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# Appendix P

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## ESD Report

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# Hunter Street East Over Station Development Ecologically Sustainable Development Report

Appendix P

November 2022

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# Glossary

Term	Definition
ACB	Active chilled beam
CBD	Central business district
Concept and Stage 1 CSSI Application	Application SSI-10038 including all major civil construction works between Westmead and The Bays, including station excavation and tunnelling, associated with the Sydney Metro West line
Concept SSDA	A concept development application as defined in section 4.22 the EP&A Act, as a development application that sets out concept proposals for the development of a site, and for which detailed proposals for the site or for separate parts of the site are to be the subject of a subsequent development application or applications.
Council	City of Sydney
CSSI	Critical Stage Significant Infrastructure
D&AB	Design and As Built
DCP	Development Control Plan
DPE	Department of Planning and Environment
EIS	Environmental impact statement
EMP	Environmental Management Plan
EMS	Environmental Management System
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPA	Environment Protection Authority
ESD	Ecologically Sustainable Development
FSR	Floor space ratio
GFA	Gross floor area
GHG	Greenhouse gas
GWP	Global warming potential
LEP	Local Environmental Plan
NABERS	National Australian Built Environment Rating System
NatHERS	Nationwide House Energy Rating Scheme
NCC	National Construction Code
OSD	Over Station Development
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
SEARs	Secretary's Environmental Assessment Requirements

Term	Definition
SSDA	State Significant Development Application
SSI	State Significant Infrastructure
Stage 2 CSSI Application	Application SSI-19238057, including major civil construction works between The Bays and Hunter Street Station
Stage 3 CSSI Application	Application SSI-22765520, including rail infrastructure, stations, precincts and operation of the Sydney Metro West line
Sydney Metro West	Construction and operation of a metro rail line and associated stations between Westmead and the Sydney CBD as described in section 1.1
TfNSW	Transport for New South Wales
VAV	Variable air volume
VKT	vehicle kilometres travelled
WSUD	Water sensitive urban design
ZCAP	Zero Carbon Action Plan

## Executive summary

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This Ecologically Sustainable Development (ESD) Report supports a Concept State Significant Development Application (Concept SSDA) submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Concept SSDA is made under section 4.22 of the EP&A Act.

Sydney Metro is seeking concept approval for a commercial tower above the Hunter Street Station eastern site (the site), otherwise known as the over station development (OSD).

The Concept SSDA seeks consent for a building envelope and its use for a commercial and retail premises, a maximum building height of 58 storeys (257.7m, reduced level 269.10), a maximum gross floor area (GFA) of 84,223m<sup>2</sup>, pedestrian and vehicular access, circulation arrangements and associated car parking and the strategies and design parameters for the future detailed design of development.

This ESD Report responds specifically to the Secretary's Environmental Assessment Requirements (SEARs) and provides an outline of sustainability criteria to be met by future developments.

### Climate responsive design

Resiliency is fundamental to decision making. Development must take account science-based climate modelling to ensure investment in social and community infrastructure is secure, and assets can serve the community long into the future.

The proposed development is to respond to the sun path and prevailing wind conditions to enhance daylight access, thermal comfort and optimise passive performance. The development site is also within a highly dense and extensively overshadowed urban environment. The site context will need to be considered in the future design.

Part of the climate responsive approach should include facade optimisation measures to mitigate and manage visual discomfort for commercial tenants and improve passive design is recommended. Additional mitigation measures to reduce the impact of solar reflectivity and the urban heat island effect should also be included, such as external horizontal and vertical shading elements; intrinsic features of the building form, such as reveals and returns; and matte or non-reflective materials.

Indoor environmental quality and access to daylight is essential to showcase design excellence. The building envelope of the proposed development is expected to experience varying daylight access performance between lower and upper levels, primarily due to overshadowing from adjacent buildings. Optimisation of daylight access should be considered through the application of a rectilinear floor plate and potential varied facade articulation across levels, including varying visible light transmittance of glazing, shading ratio and window to wall ratio.

Electrification of all energy uses of the buildings and 100% renewable electricity underpins the developments climate positive ambitions.



## Sustainable transport

Assessing the proposed development and acknowledging Sydney Metro West will be net zero in operation, the following targets were met:

- private vehicle use emissions reduction: 40%
- active mode encouragement: 90%
- vehicle kilometres travelled (VKT) reduction: 20%
- amenity diversity: 10 amenities across five categories within 400m of the building.

Active mode encouragement was achieved based on the adequate provision of end of trip facilities and bicycle parking spaces.



Seven categories of amenities and a total of 69 diverse amenities were identified within a 400m radius of the proposed development. This strongly encourages walkability for workers, residents and visitors.

The sustainable transport initiatives, ready access to bus, light rail, train and metro services, and high-quality active mobility options drive private vehicle use emissions reductions of circa 70% and a VKT reduction of circa 90%.

## Sustainability rating strategy

A sustainability rating strategy has been established for Sydney Metro West packages and station development. Sustainability rating requirements are correlated across a range of current and emerging regulatory, policy, statutory planning and Sydney Metro requirements, and market recognised standards, drivers and trends.

The proposed development will target the following minimum sustainability rating targets:

Tool	Commercial
	6 star Buildings
	6 star NABERS Energy (base building) (Commitment Agreement) (without GreenPower) 4.5 star NABERS Water

## ESD strategy

In combination with the Sustainability Rating Strategy, the following performance targets have been identified for the proposed development to align with the Green Star Climate Positive Pathway.

### Climate Positive targets

Climate Positive	
40%	reduction in upfront carbon emissions
20%	reduction in energy use
100%	renewable energy
100%	elimination / offset of other emissions
40%	reduction in potable water use
30%	reduction in life cycle impacts

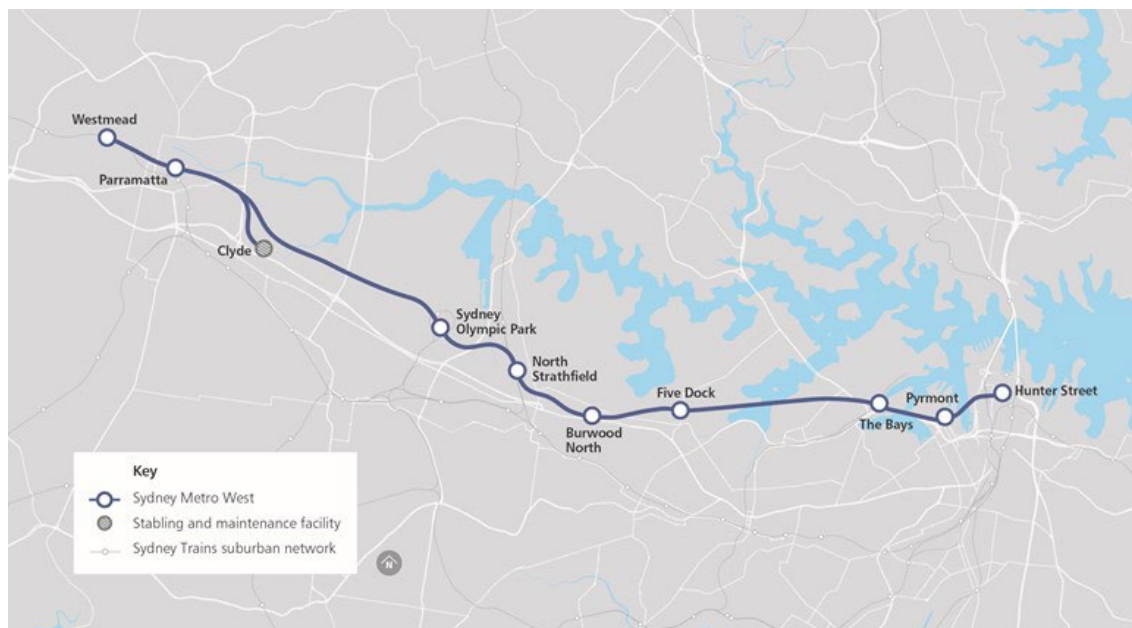
# 1 Introduction

## 1.1 Sydney Metro West

Sydney Metro West will double rail capacity between Greater Parramatta and the Sydney Central Business District (CBD), transforming Sydney for generations to come. The once in a century infrastructure investment will have a target travel time of about 20 minutes between Parramatta and the Sydney CBD, link new communities to rail services and support employment growth and housing supply.

Stations have been confirmed at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays, Pyrmont and Hunter Street.

Sydney Metro West station locations are shown in Figure 1-1 below.



**Figure 1-1 Sydney Metro West**

## 1.2 Background and planning context

Sydney Metro is seeking to deliver Hunter Street Station under a two part planning approval process. The station infrastructure is to be delivered under a Critical State Significant Infrastructure (CSSI) application subject to provisions under Division 5.2 of the EP&A Act, while the over station developments are to be delivered under a State Significant Development (SSD) subject to the provisions of Part 4 of the EP&A Act. It is noted a Planning Proposal request has been submitted to the City of Sydney Council to amend the planning controls on the site (refer to section 1.2.3).

### 1.2.1 Critical State Significant Infrastructure

The state significant infrastructure (SSI) planning approval process for the Sydney Metro West metro line, including delivery of station infrastructure, has been broken down into a number of planning application stages, comprising the following:

- Concept and Stage 1 CSSI Approval (SSI-10038) – All major civil construction works between Westmead and The Bays including station excavation, tunnelling and demolition of existing buildings (approved 11 March 2021)

- Stage 2 CSSI Application (SSI- 19238057) – All major civil construction works between The Bays and Hunter Street Station (approved 24 August 2022)
- Stage 3 CSSI Application (SSI- 22765520) – Tunnel fit-out, construction of stations, ancillary facilities and station precincts between Westmead and Hunter Street Station and operation and maintenance of the Sydney Metro West line (under assessment).

### **1.2.2 State significant development application**

The SSD will be undertaken as a staged development with the subject concept state significant development application (Concept SSDA) being consistent with the meaning under section 4.22 of the EP&A Act and seeking conceptual approval for a building envelope, land uses, maximum building heights, a maximum gross floor area, pedestrian and vehicle access, vertical circulation arrangements and associated car parking. A subsequent Detailed SSDA/s is to be prepared by a future development partner which will seek consent for detailed design and construction of the development.

### **1.2.3 Planning proposal**

A Planning Proposal request has been submitted to the City of Sydney Council to amend the planning controls that apply to the Hunter Street Station under the Sydney Local Environmental Plan 2012 (LEP). Hunter Street Station includes both an eastern site (this application) and western site.

The Planning Proposal request seeks to enable the development of a commercial office building on the site that would:

- comprise a maximum building height of between reduced level (RL) 257.7m and RL 269.10m (as it varies to comply with the relevant sun access plane controls)
- deliver a maximum gross floor area (GFA) of 84,287m<sup>2</sup> (resulting in a maximum floor space ratio (FSR) of 22.82:1, measured above ground level.
- facilitate the adaptive reuse of the existing Former Skinners Family Hotel within the overall development.
- include site specific controls which ensure the provision of employment and other non-residential land uses.
- require the mandatory consideration of a site specific Design Guideline.
- allow for the provision of up to 70 car parking spaces.
- establish an alternative approach to design excellence.

The Planning Proposal request was submitted to the City of Sydney in May 2022 and is currently under assessment.

## **1.3 Purpose of the report**

This ESD report supports a Concept SSDA submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the EP&A Act. The Concept SSDA is made under section 4.22 of the EP&A Act.

This report has been prepared to specifically respond to the Secretary's Environmental Assessment Requirements (SEARs) issued for the Concept SSDA on the 8 August 2022 which states that the environmental impact statement is to address the following requirements.

Key issue	SEARs	Addressed in
8. Ecologically Sustainable Development	Identify how ESD principles (as defined in the EP&A Regulation) are incorporated in the design and ongoing operation of the development.	Section 4 – The proposal
	Demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards.	Section 5 – The proposal
	Demonstrate how the development achieves net zero greenhouse gas emissions (reflecting the Government's goal of net zero emissions by 2050 and the City of Sydney's net zero energy planning controls) and consumption of energy, water (including water sensitive urban design) and material resources.	Section 6 and 7 – The proposal

This ESD report outlines what sustainability criteria can be met by future developments on the site. Through site and climactic analysis, recommendations are made to ensure future developments are designed to be climate responsive, environmentally friendly and improve human health and wellbeing. Pathways to support a low carbon, sustainable transport strategy has also been outlined. Analysis has been carried out to inform a sustainability rating strategy as well as a performance targets for the development to meet.



## 2 The site and proposal

### 2.1 Site location and description

Hunter Street Station is in the northern part of the Sydney CBD, within the commercial core precinct of Central Sydney and within the Sydney Local Government Area (LGA). The Hunter Street Station includes two sites – the eastern site and the western site. This report relates to the eastern site only.

The Hunter Street Station eastern site (the site) is on the corner of O'Connell Street, Hunter Street and Bligh Street adjacent to the existing CBD and South East Light Rail that extends from Circular Quay to Moore Park, Kensington and Kingsford. The east site is adjacent to the new Martin Place Station which forms part of the Sydney Metro City and Southwest, Australia's biggest public transport project connecting Chatswood to Sydenham and extending to Bankstown. The remainder of the site is currently occupied by commercial office buildings and a range of ground floor business premises including retail, restaurants and cafes.

The site area is 3,694 m<sup>2</sup> and be cleared of all buildings and utilities prior to commencement of station construction activities. The site location is shown in Figure 2-1.

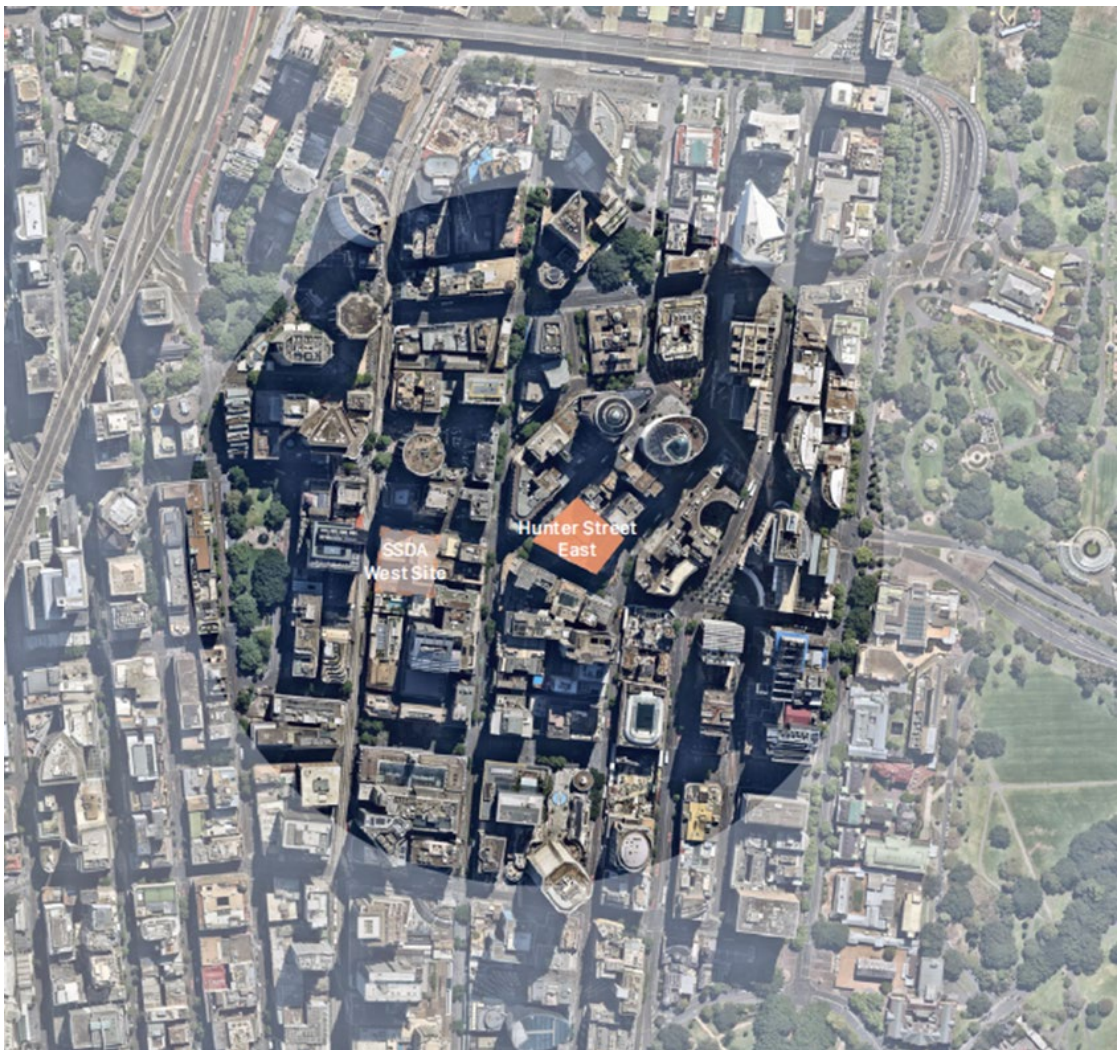


Figure 2-1 Location of the site

Table 2-1 sets out the address and legal description of the parcels of land that comprise the site.

**Table 2-1 Site legal description**

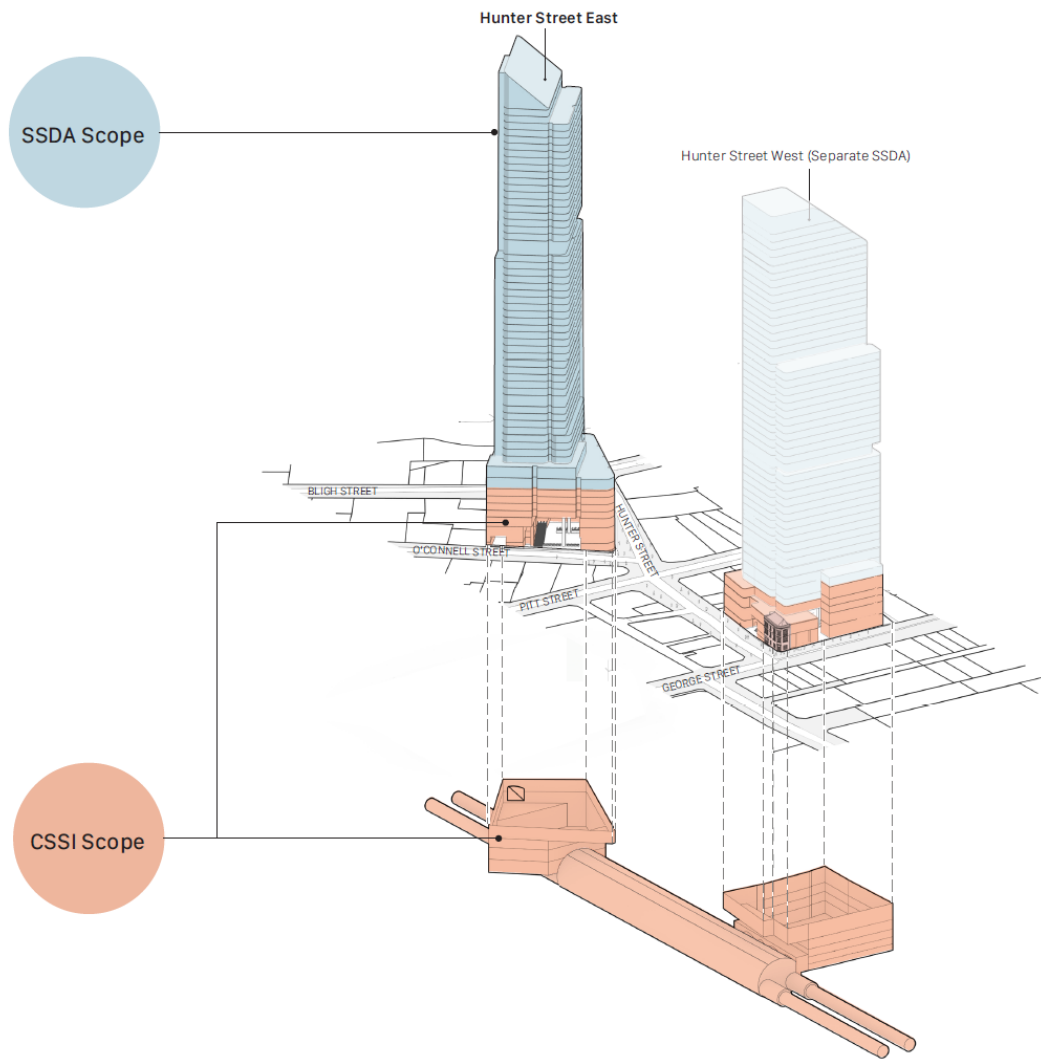
Address	Lot and DP
28 O'Connell Street, Sydney	Lot 1, DP217112
28 O'Connell Street, Sydney	Lot 1, DP536538
28 O'Connell Street, Sydney	Lot 1, DP1107981
48 Hunter Street, Sydney	Lot 1, DP59871
48 Hunter Street, Sydney	Lot 2, DP217112
33 Bligh Street, Sydney	Lot 1, DP626651
37 Bligh Street, Sydney	CP and Lots 1-14, 21-31, 33-36, and 40, SP58859
37 Bligh Street, Sydney	CP and Lots 41-49, SP61852
37 Bligh Street, Sydney	CP and Lots 50-57, SP61922
37 Bligh Street, Sydney	CP and Lots 58-65, SP61923
37 Bligh Street, Sydney	CP and Lots 66 and 67, SP63146
37 Bligh Street, Sydney	CP and Lots 67-70, SP63147
37 Bligh Street, Sydney	CP and Lot 72, SP74004
37 Bligh Street, Sydney	CP and Lots 75-82, SP87437
37 Bligh Street, Sydney	CP and Lots 73-74, SP87628
<b>Total Area: 3,694 m<sup>2</sup></b>	

## 2.2 Overview of the proposal

The Concept SSDA will seek consent for a building envelope above the site (the proposed development). As detailed in Table 2-2 and Figure 2-2.

**Table 2-2 Proposed development overview**

Built form component	Proposed development outcome
Site area	3,694m <sup>2</sup>
Height	Building height of 257.7m (RL 269.10)
Ground floor area	Up to 84,223m <sup>2</sup>
Land use(s)	Commercial office and retail
Carparking	Up to 70 car parking spaces



**Figure 2-2 Proposed Concept SSDA development and CSSI scope**

### 3 Policy drivers

Table 3-1 outlines the policy drivers relevant to the proposed development.

**Table 3-1 Policy drivers**

Policy driver	Description
SEARs	<ul style="list-style-type: none"> <li>Consider environmental impacts, such as overshadowing and solar access, visual comfort, wind and reflectivity</li> <li>Adhere to the principles of ecologically sustainable development</li> <li>Prioritise active transport modes and improve the permeability of the pedestrian network</li> <li>Demonstrate that the development is capable of achieving best practice energy performance in the common areas of the part of the building to be used as office premises.</li> </ul>
Sydney Development Control Plan 2012	<ul style="list-style-type: none"> <li>Reduce the need for active heating and cooling by incorporating passive design measures</li> <li>Be capable of achieving a 5.5-star NABERS Energy for Offices rating for the base building for new developments containing office premises with a net lettable area of 1,000 m<sup>2</sup> or more</li> <li>Move toward net zero carbon</li> <li>Reduce the consumption of potable water, including the harvesting and reuse of rainwater and stormwater</li> <li>Minimise waste generation, and encourage the recycling of construction and demolition waste</li> <li>Maximise recovery, recycling and reuse of operational waste</li> <li>Install dual plumbing systems and make provision for a future-ready connection to a recycled water network.</li> </ul>
Central Sydney Planning Strategy 2016-2036	<ul style="list-style-type: none"> <li>Reduce greenhouse gas (GHG) emissions, potable water use and waste generation</li> <li>Utilise low carbon and renewable energy</li> <li>Adapt to climate change</li> <li>Increase the recycling of waste and the use of products from recycled sources</li> <li>Improve indoor environmental quality</li> <li>Minimise the environmental impact from building materials through reduction, re-use and recycling of materials, resources and building components</li> <li>Enhance biodiversity.</li> </ul>
Department of Planning and Environment Net Zero Plan, Stage 1: 2020-2030	<ul style="list-style-type: none"> <li>Drive the uptake of proven GHG emissions reduction technologies to reduce the cost of living</li> <li>Empower consumers and businesses to make sustainable choices</li> <li>Invest in the next wave of GHG emissions reduction innovation to ensure economic prosperity from decarbonisation.</li> </ul>
Department of Planning and Environment Net Zero Plan Stage 1:2020-2030 (Implementation update)	<ul style="list-style-type: none"> <li>Electrify all energy uses and supply all energy uses with renewable electricity by 2030</li> <li>Plan operational improvements and projects, and decarbonisation pathways for businesses</li> <li>Accelerate the transformation of the built environment towards net zero emissions under a range of Net Zero Buildings initiatives that leverage NABERS (embodied and operational</li> </ul>



Policy driver	Description
	GHG emissions), green finance mechanisms and BASIX enhancements that align with the Trajectory for low energy buildings.
NSW Electric Vehicle Strategy	<ul style="list-style-type: none"> <li>• Ensure new buildings and precincts are 'EV ready'.</li> </ul>
NSW Circular Economy Policy Statement	<ul style="list-style-type: none"> <li>• Use resources sustainably</li> <li>• Replace raw materials with recycled products</li> <li>• Minimise the use of virgin materials</li> <li>• Recognise that resources have value throughout multiple cycles of use and reuse</li> <li>• Innovate product design for longevity, reuse and recovery</li> <li>• Reduce the demand for new landfills</li> <li>• Improve the quality of collected materials, and improve sorting of these materials and reuse</li> <li>• Capture value from recycling resources.</li> </ul>
NSW Climate Change Policy Framework	<ul style="list-style-type: none"> <li>• Achieve net zero emissions by 2050</li> <li>• Be more resilient to a changing climate</li> <li>• Reduce risks and damage to public and private assets arising from climate change</li> <li>• Embed climate change considerations into asset and risk management</li> <li>• Reduce climate change impacts on health and wellbeing</li> <li>• Manage impacts on natural resources, ecosystems and communities.</li> </ul>
NABERS, The Rules, Energy and Water for Offices	<ul style="list-style-type: none"> <li>• Disclose the energy and water performance of assessable assets, including but not limited to offices and apartment buildings</li> <li>• Demonstrate credible savings in energy and water costs through the efficient design of a building's fabric and services</li> <li>• Represent good quality design and reflect market requirements.</li> </ul>
National Construction Code (NCC), Volume One, Building Code of Australia 2019	<ul style="list-style-type: none"> <li>• Integrate features in a building's fabric and services to facilitate the efficient use of energy</li> <li>• Comply with Verification Methods: <ul style="list-style-type: none"> <li>○ JV1 NABERS Energy for Offices - obtain a minimum 5.5-star NABERS Energy for Offices base building Commitment Agreement</li> <li>○ JV2 Green Star - register for a Green Star rating and demonstrate that the annual GHG emissions of the proposed building are less than 90% of the GHG emissions of a reference building</li> <li>○ JV3 Verification using a reference building - demonstrate that the annual GHG emissions of the proposed building are not more than the GHG emissions of a reference building</li> </ul> </li> <li>• Achieve a thermal comfort level of between a Predicted Mean Vote of -1 to +1 across not less than 95 % of the floor area of all occupied zones for not less than 98 % of the annual hours of operation of the building</li> </ul>

Policy driver	Description
	<ul style="list-style-type: none"> <li>Consider the NCC 2022 public comment draft (stage 2), including more stringent whole-of-home annual energy use requirements and deemed-to-satisfy provisions.</li> </ul>
Green Star Buildings Submission Guidelines	<ul style="list-style-type: none"> <li>Register and obtain a Green Star Buildings rating</li> <li>Meet Minimum Expectations: <ul style="list-style-type: none"> <li>Manage environmental impacts during construction</li> <li>Verify the effective operation of building systems</li> <li>Enable practices that reduce operational waste</li> <li>Improve the indoor environment quality</li> <li>Address climate change</li> <li>Emit less GHG emissions in construction and during operation</li> <li>Achieve a water-efficient operation</li> <li>Promote physical activity</li> <li>Embrace diversity</li> <li>Protect environmentally sensitive areas</li> <li>Align with the Climate Positive Pathway: <ul style="list-style-type: none"> <li>Drive credible reductions in upfront and operational carbon</li> <li>Avoid locking in fossil fuels</li> <li>Electrify all energy uses and supply all energy uses with renewable electricity</li> <li>Offset operational carbon that cannot be eliminated using nature-based solutions, and carbon capture and storage technologies.</li> </ul> </li> </ul> </li> </ul>

## 4 Climate responsive design

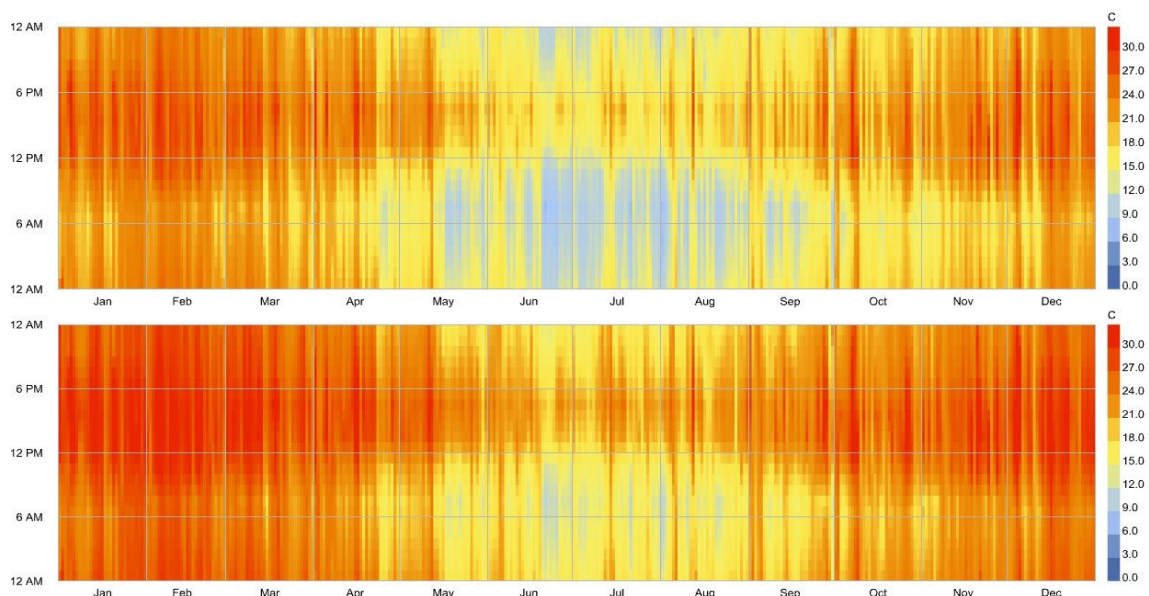
### 4.1 Climate analysis

Resiliency is fundamental to decision making. Development must take account of science-based climate modelling to ensure investment in social and community infrastructure is secure and assets can serve the community long into the future.

To affect sound decision making, Representative Concentration Pathway 8.5 (high emissions scenario) climate modelling, in line with the NSW and ACT Regional Climate Modelling Project, has been incorporated into the analysis to account for future climate scenarios. A 2070 timeline horizon (far future) has been selected based on a building design life of 40 years.

The following future climate projections impact are identified:

- maximum temperatures are projected to increase by 1.9 °C and minimum temperatures are projected to increase by 2.0 °C
- the number of cold nights will decrease
- the number of hot days (above 35 °C) is projected to increase up to an additional 10 - 20 days per year (refer to Figure 4-1). These increases in hot days are projected to occur mainly in spring and summer, extending into autumn.
- rainfall is projected to increase in summer and autumn
- severe fire weather days are projected to increase in summer and spring.



**Figure 4-1 Compares the projected increase in temperatures over current conditions**

Microclimate and building performance analysis have been conducted in evaluating how the indicative OSD and public realm can react appropriately in the face of increasing temperatures. Analysis carried out includes the following:

- sun path analysis - tracking the sun moves throughout the year and what considerations the indicative design will need to consider in regards to the management of solar gain
- solar reflectivity - understanding how the indicative building envelope can contribute to solar glare onto the ground level and neighbouring buildings

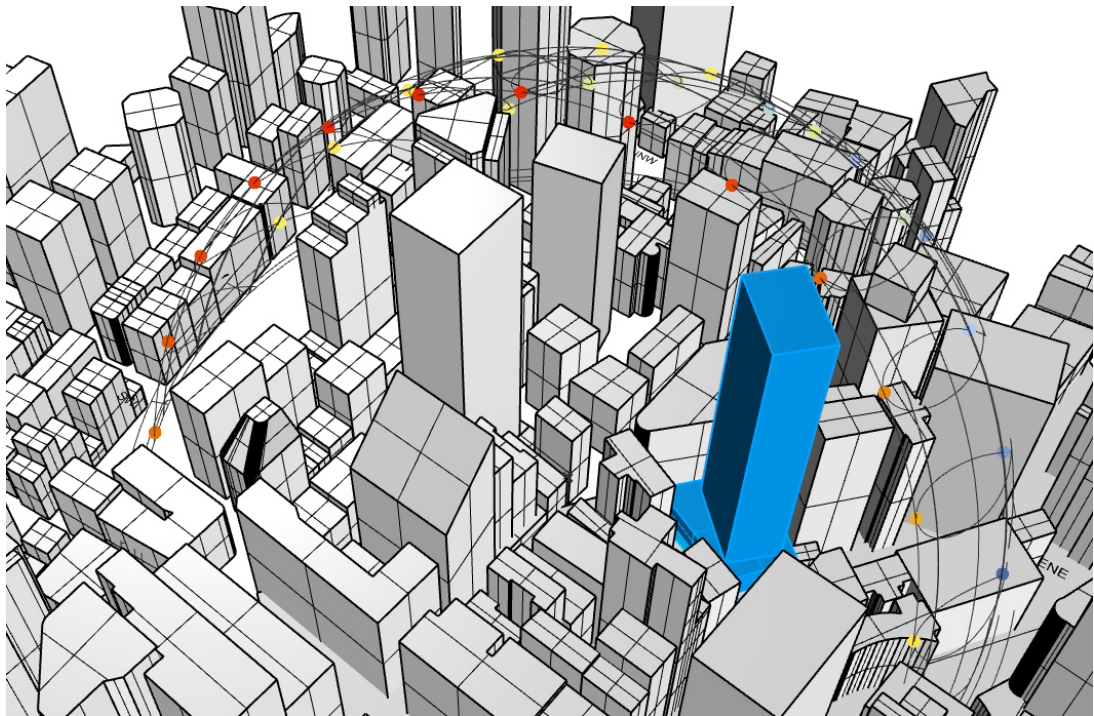
- solar gain - measuring levels of direct solar gain across the indicative building envelope to assess which areas can reduce summer heat gain through shading and reduced glazed areas and allow winter heat gain to improve passive performance
- visual comfort - analysis of daylight penetration to inform indicative building envelope form and optimisation of the façade.

## 4.2 Sun path

Figure 4-2 illustrates the sun path diagram for winter, mid-season and summer for the site.

Richard Johnson Square, adjacent to the site, maintains good levels of direct morning sunlight throughout summer. The urban massing acts to shade the public open spaces on summer afternoons, enhancing outdoor comfort and liveability.

The proposed development building envelope receives good levels of direct sunlight throughout the year, particularly with direct morning sunlight. Lower levels are generally protected by surrounding development to the west.



**Figure 4-2 Sun path diagram for the site (southeast perspective of proposed development envelope)**

Note: Blue path indicates a lower sun angle in winter, red path indicates higher sun angle in summer.

## 4.3 Solar reflectivity

Reducing the solar reflectivity of buildings can help to address pedestrian visual discomfort and hazardous glare for motorists. It also assists in mitigating localised urban heat island effects.

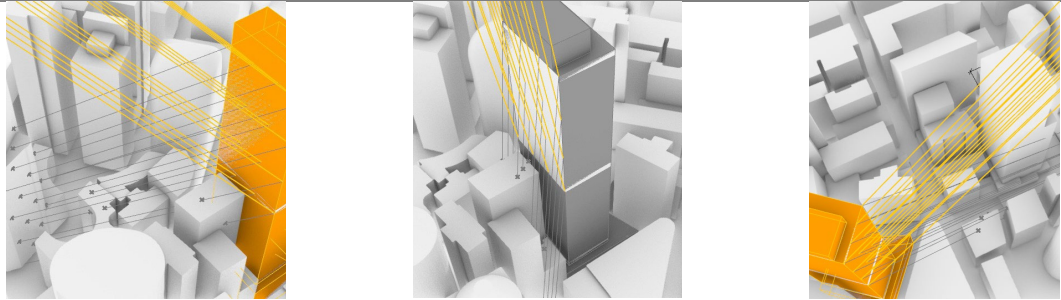
Figure 4-3 illustrates direct solar reflectance to adjacent buildings and the ground plane attributed only to those elevations of the proposed development building envelopes deemed to pose a risk, including time of year.

The following instances occur, where solar reflectivity reaches ground level:

- the southwest elevation of the proposed development building envelope for the east site reflects direct afternoon summer sun along Hunter Street to George Street.

Mitigation measures to reduce the impact of solar reflectivity and the urban heat island effect attributed to the proposed development could include one or a combination of the following:

- external horizontal and vertical shading elements
- intrinsic features of the building form, such as reveals and returns
- utilisation of matte or non-reflective materials, where possible.



**Figure 4-3 Reflectivity review from external facades**

Note: perspectives illustrate incidence of solar reflectance onto Bligh Street in the morning (left), adjacent buildings to the north mid day (middle) and on to Hunter Street in the afternoon (right) buildings to the west on George Street

## 4.4 Sun hours

A sun hours analysis was conducted to assess direct sunlight exposure to the proposed development building envelopes and public open spaces.

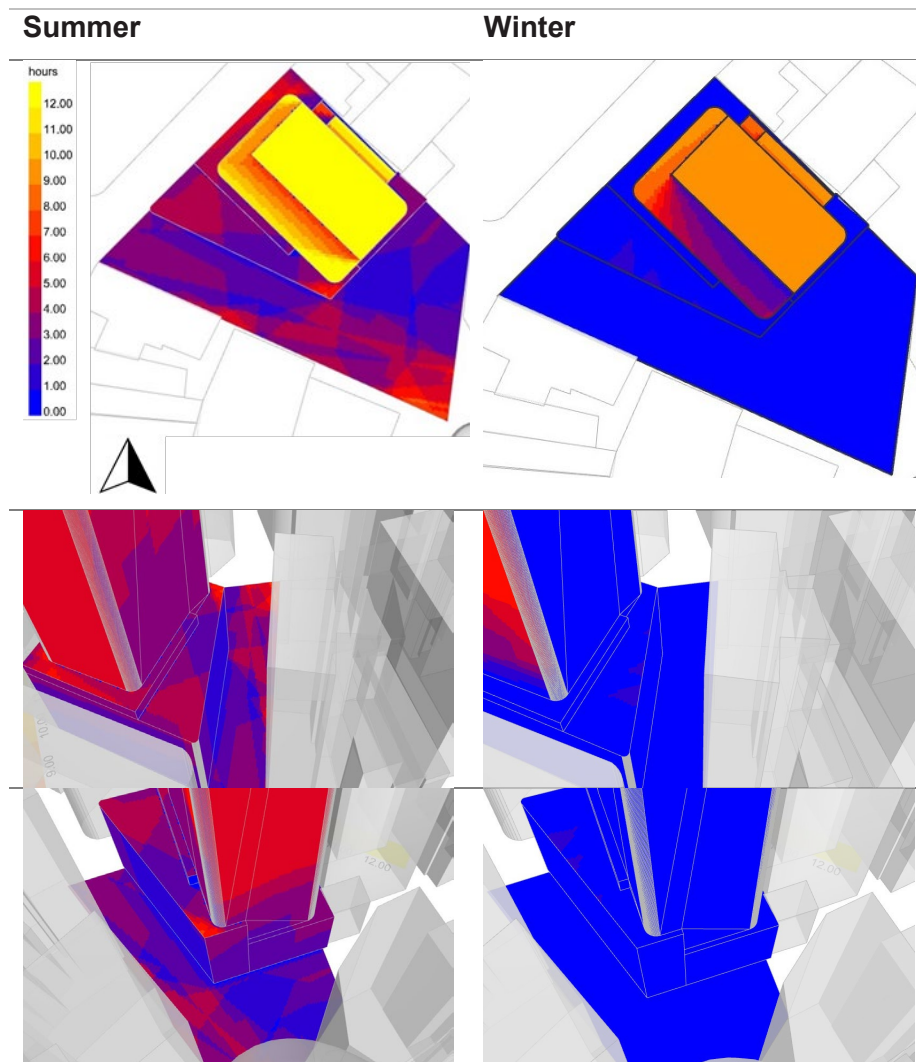
Figure 4-4 illustrates the number of direct sunlight hours received by the proposed development building envelopes for the east site throughout the year.

The proposed development is within a highly dense and extensively overshadowed urban environment. The intent is to utilise and maintain sun access, wherever possible.

Public open spaces in summer see a balanced combination of shaded and partially exposed areas, creating a diversity of street typology for activation.

The proposed development building envelope receives high levels of direct sunlight to the upper northeast and northwest elevations throughout the year. To balance solar exposure across the upper and lower elevations, the facade design should integrate climate responsive measures to optimise performance.





**Figure 4-4 Sun hour analysis**

Note: Top row of graphics illustrate incidence of direct sunlight on the roof. Middle row illustrates incidence of direct sunlight to north and west facades. Bottom row illustrates incidence of direct sunlight to south and east facades.

## 4.5 Visual comfort

Indoor environmental quality and access to daylight is essential to showcase design excellence. Visual comfort analysis has been conducted to identify whether the proposed development buildings envelopes receive good levels of daylight access.

The proposed development building envelopes experience a varying daylight access performance at lower and upper levels, primarily due to overshadowing from adjacent buildings (see Figure 4-5).

Optimisation of daylight access has considered the application of a rectilinear floor plate and potential varied facade articulation across levels, including varying visible light transmittance of glazing, shading ratio and window to wall ratio.

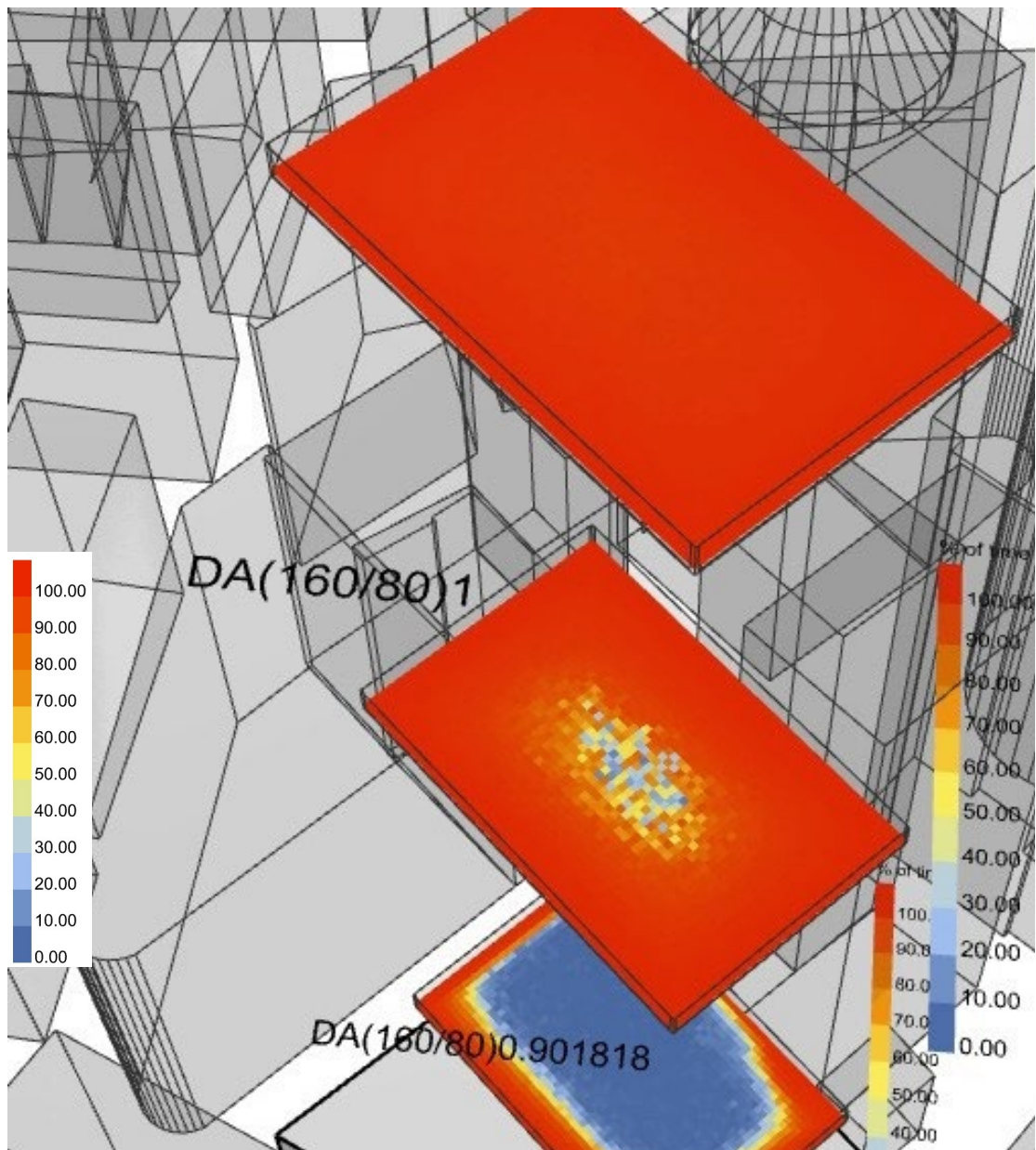


Figure 4-5 Daylight illuminance review of upper and lower level floor plates

## 5 Sustainability targets and rating requirements

### 5.1 Minimum sustainability rating requirements

A sustainability rating strategy has been established for Sydney Metro West packages and station development.

Sustainability rating requirements are correlated across a range of current and emerging regulatory, policy, statutory planning and Sydney Metro requirements, and market recognised standards, drivers and trends.

Minimum sustainability rating targets for the proposed development and their justification are outlined in Table 5-1. Together with the drivers presented in section 3, these minimum sustainability rating targets meet and exceed the best practice energy performance nominated in clause 7.25A Sustainable development in Central Sydney tower cluster areas of the Sydney LEP 2012.

**Table 5-1 Rating targets for the proposed development**

Assets	Minimum rating targets	Justification
Proposed development – Commercial office	6 star Green Star Buildings v1b	Guidance on sustainable development - City of Sydney Council PCA Premium Grade office quality guidelines
	6 star NABERS Energy for Offices (base building) (Commitment Agreement) (without GreenPower)	Green Star Buildings, Credit 22 Energy Use, Exceptional Performance, NABERS Commitment Agreement Pathway
	4.5 star NABERS Water for Offices	Guidance on sustainable development, City of Sydney Council
	5 star NABERS Water for Offices (stretch target)	Verifiable performance, see section 6

An indicative energy and water approach is set out in sections 6 and 7, respectively. Sustainable transport considerations are presented in section 8. The indicative design response is summarised in section 9. A Preliminary Green Star Buildings Scorecard is provided in Appendix A for guidance only.

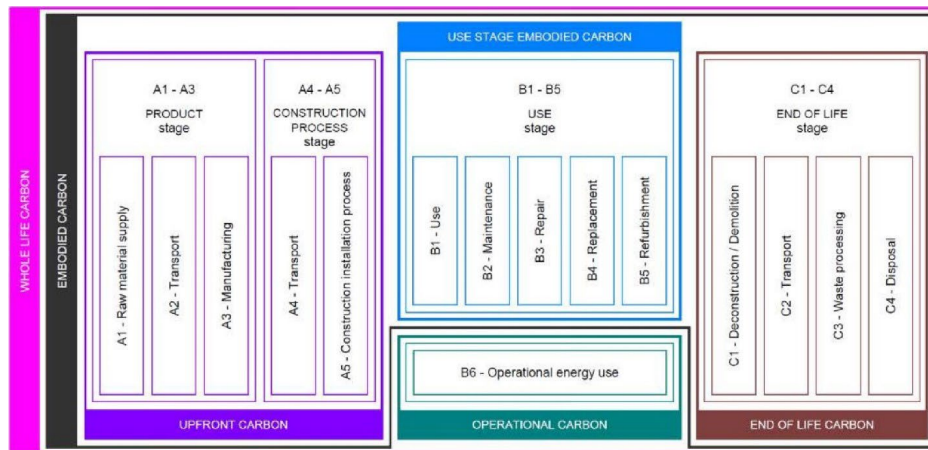
### 5.2 Climate positive

The Green Building Council of Australia (GBCA) is helping to drive the transformation of the built environment to a climate positive future. The science of climate change and an understanding of how the built environment needs to act is captured in the role and targets set in Green Star Buildings.

The Climate Positive pathway sets a Whole Life Carbon Vision that leverages the World Green Building Council's (World GBC's) Advancing Net Zero program that is working toward total sector decarbonisation by 2050.

Referring to Figure 5-1, the scope of the World GBC's Whole Life Carbon Vision considers the complete life cycle modules of those defined in EN 15978, i.e. Upfront Carbon (A1-A5), Use Stage Embodied Carbon (B1-B5), Operational Carbon (B6) and End of Life Carbon (C1-C4).





**Figure 5-1 Scope of the World GBC's Whole Life Carbon Vision**

The Climate Positive pathway established under the Green Star Buildings toolsets out provisions to:

- reduce:
  - drive credible reductions in upfront carbon and operational carbon.
- eliminate:
  - avoid locking in fossil fuels
  - install systems that use low impact refrigerants
  - electrify all energy uses and purchase 100% renewable electricity.
- compensate:
  - offset operational carbon that cannot be immediately eliminated (e.g., refrigerants and standby generator test diesel fuel use).
- neutralise:
  - neutralise carbon that cannot be eliminated (e.g., product and material manufacturing, use and disposal, construction activities, water supply, wastewater treatment, and waste transport and treatment) through short-term nature-based solutions, and long-term carbon capture and storage technologies.

Assuming certification will occur after 1 January 2030, the following Climate Positive Pathway requirements will apply:

- Credit 21 Upfront Carbon Emissions | Exceptional Performance | 40% reduction in upfront carbon emissions over a reference building
- Credit 22 Energy Use | Credit Achievement | 20% reduction in energy use over a reference building<sup>1</sup>
- Credit 23 Energy Source | Minimum Expectation | preparation of a Zero Carbon Action Plan (ZCAP)
- Credit 23 Energy Source | Exceptional Performance | 100% of the building's energy comes from renewables
- Credit 24 Other Carbon Emissions | Credit Achievement | high GWP refrigerants are eliminated or offset
- Credit 24 Other Carbon Emissions | Exceptional Performance | 100% of residual embodied emissions are offset.

## 6 Energy strategy

Operational energy performance is a major contributor to the building life cycle carbon footprint.

Preliminary building energy models have been developed in accordance with NABERS protocols for the proposed development.

A minimum 6-star NABERS Energy for Offices target has been established for the proposed development. The proposed development design was found to meet this energy performance target based on the nominated passive and active design measures presented in Table 6-1. The nominated measures are only intended to provide guidance for future design development by others.

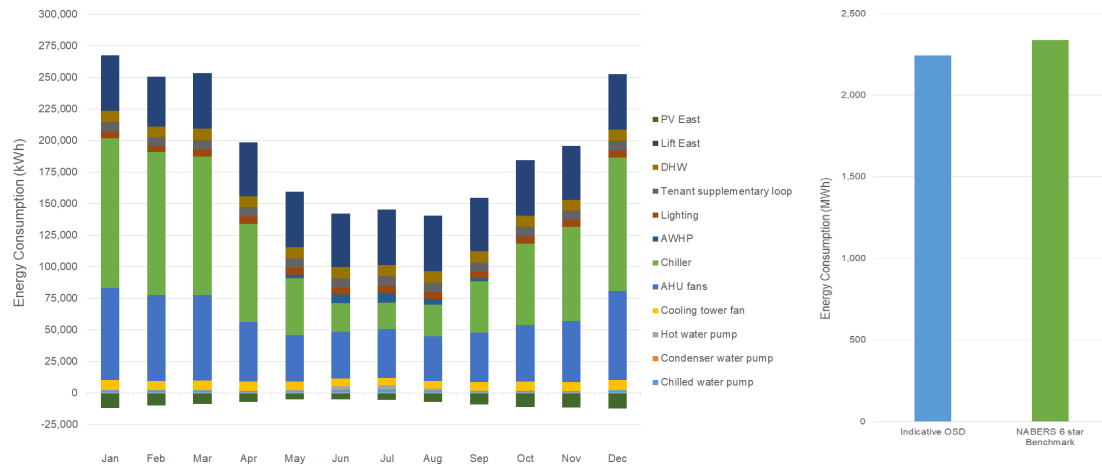
This evaluation is only intended to verify that the proposed development can meet the nominated sustainability rating requirements detailed in Table 6-1 and demonstrate design excellence with respect to sustainability. The energy efficiency measures detailed in Table 6-1 should be interpreted as guidelines only. It is acknowledged that a future development partner may pursue an alternative design response under the detailed design and construction of the proposed development.

**Table 6-1 Energy efficiency guidelines**

Passive design measures	Active design measures
<ul style="list-style-type: none"><li>• 50% window to wall ratio (average for all levels and elevations)</li><li>• glazing system U-value 2.8 W/m<sup>2</sup>.K   SHGC 0.23</li><li>• 300mm deep horizontal shading to the north, west and east elevations</li><li>• Envelope wall system R-value 1.5 m<sup>2</sup>.K/W (total R-value 3.5 m<sup>2</sup>.K/W)</li><li>• Spandrel system R-value 1.0 m<sup>2</sup>.K/W (total R-value 3.5 m<sup>2</sup>.K/W)</li><li>• envelope roof total R-value 3.2 m<sup>2</sup>.K/W</li><li>• envelope floor total R-value 2.0 m<sup>2</sup>.K/W</li><li>• all internal conditions and operational profiles are in line with NABERS protocols</li></ul>	<ul style="list-style-type: none"><li>• active chilled beam (ACB) with constant air volume (CAV) system to the perimeter office zones</li><li>• variable air volume (VAV) system to the centre office zones</li><li>• central air handling plant (including economy cycle and demand control ventilation) separately serving the hybrid ACB and VAV heating, ventilation and air conditioning (HVAC) systems</li><li>• 15% improvement in the energy efficiency ratio (EER) over Part J5.10 Refrigerant chillers (NCC 2019, section J Energy efficiency) for water-cooled chiller plant serving comfort cooling systems</li><li>• a seasonal coefficient of performance (COP) &gt; 3.5 for air-to-water polyvalent heat pump plant serving space heating and domestic hot water heating systems, and comfort cooling low load/peak load conditions</li></ul>

Figure 6-1 present the following for the site:

- predicted monthly energy consumption by end-use
- predicted annual energy performance against the 6 star NABERS Energy budget, including a 15% margin.



**Figure 6-1 Energy consumption breakdown for the proposed development.**

Note: [Right] annual consumption vs NABERS 6 star benchmark. [Left] monthly energy consumption broken down by use

## 7 Water strategy

To support water resilience, buildings must integrate water efficiency measures and make use of alternative water sources to reduce the demand for potable water.

This evaluation is only intended to verify that the proposed development can meet the nominated sustainability rating requirements detailed in Table 7-1 and demonstrate design excellence with respect to sustainability. The water efficiency measures detailed in Table 7-2 should be interpreted as guidelines only. It is acknowledged that a future development partner may pursue an alternative design response under the detailed design and construction of the proposed development.

The proposed development has been assessed against the NABERS Water for Offices and Green Star Buildings (Credit 25 Water Use) rating systems.

A preliminary building water balance analysis has been carried out in accordance with the related protocols of each rating system, and was found to meet the NABERS annual potable water consumption targets presented in Table 7-1.

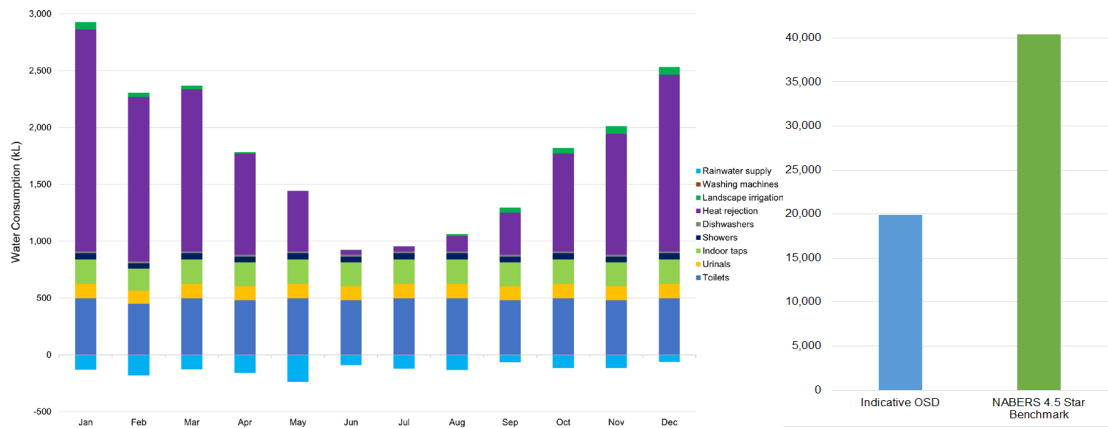
Figure 7-1 visually present the indicative performance against the NABERS water benchmarks and water balance for the proposed development.

**Table 7-1 Water targets**

Site	Target / budget
Proposed development	<ul style="list-style-type: none"><li>• 4.5 star NABERS Water</li><li>• 40,418 kL/year</li></ul>

**Table 7-2 Water efficiency pathway**

Water efficiency potential pathways
<ul style="list-style-type: none"><li>• toilets - 5 star WELS rating</li><li>• urinals - 5 star WELS rating</li><li>• wash hand basin taps - 6 star WELS rating</li><li>• kitchen taps - 6 star WELS rating</li><li>• showers - 4 star WELS rating</li><li>• dishwashers - 5 star WELS rating</li><li>• dual plumbing systems serving all non-potable water demands, including toilet and urinal flushing, landscape irrigation and make-up water for heat rejection systems</li><li>• 25 kL rainwater tank and treatment system for rainwater harvesting and reuse to meet a proportion of the non-potable water demands</li><li>• future ready connection for a recycled water network, including future ready space provision for a recycled water tank</li><li>• closed circuit cooler (hybrid cooling tower) plant for heat rejection serving base building and tenant supplementary loop</li><li>• landscape design - total average crop coefficient less than 0.6</li><li>• landscape irrigation - subsurface drip irrigation - 90% system efficiency</li><li>• fire protection system - water is not expelled during testing</li></ul>



**Figure 7-1 Water consumption breakdown for proposed development**

Note: [left] monthly water consumption broken down by end-use; [right] annual consumption vs NABERS 4.5 star benchmark

## 8 Sustainable transport

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### 8.1 Movement and place

City of Sydney Council has set provisions that:

- prioritise active transport modes and improve the permeability of the pedestrian network
- reduce private vehicle use and encourage active, shared and public transport use.

Whilst not applicable to the project SSDA, the development utilises the following relevant Sydney DCP 2012 design controls as guidelines:

- one carshare parking space per 30 car spaces must be provided for any office, business, or retail premises
- one occupant bicycle parking space per 150m<sup>2</sup> and one visitor bicycle parking space per 400m<sup>2</sup> of floor space of commercial development must be provided
- one occupant bicycle parking space per 250m<sup>2</sup> and two plus one visitor bicycle parking spaces per 100m<sup>2</sup> over 100m<sup>2</sup> of floor space of retail development must be provided
- one personal locker for each bike parking space for non-residential developments
- one shower and change cubicle for up to 10 bike parking spaces
- two shower and change cubicles for up to 11 to 20 or more bike parking spaces
- two additional showers and change cubicles for each additional 20 bike parking spaces of part thereof.

To encourage workers and visitors to use active, low carbon and public transport options instead of private vehicles, the criteria set out in Green Star Buildings (Credit 27 Movement and Place) have been set as a benchmark for the proposed development.

These criteria include:

- minimum expectation:
  - the building must include showers and changing facilities for building occupants
  - these facilities must be accessible, inclusive and located in a safe and protected space.
- credit achievement:
  - access for cyclists and the provision of bicycle parking facilities must be prioritised
  - a Sustainable Transport Plan must be prepared and implemented
  - electric vehicle (EV) charging capabilities must be integrated
  - transport options that reduce the need for private fossil fuel powered vehicles must be prioritised
  - the building's design and location must encourage walking.

## 8.2 End of trip facilities

Table 8-1 Active transport details the various buildings uses, and associated areas and population, and the end of trip facilities requirements (including showers, lockers and bike racks).

Commercial and retail anticipated daily occupancies are based on Table 8-1 of NCC 2019.

The relevant Green Star Buildings criteria have been applied when determining the required number of showers, lockers and bicycle parking provision. Where there is an inconsistency, the more onerous requirement should be met.

**Table 8-1 Active transport**

	Commercial	Retail
Area	82,779m <sup>2</sup>	1,454m <sup>2</sup>
Occupancy	8,278	485
Required showers	76	5
Required lockers	1,035	61
Required bike racks	759	22
Recommended bike racks	760	25

## 8.3 Private vehicle use

The Green Star Movement and Place calculator has been applied to assess emissions reduction from transport by encouraging active and public transport use to reduce vehicle kilometres travelled. Table 8-2 details the inputs used in the Movement and Place calculator for both the proposed buildings and a baseline based on 2016 Census results.

**Table 8-2 Movement and place calculator inputs**

	Baseline	Proposed
Workweeks	48	48
Avoided trips	2%	2%
Average trip length	18.26 km	18.26 km

Workweeks refer to the number of normal working weeks per annum for employees. This is assumed to be 48 weeks (assuming a typical 4-week or 20-day annual leave provision).

Avoided trips refer to the tendency of employees to work from home or otherwise not take a commuting trip during a workweek. This avoided trips percentage for the proposed buildings is based on Census data. It is expected that the proposed avoided trips percentage will increase once COVID and flexible working trends are better understood.

The average trip length is based on Statistical Area Level 2 (SA2) Census data for the development location. The baseline and proposed building average trip length are deemed equivalent.

Emissions intensity is based on the Green Star Movement and Place calculator and assumes both Sydney Trains and Sydney Metro are net zero in operation.

Table 8-3 details the baseline and proposed mode share for commercial and retail building use for input to the Green Star Movement and Place calculator.

Baseline mode share data is based on 2016 Census data. Proposed mode share data are early estimates provided by the Transport Planners. Adjusted mode share data is based on aspirational targets that aim to encourage active mode transport in the case where the proposed does not meet the Green Star criteria.

Assessing each building individually, the following targets were met when applying the adjusted mode share:

- private vehicle use emissions reduction: 40 percent
- active mode encouragement: 90 percent
- vehicle Kilometres Travelled (VKT) reduction: 20 percent
- amenity diversity: 10 amenities across five categories within 400 metres of the building.

The required bicycle parking facilities to meet or exceed the 90% active mode encouragement are presented in Table 8-1. The calculation for bicycle parking provisions are heavily reliant on the baseline active mode share (bicycle and walking). Recommended bicycle parking is presented in the case where the proposed mode share is subject to change.

The proposed car parking provision of 70 spaces at each subject site is less than the LEP maximum rates set out in Table 8-3. Given the proximity of the subject site to a range of public transport links, the reduction in the number of spaces compared to the prior parking provisions is considered appropriate.

By providing a lower number of commercial and retail parking spaces than the LEP maximum, employees will be discouraged from using private vehicles for work commuting trips, catalysing a shift to sustainable transport modes and reducing impacts on the broader road network.

The sustainable transport initiatives and ready access to metro services drive private vehicle use emissions reductions of circa 70% and a VKT reduction of circa 75%.

Located in the Sydney CBD, occupants have access to a diverse range of amenities, encouraging the walkability of the proposed sites. This is supported by the results from the Movement and Place calculator showing both sites meet the amenity diversity criteria outlined above.

This presents a compelling sustainable transport response for the proposed development.

**Table 8-3 Private car accommodation**

Land use	Maximum permissible	Proposed parking spaces <sup>1</sup>	Draft Planning Proposal rates
Commercial	72	70	70
Retail	1	0	0
Total	73	70	70

<sup>1</sup>Total number of proposed parking spaces located at either the west or east site is not to exceed 70. The distribution of the 70 spaces across the two sites will be determined at Detailed SSDA.



## 8.4 Electric vehicles

To ensure the proposed development can support the transition to electric vehicles, the following initiatives are addressed within the context of electrical infrastructure, and EV ready and EV capable capacity:

- EV ready
  - EV charging points to at least 5% of all car parking spaces
  - EV charging points to all car share parking spaces (in addition to the 5% provided)
- EV capable
  - electrical infrastructure and a load management plan prepared to allow for future installation of EV charging to 25% of all car parking spaces (including the EV ready provision)
  - a dedicated, safe, unobstructed route from the electrical supply point that allows for the future provision of all necessary electrical cabling to all car parking spaces without connection to the electrical cabling installation.

## 9 Conclusion

This report presents the results of an ESD assessment for the Concept SSDA for the Hunter Street East site. It has been prepared to respond to relevant SEARs and outline sustainability targets, requirements and ESD framework for the proposed development.

### Precautionary principle

The Concept SSDA seeks consent for building envelopes, land uses, maximum building heights, maximum gross floor areas, pedestrian and vehicular access, circulation arrangements and associated car parking, and the strategies and design parameters for the future detailed design of the proposed development.

No threat of serious or irreversible environmental damage is posed by the proposed development.

Proactive measures to prevent environmental degradation will be included within the design, construction and operation phases of the proposed development.

To deliver a high level of performance in operation, the buildings will pursue set environmental performance targets (in alignment with Green Star and NABERS targets) and be set up for optimum ongoing management that is supported by appropriate metering and monitoring systems.

### Inter-generational equity

The proposed development will maintain the health, diversity and productivity of the environment for future generations by minimising the consumption of energy and water, and waste generation. This could be achieved through the design integration outline in the following sections.

### ESD Strategy

An ESD strategy has been established for Sydney Metro West packages, including associated station development. Sustainability targets and rating requirements are correlated across a range of current and emerging regulatory, policy, statutory planning and Sydney Metro requirements, including market recognised standards, drivers and trends.

These sustainability targets and requirements comprehensively demonstrate the integration of best practice sustainable building principles into the design of the proposed development.

The ESD strategy sets the following sustainability performance targets:

Climate positive	
40%	reduction in upfront carbon emissions
20%	reduction in energy use
100%	renewable energy
100%	elimination / offset of other emissions
40%	reduction in potable water use
30%	reduction in life cycle impacts

The ESD strategy sets the following sustainability rating requirements:

Tool	Commercial
	6 star Buildings
	6 star NABERS Energy (base building) (Commitment Agreement) (without GreenPower) 4.5 star NABERS Water

### Greenhouse gas emission minimisation

The proposed development can minimise greenhouse gas emissions by:

- implementing a Climate Positive Pathway (see section 5.2)
- taking advantage of proven emissions reduction technologies to reduce operational costs
- driving credible reductions in Upfront Carbon and Operational Carbon
- avoiding locking in fossil fuels and empowering businesses to make sustainable choices by investing in the electrification of space heating and hot water services
- maximising onsite renewable energy
- purchasing 100% renewable electricity for base building and shared services operations
- installing systems that use low impact refrigerants
- making allowance for 25% of the total electrical demand of EV charging for all car parking spaces to support future EV charging capacity.

### Climate Responsive Design

The proposed development building envelope is exposed to low angle sunlight from the west and northwest in the afternoon. Facade optimisation measures to mitigate and manage visual discomfort for commercial tenants and improve passive design is recommended.

Richard Johnson Square, adjacent to the site, maintains good levels of direct morning sunlight throughout summer. The urban massing acts to shade the public open spaces on summer afternoons, enhancing outdoor comfort and liveability.

The proposed development building envelope receive good levels of direct sunlight throughout the year, particularly with direct morning sunlight. Lower levels are generally protected by surrounding development to the west.

The proposed development building envelopes experience a varying daylight access performance at lower and upper levels, primarily due to overshadowing from adjacent buildings. Optimisation of daylight access has considered the application of a rectilinear floor plate and potential varied facade articulation across levels, including varying visible light transmittance of glazing, shading ratio and window to wall ratio.

### Water Strategy

Section 7 defines an advanced water strategy that delivers at least a 45% reduction in annual water consumption. Dual plumbing systems should be installed to serve all

non-potable water demands, including toilet and urinal flushing, landscape irrigation and make-up water for heat rejection systems. This can be supported by the integration of 25 kL rainwater tank and treatment systems for rainwater harvesting and reuse to meet a proportion of the non-potable water demands. Future-ready connections for a recycled water network should be provisioned, including future-ready space provision for a recycled water tank.

### **Material consumption minimisation**

Minimisation of material consumption through the life of the proposed development will be met through:

- selection of sustainable materials and reduction in embodied carbon in line with Green Star requirements.
- the development of a waste management plan that addresses waste management during construction and operation where at least 95% of construction and demolition waste will be diverted from landfill
- identification and quantifying of the various waste streams which may be generated from construction and operation
- the provision of relevant management strategies for effective storage, reuse/recovery, treatment and/or disposal of waste generated
- embracing circular economy principles, transitioning away from a traditional linear economy of take, make, use and dispose.

### **Sustainable transport**

Sustainable transport initiatives have been defined to:

- Reduce the emissions attributed to private vehicle use by 40% and VKT by 20%
- Encourage walkability by demonstrating there are a range of diverse amenities within 400m
- Limit speed to 10km/h for roads within the site
- Improve active mode uses by 90%.

### **Conservation of biological diversity and ecological integrity**

The proposed development is considered highly unlikely to have significant biodiversity impacts as the development is limited to highly modified areas, containing planted native and exotic vegetation only.

The site may comprise potential and marginal foraging habitat within the broad habitat ranges of highly mobile native fauna. However, no suitable roosting or breeding habitat within the buildings to be demolished was identified.

### **Environmental factors**

- Environmental factors are addressed through the Concept SSDA based on the definition of an ESD framework (see Appendix A).
- During operation, environmental performance targets will be set and verified.

## Appendix A ESD framework

Requirement	Reference	Response
<b>Responsible</b>		
<ul style="list-style-type: none"> <li>• Avoid, wherever practicable, serious or irreversible damage to the environment</li> <li>• Bear the cost of containment, avoidance or abatement of pollution and waste</li> <li>• Reduce environmental impacts</li> <li>• Use resources sustainably</li> <li>• Replace raw materials with recycled products</li> <li>• Minimise the use of virgin materials</li> <li>• Recognise that resources have value throughout multiple cycles of use and reuse</li> <li>• Innovate product design for longevity, reuse and recovery</li> <li>• Reduce the demand for new landfills</li> <li>• Improve the quality of collected materials, and improve sorting of these materials and reuse</li> <li>• Capture value from recycling resources</li> <li>• Procure products, materials and services that represent best practice environmental and social principles</li> <li>• Reduce resource consumption from 8.2 kg to 6.1 kg per person by 2038 (based on 2015 levels)</li> </ul>	<ul style="list-style-type: none"> <li>• Sydney DCP 2012</li> <li>• Planning Proposal: Central Sydney</li> <li>• Green Star Buildings               <ul style="list-style-type: none"> <li>○ Credit 2 Responsible Construction (Minimum Expectation + Credit Achievement)</li> <li>○ Credit 3 Verification and Handover (Minimum Expectation)</li> <li>○ Credit 4 Operational Waste (Minimum Expectation)</li> <li>○ Credit 5 Responsible Procurement (Credit Achievement)</li> <li>○ Credit 6 Responsible Structure (Credit Achievement) + (Exceptional Performance - commercial only)</li> <li>○ Credit 7 Responsible Envelope (Credit Achievement)</li> <li>○ Credit 8 Responsible Systems (Credit Achievement)</li> <li>○ Credit 9 Responsible Finishes (Credit Achievement) + (Exceptional Performance - commercial only)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During construction, put in place an EMS to manage environmental impacts on site and implement an EMP that covers the scope of the construction activities</li> <li>• Undertake a risk and opportunity assessment of the construction supply chain to identify environmental and social risks and opportunities, and implement a responsible procurement plan to mitigate and manage the identified risks</li> <li>• Source responsibly manufactured structure, envelope, systems and finishes products</li> <li>• Divert at least 95% of construction and demolition waste from landfill</li> <li>• During operation, optimise ongoing management through the integration of appropriate metering and monitoring systems, set environmental performance targets, design and test for airtightness, and undertake commissioning and building tuning that is independently verified</li> <li>• Deploy coordinated building hand over procedures with the facilities management team and building users</li> <li>• Develop a waste management plan to identify, quantify and classify the likely waste streams generated during construction and operation, and promote responsible source separation to reduce the amount of waste that goes to landfill by implementing convenient and efficient waste management systems</li> </ul>
Increase diversion from landfill to 85% by 2038	Credit 26 Life Cycle Impacts (Credit Achievement)	

Requirement	Reference	Response
Responsible		

Demonstrate a 30% reduction in life cycle impacts from resource use over the life of the buildings when compared to standard practice

Requirement	Reference	Response
Healthy		

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Consider the environmental impacts, such as sustainable design, overshadowing and solar access, visual comfort, wind and reflectivity</li> <li>Provide sunlight access to private and public open space, and habitable rooms</li> <li>Provide solar access to living areas, private open space and communal open space</li> <li>Naturally cross ventilate at least 60% of apartments in the first nine storeys of a building</li> <li>Maintain a high thermal comfort performance for building occupants and optimise cross ventilation</li> <li>Minimise pollutants entering the building and supply adequate fresh air to maintain indoor air pollutants at acceptable levels</li> <li>Provide good levels of daylight and high quality artificial lighting</li> <li>Provide acoustic comfort for building occupants</li> <li>Prevent exposure of building occupants to toxins</li> <li>Provide internal amenities that improve occupant experience of using the buildings</li> <li>Foster a connection to nature for building occupants</li> </ul> | <ul style="list-style-type: none"> <li>Sydney LEP 2012, Design Excellence</li> <li>Sydney DCP 2012</li> <li>Guidance on sustainable development, City of Sydney Council</li> <li>Planning Proposal: Central Sydney</li> <li>Green Star Buildings               <ul style="list-style-type: none"> <li>Credit 10 Clean Air (Minimum Expectation) + (Credit Achievement - commercial only)</li> <li>Credit 11 Light Quality (Minimum Expectation) + (Credit Achievement - commercial only)</li> <li>Credit 12 Acoustic Comfort (Minimum Expectation + Credit Achievement)</li> <li>Credit 13 Exposure to toxins (Minimum Expectation) + (Credit Achievement - commercial only)</li> <li>Credit 14 Amenity and Comfort (Credit Achievement - commercial only)</li> </ul> </li> <li>Credit 15 Connection to Nature (Credit Achievement)</li> </ul> | <ul style="list-style-type: none"> <li>Maintain high levels of direct morning sunlight throughout the year to the public open spaces and enhance outdoor comfort and liveability</li> <li>Enhance indoor daylight access</li> <li>Support the permeability of summer breezes within the public open spaces and shelter the public open spaces from cold winter winds</li> <li>Facilitate effective indoor natural ventilation</li> <li>Design building ventilation systems with minimum separation distances between pollution sources and outdoor air intakes</li> <li>Clean all ductwork that serves the building prior to occupation</li> <li>Provide adequate access to components of the ventilation systems for maintenance purposes</li> <li>Maintain carbon dioxide concentration levels below 700 parts per million at all time during the occupancy period</li> <li>Remove / exhaust pollutants from internal pollutant sources</li> <li>Achieve lighting comfort criteria and maximise access to daylight</li> <li>Prepare an acoustic comfort strategy and achieve acoustic comfort criteria</li> </ul> |
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Requirement	Reference	Response
<b>Healthy</b>		
Install dual plumbing systems and make provision for a future ready connection to a recycled water network		<ul style="list-style-type: none"> <li>Meet stipulated toxicity standards for paints, adhesives, sealants, carpets and engineered wood products, and conduct in-site testing to verify compliance</li> </ul> <p>Include a room designed to promote either inclusivity, mindfulness or exercise for building occupants</p>

Requirement	Reference	Response
<b>Resilient</b>		
<ul style="list-style-type: none"> <li>Design resilient and diverse places for enduring communities</li> <li>Contribute to water security and urban cooling</li> <li>Enhance tree canopy</li> <li>Evaluate site-specific climate risks and define strategies to reduce vulnerability to bushfire, flooding and extreme heat</li> <li>Be more resilient to a changing climate</li> <li>Reduce risks and damage to public and private assets arising from climate change</li> <li>Embed climate change considerations into asset and risk management</li> <li>Reduce climate change impacts on health and wellbeing</li> <li>Reduce heat island effect</li> <li>Provide year round solar access to public open space along with protection from strong winds</li> <li>Manage impacts on natural resources, ecosystems and communities</li> </ul>	<ul style="list-style-type: none"> <li>NSW Climate Change Policy Framework</li> <li>Sydney LEP 2012, Design Excellence</li> <li>Sydney DCP 2012</li> <li>Green Star Buildings <ul style="list-style-type: none"> <li>Credit 16 Climate Change Resilience (Minimum Expectation + Credit Achievement)</li> <li>Credit 17 Operations Resilience (Credit Achievement)</li> <li>Credit 19 Heat Resilience (Credit Achievement)</li> </ul> </li> <li>Credit 20 Grid Resilience (Credit Achievement)</li> </ul>	<ul style="list-style-type: none"> <li>Perform a climate change risk and adaptation assessment, and manage all 'Extreme' and 'High' risks through specific design or future operational responses</li> <li>Mitigate urban heat island effects</li> <li>Evaluate and set minimum urban heat control requirements through effective building envelope shading</li> <li>Implement WSUD features, including tree pits, bio-retention systems, rainwater harvesting and reuse systems, on-site detention tanks with water filtration, etc.</li> <li>Support water resilience through the integration of water efficiency measures and using alternative water sources to reduce the demand for potable water</li> <li>Incorporate diverse and appropriate planting, bio-filtration gardens, appropriately planted shading trees, areas for community gardens, and green roofs and walls</li> </ul>

Requirement	Reference	Response
<b>Resilient</b>		
<ul style="list-style-type: none"> <li>Respond to acute shocks and chronic stresses that affect operations</li> </ul> <p>Support the clean transition of the electricity grid</p>		<ul style="list-style-type: none"> <li>Scale trees, and balance evergreen and deciduous trees to provide shading in summer and sunlight access in winter, and shade structures, such as pergolas for balconies and courtyards</li> <li>Select plants suited to the site conditions, including drought and wind tolerance, seasonal changes and sunlight access, soil conditions and plant longevity</li> <li>Conduct an operations resilience assessment to identify a set of clear operations resilience objectives and performance goals that:             <ul style="list-style-type: none"> <li>•Consider interdependent infrastructure systems, networks, services and assets</li> </ul> </li> <li>Identify vulnerability</li> <li>Outline emergency response procedures</li> <li>Assess building survivability in the case of a blackout and provide a measure of survivability to account for its design purpose</li> </ul> <p>Demonstrate the building has the ability to reduce its electricity peak demand by 10% based on on-site technology and/or load shedding strategies</p>



Requirement	Reference	Response
<b>Positive</b>		
<ul style="list-style-type: none"> <li>• Ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations</li> <li>• Drive the uptake of proven GHG emissions reduction technologies to reduce the cost of living</li> <li>• Empower consumers and businesses to make sustainable choices</li> <li>• Invest in the next wave of GHG emissions reduction innovation to ensure economic prosperity from decarbonisation</li> <li>• Electrify all energy uses and supply all energy uses with renewable electricity by 2030</li> <li>• Plan operational improvements and projects, and decarbonisation pathways for businesses</li> <li>• Accelerate the transformation of the built environment towards net zero emissions</li> <li>• Provide a pathway to net zero emissions by 2050</li> <li>• Adhere to the principles of ecologically sustainable development</li> <li>• Promote sustainable development through energy efficient design, construction and operation</li> <li>• Contribute to an overall reduction in greenhouse gas (GHG) emissions</li> <li>• Reduce energy bills and the whole of life cost of energy services</li> </ul>	<ul style="list-style-type: none"> <li>• Net Zero Plan Stage 1: 2020 - 2030</li> <li>• Net Zero Plan Stage 1: 2020 - 2030, Implementation Update</li> <li>• NCC 2019</li> <li>• Planning Proposal: Central Sydney</li> <li>• Sydney DCP 2012</li> <li>• Green Star Buildings <ul style="list-style-type: none"> <li>○ Credit 21 Upfront Carbon Emissions (Minimum Expectation + Credit Achievement + Exceptional Performance)</li> <li>○ Credit 22 Energy Use (Minimum Expectation + Credit Achievement)</li> <li>○ Credit 23 Energy Source (Minimum Expectation + Credit Achievement + Exception Performance)</li> <li>○ Credit 24 Other Carbon Emissions (Credit Achievement + Exceptional Performance)</li> </ul> </li> <li>Credit 25 Water Use (Minimum Expectation)</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate that the annual energy and water consumption is less than a 6 star NABERS Energy for Offices base building and</li> <li>• 4.5 star NABERS Water for Offices budget, respectively</li> <li>• Deliver a 40% reduction in annual water consumption when compared to a reference building</li> <li>• Achieve a 40% reduction in upfront carbon emissions over a reference building</li> <li>• Demonstrate a 30% reduction in energy use over a reference building</li> <li>• Prepare a ZCAP</li> <li>• Source 100% of the building's energy from renewables</li> <li>• Eliminate or offset high GWP refrigerants</li> </ul> <p>Offset 100% of residual embodied emissions</p>

Requirement	Reference	Response
<b>Positive</b>		
<ul style="list-style-type: none"> <li>Reduce the consumption of potable water, including the harvesting and reuse of rainwater and stormwater</li> <li>Integrate best practice sustainable building principles to improve environmental performance, including energy and water efficient design, and renewable energy</li> <li>Achieve a 60% emissions reduction by 2038 (based on 2015 levels)</li> <li>Meet 50% of electricity demand through renewable energy by 2038</li> </ul> <p>Deliver no net increase in potable water consumption by 2038 based on 2015 levels</p>		

Requirement	Reference	Response
<b>Places</b>		
<ul style="list-style-type: none"> <li>Prioritise active transport modes and improve the permeability of the pedestrian network</li> <li>Reduce private vehicle use and encourage active, shared and public transport use</li> </ul> <p>Ensure new buildings and precincts are 'EV ready'</p>	<ul style="list-style-type: none"> <li>Sydney LEP 2012, Design Excellence</li> <li>Sydney DCP 2012</li> <li>Green Star Buildings <ul style="list-style-type: none"> <li>Credit 27 Movement and Place (Minimum Expectation and Credit Achievement)</li> <li>Credit 28 Enjoyable Places (Credit Achievement)</li> <li>Credit 29 Contribution to Place (Credit Achievement)</li> </ul> </li> <li>Credit 30 Culture, Heritage and Identity (Credit Achievement)</li> </ul>	<ul style="list-style-type: none"> <li>Reduce the emissions attributed to private vehicle use by 40% and VKT by 20%</li> <li>Encourage walkability by demonstrating there are a range of diverse amenities within 400 m</li> <li>Improve active mode uses by 90%</li> <li>Include showers and changing facilities for building occupants</li> <li>Make facilities accessible and inclusive, and locate in a safe and protected space</li> <li>Prioritise cyclists and access to bicycle parking facilities</li> <li>Prepare and implement a Sustainable Transport Plan</li> </ul>

Requirement	Reference	Response
<b>Places</b>		
		<ul style="list-style-type: none"> <li>Integrate EV charging capabilities and make allowance for 20% of the total electric demand of EV charging for all car parking spaces</li> <li>Prioritise transport initiatives that reduce the need for private fossil fuel powered vehicles</li> <li>Location selected to encourage walkability</li> <li>Provide publicly accessible spaces that are enjoyable and support community activity and interaction</li> <li>Prepare an activation strategy</li> </ul> <p>Undertake independent design reviews at key points in the development of the design</p>

Requirement	Reference	Response
<b>People</b>		
<ul style="list-style-type: none"> <li>Promote diversity, and reduce physical and mental health impacts through effective construction practices</li> <li>Celebrate Aboriginal and Torres Strait Islander people, culture and heritage</li> <li>Facilitate workforce participation and economic development of disadvantaged and under-represented groups</li> </ul> <p>Welcome a diverse population and their needs</p>	<ul style="list-style-type: none"> <li>Green Star Buildings <ul style="list-style-type: none"> <li>Credit 31 Inclusive Construction Practices (Minimum Expectation)</li> <li>Credit 32 Indigenous Inclusion (Credit Achievement)</li> <li>Credit 33 Procurement and Workforce Inclusion (Credit Achievement - commercial only)</li> </ul> </li> <li>Credit 34 Design of Inclusion (Credit Achievement)</li> </ul>	<ul style="list-style-type: none"> <li>Put in place on-site facilities, implement policies and undertake training to address gender inclusivity, discrimination, racism, bullying, mental health, and drug and alcohol awareness</li> <li>Demonstrate that the Australian Indigenous Design Charter guiding principles are incorporated in the design of the buildings</li> <li>Develop and implement a social procurement strategy that directs at least 2% of a building's total contract value to generate employment opportunities for disadvantaged and under-represented groups</li> </ul> <p>Design and construct the buildings to enable easy navigation and enjoyment by stakeholders of diverse ages, genders and abilities</p>

Requirement	Reference	Response
<b>Nature</b>		
<ul style="list-style-type: none"> <li>• Conserve biological diversity and ecological integrity</li> <li>• Express an excellent and integrated landscape design</li> <li>• Minimise the quantity of stormwater run-off</li> <li>• Integrate WSUD principles to maximise the treatment of stormwater run-off</li> <li>• Manage impacts on natural resources, ecosystems and communities</li> <li>• Design drought-tolerant, low water use landscaping</li> <li>• Maximise porous and open paving materials</li> <li>• Integrate on-site stormwater and infiltration systems, including bio-retention systems such as rain gardens and street tree pits</li> </ul> <p>Integrate green infrastructure</p>	<ul style="list-style-type: none"> <li>• NSW Climate Change Policy Framework</li> <li>• Sydney LEP 2012, Design Excellence</li> <li>• Sydney DCP 2012</li> <li>• Guidance on sustainable development, City of Sydney Council</li> <li>• Planning Proposal: Central Sydney</li> <li>• Sydney Development Control Plan 2012</li> <li>• Green Star Buildings <ul style="list-style-type: none"> <li>◦ Credit 36 Biodiversity Enhancement (Credit Achievement - commercial only)</li> </ul> </li> </ul> <p>Credit 39 Waterway Protection (Credit Achievement) + (Exceptional Performance - commercial only)</p>	<ul style="list-style-type: none"> <li>• Promote WSUD features for the site, including tree pits, bio-retention systems, rainwater harvesting and reuse systems, on-site detention tanks with water filtration, etc.</li> <li>• Incorporate diverse and appropriate planting, bio-filtration gardens, appropriately planted shading trees, areas for community gardens, and green roofs and walls</li> <li>• Select plants suited to the site conditions, including drought and wind tolerance, seasonal changes and sunlight access, soil conditions and plant longevity</li> <li>• Provide a sufficient area of landscaping (horizontal and/or vertical)</li> <li>• Prepare and put in place a biodiversity management plan</li> <li>• Reduce the average annual stormwater discharge by 40% across the site</li> </ul> <p>Meet stormwater pollution reduction targets</p>

## Appendix B Sustainability Ratings





## Climate Positive

40%	reduction in upfront carbon emissions
20%	reduction in energy use
100%	renewable energy
100%	elimination / offset of other emissions
40%	reduction in potable water use
30%	reduction in life cycle impacts



Manage environmental impacts during construction Be verified to work  
Enable practices that reduce operational waste  
Drive supply chain transformation



Have improved air  
Have improved light  
Have improved acoustics  
Have improved products Connect people to nature



Be built with climate change in mind  
Have capacity to bounce back from shocks and stresses



Promote physical activity  
Create safe, enjoyable, integrated and comfortable places



Embrace the diversity of our population  
Address the social health of the community



Protect environmentally significant areas  
Create biodiverse green spaces

