State Significant Development
Environmental Impact Statement

ONE SYDNEY HARBOUR
BARANGAROO

Building R5 (SSD 6966)
Barangaroo South

Submitted to Department of Planning and Environment
On Behalf of Lendlease (Millers Point) Pty Ltd

September 2016 ■ 10051

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JBA Urban Planning Consultants Pty Ltd operates under a Quality Management System. This report has been prepared and reviewed in accordance with that system. If the report is not signed below, it is a preliminary draft.

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Development Application Details	
Applicant name	Lendlease (Millers Point) Pty Ltd
Applicant address	Level 4, The Bond, 30 Hickson Road Millers Point NSW 2000
Land to be developed	Lot 209 in DP 1211553
Proposed development	Building R5 within Barangaroo South as described in Section 3.0 of this Environmental Impact Statement (SSD 6966)
Prepared by	
Name	Michael Rowe
Qualifications	BPlan (Hons) MPIA
Address	Level 7, 77 Berry Street, North Sydney
In respect of	State Significant Development - Development Application
Certification	
	I certify that I have prepared the content of this EIS and to the best of my knowledge: ▪ it is in accordance with Schedule 2 of the Environmental Planning and Assessment Regulation 2000; ▪ all available information that is relevant to the environmental assessment of the development to which the statement relates; and ▪ the information contained in the statement is neither false nor misleading.
Signature	
Name	Michael Rowe
Date	16/09/2016

Disclaimer

All place names specified within this Environmental Impact Statement are used for identification purposes only and do not represent the final names which will be adopted. All place names will be subject to a separate naming approval process.

Executive Summary

Purpose of this Report

This Environmental Impact Statement (EIS) has been prepared as part of a Development Application (DA) to the Department of Planning and Environment (the Department) under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). It relates to proposed Building R5 and the Stage 1B Basement at Barangaroo South.

The DA site is located entirely within the Barangaroo Site, which is identified as a State Significant Site in Schedule 2 of *State Environmental Planning Policy (State and Regional Development) 2011*. Development at Barangaroo with a capital investment value of more than $10 million is State Significant Development (SSD) for the purposes of the EP&A Act. As the proposed development will have a capital investment value in excess of $10 million it is SSD for the purposes of the EP&A Act.

The application has been prepared under the approved Concept Plan (Mod 8) (MP06_0162) and the associated amendment to *State Environmental Planning Policy (State Significant Precincts) 2005* (State Significant Precincts SEPP).

The Secretary's Environmental Assessment Requirements (SEARs) were issued on 2 April 2015 under SSD 6966. This submission is in accordance with the Department's guidelines for SSD applications lodged under Part 4 of the EP&A Act, and addresses the issues raised in the SEARs. The EIS has been prepared in accordance with Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) with regards to requirements for an EIS.

Overview of the Development

The application seeks approval for the construction, fit-out and use of a 29 storey residential building (RL 105.89) known as Building R5. Building R5 forms part of a composition of three proposed residential towers in Barangaroo Stage 1B, referred to collectively as 'One Sydney Harbour'. The building comprises 19,158m^2 of residential floor space (including 3,355m^2 of Key Worker Housing floor space), with 909m^2 of retail uses in the podium.

The application also seeks approval for:

- Fit-out and use of the Stage 1B basement car park (approval for construction sought under the Stage 1B Basement application) to accommodate 170 residential car spaces, 1 retail car space, residential and retail storage, waste rooms, facilities management offices, shared plant and services, and circulation spaces.
- Limited demolition of interim basement elements, such as access points and service risers, constructed on a temporary basis under the Stage 1B Basement application to allow for the integration of the basement elements with the proposed building.
- Interim and permanent landscaping works, including pedestrian paving immediately surrounding the building and a podium garden.
- Two signage zones to accommodate building identification signage on Watermans Quay and Hickson Road.

The Site

Barangaroo is located on the north western edge of the Sydney Central Business District (CBD), bounded by Sydney Harbour to the west and north, the historic precinct of Millers Point (for the northern half), The Rocks and the Sydney Harbour

Bridge approach to the east and a range of new development dominated by large CBD commercial tenants to the south.

The Barangaroo site has been divided into three distinct redevelopment areas (from north to south) – Barangaroo Reserve, Central Barangaroo and Barangaroo South, and has been subject to multiple investigations that detail the physical and natural characteristics of the site.

The land the subject of this SSD DA comprises land within Barangaroo South generally known and identified in the approved Concept Plan (Mod 8) as Block 4B. The development also includes interim landscape works around the podium which includes parts of Hickson Park, and the roads outside of the development blocks. The DA site is located entirely within the Barangaroo Site.

Planning Context

Section 4.1 of the EIS considers all applicable legislation in detail. The development is consistent with and complies with all the relevant strategic policies, the State Significant Precincts SEPP, environmental planning instruments, plans and guidelines, including Concept Plan (Mod 8).

Environmental Impacts and Mitigation Measures

This EIS provides an assessment of the environmental impacts of the development in accordance with the SEARs and sets out the commitments made by Lendlease to manage and minimise potential impacts arising from the development. It demonstrates that the proposed development is satisfactory with respect to:

- land use and GFA;
- urban design and built form;
- Sydney Observatory impacts;
- amenity;
- design excellence
- ecologically sustainable development;
- public domain and public access;
- transport, traffic, car parking and accessibility impacts;
- visual and view impacts
- heritage;
- contamination;
- infrastructure provision;
- noise;
- air quality and odour;
- water, drainage and stormwater;
- sediment, erosion and dust control;
- construction and operation waste management;
- BCA;
- structural engineering;
- environmental, construction and site management;
- staging;
- sea level rise; and

- consultation.

All measures that have been recommended as part of the detailed technical studies to mitigate potential environmental impacts have been incorporated into the proposed development, or are included in the mitigation measures at Section 6.0.

Conclusion and Justification

Having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development, the carrying out of the development is justified for the following reasons:

- There is a strategic need to provide Building R5 within Barangaroo South to ensure there is a building that:
  - creates a transition between the mid-rise scale of buildings along Hickson Road, and the Crown Sydney Hotel Resort at the water's edge;
  - defines the street alignments and responds to the desired future scale and activation for Hickson Road, Watermans Quay and Barangaroo Avenue;
  - promotes equitable access to views towards the harbour through defining the street corridors whilst providing sky view corridors between residential towers; and
  - provides key worker housing;
- The development is generally consistent with all the relevant strategic policies, environmental planning instruments, plans and guidelines.
- The development is generally consistent with the Concept Plan (Mod 8).
- The development will have a wide range of positive social and economic impacts, including but not limited to the provision of key worker housing within Barangaroo South.
- There are no adverse environmental impacts that cannot be appropriately managed by the mitigation measures set out in this EIS.

1.0 Introduction

This Environmental Impact Statement (EIS) is submitted to the Department of Planning and Environment (the Department) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in support of a State Significant Development (SSD) Application for Building R5 at Barangaroo South.

Proposed Building R5 is located entirely within the Barangaroo Site as currently depicted in *State Environmental Planning Policy (State Significant Precincts) 2005* (State Significant Precincts SEPP), and under the State Significant Precincts SEPP. The Barangaroo Site is identified as a State Significant Site in Schedule 2 of *State Environmental Planning Policy (State and Regional Development) 2011*. Development at Barangaroo with a capital investment value of more than $10 million is SSD for the purposes of the EP&A Act. As the proposed development will have a capital investment value in excess of $10 million it is SSD for the purposes of the EP&A Act.

The report has been prepared by JBA on behalf of Lendlease (Millers Point) Pty Ltd, and is based upon the architectural drawings supplied by Renzo Piano Building Workshop (RPBW) at **Appendix A**, and other supporting technical information appended to the report (see Table of Contents).

This EIS has been prepared in accordance with the requirements of Part 4 of the EP&A Act, Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), and the Requirements of the Secretary of the Department of Planning and Environment for the preparation of the EIS (refer to SEARs for SSD 6966 which are included at **Appendix B**). This EIS should be read in conjunction with the supporting information and plans appended to and accompanying this report.

1.1 Background

1.1.1 The Barangaroo Concept Plan

The Approved Concept Plan

The Barangaroo Concept Plan (MP06_0162) was approved in February 2007. The Concept Plan covers urban design and policy initiatives and is the statutory planning approval to guide the urban renewal of Barangaroo.

The approved Concept Plan has been modified seven times since originally being approved and the Statement of Commitments has been revised accordingly. The most recent modification, referred to as Concept Plan (Mod 8), was approved on 28 June 2016 (Concept Plan).

The approved Concept Plan provides for:

- a 563,965m^2 mixed use development across the entire Barangaroo site, comprising:
  - a maximum of 514,465m^2 mixed uses GFA, including residential, commercial and retail uses which includes;
    - a maximum of 128,763m^2 of residential uses (a minimum of 99,763m^2 of which will be in Barangaroo South);
    - a maximum of 50,000m^2 of tourist uses GFA;
    - a maximum of 39,000m^2 of retail uses;
  - a maximum of 4,500m^2 of active uses GFA (3,000m^2 of which will be in Barangaroo South); and

  - a minimum of 12,000m^2 of community uses GFA (10,000m^2 of which will be in Barangaroo South);
- approximately 11 hectares of new public open space/public domain, with a range of formal and informal open spaces serving separate recreational functions including a 2.2km public Waterfront Promenade;
- built form principles, maximum building heights and GFA for each development block within the mixed use zone;
- public domain landscape concept, including parks, streets and pedestrian connections; and
- alteration of the existing seawalls and creation of a portion of the new shoreline to the Harbour.

To facilitate the redevelopment of the Barangaroo site under the Concept Plan, the site was listed in Part 12 of Schedule 3 of the State Significant Precincts SEPP.

The State Significant Precincts SEPP zones the Barangaroo site part B4 Mixed Use and part RE1 Public Recreation. It also establishes maximum building heights and gross floor area (GFA) restrictions for the nominated development blocks within the B4 Mixed Use zone.

Concept Plan (Mod 8)

In May 2011 the Minister for Planning announced a 'Short Sharp Review' (the Review) of the Barangaroo development. The Review looked at the process that led to the current planning for Barangaroo.

The report outlining the outcomes of the Review was released on 1 August 2011 (Report). A key focus of the Report was the 'Hotel over the Harbour'. The Report concluded that *"While Lendlease has zoning and Concept approval for the hotel in the harbour, this Review suggests that it would be a significant demonstration of goodwill to relocate the hotel to elsewhere on the site."*

Modification 8 to the Concept Plan (herein referred to as Concept Plan (Mod 8)) was approved by the Planning Assessment Commission on 28 June 2016. Concept Plan (Mod 8) is the outcome of negotiations between Lendlease and the NSW Government, including the Barangaroo Delivery Authority, in response to the findings and recommendations of the Review, in particular the recommendation to relocate the landmark hotel building elsewhere on the site.

Concept Plan (Mod 8) relocates the landmark hotel building (Block Y), which was previously located on a public pier extending into the harbour, back onto the area of the site in front of existing Blocks 4A, B and C, which is currently zoned RE1 Public Domain. The modifications to the Concept Plan for Block Y in response to its new location on the site, include:

- providing for retail and residential uses;
- increasing the amount of tourist uses (including use as a casino);
- increasing the maximum GFA for Block Y to 77,500m^2; and
- increasing the maximum height for Block Y to RL 275.

The relocation of the landmark hotel building necessitatedchanges to the remainder of the site:

- The total Barangaroo South site area has been reduced from 7.8ha to approximately 7.7ha as a result of:
  - reconfiguration of the hotel pier for public uses; and

  - reconfiguration of the waterfront promenade adjacent to the hotel.
- The size of the Southern Cove has been amended and its location modified.
- The hotel pier approved in Concept Plan (Mod 4) has been reduced in size and relocated such that it extends approximately 15m south of the existing site boundary and is shortened by approximately 20m. The pier is now proposed to accommodate public space and a 2-3 storey community building of approximately 3,000m^2, with a minimum of 1,000m^2 of community uses.
- The maximum tourist uses GFA permitted has been increased to 59,000m^2 and located specifically within the Barangaroo South site.
- The total GFA on the Barangaroo South site has been increased to a new maximum of 535,166m^2 (an 8.5% increase).
- The total GFA on the entire Barangaroo Concept Plan site has been increased to 594,354m^2.
- The public domain has been redistributed to continue to provide approximately 50% of the Barangaroo South site as publicly accessible space.
- In order to offset the potential loss of public domain that would otherwise occur as a result of the relocation of the landmark hotel building back on land, the maximum heights of the buildings within the modified 'Block 4' have been increased and the footprints of those buildings rationalised. Maximum heights within Blocks 1-3 and X remain as per the previously approved Concept Plan, or are reduced, while maximum heights in Block 4 have been increased to range from approximately RL105.89 to RL250 across three residential buildings.

For the entire Barangaroo site, Concept Plan (Mod 8) has resulted in:

- a 594,354m^2 mixed use development across the entire Barangaroo site, comprising:
  - a maximum of 579,354m^2 mixed uses GFA, including residential, commercial and retail uses which includes;
    - a maximum of 183,031m^2 of residential uses (a maximum of 154,031m^2 of which will be in Barangaroo South);
    - a maximum of 76,000m^2 of tourist uses GFA, 59,000 of which may be in Barangaroo South;
    - a maximum of 34,000m^2 of retail uses, 30,000 of which may be in Barangaroo South
  - a maximum of 5,000m^2 of active or community uses GFA (3,500m^2 of which will be in Barangaroo South); and
  - a minimum of 12,000m^2 of community uses GFA either in the RE1 or B4 zones;
- approximately 11 hectares of new public open space/public domain, with a range of formal and informal open spaces serving separate recreational function and including a 2.2km public foreshore promenade;
- design guidelines, maximum building heights and GFA for each development block within the mixed use zone;
- an indicative public domain landscape concept, including parks, streets and pedestrian connections;
- alteration of the existing seawalls and creation of a portion of the new shoreline to the Harbour; and

- construction, operation and maintenance of a concrete batching plant to supply concrete for construction of future development under the Concept Plan at Barangaroo South.

The changes described above necessitate modifications to the existing Instrument of Approval and Statement of Commitments for the Concept Plan.

Additionally, the modifications to the Concept Plan varied from the existing development controls for the site established under the State Significant Precincts SEPP. A SEPP amendment has also been approvedto reconcile the State Significant Precincts SEPP planning provisions with the approved Concept Plan (Mod 8) and, more specifically, to:

- reconfigure the existing development blocks and land uses;
- amend the site boundary to reflect the relocation of the landmark hotel building from over the water onto land within Barangaroo South and the proposed new public pier. This has required an amendment to the boundary of the Barangaroo site shown on the State and Regional Development SEPP map referred to in Schedule 2 of that SEPP;
- redistribute and increase the maximum permissible GFA within the Barangaroo South development blocks; and
- increase the maximum permissible height controls within some of the Barangaroo South development blocks, including Block 4B.

The proposed development has been designed in accordance with Concept Plan (Mod 8).

1.1.2 Stage 1 Tender and Bid Process

The 22 hectare Barangaroo site has been divided into three distinct redevelopment areas (from north to south) – Barangaroo Reserve, Barangaroo Stage 2 (referred to herein as Central Barangaroo) and Barangaroo Stage 1 (herein referred to as Barangaroo South).
Lendlease was successfully appointed as the preferred proponent to develop Barangaroo South on 20 December 2009. This application forms one of a series of individual applications that Lendlease either has or will be submitting to deliver Barangaroo South.

1.1.3 Barangaroo South

For the purposes of construction Barangaroo South has been divided into three areas, Stage 1A, 1B and 1C. A site plan of Barangaroo South is provided at **Figure 1**. Information regarding the status of each of the stages is provided below.

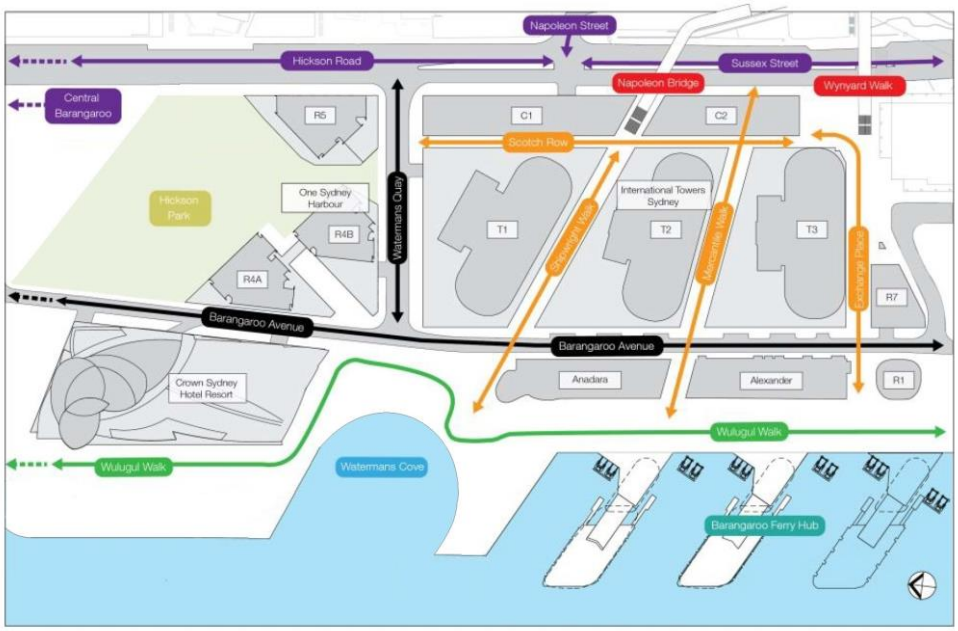

Figure 1 – Barangaroo South Site Plan

Stage 1A

Stage 1A refers to the portion of the Barangaroo South site south of Watermans Quay (formerly Globe Street). Within Stage 1A, approval has been granted for the shared Stage 1A Basement and Public Domain, four commercial buildings, known as Commercial Building C2, C3, C4 and C5, two Residential Buildings (R8 and R9), one mixed use commercial / retail building known as R7 and one retail building known as R1. Parts of Commercial Building C4 and the public domain were opened to the public in early July 2015. Construction has or is about to commence on the remainder of the above-mentioned projects.

The site has been also subject to a number of minor DAs submitted to the City of Sydney Council for public art, signage, retail uses and outdoor seating.

Stage 1B

Stage 1B refers to the portion of the Barangaroo South site north of Watermans Quay, with the exception of the area being developed by Crown Resorts, which is referred to as Stage 1C. Stage 1B comprises three residential towers and the future northern park (known as Hickson Park) above a shared basement. Separate but concurrent SSD development applications have been prepared for these works and include:

- Stage 1B Basement (SSD 6960): The Stage 1B Basement will service the Stage 1B Residential Buildings (Residential Buildings R4A, R4B and R5). The Stage 1B Basement will also provide the ground level slab and trunk services infrastructure for the Stage 1B Public Domain above, which will be the subject of a separate future SSD development application. SSD 6960 also includes interim public domain and landscaping works comprising landscaping the future Hickson Park. The construction of part of Barangaroo Avenue will also be undertaken as part of the Stage 1B Basement consent.
- Building R4A (SSD 6964): Building R4A will be a residential tower and podium building of 72 storeys, comprising approximately 327 apartments. The building will have a maximum height of RL 250 and a GFA of 47,882 m^2 comprising predominantly residential floor space with retail at ground floor level.
- Building R4B (SSD 6965): Building R4B will be a residential tower and podium of 60 storeys comprising approximately 297 apartments. The building will have

a height of RL 210 and a GFA of 39,063m^2 comprising predominantly residential floor space with retail at ground floor level and podium level 1.

- Building R5 (SSD 6966): Building R5 will be a residential tower and podium of 29 storeys comprising approximately 151 apartments. The building will have a height of RL 105.89 and a GFA of 19,158m^2 comprising predominantly residential floor space with retail at ground floor level and podium level 1. Building R5 will accommodate 3,355m^2 of Key Worker Housing (39 apartments), in accordance with Lendlease's commitment for Barangaroo South.

A separate development consent (SSD 5897) has been granted for remediation of the Stage 1B Basement site. Building R5 sits within the basement footprint, and no additional excavation or bulk earthworks are proposed. This existing approval also grants consent for the construction of groundwater retention walls, bulk excavation within the groundwater retention walls, diversion and augmentation of stormwater infrastructure, tree removal and management, and demolition of existing structures on the site.

Interim public domain works are proposed as part of the concurrent Stage 1B Basement DA, which will include landscaping of Hickson Park and the provision of part of Barangaroo Avenue. A separate SSD development application will be prepared for the permanent Stage 1B Public Domain works. The public domain works will include provision of Hickson Park, all ground treatments and finishes, landscaping, furniture and fixtures, public domain structures, lighting, civil and stormwater infrastructure and utility services.

Stage 1C

Stage 1C relates to the landmark hotel building (herein after referred to as the Crown Sydney Hotel Resort) within Block Y. The landmark hotel building and apartments, and associated site preparation and basement works are being developed by Crown Resorts. An SSD DA was approved by the Planning Assessment Commission on 28 June 2016 for the Crown Sydney Hotel Resort.

1.1.4 Barangaroo Delivery Authority

The Barangaroo Delivery Authority was established on 30 March 2009 under the *Barangaroo Delivery Authority Act 2009* (NSW) to manage the redevelopment of Barangaroo and to deliver world class benchmarks in urban design, public domain and sustainability.

The creation of the Barangaroo Delivery Authority reinforces the NSW Government's commitment to the delivery of Barangaroo in a coordinated and financially responsible manner.

The Barangaroo Delivery Authority is subject to the control and direction of the NSW Premier.

The objects of the *Barangaroo Delivery Authority Act 2009* are:

- to encourage the development of Barangaroo as an active, vibrant and sustainable community and as a location for national and global business;
- to create a high quality commercial and mixed use precinct connected to and supporting the economic development of Sydney;
- to facilitate the establishment of Barangaroo Reserve and public domain land;
- to promote the orderly and sustainable development of Barangaroo balancing social, economic and environmental outcomes; and

- to create in Barangaroo an opportunity for design excellence outcomes in architecture and public domain design.

The Barangaroo Delivery Authority is the registered landowner of most of the Barangaroo site, including the SSD DA site.

1.2 Objectives of the Development

The objectives of the Building R5 DA are to:

- provide a building that achieves design excellence and is generally consistent with the Concept Plan (Mod 8);
- create a residential building with the most desirable premium apartments ever built in Sydney and Australia;
- link the residential tower and podium into the broader aspirations for the Stage 1B public domain;
- maximise orientation to optimise views throughout the entire building;
- provide apartments with a high level of residential amenity;
- achieve best practice sustainability outcomes;
- provide Key Worker Housing in accordance with the Concept Plan Statement of Commitments;
- manage the western sun whilst maximising views to the Harbour; and
- ensure that any environmental impacts associated with the construction and operation of the building are appropriately mitigated.

1.3 Summary of Approval Sought

The application seeks approval for the following development within Block 4B of Barangaroo South:

- Construction, use and fit-out of a 29 storey building (RL 105.89) known as Building R5, comprising:
  - 909m^2 retail floor space; and
  - 18,249m^2 residential floor space, including 3,355m^2 of Key Worker Housing floor space calculated in accordance with the Concept Plan (MP06_0162), as modified under Mod 8.
- Fit-out and use of the Stage IB Basement car park (approval for construction will be sought under the Stage 1B Basement development application) to accommodate 170 residential car spaces, 1 retail car space, residential and retail storage, waste rooms, facilities management offices, shared plant and services, and circulation spaces.
- Limited demolition of interim basement elements, such as access points and service risers, constructed on a temporary basis under the Stage 1B Basement consent to allow for the integration of the basement elements with the proposed building.
- Interim and permanent landscaping works, including paving immediately surrounding the building and a podium garden.
- Two signage zones to accommodate building identification signage on Watermans Quay and Hickson Road.

This DA does not seek approval for development that has been included in the Block 4 Remediation, Stage 1B Basement, or Stage 1B Public Domain development applications, which encompass:

- All site preparation works, including: demolition, tree removal, remediation, construction of retention walls, bulk excavation, and stormwater diversion.
- Excavation for the Stage 1B Basement, to an estimated maximum depth of RL -18.85 m, plus piling.
- Construction of basement slabs to accommodate four levels of parking.
- Construction of the loading docks, waste rooms and storage areas.
- Construction of the Stage 1B Residential Buildings' structural cores and associated building services up to ground level.
- Construction of low-rise above ground basement elements, including car park ramps, risers and some building services which will be integrated into the future buildings (i.e. within the podium).
- Interim public domain works around the car park ramps and risers to allow for the potential staging of the construction and occupation of the Stage 1B Residential Buildings.
- Construction of a permanent stormwater connection from Hickson Road to Darling Harbour. This infrastructure will be located between the Stage 1A Basement and the proposed Stage 1B Basement and will replace the temporary stormwater infrastructure that is proposed under the concurrently submitted modification to SSD 5897.
- Construction and connection of associated services, including stormwater drainage.
- Construction of the permanent public domain within Stage 1B, including Hickson Park, Watermans Cove, Watermans Quay, Barangaroo Avenue and Wulugul Walk.

1.4 Analysis of Alternatives

Strategic need for the Proposal

As detailed in Section 1.0, the redevelopment of the Barangaroo site is the result of a long term strategic planning process which culminated in February 2007 when the NSW Minister for Planning approved a concept plan to guide the urban renewal of Barangaroo.

Barangaroo South is the southern 7.5 hectares of the Barangaroo site which is destined to become the most advanced financial district and the first large scale, carbon neutral precinct in Australia. Barangaroo South will comprise a mix of land uses, including commercial, residential, retail and dining along with a new landmark hotel.

The success of Barangaroo relies heavily on the comprehensive delivery of a new urban form and land uses as envisaged under the Concept Plan (Mod 8). Specifically the Building R5 site has the important strategic role under the Concept Plan (Mod 8) of forming part of a group of residential towers (together with Buildings R4A and R4B) that will:

- continue a built form dialogue with the adjoining CBD;
- provide a backdrop to the Crown Sydney Hotel and Resort; and
- complete the city frame and book-end the city's north western edge in connection with the Crown Sydney Hotel and Resort.

Alternative Options

Three options are available to Lendlease in responding to the identified need for Building R5 within Barangaroo South.

Option 1: The Proposal
Option 1 involves providing the building as proposed in this SSD DA (as described in Section 2.6.2). The proposal will ensure that a high quality building is provided on the site that responds to the strategic need identified above.

Option 2: Do Nothing
Not providing a building on the site would not be an appropriate outcome for a site of the strategic importance of Barangaroo. Not providing a building in this location would be inconsistent with the Barangaroo Concept Plan (as modified under Mod 8) which envisages a building in the subject location which will form part of a group of three residential towers. The do nothing approach would prevent development as envisaged by the Concept Plan, and would result in a failure to provide key worker housing on the site.

Option 3: Alternative Designs
An international design excellence architectural selection process was conducted in accordance with the Barangaroo Design Excellence Strategy. This competition included alternative designs submitted by some of Australia and the world's most eminent architects including FJMT, Christian de Portzamparc and WOHA. The RPBW design was selected as the winner of the competition as it resulted in the best outcome for the site out of the alternatives considered in terms of achieving the primary objectives referred to above. Further detail regarding the design excellence process is provided in Section 4.4.1

1.5 Project Team

An expert project team has been formed to deliver the project and includes:

Proponent	Lendlease (Millers Point) Pty Limited
Urban Planning	JBA
Principal Architect	Renzo Piano Building Workshop (RPBW)
Executive Architect	Lendlease Design
Traffic and Transport	ARUP
Contamination and Remediation	AECOM
Site Auditor	Graeme Nyland (Environ)
Public Domain and Landscaping	Grant Associates
View / Visual Impact Analysis	Virtual Ideas / JBA
Civil Engineering	Cardno
Structural Engineer	Robert Bird Group
Air Quality & Odour	AECOM
Noise & Vibration	Wilkinson Murray
Waste Management	ARUP
Environmental, Construction and Site Management	Lendlease Building
Ecologically Sustainable Development	Lendlease Design

BCA & Accessibility	McKenzie Group
Wind	Windtech
Surveyor	Rygate
Reflectivity	ARUP
Infrastructure and Services	Cardno / Lendlease Building
Fire Engineering	Defire
Prescribed Airspace for Sydney Airport	AvLaw
Heritage	TKD Architects

1.6 Secretary's Environmental Assessment Requirements

In accordance with section 89G of the EP&A Act, the Secretary of the Department of Planning and Environment issued the environmental assessment requirements for the preparation of the EIS on 2 April 2015 under SSD 6966. A copy of the Secretary's Environmental Assessment Requirements (SEARs) is included at **Appendix B**.

Table 1 provides a detailed summary of the individual matters listed in the SEARs and identifies where each of these requirements has been addressed in this report and the accompanying technical studies.

Table 1 – Secretary's Requirements (SSD 6966)

Requirement	Location in EIS
General	
The Environmental Impact Statement (EIS) must address the Environmental Planning and Assessment Act 1979 and meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000.	Sections 1-8
Notwithstanding the issues specified below, the EIS must include an environmental risk assessment to identify the potential environmental impacts associated with the development.	Section 4 and 5
Where relevant, the assessment of the key issues below, and any other significant issues identified in the assessment, must include:	Section 5
▪ Adequate baseline data	
▪ Consideration of potential cumulative impacts due to other development in the vicinity.	
▪ Measures to avoid, minimise, and if necessary, offset the predicted impacts including detailed contingency plans for managing significant risks to the environment.	
The EIS must be accompanied by a report from a qualified quantity surveyor providing:	Refer to CIV Certificate, submitted under a separate cover
▪ A detailed calculation of the capital investment value (as defined in clause 3 of the Environmental Planning and Assessment Regulation 2000) of the proposal, including details of all assumptions and components from which the CIV calculation is derived.	
▪ An estimate of the jobs that will be created by the development (construction and operation).	Refer to CIV Certificate, submitted under a separate cover
▪ Certification that the information provided is accurate at the date of preparation	Page i

Requirement	Location in EIS	
Key Issues	**Report / EIS**	**Technical Study**
1. Environmental Planning Instruments, Policies & Guidelines Address the relevant statutory provisions applying to the site, contained in the relevant EPIs, including: ▪ *State Environmental Planning Policy (State and Regional Development) 2011*; ▪ *State Environmental Planning Policy (Major Development) 2005*; ▪ *State Environmental Planning Policy 55 - Remediation of Land*; ▪ *State Environmental Planning Policy (Infrastructure) 2007*; ▪ *State Environmental Planning Policy No. 65 – Design Quality of Residential Flat Development;* ▪ *State Environmental Planning Policy (Building Sustainability Index – BASIX) 2004;* and ▪ *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005*.	Section 4.1	**Appendix C** **Appendix D** **Appendix E** **Appendix F**
Address the relevant provisions, goals and strategic objectives in the following: ▪ NSW 2021; ▪ Plan for Growing Sydney; ▪ Draft Sydney City Sub-Regional Strategy; ▪ NSW Long Term Master Transport Plan; ▪ Sydney's Cycling Future; ▪ Sydney's Walking Future; ▪ Sydney City Centre Access Strategy; ▪ Residential Flat Design Code (replaced by the Apartment Design Guide); ▪ Barangaroo Integrated Transport Plan; and ▪ Barangaroo Housing Strategy.	Section 4.1	**Appendix E** (Consistency with Apartment Design Guide)
2. Barangaroo Concept Plan Demonstrate how the proposal is consistent with the Concept Plan MP06_0162 (as modified), including any relevant Statement of Commitments	Section 4.2	-
3. Land Use and GFA Provision of a table identifying the building's different land uses*, including a floor by floor breakdown of GFA, total GFA and site coverage. * Retail uses must be separately defined as per the Standard Instrument.	Section 4.3	**Appendix A**
If the proposed uses include pubs, bars, nightclubs or the like, detailed Plans of Management and Security Management Plans must be prepared.		-
4. Design Excellence, Built Form and Urban Design Outline the design process leading to the proposal and justify the suitability of the site for the proposal.	Section 4.4	**Appendix G**
Demonstrate design excellence with specific consideration of the site's character, layout, setbacks, architectural design, materials, articulation and detailing, amenity, views and vistas, open spaces and public domain, connectivity and street activation.		
Address the height, bulk and scale of the proposal development within the context of the locality and its surrounds.		
Address retail tenancy fit-outs, shopfront design and signage.		
5. Visual and View Impacts Identify important sight lines and visual connectively to and through the site.	Section 4.5	**Appendix H**
A visual impact assessment is to be provided to identify the visual changes and impacts on the site and its surrounds when viewed from key vantage points (see plans and documents section).		
6. Sydney Observatory Impacts Undertake an analysis of potential sky view loss and resultant impacts on the functioning of the Sydney Observatory telescopes and astronomical sightlines.	Section 4.6	-
7. Amenity Outline and address the proposed development's impacts in terms of sunlight, natural ventilation, wind, reflectivity, visual and acoustic privacy, and safety and security.	Section 4.7	**Appendix E** **Appendix K** **Appendix L**
The EIS must include: ▪ a shadow diagrams report; and ▪ wind effects report		**Appendix N** **Appendix K**

Requirement	Location in EIS	
8. Ecologically Sustainable Development Detail how ESD principles (as defined in clause 7(4) Schedule 2 of the EP&A Regulation 2000) will be incorporated in the design, construction and ongoing phases of the development.	Section 4.8	**Appendix O**
Outline resource, energy and water efficiency initiatives, including the use of sustainable technologies and or/renewable energy.		
Provide an integrated Water Management Plan including alternative water supply, proposed end uses of potable and non-potable water, water sensitive urban design and water conservation measures.		
9. Public Domain and Public Access Identify proposed open space, public domain and linkages with and between other public domain spaces, including Hickson Road, other streets and lanes, and the Harbour foreshore.	Section 4.9	**Appendix P** **Appendix G**
Detail and outline the interface between the proposed uses and the public domain.		
Outline specific design features (if applicable): ▪ footpaths and pavements, roads and/or rights of carriageways; ▪ outdoor seating; ▪ materials and finishes; ▪ public art; ▪ furniture and fixtures; ▪ street lighting, pedestrian lighting and feature lighting; ▪ edges, screens and fences; ▪ walls, embankments and mounds; ▪ steps, ramps, vehicle crossings, decks and pathways; ▪ services where affected, utility poles, and service pits; ▪ civil and stormwater infrastructure; ▪ tree planting; ▪ mass planting beds, planter boxes and individual plantings; and ▪ bicycle parking.		
10. Transport, Traffic, Car Parking and Accessibility Demonstrate consistency with the Barangaroo Integrated Transport Plan and the Sydney City Centre Access Strategy.	Section 4.10	**Appendix Q**
The EIS shall include a Traffic and Transport Impact Assessment that provides, but is not limited to, the following: ▪ current daily and peak hour vehicle, public transport, pedestrian and bicycle movements and existing traffic and transport facilities provided on the road network; ▪ daily and peak traffic movements likely to be generated by the development, including peak traffic movements; ▪ assessment of the existing and future performance of key intersections providing access to the site, and any upgrades (road/intersections) required as a result of the development. The assessment of the existing and future road network operations needs to consider the cumulative impacts of traffic volumes and focus on intersections in the north-west quadrant of the CBD in the vicinity of Barangaroo. The assessment needs to be supported by appropriate modelling and analysis to the satisfaction of Roads and Maritime Services; ▪ details of the proposed number of car parking spaces and compliance with appropriate parking codes. It should demonstrate a minimalist approach to the provision of on-site parking, and how traffic generation (number of vehicles and time of access) will be managed in response to capacity limitations on the road network; ▪ pedestrian and cycle connections/circulation and required upgrades to meet the likely future demand within the precinct and connections to the external networks, particularly the cycle network identified in the Sydney City Centre Access Strategy; ▪ existing public transport services and opportunities for greater usage for residents, workers and visitors; ▪ details of sustainable travel initiatives for residents, workers and visitors particularly for the provision of end-of-trip facilities; ▪ assessment of proposed loading dock provisions and access arrangements		

Requirement	Location in EIS	
to loading docks; ▪ details of existing and proposed vehicular access and car parking arrangements for residents, workers and visitors (cars, coaches/buses & taxi ranks), including compliance with parking codes and Australian Standards, and measures to mitigate any associated traffic impacts and impacts on public transport, pedestrian and cycle networks; ▪ details of access arrangements for emergency and service vehicles (including vehicle type and likely arrival and departure times of service vehicles).		
The EIS shall include an updated Transport Management and Accessibility Plan.		
In relation to construction traffic: ▪ assessment of cumulative impacts associated with other construction activities on the Barangaroo and Wynyard Precincts; ▪ details of anticipated truck movements to and from the site; ▪ details of access arrangements for workers to/from the site, emergency vehicles and service vehicle movements: ▪ details of temporary cycling and pedestrian access during construction; ▪ details of proposed construction vehicle access arrangements at all stages of construction; and ▪ Assessment of traffic and transport impacts during construction and how these impacts will be mitigated for any associated traffic, pedestrian, cyclist and public transport, including the preparation of a draft Construction Traffic Management Plan to demonstrate the proposed management of impact. This Plan needs to include vehicle routes number of trucks, hours of operation, access arrangements and traffic control measures for all demolition/construction activities.		
The EIS shall include an assessment of the impact on the operation of the proposed Barangaroo Ferry Hub including environmental impacts on the ferry hub and ferry customers such as shadow impacts. This should also consider lighting design and any potential impact on navigational safety		
Relevant Policies and Guidelines ▪ *Barangaroo Integrated Transport Plan* ▪ *Barangaroo Transport Management and Accessibility Plan* ▪ *Guide to Traffic Generating Developments (Roads and Maritime Services)* ▪ *Sydney City Centre Access Strategy* ▪ *EIS Guidelines – Road and Related Facilities (DoPI)* ▪ *NSW Planning Guidelines for Walking and Cycling* ▪ *Guide to Traffic Management – Part 12: Traffic Impacts of Development (AUSTROADS)*		
11. Heritage The EIS must include an assessment of the likely impacts of the proposal on any heritage and archaeological items and outline mitigation and conservation measures.	Section 4.11	**Appendix I**
12. Contamination Demonstrate compliance with the requirements of SEPP 55.	Section 4.12	**Appendix C** **Appendix D**
If remediation works are required, the EIS must include a Remedial Action Plan (RAP). The RAP must be accompanied by a Site B audit statement prepared by an EPA accredited site auditor and the RAP must be prepared in accordance with the contaminated land planning guidelines under section 145C of the Environmental Planning and Assessment Act 1979 and relevant guidelines produced or approved under section 105 of the Contaminated Land Management Act 1997.		
13. Infrastructure Provision Detail any infrastructure proposed to service the development and demonstrate that the site can be suitably serviced.	Section 4.13	**Appendix R** **Appendix S**
Detail the existing infrastructure on-site, and identify any possible impacts on infrastructure arising from the construction of the proposed works.		
Where the proposed works affect existing infrastructure, the application should detail any mitigation works proposed, including service relocations.		
14. Noise	Section 4.16	**Appendix M**

Requirement	Location in EIS	
The applicant must include a Noise and Vibration Assessment of construction, operation, traffic and cumulative noise impacts prepared in accordance with the relevant EPA guidelines. This assessment must consider any potential noise impacts on nearby noise sensitive receivers and outline proposed noise mitigation and monitoring issues.		
Relevant Policies and Guidelines ▪ *NSW Industrial Noise Policy 2000 (EPA)* ▪ *NSW Industrial Noise Policy – application notes 2013 (EPA)* ▪ *Interim Construction Noise Guideline 2009 (DECC)* ▪ *Assessing Vibration: A Technical Guideline 2006 (DECC)* ▪ *NSW Road Noise Policy (DECCW 2001)* ▪ *NSW Road Noise Policy – application notes 2013 (EPA)*		
15. Air, and Odour Provide an Air Quality Impact Assessment. The assessment must be prepared in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW 2005 and must consider the requirements of the Protection of the Environment Operations (Clean Air) Regulation 2010. The key air quality issues that must be covered in the assessment include, where applicable: ▪ the identification of the pollutants of concern including dust and odours ▪ the identification and assessment of all relevant fugitive and point source emissions; and ▪ proposed air quality management and monitoring procedures during the works.	Section 4.17	**Appendix T**
Relevant Policies and Guidelines ▪ *Protection of the Environment Operations Act 1997* ▪ *Protection of the Environment Operations (Clean Air) Regulation 2010* ▪ *The Approved Methods for the Modelling and Assessment of Air Pollutants (August 2005) (DEC)* ▪ *The Approved Methods for Sampling and Analysis of Air Pollutants (January 2007) (DEC)* ▪ *Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards (2012) (Department of Health)* ▪ *Assessment and Management of Odour from Stationary Sources in NSW: Technical Framework (DEC, 2006)* ▪ *Assessment and Management of Odour from Stationary Sources in NSW: Technical Notes (DEC, 2006)*		
16. Water, Drainage, Stormwater and Groundwater Prepare a Stormwater and Drainage Assessment to assess the impacts of the proposal on surface and groundwater hydrology and quality	Section 4.18	**Appendix S**
Identify appropriate water quality management measures focussing on the management of the impacts from the proposed works on Sydney Harbour.		
Prepare an Integrated Water Management Plan. This should include stormwater and wastewater management, including any re-use and disposal requirements, demonstration of water sensitive urban design and any water conservation measures.		
The applicant shall provide information on the required water and waste water services and any augmentation of Sydney Water infrastructure that may be required for the proposed development		
17. Sediment, Erosion and Dust Controls Identify measures and procedures to minimise and manage the generation and off-site transmission of sediment, dust and particles.	Section 4.17 Section 4.18	**Appendix S** **Appendix U**
Relevant Policies and Guidelines: ▪ *Managing Urban Stormwater – Soils & Construction 4th Edition (Landcom)* ▪ *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA)*		
18. Waste Assess the waste impacts and their management during construction and operation. Consideration should also be given to the assessment and management of any acid sulfate soil and potential acid sulfate soil.	Section 4.19	**Appendix V**
Relevant Policies and Guidelines:		

Requirement	Location in EIS	
▪ *Waste Classification Guidelines Part 1: Classifying Waste 2014 (EPA)* ▪ *Waste Classification Guidelines Part 4: Acid Sulfate Soils 2014 (EPA)* ▪ *Acid Sulfate Soils Manual 1996 (ASSMAC)* ▪ *Waste Avoidance and Resource Recovery Act 2001*		
19. Building Code of Australia Prepare a detailed BCA and access report demonstrating compliance with the Building Code of Australia.	Section 4.21	**Appendix W**
20. Environmental, Construction and Site Management Plan The EIS shall provide an Environmental and Construction Management Plan for the proposed works, and is to include: ▪ community consultation, notification and complaints handling; ▪ impacts of construction on adjoining development and proposed measures to mitigate construction impacts; ▪ noise and vibration impacts on and off site; ▪ air quality impacts on the neighbourhood; ▪ odour impacts; o water quality management for the site; and ▪ Construction waste classification, transportation and management methods in accordance with DECCW's Know Your Responsibilities: Managing Waste from Construction Sites Guideline.	Section 4.14	**Appendix U**
21. Staging Details regarding the staging of the proposed development.	Section 4.15	-
22. Sea Level Rise The EIS must assess the risks associated with sea level rise on the Proposal.	Section 4.25	-
23. Consultation ▪ Undertake an appropriate level of consultation with council and State government agencies. ▪ Provide details on the Community Engagement Framework to guide the public consultation process.	Section 4.26	-

2.0 Site Analysis

2.1 Site Location and Context

Barangaroo is located on the north western edge of the Sydney Central Business District (CBD), bounded by Sydney Harbour to the west and north, the historic precinct of Millers Point (for the northern half), The Rocks and the Sydney Harbour Bridge approach to the east and a range of new development dominated by large CBD commercial tenants to the south.

The 22 ha Barangaroo site is generally rectangular in shape and has a 1.4 kilometre Harbour foreshore frontage, with an eastern street frontage to Hickson Road. The locational context of the Barangaroo development site is shown in **Figure 2**.

Figure 2 – Locality Plan

2.2 Site Description

The Barangaroo site has been divided into three distinct redevelopment areas (from north to south), comprising the Barangaroo Reserve, Central Barangaroo and Barangaroo South (see **Figure 3**), and has been subject to multiple investigations that detail the physical and natural characteristics of the site.

For the purposes of overall staging, Lendlease has broken Barangaroo South into three areas, referred to as Stage 1A, Stage 1B and Stage 1C. Stage 1B refers to the portion of the Barangaroo South site north of Watermans Quay, with the exception of the area being developed by Crown Resorts, which is referred to as Stage 1C. Stage 1B is generally known and identified in Concept Plan (Mod 8) as Blocks 4A and 4B, and the northern park, between Blocks 4A and 4B and Central Barangaroo.

The proposed development is located within Block 4B. **Figure 3** illustrates the location of site in relation to Stage 1B. It is bounded by Watermans Quay to the south, Block R4A (Building R4B) to the west, the future Hickson Park to the north and Hickson Road to the east.

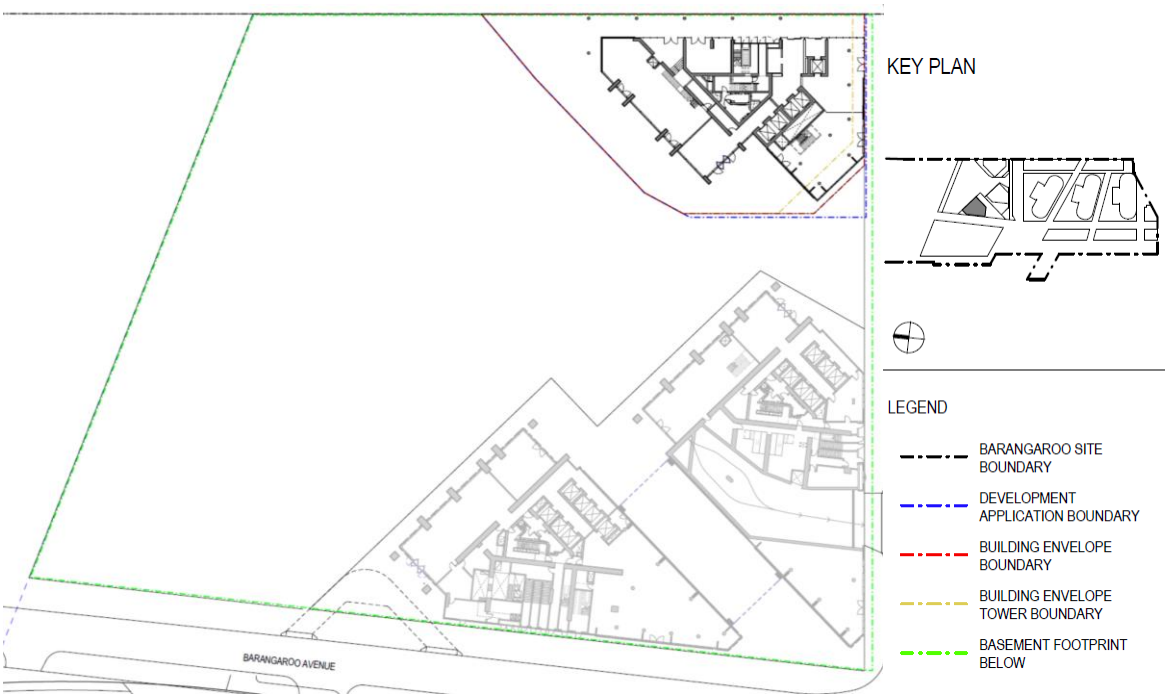

Figure 3 – Site Plan

Land Ownership and Description

A site survey plan prepared by Rygate is included at **Appendix X**.

Under the *Barangaroo Delivery Authority Act 2009* (NSW), Barangaroo is defined as the land identified as the "Barangaroo Delivery Authority operational area on the Barangaroo Delivery Authority Operational Area Map".

The Barangaroo Delivery Authority owns the majority of Barangaroo, however small areas are owned by other Government agencies including the Marine Ministerial Holding Corporation, the Roads and Maritime Services and the Crown. The Building R5 site, the subject of this SSD DA, comprises Lot 209 in DP 1211553. The Barangaroo Delivery Authority is the owner of the Site. The Barangaroo Delivery Authority has issued landowner's consent to the making of this SSD DA, provided with the completed Application Form submitted under separate cover.

2.3 Existing Development and Structures

2.3.1 Built Form

The subject site comprises an open concrete/bitumen apron. It is currently used for site sheds and storage associated with the construction of Stage 1A.

As identified at Section 1.1.3, development consent has been granted for remediation of the Stage 1B Basement site (SSD 5897). The approval includes consent for the construction of groundwater retention walls, bulk excavation within the groundwater retention walls, diversion and augmentation of stormwater infrastructure, tree removal and management, and demolition of existing structures on the site These works are intended to commence prior to the works the subject of this application.

A concurrent SSD DA (SSD 6960) has been lodged for construction of the Stage 1B Basement which will serve proposed Buildings R4A, R4B and R5. Building R5 sits entirely within the footprint of the proposed basement. The Stage 1B Basement works include construction of Building R5's core to ground level and associated plant and services.

2.3.2 Infrastructure and Services

Stormwater

The external catchment draining to the existing stormwater drainage system is approximately 14 Ha. The existing stormwater drainage system consists of large diameter pipes along Hickson Road that turn across the Barangaroo site and discharge untreated water into the Harbour. Overland flows in excess of the piped flows are directed to the existing low point in Hickson Road and ponded water traverses the Barangaroo South site and ultimately discharges to the Harbour.

Changes to the existing stormwater network, including the provision of trunk drainage works and the relocation of existing stormwater pipes, are approved under SSD 5987. As part of the Stage 1B Basement DA approval, a permanent stormwater management solution will be introduced between Hickson Road and Darling Harbour.

Water

The existing water supplies to the Barangaroo site are supplied from a 300mm diameter Sydney Water main in Hickson Road.

Sewer

There is an existing sewer trunk main in Hickson Road near the western kerb line which drains to an existing Sydney Water sewage pumping station SP1129 outside the Barangaroo site.

Electricity

The Barangaroo South site was served by 5 KV high voltage feeders entering the Barangaroo site at the southern end of Hickson Road and terminating in an AusGrid (formerly Energy Australia) HV switch room. The HV supply and private HV reticulation were decommissioned and the private substations demolished as part of demolition works in 2010/2011.

Telecommunications

The Stage 1B precinct will be serviced with incoming telecommunications services by Telecommunications Service Providers (TSPs) via connections included in the Stage 1B Basement application. Lead-in cabling will enter the site via a bank of ducts sufficient for the TSP's service requirements. The TSPs selected to service

the residential buildings, including R5, will be agreed by the stakeholders. The sizing, quantity and configuration will be agreed with the stakeholders and proposed carriers.

Residential Building R5 will be serviced from the Barangaroo South Stage 1B Precinct Entrance/Campus Distribution Room (CDR) located in the basement, provided under the Stage 1B Basement DA.

Natural Gas

There is an existing gas supply at the intersection of Napoleon Street and Hickson Road and also at the end of Lime Street near the south-west corner of the Barangaroo site.

2.4 Traffic and Transport

2.4.1 Vehicular Access

Hickson Road connects into Sussex Street south of Napoleon Street and is the north-south access road for Barangaroo South. Local road access to the Barangaroo site is provided:

- via Napoleon Street and Margaret Street from the eastern CBD from Millers Point via Dalgety Road;
- via George Street from the north east; and
- via Harbour Street, Wheat Road (through King Street Wharf) to Shelley Street from the south via Sussex Street/Kent Street/Napoleon Street from the southern CBD.

Building R5 fronts the future Watermans Quay to the south and Hickson Road to the east. Once constructed, Watermans Quay will connect to Hickson Road in the east, and Barangaroo Avenue in the west, which will connect through to the King Street Wharf precinct.

2.4.2 Public Transport

The Barangaroo site is served by the following public transport modes:

- **Rail:** Wynyard, Martin Place, Town Hall and Circular Quay railway stations are within walking distance of the Barangaroo site and provide frequent services throughout the day. In June 2015 the NSW Government announced a new underground railway station at Barangaroo will be part of the plans for the new Sydney Metro. The new station is expected to be located at Central Barangaroo. The timing for the delivery of the new station is yet to be confirmed.
- **Bus:** There is a major bus interchange located at Wynyard Station for buses servicing the Hills District, Northern Beaches and the North Shore areas. These services all utilise the bus lane on the Harbour Bridge to access Wynyard. Stops for services to other locations are provided through the CBD including along George, Park, Elizabeth and Castlereagh Streets.

  A number of bus routes terminate in the vicinity of the Barangaroo site, King Street Wharf and Circular Quay.
- **Ferry:** Commuter ferry services arrive and depart from both King Street Wharf and Circular Quay. NSW Ferries has a current State Significant Infrastructure Application to provide future wharves at the Barangaroo South near Building R1.

Further information on existing and known planned public transport accessibility of the Barangaroo site is provided in the Transport Management and Accessibility Plan prepared by ARUP at **Appendix Q**.

2.4.3 Pedestrians and Cyclists

Pedestrian Access

The NSW Government has commenced construction on Wynyard Walk, a direct pedestrian link between the new Barangaroo development and Wynyard Station and transport interchange. Wynyard Walk, expected to be opened in 2016, will provide a high level of access to public transport for the growing western corridor of the CBD, including Barangaroo and King Street Wharf. This will assist in accommodating the additional commuters who are expected to use this route to access the Barangaroo site. Lendlease has also provided a second pedestrian bridge, known as Napoleon Bridge, which connects Wynyard Walk near Kent Street to the site between the Hickson Road Buildings C1 and C2.

Pedestrian access to Barangaroo is available along local roads, all of which are footpath lined. Notwithstanding the high degree of pedestrian footpaths and thoroughfares, there are generally low levels of pedestrian activity adjacent to the Barangaroo site. Whilst pedestrian access is still limited across the Barangaroo site due to ongoing development works, sections of Mercantile Walk, Wulugul Walk, Shipwright Walk and Barangaroo Avenue have now been opened.

Bicycles

A marked bicycle lane exists along part of Hickson Road and forms part of a cycleway between Circular Quay and Napoleon Street which is utilised by both commuter and recreational cyclists. Cycling connections to the site have been improved through the construction of separated cycleways along King Street and Kent Street by City of Sydney Council (Council). An on-road bicycle lane has recently been installed for eastbound riders (uphill), with a mixed traffic environment in the westbound direction.

The Sydney City Centre Access Strategy (Strategy) outlines the future city centre cycleway network to encourage growth in cycling and reduce pressure on the public transport system. The Strategy's strategic cycleway network map indicates future cycleway connections into Barangaroo will be via the Pyrmont Bridge cycleway and the Harbour Bridge cycleway. These new links are yet to be determined.

2.5 Physical Characteristics

2.5.1 Geology and Geomorphology

Investigation reports prepared previously for the Block 4 Remediation SSD DA (SSD 5897) by AECOM and others provide a detailed analysis of the geological and geomorphological characteristics of the Building R5 site and the Barangaroo site generally.

The Sydney Geological Map Scale 1:100,000 and the Sydney Geological Map Scale 1:250,000 indicate the Barangaroo site is underlain by Hawkesbury Sandstone. Quaternary sediments and man-made fill overlay the Hawkesbury Sandstone.

Previous Geotechnical Reports which considered the Barangaroo site indicate that it is underlain by manmade fill, which is in turn underlain by marine sediment and Hawkesbury Sandstone. The fill material is up to 21m deep and comprises a mix of silt clay, coarse gravel and fragments of concrete, brick, steel, glass and ash.

2.5.2 Site Contamination

A number of site history studies and environmental site investigations have been undertaken to assess the extent and nature of contaminants within the Barangaroo site as a whole, as well as within the Barangaroo South area which includes the site. Investigations revealed that both the soil and groundwater was contaminated, and that the extent of the contaminated materials varied across the Barangaroo site.

Concentrations of lead, total petroleum hydrocarbons (TPHs), benzene, xylenes and polycyclic aromatic hydrocarbons (PAHs) in the soil variably exceeded applicable guideline criteria. The contamination was largely associated with the operation of a former gasworks (which was located to the north east of Stage 1A of the site), and from the importation of materials historically used to fill the Barangaroo site.

In May 2009, the Department of Environment, Climate Change and Water (DECCW) (now the NSW EPA) declared part of the Barangaroo site (part of Blocks 4A, 4B, 4C and 5) and immediately adjacent land within the Hickson Road reservation to be a "remediation site" under the *Contaminated Land Management Act, 1997* (Declaration No. 21122) (known as the 'Declaration Area') (see **Figure 4**). The DA site includes part of the Declaration Area.

Remediation of the Declaration Area is being undertaken as three remediation areas that are in line with the development blocks as identified within Concept Plan (Mod 8). These remediation areas are:

- Block 4;
- Block 5; and
- Hickson Road.

The remediation of that part of the Declaration Area within Block 4 (i.e. the Block 4 Remediation Area) has been approved under SSD 5897. The site the subject of this DA is located within the Block 4 Remediation Area. Remediation of the Block 5 Remediation Area is being assessed as SSD 6533 (currently under assessment by the Department of Planning and Environment) and remediation of part of Hickson Road (the Hickson Road Remediation Area) is to be assessed as SSD 6617 - the EIS has not yet been lodged for the Hickson Road remediation SSD. Remediation of the Block 5 and Hickson Road Remediation Areas is not yet approved.

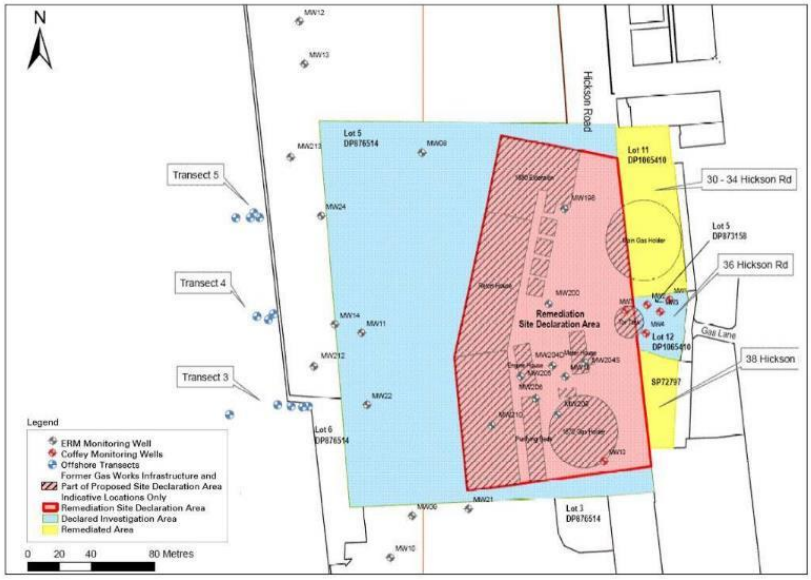

Figure 4 – Declared area

ERM has prepared an Overarching Remedial Action Plan (Overarching RAP) for the Barangaroo site on behalf of the Barangaroo Delivery Authority. The Overarching RAP presents a summary of the contamination issues identified on the Barangaroo site and outlines an approach to the remediation of the site as a whole.

A Site Auditor's Statement has been prepared by Graeme Nyland in relation to the Overarching RAP. The Overarching RAP requires that site specific RAPs be developed for the DECCW Declaration Area and for the other development sites.

In accordance with the requirements of the Overarching RAP, a Site Specific Remedial Action Plan known as the "NSW EPA Declared Remediation Site 21122 and Block 4 (Stage 1B) Development Works, Barangaroo, Millers Point, NSW" has been prepared by AECOM Australia Pty Ltd, dated 24 July 2013 (Stage 1B RAP). The Stage 1B RAP includes the entire SSD DA site. The preparation of the Stage 1B RAP was informed by the Human Health Environmental Risk Assessment, prepared by AECOM, dated 4 July 2011 (HHERA), including the Site Specific Target Criteria (SSTC) that are contained in the HHERA. Remedial works specified within the Stage 1B RAP were approved as part of Block 4 Remediation SSD DA (SSD 5897) in November 2014.

Full details of the nature and extent of soil and groundwater contamination within the site are documented in the AECOM Remedial Action Plan submitted with SSD 5897.

2.5.3 Groundwater and Hydrogeology

The groundwater profile beneath the Barangaroo site is likely to be influenced by the groundwater flow from the east beneath the CBD and tidal fluctuations associated with Sydney Harbour.

Data collected in July 2006 indicates that the depth of groundwater ranged between 1.7m and 2.5m below ground level. Short term variations in groundwater levels were reported particularly close to the sea wall.

A detailed chemical composition of the groundwater was prepared and is addressed in ERM's RAP. In summary, groundwater analysis indicates varying concentrations of contaminates. Detectable concentrations of polycyclic aromatic hydrocarbons (PAHs); benzene, toluene, ethylene and xylene (BTEX) and total petroleum hydrocarbon (TPHs) are limited to the north eastern area of Barangaroo South associated with the former gasworks. Heavy metal concentrations likely to be related to fill materials are present in groundwater across the Barangaroo site.

As identified at Section 1.1.3, the Block 4 Remediation approval (SSD 5897) covers site establishment works within Block 4B (which includes the development site), including de-watering infrastructure and groundwater treatment, and the on-site treatment and remediation of contaminated soils.

This DA is informed by the detailed assessments in relation to groundwater and hydrogeology undertaken as part of SSD 5897.

2.5.4 Soil Landscapes

This SSD DA is informed by the detailed soil assessments undertaken as part of the Block 4 Remediation DA. The 1:100,000 Sydney Soil Landscape Map indicate the Stage 1B site is underlain by disturbed soils.

An Acid Sulfate Soils Management Plan prepared by AECOM in relation to the Block 4 Remediation DA has identified Potential Acid Sulfate Soils (PASS) to be potentially present at depths ranging from -10.58 to 15.36m AHD across the site.

As identified at Section 1.1.3, the Block 4 Remediation Approval includes bulk excavation works below the footprint of the proposed building.

2.5.5 Vegetation

The site is devoid of existing vegetation. All previously existing vegetation will have been removed from the site as part of SSD 5897.

2.5.6 Heritage and Archaeology

Heritage

The approved Concept Plan (MP06_0162) and Demolition Project Application (MP10_0023) comprehensively addressed the heritage significance of the Barangaroo site. The Heritage Impact Statement prepared for the Barangaroo site by City Plan Heritage in 2007 (refer to Demolition Project Application MP07_0077) confirms the Barangaroo South site is not of heritage significance and does not exhibit heritage values (including existing buildings and structures).

The Statement of Commitments for the Concept Plan (as modified) required an Interpretation Strategy to be prepared prior to any works commencing that involve surface disturbance. Accordingly, an Outline Interpretation Plan was prepared by Tanner Architects and was submitted to the Department of Planning and Environment as part of the Environmental Assessment Report (EAR) for the Stage 1A Basement Car Park Project Application (refer to Appendix FF of that EAR). The Outline Interpretation Plan relates to the whole of the Barangaroo South area, including the Building R5 DA site.

As assessment of the potential heritage impacts associated with the proposed development is provided at **Appendix I** and Section 4.11.

Indigenous and Non-Indigenous Archaeology

A Non-Indigenous Archaeological Assessment undertaken by Casey & Lowe and was submitted to the Department as part of the Block 4 Remediation EIS (refer to Appendix S of SSD 5897). That assessment indicated that the development site

contains a significant archaeological resource associated with Australia's first gasworks and nineteenth-century shipbuilding, reclamation and wharfage. However, the nature of the contamination makes it difficult to realise the significance of this resource.

A search of the OEH's Aboriginal Heritage Information Management System (AHIMS) indicates that no known Aboriginal sites have been previously recorded within or in the vicinity of the Barangaroo site or the broader Barangaroo site.

An Aboriginal Archaeological and Cultural Heritage Assessment was prepared by Comber Consultants for the Block 4 remediation application (SSD 5897). That Assessment suggests that the site has no Aboriginal archaeological or cultural heritage potential and that the remediation proposed under SSD 5897, including excavation of the development site area, can proceed without any further Aboriginal archaeological assessment, excavation or testing.

During 2011 and 2012 Casey & Lowe and Comber Consultants undertook a ten month archaeological program of excavation and recording. Following completion of the program there are considered to be no surviving significant archaeological remains within the site. No archaeological issues were identified in the area to the west of the eastern 40m of Barangaroo South.

The Building R5 DA site is considered to have no archaeological potential or significance. As set out above, the Building R5 DA site will be excavated under the Block 4 Remediation consent.

2.6 Surrounding Development

A description of the existing development and future proposed development envisaged under the Concept Plan (Mod 8) is outlined below.

2.6.1 Existing Surrounding Development

The development site is surrounded by the following existing development:

To the north: Block 5 of the Barangaroo site (as defined in Concept Plan (Mod 8)) is currently used as a construction compound for development at Stage 1A of Barangaroo South. Upon commencement of SSD 5897 part of this area will be used as a remediation compound.

To the south: Stage 1A of Barangaroo South. This area is currently a development site which features the following buildings:

- Commercial Building C2;
- Commercial Building C3:
- Commercial Building C4;
- Commercial Building C5;
- Retail Building R1;
- Mixed Use Building R7;
- Residential Building R8;
- Residential Building R9;
- Stage 1A Basement Car Park; and
- Stage 1A Public Domain.

The closest of these buildings to Building R5 is Commercial Building C3. Under the approved Concept Plan (Mod 8), a future building, known currently as Building C1,

is contemplated on land to the east of Building C3, fronting Hickson Road. A development application is yet to be submitted for this building. Full details regarding the current status of each of the buildings is provided in Section 1.1.3.

To the west: The remainder of the Barangaroo site and Darling Harbour.

To the east: Millers Point and the Sydney CBD.

2.6.2 Future Surrounding Development

The future development as envisaged by Concept Plan (Mod 8) for Barangaroo South is indicated on **Figure 5**.

Immediately to the north of the Building R5 site is the future Hickson Park, beyond which lies Central Barangaroo.

To the east of the site lies Hickson Road. On the opposite side of Hickson Road lies a range of commercial and residential uses.

To west of the site will be Residential Buildings R4B and R4A, currently proposed under SSDs 6965 and 6964, respectively. Further to the west lies the Crown Sydney Hotel Resort, Wulugul Walk and Darling Harbour.

Immediately to the south is Watermans Quay, beyond which lies Commercial Building C3 within the remainder of the Stage 1A development.

Figure 5 – Building R5 (red outline) in relation to the Concept Plan (Mod 8) Indicative Building Layout

3.0 Description of the Development

This chapter of the report provides a detailed description of the proposed development. Architectural Drawings and a Design Statement prepared by RPBW are included at **Appendix A**.

This application seeks approval for:

- Construction, use and fit-out of a 29 storey building (RL 105.89) known as Building R5, comprising:
  - 909m^2 retail floor space; and
  - 18,249m^2 residential floor space, including 3,355m^2 of Key Worker Housing floorspace calculated in accordance with the Concept Plan (MP06_0162), as modified by Mod 8.
- Fit-out and use of the Stage 1B basement car park (approval for construction sought under the Stage 1B Basement development application) to accommodate 170 residential car spaces, 1 retail car space, residential and retail storage, waste rooms, facilities management offices, shared plant and services, and circulation spaces.

  Limited demolition of interim basement elements, such as access points and service risers, constructed on a temporary basis under the Stage 1B Basement development application to allow for the integration of the basement elements with the proposed building.
- Interim and permanent landscaping works, including paving immediately surrounding the building and a podium garden.
- Two signage zones to accommodate building identification signage on Watermans Quay and Hickson Road.

A photomontage of Building R5 is shown at **Figure 6**.

Figure 6 – Photomontage of Building R5 (left) including Buildings R4B (centre) and R4A (right)

This SSD DA does not seek approval for development that has been included in the Block 4 Remediation Consent (SSD 5897) or that will be included in the Stage 1B Basement development application (SEARs have been issued for this application) or the Stage 1B Public Domain development application (a request for SEARs has been lodged with the Department for this development application), which encompass:

- All site preparation works, including: demolition, tree removal, remediation, construction of retention walls, bulk excavation, and stormwater diversion.
- Excavation for the Stage 1B Basement, to an estimated maximum depth of RL – 18.85 m, plus piling.
- Construction of basement slabs to accommodate four levels of parking.
- Construction of the loading docks, waste rooms and storage areas.
- Construction of the Stage 1B Residential Buildings' structural cores and associated building services up to ground level.
- Construction of low-rise above ground basement elements, including car park ramps, risers and some building services which will be integrated into the future buildings (i.e. within the podium).
- Interim public domain works around the car park ramps and risers to allow for the potential staging of the construction and occupation of the Stage 1B residential buildings.
- Construction of a permanent stormwater connection from Hickson Road to Darling Harbour. This infrastructure will be located between the Stage 1A basement and the proposed Stage 1B Basement and will replace the temporary stormwater infrastructure that is proposed under the concurrently submitted modification to SSD 5897.
- Construction and connection of associated services, including stormwater drainage.
- Construction of the permanent public domain within Stage 1B, including Hickson Park, Watermans Cove, Watermans Quay, Barangaroo Avenue and Wulugul Walk.

Further, this application does not seek approval for works that form part of the separate but concurrent SSD development applications for Residential Buildings R4A or R4B. In summary, these SSD development applications seek approval for:

- Building R4A (SSD 6964): Building R4A will be a residential tower and podium building of 72 storeys, comprising approximately 327 apartments. The building will have a maximum height of RL 250 and a GFA of 47,882m^2 comprising predominantly residential floor space with retail at ground floor level.
- Building R4B (SSD 6965): Building R4B will be a residential tower and podium of 60 storeys comprising approximately 297 apartments. The building will have a height of RL 210 and a GFA of 39,063m^2 comprising predominantly residential floor space with retail at ground floor level and podium level 1.

3.1 Numerical Overview

Table 2 outlines the key numeric information of the proposed development.

Table 2 – Key development information

Component	Proposal	
Development site area	1,821m^2	
GFA	Total GFA of 19,158m^2, comprising: ▪ 18,249m^2 of residential uses* (including 3,355m^2 of Key Worker Housing floor space) ▪ 909m^2 retail uses*	
Apartments	151, including 39 Key Worker Housing apartments	
Maximum Height	Top of Roof Level	RL 101.140
	Top of BMU	RL 104.47
	Top of Roof Feature	RL 104.47
	Top of Lift Overrun	RL 105.89
	Metres (to top of lift overrun)	102.39 metres
	Storeys	29
Total proposed car parking spaces	Maximum of 171, comprising: ▪ 170 residential ▪ 1 retail	

* As defined by the Concept Plan (MP06_0162), as modified

3.2 Residential Building R5

3.2.1 Height and Massing

Building R5 is the smallest of the three residential towers proposed in Stage 1B, comprising 29 storeys with a maximum height of RL 101.14 (29 storeys) to the top of the roof level. Above this level, the roof scape is 'fringed' by an extension of each of the main curtain walls. The lift overrun has a maximum height of RL 105.89, consistent with maximum height established for Block 4B under Concept Plan (Mod 8) and the State Significant Precincts SEPP.

Building R5 forms part of a composition of three proposed residential towers in Barangaroo Stage 1B, referred to collectively as 'One Sydney Harbour'. The three towers have been conceived as three 'crystals', which will increase in scale from east to west as they move from the mid-rise scale of buildings along Hickson Road towards the Crown Sydney Hotel and Resort at the water's edge. The staggered roof profiles and slim proportions of the three towers will create a dynamic arrangement between the Hotel and commercial towers, and will complete the city frame at its north-western edge.

Building R5 has been designed as a triangular 'crystal' volume, consistent with Buildings R4A and R4B. This form enables the apartments to achieve good access to natural light, ventilation and views, avoids apartments looking onto each other and limits south facing apartments. At the lower levels, a three storey podium wraps around the building beyond the extent of the tower footprint and extends to a maximum height of RL17.830m, which is approximately 14.33m above the future ground plane. The podium will reinforce the urban edges to the adjacent streets, and provide a transitional scale for the towers and the relationship to the adjacent buildings. The podium will accommodate communal residential facilities and retail uses which will activate the surrounding public domain, and provide a more human scale at ground level. Unlike the two other residential towers (being Buildings R4A and R4B), residential apartments are proposed at podium level 2, together with the communal residential facilities.

Collectively, the three One Sydney Harbour buildings have been aligned along the southern boundary of the Stage 1B site, and to the edge of the Concept Plan building envelopes along Watermans Quay, Hickson Road and Barangaroo Avenue. This alignment will allow the buildings to integrate with the adjacent commercial development, and will act to frame the future park, currently referred to as Hickson Park (subject to a separate approval). The proposed siting of the towers will also provide a gateway to the southern precincts of Barangaroo such as Scotch Row, Barangaroo Avenue retail and Watermans Cove. The Plaza between Building R4B and R5 will further enhance connectivity between the commercial and residential precinct, also encouraging pedestrians into Hickson Park from Watermans Quay.

3.2.2 Facades

To express the concept of 'crystals', the One Sydney Harbour Buildings are skinned with a highly transparent glass façade which extends from ground level to beyond the roof line at the top of each tower. The form of the towers is slender and elegant. The verticality of the tower form is emphasised by a narrow modular pattern of fenestration, created by the positioning of delicate mullions behind the glazing.

The triangular geometry of the building footprints is emphasised through the continuation of the façade beyond the internal floorplate to create a feathering effect at the edges, and by application of solid materials to the inset 'notches' at each corner of the two main glazed facades.

Various façade elements including the operable wintergardens, balconies, roller blinds and wind deflectors to balconies will combine to create movement and animation to the tower, contributing to the faceted appearance of the architecture, whilst supporting functionality and occupant comfort. Wind deflectors are proposed to the balconies on the north-western façade, projecting beyond the building envelope by a maximum of 600mm.

The east and north-west facing facades incorporate balconies. These balconies will be permanently open above a fixed glass balustrade. At the penthouse level (level 26) wintergardens are proposed on the north-west and south-east corners. The wintergarden façades comprise of fixed glass balustrades, with vertical sliding planes of glass above which gives occupants the ability to shield the balcony during times when the environmental conditions are not commensurate with balcony use. A mock-up of the wintergarden façade is provided at **Figure 7**.

The facades to the bedrooms comprise of a ventilated cavity system which utilises blinds to minimise glare and heat entering the apartment.

As detailed above, the curtain wall façades have been extended above the roof line to create a glazed 'fringe'.

A materials board has been prepared and is submitted under separate cover. An indicative render of the proposed façade treatment is shown at **Figure 8**.

Figure 7 – A full-scale mock-up of the Wintergarden facade

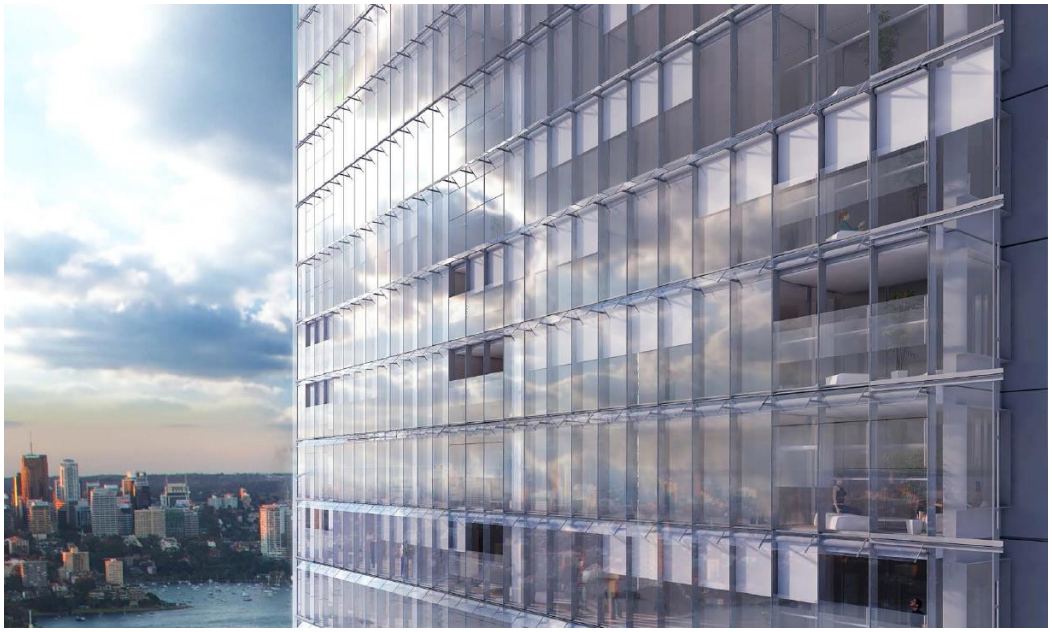

Figure 8 – Façade Render

3.2.3 Gross Floor Area and Use

The proposed development comprises a total gross floor area (GFA) of 19,106m^2. **Table 3** provides a detailed breakdown of the proposed GFA and use on a floor by floor basis. In summary, the key uses within Building R5 are:

- 909m^2 retail floor space; and
- 18,249m^2 residential floor space, including 3,355m^2 of Key Worker Housing floor space calculated in accordance with Concept Plan (MP06_0162), as modified by Mod 8.

Table 3 – Land use and GFA by level

	Use	GFA (m^2)*	Wintergarden GFA
Basement 1	Residential	**33**	**-**
Basement 0	Storage, Plant	**-**	**-**
Ground	Retail	**531**	**-**
	Residential Lobby	**150**	**-**
Podium Level 1	Retail	**378**	**-**
	Plant	**-**	**-**
Podium Level 2	Residential	**716**	**-**
Level 1 - 13	Residential	**675**	**-**
Level 14	Residential	**680**	**-**
Level 15 - 24	Residential	**681**	**-**
Level 25	Residential	**440**	**-**
	Plant	**-**	**-**
Level 26	Residential	**636**	**21.8**
Level 27	Roof Plan	**-**	**-**
Total Internal GFA*	-	**19,159**	**-**
Total Wintergarden GFA	-	**-**	**21.8**
Total GFA	-	**19,179.8**	

* As defined by the Concept Plan (MP06_0162), as modified.

The podium levels of Building R5 will include a mix of retail uses and communal resident facilities, as well as a small component of residential uses.

The ground floor and level 1 will accommodate a mix of retail uses, the majority of which are anticipated to comprise café and restaurant uses. The fit-out and use of these retail spaces will be the subject of future approvals, where required. The architectural drawings submitted with this application include a series of ground floor shopfront design typologies, with additional indicative shop front typologies included in the Design Statement at **Appendix G**. Further details are proposed to be submitted for approval prior to the issue of the relevant Construction Certificate.

A range of communal resident facilities including a residents' lounge are proposed for podium level 2, with a landscaped terrace over the part slab created as part of the Stage 1B Basement consent (for basement risers and substation). Three residential apartments are also proposed at podium level 2.

Wintergardens are proposed at the penthouse level (level 26) to ensure environmental conditions are suitable and controllable by the residents throughout the year. These are technically defined as GFA under the Standard Instrument Local Environmental Plan, and are therefore considered in terms of compliance with the Development Block GFA limits set by *State Environmental Planning Policy (State Significant Precincts) 2005*. However, under Concept Plan (Mod 8) there is no limit on Wintergarden GFA, and so they do not contribute towards the total GFA limit per Development Block provided for by Concept Plan (Mod 8).

3.2.4 Dwelling Mix

Table 4 provides a detailed breakdown of the proposed number of apartments and dwelling mix in Building R5.

Table 4 – Apartments and dwelling mix

Building R5	1 Bedroom	2 Bedroom	3 Bedroom	Penthouse	Total
On Market Apartments	24	61	26	1	116
Key Worker Housing	26	13			39
Mix (%)	33.1	49	17.2	0.7	100%

3.2.5 Setbacks

Residential Building R5 is modulated with a series of setbacks which range in depth. Building R5 is built to the eastern, southern and south –western block boundaries with varying setbacks to the northern and north-western block boundaries providing articulation at the interface.

A summary of the relevant Building R5 setbacks are provided in **Table 5**.

Table 5 - Relevant building setbacks

Boundary	Minimum Building Setback (m)
Northern Block 4B boundary	6m
North-eastern Block 4B boundary	3m
South-eastern Block 4B boundary	0m
Southern Block 4B boundary	0
South-western Block 4B boundary	2m
Western Block 4B boundary	7.2m

* As detailed above, the fritted solar shades to the north- western façade extend beyond the building envelope boundary by up to 600mm. The ground levels awnings on these facades also extend beyond the building envelope boundary by 2 metres.

3.2.6 Landscaping

The proposed landscaping in Building R5 is shown on the Landscape Plans prepared by Grant Associates at **Appendix P**. It includes the following permanent works:

- Granite paving around the perimeter of the building within the Concept Plan (Mod 8) Development Block, to match the City of Sydney paving, as implemented within Stage 1A Barangaroo South; and
- A landscaped garden on podium level 2.

The landscaped garden on podium level 2 is a key feature of the proposed landscape scheme (refer to **Figure 9**). It has been designed as a private garden, which will provide a variety of spaces and experiences for residents, providing respite and refuge from the CBD environment.

Figure 9 – Podium landscape garden

The garden will feature a large lawn area, surrounded by beds featuring a range of exotic and native flowering plants that offer dramatic colour displays throughout the year. The combination of hard paved areas, garden beds, raised lawns and planters will distinguish different use zones, whilst also providing adequate soil depth for substantial shrub planting.

Interim public domain is also proposed to complement the permanent landscaping described in this section. Refer to Section 3.3 below.

3.2.7 Pedestrian Access

The residential lobby to Building R5 is located off the triangulated pedestrian Plaza located between Buildings R4B and R5. A second lobby entry is provided on Hickson Road, providing access to the thirteen levels of Key Worker Housing on the eastern side of the building. The Hickson Road lobby is within the colonnade, which will assist in defining the entry and enhancing the pedestrian experience.

Pedestrian access to the retail areas will be via the retail frontages directly from Hickson Road, Watermans Quay and Hickson Park.

3.2.8 Pedestrian Plaza and Colonnade

A pedestrian Plaza is proposed between Buildings R4B and R5, aligning with the entrance of the neighbouring commercial building. Development consent for the detailed design of the Plaza will be sought as part of the future Stage 1B Public Domain development application. The Plaza will enhance the fine grain structure between the tower forms, visually break down the mass between Buildings R4B and R5, and provide visual and physical connectivity to Hickson Park. An indicative view of the Plaza is provided at **Figure 10**.

Along Hickson Road, a pedestrian colonnade is proposed in line with the eastern façade of the tower to provide weather protection and improve the pedestrian environment. The colonnade will also provide continuity with development in the southern part of the Barangaroo site.

Figure 10 – The entrances to Buildings R4B and R5, as viewed from the future Hickson Park

3.3 Interim Public Domain

Broader interim public domain works are proposed as part of the concurrent Stage 1B Basement DA, which will include landscaping of Hickson Park, the provision of part of Barangaroo Avenue.

As Stage 1B will be delivered in a phased manner, the surrounding curtilage of Building R5 will need to strike a balance between providing good amenity and access for residents and allowing for progress on the successive stages of works within the precinct.

To that end, an 'interim' public domain solution is proposed for the footpaths and pedestrian areas adjacent to the building to the north and south-west, as shown on the Interim Landscape Drawings at **Appendix P** and illustrated in **Figure 11** below. It features paving finishes to the ground plane outside Concept Plan (Mod 8) Development Block, compatible with the Stage 1A Public Domain and City of Sydney Council's public domain and streetscape palette. It also features tree planting adjacent to the building, in order to soften and green the public domain.

Ultimately, the permanent public domain will be provided outside the Development Block through the future Stage 1B Public Domain application. The detailed requirements of the SEARs, relating to items such as outdoor seating, furniture and fixtures, steps, ramps, vehicle crossings, decks and pathways are not relevant to the scope of this DA, and will be addressed as part of the future Stage 1B Public Domain application.

Figure 11 – Building R5 interim and permanent landscape areas

3.4 Vehicular Access and Parking

Vehicular Access

The construction of part of Barangaroo Avenue will be undertaken as part of the Stage 1B Basement DA.

Watermans Quay and Barangaroo Avenue within the Stage 1A site will be constructed as part of the approved Stage 1A Public Domain SSD.

As part of the Stage 1B Public Domain DA, Watermans Quay is proposed to be widened to accommodate traffic from Stage 1B and the intersection with Hickson Road is proposed to be signalised. Barangaroo Avenue is also proposed to be extended south to connect with that part of Barangaroo Avenue that has been constructed under the Stage 1A Public Domain consent

Vehicular entrances to the Stage 1B Basement car park will be provided off Watermans Quay, with the driveway entry forming part of Building R4B. Car spaces in Building R5 can be accessed through the driveway forming part of Building R4B. The driveway and associated structure will be constructed initially as part of the Stage 1B Basement SSD DA and integrated into the structure of Building R4B, when it is being constructed.

Car Parking

The construction of the Stage 1B Basement car park is the subject of the concurrent Stage 1B Basement SSD DA. The number of parking spaces within the basement to be allocated to Building R5 has been determined having regard to the approved car parking rates in Concept Plan (Mod 8). A maximum of 171 parking spaces will be provided within the basement, comprising:

- 170 residential spaces; and
- 1 retail spaces.

A breakdown for how the above parking provision has been calculated using the Concept Plan rates is provided in Section 4.10.

A range of shared loading facilities will be provided within the basement.

Bicycle Parking

Bicycle parking for residents will be provided as part of their storage cages, which will be located within the basement. There will also be public bicycle parking provided as part of the future Stage 1B Public Domain SSD DA for short term visitor use. In accordance with the Concept Plan rates, no retail tenant bicycle parking is required.

Motorcycle Parking

Whilst no dedicated motorcycle parking spaces are proposed, there will be adequate space for residents to park motorcycles in the residential storage cages, or within their designated car parking spaces.

3.5 Building Services and Infrastructure Provision

All infrastructure provision to Building R5, including water, gas, electricity and communications, will be provided as part of the Stage 1B Basement DA works. Building R5 will connect to this basement infrastructure. The following services are provided within the building, as outlined in the Services Report prepared by Lendlease Building (**Appendix R**).

Water

The existing water supply to the Barangaroo site is supplied from a 300mm diameter Sydney Water main in Hickson Road. A new 250mm diameter ring main will be constructed within Stage 1B, and connected to this existing main.

Sewer

No connection to Sydney Water's sewerage system will be required to service Building R5. Connections will be made to the Barangaroo South Recycled Water Treatment Plant (RWTP) via a network of sewerage mains within the Stage 1B and Stage 1A Basements.

Electricity

Power to the Barangaroo South Stage 1A development is provided by Ausgrid 33kV feeders originating at Pyrmont Switching Station. These feeders will be upgraded to service the additional load of the Barangaroo South Stage 1B development, subject to agreement with Ausgrid.

The Barangaroo South Stage 1B development will be provided with incoming power from the Barangaroo South Stage 1A private high voltage embedded network infrastructure, which will be carried out under the Stage 1B Basement application. A substation will be established at the podium level of Building R5 (as part of Stage 1B Basement DA) to service the residential buildings, retail and associated uses.

Telecommunications

The Stage 1B precinct will be serviced with incoming telecommunications services by Telecommunications Service Providers (TSPs) under the Stage 1B Basement DA. Lead-in cabling will enter the site via a bank of ducts to meet the TSP's service requirements. The sizing, quantity and configuration will be agreed with the stakeholders and proposed carriers.

Building R5 will be serviced from the Barangaroo South Stage 1B Precinct Entrance/Campus Distribution Room (CDR) located in the Stage 1B Basement.

Natural Gas

A new low pressure gas main will be constructed above the Stage 1B Basement and will connect to the existing 110mm low pressure gas main in Hickson Road.

Mechanical

Chilled water pipework will reticulate from the basement heat exchanger and chilled water pump room throughout the building via chilled water pipe risers for the tenant air conditioning systems.

The residential apartments will be provided with a centralised toilet exhaust system to serve the bathrooms, powder rooms and laundries. A general exhaust system comprising of exhaust risers serving kitchen range hood in multiple apartments will be provided. The exhaust will be ducted to the plant room where it is filtered from grease and treated for odours prior to discharge to the outside.

Fire

The fire services for the building include fire detection, sprinkler services, fire hose reels, hydrants and a booster valve system for fire brigade connection. All services will be connected to the basement infrastructure and monitored by the precinct wide operations. Both the sprinkler and detection system will be reticulated throughout the entire Building R5 and commissioned prior to practical completion.

The entire building is to be protected by an automatic sprinkler/hydrant installation complying with the requirements of the National Construction Code and relevant Australian Standards, including AS2118.6.

Lifts

Building R5 will be provided with four lifts to achieve a level of service commensurate with similar premium developments around the world. The passenger lifts will be able to stop at all levels of the podium to enable direct access to amenities.

A separate 1600kg retail goods lift is proposed which will operate independently of the residential tower lifts.

Security

Building R5 and the associated basement will be provided with standalone access control, intruder detection and CCTV services. Building entry points will be provided with Internet Protocol based video intercom call stations which will allow communication to individual apartments.

3.6 Signage Zones

Indicative primary signage zones are provided on the Building R5's south-west elevation, fronting the Plaza off Watermans Quay and on the eastern (Hickson Road) elevation (refer to **Figure 12** and **13**). Details of the primary signage will be provided to the Secretary for approval, prior to the issue of the relevant Construction Certificate. The detailed signage plans will be accompanied by an assessment against the provisions of SEPP 64. The future signs will assist in identifying the main entry points for the on-market and Key Worker Housing components of the building, and will act as an important way-finding device.

To ensure signage will be compatible with the architecture of the building and with other signage across the precinct, secondary building identification (such as wayfinding and under awning signage) and retail tenant signage will form part of a future signage strategy to be approved by the Department pursuant to a condition of consent. This is consistent with the approach applied on the commercial tower and residential buildings within Stage 1A Barangaroo South.

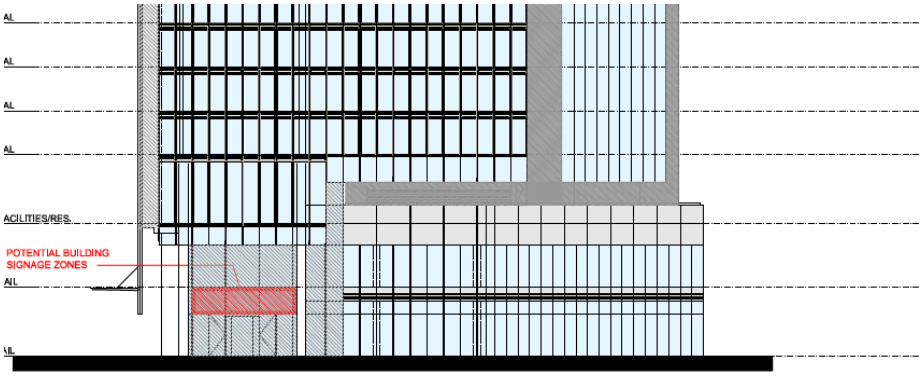

Figure 12 – Watermans Quay building signage zone

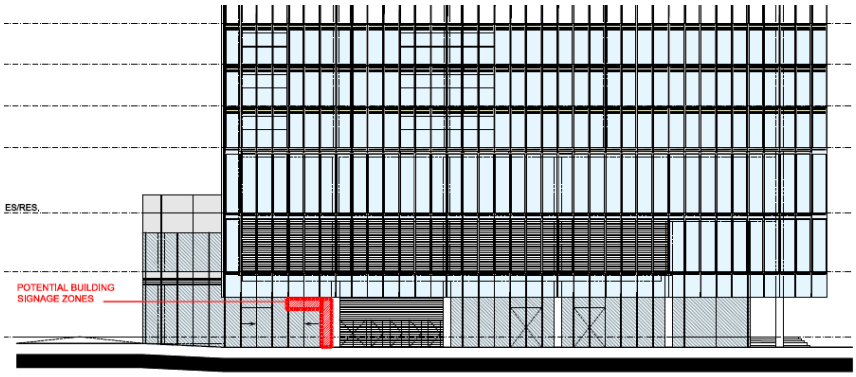

Figure 13 – Hickson Road building signage zone

3.7 Operational and Construction Waste Management

A Waste Management Plan (WMP) has been prepared by ARUP and is included at **Appendix V**. The WMP identifies the waste quantities and waste space allocation requirements, as well as waste minimisation and management procedures.

3.7.1 Operational Waste

Residential Waste Generation and Storage

ARUP has estimated that the residential component of Building R5 will generate 2,610L/day of mixed general waste and 2,610/day of comingled recycling waste. Storage provision for the residential component will comprise:

Tenant Waste Collection Rooms

Each residential level will host a tenant waste collection area, which will include:

- access to the dual system waste chute via a hand loaded compartment; and
- space for temporary storage of larger recyclables such as flattened cardboard boxes.

R5 Residential Garbage Room

A residential garbage room will be located at basement level 1. This room will receive waste and recycling from residential areas via a dual system waste chute. It will accommodate:

- general waste: 4 x 660L rotary compactor;

- general waste bins: 6 x 660L; and
- co-mingled recycling bins: 44 x 240L.

Recycling and landfill waste streams will be clearly segregated within the room using barriers and colour coded bins.

Retail Waste Generation and Storage

ARUP has estimated that the retail component will generate 1,440L/day of mixed general waste, 540L/day of comingled recycling waste, 560L/day of paper and cardboard recycling and 380L/day of organic waste. Storage provision for the retail component will comprise:

R5 Retail Waste Storage Room

A retail waste storage room will be located at basement level 1. This room will receive waste from retail areas of Building R5 via manual handling of bins from individual tenancies and use of a goods lift. Waste will be stored in the retail waste storage room prior to collection. It will accommodate:

- general waste: 5 x 660L bins;
- organic waste: 2 x 240L bin;
- co-mingled recycling: 5 x 240L bins;
- paper and card recycling: 2 x 660L bin; and
- cardboard baler.

Storage for Bulky and Electronic Waste

A storage room will be provided on basement level 1, in close proximity to the waste storage room for the interim storage and management of bulky waste items such as mattresses and large boxes.

Operational Waste Management

Operational Waste management will generally accord with the City of Sydney's Waste Guidelines and will be managed in the following way:

- General and co-mingled waste will be transferred from the upper residential levels to the residential compactor rooms at basement level 1 via the dual system residential waste chute. The bins will then be moved from the central storage room to the bin collection area in the loading dock by building management to await collection.
- General and co-mingled waste from the retail tenancies will be transferred from the tenancies to bins in the basement waste storage room via manual handling and goods lifts. Bins will be transferred directly to the loading dock and waste collection truck by waste collection contractors.
- Organic waste generated by retails tenants will be collected in dedicated 240L organic waste bins and transferred to the central waste storage room in basement 1 for collection.
- Cardboard and paper recycling from the retail tenancies will be collected separately wherever possible and transferred to the cardboard baler in the central retail waste room. Cardboard baling equipment will be utilised only by trained staff members.
- Waste and recyclables collection will be undertaken by the City of Sydney or a private contractor. The frequency of collection varies for the different uses and waste types, ranging from 5 times per week for organic retail waste, to 2 times per week for residential co-mingled recycling, and on an as-needs basis for hard rubbish and bulky waste.

3.7.2 Construction Waste

Construction waste will be managed in accordance with the project's Green Star objectives, particularly in regards to use of recycled building materials and recycling of construction waste streams. The primary goal for waste management in the construction phase is to ensure at least 80% of waste is recycled or reused.

Construction waste management is addressed in detail at Section 4.19.

3.8 Construction Hours

In accordance with the Construction Framework Environmental Management Plan prepared by Lendlease at **Appendix U**, construction works are proposed to be undertaken between the hours of 7.00am and 7.00pm Monday-Friday and between 7.00am and 5.00pm on Saturdays. No work will be undertaken on Sundays or public holidays. These construction hours are consistent with those approved across Stage 1A of Barangaroo South and City of Sydney Council's policy. The potential impacts of construction during these hours have been assessed in this EIS.

Notwithstanding this, in areas that have been enclosed by the building façade, internal works may be carried out outside of these standard construction hours, consistent with what has occurred across Stage 1A.

3.9 Construction Hoardings

The construction site will be secured by Class A hoardings. The conceptual treatment of the hoardings will be designed to improve the appearance of the site in the streetscape throughout the construction phase and provide transparent view points of the site for the community. It will include information about Barangaroo South and its aspirations, such as sustainability, community engagement, heritage and the overall ambitions of the development, all of which may be updated from time to time. It may incorporate elements of public art as part of the graphic installation but will not include any third party advertising material.
A maintenance regime will be implemented to ensure the appearance and integrity of the hoarding is maintained. The final graphic treatment for the hoardings and any future changes will be submitted to the Secretary of the Department for approval prior to its implementation on site.

This approach is consistent with the exemplary approach to hoarding treatments that has been implemented in Stage 1A Barangaroo South.

4.0 Environmental Assessment

This section of the report assesses and responds to the environmental impacts of the proposed development. It addresses the matters for consideration set out in the SEARs including relevant EPIs, policies and guidelines (see Section 1.6).

The mitigation measures at Section 6 supplement the findings of this section.

As detailed at Section 3.0 of this EIS, the lodgement of this SSD DA follows approval of the Block 4 Remediation SSD DA and it has been lodged concurrently with the Stage 1B Basement SSD DA. The Block 4 Remediation SSD consent allows for demolition works, site establishment, bulk earthworks, onsite treatment and remediation of contaminated soils. The Stage 1B Basement DA proposes the construction of the Building R5 core (up to ground level), a basement car park and associated services and infrastructure to support Building R5.

The Block 4 Remediation SSD DA and Stage 1B Basement Car Park DA provide detailed information and environmental assessment of a number of planning and environmental issues, including, relevantly the following:

- demolition, part excavation and tree removal;
- remediation of contaminated material;
- non-indigenous archaeology;
- indigenous archaeology;
- geotechnical impacts;
- acid sulphate soils; and
- de-watering, groundwater treatment and water quality.

This SSD DA is informed by the detailed assessments included in the Block 4 Remediation and Stage 1B Basement applications to the extent that they are relevant to the proposed development. Consideration has also been given to the environmental assessments for Buildings R4A and R4B which, together with Building R5, will complete the composition of the three towers.

4.1 Relevant EPIs, Policies and Guidelines

Table 6 demonstrates that the proposed development will comply with / is consistent with the relevant strategies, environmental planning instruments, and Concept Plan as set out in the SEARs.

Table 6 – Summary of consistency with relevant Strategies, EPIs, Policies and Guidelines

Instrument / Strategy	Comments
Strategic Plans	
NSW 2021	NSW 2021 is a 10 year plan to rebuild the economy, provide quality services, renovate infrastructure, restore government accountability, and strengthen our local environment and communities. The Barangaroo site has an important role in the NSW 2021 Plan as it will assist with achieving multiple goals set out in the Plan, including but not limited to improving the performance of the NSW economy, increasing the competitiveness of doing business in NSW, providing critical infrastructure and building liveable centres. As discussed in Section 1.2, Building R5 plays a role in the success of Barangaroo South and achievement of the above goals. In addition Building R5 will directly contribute to the goal of providing housing, including key worker housing, in a central location.
Plan for Growing Sydney	The SSD DA is consistent with the Plan for Growing Sydney, as it will deliver a residential building within Barangaroo South which is identified as a key element of

Instrument / Strategy	Comments
	maintaining Sydney's global reputation, as per Direction 1.1 of the Plan for Growing Sydney. Additionally, Building R5 is consistent with Action 2.1.1 in that it will contribute to the dwelling target of an additional 664,000 new dwellings by 2031 in Sydney. Further, the proposed Building R5 provides dwellings within the Sydney CBD centre which are close to jobs and well serviced by public transport, which are considered within the Plan for Growing Sydney to be the most suitable areas for such development.
Draft Sydney City Sub-Regional Strategy	The SSD DA is consistent with the Draft Sydney City Subregional Strategy as it will deliver a building at Barangaroo South which is identified in the Draft Strategy as a major development opportunity to conduct a focused and considered renewal process aimed at generating a new urban precinct in Australia's premier city.
NSW Long Term Master Transport Plan	The NSW Long Term Transport Master Plan provides a framework for delivery of integrated and modern transport systems. Given the proximity of the site to existing and planned public transport services, the proposed development will support the proposed actions contained within the Plan.
Sydney's Cycling Future	Sydney's Cycling Future was released in December 2013, and outlines the intent to create a safer and easier bicycle riding experience for the people of Sydney. Bicycle parking for residents will be provided as part of their storage cages, which will be located within the basement. There will also be public bicycle parking provided as part of the future Stage 1B Public Domain SSD for short term visitor use.
Sydney's Walking Future	Sydney's Walking Future was released in December 2013, and seeks to make walking the transport choice for quick trips under two kilometres and help people access public transport. Given the proximity of the site to the CBD, existing and planned pedestrian connections and public transport services, the proposed development will support the proposed actions contained within the Plan.
Sydney City Centre Access Strategy	The proposed development is consistent with the Sydney City Access Strategy, encouraging the use of existing and future public transport linkages in close proximity to the site. The Strategy seeks to connect Barangaroo to the city centre and Sydney transport network through the following infrastructure: – Wynyard Walk, which will provide a direct, accessible pedestrian connection between Barangaroo and the Wynyard Station interchange precinct; – New bus routes serving Barangaroo and Walsh Bay; and – A new Barangaroo ferry hub and new routes to provide more opportunities to access Barangaroo and the mid-town precinct by public transport. The proposal is consistent with the Strategy, providing housing in a location highly accessible to existing and planned public transport and employment. The proposal will not impact on the ability for the Government to deliver the planned infrastructure and service upgrades as part of the Strategy
Barangaroo Integrated Transport Plan	The Barangaroo Integrated Transport Plan (BITP) addresses a range of transport modes and recommends actions in the areas of walking, cycling, traffic and taxi access, Wynyard Bus Interchange, ferry services, light rail and bus services, Wynyard Station upgrades, rail capacity and a Transport Square Interchange on the western foreshore of the CBD. The development is consistent with the mode share targets that were established under the Concept Plan that are reinforced in the BITP.
Barangaroo Housing Strategy	The proposal's consistency with the Barangaroo Housing Strategy is considered in Section 4.2. The document is not managed by Lendlease and is now outdated. As a result, it is not appended to this application. Notwithstanding this, the relevant provisions are addressed in this report.
State Legislation	
EP&A Act	The proposed development is consistent with the objects of the EP&A Act for the following reasons: – it reflects the proper development of the site for the purpose of promoting the social and economic welfare of the community and a better environment; and – it will ensure the promotion and co-ordination of the orderly and economic use and development of land.

<table>
<tr><th>Instrument / Strategy</th><th>Comments</th></tr>
<tr><td></td><td>The proposed development is consistent with Division 4.1 of the EP&A Act, particularly for the following reasons:
– the proposed development has been declared to be of State significance;
– the development is not prohibited by an environmental planning instrument; and
– the development has been evaluated and assessed against the relevant heads of consideration under section 79C.</td></tr>
<tr><td>EP&A Regulations</td><td>The EIS has addressed the specification criteria within Clause 6 and Clause 7 of Schedule 2 of the EP&A Regulation. Similarly, the EIS has addressed the principles of ecologically sustainable development through the precautionary principle (and other considerations), which assesses the threats of any serious or irreversible environmental damage (see Section 7.3).

As required by Clause 7(1)(d)(v) of Schedule 2, and as set out below, no additional approvals will be required in order to permit the proposed development to occur.

<table>
<tr><th>Act</th><th>Approval Required</th></tr>
<tr><td colspan="2">Legislation that does not apply to State Significant Development</td></tr>
<tr><td>Coastal Protection Act 1979</td><td>N/A</td></tr>
<tr><td>Fisheries Management Act 1994</td><td>N/A</td></tr>
<tr><td>Heritage Act 1977</td><td>N/A</td></tr>
<tr><td>National Parks and Wildlife Act 1974</td><td>N/A</td></tr>
<tr><td>Native Vegetation Act 2003</td><td>N/A</td></tr>
<tr><td>Rural Fires Act 1997</td><td>N/A</td></tr>
<tr><td>Water Management Act 2000</td><td>N/A</td></tr>
<tr><td colspan="2">Legislation that must be applied consistently</td></tr>
<tr><td>Fisheries Management Act 1994</td><td>No</td></tr>
<tr><td>Mine Subsidence Compensation Act 1961</td><td>No</td></tr>
<tr><td>Mining Act 1992</td><td>No</td></tr>
<tr><td>Petroleum (Onshore) Act 1991</td><td>No</td></tr>
<tr><td>Protection of the Environment Operations Act 1997</td><td>No</td></tr>
<tr><td>Roads Act 1993</td><td>No</td></tr>
<tr><td>Pipelines Act 1967</td><td>No</td></tr>
</table>
</td></tr>
<tr><td>SEPP 55</td><td>As identified at Section 2.5 of this EIS, the Block 4 Remediation Approval provides for the remediation of all contaminated material within the site to make it suitable for the proposed use of the land, as required by Clause 7 of SEPP 55.

The remedial strategy set out in the Stage 1B RAP contemplated residential uses within Block 4B. As the proposed development is for a predominantly residential use it is consistent with the future use provided for under the Stage 1B RAP and satisfies Clause 7(2) of SEPP 55.</td></tr>
<tr><td>SEPP 64</td><td>SEPP 64 applies to all signage which, under an environmental planning instrument, can be displayed with or without development consent and is visible from any public place or public reserve. The Architectural Drawings (Appendix A) identify zones for signage which illustrate the indicative location and size of future signage.
Under clause 8 of SEPP 64, a consent authority must not grant consent for any signage application unless the consent authority is satisfied that the proposal is consistent with the objectives of the SEPP and with the assessment criteria which are contained in Schedule 1.

The proposed signage is consistent with the objectives of SEPP 64 and satisfies the criteria specified in Schedule 1 of the SEPP as follows:
– the provision of signage is consistent with the desired future character for new buildings within the Barangaroo site;
the proposed signage zones sit within the building envelope, and will not dominate the skyline or reduce the quality of vistas;
– the proposed signage has been located in the most architecturally appropriate locations to assist in place identification and wayfinding; and</td></tr>
</table>

Instrument / Strategy	Comments	
	– any illumination of future signage will be fully integrated with the building structure	
SEPP 65	A Design Verification Statement is included at **Appendix E**. The Statement demonstrates that the proposed development is consistent with the principles in the SEPP. The Residential Flat Design Code has now been replaced by the Apartment Design Guide (ADG). An assessment of the proposal against the Design Criteria and Objectives in the ADG is provided in Section 4.7.1. The Assessment shows the development is generally consistent with the Objectives and Design Criteria in the ADG and will achieve a high level of residential amenity.	
State Significant Precincts SEPP	The Barangaroo site is listed as a State Significant Site under Part 12 of Schedule 3 of the State Significant Precincts SEPP. The following is an assessment of the proposal's compliance against the State Significant Precincts SEPP	
	Clause 8 - Zone B4 Mixed Use	The proposed shop top housing, comprising ground level retail with residential uses above is permissible and consistent with the objectives of the B4 Mixed Use zone.
	Clause 17 - Height of buildings (Maximum RL 107)	The maximum RL to the top of Building R5's roof level is RL 101.14 however the building incorporates an architectural roof feature and lift overrun resulting in a maximum RL of 105.89, and is therefore consistent with Clause 17 of Concept Plan (Mod 8).
	Clause 18 - Gross Floor Area Restrictions - Maximum 20,970m^2 (across Block 4B)	The total GFA of Building R5, including wintergardens, is 19,179.8m^2 and is therefore consistent with the maximum GFA restriction for Block 4AB.
	Clause 19 - Design Excellence	The proposed development demonstrates Design Excellence in accordance with Clause 19. See Section 4.4.2.
SEPP (Infrastructure)	The relevant matter for consideration within SEPP Infrastructure is the referral requirements for Traffic Generating Development (Schedule 3). Residential apartments and flat buildings with more than 300 dwellings require referral to the RMS. Building R5 contains 151 apartments, and so does not require referral to the RMS for comment.	
SEPP (State and Regional Development)	Development that has a capital investment value (CIV) of more than $10 million on land identified as being within a State Significant Development Site is State Significant Development under Schedule 2 of *State Environmental Planning Policy (State and Regional Development) 2011* (State and Regional Development SEPP). Accordingly, as the development has a CIV in excess of $10 million this development is State Significant Development.	
SEPP BASIX	A BASIX Certificate has been provided at **Appendix F**, demonstrating that the proposed development meets all relevant requirements.	
Sydney Harbour REP	Clause 20 General	The matters referred to in Division 2 are addressed below.
	Clause 21 Biodiversity, ecology and environment protection	The proposed mitigation measures set out in Section 6 will ensure the development will not have any adverse impact on the Harbour's biodiversity, ecology or environment.
	Clause 22 Public access to, and use of foreshores and waterways	The development is consistent with the Concept Plan which provides improved pedestrian access within Barangaroo and the foreshore, and is therefore considered entirely consistent with Clause 22.
	Clause 23 Maintenance of a working harbour	The proposed Building R5 forms part of the redevelopment of the wider Barangaroo site for mixed uses that was assessed as part of the Concept Plan for the site.
	Clause 24 Interrelationship of water and foreshore uses	The proposed development will not have any adverse impacts on the use of waterway for maritime functions. The development is located away from the foreshore.
	Clause 25 Foreshore and waterways scenic	This application seeks to provide a high quality new building that will contribute to the scenic quality of the waterway.

Instrument / Strategy	Comments	
	quality	
	Clause 26 Maintenance, protection and enhancement of views	The proposed development is consistent with Concept Plan (Mod 8). It will also provide new views to the Harbour from the new building. A View and Visual Impact Assessment is provided at **Appendix H**, and is discussed at Section 4.5.
	Clause 27 Boat storage facilities	N/A. No boat storage facilities are proposed.

4.2 Barangaroo Concept Plan

Under the Transitional Provisions for Part 3A in Section 6A of the EP&A Act, the consent authority must not grant consent to development under a Part 3A Concept Plan unless it is generally consistent with the Concept Plan.

The following section provides an assessment of the proposal against the Concept Plan. The section demonstrates that the proposed development is generally consistent with the approved Concept Plan.

4.2.1 Numeric Concept Plan Controls

Table 7 provides a comparison of Building R5's consistency with the Concept Plan numerical controls.

Table 7 – Compliance with Concept Plan (Mod 8) Block 4B Concept Plan Controls

Block 4B Concept Plan (Mod 8) Control	Building R5	Block 4B Cumulative Total	Compliance
Maximum Residential GFA – 18,287m^2	18,249m^{2*}	18,249m^{2*}	✓
Maximum Available Balance GFA – 871m^2	909	909	✓
Maximum GFA – 19,158m^2	**19,158m^{2}***	**19,158m^{2}***	✓
Maximum height – RL107	RL 105.89	-	✓
Minimum Setbacks Northern block boundary Eastern block boundary Southern block boundary Western block boundary	 6m 0m 0m 3m	-	✓

* Calculated in accordance with the Concept Plan (MP06_0162), as modified.

The Barangaroo Concept Plan also includes maximum GFAs for specific uses across the entire Barangaroo site, as well as Barangaroo South. A detailed reconciliation between the proposed and approved GFAs and the maximums in the Concept Plan are provided in Section 4.3. The Section demonstrates that the proposal is below these maximums and is therefore consistent with the Concept Plan (Mod 8).

4.2.2 Built Form Principles and Urban Design Controls

The Concept Plan requires future applications to demonstrate consistency with the Built Form and Urban Design Controls (Urban Design Controls). The Urban Design Controls provide an integrated performance framework in which to consider each development application on its merits.

An assessment against each of the relevant sections of the Urban Design Controls is provided below. The assessment demonstrates that the proposed development is consistent with the Urban Design Controls.

Urban Design Controls

Table 8 provides an assessment of the proposal against the objectives and standards for Block 5 in Section 5 of the Urban Design Cotnrols. Where alternative solutions are proposed they are identified in the table and discussed in further detail below the table.

Table 8 – Consistency with Urban Design Controls

Concept Plan (Mod 8) Blocks 4A & 4B Controls	Residential Building R4B	Comment
Control 1 Building Mass and Location		
Objectives:		
The orientation and location of the buildings relate to the fan principle.	The orientation and siting of the building is consistent with the fan principle, aligning with the southern side of the future Hickson Park. The fan principle provides optimum solar access and view sharing for the buildings, and a strong frame and address for Watermans Quay.	Consistent
To ensure building mass is appropriate within the envelope.	The proposed building is within the building envelope established by Concept Plan (Mod 8).	Consistent
The podium shall be low to allow sunlight penetration through the buildings to the public domain	The podium is limited to a maximum height of RL 17.83m, which is approximately 14.3m above the future ground plane. The scale of the podium, and position of the buildings to the south of the future Hickson Park, will allow ample sunlight to the public domain.	Consistent
Building placement to consider existing view corridors from Kent Street buildings	The placement of Building R5 is consistent with Concept Plan (Mod 8) which has given consideration to view corridors from existing buildings along Kent Street.	Consistent
To ensure the vertical massing form is an integral part of the composition of towers in Block 4A.	The vertical massing of the building is emphasised by the slender tower form, and separation between the towers which provides for sky views. The verticality of the tower form is further emphasised by a narrow modular pattern of fenestration.	Consistent
Ensure clear views to the sky between all towers.	Clear sky views have been maintained between residential Buildings R4A, R4B and R5.	Consistent
Allow balconies on towers including residential and / or tourist and visitor accommodation GFA to be partially enclosed without the need to include balcony floor area as GFA.	Noted. Building R5 includes partially enclosed balconies, which have been excluded from the calculation of GFA.	
Standard:		
The height of the towers within the block shall be varied and ascend in height from east to west	The towers ascend in height from east (Building R5 at RL 105.89) to west (Building R4A at RL 250).	Consistent
Towers in Block 4A shall have a minimum of 30m variation in height	Not applicable – Building R5 sits outside of Block 4A.	N/A
Towers proposed in Block 4A should be separated by a minimum of 9m.	Not applicable – Building R5 sits outside of Block 4A.	N/A
All predominant tower massing shall provide a minimum of 27m separation from the Block Y tower massing.	A separation of 27m is provided between the Crown Sydney Hotel and Resort on Block Y, and the nearest residential building - Building R4A.	Consistent
All predominant tower mass shall be set back from Watermans Quay by a minimum of 4m with no projections into this setback zone.	The tower mass of Building R5 is setback over 4m from Watermans Quay.	Consistent

Concept Plan (Mod 8) Blocks 4A & 4B Controls	Residential Building R4B	Comment
Block 4A podium buildings are to have a maximum height of RL 22.	The podium is limited to a maximum height of RL 17.83m, which is approximately 14.3m above the future ground plane.	Consistent
Podiums shall be built to the edge of the envelope on Watermans Quay.	Building R5, in conjunction with proposed Building R4B, does not provide a continuous podium to the edge of the envelope on Watermans Quay. Instead, a Pedestrian Plaza is proposed between the two podiums. The Strada was a key element of the RPBW competition winning design, and will connect the key public spaces of Hickson Park and Watermans Quay and create a more human scale to the podiums. The Strada offers a range of additional benefits consistent with the other objectives in the Urban Design Controls, in particular it will improve the north south connection through the Barangaroo site by providing permeability through the block.	See further discussion below.
Applies to residential and tourist and visitor accommodation development within a building with a height of 30 metres or more; the maximum private external balcony .area must not exceed 15% of the GFA of the apartment or tourist and visitor accommodation room to which the balcony is connected; and the bulk of the building is no greater than it would be if balconies were not partially enclosed.	Building R5 is greater than 30m in height. All balconies are less than 15% of the GFA of the adjoining apartment. The enclosure of the balconies has not resulted in any changes to the built form, and the building continues to be within the envelope approved under Conceot Plan (Mod 8).	
Control 2 Street Wall Establishment		
Objectives:		
Ensure that the Street Wall defines Barangaroo Avenue	Not applicable – Building R5 does not have a frontage to Barangaroo Avenue.	N/A
Ensure a human scale streetscape.	As above, the proposed podium together with the Pedestrian Plaza will create a human scale at street level. The podium incorporates retail uses fronting Hickson Park, Hickson Road, Watermans Quay and the Pedestrian Plaza which will assist in activating the public domain. Further, the Plaza provides a more considered response to the adjacent buildings by opening up the corner diagonally opposite Scotch Row, providing visual and physical permeability to Hickson Park.	Consistent
Podium height is to foster a coordinated streetscape and appropriate street level environment	The proposed podium height of RL 17.83m is within the maximum podium height of RL 22m. The proposed podium will create an appropriate pedestrian environment at street level, whilst still defining the street edge.	Consistent
Standard:		
Building form to create a streetwall with a one storey minimum height for most of the public accessible ground floor facade.	The building form comprises a three storey podium, with a tower above. The podium extends across most of the site, with the exception of the pedestrianised Plaza between Buildings R5 and R4B, as outlined above.	Consistent
All podium streetwalls define Watermans Quay and Hickson Road.	The podium streetwall and colonnade will define Hickson Road, and provide continuity with development in the southern part of the Barangaroo site. As outlined above, the introduction of the pedestrianised Plaza	See further discussion below.

Concept Plan (Mod 8) Blocks 4A & 4B Controls	Residential Building R4B	Comment
	between Buildings R5 and R4B creates a break in the street wall along Watermans Quay. Notwithstanding this, the PLaza will result in significant permeability and public domain benefits.	
Hickson Road Street Wall will maintain the colonnade for Blocks 2 + 3 up to 6m.	A colonnade is provided along the Hickson Road frontage.	Consistent
To ensure the streetwall on Hickson Road mitigates the podium height in Blocks 2 + 3 and steps down in height towards the north.	The podium height of Building R5 is lower than the podiums of Buildings C1 and C2 on Blocks 2 and 3 respectively, providing a stepping down in height towards the north.	Consistent
Control 3 Building Articulation		
Objectives:		
To establish an articulated, well-proportioned building mass.	Building R5 represents a well-proportioned and articulated building mass, consistent with its role in providing a transition between existing buildings along Hickson Road, and the Crown Sydney Hotel and Resort at the water's edge	Consistent
To reduce the impact of the building's mass	The building has been designed as a slender and elegant tower. To further reduce the perceived mass of the building, a range of design mechanisms have been adopted into the design of the façade, as described below.	Consistent
To ensure the towers in Blocks 4A and 4B are considered as a holistic composition	The residential towers on Blocks 4A and 4B have been conceived as three 'crystals', which will increase in scale from east to west as they move from the mid-rise scale of buildings along Hickson Road towards the Crown Sydney Hotel and Resort at the water's edge. The towers form part of a holistic composition, with the staggered roof profiles and slim proportions of the three towers creating a dynamic arrangement and completing the city frame at its north-western edge. Together, the buildings will integrate with the adjacent commercial development, and will act to frame the future Hickson Park (subject to a separate approval). The proposed siting and design of the towers will also provide a gateway to the southern precincts of Barangaroo such as Scotch Row, Barangaroo Avenue retail and Watermans Cove.	Consistent
Standard:		
The building envelopes and floor plates are to be articulated.	Building R5 has a triangular geometry which articulates the building form. The triangular building footprint is emphasised through the continuation of the façade beyond the internal floorplate to create a feathering effect at the edges of the building. The application of solid materials to the inset 'notches' at each corner of the two main glazed facades further accentuates the triangular form and articulation of the building.	Consistent
Tower Form is to express sustainability features e.g. Access to natural light, ventilation and solar shading.	The triangular form enables the apartments to achieve good access to natural light, ventilation and views, avoids apartments looking onto each other and limits south facing apartments.	Consistent
To establish a complementary	The towers have been designed as three	Consistent

Concept Plan (Mod 8) Blocks 4A & 4B Controls	Residential Building R4B	Comment
relationship between the towers in Blocks 4A and 4B such as a common chassis.	'crystal' forms, with a common design language and the same structural design carried across all three buildings.	
Vertical articulation and breaks are encouraged to minimise the perceived building mass.	The streamlined, 'crystal' form of the building was a key feature of the winning RPBW scheme. The verticality of the building is enhanced by the slender form and narrow pattern of fenestration, as well as the 'feathering' and 'notches' described above. These features, and the sky views between the buildings, enhance the vertical articulation of the buildings, and minimising the perceived mass.	Consistent
Horizontal articulation and breaks are encouraged to reduce the impact of the building mass.	Whilst a key feature of the building is its slender, vertical form, horizontal articulation has also been considered in the design of the building. The building incorporates wind and sun shading devices which will assist in reducing the impact of the building mass.	Consistent
Ensure a highly transparent and visually permeable frontage to the park edge. The tower form on the park side is to come to ground and be dominant through any lower levels of the building.	Creating a transparent and visually permeable frontage to the park edge is a key component of the building design. The podium facade has been articulated into two main typologies, with a more spaciously framed glazed façade oriented toward the park, and a more regularly spaced framed curtain wall façade along the other podium frontages, including the pedestrian Plaza.	Consistent
Control 4 Building Legibility		
Objectives:		
Constituent elements of the building need to be legible.	Whilst the building will read as a cohesive whole, the constituent elements will remain legible. This includes the reading of the separate uses, as well as the various elements of the building's composition – glazed facades, balconies, shading devices and wind deflectors etc.	Consistent
To ensure that building elements and structure are legible at the base.	Building R5 has been designed to align with Barangaroo Avenue, Watermans Quay and the future Hickson Park, and will therefore allow for legibility at the building's base.	Consistent
To ensure that towers in Block 4A and 4B are complimentary and read as a cohesive composition.	As described above, the buildings have been designed as a cohesive composition of three crystal forms.	Consistent
Standard:		
Express facade elements including shading and wind amelioration.	The façade incorporates various elements including wind deflectors to balconies and integrated metal nosing which will contribute to the faceted appearance of the architecture, whilst supporting functionality and occupant comfort by providing solar and wind amelioration.	Consistent
Consider a common architecture expression to ensure towers in Block 4A and 4B are complementary to each other yet have their own unique identity.	See response above, the three towers display a consistent architecture, however have been scaled and modulated to ensure each tower is unique.	Consistent
Ensure visual permeability of the tower lobbies on the park to allow the structure to be legible at the base.	Visual permeability of the adjoining park is a key feature of the design, with the residential lobby being located to maximise outlook over the park to the north of Building R5. Further, the tower façade that is orientated towards the park comprises a more spaciously framed	Consistent

Concept Plan (Mod 8) Blocks 4A & 4B Controls	Residential Building R4B	Comment
	glazed design.	
Control 5 Ground Floor Permeability and Accessibility of Public Realm		
Objectives:		
To provide permeability and accessibility through Barangaroo South.	The proposal incorporates a pedestrianised Plaza between Buildings R5 and R4B, which will facilitate permeability and pedestrian access across the site.	Consistent
Standard:		
Public access around the Block is to be maintained on all edges.	Public access is maintained along all edges.	Consistent
To provide two north to south primary connections across the block including the Hickson Road colonnade.	In addition to the Hickson Road colonnade, north-south pedestrian connections are created by the Strada between Buildings 4A and 4B, and the Plaza between Buildings R4B and R5.	Consistent
To provide two east to west primary connections across the block.	East-west connections are provided along Watermans Quay. East-west connections will also be available through the future Hickson Park (subject to a separate application).	Consistent
Watermans Quay retail and podium buildings should consider the address to Scotch Row view.	The pedestrian Plaza between Buildings R4B and R5 has been positioned to provide visual and physical permeability between Hickson Park and Scotch Row.	N/A
Ground floor retail and residential lobbies should consider a relationship to the northern parkland public space.	The ground floor of Building R5 fronting the future Hickson Park comprises the residential lobby and retail uses. The proposed uses will activate Hickson Park, and provide surveillance over the public domain.	Consistent
Canopies to be located at the park edge.	All three buildings in Blocks 4A and 4B incorporate canopies along the Hickson Park edge.	Consistent
Consider lobby street address on Barangaroo Avenue for tower R4A, Watermans Quay for tower R4B and Hickson Road for tower R5 off the plaza	Residential lobbies for Building R5 are provided off Hickson Road and the pedestrian Plaza.	Consistent
Control 6 Ensuring Quality of Rooftops		
Objectives:		
To ensure that the mass of the rooftop is articulated and legible.	The roof form of Building R5 has been articulated with the inclusion of a glazed 'fringe', which is an extension of the main curtain walls.	Consistent
Standard:		
Roof forms to be designed, coordinated, remain sympathetic to its adjacent context, use good quality materials and incorporate architectural treatment of exposed elements such as lift shafts, overruns control rooms and any sustainability features, however, exposed mechanical equipment is to be avoided.	The three buildings in Blocks 4A and 4B have been designed to read as a collection of three 'crystal' forms. For consistency, the roof form of each building comprises a glazed 'fringe', which is an extension of the main curtain walls. The proposed roof features conceals roof plant, and assists in unifying the three buildings.	Consistent
Roof design may integrate sustainable features, such as photovoltaics	The roof is capable of incorporating PV cells.	Consistent
Consistency in the roof form between towers in Block 4A is encouraged.	See response above.	Consistent
Control 7 Facades		
Objectives:		
To ensure the architectural quality of the facades.	The facade has been designed using quality materials and finishes, and has been detailed to a high standard. These materials have suitable longevity, durability and flexibility.	Consistent

Concept Plan (Mod 8) Blocks 4A & 4B Controls	Residential Building R4B	Comment
To articulate the building's functions and massing with appropriate facade design and detailing.	Both the podium and tower will be glazed. The podium facade has been articulated into two main typologies, being a more spaciously framed glazed façade oriented towards the park, and a more regularly spaced framed curtain wall along the other podium frontages, including the pedestrian Strada. Where required, the opacity of the podium façade will be altered for service and fire escape stairs. The tower façade incorporates various façade elements including the operable wintergardens, balconies, roller blinds, wind deflectors to balconies and integrated metal nosing. These elements will combine to create movement and animation, whilst defining the building's function and supporting occupant comfort.	Consistent
To ensure the facades contribute to the building's articulation and mass.	Whilst the façade is predominantly glazed, as outlined above, a number of design treatments have been utilised to articulate and animate the building, and enhance the verticality of its massing.	Consistent
To contribute to the "carbon neutral" aims for Barangaroo South.	The building is consistent with the 'carbon neutral' aims for Barangaroo South.	Consistent
Standard:		
The choice of appropriate materiality for longevity, durability and flexibility. Materials such as steel, glass, concrete, timber and aluminium shall be considered.	The facade has been designed using quality materials and finishes, with glazing being the predominant material. These materials have suitable longevity, durability and flexibility.	Consistent
Environmentally sustainable design is to be incorporated on all facades.	The proposed façades incorporate the principles of environmentally sustainable design. The high performance façade enables residents to manage thermal loads and access to daylight. In summary: - The use of open cavity facades, balconies and wintergardens allow high visible light transmittance to the apartments in winter and when sun is not on the facade. - During warmer periods of direct sunlight, blinds within the open cavity facades and wintergardens will allow the solar loads to be reflected outward prior to reaching the inner most glazing, providing a high degree of solar control and maximising amenity of the neighbouring spaces. Heat absorbed by the blinds will be vented from the cavity facade. - The innermost skin to the façade, wintergarden and balcony areas is proposed to be double glazed, providing a high degree of thermal insulation in winter when coupled with the buffering effects of the balcony/ wintergarden and open cavity facade external skins. - Operable portions of the inner skin of the open cavity facades are proposed which, combined with the operable wintergarden outer glazing and sliding doors, will allow residents to achieve a high level of natural ventilation.	Consistent
Depth and layering of facades is to be	To express the concept of a 'crystal', Building	Consistent

Concept Plan (Mod 8) Blocks 4A & 4B Controls	Residential Building R4B	Comment
achieved through relief and protrusions.	R5 is skinned with a highly transparent glass façade. A number of techniques have been used to provide a sense of depth and layering, including: - The use of a narrow modular pattern of fenestration. - The continuation of the façade beyond the internal floorplate to create a feathering effect at the edges, and by application of solid materials to the inset 'notches' at each corner of the two main glazed facades. - The incorporation of various façade elements including the operable wintergardens, balconies, roller blinds, wind deflectors to balconies and integrated metal nosing.	
Facade components such as external shading shall be used to provide light and shade to the building.	See response above.	Consistent
Control 8 Active Street fronts		
Objectives:		
To ensure an activated public domain at street level.	The proposed design seeks to maximise activation at the public domain through the incorporation of retail and residential (lobby) uses fronting the future Hickson Park, Hickson Road and pedestrian Plaza.	Consistent
Standard:		
At least 60% of the Ground Level is to be active on the primary Street Wall facades	The proposed development provides a park address to the northern frontage, with 100% activation proposed through a glazed residential lobby and small retail tenancy. As discussed above, the proposed development does not provide a continuous street wall along Waterman Quay, and therefore does not technically provide a building that activates the frontage. However, the provision of the Plaza, which has the potential for activation within it from the adjoining large-scale retail, will provide the activation required, and will create a vibrant and active public domain.	See further discussion below.
Building vehicle access, areas for service and egress shall not count towards the 60% requirement	See response above, there are no vehicular access points within Building R5.	N/A
Building service areas, parking entrances and loading docks may be accessed from Watermans Quay.	Vehicular entrances to the Stage 1B basement car park will be provided off Watermans Quay, with the driveway entry forming part of Building R4B. The driveway and associated structure will be constructed initially as part of the Stage 1B Basement SSD DA and integrated into the structure of Building R4B when it is being constructed.	Consistent
The width of driveways shall be minimised.	The driveway entry does not form part of the Building R5 application.	N/A
Control 9 Signage		
Objectives:		
To ensure that the location, size, appearance and the quality of the signage on the building is appropriate	Primary signage zones have been identified on the plans. The detailed design of the signage, including the exact location, size and materiality will be submitted to the Secretary for approval prior to the issue of the relevant	Consistent

Concept Plan (Mod 8) Blocks 4A & 4B Controls	Residential Building R4B	Comment
	Construction Certificate.	
Standard:		
Building identification signage is to be limited to one sign per frontage at podium level.	Indicative primary signage zones are provided on Building R5's south-west elevation, fronting the Plaza off Watermans Quay and on the eastern (Hickson Road) elevation	Consistent
Signage is not to exceed $15m^2$ per sign.	The signage zones have an area of less than $15m^2$.	Consistent
Details of signage to be considered as part of the overall design of the building for the purposes of Design Excellence.	No detailed signage is proposed.	N/A
Each development application submitted for the erection of a new building/s is to include as a minimum a description and illustration of intended signage location/s and form. Where detailed signage proposals are not included in the works proposed in a development application for the erection of new buildings, actual sign approvals will be subject to separate Development Applications.	Indicative primary signage zones are shown on the Architectural Drawings. Secondary building identification (such as wayfinding and under awning signage) and retail tenant signage will form part of a future signage strategy to be approved by the Department pursuant to a condition of consent. This is consistent with the approach applied on the commercial tower and residential buildings within Stage 1A Barangaroo South.	Consistent
Control 10 Residential Amenity		
Objectives:		
Enable the partial enclosure of balconies to provide private open space that is usable and has a high level of amenity.	Building R5 incorporates partially enclosed wintergardens to ensure that the amenity of private open spaces on the upper levels of the building is maintained.	Consistent
Standard:		
The glass wind screen must be designed so the balcony remains external open space; and the wind screen design ensures permanent natural ventilation and cannot be fully enclosed or sealed from the weather	The wintergarden façades comprise of fixed glass balustrades, with vertical sliding planes of glass above giving occupants the ability to shield the balcony during times when the environmental conditions are not commensurate with balcony use	Consistent

4.2.3 Concept Plan Modifications and Future Application Requirements

Part B of the Instrument of Approval contains a number of modifications to the Conept Plan. Of particular relevance to this application are Conditions B11 and B12, which relate to Key Worker Housing and Staging respectively.

Key Worker Housing is addressed in Section 4.2.4, below. With respect to staging, a separate application will be submitted for the foreshore promenade (to the full extent mapped in the SEPP Amdnement), pier, Watermans Cove and Hickson Park (other than the temporary construction road corridor on the alignment of the former Barton Street). These areas will be constructed, landscaped and publicly accessible prior to the issue of any Occupation Certificate for development witin Block 4A, 4B or Y.

Part C of the Instrument of Approval contains a number of requirements for future applications made pursuant to the Concept Plan. **Table 9** below demonstrates that the proposal is consistent with the relevant requirements, as approved under Concept Plan (Mod 8).

Table 9 – Consistency with the relevant Conditions in Part C of the Concept Approval (as modified)

Part C – Future Applications	Comment	Consistency
Condition C2 – Design Excellence	Section 4.4 demonstrates that the proposal will achieve design excellence in accordance with Condition C2.	✓
Condition C4 – Car Parking	Section 4.10 demonstrates that the proposal will provide car parking in accordance with Condition C4.	✓
Condition C7 – Pedestrian Linkages, Activation of Streets and Public Domain	The provision of the Plaza was a key element of the RPBW scheme. This linkage will assist in providing additional permeability through the Block, however will not impact on the primacy of Watermans Quay and Barangaroo Avenue. These two roads will continue to be the main pedestrian and vehicular thoroughfares into and through Barangaroo South, and so will continue to be the primary focus for pedestrian movements and associated retail activity. Whilst the Plaza will also attract pedestrian and retail activity, it is considered a secondary linkage for pedestrians wanting to access Watermans Quay from Hickson Park, and will not perform the same function as Barangaroo Avenue or Watermans Quay.	✓
Condition C12 – Wind Assessment Report	A wind report is provided at **Appendix K** identifying specific mitigation measures for wind impacts.	✓
Condition C13 – Lighting Strategy	**Appendix J** provides a review of studies undertaken on potential impacts to the Sydney Observatory. It has been determined that the lighting of the proposed buildings is acceptable (refer further to Section 4.6.2).	✓
Condition 15 - Airspace	Consultation will occur with the relevant authorities and all necessary approvals under the *Airports (Protection of Airspace) Regulations 1996* will be obtained as required.	✓

4.2.4 Statement of Commitments

The Statement of Commitments requires a number of Plans and Strategies to be submitted to the Planning Reference Group prior to lodgement of any relevant Project Application (other than for demolition or early /site preparation work). In conformance with the Statement of Commitments, the above Plans and Strategies were submitted to the Planning Reference Group prior to the submission of the Commercial Building C4 Project Application.

Barangaroo Housing Strategy

Commitments 29-34 relate to preparation of a housing strategy and the provision of up to 2.3% of the approved residential GFA as Key Worker Housing (KWH), which is to be provided within Barangaroo South. Further, Condition B11 of the Concept Plan approval requires at least an additional 0.7% of residential GFA on Barangaroo South, or its equivalent development value, to be provided as KWH off-site.

Consistent with the Barangaroo Housing Strategy, Building R5 provides 3,355m^2 of KWH, which equates to 2.3% of the overall residential GFA currently proposed and provided for under Concept Plan (Mod 8) within Barangaroo South. The KWH housing component comprises 3,355m^2 of GFA (including ground floor lobby, typical lobbies and apartment GFA), and 39 apartments including 67% x 1 bedroom and 33% x 2 bedroom apartments. We note that the KWH provision has been calculated based on what is approved and currently proposed in accordance

with Concept Plan (Mod 8) (i.e. Buildings R8, R9, R4A, R4B and R5) and not the upper residential limit of 154,000m^2.

Lendlease has consulted with a number of affordable housing providers who operate in and around the Sydney CBD. The design has been informed by this consultation process to ensure that the development meets the market's needs. Further details of the consultation that has been undertaken are provided at Section 4.26. The key requirements to come out this consultation process are:

- the apartment mix should focus on smaller products (eg. 1 and 2 bedroom apartments); and
- dedicated building entries and lifts make it easier for housing providers to manage the building and lowers operational costs.

In addition, the proposed residential buildings will contribute to Barangaroo becoming a sustainable, vibrant and diverse community that will provide housing that will support a wide range of people.

The proposed housing mix provides the flexibility to be capable of being adapted in the future, and will respond to the changing dynamics of the market and preferences of apartment owners and occupiers. Building R5 includes a mix of one, two and three bedroom apartments for investors, city professionals and owner occupiers.

In accordance with Condition B11, an additional 0.7% of residential GFA will be provided as KWH elsewhere in the City of Sydney LGA, but within 5km of the site. This additional KHW will be provided prior to the issue of an Occupation Certificate for development on Blocks 4A, 4B or Y and will comprise a mix of unit sizes.

Environmentally Sustainable Development

Commitments 78-85 relate to ESD. The proposal's consistency with these commitments is demonstrated in the ESD Report prepared by Lendlease Design (refer to **Appendix O**).

Residential Amenity

Commitments 90-97 under the previously approved Concept Plan related to residential amenity, and were based on the 'Rules of Thumb' contained in the Residential Flat Design Code (RFDC). These commitments were deleted as part of Concept Plan (Mod 8).

4.3 Land Use and GFA

Building R5 is characterised under the standard instrument as 'shop top' housing, comprising retail at ground level with residential uses above.

Further applications will be made for the fit-out and use of the various ground level retail tenancies, if required, once tenants have been confirmed. The impacts of the future use will be assessed as part of any future application. Depending on the final use, the future applications will provide Plans of Management and Security Management Plans, if required. The future retail uses are as defined under the Concept Plan definition for retail uses and may include food and drink premises, retail premises, markets and pubs and the like. A summary of Building R5's uses, including a floor by floor breakdown of GFA is provided at **Table 10**.

Table 10 – Summary of proposed building uses and areas

	Use	GFA (m^2)*	Wintergarden GFA (Maximum 15% of apartment)
Basement 1	Residential (security room)	**33**	**-**
Basement 0	Parking, Storage, Plant	**-**	**-**
Ground	Retail	**531**	**-**
	Residential Lobby	**150**	**-**
Podium Level 1	Retail	**378**	**-**
	Plant	**-**	**-**
Podium Level 2	Residential	**716**	**-**
Level 1 - 13	Residential	**675**	**-**
Level 14	Residential	**680**	**-**
Level 15 - 24	Residential	**681**	**-**
Level 25	Residential	**440**	**-**
	Plant	**-**	**-**
Level 26	Residential	**636**	**21.8**
Level 27	Roof Plan	**-**	**-**
Total Internal GFA*	-	**19,158**	**-**
Total Wintergarden GFA	-	**-**	**21.8**
Total GFA	-	**19,179.8**	

* As defined by the Concept Plan (MP06_0162), as modified.

A summary of the total approved/proposed GFAs by Concept Plan block, land use and precinct are provided in **Tables 11** and **12**. The allowable GFA figures are based on those under Concept Plan (Mod 8).

Table 11 – Summary of approved/proposed GFA by Concept Plan block

Block	Building	Approved/Proposed GFA (m^2)	Max Allowable GFA (m^2) under the Concept Plan (Mod 8)	Residual GFA
Block 1	Building R7	1,927	1,927	0
	Total	**1,927**		
Block 2	Commercial Building C2	7,945	197,280	133
	Commercial Building C4	99,097		
	Commercial Building C5	90,105		
	Total	**197,147**		
Block 3	Commercial Building C3	118,959	129,934	10,975
	Total	**118,959**		
Block 4A	Residential Building R4A	47,882	86,979	0
	Residential Building R4B	39,063		
	Total	**86,979*** (including 34m^2 of GFA for the loading dock office on Basement Level 1, which forms part of the Stage 1B Basement DA)		
Block 4B	Residential Building R5	19,158	19,158	0
	Total	**19,158***		
Block X	Residential Building R8	9,694	18,908	0
	Residential Building R9	8,410		
	Building R1	804		
	Total	**18,908**		
Block Y	Crown Hotel	**77,500**	77,500	0
	Total	**77,500**		

* Calculated in accordance with the Concept Plan (MP06_0162), as modified

Table 12 – Summary of approved/proposed land uses across Barangaroo South

	Retail	Commercial	Tourist	Community	Residential
Commercial Building C2	635	7,285	-	-	-
Commercial Building C3	5,949	111,557	-	1453	-
Commercial Building C4	2,169	96,705	-	-	-
Commercial Building C5	4,564	85,702	-	-	-
Residential Building R8	832	-	-	-	8,826
Residential Building R9	815	-	-	-	7,595
Building R1	804	-	-	-	-
Building R7	1,499	338	-	91	-
Residential Building R4A	431	-	-	-	47,451*
Residential Building R4B	467	-	-	-	38,596*
Residential Building R5	909	-	-	-	18,249*
Total	**19,074**	**301,587**		**1,544**	**120,717**

* Calculated in accordance with Concept Plan (MP06_0162), as modified.

4.4 Design Excellence, Built Form & Urban Design

4.4.1 The Design Process

A design competition was held for Buildings R4A, R4B and R5 in 2014 and included alternative designs submitted by a selection of locally and internationally renowned architects, including Renzo Piano Building Workshop (RPBW), WOHA, Denton Corker Marshall (DCM), Kerry Hill and Christian De Portzamparc.

A judging panel comprising Lendlease team members and the Barangaroo Delivery Authority selected RPBW over the other entrants due to the innovation shown in the design and the building's relationship to its context.

An overview of the design vision is provided in the Architectural Design Statement at **Appendix G**.

Following the completion of the design competition the proposed design for Building R5 has been through a rigorous process of design review, both internally and with the independent design experts. The proposed design was presented to the Barangaroo Delivery Authority's Design Director and design advisors. Comments from all of the design reviewers have been taken into account and have led to the refinement of the design.

The Design Team

RPBW is an international architectural practice with offices in Paris, Genoa and New York City. Since its formation in 1981, RPBW has successfully undertaken and completed over 120 projects across Europe, North America, Australasia and East Asia. Among its best known works are:

- the Menil Collection in Houston, Texas;
- the Kansai International Airport Terminal Building in Osaka;
- the Kanak Cultural Centre in New Caledonia;
- the Beyeler Foundation in Basel;
- the Rome Auditorium;
- the Maison Hermès in Tokyo;
- the Morgan Library and the New York Times Building in New York City; and

- the California Academy of Sciences in San Francisco.

Recently completed works include the Isabella Stewart Gardner Museum extension in Boston, the Shard in London, and the Astrup Fearnley Museum in Oslo. The quality of RPBW's work has been recognised with over 70 design awards, including major awards from the American Institute of Architects (AIA) and the Royal Institute of British Architects (RIBA). Further information regarding RPBW can be found in their Architectural Design Statement at **Appendix G**.

The design of Building R5 was informed by the 'Master Architects' of Barangaroo South, Rogers Stirk Harbour and Partners (RSH+P). Other members of the consultant team have also contributed greatly to the scheme, ensuring that Building R5 is a realistic, integrated and innovative design. Lendlease's team of world class specialists in engineering, sustainability, urban planning and landscape design have all helped to shape the scheme from its inception.

In addition the project team has always been mindful of emerging trends throughout the world and has benchmarked the scheme against other projects in Australia and internationally.

4.4.2 Achieving Design Excellence

Pursuant to Clause 19, Part 12 of Schedule 3 of the State Significant Precincts SEPP and DGR 4 - Urban Design and Built Form, in determining an application for a new building at Barangaroo, the consent authority must consider whether the proposed development exhibits design excellence.

In considering whether the proposed building exhibits design excellence, the consent authority must have regard to the following matters:

a) *whether a high standard of architectural design, materials and detailing appropriate to the building type and location will be achieved;*

b) *whether the form and external appearance of the building will improve the quality and amenity of the public domain;*

c) *whether the building will meet sustainable design principles in terms of sunlight, natural ventilation, wind, reflectivity, visual and acoustic privacy, safety and security and resource, energy and water efficiency; and*

d) *if a design competition is required to be held in relation to the building, as referred to in subclause (3), the results of the competition.*

Clause 19(3) requires a design competition to be held for development that will be greater than RL 57, or where the erection of a new building is proposed on a site of greater than 1,500 square metres.

In addition, Condition C2 – Design Excellence of the approved Concept Plan (Mod 8) requires a design excellence competition to be held by the Director-General and convention of a design review panel for development that exceeds 55 metres in height, or is on land exceeding 1,500m^2 in area. Under Condition C2, the key matters for consideration are:

- whether a high standard of architectural design, materials and detailing appropriate to the building type and location will be achieved;
- whether the form and external appearance of the building will improve the quality and amenity of the public domain;
- whether the building meets sustainable design principles in terms of sunlight, natural ventilation, wind, reflectivity, visual and acoustic privacy, safety and security and resource, energy and water efficiency;

- a comparison of the proposed development against the indicative building controls identified in Section 13.0 – Built Form of the approved Concept Plan EAR; and
- whether the new development detrimentally impacts on view corridors, particularly from public spaces and streets.

As detailed in Section 4.4.1, a design competition was held for the building with the intent of selecting an architect that demonstrates the capacity to design a building that exhibits design excellence.

Some of the key design features of Building R5 which demonstrate the achievement of the above matters of consideration and those listed in the SEARs, include:

- the design strikes a balance between creating a suite of three elegant towers of an international architectural standard whilst being considerate of neighbouring buildings, including the Crown Sydney Hotel Resort, which under the Concept Plan (Mod 8) is intended to be the landmark building on the site.
- the 'crystal' inspired design respects the Concept Plan layout and setbacks, to create three towers that read as separate stand-alone buildings that also form part of a bigger architectural statement;
- the proposed materials, articulation and detailing of the facades match the quality that is synonymous with RPBW buildings;
- the generous apartment layouts have been optimised to deliver an exceptional standard of amenity, in particular taking advantage of the northern aspect and harbour views;
- the design provides a striking back drop to the future Hickson Park. Each of the dwellings have been designed to maximise outlook to the park to the north, and harbour to the west; and
- implementing a variety of environmentally sustainable measures including the use of water efficient fixtures and fittings and photovoltaics.

The proposed development exhibits design excellence as:

- it has been designed by an internationally renowned architects, RPBW;
- a high standard of architectural design, materials and detailing is achieved, appropriate to the building type and location;
- the building form, external appearance and the ground floor plane provides for high amenity and quality of the public domain;
- Lendlease is committed to ensuring continuity in the design process and realisation of the submitted design in the completed building by ensuring that RPBW has direct involvement in the design documentation phase;
- the proposed scheme generally complies with the planning framework established for the site;
- the design will have no adverse impacts on view corridors, particularly from public spaces and streets, beyond those assessed as part of Concept Plan (Mod 8);
- it utilises Lendlease's skills and proven track record to deliver an exemplary residential building; and
- it explores and implements innovative technical and sustainable solutions, contributing to cutting edge design excellence.

The proposed Building R5 exhibits design excellence and therefore clearly meets the intent of Clause 19, Part 12 of Schedule 3 of the State Significant Precincts SEPP and Condition C2 of the Concept Plan (Mod 8).

4.4.3 Height, Bulk and Scale

The Concept Plan for Block 4B establishes a maximum height of RL 107 for Block 4B. The proposed building has a maximum height of RL 105.89 and is therefore consistent with the maximum height control. More broadly, Building R5 is generally consistent with the Block 4B envelope controls under Concept Plan (Mod 8) and the Built Form Principles and Urban Design Guidelines, and is therefore considered appropriate for the future character of the site in terms of building form, bulk, scale and height. Concept Plan (Mod 8) identifies the three residential buildings in Stage 1B as tall, slender forms, with an emphasis on their vertical massing.

These towers will provide a transition in scale between the Crown Sydney Hotel and Resort and the adjoining CBD. Within this group of towers, Building R5 is identified as the smallest building, providing a transition element between medium scale buildings along Hickson Road, the taller residential buildings and Crown Sydney Hotel Resort.

As demonstrated by the photomontages at **Appendix G** and **Figure 14**, the building's facades are highly refined. The building has been conceived as a transparent glass 'crystal' that reflects the colours of the sky and adds simplicity to the precinct, contrasting with more solid forms along the city edge. The clarity of the skin and the delicate detailing of the facade elements will result in an elegant and streamlined form along the waterfront, and a gentle presence in the city skyline.

As detailed at Section 4.2, Building R5 sits within the approved development block envelope and complies with the relevant urban design controls relating to that block. In this regard, the development will not give rise to any loss of views or vistas that have not already been considered and assessed as being acceptable as part of Concept Plan (Mod 8).

Figure 14 – The relationship between Building R5 and existing and proposed surrounding development

4.4.4 Street Frontage Heights and Setbacks

As detailed at Section 4.2, the proposed building design is consistent with the objectives for street wall height. Having regard to the built form principles and urban design controls, the proposed podium defines and encloses the public realm, and assists in mitigating the visual impact of taller building elements on the public domain. In order to achieve this, each edge of the scheme has a significant street presence which allows the interaction with, and occupation of, the perimeter of the building.

The proposed podium has been built to the Watermans Quay alignment, and is consistent with the maximum podium height of RL 22m under Concept Plan (Mod 8). The podium is compatible with the existing and future streetscape form in the surrounding area. The proposal will appropriately engage and frame the public domain, including Hickson Park, with the podium facade being articulated into two main families, being a more spaciously framed glazed front corresponding to the tower facade that is oriented toward the park, and a more regularly spaced framed curtain wall along the other sides, including the pedestrian Plaza.

4.4.5 Retail Fitouts, Shopfronts and Signage

Further applications will be made for the fit-out of the various ground level retail tenancies, as required, once tenants have been confirmed. Similarly, signage for the tenancies will be the subject of a future signage strategy. These may be development applications, or complying development certificates.

In keeping with the intent of the Urban Design Controls for Concept Plan (Mod 8), the facades of the lobbies and retail shopfronts at the podium level aim to break down the boundary between interior and exterior space, activate the building at ground plane and providing unobstructed views of the park and green spaces from the interior of the building. In order to achieve this, and to provide flexibility to meet the varying needs of future tenants, the proposed development includes three interchangeable façade options for the retail shopfronts at ground floor level.

The architectural drawings submitted with this application include two ground floor shopfront design typologies, being a swing glass door façade and a bi-fold / stacking glass door solution. An additional indicative shop front typology is included in the Design Statement at **Appendix G**. This typology comprises lifting sash doors, where the entire lower panel can be lifted to provide an uninterrupted connection between the interior spaces and exterior seating (refer to **Figure 15**).

Further details are proposed to be submitted for approval prior to the issue of the relevant Construction Certificate.

Figure 15 – Indicative image of the retail façade to Hickson Park

4.5 Visual and View Impacts

A Visual and View Impact Analysis, undertaken in accordance with the SEARs, has been prepared by JBA in support of the proposed development and is included at **Appendix H**. This analysis builds on and provides further detail on the 'overarching' Visual and View Impact Analysis prepared and submitted in support of Concept Plan (Mod 8).

To support the visual analysis, the relevant visual catchment of the Barangaroo Site has been defined and key public domain views, view corridors and public vantage points within and surrounding the site have been identified.

Photomontages have been prepared for a total of 22 public domain views and vantage points in the following general locations (refer to **Figure 16**):

- ***From the water:*** Vantage points 12 (Ballarat Park), 13 (Pyrmont Park Pier Jones Bay Wharf), 14 (Balmain East), 15 (Darling Harbour), 16 (Blues Point), 17 (Opera House Western Forecourt), 18 (Cremorne Point), 22 (Sydney Wharf);
- ***From public open space:*** As above, an in addition Vantage points 7 (Millers Point Observatory Hill), 8 (Clyne Reserve), 9 (Munn Reserve), 20 (Watsons Bay), 21 (Sydney Observatory Park);
- ***From key streets:*** Vantage points 1 (Hickson Road), 2 (Ken Street, 3 (Shelly Street), 4 (Lime Street), 5 (High Street), 6 (Gas Lane), 10 (Sydney Harbour Bridge), 11 (Pyrmont Bridge), 19 (Gladesville Bridge).

Four (4) key buildings in the vicinity of the Building R5 Site have been identified as being impacted or potentially impacted by the project in terms of private views. The key residential buildings are: Highgate, Georgia, Stamford Marque, and Stamford on Kent.

Importantly, the detailed Building R5 design sits within the Concept Plan Block 4B envelope. The consideration of potential visual and view impacts associated with the proposal should be read in conjunction with the Visual and View Impact Analysis submitted in support of Concept Plan (Mod 8).

4.5.1 Visual Impacts

Building R5 will be visible in views from key public domain locations. The proposed Building R5 detailed design provides separation between the adjoining future building, being Building R4B, providing for the maintenance of some view lines across the Barangaroo site and the ability for a greater appreciation of sky views.

The massing and height of Building R5 is comparatively lower than the two other buildings in the family of Stage1B buildings, being Buildings R4A and R4B. Given the height of Building R5 and the nature of the surrounding topography, the building is not visible in the majority of public domain views considered.

Building R5 is a new high quality residential building that is part of a composition of three related buildings, designed by a world renowned architectural practice. The development of Building R5 will contribute to the world-class nature of Barangaroo and offers a positive visual impact through extending the western edge of Sydney's CBD. The architecture of Building R5 and its relationship to Buildings R4A and R4B in the family of residential buildings is striking and attractive when considered as an addition to the city fabric.

Overall, Building R5 will not affect the relevant and appropriate visual impact objectives previously approved under the Concept Plan. The accompanying analysis shows that the impacts of the proposal are generally consistent with

those identified in Concept Plan (Mod 8) which were assessed as being acceptable.

4.5.2 View Impacts

The oblique view analysis prepared for private views demonstrates that view sharing will be achieved under Concept Plan (Mod 8) by having more slender buildings (including Building R5) with spaces in between at times, thereby enabling oblique views and view corridors. These oblique views are also enhanced by the significant distances between the proposed buildings and the residential units on Kent Street.

In summary:

- The zone of potential view impact from the residential buildings on Kent Street principally affects the west facing elevation of the buildings only, relating solely to views to the west and south-west. Views to the north-west, north, east and south will be unaffected by Building R5.
- The buildings are generally located north of the alignment of Gas Lane, and therefore north of proposed development Blocks 4A and 5. Significant northerly views will be retained from both the lower and upper levels of this building given the development on Central Barangaroo is restricted to a maximum height of RL 34, and development further to the north on Block 5 is restricted to a maximum height of RL 29.
- When compared with the view assessment supporting Concept Plan (Mod 8), the view corridors of the indicative design and the proposed detailed Building R5 design are similar, but not exact. This is due to a slight variation in the position of the views, which in turn demonstrates that an oblique view corridor will continually alter based on the position of a person and their orientation.
- Views from Stamford on Kent have been slightly reduced from those considered in the indicative design for Concept Plan (Mod 8). Despite this, there is still potential to appreciate similar oblique view corridors and sky view opportunities are still available in part between Building R5 and Commercial Building C3 and at a higher level above Building R5 between Building R4B and Commercial Building C3. These oblique view lines, available at both the upper and lower levels, provide alternative sky views and water views and allow for a clear visual break in the built form.
- While views to the west and south-west are impacted, there is anticipated to be a new public open space (Hickson Park) to the east of the built form at Barangaroo South, increasing the separation between Highgate and Building R5, thus improving foreground outlook from all levels of the buildings.

The visual impact of Building R5 when viewed from Stamford on Kent is slightly increased when compared with the indicative design assessed with Concept Plan (Mod 8). From other buildings assessed the expected impacts will remain similar to that assessed under Concept Plan (Mod 8), if not reduced. Overall, the proposal remains within the Concept Plan (Mod 8) envelope and continues to offer oblique view corridors. The development proposed is acceptable in terms of visual and view impacts and is reasonable in the circumstances.

Figure 16 – Photomontage locations

4.6 Impacts on Sydney Observatory

Lendlease and UNSW Global undertook an analysis of potential sky view loss and resultant impacts arising from Concept Plan (Mod 8) and the potential impact on the functioning of the Sydney Observatory astronomical sightlines. The report was updated in response to submissions received during the public exhibition of Concept Plan (Mod 8).

The original report found that only Buildings R4A and R4B sit within the view corridor from Sydney Observatory, and so Building R5 will not obstruct any sky targets.

With respect to the contribution to sky glare, UNSW Global conclude that observing conditions at Sydney Observatory for low elevation targets in a South West direction are poor, even on clear nights. Glare from nearby brightly lit objects (e.g. Harbour Bridge, other nearby city buildings, street lighting etc.) currently

illuminates the background sky, thereby degrading the contrast of sky images, and affecting the viewing of faint objects such as Alpha Centauri. Viewing of bright targets such as individual stars and star clusters (e.g. the Pointers, the Southern Cross and the Jewel Box cluster) will be much less affected than viewing faint objects.

Further, a number of measures have been implemented as part of the design of the Stage 1B residential buildings to minimise the amount of lighting, and in particular the amount of light directed upward. These measures include:

- keeping brightly lit surfaces to a minimum;
- fitting luminaires with light shields;
- keeping the colour temperature of light sources low; and
- minimising the amount of upward directed lighting.

Further, it has been confirmed by ARUP that the lighting design for the residential building is compliant with, or exceeds most of the Observatory's recommendations, and that this will result in minimal to no impact on Sydney Observatory's astronomical observation activities, with regard to light spill impacts.
UNSW Global concludes that the above measures should ensure that the additional sky glare introduced by the residential buildings would not significantly degrade observing the night sky from Sydney Observatory in all directions, other than in the immediate vicinity of the building.

4.7 Amenity

4.7.1 Residential Amenity

The Residential Flat Design Code was recently superseded by the Apartment Design Guide (ADG). The Apartment Design Guide (ADG) is a tool intended to assist with designing apartments and therefore provides the framework to consider whether an apartment building achieves an acceptable level of residential amenity. **Table 13** lists the Design Criteria and associated Objectives in the ADG, and assesses whether the project achieves the intent of those Objectives.

The assessment demonstrates that the proposed development is consistent with the relevant objectives and the majority of the numeric Design Criteria, and that all apartments within the proposed development will achieve a very high standard of residential amenity. Where an alternative solution is proposed to the Design Criteria to meet the Objectives, the proposal's consistency with the Objectives and associated Design Guidance are discussed in further detail below the table.

Table 13 – Consistency with the Apartment Design Guide

Design Criteria	Proposal
Part 3 Siting the Development	
3D Communal and Public Open Space	
Objective An adequate area of communal open space is provided to enhance residential amenity and to provide opportunities for landscaping	✓
Design Criteria Communal open space has a minimum area equal to 25% of the site	✓
Developments achieve a minimum of 50% direct sunlight to the principal usable part of the communal open space for a minimum of 2 hours between 9 am and 3 pm on 21 June (mid winter)	Achieves intent. See discussion below.
3E Deep Soil Zones	
Objective Deep soil zones provide areas on the site that allow for and support healthy plant and	✓

Design Criteria	Proposal
tree growth. They improve residential amenity and promote management of water and air quality.	
Design Criteria Deep soil zones are to meet the following minimum requirements: Site Area — Minimum Dimensions — Deep Soil Zone (% of site area) Greater than 1,500m^2 — 6m — 7%	Achieves intent. See discussion below.
3F Visual Privacy	
Objective Adequate building separation distances are shared equitably between neighbouring sites, to achieve reasonable levels of external and internal visual privacy.	✓
Design Criteria Separation between windows and balconies is provided to ensure visual privacy is achieved. Minimum required separation distances from buildings to the side and rear boundaries are as follows: Building Height — Habitable rooms and balconies — Non-habitable rooms Up to 12m (4 storeys) — 6m — 3m Up to 25m (5-8 storeys) — 9m — 4.5m Over 25m (9+ storeys) — 12m — 6m	Achieves intent. See discussion below.
3J Bicycle and Car Parking	
Objective Car Parking is provided based on proximity to public transport in metropolitan Sydney and centres in regional areas	✓
Design Criteria For development in the following locations: ▪ on sites that are within 800 metres of a railway station or light rail stop in the Sydney Metropolitan Area; or ▪ on land zoned, and sites within 400 metres of land zoned, B3 Commercial Core, B4 Mixed Use or equivalent in a nominated regional centre The minimum car parking requirement for residents and visitors is set out in the Guide to Traffic Generating Developments, or the car parking requirement prescribed by the relevant council, whichever is less. The car parking needs for a development must be provided off street.	✓
Part 4 Designing the Buildings	
4A Solar and Daylight access	
Objective To optimise the number of apartments receiving sunlight to habitable rooms, primary windows and private open space	✓
Design Criteria Living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 2 hours direct sunlight between 9 am and 3 pm at mid winter in the Sydney Metropolitan Area and in the Newcastle and Wollongong local government areas.	Achieves intent. See discussion below.
A maximum of 15% of apartments in a building receive no direct sunlight between 9 am and 3 pm at mid winter.	✓
4B Natural Ventilation	
Objective The number of apartments with natural cross ventilation is maximised to create a comfortable indoor environment for residents	✓
Design Criteria At least 60% of apartments are naturally cross ventilated in the first nine storeys of the building. Apartments at ten storeys or greater are deemed to be cross ventilated only if any enclosure of the balconies at these levels allows adequate natural ventilation and cannot be fully enclosed.	✓
Overall depth of a cross-over or cross-through apartment does not exceed 18m, measured glass line to glass line.	✓

Design Criteria	Proposal
4C Ceiling Height	
Objective Ceiling height achieves sufficient natural ventilation and daylight access	✓
Design Criteria Measured from finished floor level to finished ceiling level, minimum ceiling heights are: Minimum ceiling height Habitable rooms 2.7m Non-habitable 2.4m For 2 storey apartments 2.7m for main living area floor 2.4m for second floor, where its area does not exceed 50% of the apartment area Attic spaces 1.8m at edge of room with a 30 degree minimum ceiling slope If located in mixed use areas 3.3m for ground and first floor to promote future flexibility of use These minimums do not preclude higher ceilings if desired.	✓
4D Apartment Size and Layout	
Objective The layout of rooms within an apartment is functional, well organised and provides a high standard of amenity	✓
Design Criteria Apartments are required to have the following minimum internal areas: Apartment Type — Minimum internal area Studio — 35m^2 1 bedroom — 50m^2 2 bedroom — 70m^2 3 bedroom — 90m^2 The minimum internal areas include only one bathroom. Additional bathrooms increase the minimum internal area by 5m^2 each. A fourth bedroom and further additional bedrooms increase the minimum internal area by 12m^2 each.	✓
Every habitable room must have a window in an external wall with a total minimum glass area of not less than 10% of the floor area of the room. Daylight and air may not be borrowed from other rooms.	Achieves intent. See discussion below.
Objective Environmental performance of the apartment is maximised	✓
Design Criteria Habitable room depths are limited to a maximum of 2.5 x the ceiling height.	✓
In open plan layouts (where the living, dining and kitchen are combined) the maximum habitable room depth is 8m from a window.	Achieves intent. See discussion below.
Objective Apartment layouts are designed to accommodate a variety of household activities and needs	✓
Design Criteria Master bedrooms have a minimum area of 10m^2 and other bedrooms 9m^2 (excluding wardrobe space).	✓
Bedrooms have a minimum dimension of 3m (excluding wardrobe space).	✓
Living rooms or combined living/dining rooms have a minimum width of: ▪ 3.6m for studio and 1 bedroom apartments ▪ 4m for 2 and 3 bedroom apartments	✓
▪ The width of cross-over or cross-through apartments are at least 4m internally to avoid deep narrow apartment layouts.	✓
4E Private Open Space and Balconies	
Objectives Apartments provide appropriately sized private open space and balconies to enhance residential amenity	✓
Design Criteria	Achieves intent.

Design Criteria	Proposal
All apartments are required to have primary balconies as follows: Dwelling Type — Minimum Area — Minimum internal area Studio apartment — 4m² — - 1 bedroom apartment — 8m² — 2m 2 bedroom apartment — 10m² — 2m 3+ bedroom apartment — 12m² — 2.4m The minimum balcony depth to be counted as contributing to the balcony area is 1m.	See discussion below.
For apartments at ground level or on a podium or similar structure, a private open space is provided instead of a balcony. It must have a minimum area of 15m² and a minimum depth of 3m.	N/A
4F Common Circulation and Spaces	
Objective Common circulation spaces achieve good amenity and properly service the number of apartments	✓
Design Criteria The maximum number of apartments off a circulation core on a single level is eight.	✓
For buildings of 10 storeys and over, the maximum number of apartments sharing a single lift is 40.	Achieves intent. See discussion below.
4G Storage	
Objective Adequate, well designed storage is provided in each apartment	✓
Design Criteria In addition to storage in kitchens, bathrooms and bedrooms, the following storage is provided: Dwelling Type — Minimum Area Studio apartment — 4m² 1 bedroom apartment — 6m² 2 bedroom apartment — 8m² 3+ bedroom apartment — 10m² At least 50% of the required storage is to be located within the apartment.	✓

Communal and Public Open Space

A total of 64% of the Building R5 site area has been provided as communal and publicly accessible open space, exceeding the Design Criteria minimum by 39%. Of this communal and public open space 48% of it achieves direct sunlight during the winter solstice. This is close to the 50% nominated by the Design Criteria and represents 31% of the Building R5 site area.

Achieving direct sunlight to 50% of the total communal and publicly accessible open space would require direct sunlight to 32% of the Building R5 site area, which is equivalent to more than double the 12.5% of the site area recommended by the ADG if the minimum area of communal and public open space was provided (i.e. 50% of 25% of the site area).

More broadly, the communal and publicly accessible open spaces within Buildings R4A, R4B and R5 will be accessible to the occupants of all three towers. Additionally, the residents of Buildings R4A, R4B and R5 gain amenity from their position adjoining the future Hickson Park, a large open space to the north, which will receive plenty of solar access throughout the year.

In light of the above, the proposed communal open space achieves the intent of Objective 3D-1 as adequate area of communal open space will be provided in a way that enhances the residential amenity of the development.

Deep Soil Zones

Deep Soil Zones are defined as '*areas of soil within a development that are unimpeded by buildings or structures above and below ground and have a minimum dimension of 6m. Deep soil zones exclude basement car parks, services, swimming pools, tennis courts and impervious surfaces including car parks, driveways and roof areas.'*
Residential Buildings R4A, R4B and R5 are positioned above a site-wide basement, which precludes the provision of deep soil zones. The Design Guidance acknowledges this may not be possible on sites where:

- the location and building typology have limited or no space for deep soil at ground level (e.g. central business district, constrained sites, high density areas, or in centres); and / or
- there is 100% site coverage or non-residential uses at ground floor level.

Consistent with the Design Guidance, the site is located in a high density precinct, within the Central Business District. There are also non-residential uses at ground floor which limit the provision of deep soil zones.

Notwithstanding this, the proposal meets Objective 3E-1 with the landscape design developed by Grants Associates featuring a combination of hardscape, bed planting and new planting in specially designed pits to ensure healthy growth and long term viability. A range of sustainable stormwater management solutions are also proposed in the precinct, as set out in the ESD Report, Services Report and the Construction Framework Environmental Management Plan. These include the use of filter media in tree pits to treat stormwater, gross pollutant traps to remove littler, vegetative matter and free oils, and the use of a proprietary stormwater filtration system which will achieve the required pollutant reduction targets.

Visual Privacy

The minimum separation distance between the habitable rooms of adjacent buildings R4B and R5 is approximately 18m, which is less than the 24m between habitable rooms recommended in the Design Criteria.

However, consistent with the Design Guidance, the architectural composition and alignment of the buildings in relation to each other has been carefully considered to maximise views and outlook, whilst providing privacy between the buildings to achieve the intent of Objective 3F-1 as follows:

- sightlines into a living area or wintergarden / balcony from an adjacent living area or wintergarden / balcony have been avoided by the arrangement of the floor layout of each building and apartment;
- sightlines from living areas / wintergardens / balconies into bedrooms, and vice versa, are obstructed by architectural elements including opaque facades and overlapping façade wings; and
- the relevant apartments are offset, or oriented towards available views to the north east rather than towards the bedrooms of the apartments of the adjacent building (which are east and north-west from R4B and west from R5).

At the nearest interface between the two buildings (at the balcony of Apartment 05 in Building R5 and Apartment 03 in Building R4B) an opaque facade has been provided to limit Overlooking (refer to **Figure 17**). Further, Apartment R5 L05 has been designed to look towards Hickson Park and the harbour, away from Building R4B.

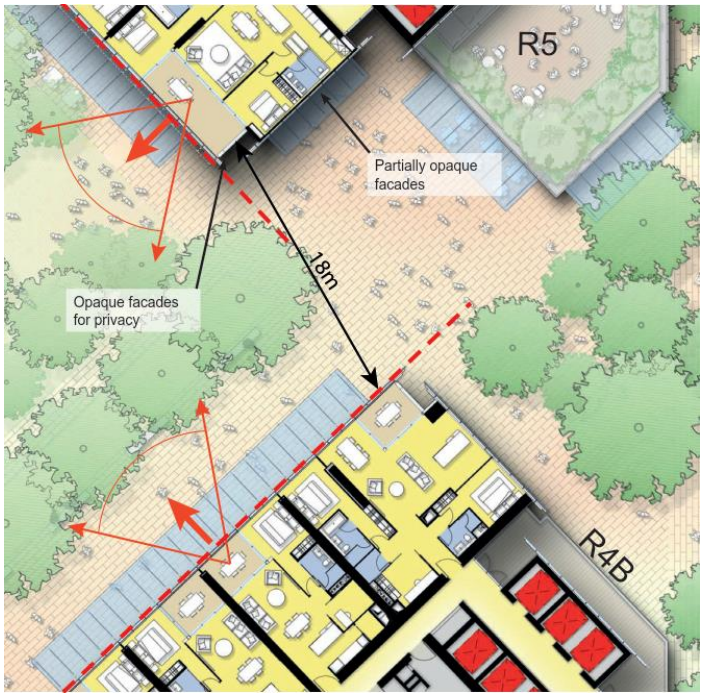

Figure 17 – Separation between R4B and R5 demonstrating the orientation of apartments towards key views, mitigating cross-viewing.

Furthermore, the potential for development on adjacent land has been thoroughly considered. The proposed building forms part of a unified architectural composition together with the Crown Sydney Hotel and Resort. The siting of the buildings is intended to achieve a better amenity outcome and more efficient use of the land than a scheme that strictly meets the Design Criteria separations. The Concept Plan design (under Mod 8) responds to the height and separation from Central Barangaroo and the substantial amenity provided by the outlook and views across the park and to the more significant distant views. By grouping the towers at the southern end of the site the maximum number of apartments are given the opportunity to benefit from the amenity of having uninterrupted views, rather than spacing them to achieve a 'compliant' view 24m across to another tower.

The proposed design therefore cleverly deals with the immediate privacy interface through apartment layouts, the inclusion of appropriate architectural responses, and the orientation of the buildings to minimise sightlines between buildings and maximise exposure to the north facing views. With this in mind any additional separation distance would not materially benefit the occupants of the proposed buildings.

Considering the architectural responses, view line orientation and the site's context in the dense urban environment that is the Sydney CBD, the proposed building separation distances will achieve a reasonable degree of external and internal visual privacy, consistent with Objective 3F-1.

Solar and Daylight Access

Consistent with the Design Guidance the proposed apartment layout and design optimises the number of apartments that receives sunlight. A total of 69% of apartment living areas and private open spaces in Building R5 will achieve 2 hours of direct sunlight between 9am and 3pm in mid-winter, just short of the 70% target of the Design Criteria.

Solar access to Building R5 is constrained by the existing CBD development to the east and development proposed to the west. However, as One Sydney Harbour is positioned near the harbour edge, further development to the west is highly unlikely to occur in the future, and therefore the precinct will receive direct

sunlight even at low solar altitudes. For this reason, daylight access has also been studied for the 9am-5pm period. During this extended 9am to 5pm period, 69.5% of apartments will achieve 2 hours of direct sunlight to apartment living areas and private open space.

The proposed variation to the Design Criteria is very minor (equating to 2 apartments of the 151 apartments) in the context of the scale of the development and the other amenity benefits afforded on the site through access to open space, views and recreational opportunities at the Barangaroo site and broader CBD.

Additionally, the proposed façade typology will allow a high light transmission glass to be used with automated cavity blinds providing solar control when needed.

In light of the above, despite the very minor variation to the solar access Design Criteria, the development achieves Objective 4A-1 by optimising the number of apartments receiving good daylight access to functional areas of the dwelling.

Apartment Size and Layout

All apartments in Building R5 exceed the minimum internal areas nominated by the Design Criteria, and have been designed to achieve a high level of amenity with a predominantly glazed façade and abundance of natural light.

In some apartments, studies do not have direct access to windows. In instances where this occurs, the proposed design is consistent with the Design Guidance under Objective 4D-1 and the Design Criteria under Objective 4D-2 by providing a direct line of sight to a window / natural light that is generally 8m from the glass line to allow for the sharing of natural light and ventilation. On this basis, the Objectives to provide rooms with a high standard of amenity will be achieved.

For open plan living, dining and kitchen areas, the ADG recommends a maximum habitable room depth of 8m. Whilst some apartments in Building R5 have a habitable room depth of up to 9.35m, a proposed variation to the Design Criteria, the apartment design will achieve Objective 4D-2, and will maximise the environmental performance of the apartments as follows:

- the majority of the kitchen area, including the main work surfaces, is within approximately 8m of the window;
- the windows are full height windows which will allow large amounts of light to reach the back of the habitable space; and
- the spaces are open plan, and there are no walls or obstructions between the windows and the kitchen area and therefore the layout does not impede internal access to light and ventilation.

Private Open Space and Balconies

All balconies for the 1 and 3 bedroom apartments are consistent with the minimum area required in the ADG, however a small number of 2 bedroom apartments (25) are approximately 1m^2 smaller than the 10m^2 recommended by the ADG. These balconies are however 2.7m deep, well in excess of the minimum 2m required thus achieving functional proportions.

The three bedroom apartment typology in Building R5 (representing 17% of apartments in total) has a balcony which is 2.1m deep or 0.3m shallower than the ADG's recommended balcony depth for 3 bedroom apartments. However, the area of the balcony is 35% larger than required by the ADG, and so will continue to be highly functional and usable space.

All balconies are of a size and shape which is practical, usable and able to be furnished. Finally, residents of Stage 1B will have access to Hickson Park, which will provide extensive open space for passive and active recreation.

In light of the above the proposed balconies achieve the intent of Objective 4E-1 as they will provide appropriately sized private open space that enhances residential amenity.

Common Circulation and Spaces

The ADG recommends that for buildings of 10 storeys and over, the maximum number of apartments sharing a single lift is limited to 40.

In Building R5, the ratio of lifts to apartments is 1:56 for the on-market apartments, and 1:20 for the Key Worker Housing.

Whilst the proposal seeks to vary the recommended ratio for the on-market apartments, as the lift service has been designed to be commensurate with global standards for luxury residential apartments, using high speed lifts and low interval waiting times (refer to **Figure 18**). As detailed in the Services Report at **Appendix R**, the following indicative performance guidelines have been adopted as part of the performance criteria for the lifts in each tower.

Indicative Performance Guidelines	
Occupancy	1.5 persons/ bedroom
Lift Dispatcher	Conventional Collective
Lift Traffic Type	Two way – no interfloor.
Interval	<60s seconds at lobby
Handling Capacity	10% of population in 5 minutes

Figure 18 – Indicative Performance Guidelines

With the above in mind, the proposal will achieve the intent of the Objective 4F-1.

4.7.2 Overshadowing

A Shadow Study for Building R5 is included at **Appendix N**. The shadowing analysis has been prepared for hourly intervals between 9am and 3pm at the winter solstice (June 21), summer solstice (December 21) and the equinoxes (March 21 and September 21) and compares the existing CBD, Concept Plan (Mod 8) envelope shadows and proposed shadows.

Shadowing from existing CBD buildings is shown in grey and the shadow cast by Concept Plan (Mod 8) maximum development Block R5 envelope is shown in red. The shadow cast by the proposed Building R5 is shown in yellow.

At all times of the year, the shadows cast by proposed Building R5 will be within the shadows which have been considered as part of Concept Plan (Mod 8) which were assessed as being acceptable. Further, due to the scale and location of Building R5 at the eastern edge of the Barangaroo site, the majority of shadows will fall within the Barangaroo site, specifically Commercial Building C3 to the south, or within the shadows cast by Buildings R4A and R4B.

Whilst Building R5 will result in a small amount of additional shadow over Darling Harbour at 9am on March and June 21, these shadows are fast moving, and will have moved from the harbour by 10am, ensuring that the harbour will continue to receive high levels of solar access throughout the rest of the day.

Whilst Building R5 will result in some overshadowing of development to the east along Hickson Road in the afternoon throughout the year, the shadows are within

those modelled under Concept Plan (Mod 8) which were assessed as being acceptable.

Summary and Conclusion

Concept Plan (Mod 8) assesses the impacts of the shadows created by the Block 4B Building Envelope as part of establishing the suitability of that envelope. Overall, it is considered that the shadowing impacts of proposed development, including the glazed fringe, are acceptable as:

- the shadows created by Building R5 are consistent with those approved under Concept Plan (Mod 8) which were assessed as being acceptable;
- the water of Darling Harbour maintains significant direct daylight hours during the key recreational middle of the day boating period;
- properties to the east and west will be unaffected by additional shadowing and are not expected to experience any more shadowing than envisaged by the approvedConcept Plan (Mod 8); and
- Building R5 will not result in any additional overshadowing of parks or open spaces beyond what has been approved under Concept Plan (Mod 8).

4.7.3 Wind

A Wind Impact Assessment for proposed Building R5 has been prepared by Windtech, and is included at **Appendix K**.

A model of the proposed Building R5 and surrounds was constructed to a radius of 500 metres, at a scale of 1:400. The 500 metre radius represents an adequate portion of the adjoining environment to be included in a proximity model. As the site is located in a major redevelopment precinct, with other nearby buildings which are yet to commence construction, the Pedestrian Wind Environment Study has modelled two scenarios:

- Scenario 1: the Hotel and Hickson Park are not included in this scenario. Buildings R4A, R4B and R5 are included in this scenario.
- Scenario 2: the Hotel and Hickson Park are not included in this scenario. Buildings R4A, R4B and R5 are included in this scenario.

The adopted environmental wind comfort criteria used in the wind study is the Davenport (1972) criteria, used in conjunction with a maximum Gust Equivalent Mean (GEM) wind speed, the criteria for which are outlined below:

- **Long Exposure:** 3.5m/s maximum GEM wind speeds (representative of approximately a weekly recurrence).
- **Short Exposure:** 5.5m/s maximum GEM wind speeds (representative of approximately a weekly recurrence).
- **Comfortable Walking:** 7.5m/s maximum GEM wind speeds (representative of approximately a weekly recurrence).
- **Fast Walking:** 10.0m/s maximum GEM wind speeds (representative of approximately a weekly recurrence).
- **Safety Limit:** 23.0m/s annual maximum gust wind speeds.

The wind testing was initially undertaken without the effect of any wind ameliorating devices such as screens, balustrades, awnings or vegetation. This allowed for 'worst case scenario' testing. The results of the Pedestrian Wind Environment Study have been presented in the form of directional plots for the 50 study point locations across the Stage 1B residential site. The 50 locations have been selected as the most critical outdoor locations of the development.

The results of the study indicate that treatments are necessary for certain locations to achieve the desired wind speed criteria for pedestrian comfort and safety. The suggested treatments apply to both scenarios, as follows:

Scenarios 1 and 2:

- The inclusion of strategic planting in the form of densely foliating trees at ground level around the site. To be effective in wind mitigation, these trees should be capable of growing to a height of approximately 5m to 6m, with a canopy diameter of approximately 4m to 5m.
- The inclusion of portable café screening on the north-western aspect of Building R5 to be controlled by the operator to provide suitable conditions for patrons during adverse wind conditions. Conditions will be suitable as a pedestrian thoroughfare when the café area is not in operation.

The Study concludes that with the inclusion of these treatments, wind conditions for all outdoor trafficable areas within and around the proposed development will be suitable for their intended uses.

4.7.4 Reflectivity

A Reflectivity Report has been prepared by ARUP and is provided at **Appendix L**. The Report assesses the impact of solar reflections on pedestrians and road traffic participants in the area surrounding the proposed building.

The Report addresses the requirements for limiting reflectivity impacts similar to those noted in Sydney DCP 2012 and is carried out using the methodology of David N.H. Hassall of the University of New South Wales.

The Hassall methodology further proposes a limit of acceptability of equivalent veiling luminance of façade reflections for traffic of 500Cd/m². Where this is exceeded, solar reflections are considered as potentially causing disability glare.

The proposed glazed facades will have a reflectivity of 28% (external specular reflectivity at normal incidence). The reflectivity impacts of the proposed facade were modelled from 10 locations within the public domain which are shown in **Figure 19**. **Table 14** summarises the outcomes of the reflectivity study.

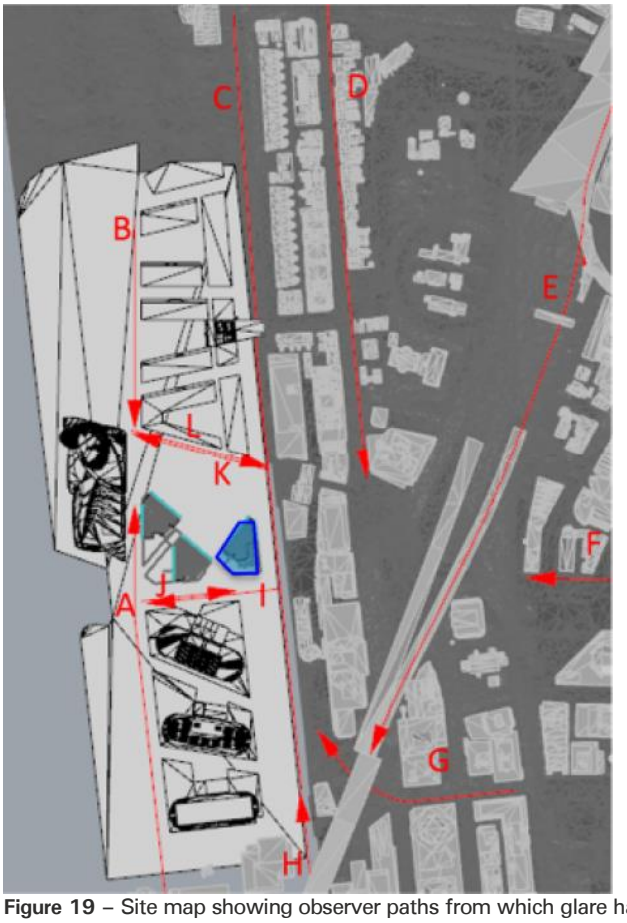

Figure 19 – Site map showing observer paths from which glare has been assessed

Table 14 – Reflectivity Results

Ref Letter	Road	Driving Direction	Maximum Lv Identified at 28% reflectivity	Comment
A	Barangaroo Avenue	N	Facades no visible	Not expected to result in unacceptable glare towards drivers.
B	Barangaroo Avenue	S	<500 Cd/m²	Not expected to result in unacceptable glare towards drivers.
C	Hickson Road	S	1750 Cd/m²	Reflections expected to be obscured by landscaping and adequately mitigated using sun visor which is deemed acceptable by Hassall.
D	Kent Street	S	<500 Cd/m²	Not expected to result in unacceptable glare towards drivers.
E	Western Distributor	S	Facades no visible	Not expected to result in unacceptable glare towards drivers.
F	Grosvenor Street	W	3700 Cd/m²	Reflections that occur can be adequately mitigated using sun visor which is deemed acceptable by Hassall.
G	Margaret Street / Napoleon Street	W	<500 Cd/m²	Not expected to result in unacceptable glare towards drivers.
H	Hickson Road	N	<500 Cd/m²	Not expected to result in unacceptable glare towards drivers.
I	Watermans Quay	W	<500 Cd/m²	Not expected to result in unacceptable glare towards drivers.
J	Watermans Quay	E	870 Cd/m²	Reflections that occur are above windscreen cut off angle which is deemed acceptable by Hassall

The above results demonstrate that the proposed building performs well in terms of solar reflectivity, and glare affecting drivers and cyclists on surrounding streets is not expected to exceed the constraints of acceptability according to the Hassall methodology, as long as the external normal specular reflectance of glazing and cladding is kept within 28%.

Pedestrian observers are easily able to adjust their view and thus reduce the glare impact of reflections. They move at a rate significantly slower than that of a vehicle. For this reason it can be concluded that it will be safe for pedestrians to divert their vision in order to avoid glare.

4.7.5 Safety and Security

The proposed development implements the principles of Crime Prevention Through Environmental Design (CPTED), as identified in the Department of Planning guideline titled *Crime Prevention and the Assessment of Development Applications (2001)* as follows:

Principle 1 – Natural Surveillance

As noted in *Crime Prevention and the Assessment of Development Applications*, good surveillance means that people can see what others are doing. People feel safe in public areas when they can easily see and interact with others. Would-be offenders are often deterred from committing crime in areas with high levels of surveillance.

In accordance with this principle, the proposed development provides surveillance. The non-residential uses located at ground level will provide active surveillance, with non-residential uses generating a degree of activity that will enable people to casually observe what others are doing. This will encourage a perceived sense of security for people in the street and adjoining open space, and will deter potential offenders.

Building R5 has been designed to provide passive surveillance over the park and public domain through the introduction of balconies and wintergardens which will overlook these spaces. The communal resident amenities within the podium will also overlook the park and public domain. This will promote the reality and / or perception that the streets and plaza are under casual surveillance during both the day and night. This acts as a way of creating the perception of risk in the minds of potential perpetrators.

Principle 2 - Access Control

Access controls use physical and symbolic barriers to attract, channel or restrict the movement of pedestrians. As noted in *Crime Prevention and the Assessment of Development Applications*, effective access controls make it clear where people are permitted to go or not go, and makes it difficult for potential offenders to reach and victimise people and damage property. Illegible boundary markers provide excuses for being in restricted areas.

The general public will be free to enter the Barangaroo site, and the public domain around Building R5. However all lifts, building entries and basements will have access control.

Similarly, all of the entry points into the building are located in areas which will be subject to high user traffic, as well as surveillance from passing pedestrians and vehicles. This will ensure that people entering and exiting the buildings can be clearly seen from communal open spaces and adjoining buildings, and monitored if necessary.

Principle 3 – Territorial Reinforcement

Territorial reinforcement refers to the clear identification of public spaces, and the creation of a sense of community ownership over such spaces. As noted in the *Crime Prevention and the Assessment of Development Applications* people feel comfortable in, and are more likely to visit, places which feel owned and cared for. Well used places also reduce opportunities for crime and increase risk to criminals.

Boundary landscaping around the buildings will differentiate public and private spaces. The provision of security-controlled entrances to the building and basement car park will also emphasise the separation of the public and private domain.

Principle 4 – Space Management

Space management refers to providing attractive, well maintained and well used spaces. As noted in *Crime Prevention and the Assessment of Development Applications*, space management strategies include site cleanliness, rapid repair of vandalism and graffiti and the removal of damaged physical elements.

Durable and high-quality materials are proposed which will ensure that minimal maintenance is required for the proposed development. The proposed development comprises premium apartments which will be maintained to a high standard, consistent with the expectations of residents and visitors. The communal areas and public domain will be well-maintained by a landscaping contractor and the maintenance of the buildings will be controlled by the management of the site. The continued maintenance of the building and its grounds will ensure that it does not become degraded and will ensure that vandalism of the property is strongly discouraged.

4.8 Ecologically Sustainable Development

Lendlease Design has prepared an Ecologically Sustainable Development (ESD) report which is included at **Appendix O**.

The Stormwater Management Plan (**Appendix S**) and ESD Report (**Appendix O**) incorporate the information that would otherwise be covered in an Integrated Water Management Plan. The two reports address proposed alternative water supply, proposed end uses of potable and non-potable water and demonstrate the relevant water sensitive urban design and water conservation measures.

The ESD Report demonstrates that the proposed Building R5 supports the site wide sustainability requirements included in the Concept Plan Statement of Commitments.

Building R5 will be targeting a 5 Star Green Star Multi-Unit Residential Design and As-Built rating using the Green Star - Multi Unit Residential v1 Tool, applying the following initiatives:

- a high level of environmental management during construction phase;
- exceeding the 80% requirement for recycling of operational waste;
- measures to achieve a high level of indoor environmental quality;
- energy efficient facade, mechanical systems and building services;
- bicycle facilities;
- water efficient fixtures and fittings and rainwater capture and re-use;
- use of sustainable and recycled materials and minimising use of PVC; and
- emissions and pollution control measures.

Lendlease Design has assessed the requirements necessary to achieve a 5 Star Green Star Multi-Unit Residential Design and As-Built rating. In order to achieve a 5 Star Green Star Multi-Unit Residential Design and As-Built ratings, an overall minimum weighted score of 60 points is required. Subject to detail design, Lendlease Design has calculated that the proposed design is capable of achieve this score

An analysis of the proposal against the principles of ecologically sustainable development set out in the EP&A Regulation is provided in Section 6.0.

4.9 Public Domain and Public Access

Building R5 seeks approval for permanent public domain around the perimeter of the building, a small area of interim public domain at the interface of the development block with Hickson Park and Waterman's Quay, and permanent podium rooftop gardens (refer to **Figure 11**). The remainder of the public domain will be provided as part of the future Stage 1B Public Domain development application. This future application will include public domain treatments for the entire Stage 1B area within Barangaroo South, including in the vicinity of Building R5.

In the intervening period, and in addition to the works proposed at the perimeter of Building R5, a series of broader interim public domain works are proposed as part of the Stage 1B Basement application. These will include landscaping of Hickson Park, the provision of part of Barangaroo Avenue.

The pedestrian experience around Building R5 has been considered in the overall design of the building. The Plaza between Buildings R4B and R5 forms a key part of the pedestrian circulation strategy, drawing pedestrians from Watermans Quay through to Hickson Park.

The building itself has been designed to provide active frontages at the ground plane, and facilitate pedestrian movements in and around the building (refer to **Figure 20**). The ground floor has been conceived as an entirely permeable space with its glazed facades that ensure transparency to the inside of the retail activities and the lobby entrances of each tower, as well as the views to the outside from the enclosed areas.

The public will be able to access the ground level retail spaces, and the through site link between Buildings R5 and R4B. However, to ensure security, access to the lift lobbies will be access controlled.

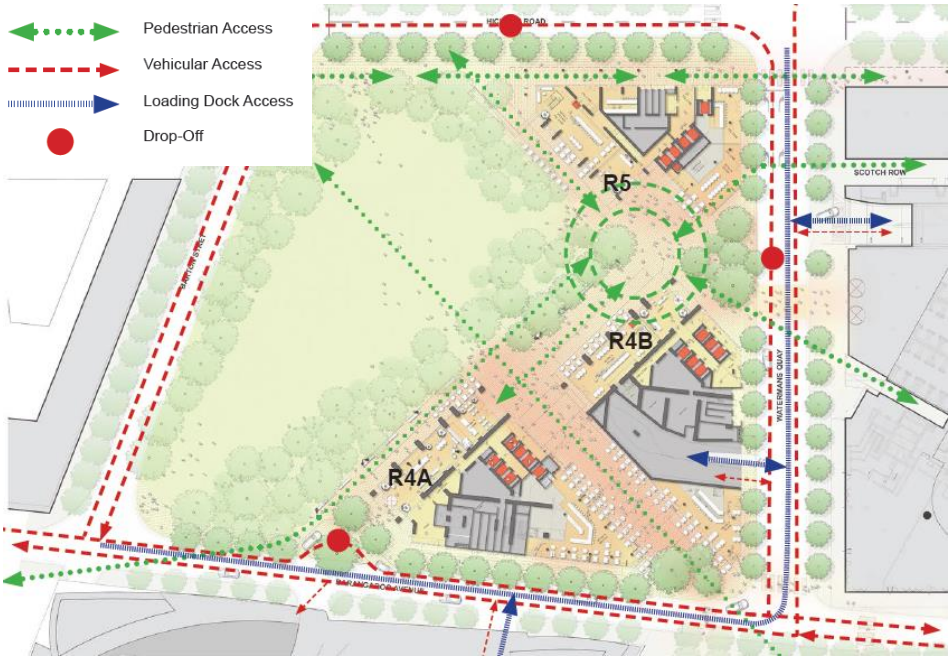

Figure 20 – Pedestrian and vehicular movement diagram

4.10 Transport and Accessibility Impacts

A Transport Management and Accessibility Plan (TMAP) , including a Construction Traffic Management Plan, has been prepared by ARUP and is included at **Appendix Q**. A summary of the assessment and proposed mitigation measures is provided below.

The TMAP addresses the forecast construction and operational traffic generated during all stages of the development and its likely impact to the road network, as well as pedestrian safety and amenity issues during the construction and operation of the subject development.

ARUP has assessed the cumulative traffic impacts associated with the construction of Building R5, and other works taking place both on and outside of the Barangaroo South site.

4.10.1 Operational Traffic

Vehicular Access

Vehicular access to the Building R5 basement car park and loading dock is proposed to be via a single driveway entry/exit towards the western end of Watermans Quay. The driveway will be completed as part of the Stage 1B Basement SSD, however the widening of Watermans Quay to provide access to the basement entry will form part of the Stage 1B Public Domain development application. The primary vehicular access route into and out of the site will be via Sussex Street, Hickson Road and Watermans Quay.

By the completion of the development planned within Stage 1B, traffic signals will be installed at the Hickson Road / Watermans Quay intersection (subject to separate approval). This will manage traffic circulation and efficiency. The detailed design of the intersection, including the phasing and lane arrangements, will take place closer to the construction date and be subject to consultation with the Road Authority and RMS.

All internal roads within the Barangaroo precinct have been designed to accommodate emergency vehicles.

Parking and Loading

Residential Parking

Parking rates for the residential component of Building R5 are based on the number and mix of apartments and the approved parking rates specified in the Concept Plan. These rates are summarised in **Table 15**.

Table 15 – Residential parking provision

Dwelling Type	No. of Units	Parking Rate	Total
1 Bed	22	0.5 spaces / unit	11
2 Bed	63	1.2 spaces / unit	76
3+ Bed	27	2.0 spaces / unit	54
Sub-Total			**141**
KWH 1 Bed	26	0.5 spaces / unit	13
KWH 2 Bed	13	1.2 spaces / unit	16
Total			**170**

Retail Car Parking

The proposed retail parking is based on the formula for other uses under the Concept Plan:

$$\frac{909m^2 \text{ (Retail)}}{19{,}158m^2 \text{ (Total GFA)}} \times \frac{1{,}821m^2 \text{ (Site Area)}}{50}$$

Based on the proposed retail floor area of 909m², 1 parking space is permissible for Building R5. Three retail parking spaces will be provided in the Stage 1B Basement to support the retail uses in all three buildings.

Loading and Servicing

A loading dock is proposed to service the site with multiple points of vertical lift connections to both ground level and to each of the residential buildings. Four loading bays are to be provided, all of which are capable of accommodating the largest design vehicle to access the basement (a City of Sydney garbage truck). Additional service bays are provided for smaller vans and couriers. The loading dock and access ramp system has been designed in accordance with *Australian Standards 2890.2- 2002, Off-street Commercial Vehicle Facilities*.

Future Road Operations and Traffic Generation

The operation of the road network following the full development of the Barangaroo precinct (including Central Barangaroo and Barangaroo Park) has been modelled using the LinSig analysis software. Traffic associated with the new development has been distributed across the road network based on Journey to Work Census data, consistent with the assumptions outlined in the MWT Modified Concept Plan – Transport Report.

Consideration has been given to the temporary and permanent traffic and transport diversions associated with the construction of the light rail on George Street, however insufficient information was available at the time of preparing the assessment to undertake detailed updated modelling. It is important to note that Hickson Road and Sussex Street (at the northern end of the CBD) are not identified as corridors expected to take displaced traffic from George Street. Therefore the traffic flows used for the modelling in the TMAP are considered appropriate to understand the impacts associated with the proposed works.

Based on the adopted traffic generation rates used for previous planning applications on the site, the residential and retail components of Building R5 would generate 22 vehicle movements in the AM peak hour and 15 vehicle movements in the PM peak hour.

Cumulatively, the total peak hour traffic forecast to be generated by the entire Stage 1B development (including Buildings R4A, R4B and R5 comprising approximately 770 residential units and ancillary retail uses) would be 109 vehicle movements in the AM peak hour and 70 vehicle movements in the PM peak hour.

The road network performance has been measured against three parameters, those being:

- Level of Service (LOS)
- Degree of Saturation (DOS)
- Average Vehicle Delay (AVD)

The results of the modelling against these three parameters are shown in **Table 16**.

Table 16 – Traffic modelling results

Peak	Intersection	LOS	DOS	AVD (Sec)
AM	Sussex Street / Erskine Street	C	0.91	41
	Hickson Road / Napoleon Street	C	0.96	41
	Kent Street / Margaret Street	C	0.94	30
	Hickson Road / Watermans Quay	B	0.91	21
PM	Sussex Street / Erskine Street	E	0.98	63
	Hickson Road / Napoleon Street	E	0.99	64
	Kent Street / Margaret Street	D	0.95	47
	Hickson Road / Watermans Quay	A	0.76	8

Summary

The cumulative traffic analysis indicates that the transport network in the Barangaroo precinct can adequately accommodate the increased movements arising from the proposed development. This is consistent with the findings of the traffic modelling recently conducted for the modification of the Barangaroo Concept Plan (Mod 8).

The modelling indicates that the forecast queue length at the northern approach of the Hickson Road / Sussex Street intersection would spill back to the Hickson Road / Watermans Quay intersection. However, it is recognised that significant vehicle queuing currently occurs in the southbound direction on Sussex Street in the PM Peak hour as a result of more congested traffic operating conditions in the vicinity of the cross traffic movements at the King Street and Market Street intersections.

The operation of the future signalised intersections on Hickson Road will be dependent on the operating conditions of intersections further downstream on Sussex Street at King Street and Market Street intersections.

In this context, the road network impacts of the proposal are considered acceptable.

Mitigation Measures

A Travel Demand Management Plan will be implemented to reduce the need for energy intensive car, taxi or air travel and encourage more sustainable modes of transport. ARUP has recommended the following physical and management

measures be considered for implementation as part of the Building R5 development:

- Providing marketing and promotional material around the sustainable travel alternatives available to encourage residents to adopt the travel plan measures;
- Introducing a car sharing scheme;
- Encouraging cycling by promoting annual events such as 'Ride to Work Day' and the City of Sydney's free community cycling training program; and
- Providing broadband availability to encourage working from home.

4.10.2 Construction Traffic

Assessment

The number of construction vehicles generated by the works is based on recent advice from Lendlease, and the existing activity profile for the Barangaroo South (Stage 1A) site. Construction vehicle activity generated by works external to Barangaroo South has been forecasted based on the supporting planning documents to each of the project applications. Further, as the proposed construction timeframe for Building R5 will extend into the period of the occupation of the Barangaroo South Stage 1A development and the opening of Barangaroo Park. An assessment of the road network impact of these works has also been undertaken.

ARUP's report (**Appendix Q**) provides a detailed summary of anticipated construction and development traffic movements associated with each project in the Barangaroo precinct. The data indicates that the peak traffic activity is anticipated to occur in September 2020, with 433 additional traffic movements during the AM peak hour (compared with the existing situation).

The existing construction traffic profile demonstrates that the majority of vehicle activity takes place outside the commuter peak hours of 8am-9am and 5pm-6pm. Most notably, construction activity dissipates significantly after 3pm, with only 5% of the day's total trucks arriving after this time. Two truck deliveries were recorded during the PM peak hour of 5pm – 6pm, equating to 2% of the daily vehicle activity.

This shows that the construction activity generated by Barangaroo South has a relatively minor impact on the operation of nearby intersections during the critical PM peak period (4pm-7pm). On this basis, ARUP's analysis has considered the morning peak hour (8am – 9am) to determine the impacts arising from the Stage 1B works.

Intersection Analysis

Construction traffic will continue to utilise the traffic routes which have been established for the site. Consistent with the forecasts adopted in previous construction traffic management plans for Barangaroo South works, 70% of construction vehicles are forecast to approach the worksite from the southern and western parts of Sydney. The remainder would approach from the northern direction (i.e. via the Harbour Bridge, Western Distributor and Harbour Street). For trucks returning to the north, they would utilise Napoleon Street and then turn left onto Kent Street to approach the Harbour Bridge. Margaret Street would not be used as a construction route during peak hours.

ARUP has assessed the future traffic operations of the five nearest and most relevant intersections, namely:

- Hickson Road / Watermans Quay - Priority Controlled (Future)
- Napoleon Street / Hickson Road- Traffic Signals

- Sussex Street / Shelley Street - Traffic Signals
- Sussex Street / Erskine Street - Traffic Signals
- Napoleon Street, Margaret Street / Kent Street - Traffic Signals

The effect of the estimated additional peak hour traffic for the combined construction and operational activities has been investigated for each of the affected intersections during the AM peak hour. As noted above, negligible construction traffic movements are anticipated during the PM peak hour and therefore this has not been considered in the analysis.

The results of the LinSig intersection analysis forecast minimal changes in the operation of key intersections as a result of the construction of the Stage 1B development, when compared with the base case scenario. Therefore, additional construction vehicles associated with the Stage 1B works will have a negligible impact on forecast road network performance.

During the AM peak hour, when construction vehicles attributable to Stage 1B are expected to access the site, the road network generally operates satisfactorily. The addition of construction traffic movements associated with the Stage 1B works does not impact the overall operation of the local road network, and requires no further works to accommodate the levels of construction traffic anticipated.

Recommended Mitigation Measures

ARUP has put forward a range of mitigation measure to manage construction vehicle movements (refer to **Appendix Q**). These include:

- managing site hours in accordance with existing project approvals for Barangaroo South to ensure traffic continues to be generated outside of the normal commuter peak period;
- continuing to restrict construction vehicle routes during certain periods;
- encouraging construction workers to use alternative modes of transport by providing no on-site parking for construction workers; and
- implementing traffic control measures such as staging and coordinating truck movements to prevent trucks circulating in CBD streets, limiting the size of trucks accessing the site, and employing traffic management personnel to control truck movements and manage traffic safety conflicts.

4.11 Heritage

As outlined in Section 2.5.6, it has been confirmed that the Barangaroo South site does not contain any further items of heritage or archaeological significance. Furthermore, no items of heritage significance are located in the immediate vicinity of the proposed Buildings R4A, R4B and R5 and its associated Basement. Previous studies and significant excavation works have been undertaken on the site, and potential archaeological items of significance have been identified and removed. As such, the proposed development will not have any physical impacts on items listed on any heritage register.

Proposed Building R5 is located within the Barangaroo South site, and is consistent with the maximum parameters established under the Concept Plan (Mod 8). However, it has frontage to Hickson Road, which features several heritage items, although not in the immediate vicinity of the building. In order to address the potential impacts of the proposed building on the curtilage and context of heritage items surrounding Barangaroo, a Statement of Heritage Impact has been prepared by TKD Architects (refer to **Appendix I**). This Statement concludes that whilst Building R5 will impact on the setting of several items it will

not affect their visual integrity and heritage significance, noting the development's siting relative to the heritage items and amongst other existing tall buildings in the CBD. It finds that the existing curtilage around heritage items and conservation areas is largely unaffected, allowing ongoing appreciation of heritage significance and interpretations of the places and individual items.

4.12 Contamination

ERM has prepared an Overarching Remedial Action Plan (Overarching RAP) for the Barangaroo site on behalf of the Barangaroo Delivery Authority. The Overarching RAP presents a summary of the contamination issues identified on the Barangaroo site and outlines an approach to the remediation of the site as a whole. The Overarching RAP was prepared in accordance with the Contaminated Land Planning Guidelines under section 145C of the EP&A Act and relevant guidelines produced or approved under section 105 of the *Contaminated Land Management Act 1997*.

In accordance with the Overarching RAP, the Stage 1B RAP was prepared by AECOM Australia Pty Ltd. The Stage 1B RAP covers the site the subject of this SSD DA. The preparation of the Stage 1B RAP was informed by the Human Health Environmental Risk Assessment, prepared by AECOM, dated 4 July 2011 (HHERA), including the Site Specific Target Criteria (SSTC) that are contained in the HHERA. Remedial works specified within the Stage 1B RAP were approved as part of SSD 5897 in November 2014.

Works approved under SSD 5897 include the excavation of contaminated material and natural materials to a nominal indicative depth of RL -16.5 m and construction of a perimeter retention wall around the excavated remediation area. The approved perimeter retention wall left a gap separating it from the Stage 1A basement wall, to provide a pathway for new and existing permanent stormwater infrastructure from Hickson Road to Darling Harbour and temporary stormwater infrastructure.

A Section B Site Audit Statement and a Site Audit Report have been issued by Accredited Site Auditor Graeme Nyland of ENVIRON Australia Pty Ltd for the remediation of the Block 4 Remediation Area in accordance with the Stage 1B RAP. In relation to the Block 4 Development Remediation Works Area, the Site Auditor concludes that:

- The nature and extent of contamination has been appropriately determined.
- The RAP is appropriate for the purpose of ensuring that Block 4 is remediated to a standard suitable for its proposed future development.

A Site Auditor's Statement will be obtained upon completion of the remediation approved under SSD 5897 to verify the site is suitable for the proposed uses as envisaged under the approved Concept Plan.

The Block 4 Remediation SSD DA (SSD 5897) will provide for the remediation of all contaminated material within the DA site (if required), ensuring that the site will be suitable for the use proposed under this SSD DA. SSD 5897 also provides for all excavation in association with the Stage 1B Basement, with the excavation depth estimated at the time to be required to a nominal depth of -16.5m RL. The Stage 1B Basement SSD DA (SSD 6960) will provide for any residual excavation that may be required and for the construction of the basement. As such, no excavation or piling works are proposed as part of this SSD DA.

State Environmental Planning Policy No. 55 – Remediation of Land

SEPP 55 sets out a State-wide planning approach to the remediation of contaminated land which includes ensuring that remediation work is permissible

throughout the State. In particular, clause 7 of SEPP 55 requires the consent authority to consider whether the land is contaminated, and if so, then to consider whether the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out.

Appendix D includes a letter from AECOM confirming that the site can be made suitable for the proposed uses. In particular, as described above, the Block 4 Remediation SSD DA (SSD 5897) will provide for the remediation of all contaminated material within the DA site (if required). An EPA accredited Site Auditor has issued a Section B Site Audit Statement and a Site Audit Report confirming that the site can be made suitable for the proposed uses, and a Section A Site Auditor's Statement will be obtained upon completion of the remediation approved under SSD 5897.

Mitigation Measures

As there are no further remediation works required under this SSD DA no contamination related mitigation measures are required for the proposed works.

4.13 Infrastructure Provision

Lendlease has prepared a Services Report outlining the existing infrastructure, how the proposed Building R5 will be serviced, and if any impacts will occur on existing infrastructure as a result of the proposed development (refer **Appendix R**).

All infrastructure provision to the Building R5 site, including stormwater, water, gas, electricity and communications is being provided under the Stage 1B Basement development application. The proposed building services will connect to this basement infrastructure (see Section 3.5). No existing infrastructure is expected to be impacted or require relocation as a result of the proposed works the subject of this development.

Mitigation Measures

As there are no environmental impacts no mitigation measures are required for the proposed works

4.14 Environmental, Construction and Site Management Plan

Lendlease has prepared a Construction Framework Environmental Management Plan (CFEMP) for Stage 1B of the Barangaroo development. This CFEMP has been updated to include Building R5, and is provided in **Appendix U**. The CFEMP includes the following sub-plans:

- Water & Stormwater Management Sub-Plan.
- Noise & Vibration Management Sub-Plan.
- Air Quality & Odour Management Sub-Plan.
- Acid Sulfate Soil Management Sub-Plan.
- Spoil and Waste Management Sub Plan.

These sub-plans will be supplemented or updated as appropriate to incorporate the mitigation and management measures describe above, and in Section 6.0.

In addition to the above, the CFEMP also sets out the approach to community, authority and stakeholder engagement. The CFEMP addresses procedures around

internal communication, pro-active community, authority and stakeholder management and complaints handling.

4.15 Staging of Construction

Lendlease proposes to undertake the construction of Barangaroo South in a staged manner. Building R5 will be constructed concurrently with the other proposed developments within Stage 1B. It is anticipated that construction will commence in December 2019, and it is intended that the building will be complete in 2023.

Building R5 will be completed in a single build, however to facilitate the construction process it is requested that the Minister structure the consent conditions to provide flexibility for interim construction and occupation certificates to be issued for discrete works packages (i.e. a staged construction process). The staging of the construction program will be defined during design development.

4.16 Noise and Vibration

A Construction and Operational Noise Report has been prepared by Wilkinson Murray, and is provided in **Appendix M**. The assessment has been carried out in accordance with the *NSW Industrial Noise Policy 2000* (EPA). The outcomes of the Report are summarised below.

4.16.1 Representative Ambient Noise and Background Noise

The Report identifies seven (7) commercial receivers and eight (8) residential receivers as well as three (3) heritage receivers. The receivers include those at Millers Point, Barangaroo, Darling Island, Pyrmont, King Street Wharf, and Balmain East.

In order to quantify the existing noise environment, long-term ambient noise levels were monitored at eight (8) locations surrounding the Site, selected to cover the range of environments in the potentially affected areas. These monitoring locations include Hickson Road, Barangaroo, King Street Wharf, Millers Point, Darling Island and Balmain East. For each noise monitoring location the background noise level (Rated Background Level (RBL)) and average noise over each 15 minute period ($LA_{eq,\ 15\text{-}min}$) were determined.

4.16.2 Noise Guidelines and Criteria

The EPA's *Interim Construction Noise Guideline* provides noise goals that assist in assessing the impact of construction noise.

For residences, the basic daytime construction noise goal is that the $LA_{eq,\ 15min}$ noise level should not exceed the background noise by more than 10dBA. This is for standard hours: Monday to Friday 7.00am to 6.00pm, and Saturday 8.00am to 1.00pm.

Outside the standard hours, each criterion would be background plus 5dBA. The criteria are based on the background noise monitoring data described above, which determines the background noise.

The guideline also identifies that noise above $LA_{eq,15\ min}$ 75dBA is likely to result in strong community reaction to noise, and the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works are to proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.

In addition, the following construction noise management levels $LA_{eq,15\ min}$ are recommended for other receivers and areas.

- Active recreation areas (such as parks): external $L_{Aeq\ ,15\ min}$ 65dBA.
- Industrial premises: external $L_{Aeq\ ,15\ min}$ 75dBA.
- Offices, retail outlets: external $L_{Aeq,15\ min}$ 70dBA.
- Classrooms at schools and other educational institutions: internal $L_{Aeq\ ,15\ min}$ 45dBA.

Table 17 sets out the background noise levels monitored for each receiver and the resulting construction noise management level for each receiver, in accordance with the *Interim Construction Noise Guideline*.

The EPA Guidelines stipulate that where the predicted $L_{Aeq(15min)}$ is greater than the construction noise management level, the proponent should apply all feasible and reasonable work practices to minimise noise, and inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.

Table 17 – Background Noise and Construction Noise Management Levels

Location	Construction Noise Management Level LAeq - dBA				Highly noise affected Noise Level LAeq - dBA
	Day	Evening	Night	Sat (7am – 5pm)	
Hickson Rd Residents	63	58	54	56	75
High St Residences	57	49	46	50	75
Merriman St Residences	56	49	45	51	75
Balmain East Residences	59	50	45	51	75
Darling Island Residences	57	49	44	55	75
Residential Building R8	63	58	54	56	75
Commercial Properties	70				
Schools / Preschools	65 / 55*				
Parks/outdoor areas	65				

* The external NML of 65 / 55dBA is based on a 20 / 10dB reduction through a closed and open window respectively to meet an internal level of 45dBA.

4.16.3 Noise Generating Activities

Consistent with other approvals on the Barangaroo site, the proposed construction hours are between 7.00am and 7.00pm Monday –Friday and between 7.00am and 5.00pm on Saturdays which are outside of standard City of Sydney construction hours.

No construction work is proposed to be undertaken outside the proposed construction hours, including on Sundays or Public Holidays, with the exception of emergency work and activities such as:

- Concrete pours that need to be completed to prevent waste and re-working;
- Service installation works and cut-overs during temporary utility shutdowns or off peak periods;

- Works behind a façade (such as plastering, internal fit-out, painting and finishes); and
- Other critical works that are generally inaudible at nearby sensitive receivers (such as concrete curing, post tensioning and membrane placement).

4.16.4 Construction Noise Predictions

Assessment of likely construction noise at surrounding commercial and residential receivers have been assessed for Building R5 and in a cumulative sense for approved and proposed works being carried out concurrently.

4.16.5 Building R5

The modelling has predicted that exceedances may occur at up to three of the identified receivers during each of the modelling scenarios. In summary:

- In Scenario A exceedances of the Saturday Noise Management Level of up to 9 dB(A) are predicted at the Hickson Road Residences;
- In Scenario B exceedances of the Saturday Noise Management Level of up to 1 dB(A) are predicted at the Hickson Road Residences;
- In Scenario C no exceedances are predicted; and
- In Scenario D exceedances of the Saturday Noise Management Level of up to 9 dB(A) are predicted at the Hickson Road Residences.

A full account of the modelling results is available in **Appendix M**. Construction noise from the proposed Residential Building R5 works in isolation (Scenarios A – C) will not generate excessive levels of construction noise at surrounding receivers during normal weekday works. Exceedances of up to 9 dBA may occur at surrounding residences on Saturday afternoons, however these levels are not considered excessive by construction standards and can be managed by existing construction management procedures. These existing management measures, including selecting appropriate equipment, planning works to minimise noise emission levels, and installing noise barriers where appropriate, will adequate manage these exceedances.

Cumulative Noise Impact

With respect to cumulative noise impacts (Scenario D), apart from Building R4B there will be no other approved projects that will be under any stage of construction when all three residential buildings and the Stage 1B Basement structure are nearing completion (indicatively around July 2022).

Noise contributions from Building R5 will be very similar to the overall cumulative construction noise levels at the potentially most affected surrounding receivers, with the exception of residences on High Street and at the R8 Residences. In these locations a small increase in overall noise levels of 3 dB(A) and 1dBA respectively can be expected.

It is also noted that an exceedance of the internal noise objective in the preschool is predicted by a small amount of 4 dBA. However this magnitude of exceedance is not considered acoustically significant and unlikely to adversely impact on the acoustic amenity of occupants of the pre-school.

4.16.6 Construction Traffic Noise

Morning peak flows are based on information provided by ARUP. The maximum impact of traffic noise from Stage 1B is anticipated at approximately July 2022, when there will be operational traffic from some of the Barangaroo South Projects. A review of traffic noise predictions indicates that:

- construction traffic from Buildings R4A, R4B and R5 will increase future traffic noise levels at Hickson Road residences by approximately 0.1 dBA; and
- when all of R4A, R4B and R5 and all Barangaroo South construction traffic is included, an increase of 0.7 dBA is predicted above operational 2020 traffic. Traffic noise levels are therefore not predicted to exceed the 2dBA objective due to construction and operational traffic in April 2021.

4.16.7 Road Traffic Noise Assessment

ARUP presented operational traffic flows with respect to all three residential components, including Building R5 (see **Appendix M**). A review of predictions indicates the following:

- Overall operational traffic noise levels at residences on Hickson Road will increase by 0.5dBA once development is complete;
- The traffic noise contribution of Buildings R4A, R4B and R5 alone is predicted to be well below existing nose levels on Hickson Road; and
- Traffic noise levels are not predicted to exceed the 2dBA objective due to all Barangaroo South operations alone.

4.16.8 Operational Noise

Operational noise from the proposed Building R5 will be from mechanical plant located predominantly on the rooftop of the development and contained within dedicated plant areas within the building. Detailed specifications of mechanical services equipment that would otherwise allow an acoustic assessment are not available at this stage of the project as selection and design is conducted after project approval.

Mechanical plant such as air-conditioning and rooftop exhausts will be selected, having regard to nearby residential and commercial properties surrounding the development, and future development within Barangaroo South.

It is expected that limitations on operational noise emission should form a conditional requirement of the development, to be satisfied prior to the issue of the construction certificate for the approved works.

4.16.9 Noise and Vibration Mitigation Measures

Equipment associated with structure and façade construction is not anticipated to be a significant generator of vibration and hence, there are no specific noise and vibration mitigation measures to be adopted.

It is noted that a Construction Noise and Vibration Management Sub Plan titled *Noise & Vibration Management Sub-Plan Barangaroo South Document No: H010106LLC004* has been prepared by Lendlease for Barangaroo in its entirety and it is intended for project specific noise and vibration control measures to be incorporated into the noise and vibration sub-plan. These are:

- General Measures to include plant noise audits; operator instruction; equipment selection; site noise planning; and installation of noise barriers between site and street frontages;
- Community Relations Programme to be included in Lendlease's *Community and Stakeholder Engagement Strategy;*
- Noise & Vibration Management Plan whereby measures required by this assessment are to be incorporated into the revised version of the sub plan.

4.16.10 Conclusion

A noise assessment of the proposed construction activities associated with the construction of Building R5 has determined the potential for noise and vibration impacts at surrounding receivers. No exceedance of noise management levels is expected at surrounding receivers during normal weekday construction. On Saturdays, exceedances of up to 9dBA are predicted during intensive periods of construction. . These exceedances will be managed in line with the Noise and Vibration Sub Plan, which will be updated prior to the commencement of the proposed works.
Vibration is considered to be negligible and no management or mitigation measures are proposed beyond normal measures. Construction traffic noise is determined as marginal and a *Noise and Vibration Management Plan* has been prepared to assist Lendlease in the management of environmental issues associated with this project. Site specific operational noise is envisaged to be complied with during detailed design phase.

4.17 Air Quality and Odour

An Air Quality Impact Assessment (AQIA) has been prepared by AECOM to determine the potential air quality and odour impacts arising from the development of Building R5 (**Appendix T**). The AQIA has been undertaken in accordance with and / or in reference to the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales 2005, published by the Environment Protection Authority (EPA).

The AQIA has considered all construction activities on the Barangaroo site, including works that will occur concurrently on Stage 1B. It is anticipated that all currently approved construction works in Stage 1A would be complete when work on Building R5 commences. An overview of the AQIA is provided below.

Sensitive Receptors

The sensitive receptors are predominately located along the western side of Hickson Road. The closest receptors are located approximately 25 metres to the east of the Barangaroo site on Hickson Road, and consist of residential and commercial properties. A number of finger wharves containing a mixture of residential and commercial uses are located directly opposite Barangaroo South, the closest at approximately 250 metres to the west. The residential suburb of Balmain East is located approximately 400 metres to the west of the northern end of Barangaroo South.

Relevant source characteristics used in previous assessments undertaken by AECOM for the Barangaroo development were used to inform the cumulative impact assessment to ensure consistency.

Assessment

AECOM has identified the relevant pollutants of potential concern, as well as impact assessment criteria, consistent with those applied to other projects at Barangaroo South. The assessment of pollutants of potential concern has factored in fugitive emissions. The dispersion modelling has also remained consistent with previous assessments to ensure a meaningful comparison is able to be completed.

A single scenario has been modelled by AECOM, representing the time at which the highest expected activity levels of construction will occur. As the construction of the Stage 1B buildings will overlap, the following concurrent activities are expected to represent the worst-case emissions during the Stage 1B construction works:

- construction of the Stage 1B Basement;

- construction of Building R4A;
- construction of Building R4B;
- construction of Building R5; and
- operation of the on-site water treatment plant.

This scenario will occur between January and August 2021. All other activities on the Barangaroo site are expected to be completed when the highest level of emissions from the Stage 1B works (excluding excavation works) are expected to occur.

The modelling has identified two exceedances of the established criteria, relating to NO_2 and PM_{10} during the one hour and 24 hour period respectively. The modelling was based on a number of conservative assumptions, including the assumption that the plant would be constantly operating between the hours of 7am and 7pm, every day of the year. This assumption is likely to lead to overestimates of short term and annual predictions, particularly as this level of concurrent work is only expected to occur for an eight month period. This conservative approach accounts for the predicted exceedance of short term NO_2 concentrations. The exceedance of the 1 hour NO_2 criterion was predicted for a group of receptors to the east of the construction area, along Hickson Road.

The predicted exceedances of the 24 hour PM_{10} criterion were attributable to the exceedances in the background PM_{10} concentrations – a total of three exceedances were predicted to occur at each receptor assessed, which corresponded to the three exceedances in the ambient data. The modelling predicted that no additional exceedances would occur at any receptor location assessed.

Management of equipment to minimise the cumulative impacts from engine generated air pollution (e.g. only operating concrete pumps when needed) is expected to significantly reduce the potential for adverse impacts.

An extensive reactive air quality management plan has been implemented for Barangaroo site. This includes a reactive dust mitigation system which includes ambient pollution monitoring, and is directly linked to real-time warnings and incorporates work procedures to ensure that action is taken to reduce dust levels when they are elevated and at risk of exceeding acceptable air pollution levels. The system has been operational on the Barangaroo South site for some time, and will continue to operate throughout the duration of the Stage 1B works. Lendlease uses its existing air quality monitoring network and its operational procedures to ensure the site emissions are mitigated to an appropriate level and that adverse impacts (i.e. exceedances of ambient air quality criteria) are minimised at sensitive receptor locations as a result of site operations.

The management of air quality impacts during construction will be addressed under Air Quality and Odour Management Sub-Plan, as part of the Construction Framework Environmental Management Plan.

Recommended Mitigation Measures

AECOM has outlined recommended air quality management and mitigation measures to be implemented during the development of Building R5 (refer to **Appendix T**) and covered by the Air Quality and Odour Sub-Plan to the Construction Framework Environmental Management Plan. These include:

- the dust, VOC and meteorological monitoring program will be continued;
- vehicle engines will be turned off while parked on site;
- vehicular access will be confined to designated access roads;

- equipment, plant and machinery will be appropriately tuned, modified or maintained to minimise visible smoke and emissions;
- site speed limits will be implemented;
- exposed areas will be minimised as much as practical;
- loads will be covered during transport;
- the complaints management system will be maintained;
- work practices will be adjusted (as required) based on wind observations and real time monitoring results;
- windbreak barriers will be erected at the site boundary;
- general environmental controls will be installed for excavation works, including bunding and sediment controls; and
- exposed surfaces and roads will be watered as required.

AECOM conclude that overall, the potential air quality and odour impacts can be adequately managed. Lendlease has demonstrated that it can undertake significant materials handling and construction activities with substantial plant and equipment numbers on site while minimising emissions through this reactive management and monitoring system. As such, the Building R5 construction works are not expected to result in adverse impacts on the surrounding environment.

4.18 Water, Drainage and Stormwater

A Stormwater Management and Infrastructure Servicing Plan has been prepared by Cardno (refer to **Appendix S**). The report assesses the proposed stormwater and drainage arrangements, and together with the ESD Report at **Appendix O**, these documents form an Integrated Water Management Plan, and address the relevant SEAR.

All stormwater drainage and infrastructure servicing for Building R5 will be provided as part of the Stage 1B Basement application. These works include a series of stormwater diversion works to improve the conveyance capacity of the external drainage network, and cater for future harbour water level increases in accordance with current State and Council policies. The stormwater network for Stage 1B is designed to provide:

- low flows directed through water quality management measures (nominally up to a 3 month ARI event) including gross pollutant trap and stormwater filter; and
- internal site drainage with sufficient capacity to capture and convey all storm events up to and including the 100 year ARI, with allowance for 50% blockage on all sag pits.

The stormwater strategy also incorporates measures to ensure stormwater quality, such as gross pollutant traps and proprietary tertiary filters, in order to achieve the required reductions in pollutant targets.

The drainage design for Building R5 proposes to capture and convey rainwater from roof and podium areas through conventional gutters, roof top drainage outlets and associated downpipes. Detailed design will be undertaken by the building hydraulic consultant and coordinated to allow connection to the trunk stormwater drainage within Barangaroo Avenue and Watermans Quay. Cardno has confirmed that there is capacity within the street drainage system to be provided in Stage 1B for Building R5 and there will be no physical impact on existing infrastructure as a result of the development.

During construction, sediment and erosion control measure will be adopted in accordance with the Construction Framework Environmental Management Plan (refer to Section 4.14 and **Appendix U**). Measures to mitigate any adverse impacts include:

- assessing and monitoring surface and ground water hydrology and quality, including Darling Harbour water quality;
- installation of supplementary erosion and sediment control measures such as temporary sediment basins, will be implemented to treat surface run-off during construction works; and
- installation of a below ground Gross Pollutants Trap (GPT) at the downstream end of the drainage system to remove litter, vegetative matter, free oils, grease and coarse sediments prior to discharge into Darling Harbour.

Mitigation Measures

Based on the content of previous reports prepared for the proposed Stage 1B Basement, adequate stormwater infrastructure has been incorporated into the base design to service the R5 development site. Any impacts associated with construction of the proposed works will be suitably mitigated through a range of measures, including temporary service provision where required.

During construction, water quality will be managed in accordance with the Construction Framework Environmental Management Plan and Stormwater Management and Infrastructure Servicing Plan to ensure no adverse impacts arise. This is reflected in the Mitigation Measures at Section 6.0.

4.19 Waste Management

A Waste Management Plan (WMP) has been prepared by ARUP and is included at **Appendix V**. The WMP identifies measures to manage waste during the construction and operational phases of the proposed development.

Waste volumes for Buildings R5 have been estimated in order to determine the waste storage area and waste storage bins which will be required (see Section 3.7). ARUP has concluded that the waste storage areas and rooms proposed to be provided in the basement are appropriate to accommodate the waste storage demand generated by the proposed building.
Construction waste will be managed in accordance with the project's Green Star objectives, particularly in regards to use of recycled building materials and recycling of construction waste streams. The primary goal for waste management in the construction phase is to ensure at least 80% of waste is recycled or reused.

Waste streams expected to generate the greatest volumes of waste during the construction process are concrete, steel reinforcement and plastics, all of which are recyclable.

The construction contractor will develop a detailed Construction Waste Management Plan (CWMP) in order to ensure that construction waste is minimised and diverted from landfill where ever possible. During construction, suitable areas on site (or off site, if necessary), will be provisioned which provide adequate space and access for:

- storage of building materials;
- storage of demolition and construction waste;
- sorting of demolition and construction waste; and
- removal of demolition and construction waste for recycling, re-use or landfill.

4.20 Tree Removal

No tree removal is proposed as part of this application. Any tree removal required to accommodate the Stage 1B residential development will be carried out as part of the Stage 1B Basement application, prior to commencement of works on the subject development.

4.21 Building Code of Australia

A Building Code of Australia (BCA) Assessment has been prepared by McKenzie Group Consulting and is included at **Appendix W**. The assessment identifies the areas of the proposal including fire resistance, egress, fire services and equipment, ventilation and smoke hazard management, lift services, sanitary facilities, access and energy efficiency that either comply with the standard BCA deemed to satisfy provisions or are to be the subject of a suitable performance based alternative solutions.

The alternate solutions will be assessed against the relevant Performance Requirements of the BCA by suitably qualified persons, and in consultation with the NSW Fire Brigade, prior to the issue of a Construction Certificate.

4.22 Fire Safety

A Preliminary Fire Safety Engineering Review has been provided by Defire (**Appendix Y**), which has been undertaken to determine whether the design can be demonstrated to achieve compliance with the relevant performance requirements of the National Construction Code Series 2014 Volume Once – Building Code of Australia (BCA). A preliminary description of alternative solutions has been provided where relevant.

Delfire conclude that it will be possible to develop alternate solutions to achieve compliance with the relevant BCA performance requirements during design development prior to the issue of a Construction Certificate.

4.23 Accessibility

The proposed building has been assessed against the provisions for Access for People with Disabilities in Part D3 of the BCA relative to the range of future land uses it is intended to accommodate.

Access for people with disabilities will be provided to and within the building in accordance with the requirements of Clause D3.2, D3.3 and D3.4 of the BCA 2015. Parts of the building required to be accessible shall comply with the requirements of AS1428.1-2009. Details of compliance with Part D3 of the BCA for the proposed development will be resolved as part of the Construction Certificate process.

4.24 Structural Engineering

A Structural Engineering Report has been prepared by Robert Bird Group (**Appendix J**) to describe the structural scheme proposed for Building R5, and to summarise the structural design criteria at the time of the Development Application.

The report concludes that the proposed Building R5 is capable of being designed and constructed utilising proven design and construction techniques.

4.25 Sea Level Rise

The recommended seawall level for the Barangaroo South site will continue to be a minimum RL2.5m AHD, ensuring the expected sea level rise of between 0.26m and 2m by 2100 is mitigated. This will be addressed under a separate approval for the Stage 1B Public Domain. As such, the future development will continue to mitigate any potential impacts of climate change induced sea level rise.

4.26 Consultation

In accordance with the SEARs for this SSD DA (see **Appendix B**), an appropriate level of consultation was undertaken with Council and State government agencies.

This section details the consultation undertaken as part of the preparation of this SSD DA and proposed ongoing stakeholder engagement. Accordingly, consultation has been undertaken as required by the SEARs and in conformance with the Department of Planning and Environment's *Major Project Community Consultation Guidelines 2007*.

In addition to the consultation processes described below, the proposed development will be placed on public exhibition for 30 days in accordance with Clause 83 of the *Environmental Planning and Assessment Regulation 2000*. During the public exhibition period Council, State agencies and the public will have an opportunity to make submissions on the project.

Council and Agency Consultation

Lendlease recognises the importance of positive relationships with Council and agencies and seeks to proactively engage with them over the duration of the project. Lendlease proposes to undertake stakeholder engagement to ensure all individuals and/or groups that have an interest in the SSD DA are consulted with.

As part of the preparation of the DA, Lendlease met with Council and presented the Building R5 design and had opportunity to provide feedback. A briefing session was also held between Council and Renzo Piano Building Workshop. The proposed design was received positively.

Lendlease meets with the EPA, Transport for NSW and Roads and Maritime Services on a regular basis. As part of those regular meetings Lendlease has informed each of the agencies that a future application would be lodged for Building R5. Transport for NSW and Roads and Maritime Services raised questions about pedestrian connections to the site and integration of Barangaroo South into the broader CBD. Pedestrian access into Stage 1B and the broader Barangaroo precinct has been considered as part of this, and other applications.

Lendlease has also carried out ongoing consultation with the Sydney Observatory. This included discussions around building illumination and view loss of night sky due to the residential towers.

Affordable Housing Provider Consultation

To ensure that the Key Worker Housing component of Building R5 satisfies the requirements of affordable housing providers, Lendlease has met with senior representatives from the following affordable housing providers:

- Bridge Housing;
- City West Housing; and
- St George Community Housing.

Bridge Housing and City West Housing were consulted on multiple occasions, and the consultation process included a site visit to City West Housing's Eveleigh project to review the design and discuss the lessons learnt on that project.

The design and operational feedback given to Lendlease was consistent across the providers, and included:

- Single, stand-alone buildings are preferred over individual affordable housing units spread across multiple buildings. Providing affordable housing in a consolidated location has operational benefits, with a more dispersed approach adding complexity when managing properties and trying to attend to repairs and maintenance for tenants.
- Whilst a true 'stand-alone' building cannot be achieved within Stage 1B, the proposed design solution would enable the Key Worker Housing to be subdivided into a separate lot for stratum purposes, including a separate building entrance that could be managed by the provider themselves. In this regard, the providers also discussed the importance of being able to separately meter and operate the lot.
- With respect to apartment mix, the providers expressed a preference for smaller sized studio, 1 and 2 bedroom apartments to suit their customer base. A design review was conducted with the providers to determine if studios were achievable in lieu of 2 bedroom apartments, however the required Apartment Design Guide sizes could not be achieved.
- The functionality of apartment layouts was discussed, with the providers expressing a preference for large amounts of storage within apartments, and showers over bathtubs. Accessible apartments were also discussed, however it was noted that this could be further developed with the preferred provider.
- With respect to waste management, providers prefer a ground floor drop-off point for tenants as they exit the building, rather than a chute which is operationally challenging and more costly to manage. Lendlease explained the waste strategy for the site, and that chutes to the basement enable below-ground waste collection which is the preference for waste disposal across the site, rather than at street level via building lobbies.

Community and Stakeholder Engagement

The Barangaroo Delivery Authority and Lendlease are consulting with local residents, the local business community and other relevant stakeholders as part of its ongoing community engagement program related to Barangaroo. The opportunity to participate has been provided through a number of direct and indirect mediums including community consultation events, Barangaroo Open Day, presentations and workshops, the Barangaroo South website and Barangaroo South newsletter. In addition:

- A consultation session was held with the local business community in March 2015.
- A consultation session was held with representatives of the commercial buildings around the site, including KPMG, Macquarie Group, AMEX, Westpac, Sussex Hotel and Investa. Questioned raised include:
  - Transport connections / access points into Barangaroo;
  - Staging information for construction timelines;
  - Coordination of Concept Plan (Mod 8) with Wynyard Walk works; and
  - The Concept Plan (Mod 8) retail strategy.
- An article was published in the Barangaroo Newsletter regarding the hotel relocation and Stage 1B buildings in April 2015. No public queries were received as a result of this article.

Lendlease also undertakes regular consultation with the NSW Police in relation to Barangaroo. This has included detailed briefings on construction works taking place at Barangaroo, including the proposed development.

Lendlease will undertake further detailed consultation and notification to the local community and relevant stakeholders, prior to the commencement of works.

5.0 Environmental Risk Assessment

The Environmental Risk Assessment (ERA) establishes a residual risk by reviewing the significance of environmental impacts and the ability to manage those impacts. The ERA for the development has been adapted from *Australian Standard AS4369.1999 Risk Management and Environmental Risk Tools*.

In accordance with the SEARs, the ERA addresses the following significant risk issues:

- the adequacy of baseline data;
- the potential cumulative impacts arising from other developments in the vicinity of the Site; and
- measures to avoid, minimise, offset the predicted impacts where necessary involving the preparation of detailed contingency plans for managing any significant risk to the environment.

Figure 21 indicates the significance of environmental impacts and assigns a value between 1 and 10 based on:

- the receiving environment;
- the level of understanding of the type and extent of impacts; and
- the likely community response to the environmental consequence of the project;

The manageability of environmental impact is assigned a value between 1 and 5 based on:

- the complexity of mitigation measures;
- the known level of performance of the safeguards proposed; and
- the opportunity for adaptive management.

The sum of the values assigned provides an indicative ranking of potential residual impacts after the mitigation measures are implemented.

Significance of impact	Manageability of impact				
	5 Complex	4 Substantial	3 Elementary	2 Standard	1 Simple
1 – Low	6 (Medium)	5 (Low/Medium)	4 (Low/Medium)	3 (Low)	2 (Low)
2 – Minor	7 (High/Medium)	6 (Medium)	5 (Low/Medium)	4 (Low/Medium)	3 (Low)
3 – Moderate	8 (High/Medium)	7 (High/Medium)	6 (Medium)	5 (Low/Medium)	4 (Low/Medium)
4 – High	9 (High)	8 (High/Medium)	7 (High/Medium)	6 (Medium)	5 (Low/Medium)
5 – Extreme	10 (High)	9 (High)	8 (High/Medium)	7 (High/Medium)	6 (Medium)

Figure 21 – Risk Assessment Matrix

				Risk Assessment		
Item	**Phase**	**Potential Environmental Impact**	**Proposed Mitigation Measures and / or Comment**	**Significance of Impact**	**Manageability of Impact**	**Residual Impact**
Key: C – Construction, O: Operation						
Wind	O	– Increase wind speeds and impact pedestrian activities	– Any adverse wind impacts can be ameliorated through implementation of mitigation measures outlined in the Wind Report. – Once implemented, these measures will ensure that the wind conditions around the site meet the pedestrian walking criterion and pass the distress criterion.	3	1	4 (Low/Medium)
Reflectivity	O	– Unacceptable reflectivity impacts on pedestrians and vehicles	Glazing and materials must not exceed 28% reflectivity.	3	1	4 (Low/Medium)
View and Visual Impacts	O	– Visual impacts and view loss associated with the proposed development	The expected impacts will remain similar to that assessed under Concept Plan (Mod 8), if not reduced. Overall, the proposal remains within the approved Concept Plan (Mod 8) envelope and continues to offer oblique view corridors. The development proposed is acceptable in terms of visual and view impacts and is reasonable in the circumstances.	3	2	5 (Low/Medium)
Infrastructure	C+O	– Impact on existing infrastructure	Cardno has determined that the proposed Building R5 works can be accommodated within the infrastructure being provided as part of the Stage 1B Basement.	1	1	2 (Low)
Air Quality and Odour	C	– Diminished air quality levels – Increase odours during construction	– Currently a reactive dust mitigation system has been adopted by Lendlease at the Barangaroo South site. This includes ambient pollution monitoring directly linked to real-time warnings and incorporates work procedures to ensure that action is taken to reduce dust levels when they are elevated and at risk of exceeding acceptable air pollution levels. The system has been operational on the Barangaroo South site for many months, and will continue to operate throughout the Stage 1B works. – AECOM has recommended that the Building R5 works be incorporated into the site management plan and the reactive dust mitigation system be adopted. If these mitigation measures are implemented, no adverse effects on local air quality are expected to occur.	2	3	5 (Low/Medium)
Noise	C+O	– Increase in noise and vibration levels during construction activities – Increase in noise levels during operation	Project specific noise and vibration control measures will be incorporated into the Construction Noise and Vibration Management Sub Plan. These are: – General measures to include plant noise audits; operator instruction; equipment selection; site noise planning; and installation of noise barriers between site and street frontages; – Community Relations Programme to be included in Lendlease's Community and Stakeholder Engagement Strategy;	3	2	5 (Low/Medium)

				Risk Assessment		
Item	**Phase**	**Potential Environmental Impact**	**Proposed Mitigation Measures and / or Comment**	**Significance of Impact**	**Manageability of Impact**	**Residual Impact**
			– Noise & Vibration Management Plan whereby measures required by this assessment are to be incorporated into the revised version of the sub plan.			
Water, Drainage, Stormwater and Groundwater	C+O	– Altered overland flow patterns causing flooding – Increased sediment and erosion runoff – Diminished water quality levels	All water, drainage, stormwater and groundwater considerations have been resolved under the Stage 1B Basement application or will be addressed in the Stage 1B Public Domain DA.	2	2	4 (Low/Medium)
Sediment, Erosion and Dust	C	– Sediment run-off and erosion during construction, resulting in reduced water quality levels. – Reduced air quality during construction as a result of dust emissions.	During construction, water and air quality will be managed in accordance with the CFEMP, and the Stormwater Management and Infrastructure Servicing Plan prepared by Cardno to ensure that water and air quality are maintained.	2	2	4 (Low/Medium)
Waste Management	C+O	– Increased waste generation during construction. – Increase waste generation during operation.	– A detailed Construction Waste Management Plan will be developed to manage the generation and disposal of construction waste, in accordance with the principles outlined in the Waste Management Plan prepared by ARUP and dated July 2016. – The appropriate infrastructure has been incorporated into the basement to accommodate the volumes of waste that will be generated during the operation of Building R5. Management measures will be incorporated in accordance with the Waste Management Plan prepared by ARUP and dated July 2016 to ensure that waste is managed appropriately.	3	2	5 (Low/Medium)
Heritage	O	– Impact on heritage listed buildings in the vicinity of the site along Hickson Road.	A Statement of Heritage Impact has been prepared by TKD Architects which concludes that whilst Building R5 will impact on the setting of several items, it will not affect their visual integrity and heritage significance.	1	1	2 (Low)
Traffic	C+O	– Increased construction traffic – Increased delay times – Diminished level of service	ARUP has determined that the additional traffic generated during the construction of Building R5 is negligible in the overall construction traffic of Barangaroo. The operation of the future signalised intersections on Hickson Road will be dependent on the operating conditions of intersections further downstream on Sussex Street. Any impacts on the surrounding network largely result from are considered acceptable in this context.	3	2	4 (Low/Medium)

6.0 Mitigation Measures

The collective measures required to mitigate the impacts associated with the proposed works are detailed in **Table 18** below. These measures have been derived from the previous assessment in Section 5.0 and those detailed in appended consultants' reports.

Table 18 – Mitigation Measures

Mitigation Measures
Air and Odour
The Building R5 construction works are to be incorporated into the existing environmental management plans including a reactive Air Quality Management Plan (including a reactive dust mitigation system) which has been implemented across the Barangaroo site. Further measures are outlined at 4.17.
Reflectivity
All glazing and materials must not exceed 28% reflectivity.
Wind
– Strategic planting, in the form of densely foliating trees, will be incorporated at ground level around the site. These trees should be capable of growing to a height of approximately 5m to 6m, with a canopy diameter of approximately 4m to 5m. – Portable café screening will be incorporated on the north-western aspect of Building R5 (to be controlled by the operator) to provide suitable conditions for patrons during adverse wind conditions. – The inclusion of wintergardens to offer protection from wind and generally improve the amenity of balconies at levels 27 and over.
Traffic and Parking
– A Travel Demand Management Plan, prepared in accordance with the TMAP by ARUP and dated August 2015, and will be prepared and implemented prior to occupation of the building. – Construction traffic will be managed in accordance with the following principles, as outlined in the TMAP prepared by ARUP and dated July 2016: - Construction access driveways are designed to allow trucks to enter and leave the site in a forward direction; - Construction access driveways are managed and controlled by site personnel; - Safety for works and the public in the vicinity of the worksite is maintained; - Designated truck routes for all access points are developed which minimises the impacts on the local road network; - A safe, convenient and appropriate environment is established for pedestrians and cyclists at all times; and - Appropriate capacity for pedestrians along the Hickson Road footpath is maintained.
Noise and Vibration
Project specific noise and vibration control measures will be incorporated into the Construction Noise and Vibration Management Sub Plan. These are: – General measures to include plant noise audits; operator instruction; equipment selection; site noise planning; and installation of noise barriers between site and street frontages; – Community Relations Programme to be included in Lendlease's Community and Stakeholder Engagement Strategy; – Noise & Vibration Management Plan whereby measures required by this assessment are to be incorporated into the revised version of the sub plan.
Building Code of Australia, Accessibility and Fire Safety
Work will be carried out in accordance with the recommendations of: – Building Code of Australia (BCA) Assessment prepared by McKenzie Group Consulting and dated July 2015. – Preliminary Fire Safety Engineering Review prepared by Defire and dated July 2015.
Construction Framework Environmental Management Plan
The CFEMP should be implemented into the construction phase of the development.
Waste Management
Waste will be managed in accordance with the Waste Management Plan prepared by ARUP, and dated July 2016.
ESD
Building R5 will be designed and constructed to achieve 5 Star Green Star – Multi Unit Residential v1 Tool Design and As- Built ratings.

7.0 Justification of the Proposal

In general, investments in major projects are justified if the benefits of doing so exceed the costs. Such an assessment must consider all costs and benefits. The EP&A Act specifies that such a justification must be made having regard to biophysical, economic and social considerations and the principles of ecologically sustainable development.

The proposed development involves provision of Building R5 at Barangaroo South. The assessment must therefore focus on the identification and appraisal of the effects of the proposed change over the site's existing condition.

Various components of the biophysical, social and economic environments have been examined in this EIS and are summarised below.

7.1 Social and Economic

Barangaroo South is the southern 7.5 hectares of the Barangaroo site, which is destined to become the greenest and most advanced financial district and the first large scale, carbon neutral precinct in Australia. It will comprise a mix of uses, including commercial, residential, retail and dining along with a new landmark hotel.

The proposed development will provide a new building within Stage 1B of Barangaroo South that will have a significant positive social and economic impact for the large number of future visitors, residents and workers at Barangaroo South. Specifically, Building R5 will:

- provide high quality residential accommodation with excellent access to employment, transport, open space and infrastructure;
- provide key worker housing in Sydney's CBD;
- deliver ground level connectivity and activation, in particular fronting the future Hickson Park;
- form part of the elegant backdrop to the new Crown Sydney Hotel Resort;
- be of a level of quality that affirms Barangaroo as part of Sydney's status as a global city; and
- provide a range of employment opportunities during construction and operation.

There are no adverse social or economic impacts as a result of the proposed development.

7.2 Biophysical

Section 4.0 of this EIS contains a thorough assessment of the likely biophysical impacts of the proposed development. The environmental risk assessment contained at Section 5.0 demonstrates that the proposed development will not result in any significant adverse environmental impacts that cannot be appropriately addressed through standard conditions of consent or the mitigation measures included at Section 6.

The environmental impact assessment of the proposed development has demonstrated that:

- the development will achieve a very high level of residential amenity;

- any wind impacts can be appropriately mitigated through the use of wind ameliorating devices such as screens, balustrades, awnings or vegetation;
- external normal specular reflectance of glazing and cladding will be limited to 28% to ensure that the building performs well in terms of solar reflectivity and glare;
- water management measures will be implemented to ensure that there are no adverse water, drainage, stormwater or groundwater impacts;
- waste will be managed during the construction and operational phases to promote recycling, and limit the amount of waste going to landfill;
- responsive measures will ensure that air quality impacts are managed during the construction phase;
- noise and vibration management measures will be implemented during the construction and operational phase to ensure that there are no adverse impacts on surrounding sensitive receivers; and
- construction and operational traffic can be appropriately managed.

7.3 Ecologically Sustainable Development

The EP&A Regulation lists four principles of ecologically sustainable development to be considered in assessing a project. They are:

- the precautionary principle;
- intergenerational equity;
- conservation of biological diversity and ecological integrity; and
- improved valuation and pricing of environmental resources.

An analysis of these principles follows.

Precautionary Principle

The precautionary principle is utilised when uncertainty exists about potential environmental impacts. It provides 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. The precautionary principle requires careful evaluation of potential environmental impacts in order to avoid, wherever practicable, serious or irreversible damage to the environment.

This EIS has not identified any uncertain and serious threat of irreversible damage to the environment.

Intergenerational Equity

Intergenerational equity is concerned with ensuring that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. The proposal has been designed to benefit both the existing and future generations by:

- enhancing the experience of visitors to the precinct through providing another critical building in the built form of Barangaroo South;
- providing a new building to contribute to the vitality and activation of the public domain within Barangaroo South; and
- implementing safeguards and management measures to protect environmental values.

The proposal has integrated short and long-term social, financial and environmental considerations so that any foreseeable impacts are not left to be addressed by future generations. Issues with potential long term implications will be avoided and/or minimised by design and through the application of safeguards and management measures described in this EIS and the appended technical reports during construction. In this regard, Barangaroo South is destined to become the first large scale, carbon neutral, water positive precinct in Australia.

Conservation of Biological Diversity and Ecological Integrity

The principle of biological diversity upholds that the conservation of biological diversity and ecological integrity should be a fundamental consideration.

This EIS has demonstrated that the proposal will not have any significant effect on the biological diversity and ecological integrity of the site and surrounding area. The potential impacts associated with development identified in the expert consultant reports (see Section 4), particularly those associated with construction, have been incorporated into the mitigation measures as Section 6.0 of this EIS. Further, the landscaping component of the development will improve biodiversity outcomes on the site by moderating the site microclimate and improving the biodiversity of the existing site, which is devoid of any plant or animal life.

Improved Valuation, Pricing and Incentive Mechanisms

The principles of improved valuation and pricing of environmental resources requires consideration of all environmental resources which may be affected by a proposal, including air, water, land and living things. Mitigation measures for avoiding, reusing, recycling and managing waste during construction and operation would be implemented to ensure resources are used responsibly in the first instance. These include exceeding the 80% requirement for recycling of construction waste, the use of water efficient fixtures and fittings and the use of sustainable and recycled materials and minimising the use of PVC.

Additional measures will be implemented to ensure no environmental resources in the locality are adversely impacted during the construction or operational phases.

8.0 Conclusion

The EIS has been prepared to consider the environmental, social and economic impacts of the proposed Building R5 at Barangaroo South. This application seeks approval for the construction of Building R5, as well as fit-out and use of part of the Stage 1B Basement (approval for construction sought under the Stage 1B Basement application) to accommodate residential and retail parking, storage, waste and plant facilities, as well as interim and permanent landscaping works, and two signage zones for building identification signage.

Building R5 forms part of a series of residential buildings designed by world renowned architects Renzo Piano Building Workshop. The development will provide the highest standard of architecture combined with exceptional residential amenity.

The EIS has addressed the issues outlined in the SEAR's and accords with Schedule 2 of the EP&A Regulation with regards to requirements for an environmental impact statement.

Having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development, the carrying out of the project is justified for the following reasons:

- There is a strategic need to provide the Building R5 within Barangaroo South to ensure there is a building that:
  - creates a transition between the mid-rise scale of buildings along Hickson Road, and the Hotel at the water's edge;
  - defines the street alignments and responds to the desired future scale and activation for Hickson Road, Watermans Quay and Barangaroo Avenue;
  - provides housing close to employment and recreation opportunities;
  - activates the public domain and will contribute to the vibrancy of Barangaroo South;
  - promotes equitable access to views towards the harbour through defining the street corridors whilst providing sky view corridors between residential towers; and
  - aligns with the fanning principle and presents the longest facade to the north.
- The development is generally consistent with all the relevant strategic policies, environmental planning instruments, plans and guidelines.
- The development is generally consistent with the Concept Plan as modified by Mod 8.
- The development will have a wide range of positive social and economic impacts.
- There are no adverse environmental impacts that cannot be appropriately managed by the mitigation measures set out in this EIS.

Given the merits described above it is requested that the application be approved.