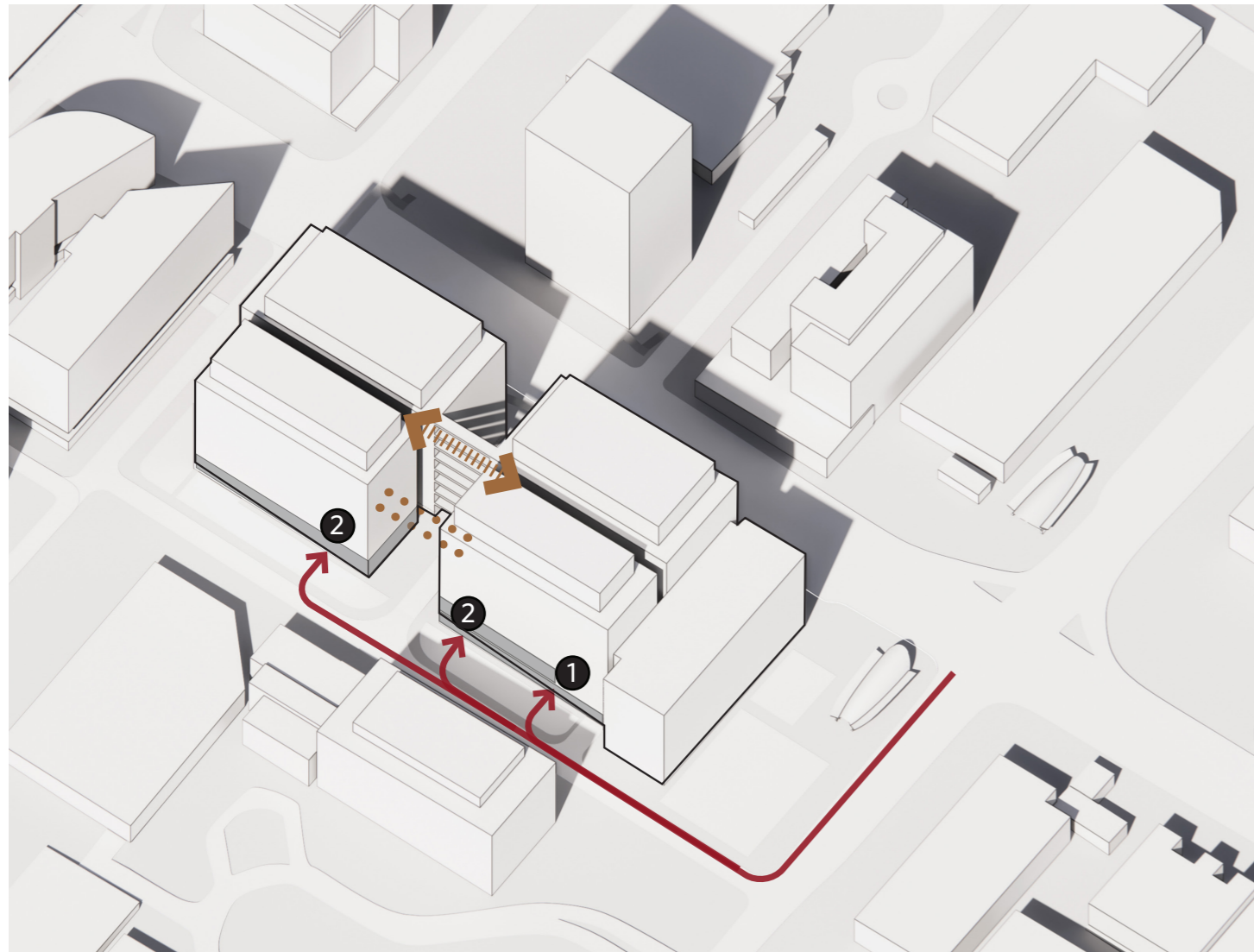
- The Green buffer acts as natural dividers and environmental enhancers, strategically positioned to mitigate impact. Trees, shrubs and ground cover provide shade, reduce noise pollution, and improve air quality.
- A meandering path through the landscaping offers a peaceful retreat within the tech hub as a vibrant fusion of technology and serenity.
- Retail shops integrated into the ground floor of the innovation centre provides occupants and the general public an opportunity to relax in the cafe outdoor colonnade seating or spill out on the lawn or various seating options throughout the civic plaza.









# 03\_ Site Design Response

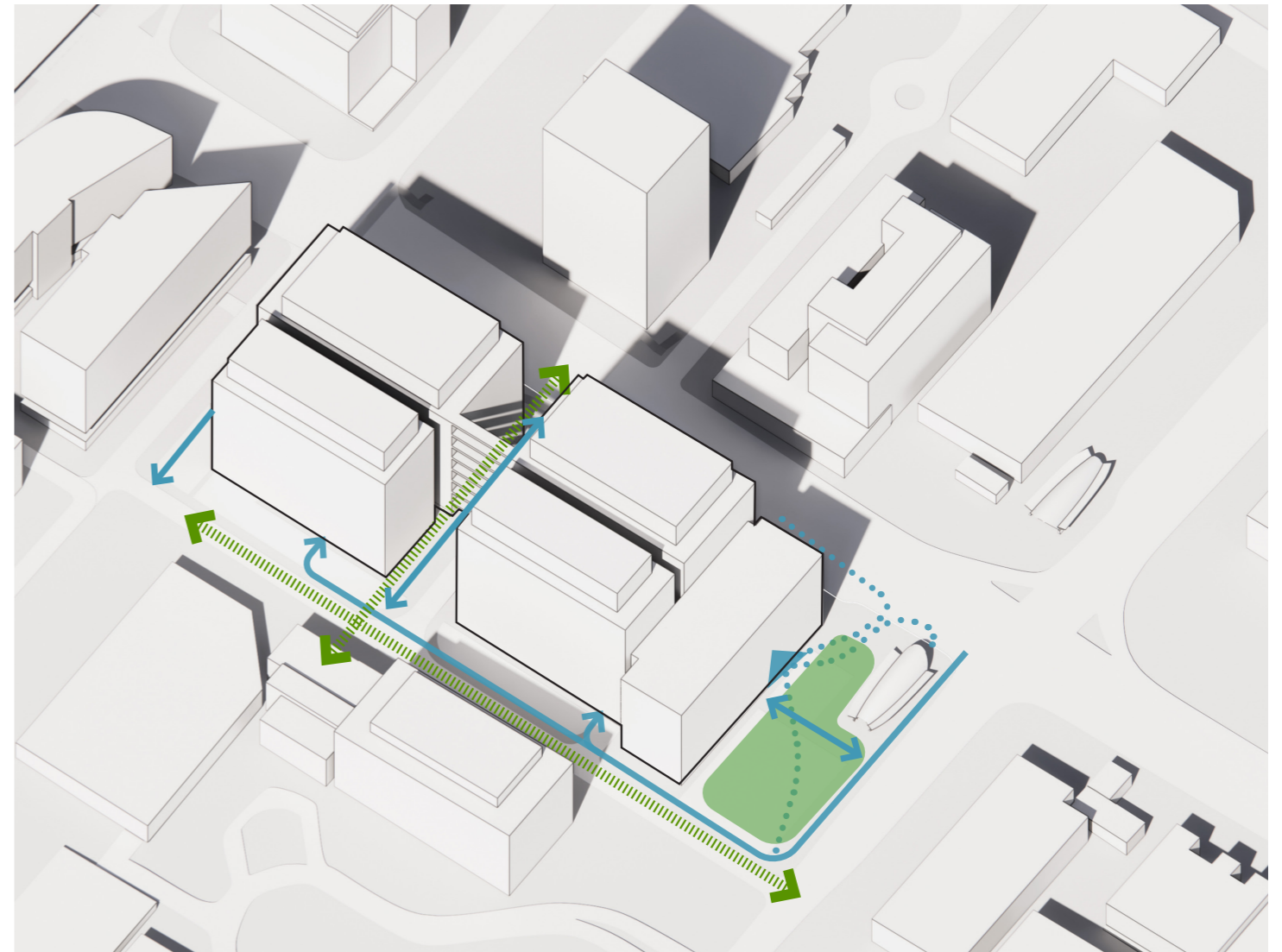
## 3.7. Site Traffic and Active Frontage




Vehicle access & Inter-building connection



-  Vehicle Access
-  Bridge Connection
-  Underground Connection
-  Parking area/Loading dock
-  Entry/Exit - Staff and Customer Car Park
-  Entry/Exit Service Vehicle/Truck

Urban connection & Pedestrian access

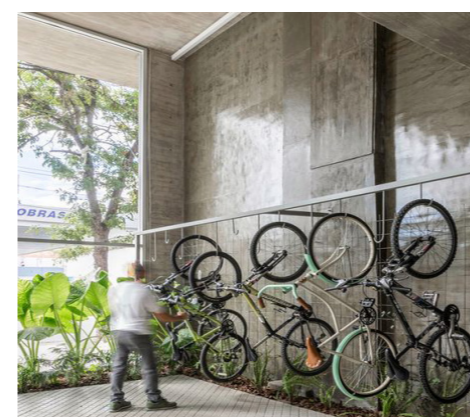
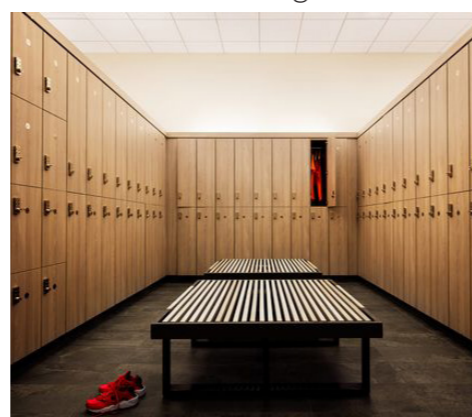
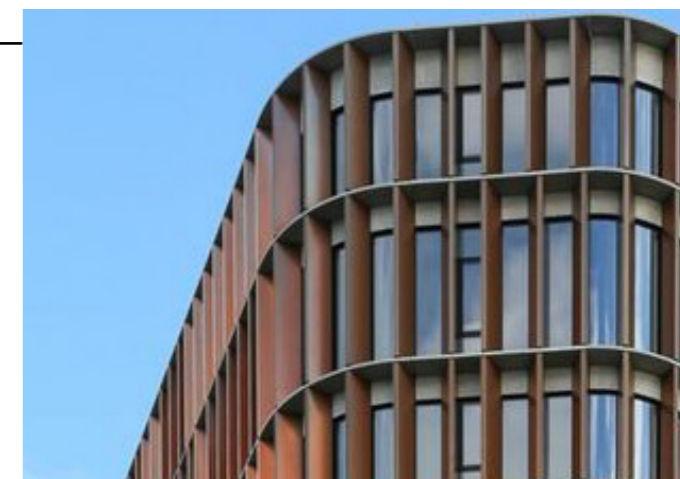
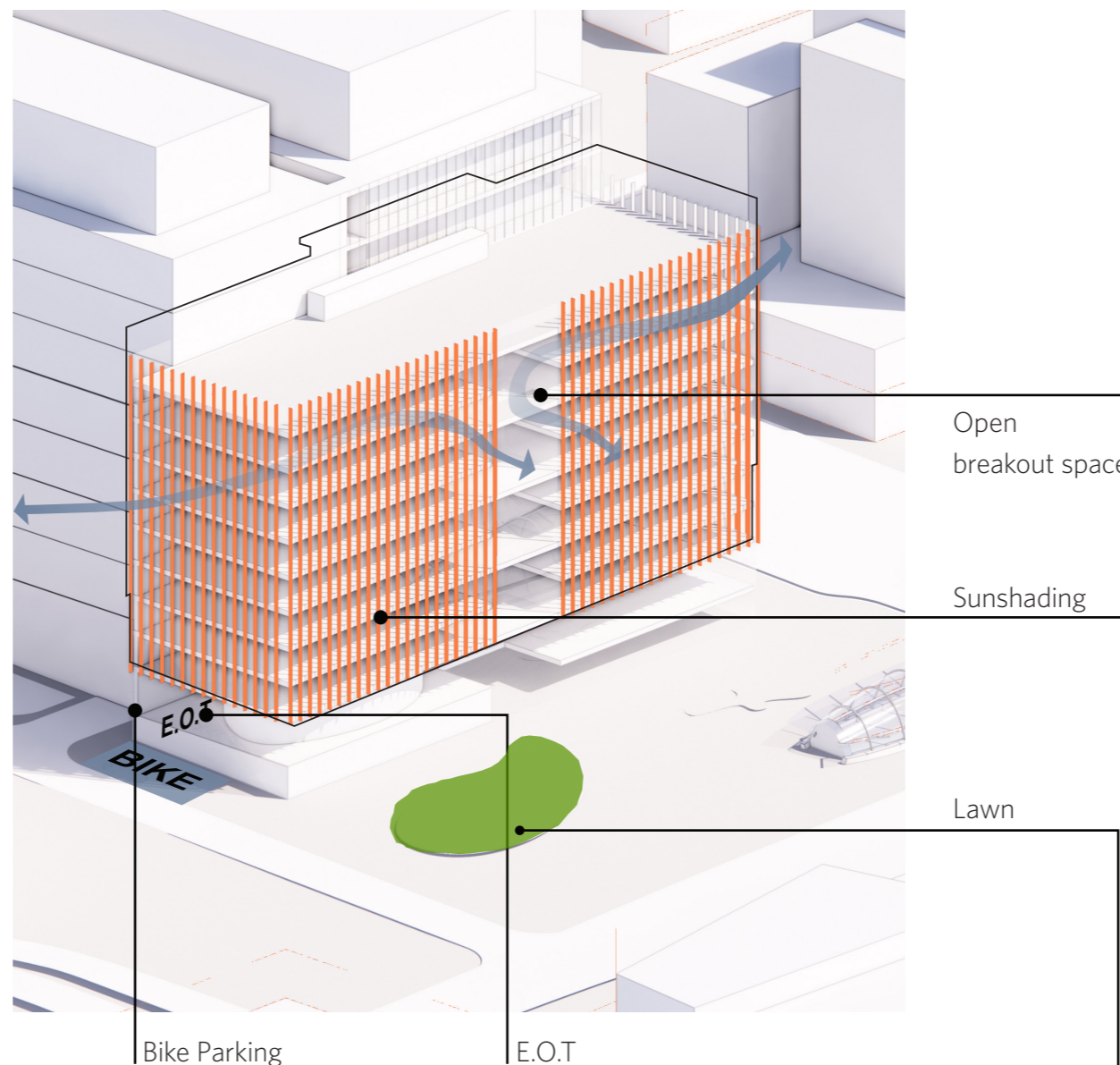


-  Civic Plaza
-  New DCP Roads through Site
-  Pedestrian Access

# 03\_ Site Design Response

## 3.8. Sustainability Initiatives

- Provision of convenient bike parking, and an end-of-trip facility and vehicle EV charging bays, transform the data and innovation centre into an eco-conscious building.
- A breathable facade, and sunshading at strategic locations optimize energy efficiency.
- Lush terrace gardens and biophilic design within the facility contribute to urban greenery and biodiversity.
- A lively civic plaza links retail areas and public transport, such as the metro station and integrated sheltered bus stops fostering social interaction and community engagement.
- In this vibrant ecosystem, sustainability seamlessly merges with community needs.



## 03\_ Site Design Response

### 3.9. Design with Country

#### Wallumattagal Country

For over sixty years, Macquarie Park has evolved into a highly valuable centre of Sydney and Australia's economy. For millennia prior, Wallumattagal Country was a significant place of higher learning, river systems and trade. Central to all aspects of life and culture was the waterways and continuum of knowledges within the eel Songline.

The future of Macquarie Park is where these two histories meet, where opportunities to reconnect strongly to pre-colonial history as a place of trade, exchange and learning, meet a future of business, knowledge and innovation.

The Macquarie Park Innovation Precinct Place Strategy has involved extensive community consultation. The engagement process has prioritised Wallumattagal Custodians first who have lived in and been caretakers in the Macquarie Park and North Ryde area for generations, and emanating out to Custodians from the broader Dharug Ngurra.

Seven new neighbourhoods have been proposed for the precinct masterplan masterplan. These are defined by natural elements, geographical boundaries and named to reflect the area's deep-time history and a connection to the songlines, stories and traditional knowledge of the Wallumatta.

-Macquarie Park, Innovation Precinct Place Strategy

#### Gari Nawi (Salt Water Canoe)

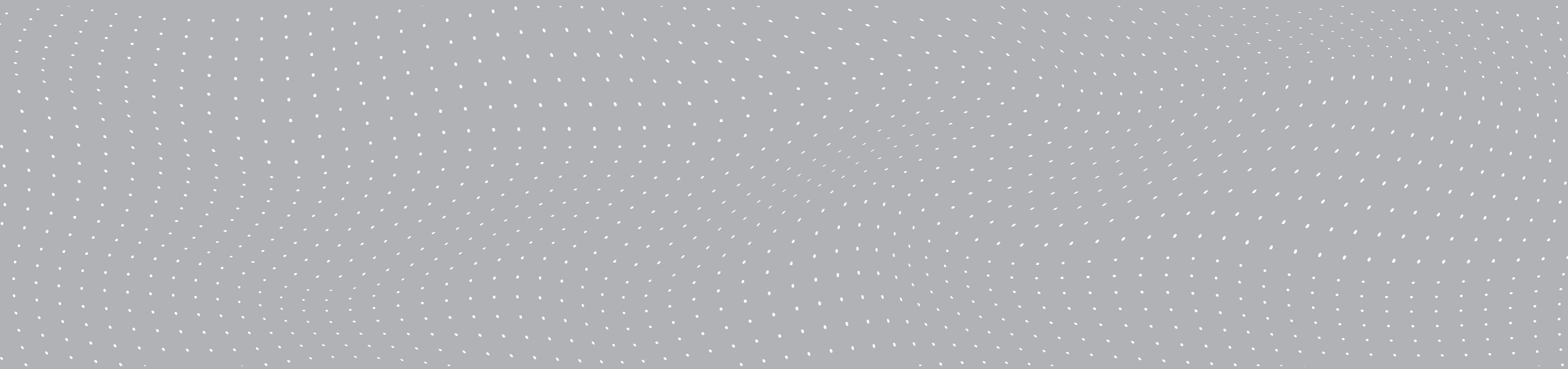
Shiraz 5 sits at the heart of Gari Nawi. As a data and innovation centre it functions as a store of memory, learning and connection but it also provides a space for cultural memory. Within the landscape and plaza, scribed into the base of the facility and into the interior, opportunities will be made to make and record connections to, and memories of, Gari Nawi, the Eel Songlines, Wallumai and other dreaming of Dharug Ngurra such as the Seven Sisters constellation, a universal and transcontinental story which has informed the seven neighbourhoods of the Macquarie Place Strategy.



NEXTDC Data Centre - Sydney

Yukupin (Toby Bishop) (b. 1996) is a Kungarakan (NT) artist and designer who grew up on the South Coast of New South Wales, where he now resides.





## 04\_ Built Form and Design Strategies

### 4.1. Design Statement

The proposed Data Centre facility, S5, epitomizes a paradigm shift in data centre architectural design, where built form and design strategies converge to create a cohesive and innovative urban infrastructure. At its core, the project's built form is characterized by two data hall towers, meticulously designed to optimize space utilization and operational efficiency, with a dynamic office component strategically located to the NE to address, and activate, the new public plaza.

#### DATA HALLS

Rising to a height of 65 metres, these structures house 14 data halls, strategically segmented to accommodate Retail Enterprise Data Halls on the lower two floors and Hyperscale Data Halls on the upper floors. This vertical stratification not only enhances spatial efficiency but also ensures a logical flow of operations, facilitating ease of access and maintenance while enhancing scalability.

#### OFFICE BUILDING & INNOVATION CENTRE

Integral to the design narrative is the integration of a high-rise building tower within Stage 1 of the project, serving as a multifunctional hub for corporate operations and community engagement. Each floor is thoughtfully curated to accommodate diverse functions, ranging from Main Entry Foyers and security amenities to auditoriums, meeting rooms, and office spaces. The incorporation of retail outlets at the ground floor Front of House area further enriches the project's contextual relevance, fostering a dynamic interplay between private secured and public civic zones.

Moreover, the project's design strategies extend beyond mere functionality, embracing principles of sustainability and environmental stewardship. Pockets of gardens at upper floor terraces, coupled with pedestrian-friendly infrastructure like covered shelter walkways and tiered seating arrangements, underscore the project's commitment to green urbanism and vibrant communal spaces conducive to social interaction.

In conclusion, the proposed Data Centre facility, S5, represents a fusion of architectural innovation, technological sophistication, and environmental consciousness. By prioritizing principles of built form and design strategies rooted in functionality, sustainability, and community engagement, the project emerges as a beacon of excellence in the realm of digital infrastructure, poised to redefine the urban landscape for generations to come.

The innovation centre is a critical component of the overall site design response, and in conjunction with the public plaza represents the primary public face of the development.

The design response for this innovation centre has been driven by two anchoring conceptual themes. Connection and Performance.



# 04\_ Built Form and Design Strategies

## 4.1. Design Statement

### Connection

The idea of connection stems from the fundamental purpose of a data centre and its essential role in empowering information exchange and the connection of people and ideas from all over the world.

Throughout the design, this idea of connection emerges in a multiplicity of ways at an urban scale, it is embedded in the new through site linkages and the increased generosity of the bounding public domain

At a civic scale, it is embedded in the new public plaza that has been designed as a space for community – a space that is designed to draw people in and provide them with amenity and respite, a place to enjoy and linger and connect.

At scale of the building, this ideal is revealed firstly through the lightweight and transparent base. A base that provides retail amenity and activation, and that is intentionally designed to connect the public with the technology showcase on display inside.

And then within the building, the central winter-garden and vertically stacked atriums provide a place to bring building users together. Visual connection between levels, connection between top and bottom, connection between inside and outside



Glazed facade - Designed as a striking amalgamation of modernity and functional efficiency, characterized by dynamic architectural elements that not only enhance the building's aesthetic appeal but also optimize natural light penetration and thermal performance.

### Performance

The second theme explored is one of performative architecture, again inspired by the nature of a data hall as a high performance, precise, efficient machine.

Here it begins to reveal itself in the architectural aesthetic - precise, engineered, high performance – with the simplicity in building form, high efficiency in layout and precision in detailing.

It also manifests in the idea of a performative architecture, shaped by environmental considerations of shading, daylight, internal amenity, energy efficiency and carbon efficiency.



# 04\_ Built Form and Design Strategies

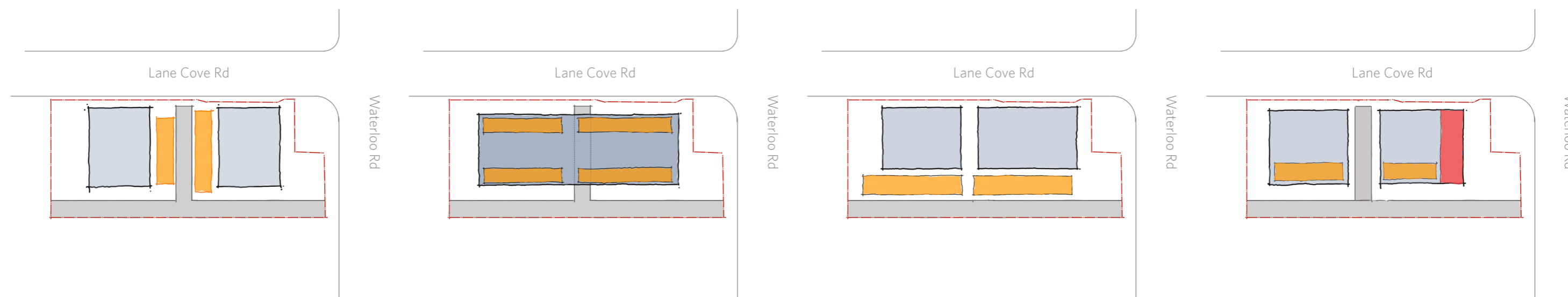
## 4.2. Design Options

Option 1

Option 2

Option 3

Option 4 (Preferred Option)



- Two data hall buildings proposed separated by DCP Road 5
- 3 floors of of containerised generators on external structural steel frame either side of DCP Road 5.
- Electrical plant rooms and data halls orientated in opposite directions
- total of 66 generators
- MCX/Office divided into four separate zones

- Concept of housing all generators on the roof plant arranged in 2 lines of 16 generators for each data hall tower. Containerised chillers and cooling towers centrally located.
- Roof area required to accommodate roof plant larger than the data hall tower floor plates
- Roof plant floor required to span DCP Road 5
- No allowance has been made for core(s), stairs etc.

- 2 lines of 15 generators per data hall tower roof plant
- Containerised chiller plant and cooling towers centrally located on roof plant enclosure
- Roof plant area required larger than the typical data floor area
- No allowance for building core

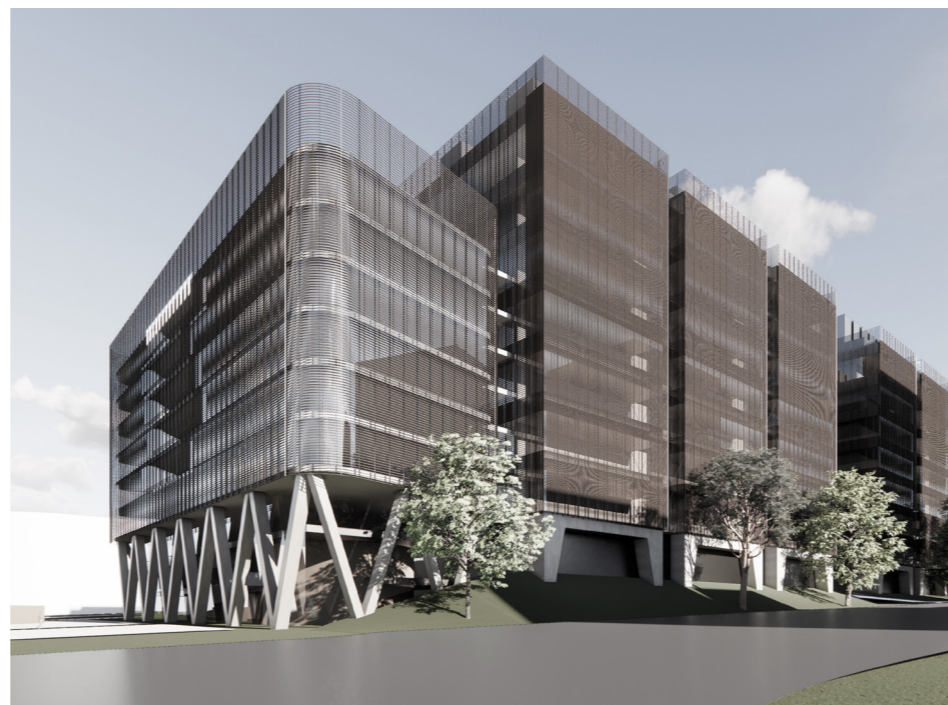
- MCX/Office tower located to address the civic plaza and Lane Cove Road & Waterloo Road intersection. Providing district views over Lane Cove National Park with a north-east orientation.
- Generators and electrical plant rooms internalised on data hall floor levels. Located away from Lane Cove Road elevation addressing DCP Road 13.
- Civic Plaza and DCP Roads 5 & 13 incorporated into concept design
- Glazed facade customer corridors located to address Lane Cove Road to activate facade
- Retail tenancies incorporated into Ground Floor Office tower to activate the civic plaza

# 04\_ Built Form and Design Strategies

## 4.2. Design Options



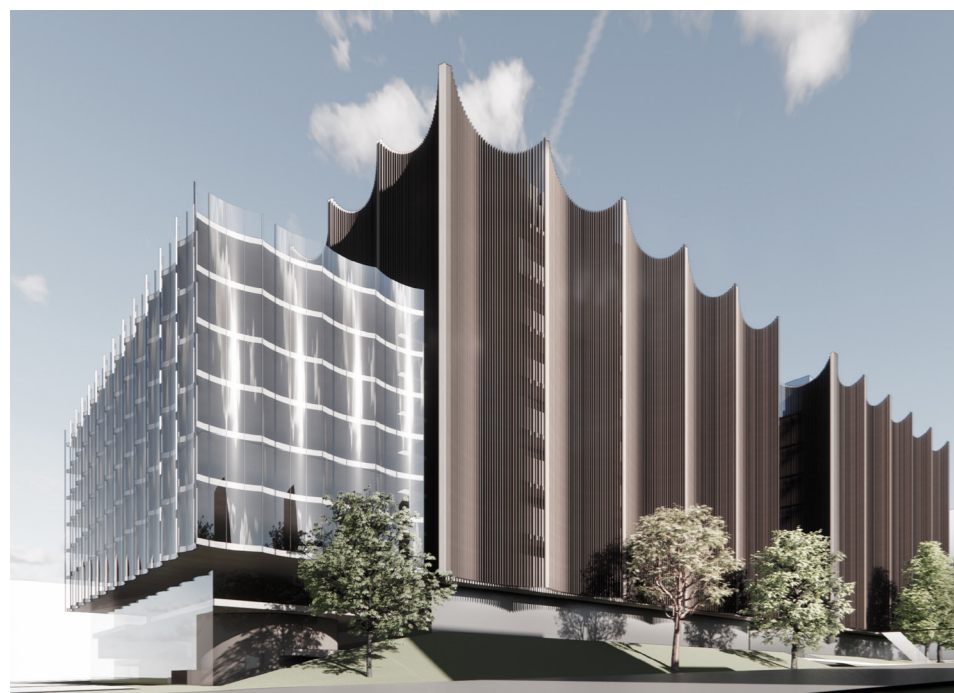
Feasibility Study



Concept Design Option 1



Concept Design Option 2



Concept Design Option 3



Concept Design Option 4

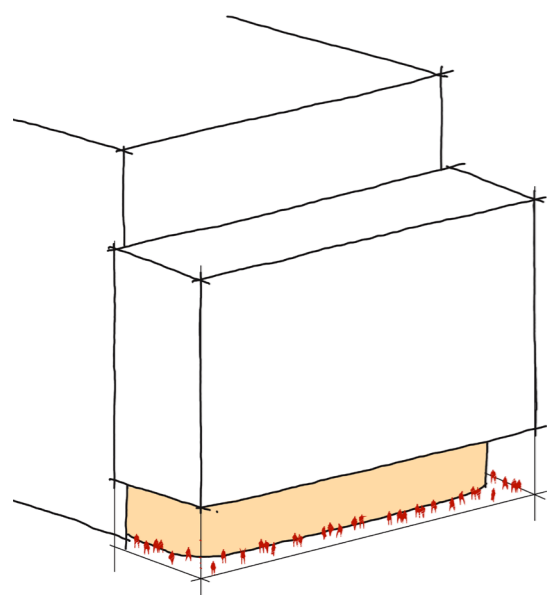


Concept Design Option 5

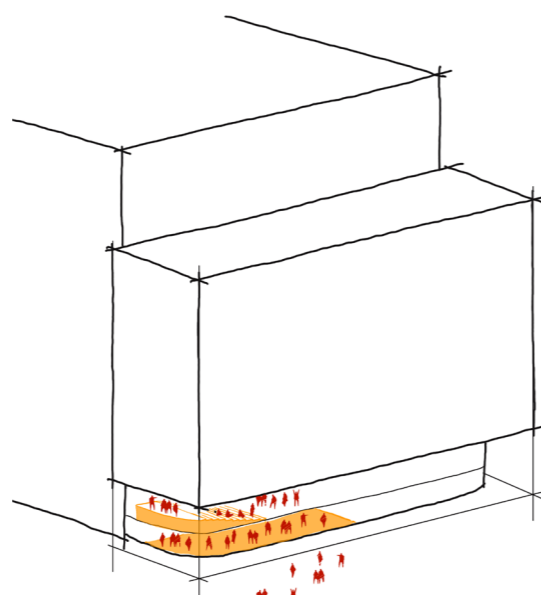
# 04\_ Built Form and Design Strategies

## 4.3. Key Design Drivers - Office Building

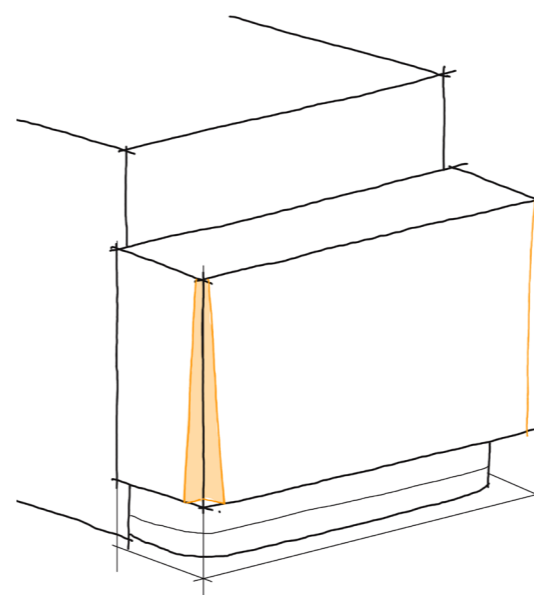
Expressed Base



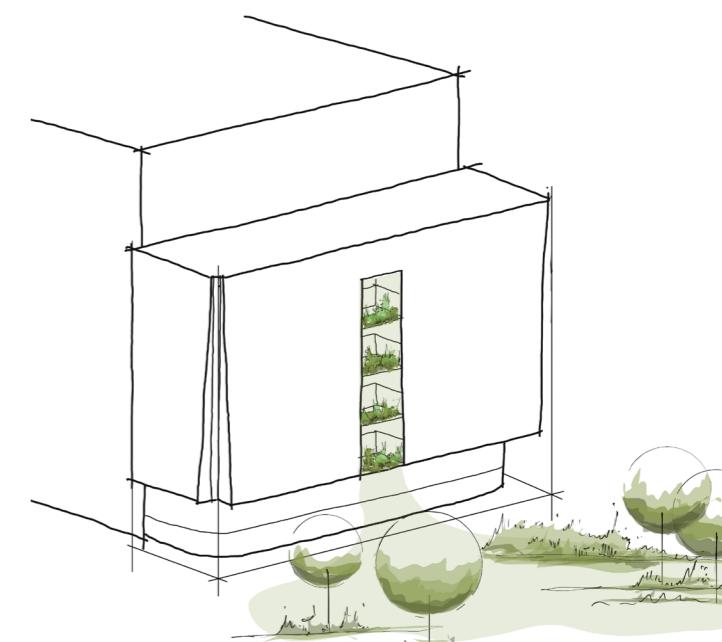
Activated Ground Plane



The Corners



Central Gardens



The lower two floors of the building are clearly separated from the building above, and are expressed as a transparent and recessive glazed base. This transparent base provides for strong visual connections with the bounding public Plaza, whilst also helping to break down and reduce the perceived scale of the office building.

The transparency of the building base allows for a high degree of activation and animation, and for visual connections between users of the building and users of the plaza.

Accessible retail space at ground level and a visible auditorium at level 01 each contribute to that connection between inside and outside and allow for an engaging user experience.

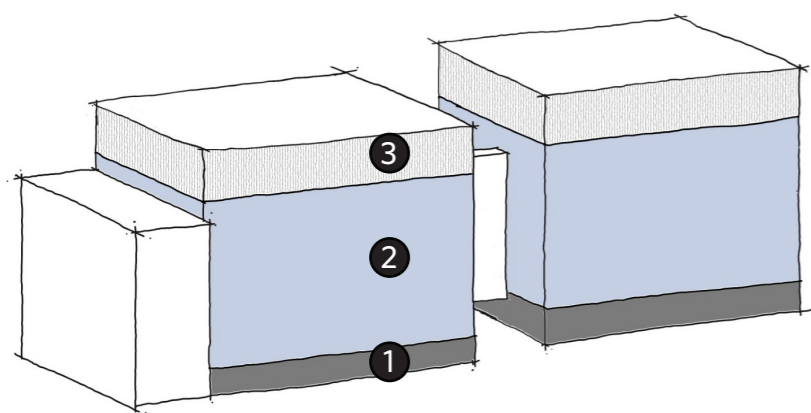
The two leading corners of the building have chamfered and articulated with a recessive slot, adding visual interest and allowing the building to better engage outwards with the adjoining public realm and street in all directions

The overall mass of the building has been further broken down through the introduction of a series of double height and centrally located stacked atriums. These garden terraces soften the presentation of the building from the outside, whilst for the building users they allow zones of amenity, respite, outlook and social connection.

# 04\_ Built Form and Design Strategies

## 4.4. Key Design Drivers - Data Halls

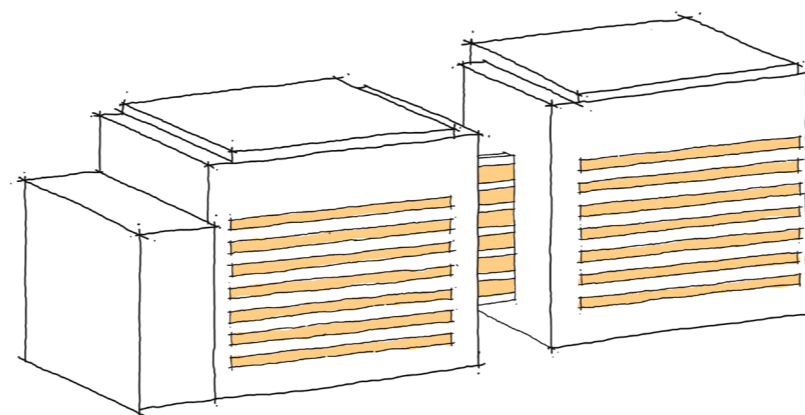
Facade break down



Building mass has been divided in three horizontal sections to break down the facade height and massing. Each facade material/element reflects a particular internal programme:

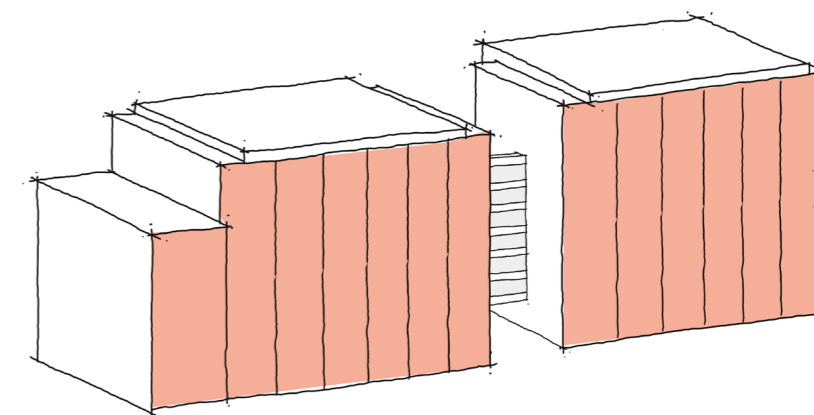
1. Parking/Loading dock/Plant Rooms
2. Data Halls
3. Roof enclosure plant area

Activated facade and recessive top



Corridors have been brought to facade surface of the data hall central facade element to animate the facade at night time, break down the building mass and offer a more transparent facade to building environment

A finer grained vertical articulation



The overall mass of the data hall towers have been further broken down with the introduction of a finer grained recessed vertical expression aligned to the buildings structural grid to the primary side elevations

# 04\_ Built Form and Design Strategies

## 4.5. Civic Plaza - Design Principles

### BUFFER THE EDGE



#### Landform and Vegetation

Waterloo Road Masterplan

- Linear Park
- Sydney Green Grid
- Urban Forest

### OLD WAYS NEW



#### Reimagining the Hardscape

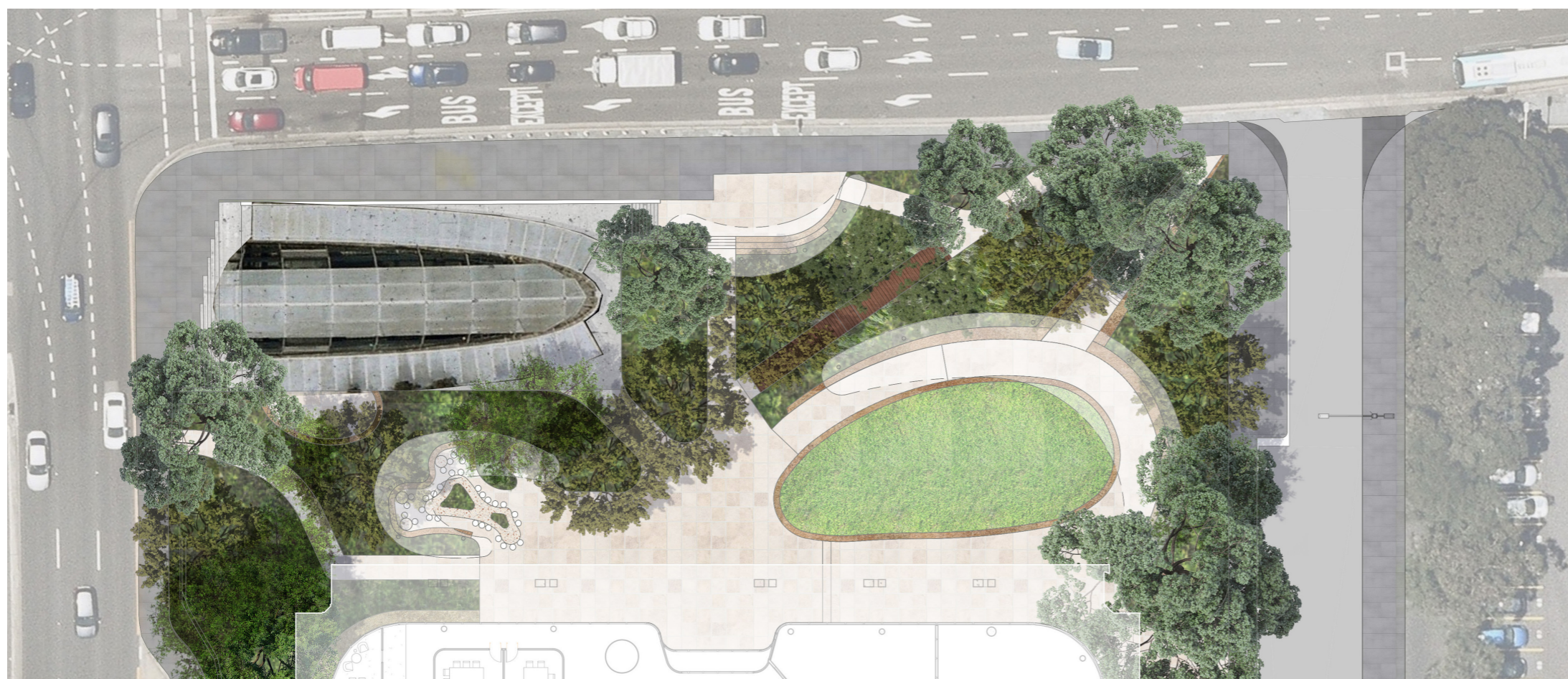
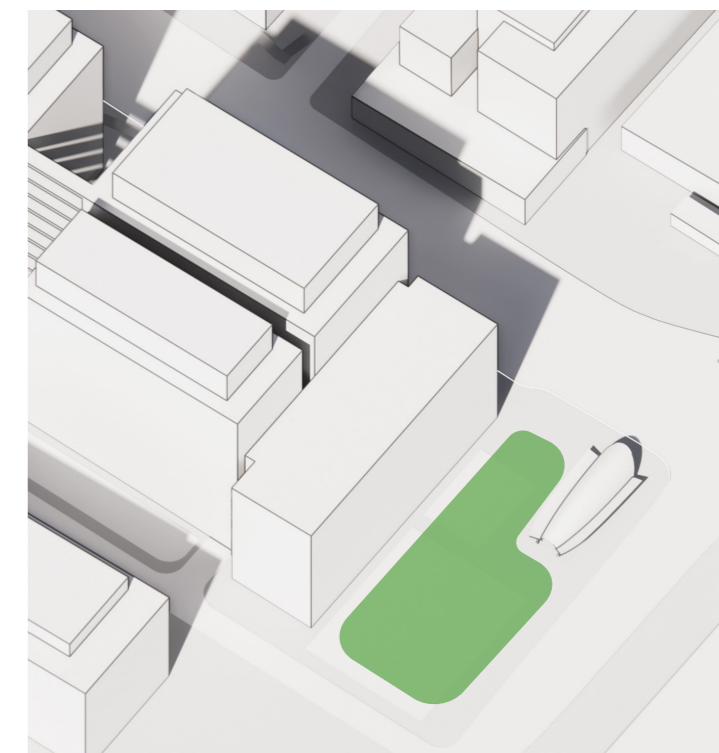
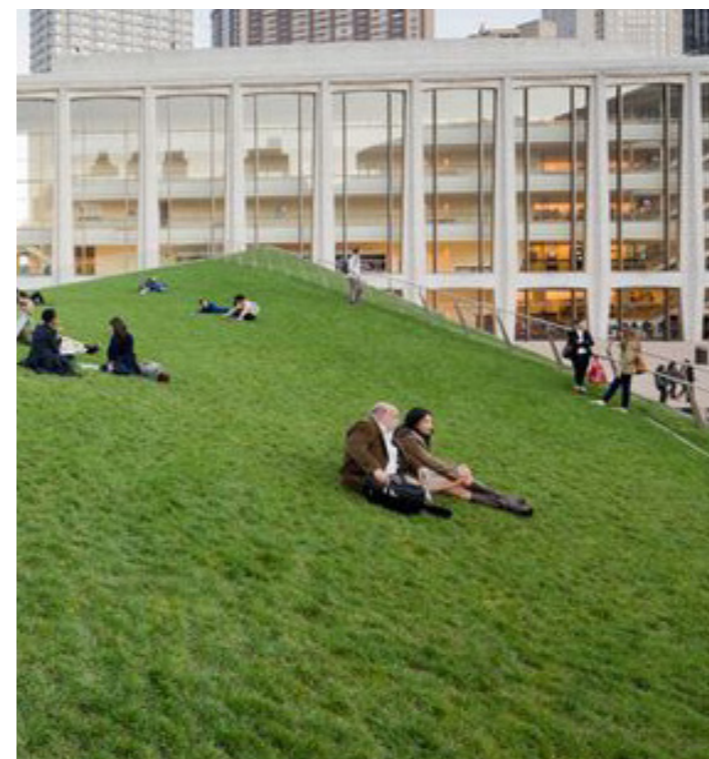
- Seamless public domain
- Robust and durable materials
- High-quality Cyclist interfacing
- Lighting and signage

### A PEOPLE PLACE



#### Placemaking, activation and community

- Prioritising pedestrian amenity
- Visual interest through public art
- Improve amenity and safety
- Equitable access



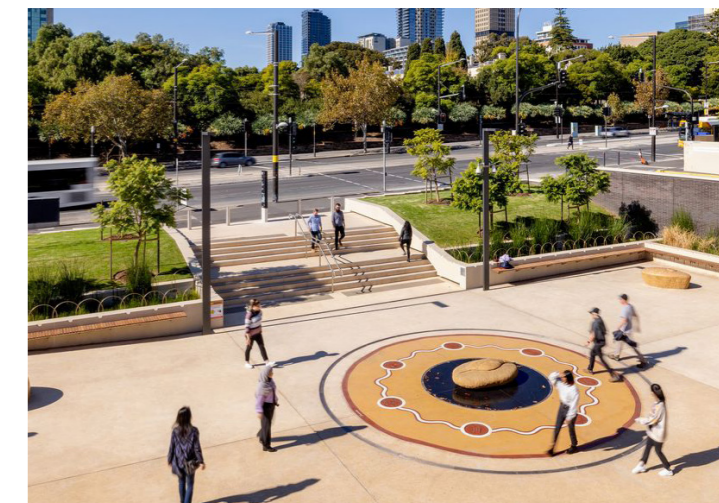
A vibrant local plaza for urban dwellers offering a welcoming civic experience that accommodates local needs, celebrates culture, inclusivity, and practical amenity.



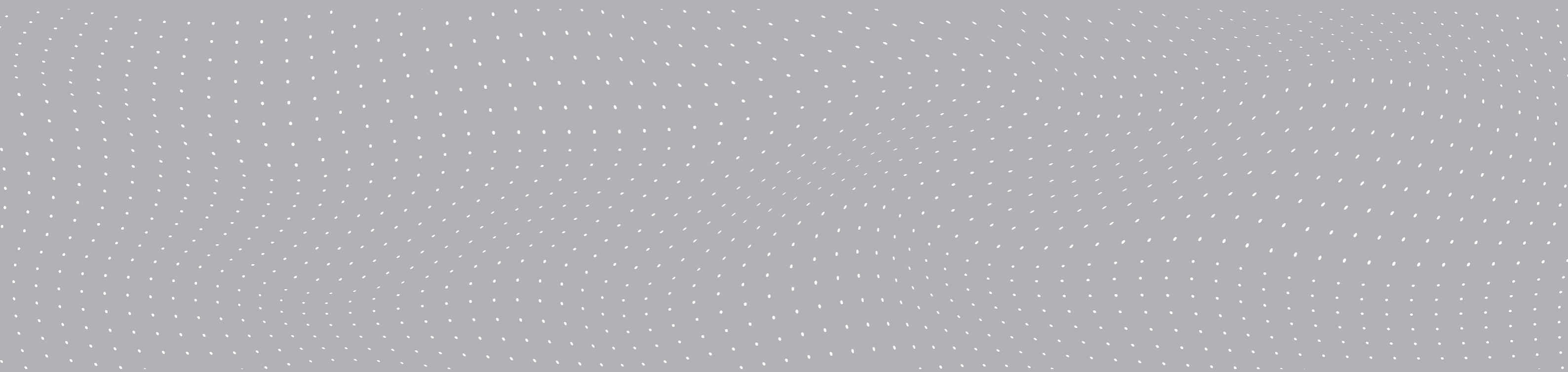
# 04\_ Built Form and Design Strategies

## 4.3. Landscape

The landscape design seamlessly blends green spaces with practicality, emphasizing the importance of Shiraz 5 public civic areas. Utilizing natural elements, such as terrace gardens at upper floors and selective flora, serves a dual purpose: not only do they contribute to energy efficiency and minimize environmental footprint, but they also elevate the quality of communal spaces. Thoughtful placement of greenery also creates visual screens, enhancing air purity and fostering biodiversity within the community's shared areas.



# 05\_ Facade Design and Materiality



## 05\_ Facade Design and Materiality

### 5.1. Office Building Facade

#### Preferred Concept Design

High-tech Architecture suits the mechanic nature of a data center precisely. Therefore the design outcome follows the aesthetic of high-tech architecture, with the simplicity in building form, high efficiency in layout and precision in detailing.

Diagrammatically the office component, as the main civic presence of this project, is interpreted as a floating box on a series of expressed "Y" columns, with splitted corners to address the street corners.

Through the information exchange and virtual network, data centres connect people from all over the world together. The architectural design also encourages connectivity in various levels. The transparent groundplane under the soffit encourages visual engagement with the plaza, and the shopfronts physically connect the building with the public.

The proposed skygardens on the facade can be seen as an vertical extension of the plaza, also it enables social interaction by creating a breakout space where all the tenants can share and enjoy.

View From Waterloo Rd



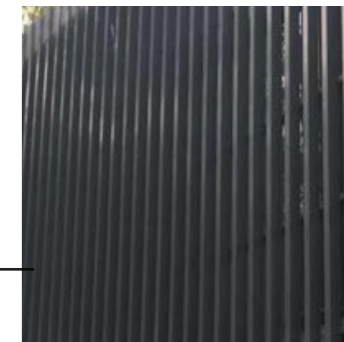
# 05\_ Facade Design and Materiality

## 5.1. Office Building Facade

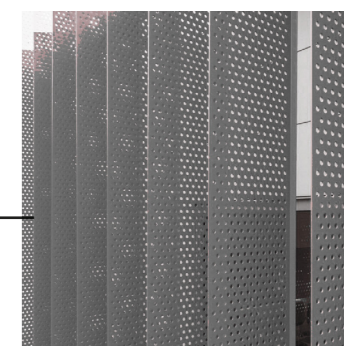
View From Waterloo Rd



Metal Batten Screen  
Color: Charcoal



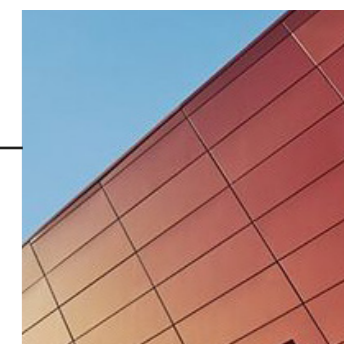
Vertical Perforated Louver Blades  
Powder coated aluminium finish  
Color: Light Grey



Glass, Color: Grey



Metal Cladding, Color: Red  
Soffit and Wall Cladding



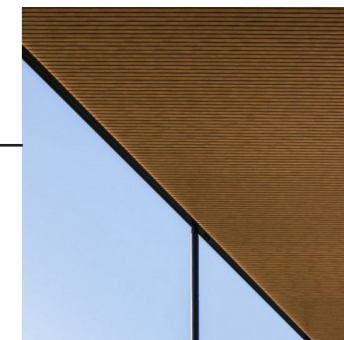
# 05\_ Facade Design and Materiality

## 5.1. Office Building Facade

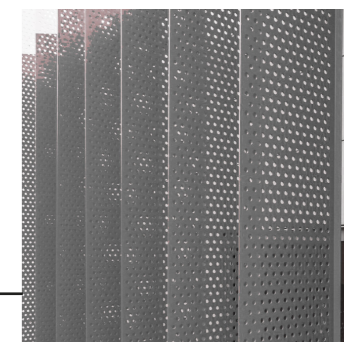
View From Waterloo Rd



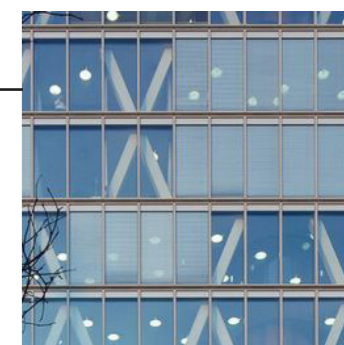
Timber Soffit



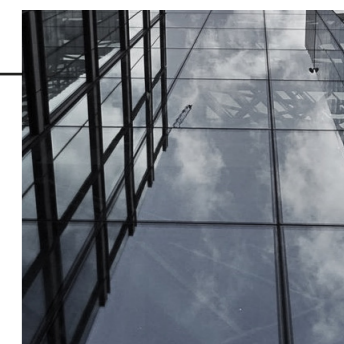
Vertical Perforated Louver Blades  
Poweder coated aluminium finish  
Color: Light grey



Aluminium spandrel panel  
Poweder coated  
Color: Light grey



Glass, Color: Grey



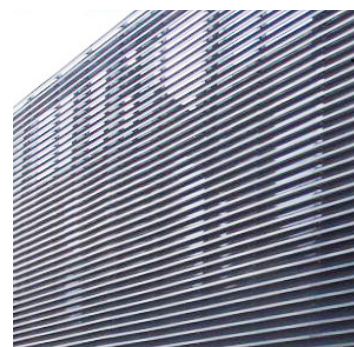
# 05\_ Facade Design and Materiality

## 5.2. Data Hall Building Facade

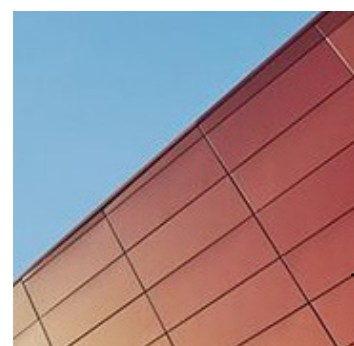
View From Lane Cove Rd



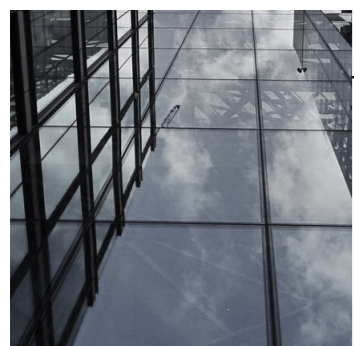
Acoustic screen, Color: Charcoal



Metal Louvre, Color: Light Grey



Metal Cladding, Color: Red  
Soffit and Wall Cladding



Glass, Color: Grey



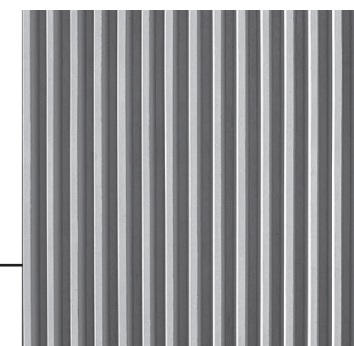
Metal Cladding  
Color: Charcoal



Concrete, Color: Natural



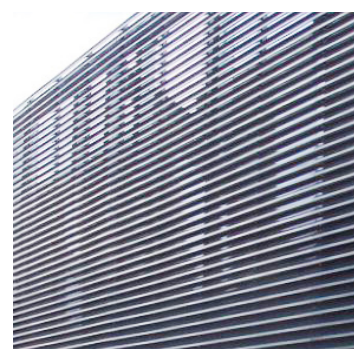
Textured Concrete, Color:Natural



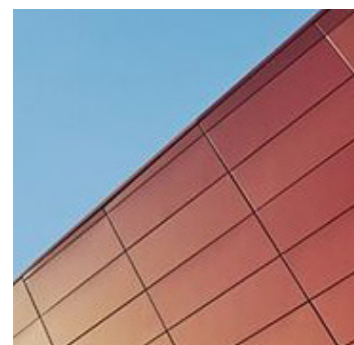
# 05\_ Facade Design and Materiality

## 5.2. Data Hall Building Facade

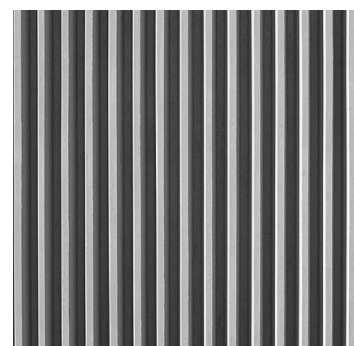
View From Road 13



Metal Louvre  
Color: Light Grey



Metal Cladding, Color: Red  
Soffit and Wall Cladding



Textured Concrete, Color: Natural



Metal Cladding  
Color: Charcoal

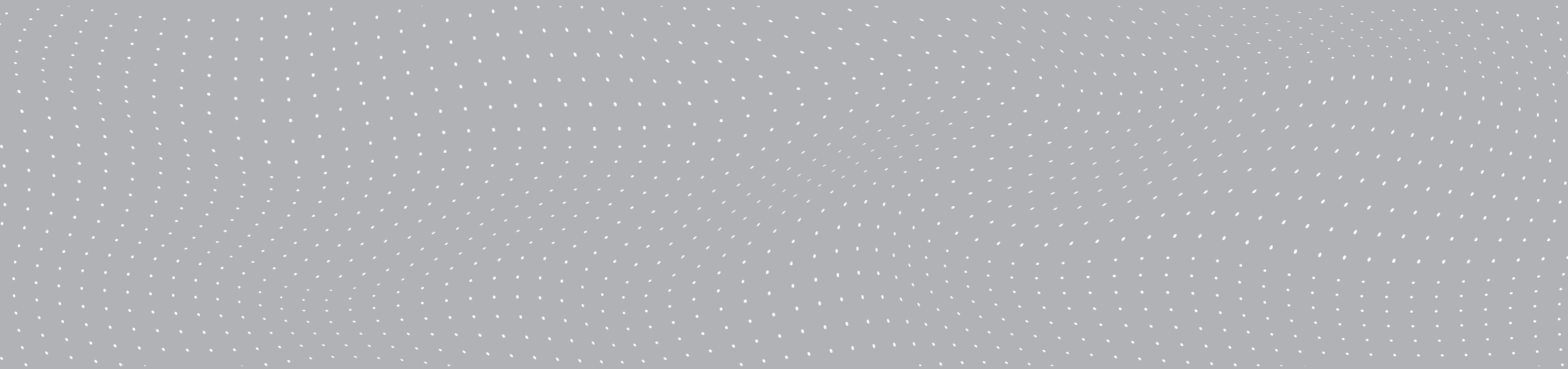


Generators Flue



Concrete, Color: Natural





# 06\_ Environmental Responses

## 6.1 Initiatives and sustainability

### Greenhouse Gas Emissions and Energy

With up to 40% of global Greenhouse Gas Emissions attributed to buildings, increasing building energy performance is a critical step in addressing the growing issues of sustainability and climate change. It is also an important step in future-proofing a development for the energy grid that is increasingly relying on renewable energy.

The NSW State government has a target Net zero emissions by 2050 with a 50% reduction in emissions by 2030.

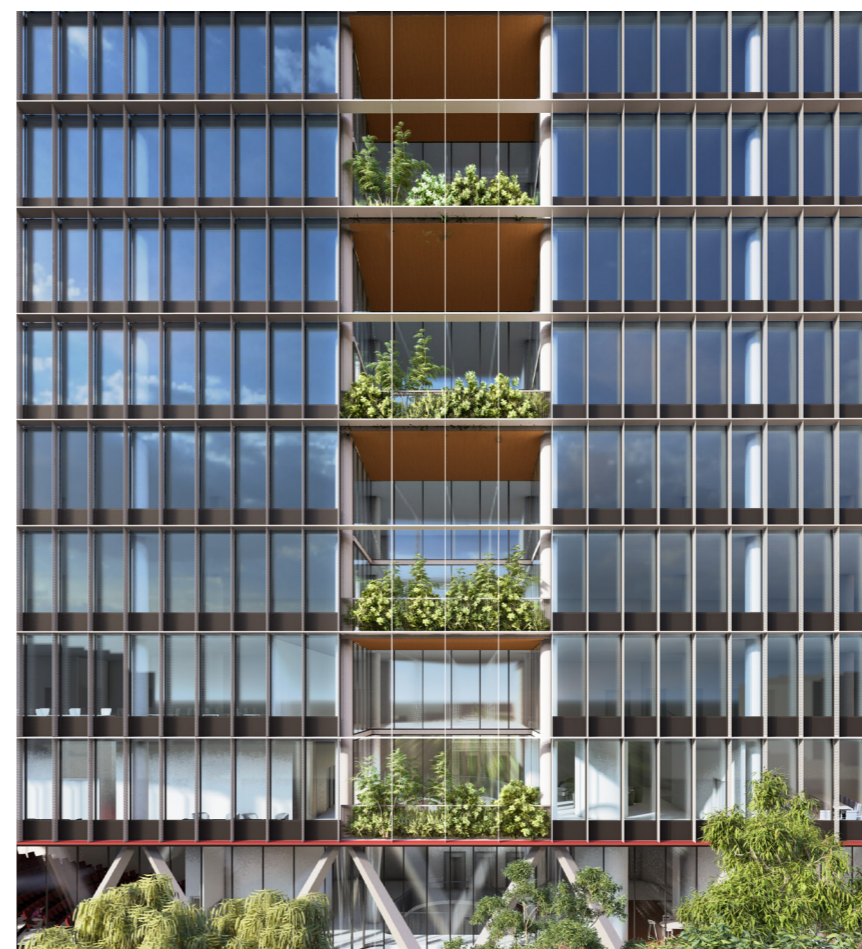
#### For Shiraz 5, we are aiming for operational energy use reduction through the following:

- Aiming for NABERS 5.5 Star Energy from the site’s operation.
- Passive design – limiting glazing extent with spandrel glazing, strategically placed sun shading devices on the exterior of the building to control sunlight exposure, well-insulated and sealed wall construction to minimise heat transmission
- Efficient building systems including LED lighting with smart controls
- Selection of energy efficient equipment, focusing on low-GWP refrigerant
- Selection of low embodied carbon materials.
- Reduce energy consumption by allowing automatic dimming or brightening of lights based on the amount of natural light in a room, and triggered by people entering an area.
- Low ‘E’ insulated doubled glazed curtain wall panels

### Water Consumption

Potable water use reduction through the following:

- Efficient fixtures and fittings for toilets and sanitary appliances
- Water Tanks for condensate water recycling, generated by the data centre’s cooling systems.
- Rainwater harvesting and reuse for irrigation and toilet flushing.



# 06\_ Environmental Responses

## 6.1 Initiatives and sustainability

### Landscape

The project utilises the following design responses:

- Emphasis on maximizing deep soil areas for green spaces and landscaping
- Drip irrigation system for the landscaping to efficiently water plants and reduce water wastage
- Massed planting to the north west corner and west frontage
- Smart irrigation technology to monitor soil moisture levels and optimize watering schedules
- Utilising native, drought-tolerant plants
- Strategically placed trees around the data centre to provide natural shade

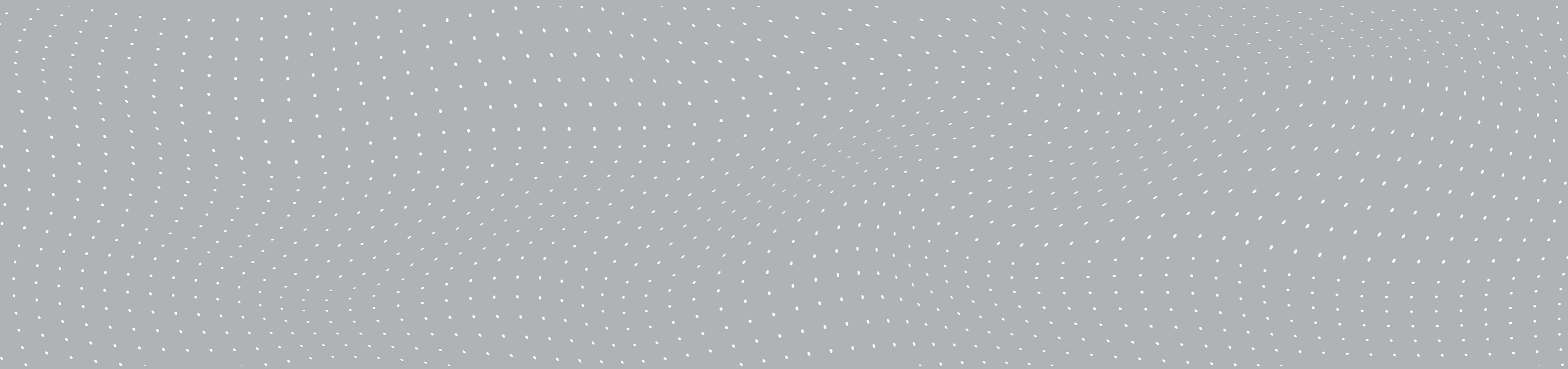


### Supporting health and wellbeing

The following helps the site's users to maintain physical and mental wellbeing:

- Low or ultra-low VOC/formaldehyde finishes
- Windows that give access to daylight and views of landscaped areas
- Rooftop facilities including seating area to allow social connection
- End of Trip facilities including bicycle parking to facilitate fossil-fuel free transport to and from the site.





# 07\_ Design Repsonse to GANSW

## 7.1. Better Placed

The Better Placed policy establishes guidelines to achieve good design within the built environment in New South Wales.

Good Design creates buildings that are efficient, user friendly, enjoyable and provide additional value to the community and local context.

The Government Architect New South Whales (GANSW) defines a well designed built environment as being: healthy, responsive, integrated, equitable and resilient.

The Better Placed policy defines seven objectives for good design:

1. Better Fit: Contextual, local and of its place
2. Better Performance: Sustainable, adaptable and durable
3. Better for Community: inclusive, connected and diverse
4. Better for people: safe, comfortable and livable
5. Better working: Functional, efficient and fit for purpose
6. Better Value: creating and adding value
7. Better look and feel: engaging, inviting and attractive



### Better Fit: Contextual, local and of its place

- The S5 Data Centre project embodies the Better Placed guideline’s ethos of “Better Fit” by seamlessly integrating into the Macquarie Park commercial zone. Aligning with the policy’s objective, the development respects its surroundings, enhancing connectivity and community engagement.
- Situated within the Macquarie Park commercial zone, proximity to existing S1 and S2 data centre locations underscores the importance of integrating the new facility seamlessly into its surroundings.
- The inclusion of retail shops on the Ground Floor enhances the facility’s engagement with the civic plaza, fulfilling the council’s development objectives.
- The covered walkways and tiered seating, along with thoughtfully landscaped gardens, creates a well-lit and welcoming environment that reflects the essence of its location. This fosters social interaction while catering to local needs.
- Commitment to creating a sustainable, responsive, and resilient built environment that adds significant value to the community while harmonizing with its context.



### Better Performance: Sustainable, adaptable and durable

- The project aligns closely with the Better Placed policy’s “Better Performance” objective, emphasizing sustainability, adaptability, and durability. By integrating these principles, the facility ensures long-term viability and minimal environmental impact.
- Sustainable features like efficient energy systems and resource management reduce operational costs and carbon footprint.
- Adaptability allows the infrastructure to evolve with technological advancements, ensuring continued relevance in the fast-paced tech industry.
- Durability ensures longevity, reducing the need for frequent upgrades or replacements. The project also embraces the policy’s broader vision by contributing to a resilient, integrated, and equitable built environment.
- By adhering to the Better Placed guidelines, the S5 Data Centre not only meets functional requirements but also enhances the community and local context, creating a space that is both efficient and beneficial for all stakeholders.



### Better for community: inclusive, connected and diverse

- S5 not only addresses technological needs but also embraces community integration and diversity, aligning with the Better Placed guidelines for good design.
- By enhancing the civic plaza with retail spaces and connectivity to public transport, it fosters inclusivity and engagement within the community. Landscape design elements like covered walkways and tiered seating create inviting spaces for social interaction, promoting a sense of belonging to the public space.
- Additionally, the project’s round-the-clock activity ensures constant activation of the public domain, enhancing safety and utilization. By adhering to the Better Placed policy’s objectives, such as being responsive, integrated, and equitable, the project not only serves its primary function but also enriches the local context.
- Through thoughtful design and consideration of the Better Placed principles, the S5 Data Centre project not only meets technical requirements but also emphasizes on connectivity, diversity, and community engagement, making it a model of inclusive and connected development.

# 07\_ Design Response to GANSW

## 7.1. Better Placed



### **Better for People: Safe, comfortable and livable**

- The project ensures that its design prioritizes the well-being of individuals interacting with the facility. With features like efficient layout planning, user-friendly spaces, and attention to comfort, S5 aims to create an environment conducive to productivity and satisfaction.
- The activation of the civic plaza promotes a sense of security. Through its design, the project ensures a safe and comfortable public space for the community and ensuring round-the-clock activation of the civic plaza with adequate lighting and security.
- Landscaping and tiered seating not only provide aesthetic appeal but also offer spaces for social engagement and relaxation. The inclusion of covered walkways linking retail areas and public transport bus stops encourages pedestrian movement and fosters connectivity.
- The data centre's 24/7 activity ensures continuous activation of public spaces, promoting safety and utilization. The project's emphasis on safety, comfort, and usable public spaces underscores its commitment to creating spaces that prioritize human needs.
- S5 project aims to prioritize people's well-being and enrich the communities it integrates with.



### **Better Working: Functional, efficient and fit for purpose**

- "Better Working" is crucial in the proposed Data Centre project, aligning with the Better Placed guidelines for good design. The project's layout, including high-rise data halls and commercial spaces, aims for functionality, efficiency, and suitability. By adhering to these guidelines, the development ensures the infrastructure is responsive to the community's needs, fostering inclusivity and connectivity.
- The integration of a well-design civic spaces and landscape design offers employees opportunities for relaxation and social interaction, reducing stress and fostering a sense of community within the workplace. Access to amenities such as retail shops and outdoor seating areas enhances convenience and work-life balance for employees.
- By prioritizing functionality, efficiency, and purposefulness, the S5 Data Centre project not only meets the demands of modern data storage but also contributes positively to the workplace environment, fostering connectivity, sustainability, and resilience.



### **Better Value: Creating and adding value**

- By adhering to this principle, the development ensures it not only meets but exceeds expectations, offering benefits beyond its core functions. Integrating retail spaces and expanding the connectivity beyond the development not only increases the project's economic viability but also enriches community engagement.
- The inclusion of the high-rise towers with expanded amenities like retail shops, public civic plaza, and connectivity to public transport systems enhances community engagement and local economic activity.
- The presence of a state-of-the-art data centre and other commercial spaces within proximity can attract businesses in the area. This can lead to economic growth in local commerce, benefiting both communities and businesses alike.
- The S5 Data Centre project exemplifies how strategic planning and design can create a dynamic, efficient, and aesthetically pleasing environment that adds significant value to both users and the broader community, in line with the Better Placed policy's vision for good design.



### **Better Look and Feel: Engaging, inviting and attractive**

- By incorporating engaging and attractive design elements, such as well-designed architecture, landscaping and inviting civic spaces, the project elevates the visual appeal of the urban landscape. This can contribute to making the area more visually pleasing and attractive to nearby residents, and visitors.
- The integration of landscape design and civic spaces fosters a vibrant public domain, which also includes tiered seating arrangements and green spaces which promotes social engagement and tranquillity. These amenities provide spaces for people to gather, socialize, and participate in events, fostering a sense of community within the urban locality.
- By contextualizing the design and integrating with the surrounding environment, the project seamlessly blends into the urban fabric, creating a harmonious relationship between the built environment and its surroundings. This integration fosters a sense of place and identity within the locality, enhancing its overall usage and attractiveness.



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CAMPUS SOUTH

MACQUARIE SHOPPING CENTRE

WASTE MANAGEMENT CENTRE

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