

Central Barangaroo

MOD 9 – ESD Summary Report

Infrastructure NSW

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Executive Summary

This ESD Summary Report describes the sustainability initiatives and targets for the Central Barangaroo Precinct and has been updated to incorporate MOD 9 development proposals. It addresses the Director General's Requirements 17.ESD: "Identify how the development will incorporate ESD principles."

Central Barangaroo's sustainability vision is to be a globally recognised exemplar in sustainable urban development delivering positive outcomes for climate, water, nature, and people, both now and in the future. To deliver this vision, the design, construction, and operation of Central Barangaroo will be guided by the Central Barangaroo Sustainability Strategy which will provide an overarching framework for all sustainability aspects of the development.

The strategy comprises four pillars and is supported by third party certification using internationally recognised sustainability rating tools. The key commitments in the strategy are:

- **Climate Positive**

- Low energy buildings through a combination of passive design, energy efficiency, smart controls, and energy performance monitoring against energy intensity targets.
- Minimal use of fossil fuels on site.
- Shared energy infrastructure including central sea water heat exchangers and heat recovery systems.
- On-site renewable energy.
- Zero Waste emissions during operation (including waste minimisation strategies and diverting at least 80% of waste from landfill).
- Carbon Neutral in operation for the duration of the 99-year lease and reporting greenhouse gas (GHG) emissions annually. The precinct will be included in the Barangaroo Precinct's annual Climate Active Carbon Neutral certification.

- **Water Positive**

- Water efficiency, sea water cooling and native planting to reduce the demand for water.
- Recycled water infrastructure provided for non-potable uses.
- Rainwater collected and used for non-potable uses.
- Best practice Water Sensitive Urban Design principles.

- **Nature Positive**

- Creation of a new 2.6 Hectare public park (Central Waterfront Park) with native gardens and an abundance of nature.
- Green landscaping, green walls and green roofs incorporated into the built areas.
- Extensive planting and tree canopy cover to reduce heat island effect.
- Designing to dark sky principles to reduce night sky pollution.
- Preference for materials with reduced environmental impact and third-party environmental certification.

- **People Positive**

- Provision of 2,800 m² of GFA for community uses within Blocks 5, 6 and 7.
- Creation of new public open space including a new 2.6 Hectare public park (Central Waterfront Park) for community use.

- Application of Universal Design principles to make places and buildings more inclusive and easily accessible for everyone.
- Best practice in indoor environment quality including the application of the ten WELL Building Standard principles to workplaces.
- Strong connection to nature, and application of best practice biophilic design principles.
- Providing a variety of outdoor spaces to support active lifestyles, relaxation, and community gatherings.
- Prioritising walking and cycling throughout the site.
- Incorporating best practice safety by design principles.
- Development and implementation of a Community Resilience Plan.
- Implementation of a Placemaking and Activation Plan including curation of public events.
- Preparation and implementation of a Heritage Interpretation Plan.
- Active engagement with relevant stakeholders.
- Curation of a public art program

The project will achieve third party certification using the following rating tools which are widely recognised in Australia as benchmarking international best practice:

- Green Star
- NABERS Energy

The project may utilise other rating tools or third-party certifications where these are appropriate, practical, help to deliver better sustainability outcomes and provide commercial, marketability and/or educational benefit to the precinct's owners, tenants, occupiers, and visitors. The use of these will be determined as the design develops noting that existing tools evolve, and new tools / certifications may be developed.

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1.0 Introduction

1.1 Purpose of this report

This Ecologically Sustainable Development (ESD) Summary Report accompanies the application for a modification to the Barangaroo Concept Plan (MP06_0162 MOD 9) submitted to the Minister for Planning and Infrastructure pursuant to Section 75W of Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The report has been prepared by Cundall on behalf of Infrastructure NSW (INSW) to summarise the sustainability principles to be incorporated into the Central Barangaroo development.

1.2 Background to Barangaroo

Barangaroo is a globally recognised 22-hectare urban renewal project located on the western harbour foreshore of Sydney’s CBD. As Australia’s first carbon neutral urban precinct, Barangaroo showcases world-class sustainability, whilst delivering extensive new foreshore public spaces on Sydney Harbour, international design excellence, the implementation of leading technologies and public art and cultural programs.

1.3 Acknowledgment of Country

We would like to acknowledge the Gadigal people who are the Traditional Custodians of this land. We would also like to pay respect to the Elders both past and present of the Eora Nation and extend that respect to all Aboriginal people.

1.4 Introduction to Central Barangaroo

Central Barangaroo is located between the Barangaroo Reserve, Barangaroo South and the nearby historic suburbs of Miller Point and Walsh Bay and adjacent to Barangaroo Station. Refer to Figure 1-1 for Barangaroo Precinct map.



Figure 1-1: Barangaroo Precinct Map

As Barangaroo's keystone project, Central Barangaroo will complete the sweep of city and foreshore experiences along the western waterfront of Sydney's CBD to become the vibrant civic and community heart of Barangaroo.

Central Barangaroo is proposed as a dynamic mixed-use foreshore precinct that draws together and integrates high quality foreshore public spaces with city living, next generation workspace, community and cultural uses, a bustling shopping and dining precinct, all easily connected to Sydney's new metro network.

Barangaroo Station will significantly improve access for visitors, residents, workers, and shoppers alike and transform how people arrive in Sydney CBD and on the harbour foreshore. Central Barangaroo will connect seamlessly to the new metro station and create the new place to arrive in and experience the city.

Central Barangaroo comprises the remaining development blocks 5, 6 and 7 of the approved Barangaroo Concept Plan and the Central Waterfront Park connecting to the harbour foreshore. Refer to Figure 1-2 for proposed block plan.

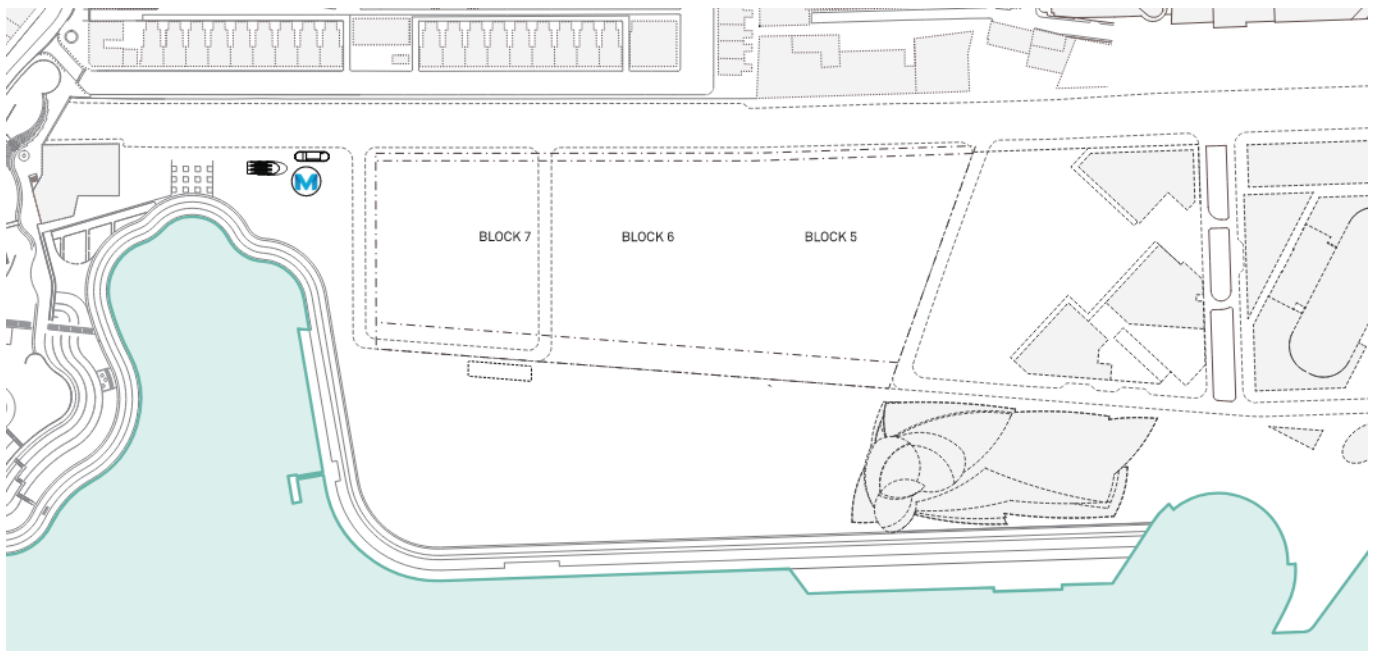


Figure 1-2: Central Barangaroo Proposed Site Block

The Central Barangaroo Urban Design Report builds upon the key objectives and core principles of the SOM Master Plan Framework for Central Barangaroo to ensure the proposed built form creates an appropriately scaled visual transition between the natural setting and scale of Barangaroo Reserve and Nawi Cove, to the bustling, high rise central business district scale of Barangaroo South.

The recently completed Wulugul Walk now extends along the entire Barangaroo waterfront as a vital section of the 14km Woolloomooloo to Glebe foreshore walk. Central Barangaroo's Harbour Park will create a major western harbour public open space that seamlessly integrates with Wulugul Walk, to diversify and enhance the city's waterfront experience. To the south, Central Barangaroo will shape and activate Hickson Park as a city park and to the north, help create Nawi Cove as the new place to arrive in the city.

1.5 Proposed Modification to Barangaroo Concept Plan for Central Barangaroo (MOD 9)

To allow for development within the Central Barangaroo precinct and below Barangaroo Reserve, Modification 9 to the Barangaroo Concept Plan (MP06_0162 MOD 9) proposes:

- 1) An increase in total permissible GFA from 602,354 sqm to 708,041 sqm, with the following within Central Barangaroo and Barangaroo Reserve:
 - a) up to 116,189 sqm of above ground GFA within Blocks 5, 6 and 7.
 - b) up to 28,166 sqm of below ground GFA within Blocks 5, 6 and 7.
 - c) a minimum of 2,800 sqm of Community uses GFA within Blocks 5, 6 and 7; and
 - d) a minimum of 6,000 sqm and up to 18,000 sqm of Community uses GFA within the RE1 Zone of Barangaroo Reserve, to allow for future community / cultural facilities located in the Cutaway.
- 2) Modifications to Barangaroo’s movement network to redirect and reduce the impact of vehicular traffic and significantly improve pedestrian movement, safety, and amenity, including the removal of vehicular traffic from Block 5 and 6 and the extension of Central Barangaroo’s Harbour Park.
- 3) Modifications to the Central Barangaroo building envelope that allow for greater variation in building heights across Blocks 5, 6 and 7 to enable building form, massing and modulation that is responsive to context and adjusts the development boundary for Block 5.
- 4) Introduction of Design Guidelines for Central Barangaroo.
- 5) Consequential amendments to the State Significant Precincts SEPP.
- 6) Revisions to the Barangaroo Concept Plan Statement of Commitments.

Figure 1-3 shows the proposed building envelope heights.

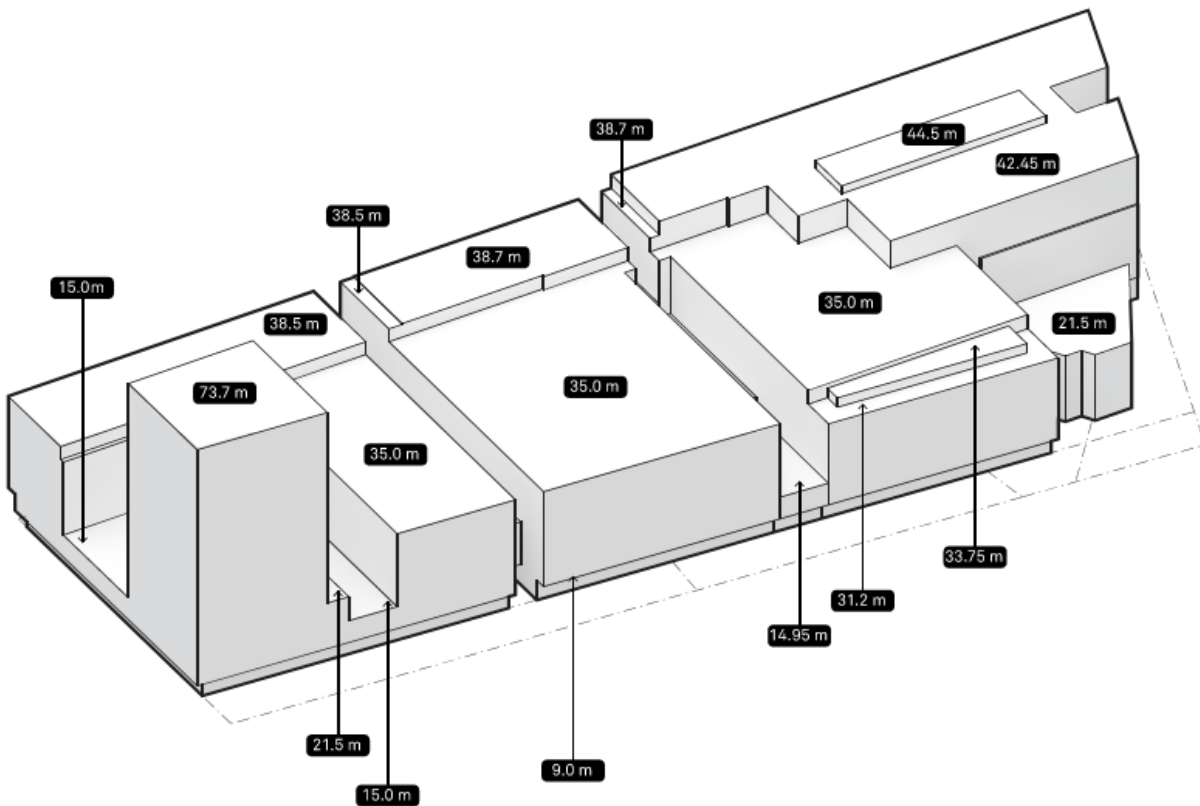


Figure 1-3: Building Envelope Axonometric showing heights

2.0 Ecologically Sustainable Development Principles

2.1 Definition

Clause 7(4) of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*, defines the principles of Ecologically Sustainable Development (ESD) as follows:

- a) the **precautionary principle**, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:
 - (i) careful evaluation to avoid, wherever practicable, serious, or irreversible damage to the environment, and
 - (ii) an assessment of the risk-weighted consequences of various options,
- b) **inter-generational equity**, namely, that the present generation should ensure that the health, diversity, and productivity of the environment are maintained or enhanced for the benefit of future generations,
- c) **conservation of biological diversity and ecological integrity**, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,
- d) **improved valuation, pricing, and incentive mechanisms**, namely, that environmental factors should be included in the valuation of assets and services, such as:
 - (i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance, or abatement,
 - (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
 - (iii) environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

2.2 Response

This project responds to the above ESD principles as follows:

- **Precautionary Principle** – The project will present no threat of serious or irreversible environmental damage. The project will deliver ecological restoration and habitat creation to improve the site, implement climate change adaptation principles, and apply industry best practice ESD initiatives. An appropriate due diligence process has been and will continue to be conducted alongside the development process to ensure the precautionary principle is satisfied. Due diligence includes conducting required studies to address all SEARs environmental requirements and all statutory provisions in all relevant planning instruments, including the Biodiversity Conservation Act 2016, relevant SEPPs and LEPs.
- **Inter-Generational Equity** – The buildings will provide healthy internal and external environments for residents, workers, and visitors. The landscaping principles of ecological restoration and habitat creation will deliver benefit to current and future generations. The low energy and water designs will minimise energy bills for owners and occupants. Over 2.6 hectares of new public open space is being created including a new public park.
- **Conservation of Biological Diversity and Ecological Integrity** – The site is of low ecological value and was previously used for industrial purposes. The site has been decontaminated. Extensive landscaping is proposed including the creation of a new 2.6 Hectare Central Waterfront Park. The landscape design will substantially enhance the biological diversity and ecological integrity of Barangaroo.
- **Improved Valuation, Pricing, and Incentive Mechanisms** – The design and operation of the precinct will reduce energy and water consumption and greenhouse gas emissions. Life Cycle Costing will be used throughout the design process to justify capital investment and reduce ongoing impacts.

3.0 Sustainability Vision and Strategy

3.1 Sustainability Vision

The Sustainability Vision for Central Barangaroo is to be “a globally recognised exemplar in sustainable urban development delivering positive outcomes for climate, water, nature and people, both now and in the future.”

The project will:

- Complete and enhance the NSW Government’s vision for Climate Positive outcomes for the whole Barangaroo Precinct.
- Deliver measurably positive outcomes for Carbon, Water, Nature and People during design, construction, and operation.
- Provide industry leadership through practical and innovative solutions that, through their replicability, have the potential to deliver market transformation in Australia and globally.
- Deliver value to all stakeholders through the application of a whole-of-life approach.
- Provide resilience to shocks and stresses in the face of an evolving and changing future.

3.2 Sustainability Strategy Structure

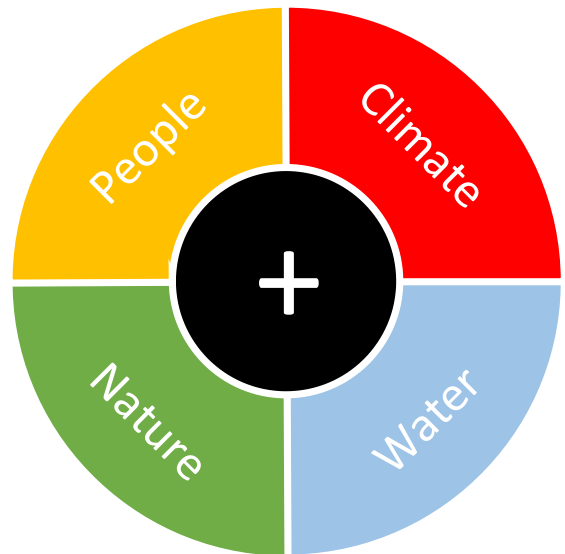
To deliver the sustainability vision, the design, construction, and operation of Central Barangaroo will be guided by the Central Barangaroo Sustainability Strategy which will provide an overarching framework for all sustainability aspects of the development.

The sustainability strategy comprises four pillars:

- Climate Positive
- Water Positive
- Nature Positive
- People Positive

These pillars align with INSW’s core sustainability commitments for the Barangaroo Precinct to be carbon neutral and water positive, to create zero waste emissions, and to contribute to community well-being. The pillars expand on these commitments with further commitments related to nature and people.

The strategy will include targets and initiatives for the four pillars, supported by third party certification using internationally recognised sustainability rating tools.



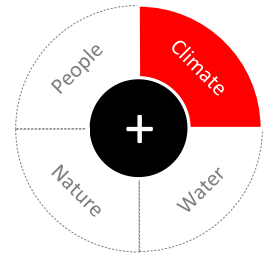
3.3 Sustainability Pillars

The key initiatives for each of the four pillars of the sustainability strategy are summarised below.

3.3.1 Climate Positive

This pillar addresses the Barangaroo Precinct's core sustainability commitments of carbon neutral and zero waste emissions. The key initiatives are:

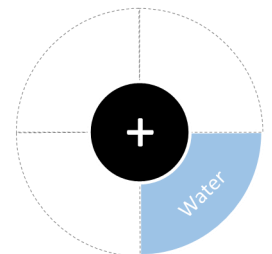
- Low energy buildings through a combination of passive design, energy efficiency, smart controls, and energy performance monitoring against energy intensity targets.
- Minimise use of fossil fuels on site including no natural gas for domestic hot water and space heating and domestic cooking.
- Shared energy infrastructure to deliver resilient high-performance energy efficiency including central sea water heat exchangers and heat recovery systems.
- On-site renewable energy to generate electricity for the Central Waterfront Park, Barangaroo Reserve and on-site water treatment, and reticulation systems.
- Carbon Neutral in operation for the duration of the 99-year lease and reporting greenhouse gas (GHG) emissions annually. The precinct will be included in the Barangaroo precinct's annual Climate Active Carbon Neutral certification.
- A minimum of 90% of waste generated during construction will be diverted from landfill.
- Zero Waste Emissions - waste generated during the operation of the precinct will be reduced through a combination of waste minimisation and avoidance and at least 70% of the waste remaining will be diverted from landfill. The GHG emissions associated with the waste treatment and disposal will be included in the carbon neutral certification.
- Low Global Warming Potential (GWP) refrigerants will be selected for all chillers and heat pump systems.
- Engagement with the supply chain and designing with and specifying materials and products with a low carbon footprint and seeking to reduce embodied carbon during construction.



3.3.2 Water Positive

This pillar addresses the Barangaroo Precinct's core sustainability commitment for Water Positive and reducing water pollution. The key initiatives are:

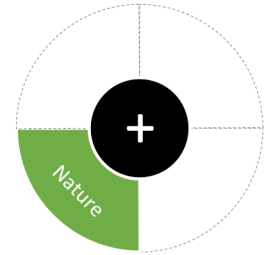
- Water efficiency, sea water cooling and native planting to reduce the demand for water.
- Recycled water infrastructure provided for non-potable uses to reduce the demand for potable mains water.
- Rainwater collected and used for non-potable uses.
- Recycled water to be generated, imported and/or exported to support the Barangaroo Precinct's site wide strategy for Water Positive.
- Best practice Water Sensitive Urban Design principles will be applied, including raingardens and biodiverse swales where appropriate, to treat stormwater run-off.



3.3.3 Nature Positive

This pillar focuses on the importance of minimising impacts on natural resources, increasing biodiversity, and reducing heat island effect through the incorporation of trees and green spaces. Combined with the Water Positive pillar it delivers best practice in Blue-Green Infrastructure design. The key initiatives are:

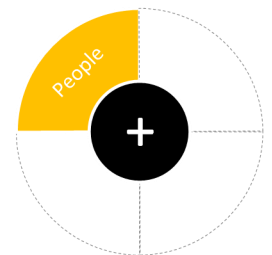
- Create a new 2.6 Hectare public park (Central Waterfront Park) on reclaimed industrial land with native gardens and an abundance of nature.
- Green landscaping, green walls and green roofs incorporated into the built areas.
- Extensive planting and tree canopy cover to reduce heat island effect.
- Native raingardens and vegetated swales to treat a proportion of the stormwater prior to discharge.
- Designing to dark sky principles to reduce night sky pollution.
- Preference for materials with reduced environmental impacts and third-party environmental certification.



3.3.4 People Positive

This pillar addresses the Barangaroo Precinct's core sustainability commitment for Community Wellbeing. It also covers Health and Wellbeing, Social Sustainability and Cultural Heritage. There are three key components to the People Positive pillar:

- **Health and Wellbeing**
 - Best practice in indoor environment quality including the application of the ten WELL Building Standard principles to workplaces.
 - Strong connection to nature and application of best practice biophilic design principles.
 - Provide a variety of outdoor spaces to support active lifestyles, relaxation, and community gatherings.
 - Prioritise walking and cycling throughout the site.
 - Implement best practice safe by design principles.
 - Implement mental health programs during construction.
- **Community and Culture**
 - Provide 2,800 m² of GFA for community uses within Blocks 5, 6 and 7.
 - Create a new 2.6 Hectare public park (Central Waterfront Park)
 - Apply Universal Design principles to make places and buildings more inclusive and easily accessible for everyone.
 - Implement a Placemaking and Activation Plan including curation of public events.
 - Prepare and implement a Heritage Interpretation Plan to acknowledge and interpret the significant history of the site.
 - Active engagement with relevant stakeholders.
 - Curate a public art program
- **Social Procurement**
 - Donate to Homes for Homes charity or similar dedicated to affordable housing.
 - Set targets for employment of disadvantaged groups during construction.
 - Set targets for Aboriginal procurement during construction.
 - Support of local SMEs and disadvantaged local residents including indigenous enterprise and employment.
 - Preference materials with transparent social impacts in the supply chain.



3.4 Strategy Alignment

The sustainability strategy will support achieving INSW's core sustainability commitments for the Barangaroo Precinct (Carbon Neutral, Water Positive, Zero Waste emissions and Community Wellbeing) and align with the following:

- UN Sustainable Development Goals.
- The Green Building Council of Australia's seven megatrends in sustainability
- City of Sydney's Sustainable Sydney 2030 strategy
- Planning Priority E19 of the Eastern City District Plan
- NSW Government's Net Zero Plan Stage 1: 2020–2030
- NSW Water Strategy
- NSW Waste and Sustainable Materials Strategy 2041 Stage 1: 2021-2027
- NSW Plastics Action Plan 2021
- Other relevant plans and policies

3.4.1 UN Sustainable Development Goals

The four pillars approximately align with the UN Sustainable Development Goals as shown in Figure 3-1.



Figure 3-1: Alignment of strategy pillars with UN Sustainable Development Goals

3.4.2 GBCA’s global megatrends in sustainability

In 2019 the Green Building Council of Australia (GBCA) identified seven global megatrends in sustainability and used these to guide the development of the new versions of Green Star released in October 2020. Figure 3-2 shows how the four pillars align with the megatrends.

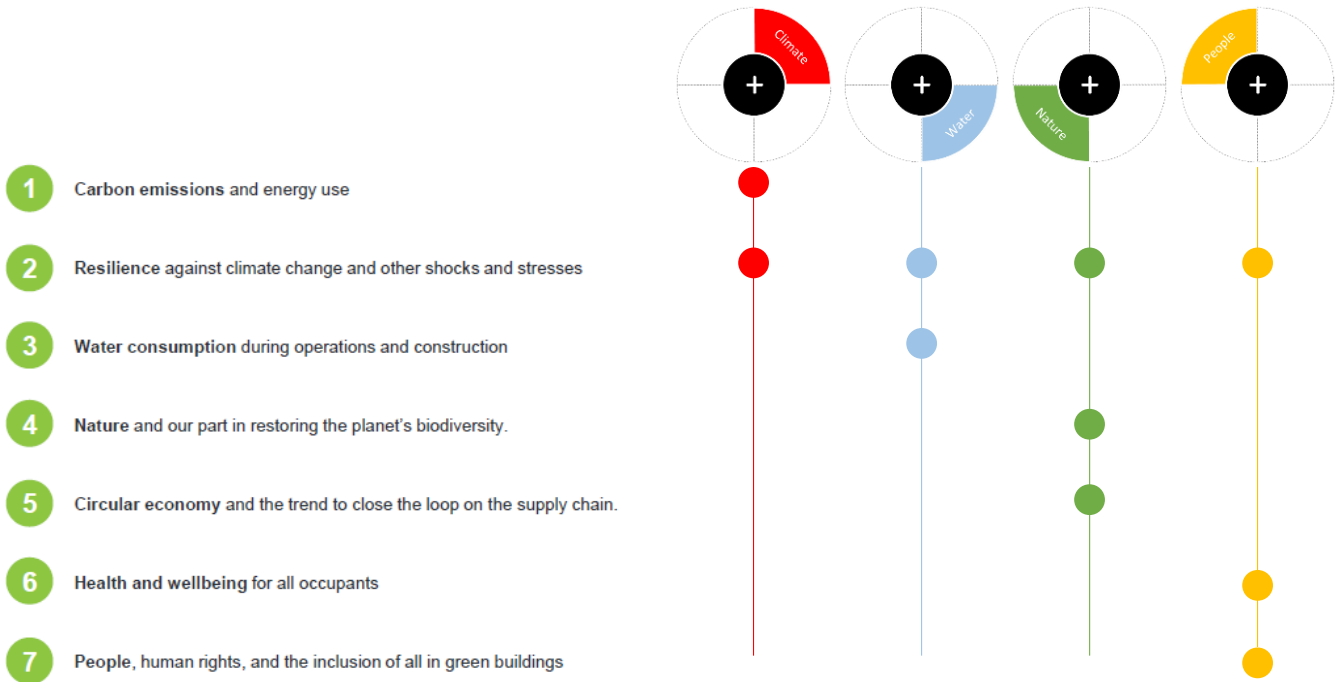


Figure 3-2: Alignment of strategy pillars with GBCA’s sustainability megatrends

3.4.3 City of Sydney’s Sustainable Sydney 2030

Central Barangaroo will be consistent with the strategic directions set out in the City of Sydney’s *Sustainable Sydney 2030 Community Strategic Plan 2017-2021*, as shown in Table 3-1.

Table 3-1: Alignment of Central Barangaroo with City of Sydney’s Sustainable Sydney 2030 Strategic Directions

Sustainable Sydney 2030 Strategic Direction	Response
A globally competitive and innovative city	The final stage of the Barangaroo redevelopment as a whole will be completed, creating a high-quality mixed-use precinct, which is set to become a global destination for people and business. The creation of extensive public space will be accessible by the whole community and be used for free public events.
A leading environmental performer	The commitment to a Climate Positive development ensures the project will be exemplar in its environmental performance, including carbon neutrality, water positivity, zero waste emissions, extensive landscaping (including native plants and tree canopy cover) and Water Sensitive Urban Design. A Climate Adaptation Plan will be prepared to improve resilience and reducing heat island effect will be a key initiative.
Integrated transport for a connected city	The new Barangaroo Station is integrated into the precinct and will improve access as well as assist with activation and pedestrian connectedness to this part of the city. It will link up and alleviate congestion with other key public transport hubs such as the Barangaroo Ferry Wharf and Wynyard Station.
A city for walking and cycling	Provision of safe and convenient routes on site for cyclists and pedestrians separated from traffic wherever possible. End of trip facilities will be provided on site for workers.

Sustainable Sydney 2030 Strategic Direction	Response
	The site forms a green hub for the Barangaroo precinct with pedestrian paths connecting through to Circular Quay and the Botanic Gardens.
A lively and engaging city centre	The precinct creates an abundance of safe and attractive public spaces for people to meet, rest and walk. There is a diversity of built form, uses and experiences (community, retail, commercial and residential) as well as extensive public realm with public art, and spaces for public events.
Resilient and inclusive local communities	The precinct will have equitable access to community facilities, places, and parks to support wellbeing in daily life. The design will be welcoming and connected.
A cultural and creative city	The public park and public domain will express creativity and support work by local artists.
Sustainable development, renewal, and design	Central Barangaroo will be an international exemplar in sustainable development. In addition to zero carbon, water positive and zero waste emissions it will promote sustainable materials and green travel, provide an abundance of nature, and deliver health and wellbeing and social outcomes for residents, workers, and visitors.
Implementation through effective governance and partnerships	The sustainability strategy will define the governance of sustainability throughout the design, construction, and operation of the precinct. Collaboration will occur with relevant partners such as social enterprises, local and state government to deliver sustainable outcomes.

3.4.4 Eastern City District Plan

Planning Priority E19 of the *Eastern City District Plan* prepared by the Greater Sydney Commission has three objectives:

Table 3-2: Alignment of Central Barangaroo with Eastern City District Plan

Objective	Response
Objective 33: A low-carbon city contributes to net-zero emissions by 2050 and mitigates climate change.	Central Barangaroo will be carbon neutral – refer to the Climate Positive pillar.
Objective 34: Energy and water flows are captured, used, and re-used.	Central Barangaroo will be energy efficient and have on-site renewables – refer to the Climate Positive pillar. Central Barangaroo will be water efficient, capture and reuse rain water, and have recycled water infrastructure – refer to the Water Positive pillar.
Objective 35: More waste is re-used and recycled to support the development of a circular economy	Central Barangaroo has construction and operational waste targets to divert waste from landfill and will have zero waste emissions through purchase of carbon offsets – refer to the Climate Active pillar.

3.4.5 NSW Government's Net Zero Plan Stage 1: 2020–2030

The NSW Government has established a target for net zero emissions by 2050, to be achieved while creating new jobs, cutting household costs, and attracting investment. The Department of Planning, Industry and Environment's *Net Zero Plan Stage 1: 2020-2030* sets out four net zero priorities describing how the NSW Government will deliver on these objectives over the next decade.

Central Barangaroo responds to the priorities as follows:

Table 3-3: Alignment of Central Barangaroo with NSW Government Net Zero Plan Stage 1: 2020-2030

Priority	Response
1. Drive uptake of proven emissions reduction technologies	Refer to Section 3.3.1 'Climate Positive' and Section 5.0 'Sustainability Initiatives' for details on initiatives to: <ul style="list-style-type: none"> ▪ reduce energy consumption ▪ minimise fossil fuels ▪ maximise renewable electricity generation ▪ support electric vehicle charging ▪ achieve zero waste emissions.
2. Empower consumers and businesses to make sustainable choices	Central Barangaroo will be a Carbon Neutral precinct. All residents and retail/office tenants will be connected to a precinct embedded energy network and encouraged to procure renewable electricity. Refer to Section 4.0 'Sustainability Certification' for details of NABERS and other building ratings which will be adopted to support this objective. The developer will engage with the material supply chain to reduce embodied carbon in construction materials – refer to Section 5.4 'Materials and Supply Chain'.
3. Invest in the next wave of emissions reduction innovation	Not directly applicable to Central Barangaroo. Opportunities for innovation within the precinct systems will be investigated as the design progresses.
4. Ensure the NSW Government leads by example	On-site solar photovoltaic (PV) electricity system to match or exceed the net annual energy consumption of Central Waterfront Park and Barangaroo Reserve.

3.4.6 NSW Water Strategy

The NSW Government has developed a 20-year, state-wide *NSW Water Strategy* to improve resilience of the state's water resources over the coming decades. The NSW Water Strategy addresses key challenges and opportunities for water management and service delivery across the state and set the strategic direction for the NSW water sector over the long-term. The *NSW Water Strategy* was published in August 2021 by the Department of Planning, Industry and Environment.

A key pillar of the Central Barangaroo Sustainability Strategy is 'Water Positive' (refer to Section 3.3.2) and this aligns with the *NSW Water Strategy* as follows:

Table 3-4: Alignment of Central Barangaroo with NSW Water Strategy

Strategy	Response
Drive changes in water use and behaviour to make NSW more water efficient and ensure water is supporting the highest value uses	Central Barangaroo will minimise potable water consumption through a combination of reducing demand (e.g., sea water cooling instead of cooling towers, native planting to reduce irrigation), water efficiency (fixtures, fittings, and irrigation systems) and using recycled water for all non-potable water uses.
Improve capacity across NSW to cope with climate variability and change	Rain water and stormwater will be captured onsite and stored for reuse. The precinct will have recycled water infrastructure and will be connected to existing and future recycled water networks off-site to increase water resilience.

Strategy	Response
Invest in appropriate and affordable infrastructure	All non-potable water uses in the precinct will be connected to recycled water infrastructure and supplied through a combination of on-site and off-site water treatment systems to support recycled water generation at scale.
2017 Sydney Metropolitan Water Plan (to be replaced by the Greater Sydney Water Strategy in 2022)	<p><i>Outcome 1: Water supply is secure and affordable</i></p> <p>Refer above for water conservation (demand reduction and water efficiency) and alternative water supplies (recycled water infrastructure including rainwater collection and reuse).</p> <p><i>Outcome 2: Water supply is resilient to stresses and shocks</i></p> <p>Water recycling provides a level of resilience to stresses and shocks. To increase resilience the recycled water system will have connection points at the site boundary for connection to the future City of Sydney Recycled Water network.</p> <p><i>Outcome 3: Our urban communities are more liveable and resilient</i></p> <p>Central Barangaroo will have an abundance of green spaces, including green roofs, public spaces, and the new public Central Waterfront Park (refer to Nature Pillar) to reduce the heat island effect and provide connection to nature. Collaborative arrangements for integrated water solutions will be investigated to optimise recycled water generation at a precinct level.</p> <p><i>Outcome 4: Rivers downstream from dams are healthy</i></p> <p>Not applicable to Central Barangaroo.</p>

3.4.7 NSW Waste and Sustainable Materials Strategy 2041 Stage 1: 2021-2027

The NSW Government Department of Planning, Industry and Environment's *NSW Waste and Sustainable Materials Strategy 2041 Stage 1: 2021-2027*, published in June 2021, establishes waste targets for NSW. Central Barangaroo will contribute to achieving these targets as follows:

Table 3-5: Alignment of Central Barangaroo with NSW Waste and Sustainable Materials Strategy 2041 Stage 1: 2021-2027

Target	Response
Eliminate problematic and single use plastics by 2025	The precinct will open after 2025. The Waste Management Plan will identify strategies to reduce the use of plastics and generation of plastic waste to go beyond the NSW Government targets.
Plastic litter reduction target of 30% by 2025	Central Barangaroo will include extensive waste bins and litter traps in stormwater systems to minimise any plastic waste entering the harbour.
Reduce total waste generated by 10% per person by 2030	The Waste Management Plan will include a target to reduce total waste generated within the precinct by greater than 10% compared to Business-As-Usual.
80% average recovery rate from all waste streams by 2030	The operational waste target is 80% diversion from landfill from commencement of operation, anticipated to be from 2026 onwards.
Introduce a new overall litter reduction target of 60% by 2030	See above.
Triple the plastics recycling rate by 2030	Plastic waste within the precinct will be collected and the percentage of this waste recycled off-site will be reported annually.
Halve the amount of organic waste sent to landfill by 2030	The operational waste target of 80% diversion will require a significant proportion of organic waste to be diverted from landfill. Strategies to achieve this will be included in the Operational Waste Management Plan.
Net zero emissions from organics to landfill by 2030	Carbon offsets for all operational waste emissions will be procured as part of the Climate Active Carbon Neutral Precinct annual certification.

3.4.8 NSW Plastics Action Plan 2021

The NSW Government Department of Planning, Industry and Environment’s *NSW Plastics Action Plan*, published in June 2021 sets out six actions to reduce plastic waste generation, make the most of plastic resources, reduce plastic leakage and improve understanding of the future of plastics.

During operation Central Barangaroo will seek to eliminate all single-use plastics within the precinct as soon as possible, working closely with all retail tenants to implement strategies ahead of NSW Government legislation. This will be documented in the Operational Waste Management Plan.

3.4.9 Other relevant plans/policies

Table 3-6: Other relevant plans / policies

Relevant plan / policy	Response
Managing Urban Stormwater: Treatment Techniques (OEH)	Please refer to relevant reports for details on how each plan / policy is being addressed.
Managing Urban Stormwater: Source Control (OEH)	
Using the ANZECC Guideline and Water Quality Objectives in NSW (OEH)	
Waste Avoidance and Resource Recovery Strategy (Resource NSW)	
Barangaroo Integrated Transport Plan (2012)	
NSW Long Term Transport Master Plan (2012)	

4.0 Sustainability Certification

Established, trusted, and internationally recognised sustainability rating tools will be used to support the sustainability strategy, establish international best practice benchmarks, and verify the performance through third party certification. Table 4-1 sets out the rating tool commitments for design, construction, and operation.

Table 4-1: Sustainable Rating Tool Commitments for Central Barangaroo

	Target	Certification
Precinct Design & Construction	<ul style="list-style-type: none"> 6 Star - Green Star Communities v1.1 	Formal certification will be obtained within 24 months of Practical Completion of the precinct.
Building Design & Construction *	<p>Commercial Offices</p> <ul style="list-style-type: none"> 6 Star - Green Star <p>Shopping Centre</p> <ul style="list-style-type: none"> 6 Star - Green Star ** <p>Residential</p> <ul style="list-style-type: none"> 6 Star - Green Star 	<p>Formal Green Star certification will be obtained within 18 months of Practical Completion of each building.</p> <p>NatHERS and BASIX will be delivered in accordance with Construction Certificate and Certificate of Occupancy requirements.</p>
Building Operation *	<p>Commercial Offices</p> <ul style="list-style-type: none"> 5 Star NABERS Energy for Office Base Building excluding green power (and 6 Star with green power) 	The NABERS ratings will be undertaken within 18 months of the issue of a Certificate of Occupancy provided 75% occupancy has been achieved or within 2 years otherwise, as per the NABERS Energy and Water for Offices: The Rules (Version 3.2 – September 2018).

*- individual buildings less than 5,000m² will not be formally certified but will be designed to the same requirements and a report prepared confirming the same level of sustainability ambition.

** the retail base building component may be awarded a 5 Star rating if natural gas is installed due to retail tenant requirements. Natural gas for cooking is not permitted in 6 star Green Star Building ratings.

Further details on the rating tools are provided in .

The project may utilise further rating tools or third-party certifications where these are appropriate, practical, help to deliver better sustainability outcomes and provide commercial, marketability and/or educational benefit to Central Barangaroo's owners, tenants, occupiers and/or visitors. The use of these will be determined as the design develops noting that existing tools evolve, and new tools / certifications may be developed over the duration of the project's staged design and construction.

5.0 Sustainability Initiatives

A broad range of initiatives are proposed to deliver the Sustainability Vision and the four pillars of the sustainability strategy described in Section 3.0 to create positive environmental and social benefits throughout design, delivery, and operation. The initiatives will be consistent with or exceed best practice in Australia and will contribute towards achieving the sustainability certification targets described in Section 4.0.

This section outlines the approaches and initiatives that are currently proposed. The initiatives will be further reviewed during design development and will be modified or enhanced as required to achieve the objectives and targets stated.

5.1 Carbon Neutral

Objective: Reduce the carbon footprint of buildings and precincts to zero.

Central Barangaroo will form part of the certification of the whole Barangaroo precinct (Barangaroo South, Central Barangaroo and Barangaroo Reserve) under the Climate Active Carbon Neutral for Precincts standard. Figure 5-1 outlines the process that will be followed.

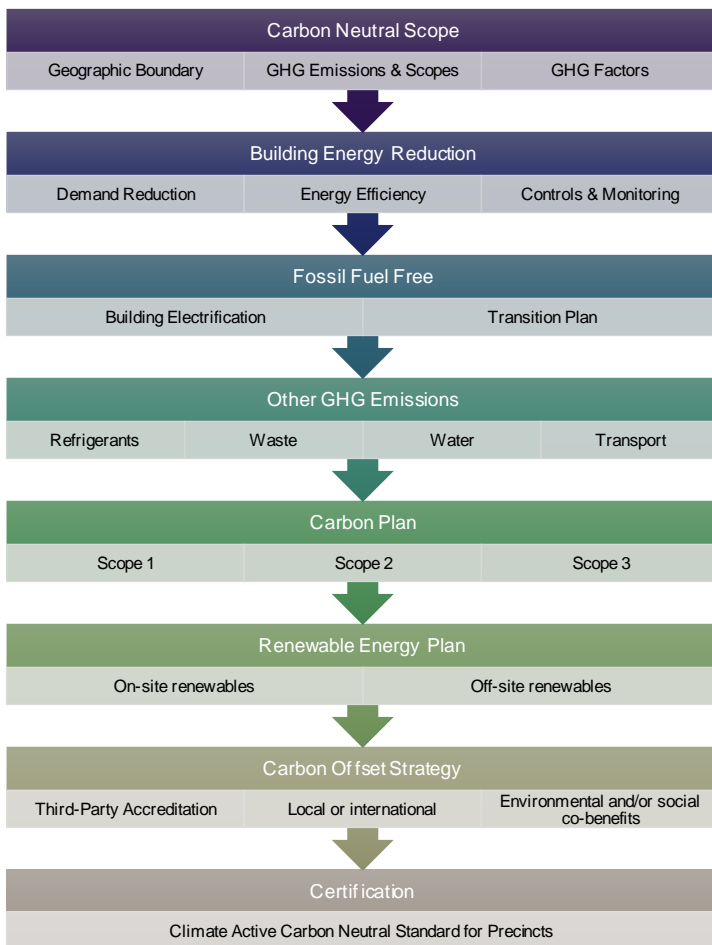


Figure 5-1: Carbon Neutral Strategy

The Greenhouse Gas (GHG) scopes will be confirmed during the materiality assessment undertaken as part of the Climate Active certification process. These are expected to align with the scopes included in the Climate Active certification of the Barangaroo Precinct undertaken in 2019 by INSW.

5.2 Zero Carbon Energy



Objective: Make buildings and infrastructure energy efficient, minimise use of fossil fuels, maximise on-site renewable energy generation and procure 100% renewable electricity supply.

The following initiatives will be developed further during the design process to contribute towards achieving zero carbon energy:

- Significantly reduce or eliminate natural gas for heating, hot water, and cooking (with some potential exceptions for cooking in food & beverage tenancies in the retail centre).
- Well-designed building envelopes prioritising passive design principles (including layout, insulation, air tightness and solar control) to reduce energy demand for heating, cooling, and lighting.
- Energy efficient building systems, equipment and appliances including heating, cooling, ventilation, pumping, refrigeration, lighting, domestic hot water, vertical transport, data and telecommunications, and various other energy consuming services.
- Energy efficient central precinct infrastructure including heating and cooling plant connected to a harbour heat rejection system serving all buildings.
- Smart metering and monitoring for sharing data to encourage energy saving behaviours.
- On-site solar photovoltaic (PV) electricity system to match or exceed the net annual energy consumption of the Central Waterfront Park, Barangaroo Reserve and on-site water treatment, and reticulation systems.
- Off-site renewable energy procurement through a combination of Power Purchase Agreements, accredited Green power, tenant lease requirements, retiring Renewable Energy Certificates (RECs) and Climate Active eligible carbon offsets.

The approach to zero carbon energy is summarised in Figure 5.3 below:

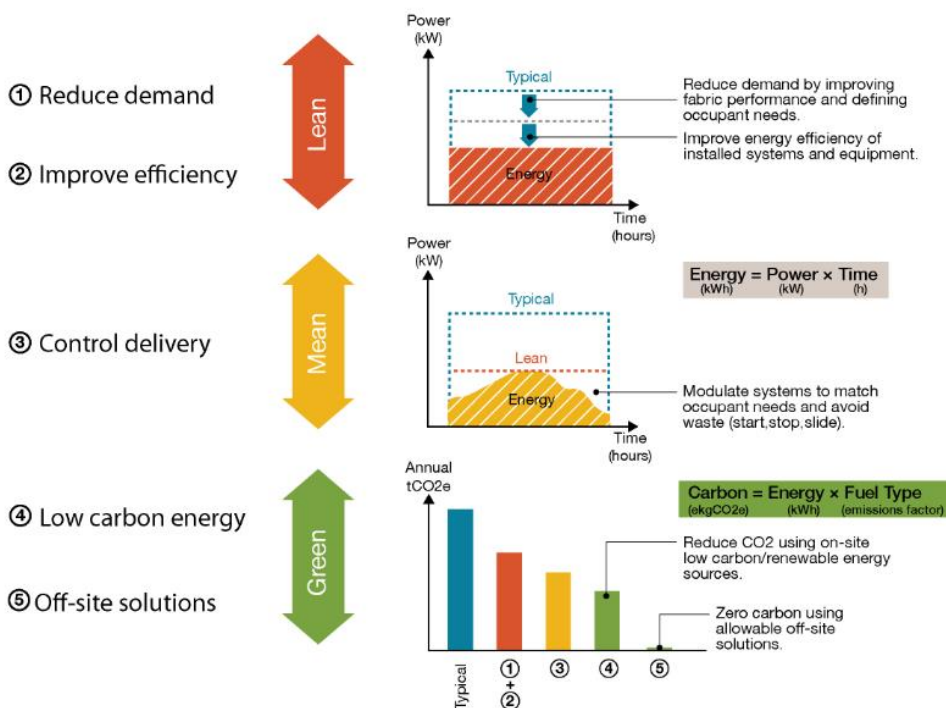


Figure 5-2: Zero Carbon Energy Strategy summary

5.3 Water



Objective: Use water efficiently and reduce demand on mains potable water supplies.

Central Barangaroo will be an exemplar in the sustainable use and treatment of water. The following initiatives will be developed further during the design process to contribute towards delivering the Water Positive strategy:

- Best practice in demand reduction, water efficiency, metering, monitoring, and controls to reduce the water footprint of the buildings and the precinct.
- Harbour heat rejection avoiding water consuming heat rejection equipment such as cooling towers.
- Drought tolerant landscaping with water efficient irrigation systems.
- Rainwater from non-trafficable roofs to be collected separately and used for irrigation and other non-potable uses.
- Recycled water reticulation infrastructure for all non-potable water uses connected to on-site and off-site recycled water supply infrastructure.

5.4 Materials and Supply Chain

Objective: Use materials from sustainable sources, apply life cycle principles, and prioritise products with transparent, ethical supply chains.



To reduce the environmental and social impact of materials used in construction the following principles will be applied:

- Measure and reduce embodied carbon in construction and seek to reduce by 20% compared to business-as-usual.
- Select materials informed by life cycle assessment of environmental impacts.
- Maximise use of reused and recycled materials.
- Preference materials with Environmental Product Declarations (EPD) or other third-party certification of environmental and/or social credentials.
- Use FSC or PEFC certified timber products.
- Best practice PVC compliance for formwork, pipes, flooring, blinds & cables.
- Partnership with the Australian Sustainable Supply Chain School to raise awareness of designers, contractors, and suppliers of environmental and social issues in the material and product supply chains.

5.5 Waste

Objective: Design to reduce consumption, maintain, re-use and recycle to work towards minimising waste to landfill. Offset all associated Greenhouse Gas emissions.



Central Barangaroo will deliver net zero waste emissions by achieving or exceeding the following waste reduction targets, and then offsetting the Scope 3 operational emissions under the Carbon Neutral Precinct strategy:

- A minimum of 90% of waste generated during construction will be diverted from landfill.
- Waste generated during the operation of the precinct will be reduced through a combination of waste minimisation and avoidance and at least 80% of the waste remaining will be diverted from landfill.

A Waste Management Plan (WMP) will be prepared to establish detailed targets, processes and initiatives for all construction and operational activities in accordance with the waste hierarchy:

- Avoid – abstain from unnecessary resource consumption.
- Reduce – lowering the amount of waste produced.
- Reuse – materials used repeatedly. Design for disassembly.

- Recycle – materials salvaged to make new products.
- Recovery – harvesting energy from waste (but not incineration).
- Landfill – limited disposal of waste to landfill.

The WMP will inform the design of the waste facilities within the precinct and will be implemented and periodically updated by the precinct facility management team and waste manager. Precinct waste facilities will accommodate both the Central Barangaroo development and public domain requirements, excluding event days.

5.6 Nature



Objective: Restore, preserve, and protect land, biodiversity, and natural capital for the benefit of people and wildlife. Protect local water catchments and reduce flooding and water pollution.

The Central Barangaroo site is currently of very low ecological value and comprises primarily decontaminated industrial land. The new development will have a significant focus on nature, including:

- Creation of a new 2.6 Hectare public park with native gardens and an abundance of nature.
- Green landscaping, green walls and green roofs incorporated into the built areas.
- Biophilic design principles to enhance human connection to nature.
- Extensive planting and tree canopy cover to reduce urban heat island effect.
- Create productive gardens (including Aboriginal bush tucker).
- Native raingardens and vegetated swales to treat a proportion of the stormwater prior to discharge.
- Designing to dark sky principles to reduce night sky pollution.
- All stormwater leaving the site to comply with DCP stormwater pollution reduction targets.
- Best practice Water Sensitive Urban Design principles will be applied, including raingardens and biodiverse swales where appropriate, to treat stormwater run-off.

5.7 Resilience



Objective: Apply practical actions to the building and precinct to protect from and adapt to chronic stresses and acute shocks related to climate and other changes. Strengthen the resilience of the development and local community by addressing risks that threaten its short and long-term performance.

A Climate Adaptation Plan will be prepared to identify and mitigate risks associated with climate change for agreed scenarios to protect communities and strengthen resilience. The mitigation measures may include:

- Design internal and external spaces to cope with more extreme temperatures.
- Design cooling system capacity for higher design temperatures to allow for increasing peak temperatures.
- Design buildings and infrastructure to cope with more extreme storms and flooding.
- Rainwater collection & storage for resilience to increasing drought frequency.
- Provide external shading, breezeways, and planting (including tree canopy cover) to make external spaces more comfortable on extreme temperature days.
- Use green landscaping and roof and pavement finishes with higher Solar Reflective Indexes (SRIs) – light colours – to reduce heat island effect.

5.8 Healthy



Objective: Encourage active, social, meaningful lives and provide buildings, infrastructure, and spaces to enhance health and wellbeing for all.

The health and wellbeing of occupants, staff and visitors will be improved in the precinct through a range of measures, including:

- Design buildings in line with best practice principles of healthy air, water, nourishment, light, movement, thermal comfort, sound, materials, mind, and community.
- Design for visual comfort (daylight, electric lighting, glare control).
- Design for thermal comfort (building fabric, building services, controls, air movement).
- Design for aural comfort (noise control, mitigation, and speech privacy).
- Design for high indoor air quality through provision of ample high quality outside air, well distributed and exhausted, supported by natural ventilation where appropriate.
- Minimise indoor pollutants through specification of low-off gassing materials such as finishes and joinery. Design for external thermal comfort including reducing heat island effect.
- Provide a variety of outdoor spaces to support active lifestyles, relaxation, and community gatherings.
- Prioritise walking and cycling throughout the site.
- Implement best practice safety by design principles.
- Design for a connection to nature (biophilia) and mindfulness.
- Deliver mental health programs for workers during construction.

5.9 People



Objective: Create safe, just, and equitable places to live, work, learn & trade, and support local prosperity and fair trade.

Specific initiatives will be developed during the design stage and will include:

- Prepare a Social Procurement Plan for the design, construction, and operation of the project. This will include:
 - Targets and programs for employment of disadvantaged groups during construction.
 - Targets and programs for employment of Aboriginal people and procurement of products and materials from indigenous businesses
 - Support of local SMEs and disadvantaged local residents including indigenous and social enterprises.
 - A sustainable procurement policy addressing modern slavery, child labour and other social equity and ethics issues in the project supply chain.
- Donate to Homes for Homes charity
- Apply Universal Design principles to make places and buildings more inclusive and easily accessible for everyone.
- Implement best practice safety by design principles.

5.10 Culture & Engagement



Objective: Nurture local identity and heritage, empower communities and promote a culture of sustainable living.

The project will provide the following facilities for the community:

- Provide 2,800 m² of GFA for community uses within Blocks 5, 6 and 7.
- Create a new 2.6 Hectare public park (Central Waterfront Park)

A Social Sustainability Plan will be developed for the design, construction, and operation of the project. Specific initiatives will be developed during the design stage and may include:

- Prepare and implement a Designing for Country process to:
 - include meaningful engagement with, and input from, Aboriginal people.
 - to recognise the Gadigal people of the Eora Nation as a living culture and the original custodians of the land.
 - to provide appropriate facilities for ceremony, healing, contemplation, public art, and knowledge sharing (including as part of the Wulgul Walk and Eora Journey Harbour Walk).
- Prepare and implement a Heritage Interpretation Plan to acknowledge and interpret the significant history of the site, from Nawi Cove as a Gadigal fishing site for thousands of years through to the development of site as an important industrial port from the 1800s until the end of the last century.
- Prepare and implement a Placemaking and Activation Plan including curation of public events.
- Public art program, public art competitions and co-evolved works with community.
- Creative a hoardings program as part of public art strategy during construction.
- Place naming and wayfinding programs to engage with local community.

5.11 Travel and Transport



Objective: Reduce the need to travel and encourage walking, cycling and low carbon transport.

Central Barangaroo will reduce use of fossil fuel vehicles by encouraging walking and cycling, providing easy access to public transport, and supporting the uptake of electric vehicles. The following initiatives are proposed:

- Circulation routes designed for walkability with places to rest and shelter – safe, shaded and well lit.
- Cycling encouraged with safe and accessible end of trip facilities for all workers on site, and adequate bike storage provided for residents, workers, and visitors.
- Easy access to public transport including integrated connections with the new Barangaroo Station.
- 5% of all car spaces will be provided with electric vehicle charging points, and the electrical infrastructure will be designed to accommodate the future roll out of charging points to the majority of car spaces to reflect the expected change in the future car fleet.
- Design of the car park structure to allow repurposing should patterns in car ownership change.

6.0 Conclusion

Central Barangaroo’s vision is to be a globally recognised exemplar in sustainable urban development delivering positive outcomes for climate, water, nature, and people, both now and in the future. To deliver the vision, the design, construction, and operation of Central Barangaroo will be guided by a sustainability draft which will provide an overarching framework for all sustainability aspects of the development.

The strategy comprises four pillars and is supported by third party certification using internationally recognised sustainability rating tools in design, construction, and operation. This is summarised in Figure 6-1.

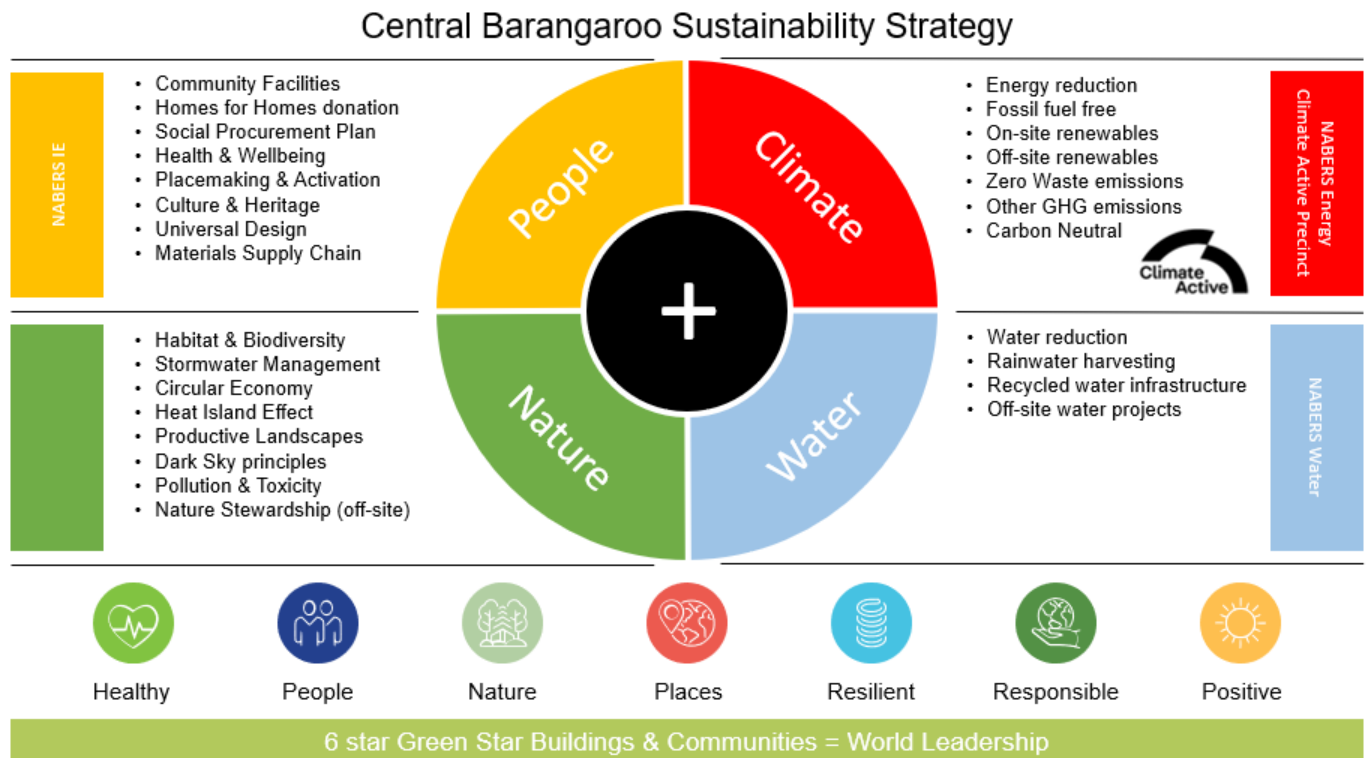


Figure 6-1: Summary of Central Barangaroo Sustainability Strategy

