Appendix S

ESD Report

Sydney Metro West

Sydney Olympic Park Over and Adjacent Station Development Ecologically Sustainable Development Report

Appendix S

July 2022

NSW GOVERNMENT

sydney METRO

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Mott MacDonald Australia Pty Ltd

Contents

List of Tables

List of Figures

Glossary

Term	Definition
ASD	Adjacent Station Development
BIPV	Building integrated photovoltaic
CBD	Central business district
Concept and Stage 1 CSSI approval	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 SSD Application	A concept state significant development application, as defined in section 4.22 the EP&A Act, is 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
COP	Coefficient of performance
CSSI	Critical State Significant Infrastructure
D&AB	Design and As Built
DPE	Department of Planning and Environment
EIS	Environmental impact statement
EMP	Environmental Management Plan
EMS	Environmental Management System
EP&A Act	*Environmental Planning and Assessment Act 1979*
ESD	Ecologically Sustainable Development
GFA	Gross floor area
GHG	Greenhouse gas
GWP	Global warming potential
NABERS	National Australian Built Environment Rating System
NatHERS	Nationwide House Energy Rating Scheme
NCC	National Construction Code
OSD	Over Station Development
PV	Photovoltaic
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SOP	Sydney Olympic Park
SOPA	Sydney Olympic Park Authority
SSD	State Significant Development
Stage 2 CSSI Application	Application SSI-19238057, including major civil construction works between The Bays and Hunter Street Station

Term	Definition
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
VKT	Vehicle kilometres travelled
WRAMS	Water Reclamation and Management Scheme
WSUD	Water sensitive urban design
ZCAP	Zero Carbon Action Plan

Executive summary

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 to secure concept approval for an over station development (OSD) and adjacent station development (ASD) on an area defined as Site 47 within the Central Precinct of Sydney Olympic Park (referred collectively as the 'proposed development'). The proposed development will comprise of one new commercial and retail building (Building 1) above the Sydney Olympic Park metro station and two residential accommodation buildings (Buildings 2 and 3) with retail and commercial space, adjacent to the Sydney Olympic Park metro station.

The Concept SSDA seeks consent for a building envelope and mixed-use purposes, maximum building height, a maximum gross floor area (GFA), 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 identifies and responds to relevant state and local government policy, and statutory planning instruments in support of the Concept SSDA.

The design response sets an ESD framework for the proposed development as follows:

- responds to relevant Secretary's Environmental Assessment Requirements (SEARs)
- aligns with the vision and priorities set out in the Sydney Olympic Park Master Plan 2030 (2018 Review) and Proposed Sydney Olympic Park Master Plan 2030 (Interim Metro Review), and the sustainability issues and objectives of the Environmental Guidelines, Sydney Olympic Park 2008
- integrates the relevant design excellence requirements nominated within the Sydney Metro Design Excellence Strategy (in preparation).

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 building envelope responds to sun path and overshadowing, wind effects and urban heat to deliver high quality private, communal and public open space. The building envelope takes advantage of the sun path and prevailing wind conditions to enhance daylight access and drive effective natural ventilation.

The proposed development building envelope receives good levels of direct sunlight throughout the year, predominately from the north west. The Sydney Olympic Park (SOP) Master Plan 2030 (2018 Review) development context acts to shade the proposed development building envelope from the south east.

The public spaces receive high levels of direct sunlight throughout the year. An appropriate landscape response will be required to mitigate the urban heat island effect and visual discomfort to enhance outdoor comfort and liveability.

Prevailing north east, east and south wind directions are observed in summer. Summer breezes can permeate the public spaces in support of the dominant pedestrian movement through the plazas and park.

A strong, prevailing west wind direction is observed in winter with comparatively greater velocity than that observed in summer. Mitigation measures, including an urban tree canopy and pergolas, should be considered to improve the outdoor thermal comfort and usability of the public spaces in winter.

The proposed development building envelope and floor plate is aligned to reduce direct sunlight exposure from the north west and limit low angle sunlight from the west.

Mitigation measures to reduce the impact of solar reflectivity and urban heat island effect attributed to the proposed development building envelope should be considered.

The proposed development building envelope experiences a varying daylight access performance at lower and upper levels, primarily due to overshadowing from the adjacent SOP Master Plan 2030 (2018 Review) development context.

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, 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%.

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.

The ESD strategy sets the following sustainability targets:

Climate Positive	
40%	reduction in upfront carbon emissions
20%	reduction in energy use
100%	renewable energy
100%	elimination / offset of other emissions
45%	reduction in potable water use - Building 1
30%	reduction in potable water use - Buildings 2 and 3
30%	reduction in life cycle impacts

The ESD strategy sets the following sustainability rating requirements:

Tool	Building 1	Buildings 2 and 3
greenstar	5 star Buildings	5 star Buildings
NABERS	5.5 star (+25%) NABERS Energy 5 star NABERS Water	4.5 star NABERS Energy 4.5 star NABERS Water
NATIONWIDE HOUSE ENERGY RATING SCHEME	-	Average 7 star NatHERS Minimum 6 star NatHERS
BASIX	-	BASIX Energy 40 BASIX Water 60

Design response

The proposed development design response to the relevant state and local government policy, statutory planning instruments, and ESD strategy sets the ESD framework.

The relevant requirements and responses are categorised as follows:

- responsible
- healthy
- resilient
- positive
- places
- people
- nature

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 CBD).

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

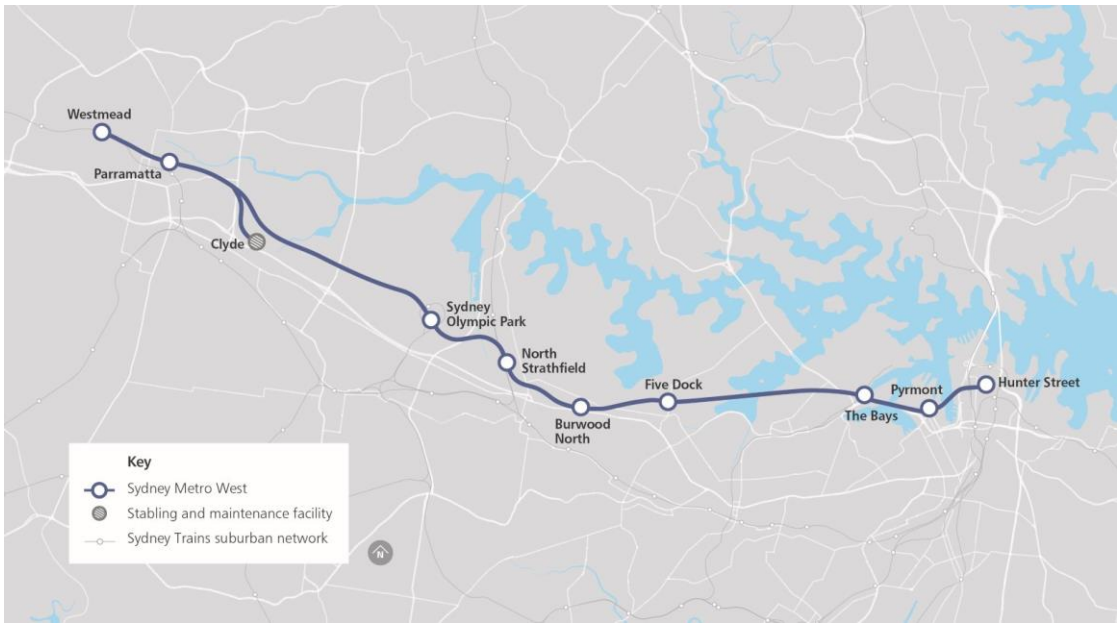


Figure 1-1 Sydney Metro West

1.2 Background and planning context

Sydney Metro is seeking to deliver Sydney Olympic Park metro station under a two-part planning approval process. The station fit-out infrastructure is to be delivered under a Critical State Significant Infrastructure (CSSI) application subject to provisions under division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), while the over and adjacent station developments are to be delivered under a State Significant Development (SSD) subject to the provisions of part 4 of the EP&A Act.

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:

- 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 (under assessment)
- 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 SSD/s is to be prepared by a future development partner which will seek consent for detailed design and construction of the development.

1.3 Purpose of the report

This Ecologically Sustainable Development (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 18 February 2022 which states that the environmental impact statement (EIS) is to address the following requirements:

SEARs requirement	Where addressed in report
8. Ecologically Sustainable Development Identify how ESD principles (as defined in clause 7(4) of schedule 2 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development.	Section 4 Section 5 Section 6
Demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards.	Section 7 Section 8
Demonstrate how the development minimises greenhouse gas emissions (reflecting the Government's goal of net zero emissions by 2050) and consumption of energy, water (including water sensitive urban design) and material resources.	Section 9 Appendix A Appendix B

This ESD report identifies and responds to relevant state and local government policy, and statutory planning instruments in support of the Concept SSDA.

The design response sets an ESD framework for the proposed development:

- In response to the relevant SEARs, the proposed development must:
    - identify how ESD principles (as defined in clause 7(4) of schedule 2 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development
    - demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards
    - demonstrate how the development minimises greenhouse gas emissions (reflecting the NSW Government's goal of net zero emissions by 2050) and consumption of energy, water (including water sensitive urban design) and material resources.
- In response to other relevant statutory planning instruments, the proposed development must:
    - align with the vision and priorities set out in the Sydney Olympic Park Master Plan 2030 (2018 Review) and (Interim Metro Review), and the sustainability issues and objectives of the Environmental Guidelines, Sydney Olympic Park 2008
    - integrate the relevant design excellence requirements nominated within the Sydney Metro Design Excellence Strategy (in preparation).

2 The site and proposal

2.1 Site location and description

The site is located within Sydney Olympic Park and is situated within the City of Parramatta Local Government Area. The site is in the Central Precinct of Sydney Olympic Park and defined as Site 47 in the Proposed SOP Master Plan (Interim Metro Review). The broader metro site is bound by Herb Elliot Avenue to the north, Olympic Boulevard to the west and Figtree Drive to the south as shown in Figure 2-1.

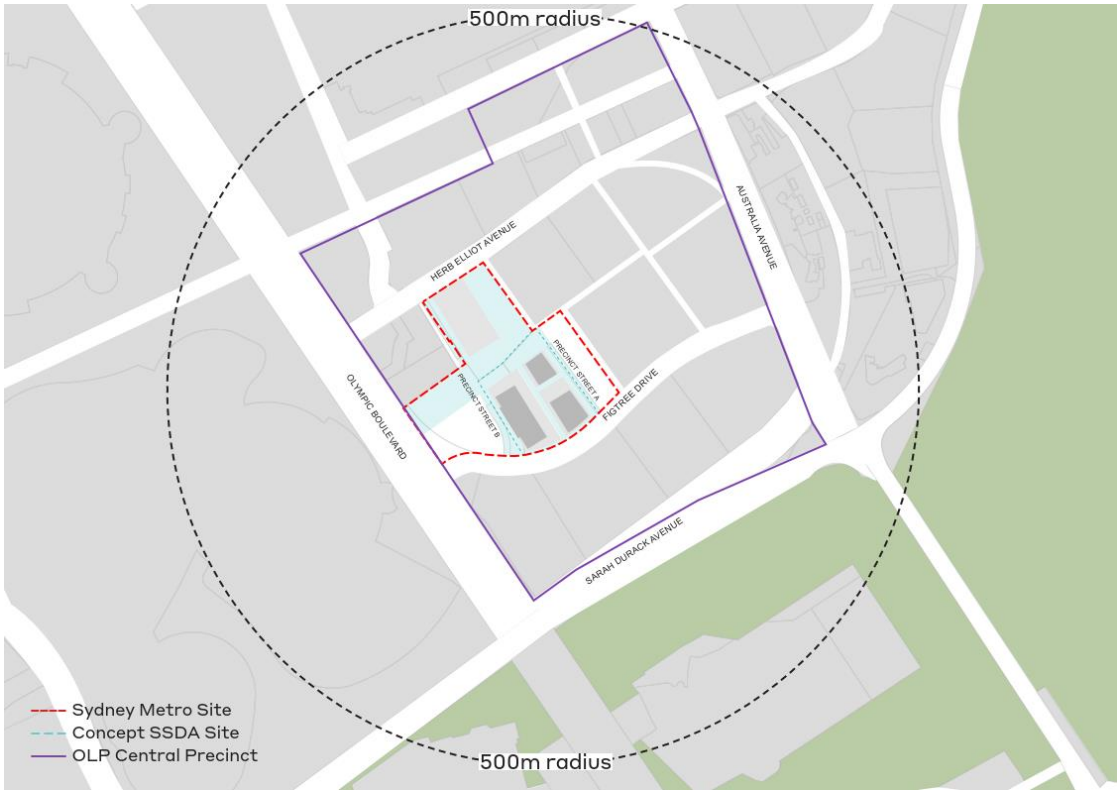


Figure 2-1 Sydney Olympic Park metro station location precinct

As described in Table 2-1, the site comprises part of Lot 59 in DP 786296 and Lot 58 in DP 786296, and comprises approximately 11,407m² of land.

Table 2-1 Site legal description

Street address	Legal description
5 Figtree Drive, Sydney Olympic Park	Lot 58 in DP 786296
7 Figtree Drive, Sydney Olympic Park	Lot 59 in DP 786296

2.2 Overview of this proposal

The Concept SSDA will seek consent for three building envelopes and the delivery of Precinct Street A as detailed in Table 2-2 and Figure 2-2.

Table 2-2 Sydney Olympic Park proposed development overview

Item	Description
Land use	**Building 1:** Commercial and retail **Building 2:** Commercial, retail and residential **Building 3:** Commercial, retail and residential
Building height (RL) / Number of storeys	**Building 1:** 120.20 / 21 storeys **Building 2**: 116.90 / 27 storeys **Building 3:** 171.50 / 45 storeys
Gross floor area (m²)	**Building 1:** 28,517 **Building 2:** 12,089 **Building 3:** 27,384 **TOTAL: 68,000**
Car parking spaces	358

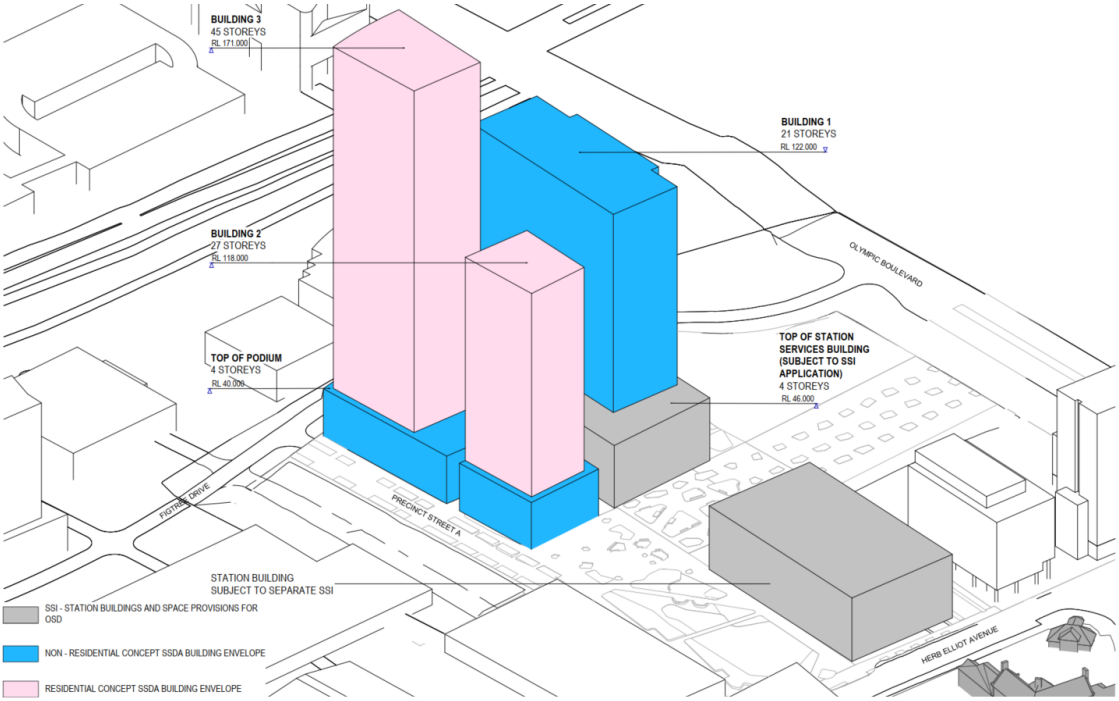


Figure 2-2 Proposed Concept SSDA development and CSSI scope

3 Policy drivers

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

Table 3-1 Policy drivers

Policy driver	Description
SEARs	• Incorporate ESD principles, as defined by clause 7(4) of schedule 2 of the EP&A Regulation, into the design and ongoing operation • Integrate best practice sustainable building principles to improve environmental performance, including energy and water efficient design, and renewable energy • Embed measures to minimise carbon emissions, reflecting NSW Government's goal of net zero emissions by 2050 and implementation update nominating a 50% reduction in emissions by 2030 • Implement measures to minimise waste generation and reduce environmental impact by moving to a circular economy • Adapt to a changing climate and manage stormwater through water sensitive urban design (WSUD) principles • Deploy water efficiency measures and make use of alternative water sources to reduce the demand for potable water
Sydney Olympic Park Master Plan 2030 (2018 Review)	• Embody a best practice approach to environmental sustainability • Minimise use of resources and production of waste and toxic materials • Protect and enhance biological diversity • Maximise renewable energy used and efficient energy practices • Maximise use of sustainable resources and materials • Use construction methods and operational management processes with the least possible environmental impact • Promote access and travel by public transport, walking and cycling • Connect to recycled water and effective water demand management practices • Maintain and extend the recycled water systems to all new streets, as required • Maintain and extend the existing stormwater system to recycle water, promote infiltration to subsoil, filters pollutants and sediments, and minimises loads on adjoining waterways • Require new commercial and residential developments to offer secure bicycle storage and change/shower facilities
Sydney Olympic Park Master Plan 2030 (Interim Metro Review)	• Apply the sustainability planning principles and controls of the Sydney Olympic Park Master Plan 2030 (2018 Review) to the metro site area, including ESD, environmentally sustainable materials and climate change adaptation

Policy driver	Description
	• Target and achieve the required environmental ratings, as per the Sydney Olympic Park Master Plan 2030 (2018 Review)
Environmental Guidelines, Sydney Olympic Park 2008	• Maximise opportunities for building and infrastructure design to incorporate water collection and recycling systems • Prioritise the use of passive solar design, natural ventilation and selection of energy efficient materials to enhance thermal performance • Require energy efficient heating and cooling systems, building management systems, lighting, and energy consuming appliances to be incorporated in all new building projects at Sydney Olympic Park environment when selecting materials for development and operations • Require waste management performance and recycling targets for all developments throughout design, construction and operational activities, with a minimum of 80% of construction and demolition waste to be recycled or re-used • Promote and support innovative transport modes, sustainable transport technologies, and the use of alternative fuels • Design new developments to be as 'walkable' as possible • Ensure conservation of biological diversity and ecological integrity is a fundamental consideration for new developments
Master Plan 2030, General Controls and Guidelines 4.0	• Engage an ESD consultant as a core member of the project team • Connect all new development to Sydney Olympic Park recycled water system for all approved uses of recycled water • Solar blinds between double glazing reduce heat loads while providing daylight and views • Prioritise sustainable materials selection • New commercial and office buildings must achieve a minimum 5.5 star NABERS Energy (Commitment Agreement) and minimum 5 star Green Star • New mixed-use areas minimum 4 star Green Star Design and As-Built (D&AB) • New high density residential must meet minimum 4 star Green Star D&AB; BASIX Energy 40 and BASIX Water 60 • All future developments and project applications should consider the impacts as a result of climate change and include elements in building design and construction
DPE (previously Department of Planning, Industry and Environment) Net Zero Plan, Stage 1: 2020-2030	• Drive the uptake of proven greenhouse gas (GHG) emissions reduction technologies to reduce the cost of living • Empower consumers and businesses to make sustainable choices • Invest in the next wave of GHG emissions reduction innovation to ensure economic prosperity from decarbonisation
DPE (previously Department of Planning, Industry and	• Electrify all energy uses and supply all energy uses with renewable electricity by 2030

Policy driver	Description
Environment) Net Zero Plan Stage 1: 2020-2030 (Implementation Update)	• Plan operational improvements and projects, and decarbonisation pathways for businesses • 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 GHG emissions), green finance mechanisms, BASIX enhancements and the Trajectory for low energy buildings
NSW Electric Vehicle Strategy	• Ensure new buildings and precincts are 'EV ready'
NSW Circular Economy Policy Statement	• Use resources sustainably • Replace raw materials with recycled products • Minimise the use of virgin materials • Recognise that resources have value throughout multiple cycles of use and reuse • Innovate product design for longevity, reuse and recovery • Reduce the demand for new landfills • Improve the quality of collected materials, and improve sorting of these materials and reuse • Capture value from recycling resources
NSW Climate Change Policy Framework	• Achieve net zero emissions by 2050 • Be more resilient to a changing climate • Reduce risks and damage to public and private assets arising from climate change • Embed climate change considerations into asset and risk management • Reduce climate change impacts on health and wellbeing • Manage impacts on natural resources, ecosystems and communities
State Environmental Planning Policy (SEPP) (Building Sustainability Index: BASIX) 2004	• Encourage sustainable residential development • Achieve a minimum water savings target of 40% for residential accommodation • Achieve a minimum energy savings target of 25% for high-rise residential accommodation • Do not exceed the heating and cooling cap for thermal comfort performance for residential accommodation
Apartment Design Guide	• Provide solar access to living areas, private open space and communal open space • Provide year-round solar access to public open space along with protection from strong winds • Naturally cross ventilate at least 60% of apartments in the first nine storeys of a building • Do not exceed an overall depth of 18m for cross-over or cross-through apartments • Incorporate water efficient fittings and appliances, and harvest rainwater and stormwater for reuse • Design drought-tolerant, low water use landscaping

Policy driver	Description
	• Maximise porous and open paving materials • Integrate on-site stormwater and infiltration systems, including bio-retention systems such as rain gardens and street tree pits • Size adequate and accessible storage areas for operational waste, and facilitate ease of collection • Provide alternative waste disposal methods such as composting

National Construction Code (NCC), Volume One, Building Code of Australia 2019	• Integrate features in a building's fabric and services to facilitate the efficient use of energy
	• Comply with verification methods:
	  ○ JV1 NABERS Energy for Offices - obtain a minimum 5.5 star NABERS Energy for Offices base building Commitment Agreement
	  ○ 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
	  ○ 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
	• 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
	• Consider the NCC 2022 public comment draft (stage 2), including more stringent whole-of-home annual energy use requirements and deemed-to-satisfy provisions

NABERS, The Rules, Energy and Water for Offices	• Disclose the energy and water performance of assessable assets, including but not limited to offices and apartment buildings • Demonstrate credible savings in energy and water costs through the efficient design of a building's fabric and services • Represent good quality design and reflect market requirements

Green Star Buildings Submission Guidelines	• Register and obtain a Green Star Buildings rating
	• Meet minimum expectations:
	  ○ Manage environmental impacts during construction
	  ○ Verify the effective operation of building systems
	  ○ Enable practices that reduce operational waste
	  ○ Improve the indoor environment quality
	  ○ Address climate change
	  ○ Emit less GHG emissions in construction and during operation
	  ○ Achieve a water efficient operation
	  ○ Promote physical activity
	  ○ Embrace diversity

Policy driver	Description
	○ Protect environmentally sensitive areas • Align with the Climate Positive Pathway: ○ Drive credible reductions in upfront and operational carbon ○ Avoid locking in fossil fuels ○ Electrify all energy uses and supply all energy uses with renewable electricity • Offset operational carbon that cannot be eliminated using nature-based solutions, and carbon capture and storage technologies

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 NARCliM (NSW and ACT Regional Climate Modelling) Project, has been considered. A 2070 timeline horizon (far future) has been selected based on an approximate building design life of 40 years.

The following future climate projections impact are identified:

1. Maximum temperatures are projected to increase by 1.9°C and minimum temperatures are projected to increase by 2.0°C.
2. The number of cold nights will decrease.
3. 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.
4. Rainfall is projected to increase in summer and autumn.
5. Severe fire weather days are projected to increase in summer and spring.

Figure 4-1 compares the projected increase in ambient temperature over current conditions.

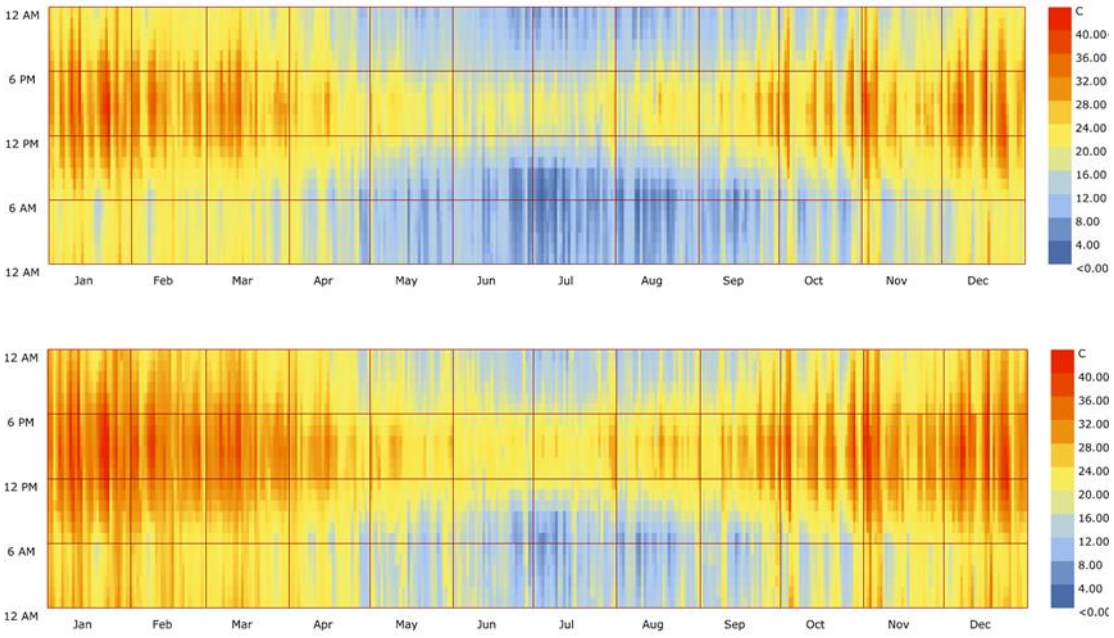


Figure 4-1 Annual hourly ambient dry bulb temperature; [top] current; [bottom] 2070

4.2 Sun path

Figure 4-2 illustrates the sun path diagram for winter, mid-season and summer. The proposed development building envelope receives good levels of direct sunlight throughout the year, predominately from the north west. The SOP Master Plan 2030 (2018 Review) development context acts to shade the proposed development building envelope from the south east.

The dominant north east elevations of the proposed development building envelope enhance daylight access.

Building 1 has a high exposure to direct sunlight in the afternoon and low angle sunlight from the north west. Measures will be required to mitigate and manage thermal and visual discomfort to building occupants.

Buildings 2 and 3 have a high exposure to low angle sunlight in the morning and direct sunlight in the afternoon. Measures will be required to mitigate and manage thermal and visual discomfort to building occupants.

The public spaces receive high levels of direct sunlight throughout the year. An appropriate landscape response will be required to mitigate the urban heat island effect and visual discomfort to enhance outdoor comfort and liveability.

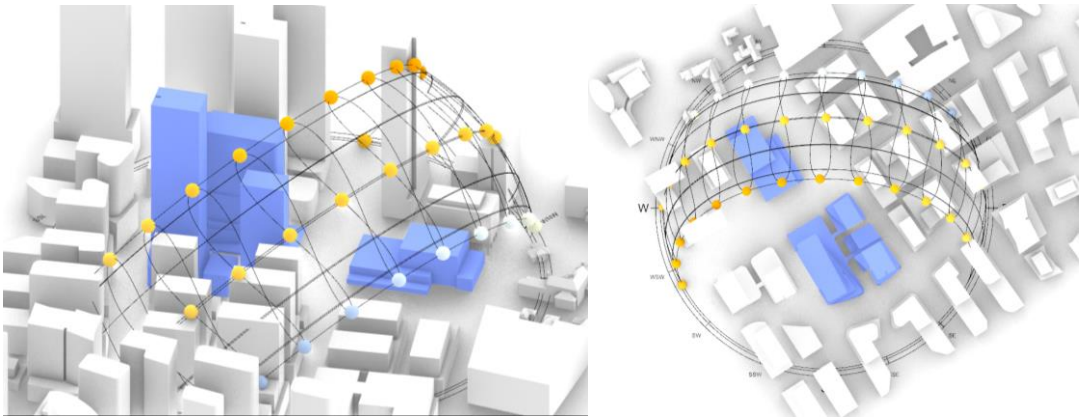


Figure 4-2 Sun path diagram [left] south-west perspective; [right] plan view

4.3 Wind

Wind direction and velocity varies seasonally. Figure 4-3 illustrate the wind direction and velocity for summer and winter, respectively.

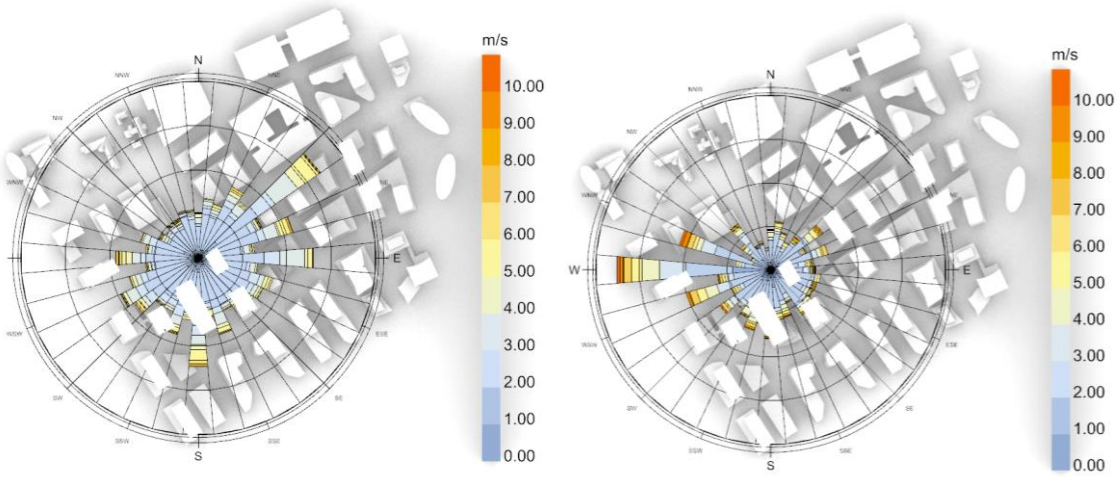


Figure 4-3 Wind rose diagram; [left] summer; [right] winter

Prevailing north east, east and south wind directions are observed in summer. Summer breezes can permeate the public spaces in support of the dominant pedestrian movement through the plazas and park.

A strong, prevailing west wind direction is observed in winter with comparatively greater velocity than that observed in summer. Mitigation measures, including tree and urban canopies, should be considered to improve the outdoor thermal comfort and usability of the public spaces in winter.

The variable seasonal wind direction facilitates effective indoor natural ventilation.

4.4 Sun hours

A sun hours analysis has been conducted to assess direct sunlight exposure to the proposed development building envelope and public spaces. Figure 4-4 and Figure 4-5 illustrate the number of direct sunlight hours received in summer and winter, respectively.

Good levels of direct sunlight are maintained to the public spaces throughout the year. Urban heat island controls should be considered to maintain usability during summer.

The proposed development building envelope and floor plate is aligned to reduce direct sunlight exposure from the north west and limit low angle sunlight from the west.

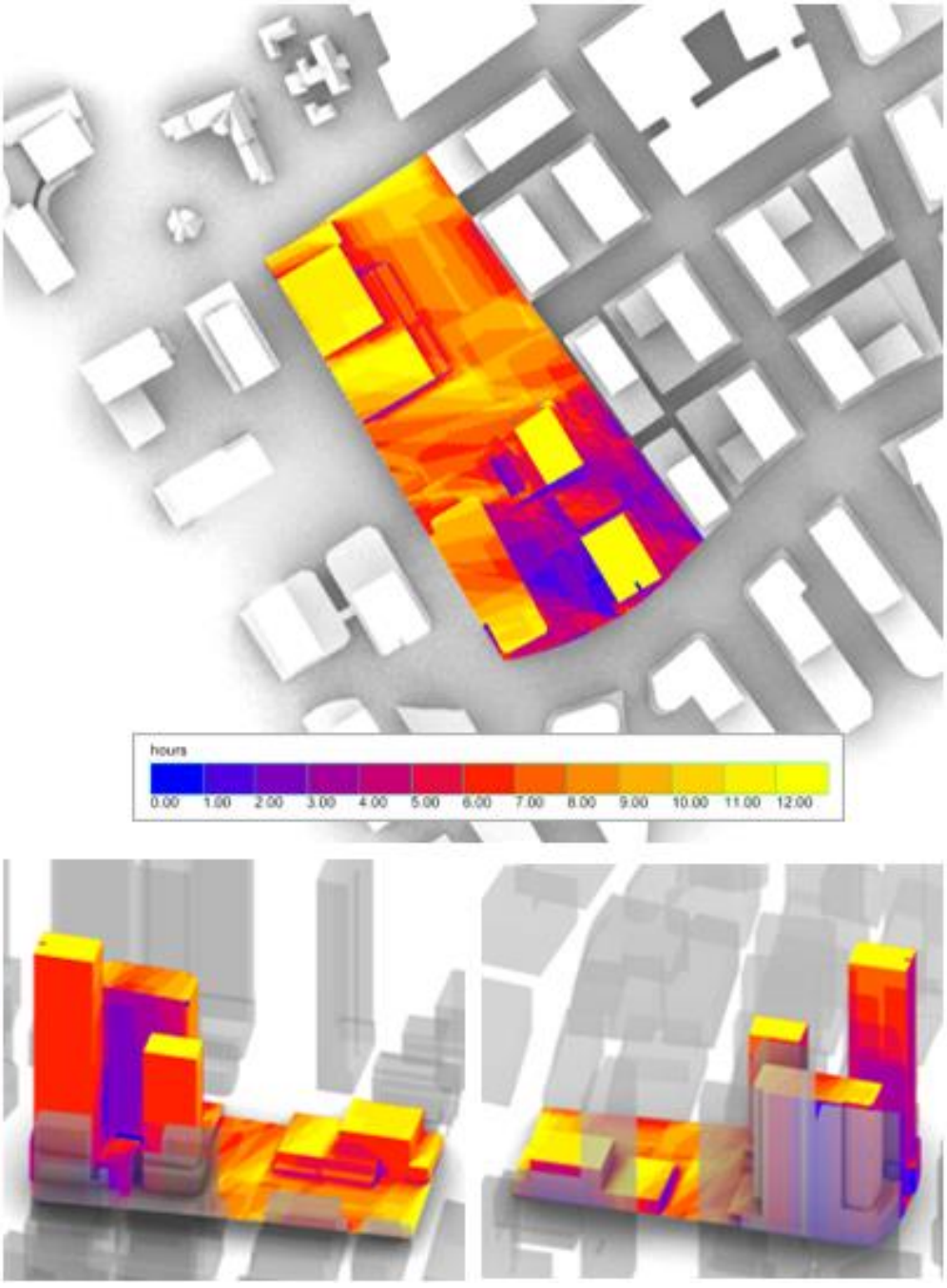


Figure 4-4 Summer sun hours; [top] top view; [bottom left] north-east perspective; [bottom right] south-west perspective

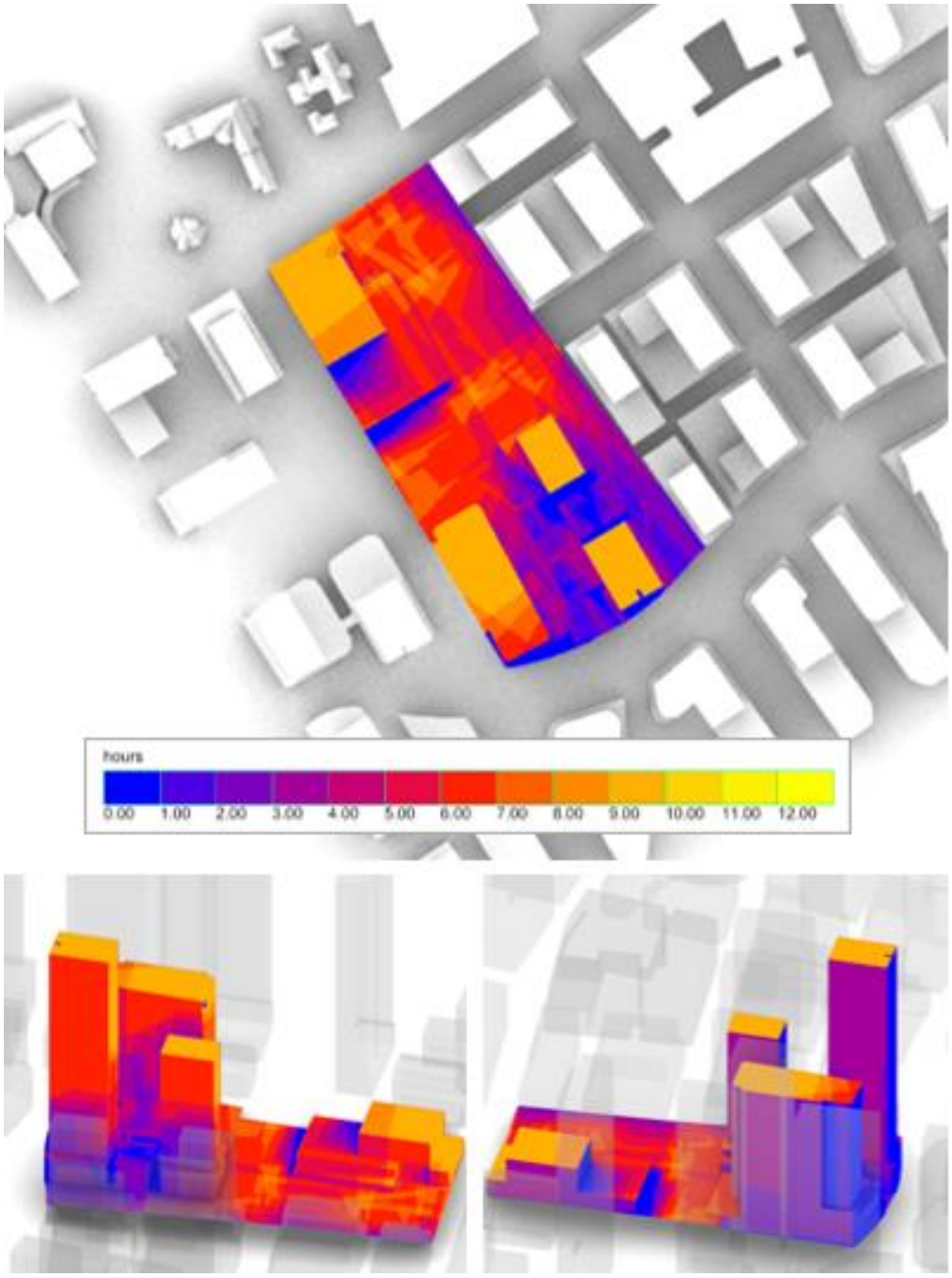


Figure 4-5 Winter sun hours; [top] top view; [bottom left] north-east perspective; [bottom right] south-west perspective

4.5 Solar reflectivity

Figure 4-6 and Figure 4-7 illustrate direct solar reflectance to public spaces and within the SOP Master Plan 2030 (2018 Review) development context.

During summer afternoons, solar reflectance attributed to the proposed development building envelope of Buildings 1 and 2 impacts the public space.

During summer mornings, solar reflectance attributed to the proposed development building envelope generally impacts the SOP Master Plan 2030 (2018 Review) development context to the east.

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

- external feature shading with a minimum solar reflectance index of 82 for horizontal shading when sloped less than 15º from the horizontal and a minimum solar reflectance index of 39 when sloped greater than 15º from the horizontal
- intrinsic features of the building form such as reveals and returns
- vegetation such as green walls
- opaque wall surfaces that are matte or non-reflective.

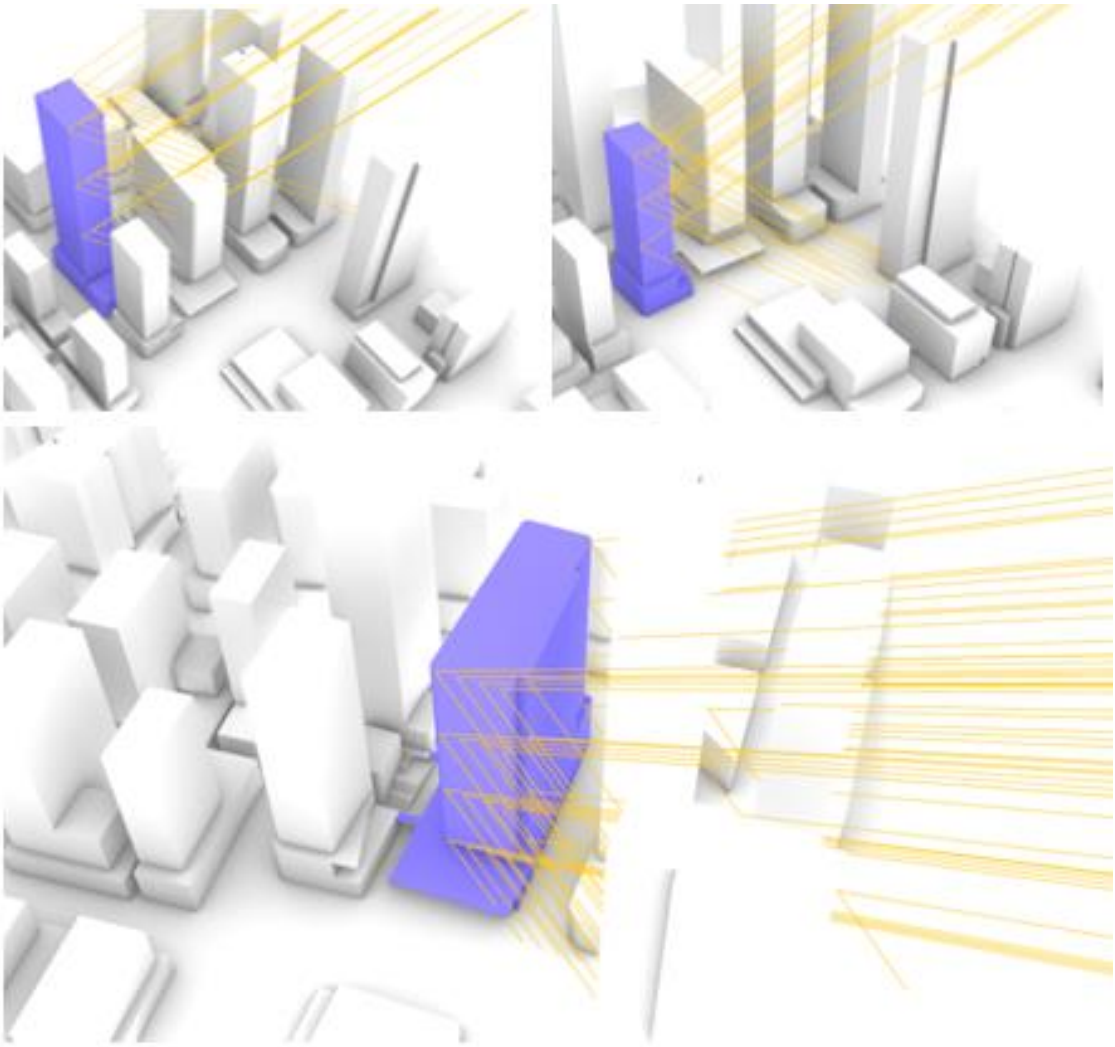


Figure 4-6 Solar reflectivity - summer afternoon

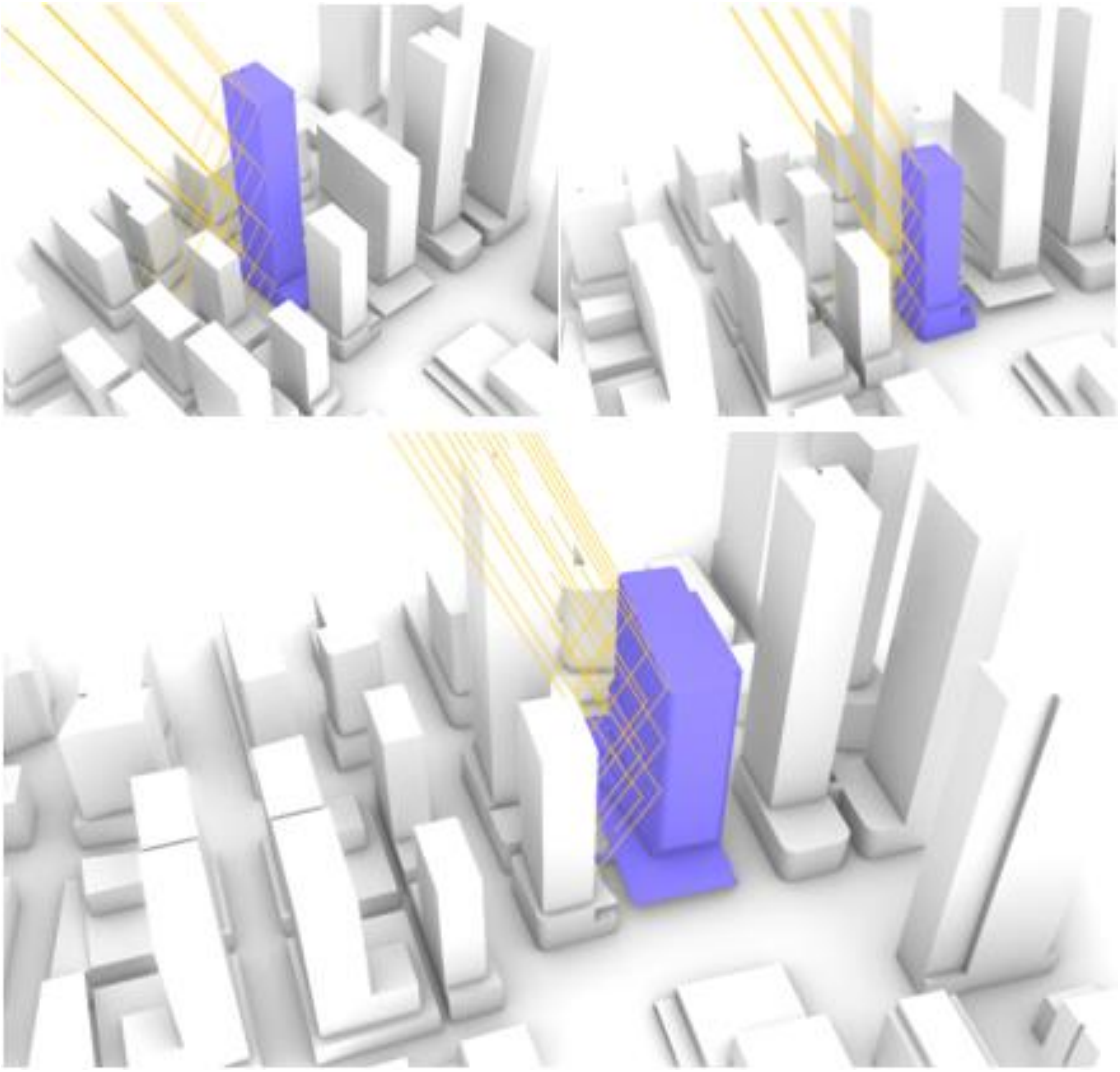


Figure 4-7 Solar reflectivity - summer morning

4.6 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 building envelope receives good levels of daylight access but acts to mitigate glare.

The proposed development building envelope experiences a varying daylight access performance at lower and upper levels, primarily due to overshadowing due to the SOP Master Plan (2018 Review) development context (see Figure 4-8 and Figure 4-9).

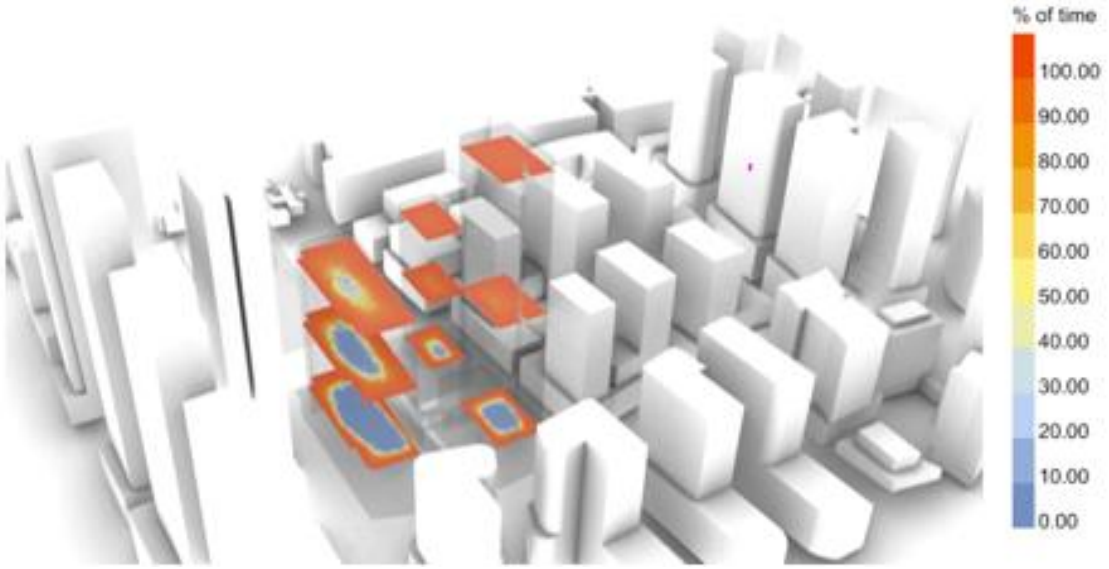


Figure 4-8 Daylight autonomy – upper and lower levels

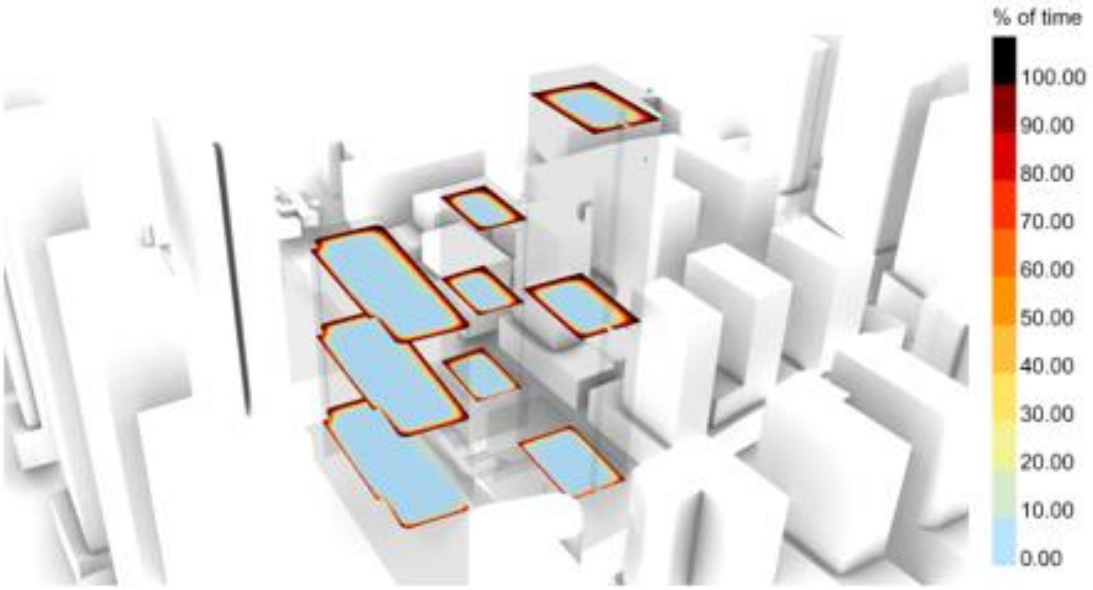


Figure 4-9 Annual sunlight exposure – upper and lower levels

5 Sustainability targets and rating requirements

5.1 Minimum sustainability rating requirements

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.

Minimum sustainability rating requirements for the proposed development and their justification are outlined in Table 5-1. Together with the drivers presented in section 3, an ESD framework for the Concept SSDA (see section Appendix A) has been established.

The energy and water strategies are set out in sections 6 and 7, respectively. A sustainable transport response is outlined in section 8.

Table 5-1 Sustainability rating strategy setting out the minimum requirements for the buildings proposed at Sydney Olympic Park

Assets	Minimum rating requirement	Justification
Building 1	• 5 star Green Star Buildings	Sydney Metro West System Requirements Specification
	• 5.5 star (+25%) NABERS Energy for Offices (base building) (without GreenPower) (Commitment Agreement)	Green Star Buildings, Climate Positive Pathway – Credit 22 Energy Use, Credit Achievement, NABERS Commitment Agreement pathway
	• 5 star NABERS Water for Offices • 45% less potable water consumption when compared to a reference building	Verifiable water performance (see section 7)
Building 2 and Building 3	• 5 star Green Star Buildings	Sydney Metro West System Requirements Specification
	• 4.5 star NABERS Energy for Apartment Buildings (without GreenPower) • 4.5 NABERS Water for Apartment Buildings	Verifiable energy and water performance (see sections 6 and 7)
	• Average 7 star NatHERS rating • Minimum individual 6 star NatHERS rating	NCC 2022
	• BASIX Energy 40 • BASIX Water 60	Sydney Olympic Park Master Plan 2030 (2018 Review)

5.2 Climate positive

The Green Building Council of Australia 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 out in Green Star Buildings.

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

Referring to Figure 5-1, the scope of the World Green Building Council'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).

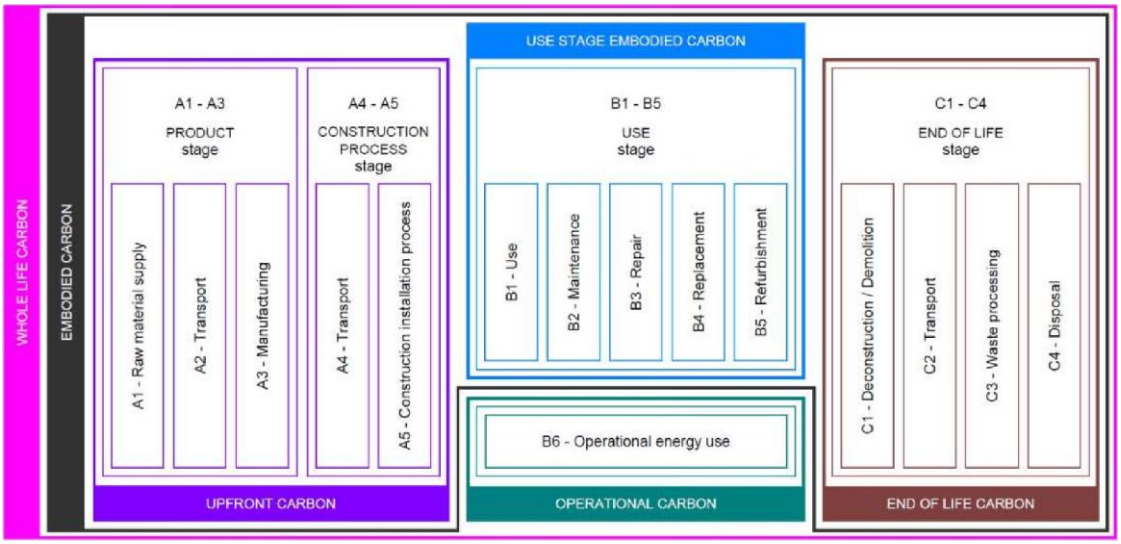


Figure 5-1 Scope of the World GBC's Whole Life Carbon Vision

The Climate Positive Pathway established under the Green Star Buildings tool sets 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 for all buildings:

1. Credit 21 Upfront Carbon Emissions | Exceptional Performance | 40% reduction in upfront carbon emissions over a reference building.
2. Credit 22 Energy Use | Credit Achievement | 20% reduction in energy use over a reference building[1].
3. Credit 23 Energy Source | Minimum Expectation | preparation of a Zero Carbon Action Plan (ZCAP).
4. Credit 23 Energy Source | Exceptional Performance | 100% of the building's energy comes from renewables.
5. Credit 24 Other Carbon Emissions | Credit Achievement | high global warming potential (GWP) refrigerants are eliminated or offset.
6. Credit 24 Other Carbon Emissions | Exceptional Performance | 100% of residual embodied emissions are offset.

[1] The Credit Achievement criteria can be met by one or a combination of the:

- reference building pathway
- NABERS Commitment Agreement pathway (available for Class 3 Hotels, Class 5 Offices and Class 6 Shopping Centres
- residential pathway (available to Class 2 Apartment Buildings only).

6 Energy strategy

6.1 Energy performance

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

This evaluation is only intended to verify that the proposed development can meet the nominated sustainability rating requirements detailed in Table 5-1 and demonstrate design excellence with respect to sustainability. The energy efficiency measures detailed in Table 6-1 and Table 6-2 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.

Building 1 has been assessed against the NABERS Energy for Offices rating system.

Buildings 2 and 3 have been individually assessed against NatHERS, BASIX Energy and the NABERS Energy for Apartment Buildings rating systems.

Preliminary building energy models have been developed for each building in accordance with the related protocols of each rating system.

6.2 Building 1

A minimum 5.5 star (+25%) NABERS Energy for Offices target has been established for Building 1.

Building 1 was found to meet the nominated sustainability rating requirements based on the energy efficiency guidelines presented in Table 6-1.

The energy performance results for Building 1 are presented in Figure 6-1.

Table 6-1 Energy efficiency guidelines

Passive design measures	Active design measures
• 60% window to wall ratio (average for all levels and elevations) • Glazing system U-value 2.8 W/m².K | SHGC 0.23 • 300mm horizontal shading applied to the north, east and west elevations • Envelope wall system R-value 1.5 m².K/W (total R-value 3.5 m².K/W) • Spandrel system R-value 1.0 m².K/W (total R-value 3.5 m².K/W) • Envelope roof total R-value 3.2 m².K/W • Envelope floor total R-value 2.0 m².K/W • All internal conditions and operational profiles are in line with NABERS protocols	• Active chilled beam with constant air volume (CAV) system to the perimeter office zones • Variable air volume system to the centre office zones • Central air handling plant (including economy cycle and demand control ventilation) separately serving the hybrid active chilled beam and variable air volume systems • 15% improvement in the energy efficiency ratio over Part J5.10 Refrigerant chillers (NCC 2019, section J Energy efficiency) for water-cooled chiller plant serving comfort cooling systems • A seasonal coefficient of performance (COP) > 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

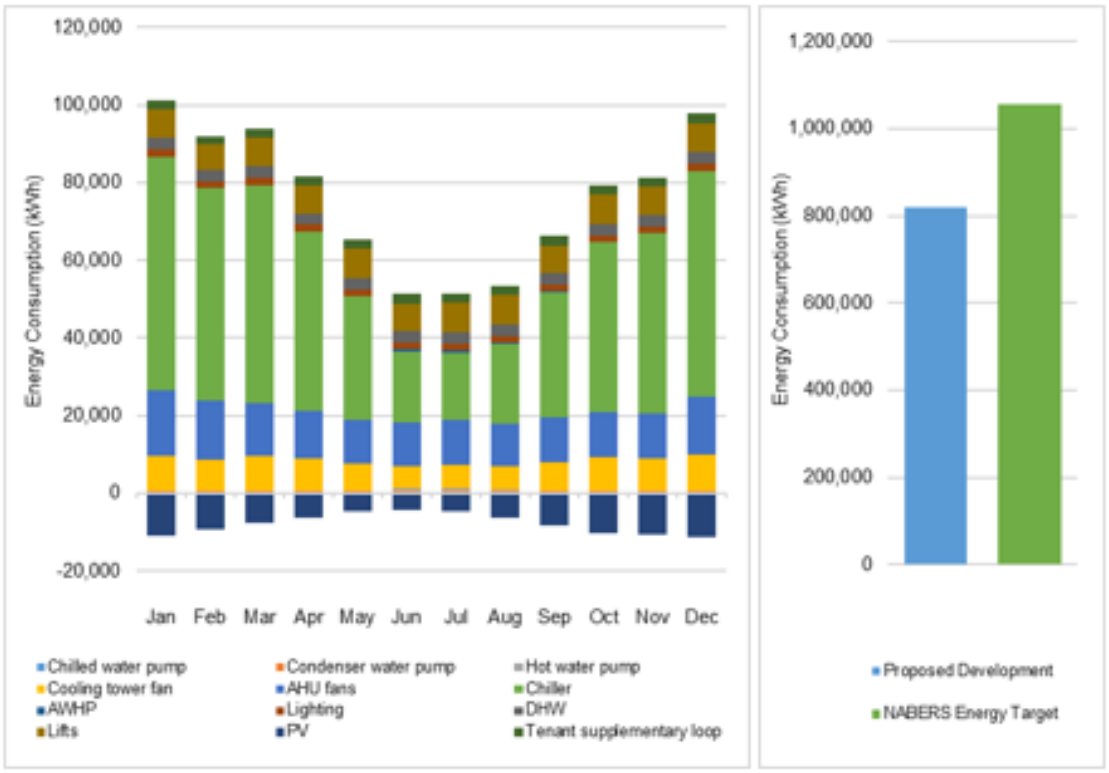


Figure 6-1 Building 1 energy performance

Note: [left] monthly breakdown; [right] annual comparison to NABERS Energy budget

6.3 Buildings 2 and 3

Minimum average 7 star NatHERS (minimum individual 6 star NatHERS), BASIX Energy 40 and 4.5 star NABERS Energy for Apartment Buildings rating targets have been established for Buildings 2 and 3.

Buildings 2 and 3 were found to meet the nominated sustainability rating requirements based on the energy efficiency guidelines presented in Table 6-2.

The energy performance results for Buildings 2 and 3 are presented in Figure 6-2 and Figure 6-3, respectively.

Table 6-2 Energy efficiency guidelines

Passive design measures	Active design measures
• 60% window to wall ratio • External window (fixed/openable) system U-value 3.4 W/m².K | SHGC 0.30 • Glazed external door (fixed/openable) system U-value 3.4 W/m².K | SHGC 0.30 • 300mm deep horizontal shading to exposed windows • Weather stripping - all external doors and windows • Envelope wall system R-value 1.5 m².K/W (total R-value 3.5 m².K/W) • Spandrel panel system R-value 1.0 m².K/W (total R-value 3.5 m².K/W) • Envelope roof total R-value 3.5 m².K/W • Roof colour - medium • Envelope floor total R-value 2.0 m².K/W • Floor finish - tiles (wet areas + kitchen) • Floor finish - carpet (bedrooms + living areas) • Ceiling fan - bedrooms + living areas • Ceiling light penetration - insulated	• Building management system • Car park supply and exhaust ventilation - CO sensors + VSD fans • Mechanical exhaust (bathroom + laundry) to facade - manual on / timer off • Mechanical exhaust (kitchen) to facade - manual on / off • Lift motor rooms ventilation supply - thermostatically controlled • Garbage and plant rooms - exhaust ventilation • Hallway ventilation - natural ventilation supported by back-up supply ventilation only / timeclock / providing a proportion of make-up air provision for bathroom, laundry and kitchen exhaust • Ground floor lobby, gym and community rooms - air conditioned • Mechanical ventilation heat recovery (MVHR) unit in each apartment with a 60% sensible heat recovery efficiency providing minimum outdoor air ventilation and a proportion of make-up air provision for bathroom, laundry and kitchen exhaust • 4-pipe fan coil unit in each apartment for comfort cooling and space heating of habitable rooms • Central water-cooled chiller plant serving comfort cooling systems - COP > 4.5 • Central air-to-water heat pump plant serving space heating and domestic hot water heating systems - COP > 3.5 • Lighting (unit) - > 80% LED fittings in all rooms • Lighting (common areas) - LED fittings + controls • Refrigerator - 4.5 star (non-ventilated) • Dishwasher - 4.5 star • Clothes washer and Clothes dryer - 4.5 star • Internal clothes drying line • Hot water piping insulation - R1.0 m².K/W • Vertical transportation - VVVF gearless traction

Figure 6-2 Building 2 energy performance

Note: [top] monthly breakdown; [bottom left] annual comparison to NABERS Energy budget; [bottom right] annual comparison to BASIX 40 budget

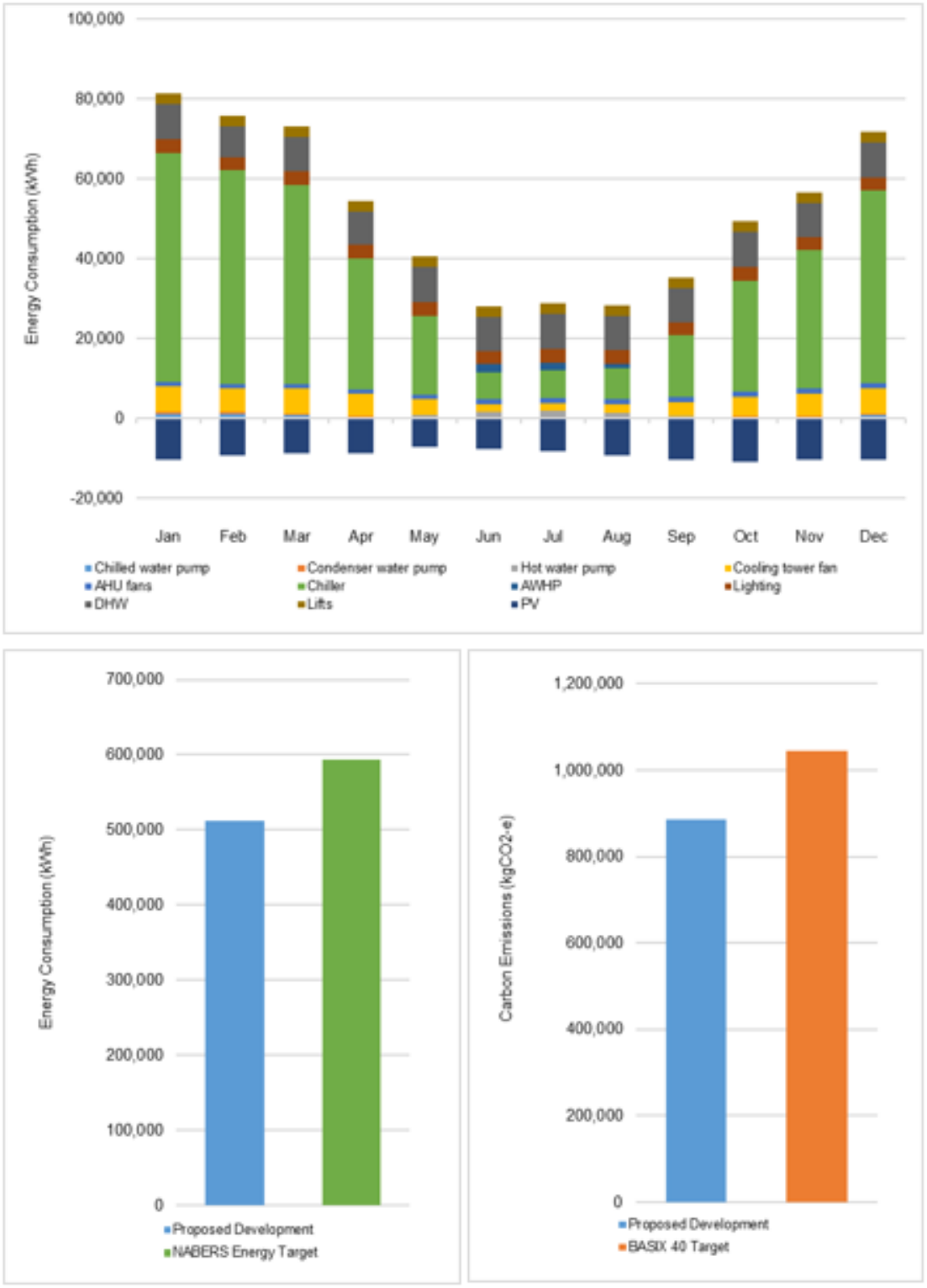


Figure 6-3 Building 3 energy performance

Note: [top] monthly breakdown; [bottom left] annual comparison to NABERS Energy budget; [right] annual comparison to BASIX 40 budget

6.4 Renewable energy

A renewable energy feasibility study was conducted for the proposed development. This consisted of coordinated spatial planning for rooftop plant and communal open space, and solar photovoltaic (PV) systems, including building integrated photovoltaic (BIPV) technology (see Table 6-3).

Communal open space is an important environmental resource that provides outdoor recreation opportunities for residents, connection to the natural environment and contributes to the appeal of the development and the wellbeing of residents, especially in high density residential development.

Figure 6-4 identifies the available roof area of Buildings 2 and 3 for solar PV systems. Solar PV capacity is assessed based on 25% of the available roof area only to better support the provision of communal open space.

In consideration of the spatial constraints on the roof, and leveraging the results from the microclimate analysis in section 4.1, the proposed development building envelope elevations highlighted in Figure 6-5 and Figure 6-6 were identified as being suitable for BIPV application. On the winter solstice, the highlighted elevations receive approximately eight hours of direct sunlight. It is assumed approximately 10% of this elevation area will be available for BIPV technology.

The solar PV and BIPV capacity and annual energy yield for each building is shown in Table 6-3.

Table 6-3 Solar PV system capacity and yield for each building

Building	Capacity/yield
Building 1	Solar PV • 74kWp • 95,000kWh
Building 2	Solar PV • 18kWp • 23,000kWh BIPV • 50kWp • 44,500kWh
Building 3	Solar PV • 26.5kWp • 34,000kWh BIPV • 86.5kWp • 77,000kWh

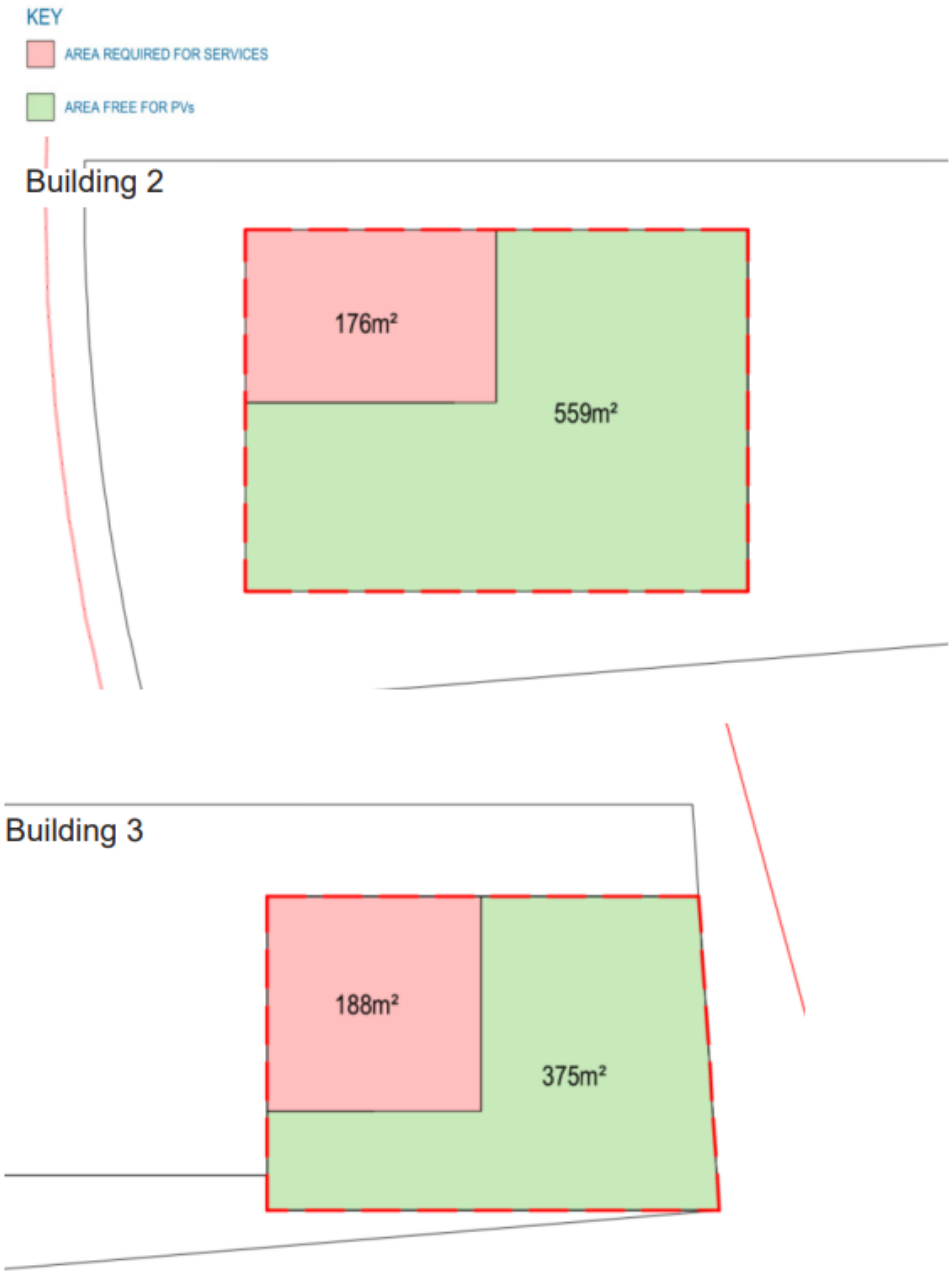


Figure 6-4 Space available for rooftop solar PV for Buildings 2 and 3

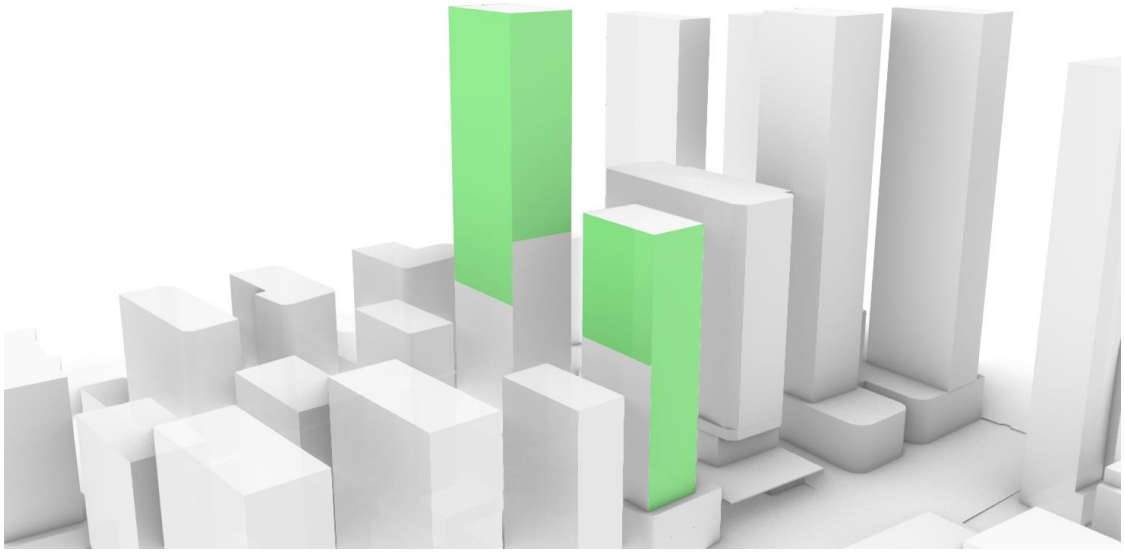


Figure 6-5 Proposed development building envelope elevations suitable for BIPV application

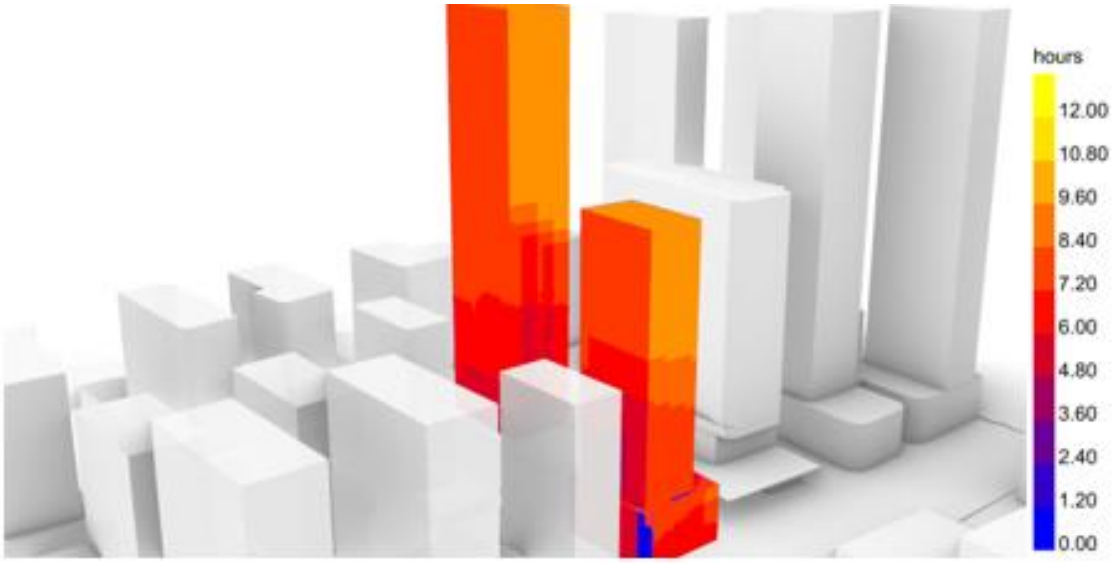


Figure 6-6 Sun hours performance for the proposed development building envelope – winter solstice

7 Water strategy

7.1 Site context

They Sydney Olympic Park Authority (SOPA) has established their industry leading Stormwater Management and Water Sensitive Urban Design (2016) policy for Sydney Olympic Park.

The policy aims to:

- promote appropriate water sensitive urban design in development
- optimise local harvesting and on-site utilisation of stormwater
- manage the discharge of stormwater from and within development sites post-construction.

The policy requires:

- at least 90% of roof area to be connected to rainwater storage(s) to supply non-potable water uses
- rainwater supply schemes must be supplemented with recycled water as a back-up to rainwater supply schemes, where connected to the Water Reclamation and Management Scheme (WRAMS) recycled water supply.

Developments located within a Sydney Olympic Park stormwater harvesting catchment must meet their non-potable water demand from non-potable water sources, including WRAMS recycled water and/or locally harvested rainwater.

The WRAMS is at/near capacity and only a 'trickle' recycled water supply is available to the buildings (1L/s subject to rainfall). Whilst this is a nominal recycled water supply, it offers opportunities to drive higher water performance objectives, as per the nominated sustainability rating requirements detailed in Table 5-1.

7.2 Water performance

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 5-1 and demonstrate design excellence with respect to sustainability. The water efficiency measures detailed in Table 7-1 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.

Building 1 has been assessed against the NABERS Water for Offices and Green Star Buildings (Credit 25 Water Use) rating systems.

Buildings 2 and 3 have been individually assessed against BASIX Water, NABERS Water for Apartment Buildings and Green Star Buildings (Credit 25 Water Use) rating systems.

Preliminary building water balance analysis has been developed for each building in accordance with the related protocols of each rating system.

7.3 Building 1

A minimum 5 star NABERS Water rating target has been established for Building 1.

In lieu of the Green Star Buildings prescribed Water Use calculator (currently in development), the Green Star - Design & As Built (D&AB) v1.3 Potable Water Calculator, Release 7 was used to calculate the annual potable water consumption for Building 1.

Building 1 was found to meet the nominated sustainability rating requirements based on the water efficiency guidelines presented in Table 7-1.

The water performance results for Building 1 are presented in Figure 7-1.

Table 7-1 Water efficiency guidelines

Water efficiency measures
• Toilets - 5 star WELS rating
• Urinals - 5 star WELS rating (commercial only)
• Wash hand basin taps - 6 star WELS rating
• Kitchen taps - 6 star WELS rating
• Showers - 4 star WELS rating
• Dishwashers - 5 star WELS rating
• Clothes washers - 5 star WELS rating (residential only)
• Dual plumbing systems serving all non-potable water demands, including toilet and urinal flushing, landscape irrigation and make-up water for heat rejection systems
• 20kL rainwater tank and treatment system for rainwater harvesting and reuse to meet a proportion of the non-potable water demands (each building)
• 1 L/s peak recycled water supply by connection to Sydney Olympic Park's Water Reclamation and Management Scheme (WRAMS); 20kL recycled water tank to support connection and act as primary top-up to the rainwater system (each building)
• Closed circuit cooler (hybrid cooling tower) plant for heat rejection serving base building and tenant supplementary loop (commercial only), and shared services (residential only)
• Landscape design - total average crop coefficient less than 0.6
• Landscape irrigation - subsurface drip irrigation - 90% system efficiency
• Fire protection system - water is not expelled during testing

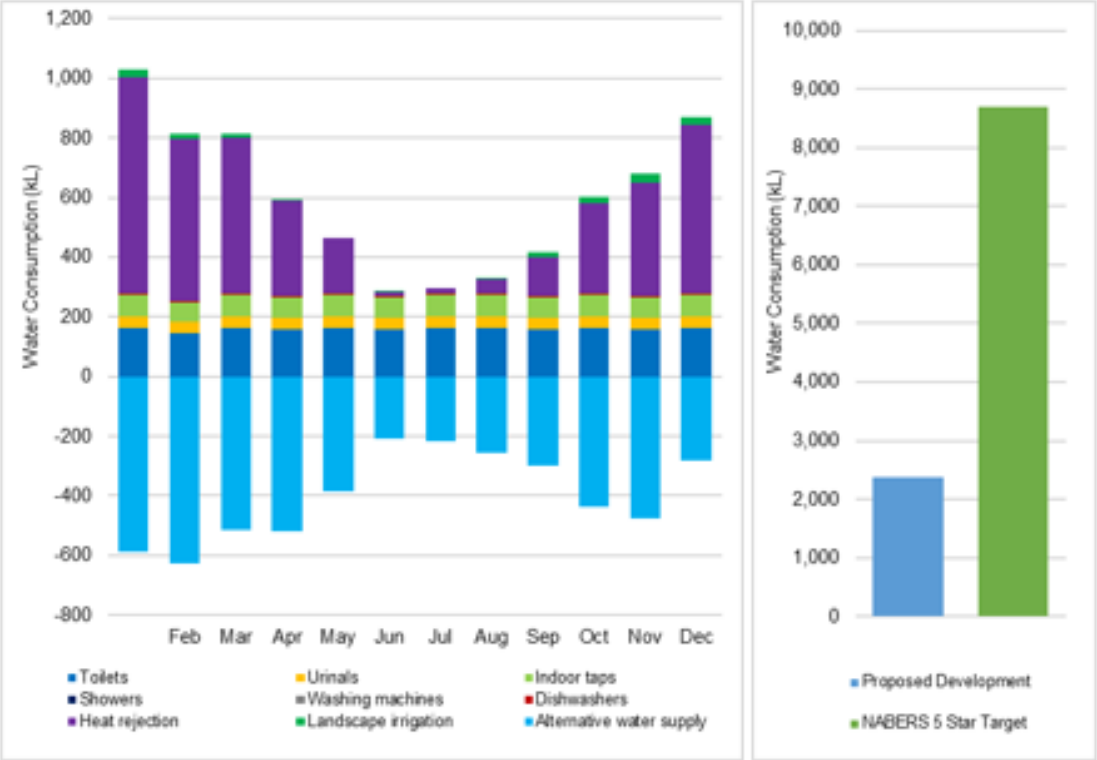


Figure 7-1 Building 1 water performance

Note: [left] monthly breakdown; [right] annual comparison to NABERS Water budget

7.4 Buildings 2 and 3

Minimum 4.5 star NABERS Water for Apartments and BASIX Water 60 rating targets have been established for Buildings 2 and 3.

The Green Star D&AB v1.3 Potable Water Calculator, Release 7 was used to calculate the annual potable water consumption for Buildings 2 and 3.

Buildings 2 and 3 were found to meet the nominated sustainability rating requirements based on the water efficiency guidelines presented in Table 7-1.

The water performance results for Buildings 2 and 3 are presented in Figure 7-2 and Figure 7-3, respectively.

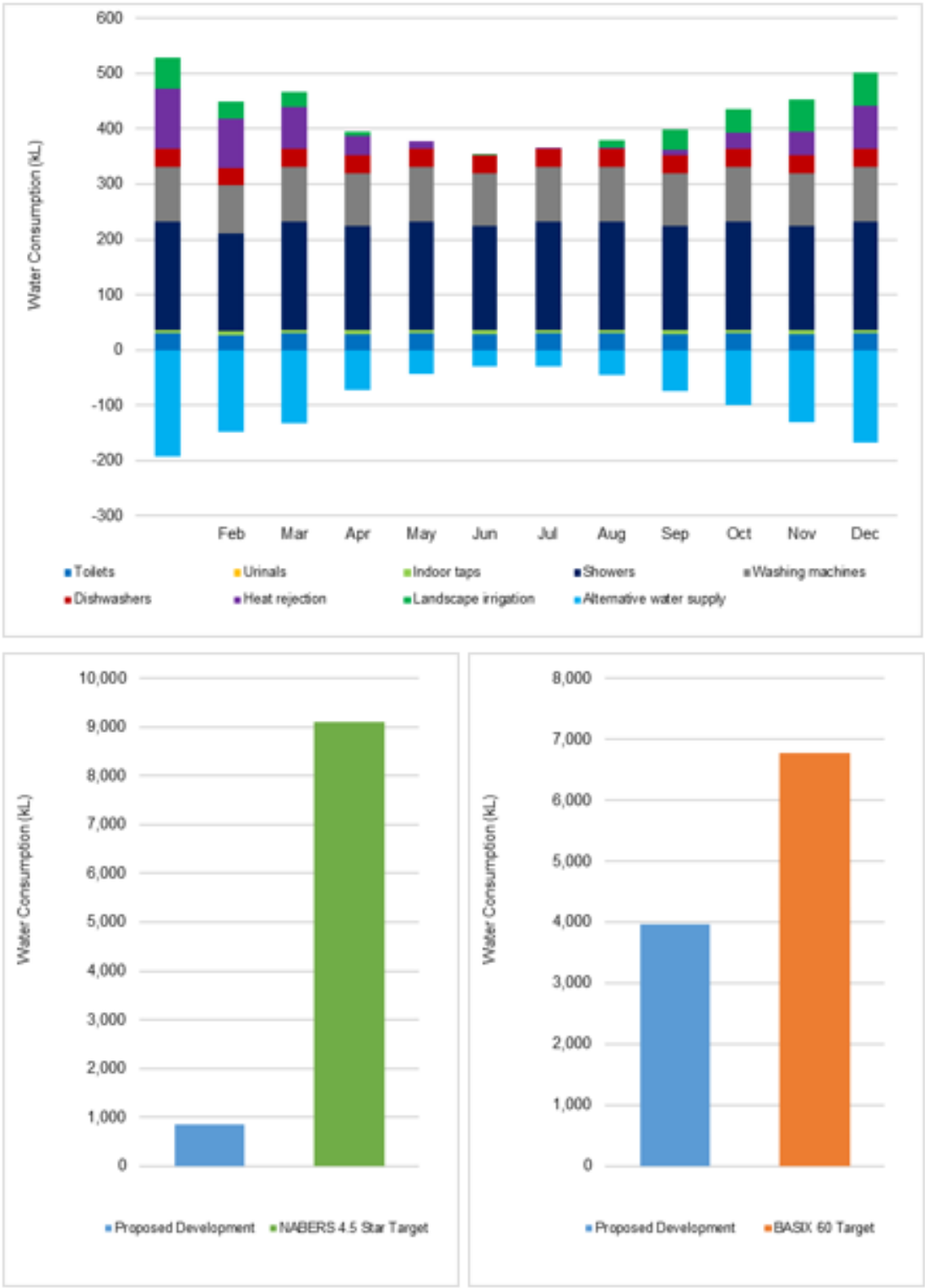


Figure 7-2 Building 2 water performance

Note: [top] monthly breakdown; [bottom left] annual comparison to NABERS Water budget; [bottom right] annual comparison to BASIX 60 budget

Figure 7-3 Building 3 water performance

Note: [top] monthly breakdown; [bottom left] annual comparison to NABERS Water budget; [bottom right] annual comparison to BASIX 60 budget

8 Sustainable transport

8.1 Movement and place

The SOPA 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.

Relevant SOP Master Plan 2030 (2018 Review) design controls include:

- one occupant bicycle parking space per 150m² and one visitor bicycle parking space per 75m² of floor space of commercial development
- residential bicycle parking rates must be provided in accordance with the rates in Table 8-1.

Table 8-1 Minimum bicycle parking rates for residential development

Type	Rate
1-bedroom	1 space/dwelling
2-bedroom	1.2 spaces/dwelling
3-bedroom	1.5 spaces /dwelling
4-bedroom	2 spaces /dwelling
Visitors	0.25 spaces/dwelling

To encourage residents, 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) must be met. 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 8-2 details the various building types, their uses and associated areas, occupants, and the number of showers and lockers required.

Commercial and retail occupancies are based on Table D1.13 of NCC 2019. Residential occupancy is based on apartment numbers and one person per bedroom is assumed.

The relevant SOP Master Plan 2030 (2018 Review) design controls and Green Star Buildings (Credit 27 Movement and Place) criteria have been applied when determining the required number of showers and lockers, and bicycle parking provision. Where there is an inconsistency, the more onerous requirement must be met.

Table 8-2 also identifies the end of trip facilities driver for each building and its uses. The SOP Master Plan 2030 (2018 Review) does not provision for showers and lockers in its design controls.

Table 8-2 Requirements for end of trip facilities

Building 1		
Use type	**Office**	**Retail**
Area	26,692m²	1,196m²
Population	2,669	399
Required showers	17 (Green Star)	5 (Green Star)
Required lockers	334 (Green Star)	50 (Green Star)
Required bike racks	534 SOP MP 2030	9 (Green Star)
Recommended bike racks	540	10

Building 2			
Use type	**Commercial**	**Retail**	**Residential**
Area	2,377m²	248m²	9,464m²
Population	238	83	198
Required showers	5 (Green Star)	2 (Green Star)	Exempt
Required lockers	30 (Green Star)	11 (Green Star)	Exempt
Required bike racks	48 (SOP MP 2030)	2 (Green Star)	61 (SOP MP 2030)
Recommended bike racks	50	10	70

Building 3			
Use type	**Commercial**	**Retail**	**Residential**
Area	3,751m²	305m²	23,328m²
Population	375	102	416
Required Showers	5 (Green Star)	4 (Green Star)	Exempt
Required Lockers	47 (Green Star)	13 (Green Star)	Exempt
Required Bike Racks	76 (SOP MP 2030)	3 (Green Star)	139 (SOP MP 2030)
Recommended Bike Racks	80	10	140

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 (VKT). Table 8-3 details the inputs used in the Movement and Place calculator for both the proposed development and a baseline based on 2016 Census data.

Table 8-3 Movement and Place calculator inputs

	Baseline	Proposed
Work weeks	48	48
Avoided trips	2%	2%
Average trip length	19.89km	19.89km

Work weeks 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 work week. This avoided trips percentage for the proposed buildings is based on 2016 Census data. It is expected that the proposed avoided trips percentage will increase once COVID and flexible working trends are better understood.

Average trip length is based on Statistical Area Level 2 2016 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 8-4 details the baseline and proposed mode share for commercial and residential 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 coordinated within the context of the Transport and Access Report forming part of this EIS (Appendix T).

Table 8-4 Commercial and residential mode share for different scenarios

Mode	Commercial		Residential	
	Baseline	Proposed	Baseline	Proposed
Train	20.80%	11.00%	28.68%	19.00%
Bus	4.14%	15.00%	3.97%	15.00%
Ferry	0.03%	0.00%	2.15%	0.00%
Tram	0.00%	0.00%	0.00%	0.00%
Metro	0.00%	30.00%	0.00%	45.44%
Car driver	69.08%	35.75%	56.26%	9.18%
Car passenger	3.81%	1.92%	3.78%	1.01%
Motorbike	0.00%	0.00%	0.00%	0.00%
Bicycle	0.78%	2.22%	0.67%	3.37%
Walk	1.37%	4.00%	4.49%	7.00%

Assessing each building individually, the following targets were met:

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

The required bicycle parking facilities to meet or exceed the 90% active mode encouragement are presented in Table 8-2. The calculation for bicycle parking provisions is 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 development is subject to the parking requirements stipulated in the SOP Master Plan 2030 (2018 Review). This gives maximum rates that are not to be exceeded. As Buildings 1, 2 and 3 all share the eastern basement, Table 8-5 sets out the maximum permissible parking spaces, as well as the proposed provision of car parking spaces for the entire basement. It should be noted that all non-residential parking has been designated as commercial for the purposes of this assessment for conservatism in the road network modelling.

Table 8-5 Car parking spaces, inclusive of car share provision

	Maximum spaces	Proposed spaces
Commercial	369	141
Retail	35	17
Residential	382	190
Residential visitor	15	10
Total	**801**	**358**

The proposed provision of parking is well within the maximum rates. Given the proximity of the proposed development site to a range of public transport links, the reduction in the number of spaces compared to the existing site is considered appropriate. By providing a lower number of parking spaces per residential dwelling than the maximum, residents and occupants will be discouraged from owning and using private vehicles, catalysing a shift to sustainable transport.

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 the need for substantial builders work in connection to the electrical cabling installation.

9 Conclusion

This report presents the results of an ESD assessment for the Concept SSDA in Sydney Olympic Park. It has been prepared to outline sustainability targets, requirements and framework for the proposed development in response to the following:

- relevant SEARs
- vision and priorities set out in the Sydney Olympic Park Master Plan 2030 (2018 Review) and Proposed Sydney Olympic Park Master Plan 2030 (Interim Metro Review), and the sustainability issues and objectives of the Environmental Guidelines, Sydney Olympic Park 2008
- relevant design excellence requirements nominated within the Sydney Metro Design Excellence Strategy (in preparation).

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 and be set up for optimum ongoing management that is supported by appropriate metering and monitoring systems.

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 targets:

Climate Positive	
40%	reduction in upfront carbon emissions
20%	reduction in energy use
100%	renewable energy
100%	elimination / offset of other emissions
45%	reduction in potable water use - Building 1
30%	reduction in potable water use - Buildings 2 and 3
30%	reduction in life cycle impacts

The ESD strategy sets the following sustainability rating requirements:

Tool	Building 1	Buildings 2 and 3
greenstar	5 star Buildings	5 star Buildings
NABERS	5.5 star (+25%) NABERS Energy 5 star NABERS Water	4.5 star NABERS Energy 4.5 star NABERS Water
NATIONWIDE HOUSE ENERGY RATING SCHEME	-	Average 7 star NatHERS Minimum 6 star NatHERS
BASIX	-	BASIX Energy 40 BASIX Water 60

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 will be possible through the following measures:

- Integrate passive and active design measures in Building 1 that demonstrates the annual energy consumption is less than a 5.5 star (+25%) NABERS Energy for Offices budget.
- Exceed the deemed to satisfy provisions of NCC 2019, section J Energy efficiency for all retail premises.
- Implement passive design measures in Buildings 2 and 3 that achieve an average 7 star NatHERS rating for all residential dwellings and not less than an individual 6 star NatHERS rating for any residential dwelling.
- Embed active design measures in Buildings 2 and 3 that:
    - exceed the performance provisions of the NCC, NSW 2 Energy efficiency performance requirements
    - achieve the BASIX Energy target of 40
    - demonstrate that the annual energy consumption of the shared services is less than a 4.5 star NABERS Energy for Apartment Buildings budget.
- Deploy on-site renewable energy systems across all buildings.
- Apply water efficiency measures and alternative water reuse strategies to Buildings 1 that:
    - demonstrate that the annual water consumption is less than a 5 star NABERS Water for Offices budget
    - deliver at least a 45% reduction in annual water consumption when compared to a Green Star standard practice building.
- Apply water efficiency measures and alternative water reuse strategies to Buildings 2 and 3 that:

    - achieve a BASIX Water target of 60
    - demonstrate that the annual water consumption of the shared services is less than a 4.5 star NABERS Water for Apartment Buildings
    - deliver at least a 30% reduction in annual water consumption when compared to a Green Star standard practice building.
- Divert at least 90% of construction and demolition waste from landfill.
- Develop a waste management plan to:
    - identify, quantify and classify the likely waste streams generated during construction and operation
    - promote responsible source separation to reduce the amount of waste that goes to landfill by implementing convenient and efficient waste management systems.

Greenhouse gas emission minimisation

The proposed development will minimise greenhouse gas emissions by:

- implementing a Climate Positive Pathway (see section 5.2)
- taking advantage of proven emissions reduction technologies to reduce the cost of living
- driving credible reductions in Upfront Carbon and Operational Carbon
- avoiding locking in fossil fuels
- installing systems that use low impact refrigerants
- empowering consumers and businesses to make sustainable choices by investing in the electrification of space heating services, and retail and residential cooking to accelerate the decarbonisation of the built environment
- purchasing 100% renewable electricity for base building and shared services operations
- making allowance for 20% 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 responds to sun path and overshadowing, wind effects and urban heat to deliver high quality private and public open space. The building envelope takes advantage of the sun path and prevailing wind conditions to enhance daylight access and drive effective natural ventilation.

The proposed development building envelope receives good levels of direct sunlight throughout the year, predominately from the north west. The SOP Master Plan 2030 (2018 Review) development context acts to shade the proposed development building envelope from the south east.

The public spaces receive high levels of direct sunlight throughout the year. An appropriate landscape response will be required to mitigate the urban heat island effect and visual discomfort to enhance outdoor comfort and liveability.

Prevailing north east, east and south wind directions are observed in summer. Summer breezes can permeate the public spaces in support of the dominant pedestrian movement through the plazas and park.

A strong, prevailing west wind direction is observed in winter with comparatively greater velocity than that observed in summer. Mitigation measures, including an

urban tree canopy and pergolas, should be considered to improve the outdoor thermal comfort and usability of the public spaces in winter.

The proposed development building envelope and floor plate is aligned to reduce direct sunlight exposure from the north west and limit low angle sunlight from the west.

Mitigation measures to reduce the impact of solar reflectivity and urban heat island effect attributed to the proposed development building envelope should be considered.

The proposed development building envelope experiences a varying daylight access performance at lower and upper levels, primarily due to overshadowing from the adjacent SOP Master Plan 2030 (2018 Review) development context.

Water strategy

Section 7 defines a water strategy that delivers at least a 45% reduction in annual water consumption for Buildings 1, and a 30% reduction for Building 2 and 3. To support water resilience, the buildings will integrate water efficiency measures and make use of alternative water sources to reduce the demand for potable water. Dual plumbing systems will 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 will be supported by the integration of rainwater tanks and treatment system in each building for rainwater harvesting and reuse to meet a proportion of the non-potable water demands. Future ready connections for a recycled water network.

WSUD features will be implemented, including tree pits, bio-retention systems, rainwater harvesting and reuse systems, on-site detention tanks with water filtration, etc in line with the SOP Master Plan 2030 (2018 Review) and Environmental Guidelines 2008.

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 90% 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.

A Biodiversity Development Assessment Report Waiver for the proposed development has been received under the Stage 3 CSSI Application (SSI-22765520).

Environmental factors

Environmental factors are addressed through the Concept SSDA based on the definition of an ESD framework (see Appendix A).

During construction, the EMS and EMP, put in place by the main contractor, will demonstrate a formalised systematic and methodical approach to planning, implementing and auditing for environmental management.

During operation, environmental performance targets will be set and verified.

Appendix A ESD framework

Requirement	Reference	Response
Responsible		

• Avoid, wherever practicable, serious or irreversible damage to the environment
• Bear the cost of containment, avoidance or abatement of pollution and waste
• Reduce environmental impacts
• Use resources sustainably
• Replace raw materials with recycled products
• Minimise the use of virgin materials
• Recognise that resources have value throughout multiple cycles of use and reuse
• Innovate product design for longevity, reuse and recovery
• Reduce the demand for new landfills
• Improve the quality of collected materials, and improve sorting of these materials and reuse
• Capture value from recycling resources
• Procure products, materials and services that represent best practice environmental and social principles
• Minimising use of resources and production of waste and toxic materials
	• SEARs, EP&A Regulation, Precautionary Principle
	• SEARs, EP&A Regulation, Inter-Generational Equity
	• SEARs, EP&A Regulation, Improved Valuation, Pricing and Incentive Mechanisms
	• SEARs, minimise waste generation and reduce environmental impact by moving to a circular economy
	• NSW Circular Economy Policy Statement
	• SOP Master Plan 2030 (2018 Review) & Environmental Guidelines 2008
	• Green Star Buildings:
	  ○ Credit 2 Responsible Construction (Minimum Expectation + Credit Achievement)
	  ○ Credit 3 Verification and Handover (Minimum Expectation)
	  ○ Credit 4 Operational Waste (Minimum Expectation)
	  ○ Credit 5 Responsible Procurement (Credit Achievement)
	  ○ Credit 6 Responsible Structure (Credit Achievement) + (Exceptional Performance - commercial only)
	  ○ Credit 7 Responsible Envelope (Credit Achievement)
		• 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
		• 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
		• Source responsibly manufactured structure, envelope, systems and finishes products
		• Divert at least 90% of construction and demolition waste from landfill
		• 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
		• Deploy coordinated building hand over procedures with the facilities management team and building users
		• 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

Requirement	Reference	Response
• Maximising use of sustainable resources and materials • Prioritise sustainable materials selection	○ Credit 8 Responsible Systems (Credit Achievement) ○ Credit 9 Responsible Finishes (Credit Achievement) + (Exceptional Performance - commercial only) ○ Credit 26 Life Cycle Impacts (Credit Achievement)	• Demonstrate a 30% reduction in life cycle impacts from resource use over the life of the buildings when compared to standard practice
Healthy		
• Consider the environmental impacts, such as sustainable design, overshadowing and solar access, visual comfort, wind and reflectivity • Provide sunlight access to private and public open space, and habitable rooms • Provide solar access to living areas, private open space and communal open space • Naturally cross ventilate at least 60% of apartments in the first nine storeys of a building • Maintain a high thermal comfort performance for building occupants and optimise cross ventilation • Minimise pollutants entering the building and supply adequate fresh air to maintain indoor air pollutants at acceptable levels • Provide good levels of daylight and high-quality artificial lighting	• SOP Master Plan 2030 (2018 Review) and Environmental Guidelines 2008 • Sydney Metro Design Excellence Strategy • Apartment Design Guide (residential only) • Green Star Buildings: ○ Credit 10 Clean Air (Minimum Expectation) + (Credit Achievement - commercial only) ○ Credit 11 Light Quality (Minimum Expectation) + (Credit Achievement - commercial only) ○ Credit 12 Acoustic Comfort (Minimum Expectation + Credit Achievement) ○ Credit 13 Exposure to toxins (Minimum Expectation) + (Credit Achievement - commercial only) ○ Credit 14 Amenity and Comfort (Credit Achievement - commercial only) ○ Credit 15 Connection to Nature (Credit Achievement)	• Maintain high levels of direct morning sunlight throughout the year to the public open spaces and enhance outdoor comfort and liveability • Enhance indoor daylight access • Support the permeability of summer breezes within the public open spaces and shelter the public open spaces from cold winter winds • Facilitate effective indoor natural ventilation • Design building ventilation systems with minimum separation distances between pollution sources and outdoor air intakes • Clean all ductwork that serves the building prior to occupation • Provide adequate access to components of the ventilation systems for maintenance purposes • Maintain carbon dioxide concentration levels below 700 parts per million at all times during the occupancy period • Remove / exhaust pollutants from internal pollutant sources

Requirement	Reference	Response
• Provide acoustic comfort for building occupants • Prevent exposure of building occupants to toxins • Provide internal amenities that improve occupant experience of using the buildings • Foster a connection to nature for building occupants • Install dual plumbing systems and make provision for a future ready connection to a recycled water network		• Achieve lighting comfort criteria and maximise access to daylight • Prepare an acoustic comfort strategy and achieve acoustic comfort criteria • Meet stipulated toxicity standards for paints, adhesives, sealants, carpets and engineered wood products, and conduct in-site testing to verify compliance • Include a room designed to promote either inclusivity, mindfulness or exercise for building occupants
Resilient		

• Design resilient and diverse places for enduring communities
• Contribute to water security and urban cooling
• Enhance tree canopy
• Evaluate site-specific climate risks and define strategies to reduce vulnerability to bushfire, flooding and extreme heat
• Be more resilient to a changing climate
• Reduce risks and damage to public and private assets arising from climate change
• Embed climate change considerations into asset and risk management
• Reduce climate change impacts on health and wellbeing
	• NSW Climate Change Policy Framework
	• Apartment Design Guide (residential only)
	• SOP Master Plan 2030 (2018 Review) & Environmental Guidelines 2008
	• Sydney Metro Design Excellence Strategy
	• Green Star Buildings:
	  ○ Credit 16 Climate Change Resilience (Minimum Expectation + Credit Achievement)
	  ○ Credit 17 Operations Resilience (Credit Achievement)
	  ○ Credit 19 Heat Resilience (Credit Achievement)
	  ○ Credit 20 Grid Resilience (Credit Achievement)
		• Perform a climate change risk and adaptation assessment, and manage all 'Extreme' and 'High' risks through specific design or future operational responses
		• Mitigate urban heat island effects
		• Evaluate and set minimum urban heat control requirements through effective building envelope shading
		• Implement WSUD features, including tree pits, bio-retention systems, rainwater harvesting and reuse systems, on-site detention tanks with water filtration, etc.
		• Support water resilience through the integration of water efficiency measures and using alternative water sources to reduce the demand for potable water
		• Incorporate diverse and appropriate planting, bio-filtration gardens, appropriately planted shading trees,

Requirement	Reference	Response
• Reduce heat island effect • Provide year-round solar access to public open space along with protection from strong winds • Manage impacts on natural resources, ecosystems and communities • Respond to acute shocks and chronic stresses that affect operations • Support the clean transition of the electricity grid • Consider the impacts as a result of climate change and include elements in building design and construction		areas for community gardens, and green roofs and walls • 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 • Select plants suited to the site conditions, including drought and wind tolerance, seasonal changes and sunlight access, soil conditions and plant longevity • Conduct an operations resilience assessment to identify a set of clear operations resilience objectives and performance goals that: ○ Consider interdependent infrastructure systems, networks, services and assets ○ Identify vulnerability ○ Outline emergency response procedures ○ Assess building survivability in the case of a blackout and provide a measure of survivability to account for its design purpose ○ Demonstrate the building has the ability to reduce its electricity peak demand by 10% based on on-site technology and/or load shedding strategies
Positive		
• Ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations • Drive the uptake of proven GHG emissions reduction technologies to reduce the cost of living	• SEARs, EP&A Regulation, Inter-Generational Equity • SEARs, integrate best practice sustainable building principles • Net Zero Plan Stage 1: 2020 - 2030 • Net Zero Plan, Implementation Update	• Building 2 and 3: ○ Achieve an average 7 star NatHERS rating for all residential dwellings and not less than an individual 6 star NatHERS rating for any residential dwelling ○ Exceed the performance provisions of the NCC, NSW 2 Energy efficiency performance requirements

Requirement	Reference	Response

• Empower consumers and businesses to make sustainable choices
• Invest in the next wave of GHG emissions reduction innovation to ensure economic prosperity from decarbonisation
• Electrify all energy uses and supply all energy uses with renewable electricity by 2030
• Plan operational improvements and projects, and decarbonisation pathways for businesses
• Accelerate the transformation of the built environment towards net zero emissions
• Provide a pathway to net zero emissions by 2050
• Adhere to the principles of ecologically sustainable development
• Promote sustainable development through energy efficient design, construction and operation
• Contribute to an overall reduction in GHG emissions
• Reduce the consumption of potable water, including the harvesting and reuse of rainwater and stormwater
• Integrate best practice sustainable building principles to improve environmental performance, including
	• SEPP (BASIX) 2004
	• NCC 2019
	• Trajectory for low energy buildings
	• SOP Master Plan 2030 (2018 Review) & Environmental Guidelines 2008
	• Sydney Metro Design Excellence Strategy
	• Green Star Buildings:
	  ○ Credit 21 Upfront Carbon Emissions (Minimum Expectation + Credit Achievement + Exceptional Performance)
	  ○ Credit 22 Energy Use (Minimum Expectation + Credit Achievement)
	  ○ Credit 23 Energy Source (Minimum Expectation + Credit Achievement + Exception Performance)
	  ○ Credit 24 Other Carbon Emissions (Credit Achievement + Exceptional Performance)
	  ○ Credit 25 Water Use (Minimum Expectation)
		○ Achieve the BASIX Energy target 40 and a BASIX Water 60 score for high-rise residential apartment buildings
		○ Demonstrate that the annual energy and water consumption of the shared services is less than a 4.5 star NABERS Energy for Apartment Buildings and 4.5 star NABERS Water for Apartment Buildings budget, respectively
		○ Deliver a 30% reduction in annual water consumption when compared to a reference building
		• Buildings 1:
		○ Demonstrate that the annual energy and water consumption is less than a 5.5 star (+25%) NABERS Energy for Offices and 5 star NABERS Water for Offices budget, respectively
		○ Deliver an over 45% reduction in annual water consumption when compared to a reference building
		• Climate Positive Pathway (all buildings):
		○ Achieve a 40% reduction in upfront carbon emissions over a reference building
		○ Demonstrate a 20% reduction in energy use over a reference building
		○ Prepare a ZCAP
		○ Source 100% of the building's energy from renewables
		○ Eliminate or offset 100% high GWP refrigerants
		• Offset 100% of residual embodied emissions

Requirement	Reference	Response
energy and water efficient design, and renewable energy		
Places		
• Prioritise active transport modes and improve the permeability of the pedestrian network • Reduce private vehicle use and encourage active, shared and public transport use • Ensure new buildings and precincts are 'EV ready'	• SOP Master Plan 2030 (2018 Review) & Environmental Guidelines 2008 • NSW Electric Vehicle Strategy • Green Star Buildings: ○ Credit 27 Movement and Place (Minimum Expectation and Credit Achievement) ○ Credit 28 Enjoyable Places (Credit Achievement) ○ Credit 29 Contribution to Place (Credit Achievement) ○ Credit 30 Culture, Heritage and Identity (Credit Achievement)	• 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 400 m • Limit speed to 10 km/h for roads within the site • Improve active mode uses by 90% • Include showers and changing facilities for building occupants • Make facilities accessible and inclusive, and locate in a safe and protected space • Prioritise cyclists and access to bicycle parking facilities • Prepare and implement a Sustainable Transport Plan • Integrate EV charging capabilities and make allowance for 20% of the total electric demand of EV charging for all car parking spaces • Prioritise transport initiatives that reduce the need for private fossil fuel powered vehicles • Encourage walkability • Provide publicly accessible spaces that are enjoyable and support community activity and interaction • Prepare an activation strategy • Undertake independent design reviews at key points in the development of the design
People		

Requirement	Reference	Response

• Promote diversity, and reduce physical and mental health impacts through effective construction practices
• Celebrate Aboriginal and Torres Strait Islander people, culture and heritage
• Facilitate workforce participation and economic development of disadvantaged and under-represented groups
• Welcome a diverse population and their needs
	• Green Star Buildings:
	  ○ Credit 31 Inclusive Construction Practices (Minimum Expectation)
	  ○ Credit 32 Indigenous Inclusion (Credit Achievement)
	  ○ Credit 33 Procurement and Workforce Inclusion (Credit Achievement - commercial only)
	  ○ Credit 34 Design of Inclusion (Credit Achievement)
		• 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
		• Demonstrate that the Australian Indigenous Design Charter guiding principles are incorporated in the design of the buildings
		• 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
		• Design and construct the buildings to enable easy navigation and enjoyment by stakeholders of diverse ages, genders and abilities

Nature		

• Conserve biological diversity and ecological integrity
• Design excellence in building and open space
• Minimise the quantity of stormwater run-off
• Integrate WSUD principles to maximise the treatment of stormwater run-off
• Manage impacts on natural resources, ecosystems and communities
• Design drought-tolerant, low water use landscaping
• Maximise porous and open paving materials
	• SEARs, EP&A Regulation, Conservation of Biological Diversity and Ecological Integrity
	• SEARs, manage stormwater through WSUD features
	• NSW Climate Change Policy Framework
	• Apartment Design Guide (residential only)
	• SOP Master Plan 2030 (2018 Review) & Environmental Guidelines 2008
	• Green Star Buildings:
	  ○ Credit 36 Biodiversity Enhancement (Credit Achievement - commercial only)
	  ○ Credit 39 Waterway Protection (Credit Achievement) + (Exceptional Performance - commercial only)
		• 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.
		• Incorporate diverse and appropriate planting, bio-filtration gardens, appropriately planted shading trees, areas for community gardens, and green roofs and walls
		• Select plants suited to the site conditions, including drought and wind tolerance, seasonal changes and sunlight access, soil conditions and plant longevity
		• Provide a sufficient area of landscaping (horizontal and/or vertical)

Requirement	Reference	Response
• Integrate on-site stormwater and infiltration systems, including bio-retention systems such as rain gardens and street tree pits • Integrate green infrastructure		• Prepare and put in place a biodiversity management plan • Reduce the average annual stormwater discharge by 40% (80% for commercial) across the site • Meet stormwater pollution reduction targets

Appendix B Sustainability ratings

RESIDENTIAL

greenstar

5 star Green Star Buildings

NATIONWIDE HOUSE ENERGY RATING SCHEME

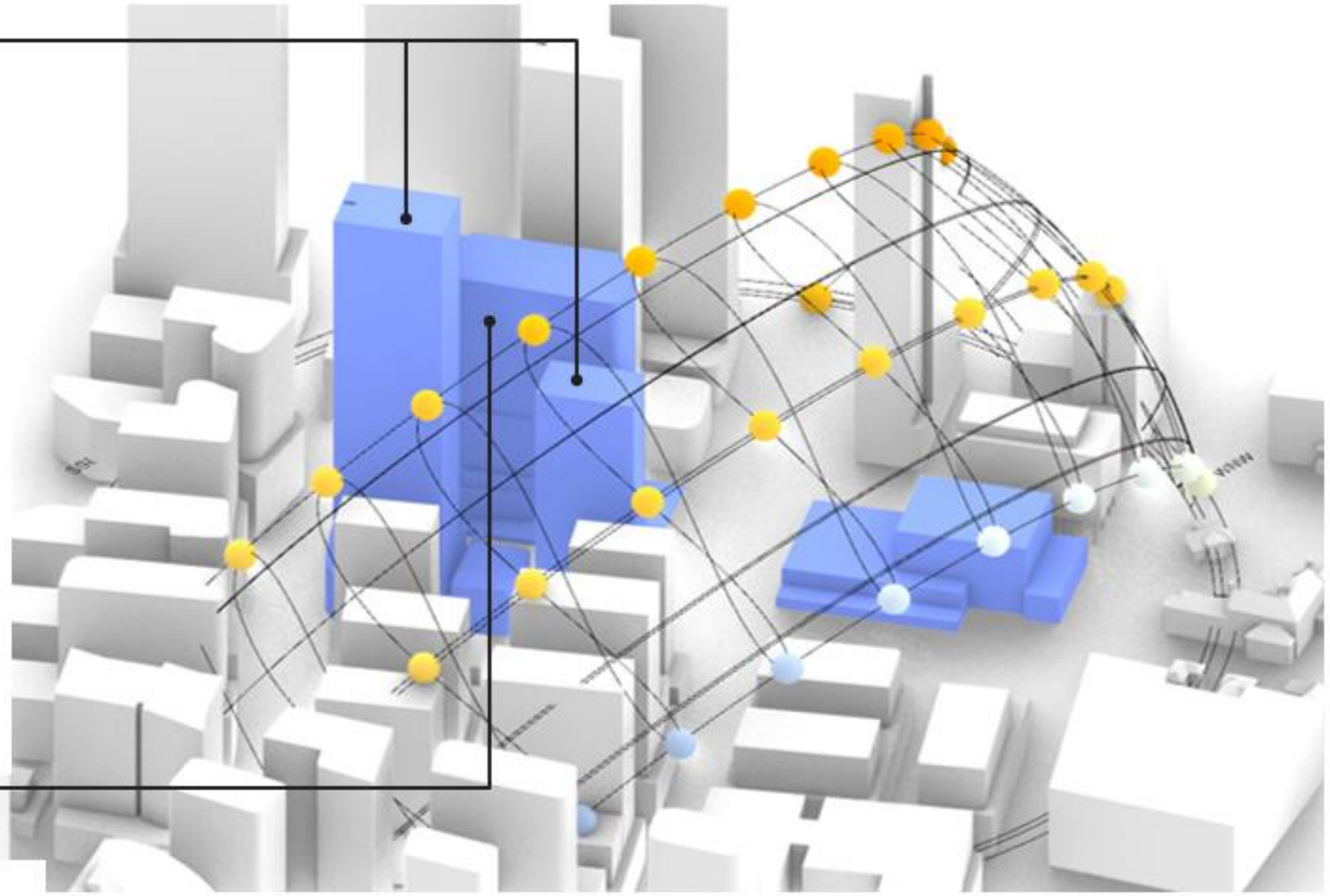
Average 7 star NatHERS
Minimum 6 star NatHERS

BASIX

BASIX Energy 40
BASIX Water 60

NABERS

4.5 star NABERS Energy
4.5 star NABERS Water



COMMERCIAL

greenstar

5 star Green Star Buildings

NABERS

5.5 star (+25%) NABERS Energy
5 star NABERS Water

Climate Positive

40%	reduction in upfront carbon emissions
20%	reduction in energy use
100%	renewable energy
100%	elimination / offset of other emissions
45%	reduction in potable water use - commercial
30%	reduction in potable water use – residential
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