



State Significant Development
Environmental Impact Statement

ONE SYDNEY HARBOUR

BARANGAROO

Stage 1B Basement (SSD 6960)

Barangaroo South

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

February 2016 ■ 10051

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This report has been prepared by:

Two handwritten signatures in blue ink. The first signature is 'H Quartermain' and the second is 'M Rowe'.

Harry Quartermain and Michael Rowe

19/02/2016

This report has been reviewed by:

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Lesley Bull

19/02/2016

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Statement of Validity

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 200 in DP 1204948
Proposed development	Stage 1B Basement within Barangaroo South as described in Section 3.0 of this Environmental Impact Statement (SSD 6960)

Prepared by

Name	Harry Quartermain
Qualifications	BA(Hons) MAURP MPIA MRTPI
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 Harry Quartermain

Date 19/02/2016

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 submission to the Department of Planning and Environment (the Department) comprises an Environmental Impact Statement (EIS) for a Development Application (DA) under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). It relates to the Stage 1B Basement and associated works 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 Secretary's Environmental Assessment Requirements (SEARs) were issued on 2 April 2015 under SSD 6960. 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 SSD application will seek consent for the construction of the Stage 1B Basement and associated works at Barangaroo South. The Stage 1B Basement will service the One Sydney Harbour Buildings (residential and retail Buildings R4A, R4B and R5), which are the subject of separate but concurrent SSD development applications. The Stage 1B Basement will also provide the ground level slab and trunk services infrastructure for the above ground development which will be the subject of a future and separate Stage 1B Public Domain SSD DA.

The application seeks approval for:

- Excavation beyond the Stage 1B Remediation and Excavation Approval to allow for construction of the Stage 1B Basement.
- Construction of basement slabs for future parking areas (4 parking levels) to support the gross floor area (GFA) envisaged under Concept Plan (Mod 8) in accordance with the car parking rates under the approved Concept Plan. The number and use of parking spaces within the basement will be the subject of the SSD DAs for each of the One Sydney Harbour Buildings.
- Construction, fit out and use of common facilities in the basement, including plant rooms, loading docks, dock-master's office, amenities, waste rooms and storage areas to support the GFA envisaged for the Stage 1B One Sydney Harbour Buildings under proposed Concept Plan (Mod 8).
- Allocation of 35m² of GFA for basement uses within Block 4A.
- Construction of the One Sydney Harbour 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 (including electricity substations, elevators, fire stairs, electricity, gas and water supply for the future buildings above), which will be integrated into the future One Sydney Harbour Buildings (i.e. within the podium).

- Provision of interim public domain and landscaped open space around the car park ramps and risers, and across the proposed basement ground level slab, to allow for the potential staging of the construction and occupation of the Stage 1B One Sydney Harbour Buildings.
- Temporary construction of Barton Street, interim construction of Barangaroo Avenue (north) and temporary construction Barangaroo Avenue (turning point southern end).
- Construction of permanent stormwater drainage infrastructure between Hickson Road and Darling Harbour.
- Provision of services and infrastructure within the Stage 1B Basement, Hickson Road, the future alignment of Watermans Quay (road subject to future development application), part of Barangaroo Avenue and between the Stage 1A Basement, Stage 1B Basement, the Crown Sydney Hotel Resort and Central Barangaroo. Services to be provided are outlined in Section 3.9.

This SSD DA does not seek approval for development that has been approved under the Stage 1B Remediation and Excavation Approval (SSD 5897), which encompasses:

- remediation works including land within EPA Declaration Area (No.21122) and adjacent areas;
- construction of a groundwater retention wall;
- bulk excavation within the groundwater retention wall;
- erection of temporary enclosures for excavation and remediation works; and
- tree removal and management, demolition of existing structures on site and associated works.

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) – the 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 site the subject of this SSD DA, referred to herein as the 'DA Site', includes part of Hickson Road, proposed Concept Plan (Mod 8) Development Blocks 4A and 4B, the adjoining land on which a future park is intended, the future alignment of Watermans Quay, Barton Street and Barangaroo Avenue, as well as the land to the north west of the Stage1A Basement extending north to the Stage 1C Crown Sydney Hotel Resort 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, environmental planning instruments, plans and guidelines, including proposed 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 undertakings 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;
- Public Domain and Public Access;
- Transport, Traffic, Car Parking and Accessibility;
- Air Quality and Odour;
- Soil and Water;
- Earthworks;
- Sediment and Erosion Control;
- Waste Management;
- Noise and Vibration;
- Contamination;
- Hazards and Risk;
- Health Impacts;
- Heritage;
- Visual Impacts;
- Environmental, Construction and Site Management;
- Staging;
- BCA Compliance;
- Sea Level Rise;
- Infrastructure Provision;
- Ecologically Sustainable Development;
- Geotechnical;
- Fire Safety;
- Tree Removal;
- Accessibility;
- Structural Engineering; 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 project is justified for the following reasons:

- There is a strategic need to provide the Stage 1B Basement within Barangaroo South as it provides:
 - car parking, loading and storage for the future Stage 1B One Sydney Harbour Buildings within Stage 1B (R4A, R4B and R5);
 - a location for building plant and services for the future Stage 1B One Sydney Harbour Buildings within Stage 1B and Stage 1C;

- interim and permanent public domain and roads for Stage 1B, to be put in place where appropriate until the time the permanent public domain is approved and constructed; and
 - a slab on which to construct the permanent public domain and some of the access roads as envisaged under the Concept Plan (as modified).
- The development is consistent with the objectives of all the relevant strategic policies, environmental planning instruments, plans and guidelines.
 - The development is generally consistent with the Concept Plan, as proposed to be modified by Mod 8.
 - The development is a fundamental part of the broader Barangaroo development that will have a wide range of positive social and economic impacts.
 - Potential adverse environmental impacts can 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 the Stage 1B Basement and associated works at Barangaroo South. The Stage 1B Basement will service the residential development within Stage 1B known as 'One Sydney Harbour'.

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 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 Lend Lease (Millers Point) Pty Ltd, and is based upon the architectural drawings supplied by Renzo Piano Building Workshop (RPBW) and Lendlease Design 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 6960 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 six times since originally being approved and the Statement of Commitments has been revised accordingly. The most recent modification, referred to as Concept Plan (Mod 7), was approved on 11 April 2014 (Concept Plan).

The Approved Concept Plan provides for:

- a 563,965m² mixed use development across the entire Barangaroo site, comprising:
 - a maximum of 514,465m² mixed uses GFA, including residential, commercial and retail uses which includes;
 - a maximum of 128,763m² of residential uses (a minimum of 99,763m² of which will be in Barangaroo South);
 - a maximum of 50,000m² of tourist uses GFA;
 - a maximum of 39,000m² of retail uses;
 - a maximum of 4,500m² of active uses GFA (3,000m² of which will be in Barangaroo South); and
 - a minimum of 12,000m² of community uses GFA (10,000m² 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 *State Environmental Planning Policy (Major Development) 2005* (Major Development SEPP).

The Major Development 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 lodged with the Department in January 2015. 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) seeks to relocate the landmark hotel building (Block Y), which is currently approved 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 proposed modifications to the Concept Plan for Block Y in response to its proposed 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 77,500m²; and
- increasing the maximum height for Block Y to RL 275.

The proposed relocation of the landmark hotel building necessitates, and is accompanied by, the following proposed range of changes 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 3,000m², with a maximum of 1,000m² of retail uses.
- The maximum tourist uses GFA permitted has been increased to 59,000m² and located specifically within the Barangaroo South site.
- The total GFA on the Barangaroo South site has been increased to a new maximum of 535,186m² (an 8.5% increase).
- The total GFA on the entire Barangaroo Concept Plan site has been increased to 605,911m².
- 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' is to be increased and the footprints of those buildings rationalised. Maximum heights within Blocks 1-3 and X remain as per the approved Concept Plan, or are reduced, while maximum heights in Block 4 are proposed to range from approximately RL107 to RL250 across three One Sydney Harbour Buildings.

For the entire Barangaroo site, the proposed Concept Plan (Mod 8) will result in:

- a 605,911m² mixed use development across the entire Barangaroo site, comprising:
 - a maximum of 590,911m² mixed uses GFA, including residential, commercial and retail uses which includes;
 - a maximum of 183,031m² of residential uses (a maximum of 154,000m² of which will be in Barangaroo South);
 - a maximum of 76,000m² of tourist uses GFA, 59,000 of which may be in Barangaroo South;
 - a maximum of 34,000m² of retail uses, 30,000 of which may be in Barangaroo South
 - a maximum of 5,000m² of active or community uses GFA (3,500m² of which will be in Barangaroo South); and
 - a minimum of 12,000m² 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.

To provide a streamlined assessment framework for the future applications for development on the site the approved Urban Design Controls have been consolidated and integrated with other key elements of the Concept Plan into the 'Barangaroo South Design Guidelines'. The Barangaroo South Design Guidelines will replace the Urban Design Controls in their entirety and incorporate the key elements of the Rogers Stirk Harbour + Partners (RSHP) Master Plan that will be used to guide the detailed design of the future buildings.

The proposed modifications to the Concept Plan depart from the existing development controls for the site established under the Major Development SEPP. A Major Development SEPP amendment is required to reconcile the Major Development SEPP planning provisions with proposed 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 will also require 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.

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

Concept Plan (Mod 9)

Lendlease understands that Barangaroo Delivery Authority intends to lodge an application for a further modification to the Concept Plan under Section 75W of the EP&A Act, referred to as Concept Plan (Mod 9), which relates to Central Barangaroo and Barangaroo Point.

At the time of lodgement of Concept Plan (Mod 8) it was understood based on a request for the Secretary's Environmental Assessment Requirements that lodgement of the Concept Plan (Mod 9) modification application was imminent. Accordingly the assessment in Concept Plan (Mod 8) had regard to Concept Plan (Mod 9) where possible. However, no modification application has yet been lodged for Concept Plan (Mod 9).

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) – the 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.

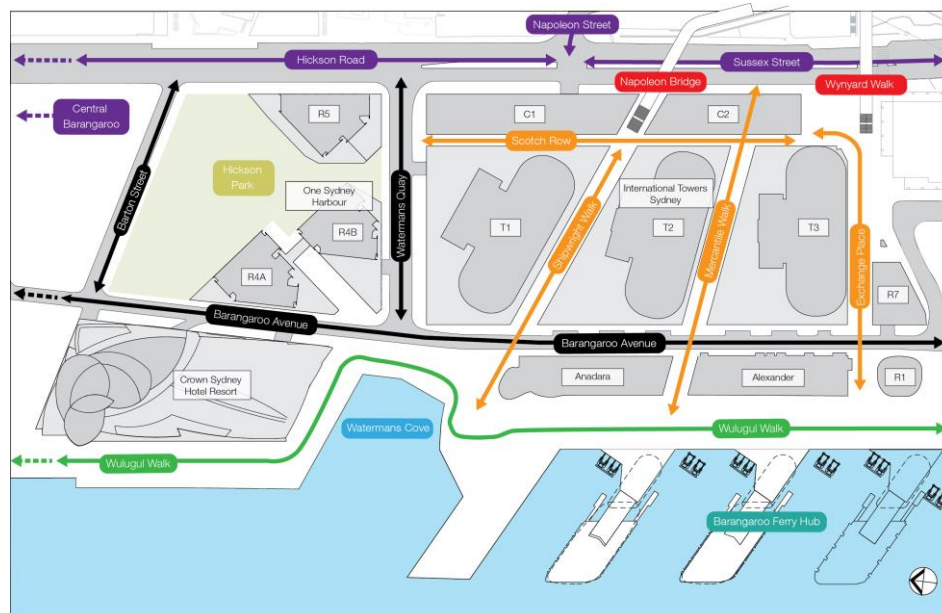


Figure 1 – Barangaroo South

Stage 1A

Stage 1A refers to the portion of the Barangaroo South site generally 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), and one mixed use commercial / retail building known as R7. Parts of Commercial Building C4 and the public domain were opened to the public in July 2015. Construction has or is about to commence on the remainder of the above-mentioned projects.

An SSD DA is currently under assessment for Retail Building R1. 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 DA (SSD 6960) (subject of this application): The Stage 1B Basement will service the One Sydney Harbour Buildings (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. SSD 6960 also includes interim public domain, landscaped open space and landscaping works comprising landscaping the future Hickson Park. The temporary construction of Barton Street and part

of Barangaroo Avenue will also be undertaken as part of the Stage 1B Basement DA

- Residential 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 47,676m² comprising predominantly residential floor space with retail at ground floor level.
- Building R4B (SSD 6965): Building R4B will be a residential tower and podium building of 60 storeys comprising approximately 297 apartments. The building will have a height of RL 210 and a GFA of 38,760m² 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 building of 29 storeys comprising approximately 151 apartments. The building will have a height of RL 107 and a GFA of 19,091m² comprising predominantly residential floor space with retail at ground floor level and podium level 1. Building R5 will accommodate Key Worker Housing, in accordance with Lendlease's commitment for Barangaroo South.

A separate development consent (SSD 5897) has been granted for remediation of the DA Site (referred to herein as the Stage 1B Remediation and Excavation Approval). This Stage 1B Remediation and Excavation 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 and minor permanent public domain and landscaped open space are proposed as part of this Stage 1B Basement DA, which will include landscaping of Hickson Park and the temporary construction of Barton Street and part of Barangaroo Avenue. A separate SSD development application will be prepared for the permanent Stage 1B Public Domain works. The permanent public domain and landscaped open space works will include provision of the final Hickson Park, all ground treatments and finishes, landscaping, furniture and fixtures, public domain structures, lighting, civil and stormwater infrastructure, beyond the trunk services covered in this DA, and utility services.

Stage 1C

Stage 1C relates to the proposed landmark hotel building (herein after referred to as the Crown Sydney Hotel Resort) within Block Y. The building and associated site preparation and basement works is being developed by Crown Resorts. A SSD DA was lodged with the Department for the Crown Sydney Hotel Resort in July 2015.

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 Park 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 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 this DA are to:

- provide space for car parking and storage associated with the Stage 1B residential and retail buildings (One Sydney Harbour Buildings);
- provide services and infrastructure connections from Stage 1A and Hickson Road to the proposed basement and associated One Sydney Harbour Buildings and connections to the separately proposed Crown Sydney Hotel Resort and Central Barangaroo site;
- provide basement services and space for building specific services associated with the Stage 1B residential and retail buildings (One Sydney Harbour Buildings) and the proposed Crown Sydney Hotel Resort;
- provide public domain, landscaped open space, and roads at ground level of Stage 1B during the interim period if required before the future permanent public domain is approved and constructed;
- achieve best practice sustainability outcomes; and
- ensure that any environmental impacts associated with the construction and operation of the building are appropriately mitigated.

1.3 Summary of Approval Sought

This DA seeks consent for the construction of the Stage 1B Basement and associated works at Barangaroo South. The Stage 1B Basement will service the Stage 1B One Sydney Harbour residential and retail buildings (Buildings R4A, R4B and R5), which are the subject of separate but concurrent SSD development applications. 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 DA.

The application seeks approval for:

- Excavation beyond that approved under the Stage 1B Remediation and Excavation Approval to allow for construction of the Stage 1B Basement.
- Construction of basement slabs for future parking areas (4 parking levels) to support the GFA envisaged under Concept Plan (Mod 8) in accordance with the car parking rates under the approved Concept Plan. The number and use of parking spaces within the basement is the subject of the separate One Sydney Harbour Buildings' SSD development applications.
- Construction, fit out and use of common facilities in the basement, including plant rooms, loading docks, dock-masters office, amenities, waste rooms and

storage areas to support the GFA envisaged for the Stage 1B One Sydney Harbour Buildings under Concept Plan (Mod 8).

- Allocation of 35m² of GFA for basement uses within Block 4A for the dock-master's and/or security offices.
- Construction of the One Sydney Harbour 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 One Sydney Harbour Buildings (i.e. within the podium).
- Provision of interim public domain and landscaped open space around the car park ramps and risers, and across the proposed basement ground level slab, to allow for the potential staging of the construction and occupation of the Stage 1B One Sydney Harbour Buildings.
- Temporary construction of Barton Street.
- Interim construction of the northern section of Barangaroo Avenue and minor interim streetscape.
- Construction of permanent stormwater drainage infrastructure between Hickson Road and Darling Harbour.
- Provision of services and infrastructure within the Basement, Hickson Road, the future alignments of Watermans Quay and Barangaroo Avenue (permanent roads subject to separate application), and between the Stage 1B Basement and the Stage 1A Basement, the Crown Sydney Hotel Resort Site, and Central Barangaroo.

This SSD DA does not seek approval for development that has been approved under the Stage 1B Remediation and Excavation Approval (SSD 5897), which encompasses:

- remediation works including land within EPA Declaration Area (No.21122) and adjacent areas;
- construction of a groundwater retention wall;
- bulk excavation within the groundwater retention wall;
- erection of temporary enclosures for excavation and remediation works; and
- tree removal and management associated with other applications in the vicinity of the development site, demolition of existing structures on site and associated works.

1.4 Analysis of Alternatives

Strategic need for the proposal

As detailed in Section 1.1, 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. With a mix of 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 (as proposed to be modified). The Stage 1B Basement is located at the northern part of the

Barangaroo South site as envisaged by the Concept Plan. Specifically the Stage 1B Basement has the important role under the Concept Plan of providing:

- car parking, loading and storage for the future Stage 1B One Sydney Harbour Buildings within Stage 1B (R4A, R4B and R5);
- a location for building plant and services for the future Stage 1B One Sydney Harbour Buildings within Stage 1B and for Stage 1C;
- providing interim public domain, landscaped open spaces and roads for Stage 1B until the time the permanent public domain is approved and constructed; and
- providing a slab on which to construct the permanent public domain, open space and access roads as envisages under the Concept Plan (as modified).

Alternative Options

Three options are available to Lendlease in responding to the identified need for the Stage 1B Basement within Barangaroo South.

Option 1: The Proposal

Option 1 involves providing the building as proposed in this SSD DA (as described in Section 3.0). The proposal will ensure that a high quality basement car park and associated building support structures are provided on the site to support the future development of One Sydney Harbour Buildings R4A, R4B and R5 consistent with Concept Plan (Mod 8).

Option 2: Do Nothing

Not providing a basement on the site would mean that the proposed future residential and retail One Sydney Harbour Buildings or public domain on the site would not be adequately serviced and would undermine the ability to realise these development works envisaged by proposed Concept Plan (Mod 8). This would not be an appropriate outcome for a site of the strategic importance of Barangaroo as it would result in an underutilisation of a significant area of land suitable for provision of employment and housing in central Sydney.

Option 3: Alternative Designs

An international design competition was conducted for the Stage 1B One Sydney Harbour Buildings. This competition included alternative designs submitted by some of Australia and the world's most eminent architects. The proposed design of R4A, R4B and R5 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. The proposed design of the Stage 1B Basement was informed by and supports the award winning competition design.

Alternative designs were also considered for the basement itself, which included a larger horizontal footprint and shallower vertical volume, this design was not pursued as it:

- added significant complexity to the construction of the basement resulting in extended programme duration, and
- is less efficient spatially, requiring more ramping and circulation space.

Separate basements for each building were also considered but discounted as they would be less efficient and require separate vehicular ingress and egress points resulting in a greater number of vehicular accesses and crossings within the future public domain.

1.5 Project Team

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

Proponent	Lendlease (Millers Point) Pty Limited (Lendlease)
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
Civil Engineering	Cardno
Air Quality & Odour	AECOM
Noise & Vibration	Wilkinson Murray
Environmental, Construction & Site Management	Lendlease Building
Ecologically Sustainable Development	Lendlease Design
BCA	McKenzie Group
Surveyor	Rygate
Structural Engineering	RGB
Services Design	Lendlease Design
Infrastructure	Cardno
Hydraulic and Fire	WSP
Fire Safety	Defire
Accessibility	MGAC
Acid Sulphate Soils	AECOM
Geotechnical	Coffey
European Heritage	Casey and Lowe
Arborist	Tree Talk

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 6960. 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 6960)

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 the Environmental Planning and Assessment Regulation 2000.		Environmental Impact Statement	
Notwithstanding the key issues specified below, the EIS must include an environmental risk assessment to identify the potential environmental impacts associated with the development		Section 5	
Where relevant, the assessment of the key issues below, and any other significant issues identified in the assessment, must include:		Section 4	
Adequate baseline data		Section 4	
Consideration of potential cumulative impacts due to other development in the vicinity.		Section 4	
Measures to avoid, minimise, and if necessary, offset the predicted impacts, including detailed contingency plans for managing any significant risks to the environment.		Section 4, Section 6	
The EIS must be accompanied by a report from a qualified quantity surveyor providing:		CIV Certificate	
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;		CIV Certificate	
An estimate of the jobs that will be created by the development during the construction and operational phases of the development; and		CIV Certificate	
Certification that the information provided is accurate at the date of preparation.		CIV Certificate	
Key Issues		EIS Section	Technical Study
1. Environmental Planning Instruments, Policies and 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 No. 55 – Remediation of Land; - State Environmental Planning Policy No. 33 – Hazardous and Offensive Development; - State Environmental Planning Policy (Infrastructure) 2007; and - Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005.		Section 4.1	-
Address the relevant provisions, goals and strategic objectives in the following: - NSW 2021; - Plan for Growing Sydney; - Barangaroo Integrated Transport Plan; - Sydney City Centre Access Strategy; - NSW Long Term Master Transport Plan; - Sydney’s Cycling Future; and - Sydney’s Walking Future.		Section 4.1	-
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	-

Requirement	Location in EIS	
3. Land Use and GFA Outline any land use and associated GFA within the basement structure linked to the buildings above.	Section 4.3	-
4. Public Domain and Public Access Detail and outline the interface between the basement car park and the public domain.	Section 4.4	Appendix C
Consider the potential impacts of the proposal on the public domain and public access in the vicinity of the site, including measures to mitigate these impacts.	Section 4.4	Appendix C
Demonstration that the any public domain works proposed contribute to a high quality landscaped public domain including adjacent roads.	Section 4.4	Appendix C
Demonstrate safe, accessible, prioritised pedestrian path of travel at entry and exit points to the basement car park.	Section 4.4	Appendix C
5. Transport, Traffic, Car Parking and Accessibility Demonstrate consistency with the Barangaroo Integrated Transport Plan and the Sydney City Centre Access Strategy.	Section 4.5	Appendix E
The EIS shall include a Traffic and Transport Impact Assessment that provides, but is not limited to, the following:	Section 4.5	Appendix E
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;	Section 4.5	Appendix E
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;	Section 4.5	Appendix E
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;	Section 4.5	Appendix E
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;	Section 4.5	Appendix E
existing public transport services and opportunities for greater usage for residents, workers and visitors;	Section 4.5	Appendix E
details of sustainable travel initiatives for residents, workers and visitors, particularly for the provision of end-of-trip facilities;	Section 4.5	Appendix E
assessment of proposed loading dock provisions and access arrangements to loading docks;	Section 4.5	Appendix E
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; and	Section 4.5	Appendix E
details of access arrangements for emergency and service vehicles (including vehicle type and likely arrival and departure times of service vehicles).	Section 4.5	Appendix E
The EIS shall include an updated Transport Management and Accessibility Plan.	Section 4.5	Appendix E
In relation to construction traffic:	Section 4.5	Appendix E
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;	Section 4.5	Appendix E

Requirement	Location in EIS	
▪ details of access arrangements for workers to/from the site, emergency vehicles and service vehicle movements;	Section 4.5	Appendix E
▪ details of temporary cycling and pedestrian access during construction;	Section 4.5	Appendix E
▪ details of proposed construction vehicle access arrangements at all stages of construction; and	Section 4.5	Appendix E
▪ 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.	Section 4.5	Appendix E
6. Air Quality and Odour The EIS must include an Air Quality Impact Assessment (AQIA) that is prepared strictly in accordance with the EPA's Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales 2005.	Section 4.6	Appendix F
The AQIA must also make appropriate reference to the EPA's Assessment and Management of Odour from Stationary Sources in New South Wales: Technical Framework 2006 and Management of Odour from Stationary Sources in New South Wales: Technical Notes 2006.	Section 4.6	Appendix F
The AQIA shall include, where applicable: ▪ the identification of the pollutants of concern, including individual toxic air pollutants, dust and odours;	Section 4.6	Appendix F
▪ the identification and assessment of all relevant fugitive and point source emissions, including cumulative impacts of the operation of the plant in relation to other construction activities;	Section 4.6	Appendix F
▪ appropriate coverage of all aspects of the development, including construction, excavation, storage and transport;	Section 4.6	Appendix F
▪ Proposed air quality management and monitoring procedures during construction; and o consideration of the requirements of the Protection of the Environment Operations (Clean Air) Regulation 2010.	Section 4.6	Appendix F
7. Soil and Water Undertake an assessment of the potential impacts on water quality of Sydney Harbour and associated marine ecology impacts.	Section 4.7	-
Assess impacts on water quality of Sydney Harbour and surface and groundwater hydrology and quality including proposed management, mitigation and monitoring measures	Section 4.7	Appendix I
Include an integrated water management system including consideration of stormwater and wastewater.	Section 4.7	Appendix I
Detail erosion, sediment and stormwater management and controls during construction and management and mitigation measures for the prevention of potential water quality impacts during construction.	Section 4.9	Appendix I
Assess the potential impact of the development on groundwater flow paths and discharge flows.	Section 4.7	Appendix I
Identification of any water licensing requirements or other approvals required under the <i>Water Act 1912</i> or <i>Water Management Act 2000</i>	Section 4.7	Appendix I
Assess the geotechnical and contamination issues (including Acid Sulphate Soils) associated with the construction of the development.	Section 4.7, Section 4.12	Appendix I, Appendix H
Include a suitable water quality monitoring program.	Section 4.7	Appendix I
Consideration of any impacts on groundwater dependent ecosystems	Section 4.7	Appendix I
Details of water supply including consideration of alternative water supply arrangements, water sensitive urban design and water conservation measures	Section 4.7	Appendix I
8. Earthworks Provide a detailed survey showing existing and proposed levels and proposed quantities of cut and fill necessary for the proposed works	-	Appendix A
Details of the fill, including types and materials and their source.	Section 4.8	
Details of the location for the disposal of excess cut and the methodology of transportation to this location	Section 4.8	
9. Sediment, Erosion and Dust Controls	Section 4.9	Appendix I

Requirement	Location in EIS	
Identify measures and procedures to minimise and manage the generation and off-site transmission of sediment, dust and particles.		
10. Waste Management Identify all potential sources of liquid waste and non-liquid wastes as defined in the EPA's Waste Classification Guidelines 2014. The EIS should identify any waste that will be stored, separated or processed on the site and identify the procedures to be adopted to minimise, manage, dispose of this waste in accordance with the relevant standards and guidelines.	Section 4.10	Appendix J
11. Noise and Vibration The application must include a Noise and Vibration Impact Assessment of construction, operation, traffic and cumulative noise impacts prepared in accordance with the relevant Environment Protection Authority guidelines. This assessment must consider any potential impacts on noise sensitive receivers and outline proposed noise mitigation and monitoring measures.	Section 4.11	Appendix K
12. Remediation and Contamination Demonstrate compliance with the requirements of SEPP 55.	Section 4.12	Appendix L
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 <i>Environmental Planning and Assessment Act 1979</i> and relevant guidelines produced or approved under section 105 of 7 the <i>Contaminated Land Management Act 1997</i> .	Section 4.12	Appendix L
The EIS must provide detailed justification for the preferred treatment methodology for contaminated material consistent with the RAP.	Section 4.12	Appendix L
13. Hazards and Risks Including a Preliminary Hazards Analysis of the development.	Section 4.13	
14. Heath Impacts Assess the impacts on health (including extraction of sediments, off-site transport and treatment as well as disposal of sediments), during construction, including details of human exposure scenarios and demonstration that the project will not have unacceptable acute or chronic health effects.	Section 4.14	Appendix M
15. Heritage Undertake an assessment of the likely impacts of the works on any heritage or archaeological items and proposed mitigation and conservation measures.	Section 4.15	Appendix N
16. Visual impacts Identify and assess the visual impacts of the entrances to the basement car park from key vantage points in the public domain, including the impacts of any above ground structures.	Section 4.16	
17. Environmental, Construction and Site Management Plan The EIS shall provide an Environmental and Construction Management Plan for the proposed works, and is to include:	Section 4.17	Appendix O
▪ Community consultation, notification and complaints handling;		
▪ Impacts of construction on adjoining development and proposed measures to mitigate construction impacts;	Section 4.17	Appendix O
▪ Noise and vibration impacts on and off site;	Section 4.17	Appendix O
▪ Air quality impacts on the neighbourhood;	Section 4.17	Appendix O
▪ Odour impacts;	Section 4.17	Appendix O
▪ Water quality management for the site; and	Section 4.17	Appendix O
▪ Construction waste classification, transportation and management methods in accordance with DECCW's Know Your Responsibilities: Managing Waste from Construction Sites Guideline.	Section 4.17	Appendix O
18. Staging Provide an outline on the staging of the works.	Section 3.12	Appendix A
19. Building Code of Australia Prepare a BCA report demonstrating compliance with the Building Code of Australia including fire safety and access provisions.	Section 4.19	Appendix P
20. Sea Level Rise The EIS must assess the risks associated with sea level rise on the proposal.	Section 4.20	-

Requirement	Location in EIS	
21. Infrastructure Provision Detail any infrastructure proposed to service the development and demonstrate that the site can be suitably serviced.	Section 4.21	Appendix I, Appendix Q, Appendix R
Detail the existing infrastructure on-site, and identify any possible impacts on infrastructure arising from the construction of the proposed works.	Section 4.21	Appendix I
Where the proposed works affect existing infrastructure, the application should detail any mitigation works proposed, including service relocations.	Section 4.21	Appendix Q
22. Ecologically Sustainable Development (ESD) Detail how ESD principles (as defined in clause 7(4) Schedule 2 of the EP&A Regulation 2000) will be incorporated in the design and construction phases of the development.	Section 4.22	Appendix T
Outline resource, energy and water efficiency initiatives, including the use of sustainable technologies and or/renewable energy.	Section 4.22	Appendix T
23. Consultation Undertake an appropriate level of consultation with council and State government agencies; and	Section 4.28	
Provide details on the Community Engagement Framework to guide the public consultation process	Section 4.28	

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.

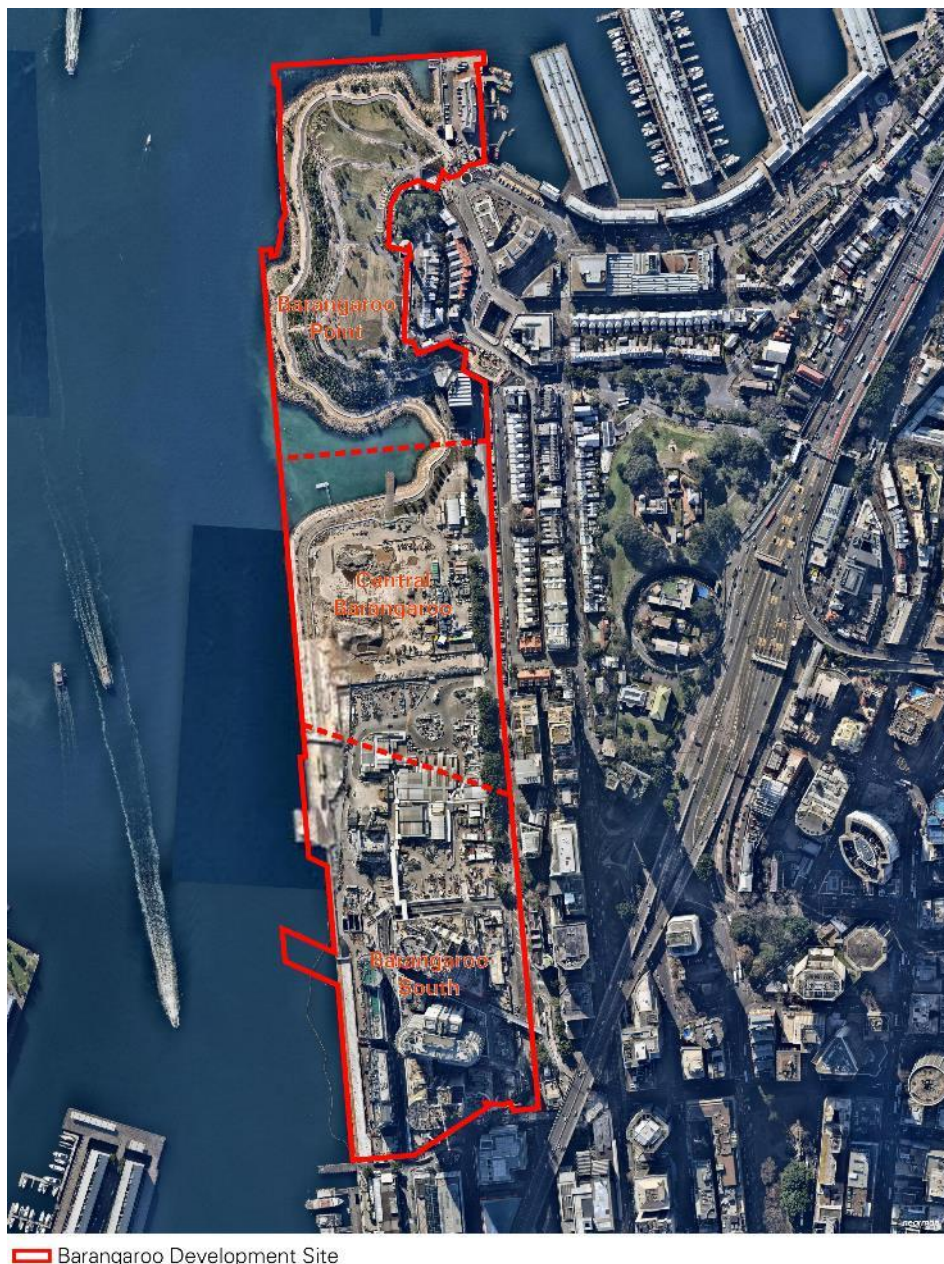


Figure 2 – Locality Plan

2.2 Site Description

The Barangaroo site has been divided into three distinct redevelopment areas (from north to south), comprising Barangaroo Reserve, Central Barangaroo and Barangaroo South (see **Figure 2**), and has been subject to multiple investigations that detail the physical and natural characteristics of the site.

Stage 1B refers to the portion of the Barangaroo South site north of Block 3 at Barangaroo South (on which Commercial Building C3 is currently under construction) , 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 (on which the three One Sydney Harbour Buildings are proposed), the northern park between Blocks 4A and 4B, and Central Barangaroo. **Figure 1** provides an overview of the Barangaroo South development.

The site the subject of this DA (see **Figure 3**), referred to herein as the 'DA Site', includes part of Hickson Road, Concept Plan (Mod 8) Development Blocks R4A and R4B, the adjoining land on which a future park is intended, the future alignment of Watermans Quay, Barton Street and Barangaroo Avenue, as well as the land to the north west of the Stage1A Basement extending north to the Stage 1C Crown Sydney Hotel Resort site.

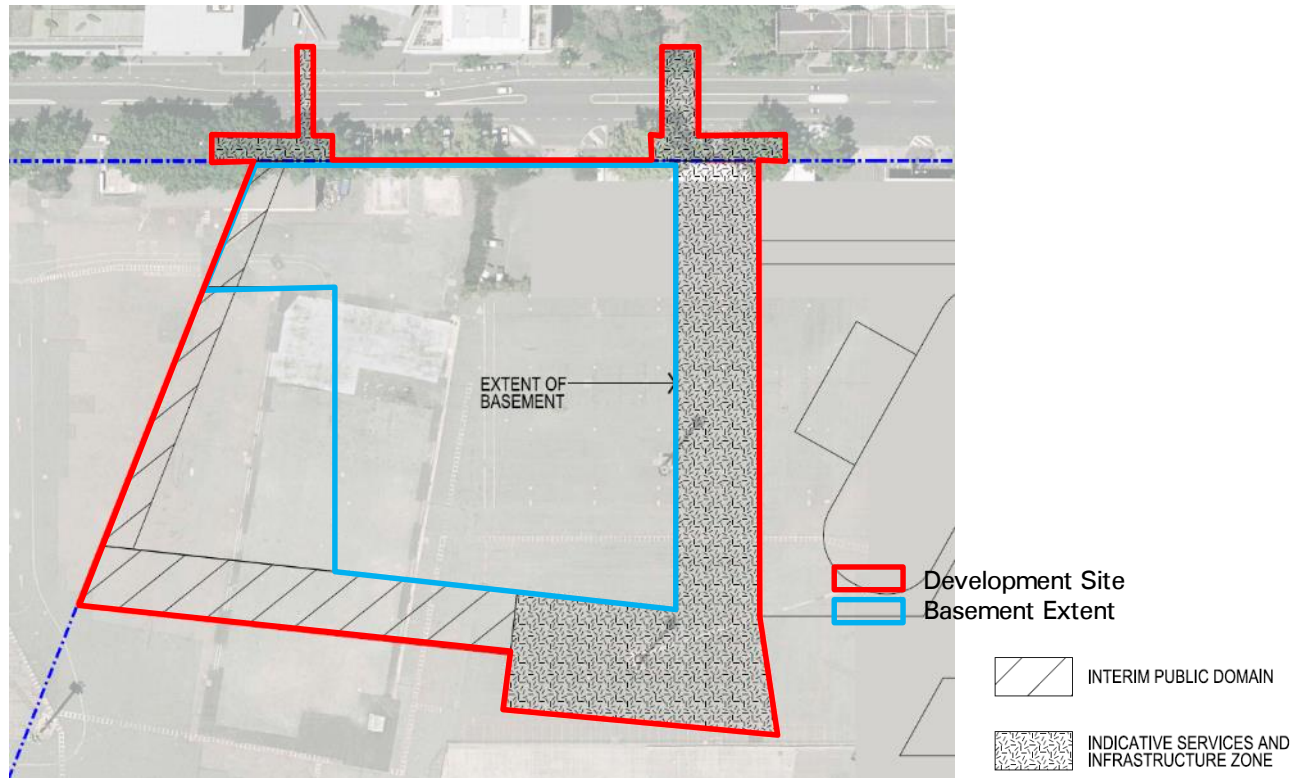


Figure 3 – DA Site Area

Services Zones

Part of the site is located outside the Stage 1B Remediation and Excavation Area in order to provide for services associated with the future Stage 1B development and for the Crown Sydney Hotel Resort. These areas are shown on Figure 4 and include:

- The Other Remediation Works North (ORWN) Services zone;
- The Block 4 services zone to the west of the Stage 1B Remediation Area;
- The ORWN interim public domain (roadway); and
- Hickson Road Services Zone.

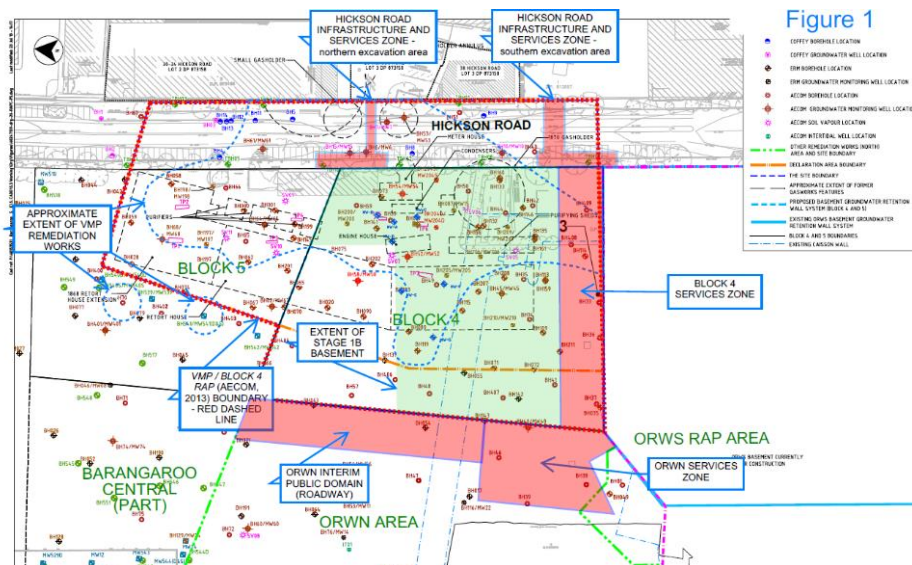


Figure 4 – Location of services zones
Source: AECOM

Land Ownership and Description

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 DA Site comprises Lot 200 in DP 1204948 including part of the future east-west road Waterman’s Quay which is currently under construction, and part of Hickson Road.

The Barangaroo Delivery Authority is the owner of the DA Site and the Roads Authority for Roads at Barangaroo (including Hickson Road). The Barangaroo Delivery Authority has issued landowner’s consent to the making of this SSD DA, which was provided with the completed Application Form submitted under separate cover.

2.3 Existing Development and Structures

2.3.1 Built Form

The DA 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 DA 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 DA Site. These works are intended to commence prior to the works the subject of this DA.

Following completion of SSD 5897 the DA Site will be devoid of structures and vegetation and the majority of excavation required to enable the construction of the Stage 1B Basement and part of the separately proposed Crown Sydney Hotel Resort basement will have been completed.

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.

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.

New electricity substations will be required to service the separately proposed residential and retail areas within Stage 1B.

Telecommunications

The Stage 1B precinct will be serviced with incoming telecommunications services by Telecommunications Service Providers (TSPs) via connections included in this Stage 1B Basement application. Lead-in cabling will enter the DA Site via a bank of ducts sufficient for the TSP's service requirements. The TSPs selected to service the residential building will be agreed by the stakeholders. The sizing, quantity and configuration will be agreed with the stakeholders and proposed carriers.

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.

The Stage 1B Basement will be accessed from the future Watermans Quay - to the south (interim alignment currently under construction under SSD 6303). Watermans Quay will connect to Hickson Road in the east, and Barangaroo Avenue in the west, which connects through to the King Street Wharf precinct to the south.

2.4.2 Existing 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 Park, Elizabeth and Castlereagh Streets.

A number of bus routes terminate in the vicinity of the Barangaroo site, King Street Wharf and Circular Quay. Further, following the planned changes to the CBD bus routes, a number of CBD bus routes now use Hickson Road.

- **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 in Barangaroo South.

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

2.4.3 Pedestrians and Cyclists

Pedestrian Access

The NSW Government has commenced construction on Wynyard Walk and Sussex Street Bridge, a direct pedestrian link between the new Barangaroo development and Wynyard Station and transport interchange (refer to **Figure 1**). Sussex Street Bridge, 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 (formerly 'City Walk 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, sections of Mercantile Walk, Wulugul Walk, Shipwright Walk and Barangaroo Avenue have now been opened. Following the completion of development works at Barangaroo South, it is considered that pedestrian access to the area will be adequate for the future needs of the site.

Bicycles

A marked bicycle lane exists along part of Hickson Road and forms part of a cycle way 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 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 to 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 by AECOM and others provide a detailed analysis of the geological and geomorphological characteristics of the development 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.

Geotechnical Reports (**Appendix G**) covered 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 have revealed that both the soil and groundwater is contaminated, and that the extent of the contaminated materials varies across the Barangaroo site.

Concentrations of lead, total petroleum hydrocarbons (TPHs), benzene, xylenes and polycyclic aromatic hydrocarbons (PAHs) in the soil variably exceed applicable guideline criteria. The contamination is 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 5**). The DA Site includes part of the Declaration Area.

Remediation of the Declaration Area is being undertaken in three sections that are generally in line with the development blocks as identified within Concept Plan (Mod 7). These remediation sections are:

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

The remediation of that part of the Declaration Area within Block 4 (i.e. the Stage 1B Remediation and Excavation Area) has been approved under SSD 5897. The majority of the DA Site is located within the Stage 1B Remediation and Excavation Area. The DA Site also includes sections of Hickson Road to the east of the Stage 1B Remediation and Excavation Area and service zones that are located to the south and west of Stage 1B Remediation and Excavation 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 being

assessed as SSD 6617. Remediation of the Block 5 and Hickson Road Remediation Areas are not yet approved.

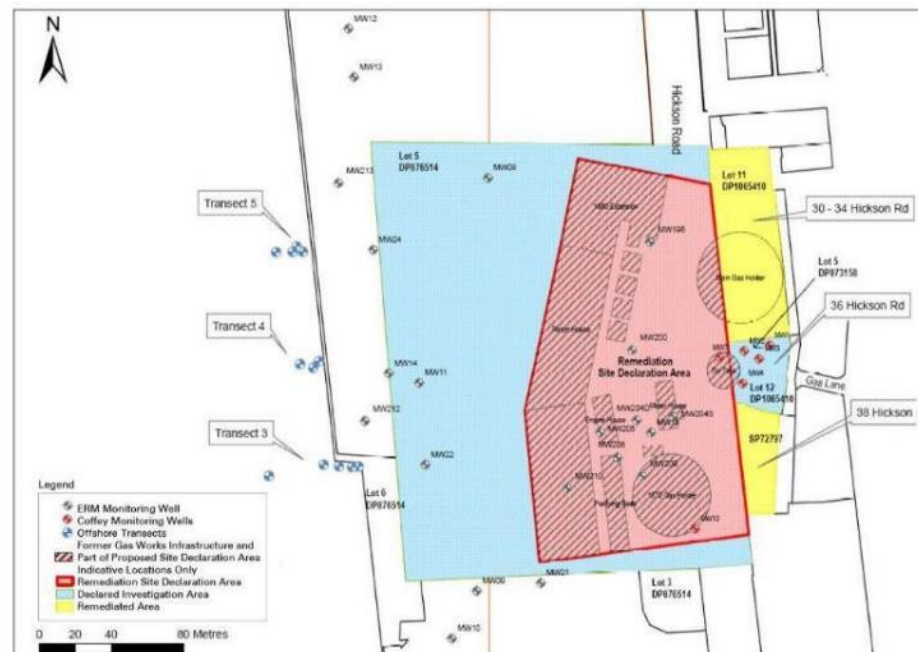


Figure 5 – Declared Area

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 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 Stage 1B Remediation and Excavation SSD DA (SSD 5897) in November 2014.

Full details of the soil and groundwater contamination and exceedance levels within the site are documented in the AECOM Remedial Action Plans submitted with SSD 5897.

Works approved under SSD 5897 include the excavation of fill material to an indicative depth of RL -16.5 m and construction of a perimeter retention wall around the excavated remediation area. To the south of the remediation area a stormwater easement was approved that would separate the Stage 1A basement from Stage 1B basement and provide a pathway for the stormwater infrastructure to pass from Hickson Road to Darling Harbour.

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 DA Site includes certain Service Zones that are outside the area subject to remediation under SSD 5897 (see **Figure 4** above), including:

- The ORWN Services zone;
- The Block 4 services zone to the west of the Stage 1B Remediation and Excavation Area;
- The ORWN interim public domain (roadway); and
- The Hickson Road Services zone.

No final use of land within the Services and Infrastructure Zone is sought as part of this DA. Remediation of these areas, if required to facilitate a future proposed land use for this area, will be conducted subject to separate applications, once the future use has been determined. However, AECOM has confirmed that the first three specified areas located outside of the Stage 1B Remediation Area are unlikely to be contaminated in such a way as to warrant remediation in relation to the continuation of the existing land use and the proposed excavation for construction and maintenance of services. AECOM therefore concludes that these areas are suitable for these specified uses and that approval can therefore be granted in accordance with SEPP 55 for these works (see **Appendix L** and Section 4.12)

Remediation of the Hickson Road Services zone is the subject of a separate application, SSD 6617. However, in case approval for SSD 6617 is not granted before the commencement of works proposed as part of this SSD DA, this SSD DA seeks consent for certain interim remediation works outlined at Section 4.12.

Clause 7 of SEPP 55 requires that a consent authority must not grant consent to the carrying out of any development unless it has considered whether the land is contaminated and, if the land is contaminated, it is satisfied that 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.

The DA satisfies the requirements of SEPP 55 insofar as it applies to land within the DA Site for which a final use is sought.

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 contaminants. Detectable concentrations of hydrocarbon pollutants Total Petroleum Hydrocarbon (TPH), Polycyclic Aromatic Hydrocarbons (PAHs) and benzene, toluene, ethylbenzene, and xylenes (BTEX) 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 Stage 1B Remediation and Excavation approval (SSD 5897) covers site establishment works within Block 4 (which includes the DA 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 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 DA site is underlain by disturbed soils.

An Acid Sulfate Soils Management Plan prepared by AECOM in relation to the Stage 1B Remediation and Excavation has identified Potential Acid Sulfate Soils (PASS) to be potentially present at the DA Site, although it is likely to be at a higher level than the excavation proposed under this application. However if Acid Sulfate Soil is encountered during the proposed excavation works, it would be appropriately managed in accordance with the Block 4 ASSMP (AECOM, 2013b) approved under the Block 4 Remediation DA SSD5897.

2.5.5 Vegetation

Trees are currently located along Hickson Road and a number of these trees will be impacted by this DA, while others may be removed prior to the works the subject of this DA being carried out, subject to separate approvals.

2.5.6 Heritage and Archaeology

Heritage

The approved Concept Plan and Demolition Project Application SSD 5897 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 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 EAR for the Stage 1A Basement Car Park Project Application MP10_0023 (refer to Appendix FF of that EAR). The Outline Interpretation Plan relates to the whole of the Barangaroo South area, including the DA Site.

Indigenous and Non-Indigenous Archaeology

A Non-Indigenous Archaeological Assessment undertaken by Casey and Lowe and was submitted to the Department as part of the Stage 1B Remediation and Excavation EIS (refer to Appendix S of SSD 5897). That assessment indicated that the DA 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 Stage 1B Remediation and Excavation 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 DA Site. No archaeological issues were identified in the area to the west of the eastern 40m of Barangaroo South.

A further archaeological assessment has been undertaken for the purposes of this SSD DA and is contained at **Appendix N**. That assessment concludes that the DA Site is considered to have no realisable archaeological potential or significance as a result of the historical contamination of the site and nature of the works needed to remediate that contamination as part of the Stage 1B Remediation and Excavation application.

2.6 Surrounding Development

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

2.6.1 Existing Surrounding Development

The DA Site is surrounded by the following existing development:

To the north: Block 5 of the Barangaroo site it 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 the DA Site is Commercial Building C3. Under the approved Concept Plan (Mod 7), 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; and

To the east: Millers Point and the Sydney CBD.

2.6.2 Future Development

The future development as envisaged by proposed Concept Plan (Mod 8) for Barangaroo South is indicated on **Figure 6**.

Immediately to the north of the DA Site is Central Barangaroo.

To west of the DA Site, on the opposite side of Barangaroo Avenue, lies the site of the future Crown Sydney Hotel Resort proposed by Crown Resorts which is currently proposed under the SSD 6957. Further to the west lies the Wulugul Walk and Darling Harbour.

To the east of the DA Site is Hickson Road and the Sydney CBD.

Immediately to the south are Commercial Buildings C1 and C3 and the remainder of the Stage 1A development.

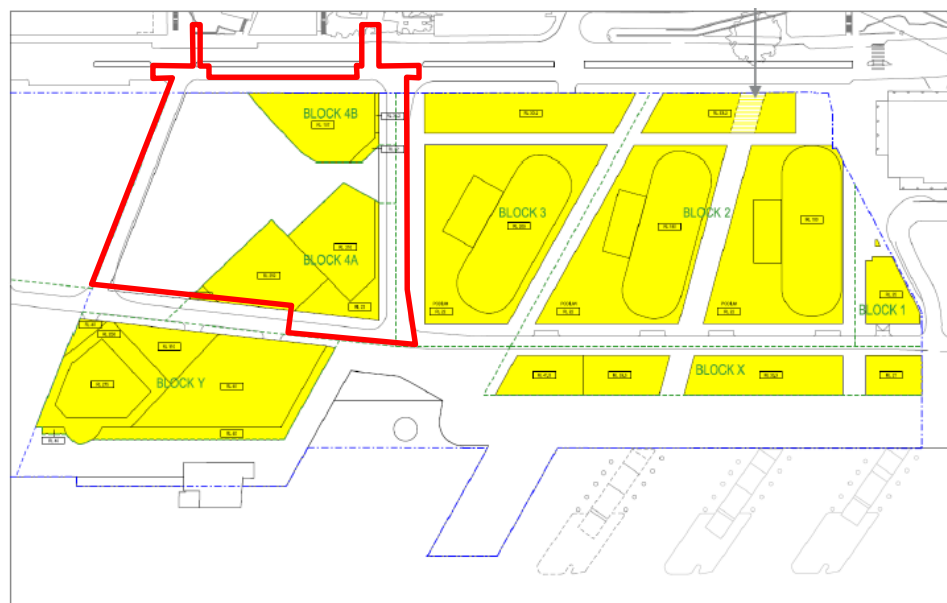


Figure 6 – Stage 1B Basement (red outline) in relation to the proposed Concept Plan (Mod 8) Indicative Building Layout

3.0 Description of the Development

This chapter of the report provides a detailed description of the proposed development. Architectural Drawings prepared by Renzo Piano Building Workshop (RPBW) and Lendlease Design are included at **Appendix A**.

The proposed development seeks approval for a shared basement to service the future development within Stage 1B. Specifically this application seeks approval for:

- Excavation beyond the Stage 1B Remediation and Excavation Approval to allow for construction of the Stage 1B Basement.
- Construction of basement slabs for future parking areas (4 parking levels) to support the GFA envisaged under Concept Plan (Mod 8) for Buildings R4A, R4B and R5 in accordance with the car parking rates under the approved Concept Plan. The number and use of parking spaces within the basement is the subject of the future One Sydney Harbour Buildings' SSD applications.
- Construction, fit out and use of common facilities in the basement, including plant rooms, loading docks, dock-masters office, amenities, waste rooms and storage areas to support the GFA envisaged for the Stage 1B One Sydney Harbour Buildings under Concept Plan (Mod 8).
- Allocation of 35m² of GFA for basement uses within the Block 4A. This GFA will be used for dock masters / security offices, to support the function and operation of the basement.
- Construction of the One Sydney Harbour 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 One Sydney Harbour Buildings (i.e. within the podium).
- Provision of interim public domain and landscaped open space around the car park ramps and risers, and across the proposed basement ground level slab, to allow for the potential staging of the construction and occupation of the Stage 1B One Sydney Harbour Buildings.
- Temporary construction of Barton Street.
- Interim construction of the northern section of Barangaroo Avenue, and minor interim streetscape.
- Construction of permanent stormwater drainage infrastructure between Hickson Road and Darling Harbour.
- Provision of services and infrastructure within the Basement, Hickson Road, the future alignment of Watermans Quay (road subject to future application), Barangaroo Avenue and between the Stage 1A Basement, Stage 1B Basement and the Crown Sydney Hotel Resort Site.

The majority of site preparation work, including: demolition, the removal of the majority of vegetation, remediation, construction of retention walls, bulk excavation, and stormwater diversion has been approved as part of SSD 5897.

Excavation associated with the proposed works may be undertaken concurrently with remediation works associated with SSD 5897. The proposed development relies on the successful completion of the works approved as SSD 5897. Occupation of the proposed development cannot occur until the SSD 5897 works have been completed and until the remediation has been verified by the site auditor. Occupation of the proposed development will therefore not occur until the EPA declaration that applies to the DA Site has been lifted.

3.1 Additional Excavation and Site Preparation

As noted above, SSD 5897 provides for the majority of site preparation works, including remediation of contaminated areas within the DA Site and excavation to an indicative depth of RL -16.5m. Excavation beyond the excavation levels approved under SSD 5897 will be required in some areas to allow for construction of the Stage 1B Basement.

3.2 Structural Works

The proposed basement structure has been designed to accommodate an appropriate amount of storage and servicing and parking for the One Sydney Harbour Buildings based on the proposed GFA / land use mix proposed in the DAs for those buildings.

The proposed basement structure has been designed to centralise plant and services required to support future development within the Stage 1B area. The plant and services areas have been located such that they are able to easily integrate into the separately proposed R4A, R4B, and R5 buildings.

A combined basement is proposed as it allows for maximum design efficiency, and for vehicular circulation within the Stage 1B area to be rationalised to the greatest extent practicable.

Rather than a series of separate basements, each with separate vehicular ingress and egress points, a combined basement of the nature proposed allows for the number of vehicular accesses and crossings within the future public domain to be minimised. A single basement therefore results in a more efficient design and more effectively mitigated traffic impacts.

3.2.1 Foundations

This SSD DA seeks approval for the necessary piling, caps and footings to support the basement car park and tower foundations as shown on the drawings at **Appendix A**.

3.2.2 Basement

Ground Level

The works proposed at ground level include:

- ramps, stairs and corridors / lobbies providing access to the lower levels;
- above ground risers and plant to be integrated above ground level into the podiums of future One Sydney Harbour Buildings (R4A, R4B and R5);
- interim landscaping around ground level elements;
- temporary surface road works to Barton Street and Barangaroo Avenue.

Level B0

This level includes a number of mezzanine levels associated with the service areas. Services provided within the service areas on this level are outlined in Section 3.9 and in **Appendix Q**.

Level B1

This level accommodates car park entry, car parking, storage, main building plant and loading docks.

Level B2 – B4 (inclusive)

Levels B2, B3 and B4 will be used for car parking, storage and services.

Level B5

Level B5 will feature three building plant and lift overrun pits, one for each of the three future One Sydney Harbour Buildings.

All levels

Services, plant and infrastructure to serve the basement itself, future buildings and public domain in Stage 1B and connections to Stage 1C and Barangaroo Central.

3.2.3 Above Ground Structures

As outlined above, the proposed development includes several above ground elements, which include basement and infrastructure-related elements, within the footprint of One Sydney Harbour Buildings R4A, R4B and R5. These elements are required to allow the future construction of the One Sydney Harbour Buildings.

The Barangaroo Stage 1B development program indicates that the future Buildings R4B and R5 may not be built immediately. Interim public domain and landscaped open space will be provided around these above ground structures as part of this application.

Drawings illustrating the proposed development prepared by Renzo Piano Building Workshop (RPBW) and Lendlease Design and are included at **Appendix A**. The elements vary in both area and height as dictated by the services located below. The basement elements such as the fire stairs and access lifts generally have a height of 8m above ground level. Some elements extend up to 14m in height above ground level.

It is intended that when the proposed One Sydney Harbour Buildings are approved on the DA Site, these above ground elements will be incorporated into the podia of these buildings.

3.3 Road Works

The development application seeks approval for a range of road works associated with the future development of Barangaroo. The works comprise:

- Temporary construction of Barton Street and associated junctions with Hickson Road (to the east) and with Barangaroo Avenue (to the west);
- Interim construction of Barangaroo Avenue, including an interim termination traffic turning point for the separately proposed R4A Building and Crown Sydney Hotel Resort;
- Construction of road services, including drainage and utility infrastructure within the future alignment of the Watermans Quay and Barangaroo Avenue, and the temporary alignment of Barton Street; and
- Removal of existing street trees along Hickson Road. Street trees will be replaced as part of the separately proposed permanent public domain works.

The proposed road works within Hickson Road will require approval under Section 138 of the *Roads Act 1993* from the appropriate roads authority, which in this case is the Barangaroo Delivery Authority, particularly in relation to:

- the erection of any structures or the carrying out of works in, on or over any public road(s);
- digging up or disturbing the surface of a public road(s);

- removing or interfering with a structure, work or tree on any public road(s); or
- connecting a road(s) (whether public or private) to a classified road.

The Barangaroo Delivery Authority is able to grant the required approval(s) under the *Roads Act 1993* prior to commencing the proposed road works.

3.4 Vehicular Access

One vehicle entrance/exit is proposed to provide access to the proposed Stage 1B Basement. This entrance will be accessible from Watermans Quay, to the south of the proposed Stage 1B Basement. The future permanent public domain in Stage 1B (which will be subject to a separate DA) will provide for the construction of the final alignment of Waterman's Quay and associated works that may be required to integrate the basement entry with the final road.

All vehicular movements to and from the Stage 1B Basement will be in a forward direction.

It is proposed that roller shutters or other full barriers will secure the ramp. The above ground elements of the ramp are shown on Drawing BB2_PA2_A400. The lower sections of the access ramp are shown on Drawing BB2_PA2_A100 and Drawing BB2_PA2_A101.

This ramp will provide access from the ground level to level B1. Levels B2 to B4 will be accessed via an internal ramp, located in the north east corner of the basement.

3.5 Future Parking and Residential Storage

The proposed basement will accommodate up to 884 car parking spaces and associated residential storage. The use and allocation of the area within the proposed basement for parking spaces and storage areas for individual buildings form part of the separate DAs for the proposed One Sydney Harbour Buildings within Stage 1B (Building R4A, R4B and R5).

Table 2 outlines the assumptions for the calculation of the 884 car parking spaces for each One Sydney Harbour Building applying the car parking rates under the Barangaroo Concept Plan.

The operation of the car parking spaces will commence in stages in line with the occupation of the relevant buildings in accordance with their respective approvals.

It is proposed as part of this DA that the basement car park structure will be used temporarily for construction related activities (but not parking), including storage and facilities associated with the construction of other projects at Barangaroo, until it is required to facilitate operation of the future One Sydney Harbour Buildings within Stage 1B.

3.8 Open Space Areas

The above ground basement works will result in parts of the basement that would ordinarily be integrated into the design of the buildings being exposed until the time those buildings are being developed. These above ground structures include pedestrian and vehicle entrances, ventilation shafts and electricity infrastructure. The above ground structures proposed for the basement are described in Section 3.2.3. These structures are concentrated in the south west and south east of the Stage 1B Basement within Concept Plan Development Blocks 4A and 4B, and occupy a relatively small area of the site as shown in **Figure 7**.

Further, access to the Basement and associated One Sydney Harbour Buildings will be required, noting that a separate DA will be made for the permanent Stage 1B Public Domain in the future.

Public domain and landscaped open space is proposed under this DA in order to mitigate the visual impact of the proposed above ground structures and ensure access to the Basement and proposed One Sydney Harbour buildings in line with their occupation, while works continue in parts of Stage 1B. This includes interim landscape works and visual treatments to the riser structures and the slab over the Basement, as well as the construction of access roads. In this regard, it is proposed to undertake temporary construction of Barton Street, interim construction of Barangaroo Avenue (north) and temporary construction Barangaroo Avenue (turning point southern end) to provide for vehicular access to the development.

The concept design of the 1B Basement public domain and landscaped open space is shown in **Figure 7**. A landscape design statement is provided in **Appendix C**.



Figure 7 – Interim Public Domain Concept Plan

Parts of the interim public domain and landscaped open space will be implemented prior to the final occupation of the relevant adjacent building unless the permanent public domain is under construction or the area is being used in association with the construction of an approved project at Barangaroo.

This DA also seeks approval for the subsequent staged demolition of the interim public domain as required.

This will ensure that, as construction work commences on Buildings R4A, R4B and R5 the respective area required for construction purposes, including associated materials storage and access, can be closed off as required by the construction and while public domain and landscape is provided elsewhere.

The proposed interim public domain in these areas will be subject to design development. The final design of the interim public domain will be provided to the Secretary for approval prior to the issue of the Construction Certificate. During design development of the interim public domain, consideration will be given to the design status of the permanent public domain, so that consistency (where possible) and works integration can be achieved.

3.9 Services and Infrastructure

The following describes the services and infrastructure for which approval is being sought under this DA to serve the proposed Stage 1B Basement and associated One Sydney Harbour Buildings and in Stage 1C, the separately proposed Crown Sydney Hotel Resort as well as Central Barangaroo.

Services and Infrastructure serving the site will be located in the Stage 1B Basement and in the following areas (see **Figure 4** above):

- The ORWN Services zone;
- The Block 4 services zone to the west of the Stage 1B Remediation Area;
- The ORWN interim public domain (roadway); and
- Hickson Road Services Zone.

Services and Infrastructure provided within the proposed development is described in **Appendices I** and **Q** and summarised below.

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.

Potable Water

A Sydney Water owned and operated 300mm diameter watermain is located on the western side of Hickson Road and extends for the full frontage of the Barangaroo South development.

Sydney Water has confirmed, through approval of the "Site Servicing Strategy – Barangaroo South", prepared by Cardno and dated March 2013, that this main has adequate capacity to provide potable water to the development.

To service the Stage 1B site and the proposed Crown Sydney Hotel Resort development (subject to a separate application), connection will be made to the existing 300mm diameter watermain in Hickson Road. From this connection, a

potable water main will be constructed along the internal road network. The new main will be laid above the podium level structural slab.

Chilled Water

A centralised chilled water plant and harbour heat rejection system have been constructed as part of Stage 1A works to provide reticulated chilled water to the Barangaroo South buildings, including the Stage 1B and proposed Crown Sydney Hotel Resort developments. Chilled water will be reticulated throughout the Barangaroo South development within a privately owned pipe network.

Sewerage

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.

The sanitary drainage system for Stage 1B and the proposed Crown Sydney Hotel Resort development will convey waste water above ground level from basins, baths, showers, toilets, sinks etc. to the centralised Barangaroo South recycled water treatment plant located in Stage 1A (separately approved) which will have a connection to discharge via gravity into the existing Sydney Water sewer infrastructure. Provision is also made for connection through to Central Barangaroo.

Recycled Water

Recycled water will be reticulated throughout Stage 1B and the Crown Sydney Hotel Resort site. Provision is also made for connection of the recycled water service through to Central Barangaroo.

Gas

It is proposed that a new gas supply will be provided to the precinct from the existing Jemena gas infrastructure in Hickson Road. The final supply strategy will be a result of negotiation and agreement with Jemena.

Jemena proposes to supply Stage 1B via a low pressure ring main within the internal roads. Each individual building on the development site will be connected to this ring main.

Jemena proposes to supply the proposed Crown Sydney Hotel Resort building and basement via a new high pressure main along Barton Street connecting through to the Crown Sydney Hotel Resort basement metering room. This DA includes provision of infrastructure to the proposed Crown Sydney Hotel Resort development should it be approved.

The gas mains extensions will be designed by Jemena in accordance with Jemena Design requirements.

Electrical Services

Power to Barangaroo South Stage 1A development is proposed to be provided by 33kV Ausgrid feeders originating at Pyrmont Switching Station. These feeders will be upgraded to service the additional load of the Barangaroo South Stage 1B development. The supply to the development and the proposed Crown Sydney Hotel Resort development if approved may change and is subject to negotiation and 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 or from Hickson Road subject to negotiation of the supply with Ausgrid.

A substation will be established on the Building R4A podium level of Stage 1B to service the One Sydney Harbour Buildings, subject to design development. This substation will be located inside an interim aboveground housing until such time as the R4A Building is constructed.

A diesel generator system will be provided in the Stage 1B basement for standby power in the event of a mains power failure. The following will be backed up by standby power:

- Basement Fire safety essential services,
- Basement Communications/security equipment,
- Basement emergency hydraulic equipment, e.g. sewer ejector pumps, emergency water pumps, stormwater pumps.

A diesel fuel tank with a capacity of approximately 5,000L may be installed within the proposed basement to provide fuel to backup generators. An assessment of the hazard and risk associated with this is provided in Section 4.13.

A site main switchboard will be provided adjacent to the Stage 1B substation, this will be located within the interim above ground build elements and then incorporated into the Building R4A podium upon development.

This will divide the bulk supply from the substation into components to serve the proposed Basement, ground plane, podium tenants, podium house services, Tower R4A, Tower R4B and Tower R5 apartments and their common services.

A dedicated main switchboard will be provided for the basement in a main switchroom located in the Stage 1B basement. Main switchboards will also be provided for each building under separate DAs.

Power outlets will be provided within the Stage 1B Basement.

Lighting

The lighting in the Stage 1B Basement will consist of enclosed LED fittings. All luminaires will be mounted to the concrete soffit or chain suspended. Transition lighting as per Australian Standards will be provided at undercover carpark entries to allow drivers' vision to adapt to the indoor lighting levels.

Exit and emergency escape lighting will be provided in all areas in accordance with NCC requirements and AS2293. The building emergency and exit luminaire system will be comprised of single point units, installed in all areas.

Metering and Monitoring

An energy metering and monitoring system will be provided and will include electrical, water, gas and thermal meters to enable load profiles to be produced in 15 minute intervals. The reporting system will provide reports to enable building function to be monitored and reports to be prepared. The system will store and display a minimum of 24 months historical data on site. The system will be web based and capable of offsite access via the internet.

Communication

Communications infrastructure will be provided centrally to service the needs of the future residents and tenants of the One Sydney Harbour Buildings. A Campus Distribution Room will be provided within the Stage 1B Basement to manage the Stage 1B precinct communications requirements.

In building mobile coverage will be available throughout the Stage 1B Basement.

Security

The Stage 1B Basement will be provided with a standalone access control, intruder detection and CCTV service. These systems will interface to a security room located in Stage 1B for overall monitoring and management.

The Stage 1B Basement's security system will be housed in a security control room located within Stage 1B with any necessary data gathering panels distributed within the risers or cupboards, which will be monitored.

Closed Circuit television (CCTV) and intercoms will be provided throughout the development, including at points of entry and egress.

Vertical Transport

Elevators will be provided to access each level of the Stage 1B Basement. These elevators will be integrated into the One Sydney Harbour Buildings following their separate approval and construction.

Hydraulic Services

The Stage 1B Basement development will include common elements, which will service the Stage 1B precinct as well as elements that are specifically for the operation of the Basement. Hydraulic Services include:

- Barangaroo South Common Services:
 - Sydney Water Water Mains and Incoming Water Supplies
 - Jemena Gas Mains
 - Lendlease Living Utilities Recycled Water Supply
 - Sewer Drainage Collection System
 - Dedicated Swimming Pool Drain Down System
- Stage 1B Basement Hydraulic Services
 - Sewer Drainage and Sanitary Plumbing
 - Grease Waste Systems
 - Rainwater Plumbing Systems
 - Car Park Drainage System
 - Basement Ingress Water Drainage
 - Domestic Water Supply
 - Recycled Water Supply
 - Hot Water Supply
 - Incoming Fire Water Services
 - Gas Supply
 - Sanitary Fixtures and Tapware

Mechanical Services

Mechanical Services provided by the Stage 1B Basement include:

- Barangaroo South Common Services:
 - Energy Transfer Station;
 - Booster Pump Room; and
 - DCP Primary Chilled Water Reticulation.
- Stage 1B Mechanical Services:
 - Carpark Ventilation;

- Loading Dock Ventilation;
- Electrical Infrastructure Ventilation;
- Plantroom Ventilation;
- Grease Arrestor Room Ventilation;
- Waste Room Ventilation;
- Diesel Generator Ventilation;
- Amenities Ventilation;
- Perimeter Wall (HHERA) Ventilation;
- Smoke Management System;
- Communications Room Air Conditioning;
- Facilities Room Air Conditioning; and
- Mechanical Services Control System.

Fire Services

The Fire Services that will be provided for the Basement area of Barangaroo South Stage 1B will include:-

- Fire Hydrant Service;
- Fire Sprinkler Service (combined service);
- Fire Hose Reel Service;
- Fire Detection & Alarm Service; and
- Portable Fire Extinguishers

The Fire Services will be designed and installed in accordance with the National Construction Code and relevant Australian Standards

3.10 Waste Management

A Construction Waste Management Plan (CWMP) has been prepared by ARUP and is included at **Appendix J**. The CWMP identifies all potential sources of liquid waste and non-liquid wastes, waste quantities, any waste that will be stored, separated or processed on site, as well as outlining waste minimisation and management procedures.

Construction Waste

ARUP has estimated the volume of excavated material that will be generated by the proposed development, and presented the anticipated quantity in **Appendix J**. The CWMP includes details of the amount of excess spoil and the location at which this would be disposed.

Excavated material will be managed in accordance with the provisions of the site waste management process as described within the CFEMP provided at **Appendix O**.

Storage for Bulky 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 retail tenants will be collected in dedicated 240L organic waste bins and transferred to the central waste storage room in basement level 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 an approved operator. 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.

3.11 Construction Hours

In accordance with the Construction Framework Environmental Management Plan prepared by Lendlease at **Appendix O**, 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, and internal works may be carried out outside of these standard construction hours, consistent with what has occurred across Stage 1A.

3.12 Staging of Construction

Lendlease proposes to undertake the construction of Barangaroo South in a staged manner. The Stage 1B Basement will be constructed concurrently with the other approved developments within Barangaroo South, noting that the basement will commence in advance of the R4A, R4B and R5 towers. It is anticipated that construction will commence in July 2017 and it is intended that the works will be complete in 2021.

In order 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).

As detailed at Section 1.1.3 of this EIS, the Stage 1B Remediation and Excavation SSD DA (SSD 5897) relates to part of the DA Site. SSD 5897 allows for demolition works, site establishment, bulk earthworks and the treatment and remediation of contaminated soils in this area. After remediation and bulk excavation of an area within part(s) of the subject site have been completed under

SSD 5897, the Stage 1B Basement works the subject of this DA would commence on that part of the site. Therefore stages of both projects will overlap as they each progress. These projects will be coordinated in order to achieve an efficient works process and manage the potential cumulative impacts of these works. To this end, it should be noted that many of the site construction management practices proposed are consistent and compatible with those that have already been approved in the context of the related SSD 5897 works.

Additionally, it is proposed that parts of the interim public domain located on the site of the future One Sydney Harbour buildings will be implemented prior to the final occupation of the relevant adjacent building unless:

- Permanent public domain is under construction; or
- The area is being used in association with the construction of an approved project at Barangaroo.

Should the interim treatments and public domain be provided, it will remain in place until the issue of the first construction certificate for the development of the permanent buildings or public domain on the land.

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 (see Section 1.6).

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

As detailed at Section 1.1.3 of this EIS, the lodgement of this SSD DA follows approval for the Stage 1B Excavation and Remediation DA (SSD 5897) which relates to part of the site the subject of this application. SSD 5897 allows for demolition works, site establishment, bulk earthworks and the treatment and remediation of contaminated soils. As detailed at Section 3.12 of this EIS, after the Stage 1B Remediation and excavation of an area within part(s) of the subject site have been completed under SSD 5897, the Stage 1B Basement works the subject of this DA would commence on that part of the site. Both projects will be coordinated in order to achieve an efficient works process and manage the potential cumulative impacts of these works.

The approved DA documentation for SSD 5897 provides detailed information and environmental assessment of a number of planning and environmental issues, including, relevantly the following:

- demolition, part excavation and some 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 SSD 5897 to the extent that they are relevant to the proposed development.

4.1 Relevant EPIs, Policies and Guidelines

Table 3 demonstrates that the proposed development will comply with / is consistent with the relevant strategies, environmental planning instruments, and Concept Plan as determined in the SEARs.

Table 3 – 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, building liveable centres. The Stage 1B Basement will contribute towards achievement of this plan's objectives by providing facilities and car parking to support the separately proposed One Sydney Harbour Buildings. The One Sydney Harbour Buildings will provide housing, including housing for key workers.

Instrument / Strategy	Comments
Plan for Growing Sydney	The SSD DA is consistent with the Plan for Growing Sydney, as it will support the delivery of One Sydney Harbour Buildings within Barangaroo South, which is identified as a key element of maintaining Sydney's global reputation, as per Direction 1.1 of the Plan for Growing Sydney. Additionally, the One Sydney Harbour buildings and their associated basement are consistent with Action 2.1.1 in that they will contribute to the dwelling target of an additional 664,000 new dwellings by 2031 in Sydney. Further, they will provide 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. Further, the proposed development proposes service connections to the Crown Sydney Hotel Resort site, which will enable that development and its associated economic impacts to be realised.
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. This SSD DA is consistent with the mode share targets that were established under the Concept Plan that are reinforced in the BITP (see Appendix E).
Sydney City Centre Access Strategy	The Sydney City Centre Access 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 SSD DA supports the Strategy, being an integral part of the proposed One Sydney Harbour Development at Barangaroo South, which will provide transit-oriented residential accommodation close to existing employment and infrastructure in the Sydney CBD.
NSW Long Term Master Transport Plan	The NSW Long Term Transport Master Plan sets the framework for the NSW Government to deliver an integrated, modern transport system that puts the customer first. The SSD DA supports the Strategy, being an integral part of the proposed One Sydney Harbour Development at Barangaroo South, which will provide transit-oriented residential accommodation close to existing employment and infrastructure in the Sydney CBD.
Sydney's Cycling Future	Sydney's Cycling Future is part of NSW's Transport Masterplan that is aimed at the 70% of NSW residents who would like to spend more time on their bikes. By providing space for bicycle parking for future residents of Barangaroo Stage 1B, this SSD DA supports the objectives of this plan.
Sydney's Walking Future	Sydney's Walking Future is part of NSW's Transport Masterplan that is aimed at improving Sydney's walkability. The proposed development is located close to transport, and has been designed to provide a high quality pedestrian experience, all of which support the walkability of the precinct.

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. 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. As detailed in Section 4.2 the proposed development is consistent with the Concept Plan (as proposed to be modified) and therefore is consistent with the provisions in Schedule 6A Transitional Arrangements – repeal of Part 3A.																																		
EP&A Regulations	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, with the exception of the Roads Act 1993, no additional approvals will be required in order to permit the proposed development to occur. <table border="1"> <thead> <tr> <th>Act</th><th>Approval Required</th></tr> </thead> <tbody> <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>Yes</td></tr> <tr> <td>Pipelines Act 1967</td><td>No</td></tr> </tbody> </table>	Act	Approval Required	Legislation that does not apply to State Significant Development		Coastal Protection Act 1979	N/A	Fisheries Management Act 1994	N/A	Heritage Act 1977	N/A	National Parks and Wildlife Act 1974	N/A	Native Vegetation Act 2003	N/A	Rural Fires Act 1997	N/A	Water Management Act 2000	N/A	Legislation that must be applied consistently		Fisheries Management Act 1994	No	Mine Subsidence Compensation Act 1961	No	Mining Act 1992	No	Petroleum (Onshore) Act 1991	No	Protection of the Environment Operations Act 1997	No	Roads Act 1993	Yes	Pipelines Act 1967	No
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Roads Act 1993	Yes																																		
Pipelines Act 1967	No																																		
Major Development SEPP	The Barangaroo site is listed as a State Significant Site under Part 12 of Schedule 3 of the Major Development SEPP. A SEPP Amendment is currently being considered by the Department to revise the SEPP in order to be consistent with proposed Concept Plan (Mod 8). The following is an assessment of the proposal's compliance against the Major Development SEPP as proposed to be modified. <table border="1"> <tbody> <tr> <td>Clause 8 - Zone B4 Mixed Use</td><td>Part of the site is zoned B4 Mixed Use. Underground car parks are permissible with development consent in the B4 Zone.</td></tr> <tr> <td>Clause 9 – Zone RE1 Public Recreation</td><td>Part of the site is zoned RE1 Public Recreation. Underground car parks are permissible with development consent in the RE1 Zone.</td></tr> </tbody> </table>	Clause 8 - Zone B4 Mixed Use	Part of the site is zoned B4 Mixed Use. Underground car parks are permissible with development consent in the B4 Zone.	Clause 9 – Zone RE1 Public Recreation	Part of the site is zoned RE1 Public Recreation. Underground car parks are permissible with development consent in the RE1 Zone.																														
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	Clause 17 - Height of buildings	The ground level slab of the Stage 1 Basement will be built to RL2.2 in landscape areas and RL3.3 elsewhere to achieve a future finished ground level of RL3.5. The above ground basement elements, which are located entirely within Blocks 4A and 4B extend to a RL 14m (approximately 10.5m above ground level), which is well below the maximum height limits of RL250 and RL 107. These above ground elements associated with the Stage 1B Basement will be incorporated into the podium levels of future Stage 1B One Sydney Harbour Buildings R4A, R4B and R5.
	Clause 18 - Gross Floor Area Restrictions - Maximum (86,579m ² across Block 4A)	The Stage 1B Basement has a total GFA of 35m ² located within Block 4A. When counted alongside the GFA proposed in Buildings R4A and R4B the total GFA complies with the maximum GFA that applies to Block 4A under Concept Plan (Mod 8).
	Clause 19 - Design Excellence	Under clause 19(3) development consent must not be granted for a new building on a site greater than 1,500m unless a design competition has been held in relation to the proposed development. The One Sydney Harbour buildings, which the proposed basement is integrated with and will serve, were the subject of a design competition. Whilst the basement is a separate development application from the towers, its design is informed by and supports the outcome of the competition. In particular the above ground elements, such as the basement entry, was the result of the design competition. Accordingly the development will achieve design excellence as appropriate for a basement.
SEPP 55 – Remediation of Land	As identified at Section 3.12 of this EIS, SSD 5897 (the Stage 1B Remediation Approval) provides for the remediation of the majority of contaminated material within the DA Site. The area of land within the 'Services and Infrastructure Zone (refer to Section.2.2)' at the south west of the DA Site will be subject of a future RAP and development in this area of the DA Site will be subject to a separate future application. A letter has been prepared by AECOM (Appendix L), which confirms that the services zones are unlikely to be contaminated in such a way as to warrant remediation in relation for the continuation of the existing land use and the proposed excavation for construction and maintenance of services. AECOM therefore concludes that these areas are suitable for these specified uses and that approval can therefore be granted in accordance with SEPP 55 for these works. Further contamination investigations and remediation (if required), which will be the subject to a separate RAP(s), will be carried out in these locations as part of obtaining approvals for the future intended land uses in these areas at the appropriate time. As such the proposed development is consistent with the future use provided for under the RAP. Further the proposed development satisfies clause 7(2) of SEPP 55 as the Minister should be satisfied that the land for which a final use is proposed, is suitable for that use.	
SEPP 33 – Hazardous and Offensive Development -	The potential fuel storage provided for within the Stage 1B Basement is not potentially hazardous or offensive development as per the Dangerous Goods Code classifications. Further description is provided in Section 4.13.	
SEPP (Infrastructure)	The proposed Stage 1B Basement will provide space for 884 car parking spaces for use by the future One Sydney Harbour Buildings R4A, R4B and R5. Use of these spaces will be approved under the separate applications for each of these buildings. The ISEPP requires that parking with a capacity for 200 or more vehicles be referred to RMS. Consequently the application will be referred to the RMS during assessment.	
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 <i>State Environmental Planning Policy (State and Regional Development) 2011</i> (State and Regional Development SEPP). Accordingly, as the development has a CIV in excess of \$10 million this development is State Significant Development.	
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 potential impacts of the proposed development on the Harbour's biodiversity, ecology or environment will be appropriately managed.

Clause 22 Public access to, and use of foreshores and waterways	The development is consistent with the Concept Plan (as proposed to be modified by Mod 8). The proposed basement will not impact on access to the foreshore and harbour waters by the public, and is therefore considered to be not inconsistent with clause 22.
Clause 23 Maintenance of a working harbour	The proposed Stage 1 B Basement 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 including the proposed modification to Concept Plan (Mod 8).
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 quality	This application seeks to provide a basement that will support high quality new buildings that will contribute to the scenic quality of the waterway.
Clause 26 Maintenance, protection and enhancement of views	The proposed development will not adversely impact any views and vistas. It will also support new One Sydney Harbour Buildings that will provide new views to the Harbour.
Clause 27 Boat storage facilities	N/A. No boat storage facilities are proposed.

4.2 Barangaroo Concept Plan

The site is subject to the Barangaroo Concept Plan approved under Part 3A of the EP&A Act (project MP10_0162, as modified). The Transitional Provisions for Part 3A in Section 6A of the EP&A Act require that the consent authority must not grant consent to development the subject of a Part 3A Concept Plan unless it is generally consistent with the terms of approval of the Concept Plan.

The following section provides an assessment of the proposal against the Concept Plan (as proposed to be modified by Mod 8). The section demonstrates that the proposed development is generally consistent with the Concept Plan (as proposed to be modified by Mod 8).

This DA seeks approval for the construction of the Stage 1B Basement and associated services as described in Section 3 of this report. Stage 1B Basement is proposed within development blocks 4A and 4B of Concept Plan (Mod 8) and the adjacent area of public domain to the north. Development works for the purposes of providing services and infrastructure to the proposed Stage 1B Basement as well as the separately proposed Crown Sydney Hotel Resort are also proposed in the following areas as shown earlier at **Figure 4**:

- The ORWN Services zone;
- The Block 4 services zone to the west of the Stage 1B Remediation Area;
- The ORWN interim public domain (roadway); and
- Hickson Road Services Zone.

The Barangaroo Concept Plan identifies specific aspects of public domain, including areas of landscaped open space and future roads. Some of these open areas and road reserves are included in this DA so that interim pedestrian, cyclist and vehicular access and amenity to be provided until the final Public Domain can be approved and constructed. The final public domain is proposed under a separate application.

The development as proposed in this DA complies with the provisions of the Concept Plan (Mod 8) and Design Guidelines and does not preclude future applications from compliance.

The proposed development is not consistent with Concept Plan (Mod 7) and relies on the Concept Plan (Mod 8) to be approved prior to its approval.

4.2.1 Numeric Concept Plan Controls

The Barangaroo Concept Plan identifies maximum GFA and height controls for each Development Block within Barangaroo South, including Blocks 4A and 4B, within which the basement is partly located. 35m² of GFA is proposed within Block 4A. There is no maximum GFA applying to the public domain area under which the other part of the basement is located, however it is noted that the maximum GFA applying to the Barangaroo site still applies. **Table 4** provides a comparison of the Stage 1B Basement's consistency with the Concept Plan numerical controls.

Table 4 – Consistency with Concept Plan (Mod 8) Block 4A GFA and Height Controls

Concept Plan (Mod 8) Control	Stage 1B Basement	Block Cumulative Total	Compliance
Maximum GFA			
Block 4A – 86,579m ²	35m ²	85,535m ² *	✓
Block 4B – 19,558m ²	-	18,199m ² *	✓
Maximum Height			
Block 4A – RL 250	RL 13.95	-	✓
Block 4B – RL 107	RL 12.8	-	✓

*Calculated in accordance with Concept Plan (MP06_0162), as proposed to be 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 4.2. The Section demonstrates that the proposal is below these maximums and is therefore consistent with the Concept Plan.

4.2.2 Barangaroo South Design Guidelines

The Concept Plan (as proposed to be modified by Mod 8) requires future applications to demonstrate consistency with the Barangaroo South Design Guidelines (Design Guidelines). The Design Guidelines provide an integrated performance framework in which to consider each development application on its merits. A key feature of this framework is to facilitate innovation and creativity through enabling alternative design solutions that can demonstrate achievement of the relevant performance criteria or vision and principles.

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

Section 2.0 Vision and Principles

The proposed development is consistent with the Vision and Principles for Barangaroo South in that it:

- supports and services the One Sydney Harbour Buildings that will achieve a built form that is consistent with the vision and principles for the site;
- provides for pedestrian permeability through the blocks, including part of Barton Street and Barangaroo Avenue as well as a pedestrian link between Blocks 4A and 4B; and

- provides open space within and surrounding the development blocks as identified within the Concept Plan (as proposed to be modified).

Section 3.0 Key Elements and Urban Structure

The proposed development provides the key elements and urban structure identified in Section 3 in that:

- It will support land uses and a built form that reflects the key elements and urban structure;
- It will provide publically accessible landscaped open space located to the north of development blocks 4A and 4B in an interim capacity until the final landscaped open space is provided;
- It will contribute to the movement network through the site attributed to the interim and permanent provision roads, including Barton Street and part of Barangaroo Avenue. Where interim roads are proposed, they are consistent with the intended final alignment of roads contemplated under the Barangaroo Design Guidelines. The intended road alignment will support the City's existing road layout and also provide access from the CBD to the harbour front; and
- It will support the provision of Key Worker Housing within Residential Building R5 adjacent to Hickson Road.

Section 4.0 Open Space Guidelines

Table 5 provides an assessment of the proposal against the performance criteria and development solutions for Barangaroo South in Section 4 of the Design Guidelines.

Table 5 – Consistency with Built Form Guidelines

Performance Criteria	Design Solution	Performance
4.1 General		
To provide an integrated public open space and public domain network that includes: - a continuous pedestrian oriented foreshore promenade - physical and visual connection between Hickson Park, Wulugul Walk and the adjoining Central Barangaroo to provide public access and view corridors - an internal street system that - defines development blocks - provides easy flow of people and vehicles - acts as a comfortable stage for activity and human interaction - creates a distinctive address for each building	DS1 - Development occurs generally in accordance with <i>Urban structure</i> Figure.	✓ (note that permanent public domain will be provided under a separate DA)
To create an attractive, safe and comfortable public domain that: - creates a unique and cohesive identity for Barangaroo South - is consistent with the role of Barangaroo South as a key part of the CBD	DS2 - Applications for public domain works demonstrate the achievement of this performance criteria	✓ (note that permanent public domain will be provided under a separate DA)

Performance Criteria	Design Solution	Performance
4.2 Open Space Network		
To create a network of high quality, publicly accessible open spaces that: a. caters for a variety of activities, including active recreation, passive recreation, informal gathering and social interaction, relaxing and organised events b. provides continuous, publicly accessible open space along the site's harbour foreshore that connects with adjoining open space in Barangaroo Central and King Street Wharf c. incorporates high quality landscaping d. enhances the vibrancy of the precinct, including during the night-time, and consolidates its role as a major CBD destination through the provision of spaces that may cater for a range of different types and sizes of events e. is legible and enables people to readily perceive and understand the character of each space, its intended use and its relationship to other spaces within the network	DS1 - Open space is provided generally in accordance with the <i>Open space network</i> Figure and the <i>Open space network characteristics</i> table within the Design Guidelines.	✓ (note that permanent public domain will be provided under a separate DA)
4.3 Street Network		
To create an integrated network of publicly accessible streets that: a. has a range of vibrant and active multi-use spaces that cater for people movement, gathering and interaction b. prioritises pedestrian movement over vehicular access c. provides a strong pedestrian connection to the CBD and to Barangaroo Reserve and Barangaroo Central d. ensures pedestrian movement throughout the precinct is clear and simple e. ensures pedestrians can move north-south within commercial buildings f. has a limited number of vehicle access streets g. caters for cyclist movement	DS1 - Streets are provided generally in accordance with <i>Street characteristics</i> table, <i>Pedestrian and cyclist network</i> figure and <i>Street network</i> figure within the Design Guidelines. DS2 - Apart from Watermans Quay and Barton Street, all other east-west streets are not open to vehicles. Note that Waterman's Quay and the southern portion of Barangaroo Avenue will be provided as part of a separate application. DS3 - Major pedestrian routes connect seamlessly with Barangaroo Avenue and Shelley Street to the south and Barangaroo Central to the north. DS4 - A continuous public walkway traverses the entire waterfront edge of the site. DS6 - All spaces in the public domain are designed to provide adequate and clear paths of travel. Note that the public domain proposed in this application is intended to be an interim solution, which will be replaced with a subsequent public domain application.	✓

Open Space Characteristics

The proposed interim public domain and site infrastructure is consistent with the desired future characteristics for open space, including Hickson Park, as set out in the Concept Plan.

The proposed interim public domain and landscaped open space will allow areas of the DA Site to be accessed by the public during the construction of the Stage 1B One Sydney Harbour Buildings and promote pedestrian movement through the precinct when those parts of the site are not otherwise needed for construction purposes.

Street Characteristics

The proposed development includes provision of parts of Barangaroo Avenue and Barton Street. As shown in **Figure 7**, proposed paving and landscape planting within Barangaroo Avenue will include elements of paving and planting that may be integrated into a future development application for permanent public domain.

Where interim solutions are proposed by this application, the alignment of the proposed roads will be consistent with the permanent roads envisaged under the Concept Plan (as proposed to be modified).

4.2.3 Future Application Requirements

Part C of the Instrument of Approval contains a number of requirements for applications made pursuant to the Concept Plan. **Table 6** below demonstrates that the proposal is consistent with the relevant requirements, as proposed under Concept Plan (Mod 8).

Table 6 – Consistency with the relevant Conditions in Part C of the Concept Approval (as proposed to be modified)

Part C – Future Applications	Comment	Consistency
Condition C2 – Design Excellence	The One Sydney Harbour buildings were the subject of a design competition. Whilst the basement is a separate planning application from the towers, its design is informed by and supports the outcome of the competition. In particular the above ground elements, such as the basement entry, was the result of the design competition. Accordingly the development will achieve design excellence as appropriate for a basement.	✓
Condition C4 – Car Parking	The proposed development does not seek approval for car parking but will provide the areas to support separate applications for that parking. Accordingly the basement has been sized to enable the provision of parking consistent with Condition C4.	✓
Condition C7 – Pedestrian Linkages, Activation of Streets and Public Domain	The proposed development will assist with providing additional permeability through the site consistent with the Concept Plan.	✓

4.2.4 Statement of Commitments

Plans and Strategies

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 first relevant project application at the Barangaroo South site, being the Commercial Building C4 Project Application.

Car and Bicycle Parking

Commitments 47 – 50 relate to car and bicycle parking and provision of appropriate end of trip facilities. The proposed development does not seek approval for car or bicycle parking but will provide the areas to support separate applications for that parking. Accordingly the basement has been sized to enable the provision of parking consistent with the rates set out in the Commitments.

Commitment 51 relates to servicing and loading facilities being provided in accordance with the City of Sydney Council rates. The servicing and loading facilities provided within the basement have been design in accordance with this Commitment, as detailed in the TMAP at **Appendix E**.

Environmentally Sustainable Development

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

4.3 Land Use and GFA

The Stage 1B Basement will support future use of the separately proposed buildings within the DA Site, known as R4A, R4B and R5. These buildings will be collectively known as the One Sydney Harbour development. The land use is defined as *shop top housing* as they will incorporate residential components above retail GFA at ground level.

The Stage 1B Basement will provide 35m² of GFA in addition to those proposed as part of the One Sydney Harbour buildings. This GFA is associated with the loading dock office that predominantly services the retail uses in Blocks 4A and 4B but will also service the residential uses within those development blocks as well.

A summary of the total approved/proposed GFAs by Concept Plan block, land use and precinct are provided in **Tables 7** and **8**. The allowable GFA figures are based on those proposed under Concept Plan (Mod 8). Proposed GFA is in *italics*.

Table 7 – Summary of approved/proposed GFA by Concept Plan block

Block	Building	Approved/Proposed GFA (m ²)	Max Allowable GFA (m ²) under the proposed 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	47,665	86,579	110
	Residential Building R4B	38,769		
	<i>Stage 1B Basement</i>	35		
	Total	86,469*		
Block 4B	Residential Building R5	19,106	19,558	452
	Total	19,106*		
Block X	Residential Building R8	9,694	18,908	0
	Residential Building R9	8,410		
	Building R1	804		
	Total	18,908		

Block	Building	Approved/Proposed GFA (m ²)	Max Allowable GFA (m ²) under the proposed Concept Plan (Mod 8)	Residual GFA
Block Y	Crown Sydney Hotel Resort	77,500	77,500	0
	Total	77,500		

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

Table 8 – 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	432	-	-	-	47,233*
Residential Building R4B	467	-	-	-	38,302*
Residential Building R5	907	-	-	-	18,165*
Total	19,093	301,587		1,544	120,121

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

4.4 Open Space and Public Access

A Landscape Design Statement has been prepared by Grant Associates and is provided as **Appendix C**. The statement outlines the principles, strategies and public domain proposals that have been developed by the project team for the interim public domain and landscaped open space at ground level.

Noting that the final public domain solution for the majority of the site will be proposed as part of a future application, the interim public domain will provide high quality open spaces within Stage 1B where possible, while construction of buildings proceeds across the site.

The design approach is a practical response to the need to create a flexible interim public domain and landscaped open space in areas not utilised for construction purposes that can be combined with more permanent solutions as they are proposed by subsequent DAs.

The proposal has been designed to integrate with the surrounding public domain levels. At the interface of the proposed works with developed areas within Stage 1A, the ground level will match the higher RL established for the Stage 1A public domain and will be appropriately graded to ensure access and functionality of the open spaces. The integration of levels between the site and the parts of Hickson Road adjacent to Stage 1B will be subject to design development. The design will depend on the levels of Hickson Road at the time construction works will be carried out.

Interim paving has been provided as part of the Interim Public Domain and Open Space scheme to enable accessible paths from the basement exits to the adjoining roads. The use of a common basement has enabled a single vehicular basement entry / exit to be located off Watermans Quay and therefore minimises the potential for pedestrian / vehicular conflicts.

The proposed interim public domain has been envisaged to mitigate the temporary impacts of the development while construction proceeds, ahead of the making of a separate permanent Stage 1B Public Domain Development Application. The proposed interim public domain will allow public to access the site before the permanent public domain is provided.

Pedestrian entry and exit points to the basement will be through the future building cores and will therefore be safe, accessible and prioritised for pedestrians. Pedestrian access to the basement's vehicular entrance will be restricted.

4.5 Transport, Traffic, Car Parking and Accessibility

A Transport Management and Accessibility Plan (TMAP) has been prepared by ARUP and is included at **Appendix E**. A summary of the assessment and proposed mitigation measures are provided below.

4.5.1 Construction Traffic

Assessment

ARUP's report provides a detailed summary of the anticipated construction traffic movements associated with each project in the Barangaroo precinct. Access for construction vehicles to the Barangaroo Stage 1B site will be via Hickson Road at the existing gatehouse, approximately 350m north of the Sussex Street / Napoleon Street intersection. This site access will be utilised until January 2019, after which time it will move approximately 25m south along Hickson Road.

For the purposes of the assessment, the number of construction vehicles generated by 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 also been forecasted.

Further, as the proposed construction timeframe for the Stage 1B Basement will extend into the period of the occupation of the Barangaroo South Stage 1A development and the opening of Barangaroo Point, the operational movements generated by those developments has also been considered. These anticipated operational traffic movements have been added to the construction traffic movements to estimate the peak total additional traffic movements that are likely to be experienced while the proposed Stage 1B Basement is under construction.

The data indicates that the peak cumulative traffic activity is anticipated to occur between December 2019 and December 2020, with 427 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 construction 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 AM 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

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 LinSig analysis for these intersections forecast minimal changes in their operation as a result of the construction of the Stage 1B development, when compared with the existing scenario (i.e. operational and construction traffic from other approved and constructed projects within the Barangaroo precinct).

Recommended Mitigation Measures

ARUP has put forward a range of mitigation measures that will be implemented on the project to minimise the impact of construction vehicle movements on the operation of the local road network and peak hour traffic in particular (refer to **Appendix E**). These include:

- 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;
- staging and coordinating truck movements to prevent trucks circulating in CBD streets and to ensure traffic continues to be generated outside of the normal commuter peak period; and
- implementing other traffic control measures such as limiting the size of trucks accessing the site and employing traffic management personnel to control truck movements and manage traffic safety conflicts.

4.5.2 Operational Traffic

Assessment

The proposed development only seeks approval for the construction of basement slabs for future parking areas to support the GFA envisaged under Concept Plan (Mod 8), calculated based on the proposed GFA in accordance with the car parking rates under the approved Concept Plan. Therefore the number and use of parking spaces within the basement will be the subject of the future One Sydney Harbour Buildings' SSD applications.

Despite this, Arup's assessment has considered the likely impact of cars associated with the use of the spaces provided for within the Stage 1B Basement

on the surrounding roads and intersections. This operational traffic assessment has been calculated based on the total number of dwellings provided within buildings R4A, R4B and R5. It should be noted that trip generation is not synonymous with the amount of parking bays provided and is more closely linked to occupancy and vehicle ownership.

The proposed development will be consistent with the Barangaroo Integrated Transport Plan.

Future Road Operations and Traffic Generation

The operation of the road network following the development of approved and currently proposed projects within the Barangaroo precinct (including Central Barangaroo and the Barangaroo Point) 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.

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 for the site, the Stage 1B precinct (including the proposed basement and One Sydney Harbour Buildings) would generate 109 vehicle movements in the AM peak hour and 70 vehicle movements in the PM peak hour.

The anticipated trip generation associated with the proposed developments within Stage 1B is shown in **Table 9**. It is noted that this information is indicative and will be confirmed within the subsequent or concurrent applications for the peripheral Stage 1B buildings.

Table 9 – Stage 1B Traffic Generation

Land Use	Variable	Variable Number	AM Peak Hour (8am – 9am)				PM Peak Hour (5pm – 6pm)			
			Trip rate	No. of trips	In	Out	Trip rate	No. of trips	In	Out
Residential	Dwelling	775	0.14	108	22	86	0.09	69	55	14
Retail	Car space	3	0.4	1	1	0	0.4	1	0	1
Sub total				109	23	86		70	55	15

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

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

Based upon the predicted traffic movements outlined in **Table 9** a corridor traffic model was developed to assess the impact of the proposed development within Stage 1B on the local road network. The results of the intersection modelling are provided in **Table 10**.

Table 10 – Intersection Modelling Results

Peak	Intersection	LOS	DOS	AVD (sec)
AM	Sussex Street / Erskine Street	B	0.60	27
	Hickson Road / Napoleon Street	E	1.00	69
	Kent Street / Margaret Street	B	0.77	26
	Hickson Road / Watermans Quay	B	0.62	16
PM	Sussex Street / Erskine Street	D	0.97	55
	Hickson Road / Napoleon Street	D	0.92	43
	Kent Street / Margaret Street	B	0.75	23
	Hickson Road / Watermans Quay	A	0.47	11

LOS: Level of Service/ DOS: Degree of Saturation/ AVD: Average Vehicle Delay

The traffic analysis indicates the transport network in the Barangaroo precinct could adequately accommodate the increased movements arising from the development of the site.

A potential issue identified in the modelling relates to the forecast queue length at the northern approach of the Hickson Road / Sussex Street intersection, which is forecast to spill back to the Hickson Road / Watermans Quay intersection. It is recognised however 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. As noted in **Appendix E**, this is an existing issue and is not caused by the proposed development.

The operation of the future signalised intersections on Hickson Road will be dependent on the operating conditions of intersections further downstream on Sussex Street. Essentially they will act as 'slave' in the Sussex Street road network, with intersections at King Street and Market Street acting as the 'masters'.

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

Pedestrian and Cycle and Public Transport Connections

Key pedestrian, cycle and public transportation routes are available from the DA Site to other destinations around Sydney. These routes are indicated within **Appendix E**. No change to these routes is proposed as part of the proposed development.

Pedestrian routes are provided within Barangaroo South as illustrated in **Figure 8**.

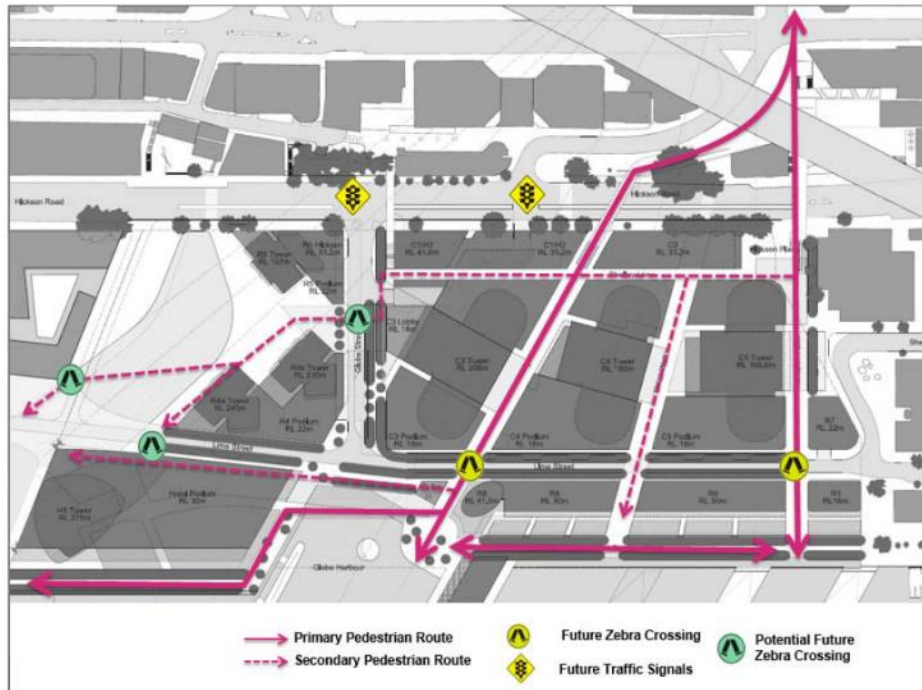


Figure 8 – Internal pedestrian and cycle routes Loading Dock

A loading dock is included to serve the future One Sydney Harbour Buildings. The loading dock has been designed in accordance with Australian Standards AS2890.2 – 2002. Four loading bays are provided to provide access to garbage trucks, as well as delivery vans and couriers and removalist vehicles.

To confirm vehicle manoeuvrability within the proposed basement, swept path analysis was undertaken by Arup. This analysis, which is presented in Appendix B of **Appendix E**, demonstrates that the design of the loading dock adequately addresses the requirements outlined in Australian Standards 2890.2-2002, off street commercial vehicle facilities.

Vehicle access to the proposed basement will be via a single driveway towards the western end of Watermans Quay. Traffic will access this driveway via Hickson Road and Sussex Street. Before the construction of the basement is complete, the Hickson Road/Napoleon Street/Sussex Street intersection will be signalised.

Mitigation Measures

A Travel Demand Management Plan will be implemented to encourage building occupants to use of sustainable modes of transport that are less energy intensive car, taxi or air travel. ARUP has recommended the following physical and management measures be considered for implementation as part of the One Sydney Harbour Building DAs:

- providing marketing and promotional material around the sustainable travel alternatives available to encourage residents to adopt the travel plan measures;
- accommodating 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 within the precinct to encourage working from home.

4.6 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 proposed development (**Appendix F**). The AQIA has considered all construction activities on the Barangaroo site, including works that will occur concurrently on Stage 1B. An overview of the AQIA is provided below.

Proximity to Sensitive Receptors

The sensitive receptors in the proximity of the site are predominately located along the western side of Hickson Road. The closest receptors are located approximately 25 metres to the east, across 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 interest, as well as impact assessment criteria, consistent with those applied to other projects at Barangaroo South. The dispersion modelling has also remained consistent with recent 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

- Crown Sydney Resort Hotel construction;
- Remediation of Block 5;
- Rock Excavation of the basement for Building R5;
- C1/H2 above ground construction;
- Hickson Road Remediation Works;
- Operation of the soil stockpile area; and
- Operation of the on-site water treatment plant.

The modelling has identified exceedances of the established criteria relating to NO₂ during the one hour period, PM₁₀ during both the one hour and 24 hour periods, and TSP.

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. AECOM have advised that this 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 is expected to account for the predicted exceedance of short term NO₂ and PM₁₀ concentrations.

Recommended Mitigation Measures

An extensive reactive air quality management plan is implemented at Barangaroo South. This includes ambient pollution monitoring linked to real-time warnings and actions to reduce dust levels when they are at risk of exceeding acceptable air pollution levels. The system will continue to operate during 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.

AECOM has outlined recommended air quality management and mitigation measures to be implemented during the development of Stage 1B Basement (refer to **Appendix F**) covered by the Air Quality and Odour Management Sub-Plan as part of the Construction Framework Environmental Management Plan. These include:

- Mains power will be used where available and suitable.
- A dust and meteorological monitoring program is currently in operation for the construction of Barangaroo South. This will be continued throughout the construction process.
- Vehicle engines will be turned off while parked on site.
- Vehicular access will be confined to designated access roads. Haul road lengths will be minimised.
- Equipment, plant and machinery will be appropriately tuned, modified or maintained to minimise visible smoke and emissions.
- If odorous material is encountered, control measures, such as covering exposed soil or using odour suppressants, would be used.
- Site speed limits will be implemented.
- Exposed areas will be minimised as much as practical.
- Loads will be covered during transport.
- Good housekeeping practices will be implemented to minimise dust on hardstand areas.
- Spills will be immediately cleaned up.
- The complaints management system will be maintained.
- Work practices will be adjusted (as required) based on wind observations and real time monitoring results.
- Water sprays and/or surfactants will be used wherever and whenever necessary.
- Windbreak barriers will be erected at the site boundary.
- Exposed surfaces and roads will be watered as required.

These measures are intended to reduce risks to human health and nuisance impacts. Ongoing monitoring works will be undertaken for the duration of the Stage 1B Basement works consistent with the requirements of Environment Protection Licence 13336, which will be varied following the granting of project approval for the proposed development works.

4.7 Soil and Water

A letter addressing Acid Sulphate Soils (ASS) has been prepared by AECOM, which is provided as **Appendix H**. An Infrastructure Servicing and Stormwater Management Plan has been prepared by Cardno, this is provided as **Appendix I**.

Assessment

Soil

The majority of the bulk earthworks required for the construction of the proposed basement have been approved. Excavation to a maximum indicative depth of RL - 16.5m was approved as part of SSD 5897.

Excavation is required to a depth that will allow for the construction of the proposed Stage 1B Basement. Subsequently a letter has been prepared by AECOM to confirm that if ASS or Potential ASS (PASS) are discovered the ASS or PASS can be managed in accordance with the requirements of the ASS management plan for Block 4.

Water Management

The proposed basement will be included in the Barangaroo South Integrated Water Management Plan as it will form part of the integrated water management system implemented at the site. This system takes into account all facets of the water cycle and will achieve a positive water balance by exporting recycled water from the site in greater quantity than potable water is imported.

Figure 9 is a flow diagram that describes the operation of the Integrated Water Management system.

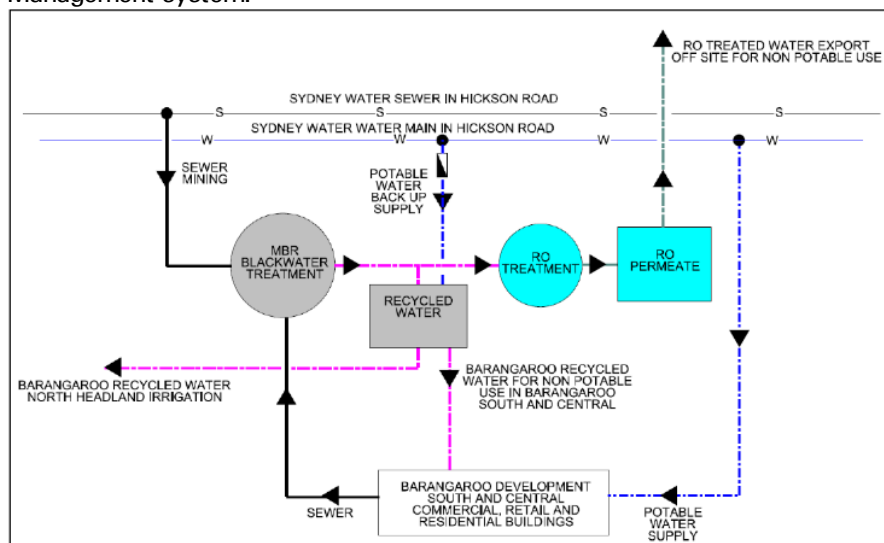


Figure 9 – The Barangaroo South Integrated Water Management System

Water Licensing

As the excavation works for the basement construction will incorporate a temporary groundwater interception scheme, a licence under the *Water Act 1912* will be required. The licence would be obtained for the excavation and dewatering works.

Stormwater Management

Key changes to overland flow paths and anticipated effects on existing stormwater infrastructure as a result of the development of Stage 1B has been outlined by Cardno in **Appendix I**.

The proposed Basement structure level and interim public domain has been designed to achieve a building FFL of 3.3-3.5, consistent with the Sea Level Rise strategy adopted for Stage 1A (see Section 4.20).

The existing stormwater pipes for the external catchment that traverse the DA Site are to be relocated due to the conflict with the Stage 1B basement footprint.

It is proposed to divert overland flow that currently traverses the eastern site boundary from Hickson Road into an upgraded pit and pipe network within Hickson Road and through the site. No changes to passage of overland flow to the north of the Stage 1B site are proposed.

The new Stage 1B internal stormwater drainage network will also collect flow from the proposed One Sydney Harbour Buildings (R4A, R4B and R5), public domain area, Barangaroo Avenue and Watermans Quay. This network will ultimately connect to the existing 1800mm diameter pipe located under the proposed Watermans Quay, between Stages 1A and 1B and discharge outlet into Darling Harbour.

Treatable flows (nominally up to a 3 month ARI event, subject to further design) will be diverted for treatment to tree pits, roof gardens (incorporating a bio-retention system), Gross Pollutant Traps (GPTs) and proprietary tertiary treatment measures such as cartridge filtration.

Surface Water

As noted by Cardno in **Appendix I**, the existing condition of the Stage 1B site is such that it is impervious and consists of an asphalt surface.

The Stage 1B Basement works will consist of interim landscaping measures such as turf, the majority of which will sit on top of the proposed basement structure. These interim landscaping measures will ultimately be replaced by a park and areas of tree planting (subject to a separate DA).

The proposed interim and future permanent landscaping measures (subject to a separate DA), along with the permanent landscaping measures that will be subject of a future DA will reduce the impervious fraction of the site compared to the existing scenario and thus improve surface hydrology.

Groundwater

As the majority of the excavation works that are required for the construction of the proposed basement will have been undertaken as approved within SSD 5897, no major impact on groundwater quality is anticipated as part of the proposed works.

Appendix I notes that the proposed works under SSD 6960 are considered unlikely to have an impact on groundwater quality either during or after construction. The preceding remediation works are considered likely to have a positive impact on groundwater quality due to the removal of contaminated material that is currently impacting upon the quality of groundwater within the site.

Marine Ecology

As noted in the Soil and Water Impact Assessment Report that accompanied SSD 5897 (Worley Parsons, 2013), there is little potential for harm to aquatic vegetation due to construction activities as no aquatic vegetation exists in the vicinity of the Stage 1B site (the nearest being located at Balmain).

Mitigation Measures

- Water Sensitive Urban Design (WSUD) measures as described above will be implemented in the development.

- A detailed Water and Stormwater Management Plan that addresses water quality and water monitoring requirements for the duration of construction works associated with the development of Stage 1B will be prepared. This will incorporate measures such as:
 - Criteria for nominating areas and different sources of site water as clean or contaminated;
 - Water monitoring protocols and decision criteria for whether site water will be directed to stormwater, a waste water treatment plant, to sewer or to a liquid waste facility;
 - Water discharge criteria and monitoring frequency for parameters listed in the 'Water Quality Monitoring Requirements' document prepared as part of the Environmental Assessment;
 - An initial more intensive monitoring program for sediment basins, stormwater discharges, reused water and ambient waters to help determine potential water quality impacts and ongoing monitoring protocols;
 - Specific discharge and monitoring points for on-site generated water including collected groundwater seepage into excavations, sediment basins for clean or contaminated areas, discharge points to stormwater drains, and confirmation of ambient monitoring locations in Darling Harbour and Johnstons Bay;
 - Suitability of chosen reference site(s) based on turbidity data from a proposed monitoring program;
 - Consideration of tidal currents, circulation patterns in Darling Harbour and the position of stormwater discharge points with regard to the positioning of monitoring location(s) outside the turbidity (silt) curtain. The location will not be a fixed point so that it can account for potential plume movement under different conditions. Alternatively, more than one location may be needed; and
 - The development of criteria for wastewater discharges that would trigger a review of water management systems. These criteria will trigger operational responses that help in ensuring licence conditions are not exceeded.

4.8 Earthworks

The majority of the earthworks associated with the Stage 1B Basement have been approved as SD 5897. Further excavation is proposed to facilitate the completion of the proposed basement and piling to support the One Sydney Harbour residential buildings. Earthworks that are required as part of the Stage 1B Basement application will be undertaken in line with requirements of the SSD 5897 approval.

4.9 Sediment, Erosion and Dust

An Infrastructure Servicing and Stormwater Management Plan has been prepared by Cardno, this is provided as **Appendix I**. This report is summarised in Section 4.7 and provides details of the erosion and sediment control measures that will be used on the DA Site. An Air Quality Impact Assessment (AQIA) has been prepared by AECOM and is provided as **Appendix F**. This AQIA includes and assessment of PM₁₀ and its findings are summarised in Section 4.6.

4.10 Waste Management

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

4.10.1 Operational Waste

Waste volumes for the future proposed One Sydney Harbour Buildings has been estimated in order to determine the waste storage area and waste storage bins which will be required within the Stage 1B Basement (see Section 3.10).

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 future proposed One Sydney Harbour buildings.

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 Stage 1B One Sydney Harbour Buildings 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 retail tenants will be collected in dedicated 240L organic waste bins and transferred to the central waste storage room in basement level 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.

4.10.2 Construction Waste

Construction waste will be managed as per the project's Green Star objective that at least 80% of waste is recycled or reused through use of recycled building materials and recycling of construction waste.

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.

A detailed Construction Waste Management Plan (CWMP) will be prepared 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.

4.11 Noise and Vibration

A Noise and Vibration Impact Assessment has been prepared by Wilkinson Murray, and is provided in **Appendix K**. The outcomes of the Noise and Vibration Impact Assessment report are summarised below.

4.11.1 Representative Ambient Noise and Background Noise

The Noise and Vibration Assessment considers five (5) commercial receivers and eight (8) residential receivers as well as three (3) heritage receivers located at Millers Point, Barangaroo, Darling Island, Pyrmont, King Street Wharf, and Balmain East.

In order to quantify the existing noise environment (Rated Background Level (RBL) and average noise over each 15 minute period ($LA_{eq, 15\text{-min}}$) were determined through long-term ambient noise level monitoring at eight (8) locations surrounding the site, 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.

4.11.2 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 daytime construction noise goal is that the $LA_{eq, 15\text{min}}$ noise level should not exceed the background noise by more than 13dBA during Monday to Friday 7.00am to 6.00pm, and Saturday 8.00am to 1.00pm.

Outside the standard hours, the criterion would be background plus 5dBA, building off the established background noise level.

The following construction noise management levels $LA_{eq, 15\text{ min}}$ apply to other receivers during the day:

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

The guideline also identifies that noise above $LA_{eq, 15\text{ min}}$ 75dBA is likely to result in strong community reaction to noise, and recommends the proponent consider other feasible ways to reduce noise. If this is not possible it is recommended that, the proponent must communicate with affected residents, including describing the duration and noise level of the works and any respite periods to impacted sensitive receivers.

Table 11 sets out the background noise levels monitored for each receiver and the resulting construction noise management level for each receiver.

Table 11 – 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	55	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	55*				
Parks/outdoor areas	65				

* The external NML of 55dBA is based on a 10dB reduction through an open window.

4.11.3 Noise Generation Activities

The proposed construction hours are between 7.00am and 7.00pm Monday – Friday and between 7.00am and 5.00pm on Saturdays, which extend outside the standard daytime hours of the EPA's *Interim Construction Noise Guideline*.

The following work and activities are proposed to occur from time to time outside of these hours:

- 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).

4.11.4 Construction Noise Predictions

Assessment of likely construction noise at surrounding commercial and residential receivers have been assessed for the Stage 1B Basement and in a cumulative sense for approved and proposed works being carried out concurrently.

4.11.5 Stage 1B Basement Works

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

- In Scenario A exceedances of the Saturday Noise Management Level of up to 12 dB(A) are predicted at the Hickson Road Residences;
- In Scenario B exceedances of the Saturday Noise Management Level of up to 13 dB(A) are predicted at the Hickson Road Residences;
- In Scenario C exceedances of the Saturday Noise Management Level of up to 13 dB(A) are predicted at the Hickson Road Residences; and

- In Scenario D exceedances of the Saturday Noise Management Level of up to 5 dB(A) are predicted at the Hickson Road Residences.

Lesser exceedances are also predicted at the High Street Residences and at the R8 Residences during Scenarios A, B and E, and at the High Street Apartments only during Scenario C. A full account of the modelling results is available in

Appendix K

Generally, construction noise from the proposed Stage 1B Basement is not expected to generate excessive levels of construction noise at surrounding receivers. Exceedances of up to 5dBA are predicted at the nearest receptor (Hickson Road Residences) during normal weekday works. During works on Saturday, exceedances up to 13dBA are predicted to occur. These exceedances can be adequately mitigated via existing construction management processes. Proposed mitigation measures are outlined in Section 4.11.9.

Exceedance of internal noise objective in the KU Lance preschool is predicted to be not acoustically significant and unlikely to adversely impact upon the amenity of the occupants of the preschool.

Cumulative Noise Impact

When the Stage 1B Basement is being constructed alongside works to Buildings R4A and R4B exceedances of the Saturday Noise Management Limit of up to 10dB(A) are predicted at the Hickson Road Apartments, lesser exceedances are also anticipated at High Street Residences and at the R8 Residences. A marginal (1dB(A)) exceedance is also anticipated at the KU Lance preschool. This predicted exceedance occurs on a Saturday only, when the preschool is unlikely to be operating.

4.11.6 Vibration

Operation of vibratory rollers and rock breakers can generate ground vibration that has the potential to transmit to nearby buildings. **Appendix K** sets out safe working distances for relevant construction plant.

It is noted that due to the proximity of the DA Site to certain buildings, notably The Bond (Commercial) and 38 Hickson Road (Residential), there would be some risk of disturbance (Human Response) impacts if the impacts are not appropriately managed. This would be particularly so for the works undertaken in the eastern part of the site when rockbreaking activities occur. Accordingly mitigation measures to adequately address these potential impacts are proposed as outlined in Section 4.11.9.

4.11.7 Construction Traffic Noise

Morning peak flows are based on information provided by ARUP, contained within **Appendix E**. The maximum impact of traffic noise from Stage 1B is anticipated at approximately September 2019 whereby operational traffic from some of the Barangaroo South Projects and findings as per below:

- 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 0.8 dBA is predicted above operational 2021 traffic.

Traffic noise levels are therefore not predicted to exceed the 2dBA objective during the period of peak construction and operational traffic in August 2021.

4.11.8 Road Traffic Noise Assessment

ARUP presented operational traffic flows with respect to all three residential components within Stage 1B. A review of predictions indicates the following:

- overall operational traffic noise levels at residences on Hickson Road will increase to be 0.9 dBA once development is complete;
- When Stage 1B and all Barangaroo South construction traffic is included an increase of 1.1 dBA is predicted. Traffic noise levels are therefore not predicted to exceed the 2dBA objective due to construction and operational traffic in September 2019;
- The predicted changes in hourly peak hour flows are considered representative of the changes over a 15-hour daytime period.

4.11.9 Noise and Vibration Mitigation Measures

A Construction Noise and Vibration Management Sub Plan has been prepared by Lendlease for the Barangaroo site in its entirety. The specific noise and vibration control measures to be implemented for the proposed development will be incorporated into the Plan prior to works commencing. These are:

- 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;
- Notification of occupants adjacent to the site of when exceedances of the relevant criteria are predicted to occur;
- Smallest practicable size of vibratory roller should be used; and
- Vibration monitoring will be conducted in response to any vibration compliant or at the initial stage of Rock Excavation.

4.11.10 Conclusion

A noise assessment of the proposed construction activities indicates that exceedance of the noise management levels by up to 5dBA is expected at surrounding residential receivers during normal weekday construction. On Saturdays, exceedances of up to 13dBA 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. The adoption of the nominated mitigation measures and application of the procedures in the Project Noise and Vibration Management Sub Plan are aimed at working towards achieving the noise management levels established at surrounding receivers.

Construction traffic noise is determined as marginal. Site specific operational noise is envisaged to be complied with during detailed design phase.

4.12 Contamination

Works within the Stage 1B Remediation and Excavation 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 copy of the Overarching RAP has been provided as **Appendix L**.

In accordance with the Overarching RAP, a RAP was prepared by AECOM Australia Pty Ltd that related to the Block 4 (Stage 1B) Development Works (the Stage 1B RAP). The Stage 1B RAP (also provided in **Appendix L**) covers most of the site the subject of this SSD DA, as well as parts of Central Barangaroo and Hickson Rd. 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.

Remediation works specified within the Stage 1B RAP were approved as part of SSD 5897 in November 2014. Works approved under SSD 5897 include the construction of a perimeter retention wall around the excavated Stage 1B remediation area and excavation of contaminated material and natural materials to a nominal indicative depth of RL -16.5 m within this perimeter retention wall. The location of the approved perimeter retention wall left a gap separating it from the previously constructed 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 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 Stage 1B Remediation Area in accordance with the Stage 1B RAP (provided in **Appendix L**). In relation to the Block 4 Development Remediation Works Area that was the subject of the remediation works described in SSD 5897 (i.e. the Stage 1B Remediation Area), the Site Auditor concludes that:

- The nature and extent of contamination has been appropriately determined.
- The works set out in 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 works approved under SSD 5897 to verify the DA Site is suitable for the proposed uses as envisaged under the approved Concept Plan.

Works Outside the Stage 1B Remediation Area

Certain areas of the site within Barangaroo are located outside the Stage 1B Remediation area. These areas include:

- The ORWN Services zone;
- The Block 4 Services Zone to the south of the Stage 1B Remediation and Excavation Area;
- The ORWN interim public domain (roadway); and
- Temporary works to Barton Street.

Works in these areas are limited to services and interim works. These works are described below:

- Construction of services within an area that is approximately 30 m wide and is bounded by:
 - the proposed Stage 1B basement retention wall and Block 4 Services Zone to the east;
 - the existing Stage 1A basement retention wall to the south;
 - the potential future Crown Sydney Hotel Resort basement retention wall to the north (which will be the subject of a separate Development Application approval);

- excavations within the ORWN Services Zone may extend to a depth of approximately 6.0 m below ground level (bgl).
- Construction of services within an area that is approximately 18 m wide and is bounded by:
 - the existing Stage 1A basement retention wall to the south;
 - the proposed Stage 1B basement retention wall to the north;
 - the Hickson Road Infrastructure and Services Zone to the east;
 - the ORWN Services Zone to the west;
 - excavations within the Block 4 Services Zone will extend to a depth of less than approximately 2.7 m bgl (as required for the provision of services from Stage 1A to the proposed Stage 1B basement).
- Construction of the proposed ORWN Interim Public Domain (roadway):
 - in the area outside and immediately to the west of the Stage 1B basement;
 - either above the basement proposed as part of the Crown Sydney Hotel Resort development or constructed at grade;
 - excavations within the ORWN Interim Public Domain may extend to a depth of approximately 0.5 m bgl (involving removal of the existing concrete slab).
- Temporary works to Barton Street will be undertaken in accordance with the Remediation Action Plan and Human Health Environmental Risk Assessment that was prepared for the construction of the Crown Sydney Hotel Resort. These documents are provided in **Appendix L**.

A letter has been provided by AECOM, which is provided as **Appendix L**, that confirms that these three specified areas located outside of the Stage 1B Remediation Area are unlikely to be contaminated in such a way as to warrant remediation in relation to the continuation of the existing land use and the proposed excavation for construction and maintenance of services. AECOM therefore concludes that these areas are suitable for these specified uses and that approval can therefore be granted in accordance with SEPP 55 for these works.

Further contamination investigations and remediation (if required), which will be subject to a separate RAP(s), will be carried out in these locations as part of obtaining approvals for the future intended land uses in these areas at the appropriate time.

Works are also proposed within the Hickson Road Infrastructure and Services Zone, including:

- Installation of underground service connections associated with the Stage 1B Basement and the Crown Sydney Hotel Resort;
- Minor road works required to reinstate the existing public road and transition from the existing public road to new roads to be constructed within the footprint of the proposed Stage 1B basement;
- excavations within the Hickson Road Infrastructure and Services Zone may extend to a depth of approximately 2.0 m below ground level (bgl);

Part of the Hickson Road Infrastructure and Services Zone is located within the EPA Declaration Area and is known to contain contamination from the gas works that historically occupied the site. Remediation work is separately proposed in this area under SSD 6617. Consent is sought for the following interim remediation works, which will be carried out only if the works associated with SSD 6617 have not been approved and completed prior to the commencement of works in the Hickson Road Infrastructure and Services Zone included in this DA:

- the base of excavations within the vicinity of the historic gasworks infrastructure be lined with a High Density Polyethylene (HDPE) liner;
- suitable, validated fill material be used to backfill around the stormwater pipes to the required finished level. The suitable fill material would need to be compacted appropriately to ensure the integrity of the below ground services and underlying HDPE liner;
- an unexpected finds protocol be implemented – the unexpected finds protocol is detailed in AECOM’s letter in **Appendix L**; and
- a Validation Report should be prepared for the remediation works to be undertaken within the contaminated area in accordance with the Stage 1B RAP. The Validation Report should be submitted to the NSW EPA Accredited Site Auditor for approval.

These interim remediation works – that may be completed under this Stage 1B Basement DA if necessary - are sufficient to make the contaminated part of the Hickson Road Infrastructure and Services Zone (i.e. the part that is subject of the EPA Declaration) suitable for the proposed use of the area under this DA (ie. construction and maintenance of the proposed services and road works).

4.13 Hazard and Risk

Potential for a diesel 5,000L storage tank is provided for within the Stage 1B Basement. The tank would be used to fuel backup generators to supply emergency electricity to the Stage 1B One Sydney Harbour Buildings.

State Environmental Planning Policy Number 33 – Hazardous or Offensive Development (SEPP 33) relates to developments that could be hazardous.

Diesel (or diesel oil or diesel fuel or any other diesel product) does not meet the definition of a Class 3 combustible liquid due to the fact that the flash point is more than 60 degrees celsius and the substance is not offered for transport or storage at a temperature above its flash point.

The NSW Government guideline *Applying SEPP 33*, requires a Preliminary Hazard Assessment (PHA) for the storage of diesel if it is to be stored alongside other flammable liquids. No other flammable liquids will be stored within the proposed basement. Therefore the stored diesel will not be classified as a Dangerous Good and PHA.

A diesel filling procedure will be developed for the Stage 1B Basement, if diesel fuel storage is to be provided. This will be prepared prior to the issue of a construction certificate, subject to relevant conditions of consent.

4.14 Health Impacts

A Human Health and Ecological Risk Assessment (HHERA) report was prepared by AECOM for the Stage 1B Remediation and Excavation works (SSD 5897), this is provided as **Appendix M**. The proposed development would be carried out following the removal of contaminated materials from the majority of the site under the SSD 5897 consent.

Works proposed within the services zone could have the potential for health impact upon nearby residents, workers and the general public if contaminated materials, dust or fumes generated on-site are inhaled. The risk detrimental effects on human health as a result of works within the Infrastructure and Services Zone is addressed within **Appendix L**.

As noted in Section 3.1, the majority of the excavation associated with the construction of the Stage 1B Basement, including all excavation and treatment of contaminated areas within the site, will have been undertaken in accordance with SSD 5897.

As a result of this, by the time that excavation associated with the proposed works commences, existing contamination will have been remediated and on site mitigation measures will be in place to prevent excavation associated with SSD 5897 from affecting the health of nearby residents, workers and the general public.

Excavation works associated with the proposed works will be carried out following the completion of works approved as SSD 5897. As such any contaminated materials present within the Stage 1B Remediation and Excavation Area will have been removed prior to the commencement of works.

AECOM have completed a supplementary assessment of the works proposed to be carried out within the Services Zones (as outlined in Section 3). AECOM's report is provided as **Appendix L1**.

The following mitigation measures are proposed to mitigate the risks to human health of carrying out works in these areas:

- excavations will be visually inspected by a qualified environmental engineer/scientist;
- if the subsurface soils encountered during the excavation are significantly different to those described in Section 7.0 (i.e. based on visual and olfactory observations), validation soil sampling of the excavation base and walls will be conducted. If required, the validation soil samples will be collected as follows:
 - wall validation samples will be collected at 10 m lineal metre intervals in material identified to be the most impacted (either by visual observations of field screening of samples using a Photoionisation Detector);
 - base validation samples will be collected at 10 m lineal metres along the base of the trench;
 - the soil analytical results will be compared to the ASC NEPM (NEPC, 2013) soil criteria for commercial/industrial land use. If these criteria are exceeded a site specific risk assessment could be undertaken to assess the suitability of the material to remain in situ; and
 - based on the assessment of the above soil validation results, undertake additional remediation and validation works (as required).
- materials used to backfill the trenches will be validated to ensure they meet the ASC NEPM (NEPC, 2013) soil assessment criteria for a commercial/industrial land use;
- if Virgin Excavated Natural Material (VENM) is to be used for backfilling, a VENM validation certificate will be sought from the source quarry/site; and
- an Asbestos Management Plan will be prepared for the excavation works to ensure any asbestos impacted fill material is appropriately managed and disposed of to a licensed landfill facility.

4.15 Heritage

An Archaeological Statement has been prepared by Heritage Architects Casey and Lowe, which is provided as **Appendix N**.

The majority of the DA Site will have been subject to extensive excavation following the completion of works approved as SSD 5897. Areas outside of this

area (i.e. within the Services Zones) are predicted to be highly disturbed and therefore the likelihood of significant archaeological discoveries is predicted to be low.

As a result of the removal of all significant archaeology in connection with the remediation process (the subject of SSD 5897), Casey and Lowe conclude that there will be no additional heritage impacts arising from this proposal.

An unexpected finds protocol is included within the CFEMP (**Appendix O**).

4.16 Visual Impacts

The basement car park entry has been designed to be integrated within the future podium of Residential Building R4B. The south facing entry is perpendicular to the waterfront and screened by Commercial Building C3 when viewed from most locations within the site, so that it will only be directly visible from Waterman's Quay.

The above ground basement works will result in built elements (risers and access points) that would ordinarily be integrated into the design of the future buildings being exposed. These elements will be exposed until the separately proposed buildings are developed. Interim public domain and landscape works are proposed to mitigate the visual impact of these basement elements and provide a high quality usable interim public domain and landscaped open areas where construction has not yet commenced.

4.17 Environmental, Construction and Site Management Plan

Lendlease has prepared a Construction Framework Environmental Management Plan (CFEMP) for Stage 1B of the Barangaroo development. The main report of the CFEMP has been updated to include the proposed development, and the concurrently proposed One Sydney Harbour Buildings, and is provided in **Appendix O**. 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 described above, and in Section 6.0.

4.18 Staging of construction

The Stage 1B Basement will be constructed concurrently with the other approved developments within Barangaroo South, noting that the basement will commence in advance of the R4A, R4B and R5 towers. It is anticipated that construction will commence in July 2017 and it is intended that the works will be complete in 2021. A full outline of the staging of the proposed works is provided in Section 3.12.

4.19 Building Code of Australia

A Building Code of Australia (BCA) Assessment has been prepared by McKenzie Group Consulting and is included at **Appendix P**.

The assessment concludes that the proposed development is capable of achieving compliance with the requirements of the BCA, subject to application of some alternative solutions to the deemed to satisfy provisions of the BCA.

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 the relevant Construction Certificate.

4.20 Sea Level Rise

Climate Change and Sea Level Rise were considered as part of the Barangaroo Concept Plan and subsequent Stage 1A Basement and Public Domain applications. Those assessments considered the risks of climate change in increasing sea levels in Sydney Harbour and potential inundation impact on Barangaroo South.

The assessments were prepared in accordance with the NSW Coastal Planning Guideline: Adapting to Sea Level Rise with regard to the former NSW Government's adopted planning benchmark of 0.9m mean sea level rise by 2100.

The assessments determined that there is a risk that a 0.9m sea level rise could result in inundation of parts of the Barangaroo South site by either direct coastal inundation or by a failure of the stormwater system where the discharge point to the Harbour would become submerged during extreme storm surge events.

Consistent with the approved approach undertaken for Stage 1A, the risk of coastal inundation has been largely mitigated by the minimum height of the existing seawall being RL 2.5 and the proposed basement and associated ground floor slab levels being RL + 3.540m.

4.21 Infrastructure Provision

A summary of the infrastructure and services provision and augmentation proposed as part of the Stage 1B Basement is provided at Section 3.9 and detailed in the following reports:

- Services Report (**Appendix Q**)
- Stormwater Management and Infrastructure Servicing Strategy (**Appendix I**)

The proposed Barangaroo South Stage 1B Basement will be serviced from connections to the existing Stage 1A infrastructure, from existing augmented trunk supply, or from new dedicated connections from external utilities' infrastructure.

Services will be provided within the DA Site to provide for the separately proposed Crown Sydney Hotel Resort.

The Services Report and Stormwater Management and Infrastructure Servicing Strategy demonstrate that the site can be suitably serviced and will not result in any impacts on existing infrastructure during the proposed works that cannot be appropriately managed.

4.22 Ecologically Sustainable Development

Lendlease Design has prepared an Ecologically Sustainable Development (ESD) report which is included at **Appendix T**. The principles of ESD are outlined at Section 7.3.

The ESD Report outlines the targets proposed for the Barangaroo South precinct, which contribute to the achievement of the broader sustainability commitments for the Barangaroo Site under the Concept Plan.

The Stage 1B Basement will support the precinct-wide sustainability targets, which include:

- The Barangaroo South precinct sustainability targets include:
- Minimal operational energy consumption off-set by offsite renewable energy to ensure a carbon neutral precinct.
- The capability to export more recycled water than potable water is imported to ensure a positive water impact.
- An 80% operational waste diverted from landfill, targeting zero net waste to landfill by 2020.
- 20% reduction in embodied carbon (cradle to gate) not including tenant fit outs.
- On site renewables of an amount to offset public realm and recycled water treatment plant energy use.
- Green Star Design and As-Built ratings for all eligible buildings within the precinct.

The design and operation of the Stage 1B Basement will support the achievement of these goals through enabling the provision of future One Sydney Harbour Buildings within the Stage1B precinct and the following specific features:

- **Water:** A recycled water supply will be extended from the Stage 1A recycled water supply connection point in the Stage 1A Basement Level B1.
- **Energy:** Energy efficiency strategies proposed for the basement include LED lighting with appropriate zoning and controls, demand controlled ventilation and sufficient metering to enable performance to be measured and monitored against proposed targets.
- **Waste:** Waste collection areas in the basement have been provided allowing for the streaming of waste and recyclables from future Stage 1B buildings

4.23 Geotechnical

A geotechnical assessment was undertaken by Coffey which is provided as **Appendix G**. A summary of this report is provided below.

The geotechnical report identifies key geotechnical risks and recommended design responses which have been implemented into Stage 1B Basement. These are outlined in **Table 12**.

Table 12 – Geotechnical Risks and Design Responses

Potential Issue	Design Response
Movement or failure of retaining structures during Stage 1B basement construction	Design of retaining structure using conventional methods would be carried out using the design parameters discussed Appendix G . During construction ground conditions encountered would be compared with design expectations. Should significant departures from design expectations occur, a review of construction methods and the design would be carried out.
Upward movement or foundation heave associated with groundwater pressure beneath the basement	Design of the basement slab has been carried out using conservative assessment of maximum groundwater pressure during the life of the structure.

Uncontrolled groundwater or harbour water ingress during construction	The ground within the construction site is water charged and responds to the tidal movements in Darling Harbour. A groundwater cut off will be established prior to basement excavation to cut off groundwater seepage within the soil profile. The cut off wall will be keyed into rock. This will reduce the rate of groundwater seepage to the construction site to a level which can readily be addressed using conventional dewatering methods.
High groundwater seepage along the Pittman LIV dyke	Geotechnical investigation has revealed the presence of a near vertical dolerite dyke crossing the Stage 1B site. Groundwater monitoring and testing has shown that the dyke and the adjacent ground may provide a conduit to carry seepage into the construction excavation beneath a cut off wall. Monitoring will be carried out to check groundwater response following construction of a cut off wall to assess the significance of groundwater seepage and grouting of the dyke and adjacent rock will be carried out to reduce flow along the dyke. The effectiveness of grouting will be evaluated based on groundwater monitoring within the cut off wall.

4.24 Fire Safety

Warren Smith and Partners have prepared a Fire Services Report, which is provided as **Appendix R** and sets out the fire services proposed within the Stage 1B Basement.

A Preliminary Fire Safety Engineering Review has been provided by Defire (**Appendix S**), 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 One – Building Code of Australia (BCA). A preliminary description of alternative solutions has been provided where relevant.

Defire 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.

4.25 Tree Removal

Tree Talk has prepared an Arboricultural Report to address the impact of tree removal within the DA Site. This report is provided as **Appendix V** and is summarised below.

A number of trees near the Stage 1B site will be removed as part of works to Hickson Road and SSD 5897. Therefore the majority of the vegetation that is currently present within the DA Site will have been removed before development works associated with this application commence.

The trees that remain within the DA Site may also have to be removed. Should the trees be able to be retained management and mitigation measures have been proposed within **Appendix V** to protect trees during construction.

4.26 Accessibility

The Stage 1B Basement 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 under the BCA 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.

4.27 Structural Engineering

A Structural Engineering Report has been prepared by Robert Bird Group (**Appendix D**) to describe the structural scheme proposed for the Stage 1B Basement, and to summarise the structural design criteria at the time of the Development Application.

The report concludes that the proposed Stage 1B Basement is capable of being designed and constructed in a manner that will ensure support of the built form above utilising proven design and construction techniques.

4.28 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 One Sydney Harbour buildings, including the basement, and had opportunity to provide feedback.

Lendlease meets with the EPA, Sydney Water, 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 the Stage 1B Basement.

Community and Stakeholder Engagement

The Barangaroo Delivery Authority and Lendlease are consulting with local residents 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.

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 10 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 10 – 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						
Infrastructure	C+O	Impact on existing infrastructure	Cardno has determined that the proposed Stage 1B Basement can be accommodated within the infrastructure that is currently available on the Stage 1B site and further that it will be able to provide services for the One Sydney Harbour Buildings.	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 Stage 1B Basement 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.	3	3	6 (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; - Noise & Vibration Management Plan whereby measures required by this assessment are to be incorporated into the revised version of the sub plan.	3	2	5 (Low/Medium)
Water, Drainage, Stormwater and Groundwater	C+O	- Altered overland flow patterns causing flooding - Increased sediment and erosion runoff	Stormwater and groundwater management will have been significantly modified and improved as part of the development works associated with SSD 5897. Construction impacts associated with the proposed works will be managed in line with the CFEMP.	2	2	4 (Low/Medium)

				Risk Assessment		
Item	Phase	Potential Environmental Impact	Proposed Mitigation Measures and / or Comment	Significance of Impact	Manageability of Impact	Residual Impact
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 the One Sydney Harbour Buildings within Stage 1B, including the Stage 1B Basement 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	5 (Low/Medium)
Potential Health Impacts	C	Exposure to contaminants within the services zones	WHS measures will be in place during construction to monitor and mitigate any likely impacts on construction staff	2	2	4 (Low/Medium)
BCA	C	Non compliances with BCA	Alternative solutions have been proposed and agreed by the BCA Consultant	1	1	2 (Low)

6.0 Mitigation Measures

The collective measures required to mitigate the impacts associated with the proposed works are detailed in **Table 13** below. These measures have been derived from the previous assessment in Section 4.0 and those detailed in appended consultants' reports.

Table 13 – Mitigation Measures

Mitigation Measures	
Traffic and Parking	
A Travel Demand Management Plan in accordance with the Transport Assessment prepared by ARUP and dated September 2015, and will be prepared and implemented prior to occupation of the building.	
Air and Odour	
The Stage 1B Basement construction works are to be incorporated into the existing environmental management plans.	
Soil and Water	
▪ Water Sensitive Urban Design (WSUD) measures as described above will be implemented in the development. ▪ A detailed Water and Stormwater Management Plan that addresses water quality and water monitoring requirements for the duration of construction works associated with the development of Stage 1B will be prepared. This will incorporate measures such as: – Criteria for nominating areas and different sources of site water as clean or contaminated; – Water monitoring protocols and decision criteria for whether site water will be directed to stormwater, a waste water treatment plant, to sewer or to a liquid waste facility; – Water discharge criteria and monitoring frequency for parameters listed in the 'Water Quality Monitoring Requirements' document prepared as part of the Environmental Assessment; – An initial more intensive monitoring program for sediment basins, stormwater discharges, reused water and ambient waters to help determine potential water quality impacts and ongoing monitoring protocols; – Specific discharge and monitoring points for on-site generated water including collected groundwater seepage into excavations, sediment basins for clean or contaminated areas, discharge points to stormwater drains, and confirmation of ambient monitoring locations in Darling Harbour and Johnstons Bay; – Suitability of chosen reference site(s) based on turbidity data from a proposed monitoring program; – Consideration of tidal currents, circulation patterns in Darling Harbour and the position of stormwater discharge points with regard to the positioning of monitoring location(s) outside the turbidity (silt) curtain. The location will not be a fixed point so that it can account for potential plume movement under different conditions. Alternatively, more than one location may be needed; and – The development of criteria for wastewater discharges that would trigger a review of water management systems. These criteria will trigger operational responses that help in ensuring licence conditions are not exceeded. It is noted that this element may fall under approval of the site recycled water/treatment devices and may be separated from the Concept Approval ▪ The Stage 1B Basement construction works are to be incorporated into the existing environmental management plans.	
Noise and Vibration	
▪ Acoustic containers on the generators or power supplied by the grid; ▪ Localised treatment such as barriers, silencers or speed control on fixed odours plant; and ▪ Selection of low noise equipment such as "quiet type" hammers and use of rocksaws where feasible. ▪ It is recommended that trial testing of vibration levels be conducted where equipment identified as having the potential to exceed the human comfort criteria is proposed. ▪ Selection of low noise equipment such as "quiet hammers". ▪ Plant Noise Audit – Noise emission levels of all critical items of mobile plant and equipment should be checked for compliance with noise limits appropriate to those items prior to the equipment going into regular service. To this end, testing should be established with the contractor. ▪ Operator Instruction – Operators should be trained in order to raise their awareness of potential noise problems and to increase their use of techniques to minimise noise emission. ▪ Equipment Selection – All fixed plant at the work sites should be appropriately selected, and where necessary, fitted with silencers, acoustical enclosures and other noise attenuation measures in order to ensure that the total noise emission from each work site complies with EPA guidelines. ▪ Site Noise Planning – Where practicable, the layout and positioning of noise-producing plant and activities on each work site should be optimised to minimise noise emission levels. ▪ Use rocksaws and rippers where feasible.	

Mitigation Measures

- Install a noise barrier between the site and street frontages. This should be a minimum 17mm thick structural plywood or equivalent panel. (Included in noise modelling)

Human Health

- Excavations will be visually inspected by a qualified environmental engineer/scientist;
- If the subsurface soils encountered during the excavation are significantly different to those described in Section 7.0 (i.e. based on visual and olfactory observations), validation soil sampling of the excavation base and walls will be conducted. If required, the validation soil samples will be collected as follows:
 - wall validation samples will be collected at 10 m lineal metre intervals in material identified to be the most impacted (either by visual observations of field screening of samples using a Photoionisation Detector);
 - base validation samples will be collected at 10 m lineal metres along the base of the trench;
 - the soil analytical results will be compared to the ASC NEPM (NEPC, 2013) soil criteria for commercial/industrial land use. If these criteria are exceeded a site specific risk assessment could be undertaken to assess the suitability of the material to remain in situ; and
 - based on the assessment of the above soil validation results, undertake additional remediation and validation works (as required).
- Materials used to backfill the trenches will be validated to ensure they meet the ASC NEPM (NEPC, 2013) soil assessment criteria for a commercial/industrial land use;
- If Virgin Excavated Natural Material (VENM) is to be used for backfilling, a VENM validation certificate will be sought from the source quarry/site; and
- An Asbestos Management Plan will be prepared for the excavation works to ensure any asbestos impacted fill material is appropriately managed and disposed of to a licensed landfill facility.

Waste Management

Waste will be managed in accordance with the Waste Management Plan prepared by ARUP, and dated September 2015.

Construction Framework Environmental Management Plan

The CFEMP should be implemented into the construction phase of the development.

Tree Removal

Should the trees be able to be retained, they will be protected in accordance with the management and mitigation measures in the Arboricultural Report prepared by Tree Talk dated September 2015.

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 a basement to support the separately proposed One Sydney Harbour Buildings within Stage 1B of 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 common basement for 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, the Stage 1B Basement will:

- support separately proposed peripheral One Sydney Harbour Buildings, which will provide high quality residential accommodation with excellent access to employment, transport, open space and infrastructure;
- allow for ground level connectivity and allow for buildings that will create ground level activation, in particular fronting the future Hickson Park;
- be of a level of quality that affirms Barangaroo as part of Sydney's status as a global city; and
- provide 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 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:

- any construction impacts can be appropriately mitigated;
- 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 unacceptable 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. Potential impacts that are identified are temporary, limited to the construction period, and many would result in a net improvement. Suitable management and mitigation measures are in place to address impacts identified within the EIS.

This EIS has carefully evaluated the impacts of the proposed development and has avoided, where possible, any associated significant impacts. An Environmental Risk Assessment has been undertaken (refer to Section 5.0) to assess the environmental risk associated with the identified impacts.

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:

- providing a shared basement that services multiple buildings within Barangaroo South;
- implementing safeguards and management measures to protect environmental values; and
- assisting in the urban revival of prime waterfront land which was previously heavily contaminated and largely unusable.

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 of this EIS. Further, the interim 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 largely 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.

Measures will be implemented (refer Section 6.0) 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 Stage 1B Basement at Barangaroo South.

The proposed Stage 1B Basement supports the One Sydney Harbour Buildings designed by world renowned architects Renzo Piano Building Workshop. The development is an integral component of the One Sydney Harbour Development, which will provide the highest standard of architecture combined with exceptional residential amenity.

The EIS has addressed the issues outlined in the SEARs 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 Stage 1B Basement within Barangaroo South as it provides:
 - car parking, loading and storage for the future Stage 1B One Sydney Harbour Buildings within Stage 1B (R4A, R4B and R5);
 - a location for building plant and services for the future Stage 1B One Sydney Harbour Buildings within Stage 1B and connections to Crown Sydney Hotel Resort in Stage 1C and Central Barangaroo;
 - interim public domain and roads for Stage 1B, to be put in place where appropriate until the time the permanent public domain is approved and constructed; and
 - a slab on which to construct the permanent public domain and some of the access roads as envisaged under the Concept Plan (as modified).
- The development is consistent with the objectives all the relevant strategic policies, environmental planning instruments, plans and guidelines.
- The development is generally consistent with the Concept Plan, as proposed to be modified by Mod 8.
- The development is a fundamental part of the broader Barangaroo development that will have a wide range of positive social and economic impacts.
- Potential adverse environmental impacts can be appropriately managed by the mitigation measures set out in this EIS.

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