

Response to Submissions and Preferred Project Report



Concept Plan Modification 8, Major Development SEPP and State and Regional Development SEPP and Sydney Harbour SREP Amendments

Barangaroo South

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

September 2015 ■ 10051

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1.0 Introduction

An Environmental Assessment Report (EAR) for Concept Plan Modification No. 8 MP 06_0162 (Concept Plan Modification) was publicly exhibited between 18 March 2015 and 1 May 2015.

In total 50 (including 9 agency, 2 council, and 39 public) submissions were received in response to the public exhibition of the Concept Plan Modification. In addition the Department of Planning and Environment (the Department) and the Design Review Panel (DRP) provided comments based on their preliminary review.

An analysis of these submissions has revealed that the following key issues were identified with the proposal:

- the public benefit;
- key worker housing;
- the location of the Landmark Hotel Building and Northern Park (Hickson Park);
- loss of public / open space;
- overshadowing impacts;
- heritage impacts;
- wind impacts;
- traffic/transport concerns;
- the planning process and the section 75W modification power;
- the scale of the development;
- public view loss including loss of constellation views from Sydney Observatory;
- private view loss; and
- social and economic impact of the gaming facility.

The proponent, Lend Lease (Millers Point) Pty Ltd (Lendlease), and its specialist consultant team have reviewed and considered the Department and DRP's comments, the agency and council submissions, and the public submissions and, in accordance with section 75H(6) of the *Environmental Planning and Assessment Act 1979* (EP&A Act), now responds to the issues raised.

This Preferred Project Report (PPR) should be read in conjunction with the Concept Plan Modification EAR prepared by JBA dated March 2015 and presents:

- further information and assessment with respect to a range of issues raised in submissions that relate specifically to the development proposed by the Concept Plan Modification;
- details of the final Concept Plan Modification, including revisions to the proposed Concept Plan Modification as exhibited; and
- a revised Statement of Commitments.

Based on the assessment within this PPR and the exhibited EAR and the accompanying technical reports, it has been determined that on balance there are limited environmental impacts beyond those originally assessed and determined to be acceptable in the approved Concept Plan (Mod 7).

2.0 Issues Summary and Lendlease's Response

Fifty (50) submissions in response to the public exhibition of the Concept Plan Modification were received from the government agencies and authorities, councils, business groups, a member of parliament and the general public. The sources of submissions can be summarised as:

- Authorities and agencies (9);
- City of Sydney Council;
- Leichhardt Council; and
- Members of the public (39), comprising:
 - 3 Community groups;
 - 3 Business / Industry groups;
 - 4 Businesses;
 - 30 Individuals; and
 - 1 Member of Parliament.

Of the 39 public submissions received by the Department:

- 2 submissions indicated support for the Concept Plan Modification;
- 5 submissions were categorised as being neutral or unclear in their position; and
- 32 submissions objected to the Concept Plan Modification for a variety of reasons.

In addition the Department and the DRP provided comments based on their preliminary review of the proposed modification.

Lendlease's detailed response to all the issues raised in relation to the Concept Plan Modification is provided at **Appendix A**. **Table 1** below provides a summary of the key issues and Lendlease's response. Where appropriate more detailed responses have been provided in the subsequent sections below the table.

The assessment provided within the exhibited EAR and this PPR demonstrate that the environmental impacts are limited or that it can be appropriately managed/mitigated so that they are of limited environmental consequence.

A separate response was prepared and submitted to the DRP, which is included at **Appendix B** for information.

Table 1 – Summary of the key issues and response

Key Issue	Lendlease Response
Public Benefit There are insufficient public benefits arising from the additional development proposed at Barangaroo South.	The public benefits resulting from the development of Barangaroo are both numerous and significant. Section 2.1 outlines a selection of the public benefits resulting from the development.
Key Worker Housing There is insufficient KWH is being provided.	The amount of KWH is consistent with the approved Concept Plan and will increase proportionately with the additional residential floor space on the site, resulting in an increased public benefit. The provision of KWH is discussed in further detail in Section 2.2.

Key Issue	Lendlease Response
Location of the Hotel and Northern Park The hotel will replace open space on the foreshore and result in a poorly integrated park with low amenity.	The relocation of the landmark hotel building was undertaken by master architects RHS+P in holistic manner to ensure the changes achieved the optimum outcome for the public domain. See further discussion in Section 2.3.
Public / Open Space There will be a loss of public / open space on the site.	The area of accessible public open space has not been reduced. See further discussion provided at Section 2.4.
Impact on the Sydney Observatory The Modification will result in heritage and observational impacts on the Sydney Observatory.	The proposed Modification does not have any adverse heritage impacts on the Observatory. Additional assessment undertaken in relation to the observational impacts. Further discussion is provided at Section 2.5.
Wind The revised building heights and location will increase wind tunnels along the Waterfront Promenade and in public streets.	A Wind Impact Assessment prepared by Cermak Peterka Petersen was provided with the Modification Application. The results of this Assessment indicate that no locations exceeded the nominated pedestrian wind comfort criteria. It also found that all locations south of Watermans Quay are suitable for, at a minimum, pedestrian walking with many locations suitable for pedestrian standing and sitting. Generally, wind conditions along the foreshore are classified as suitable for pedestrian sitting or standing. Where not classified as suitable, the provision of landscaping or other similar measures will mitigate wind impacts to be acceptable. The provision of these measures as required will be detailed in the future separate application(s) for the development of Barangaroo South.
Overshadowing The proposed modification would result in significant overshadowing of the Barangaroo South foreshore including Globe Harbour, as well as Darling Harbour and Jones Bay Wharf.	<p>A detailed assessment of the overshadowing impacts of the proposed modification were provided at Section 9.2.5 of the EAR that formed part of the Modification Application.</p> <p>The Shadow Diagrams provided with the Modification Application demonstrate an appropriate level of solar access within the Barangaroo South site, commensurate with the CBD location of the Site, and that the shadow impact on the foreshore on the southern part of the site and adjacent at King Street Wharf has in fact been reduced from that occurring under Concept Plan (Mod 7).</p> <p>A net improvement is proposed to shadowing on Darling Harbour, enhancing the recreational qualities of the Harbour from the current approved Concept Plan. Furthermore, the extent of shadow which falls on the western land side of Darling Harbour is limited in extent and restricted to the morning period.</p>
Heritage The Modification is a stark departure from the nearby Millers Point Heritage Conservation area, and negatively impacts on the character of the area.	The approved Concept Plan provided for a new high density urban precinct within Barangaroo South. The proposed modification does not seek to change the approved future character of Barangaroo South and therefore will still relate to the Millers Point Heritage Conservation area in the same manner. TKD Architects undertook a heritage assessment of the proposed Modification Application and found that there would be minimal to no impact on these items due to the distances between the items and Barangaroo South and the character of the existing setting of particular items. Any potential impacts are likely to be ameliorated by the topography and built form of the locality.
Planning Process	The proposed Modification Application is being progressed through an established assessment process under the EP&A Act. This process is transparent, inclusive and independent, with additional rigour

Key Issue	Lendlease Response
The proposal should not be treated as a modification and should be subject to a new approval process.	achieved through the determination of the Modification Application by the Planning Assessment Commission. See further discussion in Section 2.7.
Traffic and Parking A wide range of different issues relating to traffic and parking were raised.	A specific response to each of the traffic and parking issues is provided in Appendix A . A revised TMAP, in particular addressing Transport for NSW's comments is included at Appendix J .
Scale of the Development The scale of the buildings is too large and should be low scale adjacent to the harbour.	A detailed assessment of the proposed scale of the Modification is provided in Section 9.2.2 of the EAR that accompanied the Modification Application. The propose scale of the towers continue a built form dialogue with the adjoining CBD, with the highest form at the northern end of the precinct to complete the city frame and book-end the city's north western edge. The proposed envelope for the landmark hotel building is reflective of the requirement to have a hotel building which achieves landmark status. The additional height proposed for this envelope will allow the building to achieve a landmark status on land, rather than a smaller tower located over the water.
Public and Private View Loss The Modification will result in view loss from the residential buildings on Kent Street and obstruct views from significant locations such as Dawes Point, Pyrmont Park and Observatory Hill.	The View and Visual Impact Analysis provided with the EAR that accompanied the Modification Application concludes that Concept Plan (Mod 8) achieves a reasonable balance between the protection of private views and the protection of public domain views in the delivery of a new urban precinct on the foreshore of Sydney Harbour.
Adequacy of the social and economic impact of the gaming facility	An assessment of the social and economic impact of the Modification, including consideration of the gaming facility, was provided as part of the exhibited EAR. A Statement of Commitment was included that required more detailed assessment to be undertaken as part of any future application for a gaming facility. That documentation was submitted with the Crown Sydney Hotel Resort DA which is currently being assessed by the Department.

In addition to the issues raised above, the Department requested additional information in relation to a range of matters. This information has been provided as part of, or appended to, this Report as follows:

- Additional numeric information including GFA figures in relation to the mix of uses, public domain allocation, community uses GFA, KWH, and wintergarden GFA is provided in response to the specific questions at **Appendix A**.
- Selected plans and renders illustrating the detailed design of the future buildings for Blocks 4A, 4B and Y has been included at **Appendix C**. It is noted that these are provided for information purposes only.
- An addendum to the Navigation Report prepared by Royal Haskoning considering the impact of the new public pier on the Ferry Hub is provided at **Appendix F**.
- Revised Barangaroo South Design Guidelines have been prepared to address the Department's comments and are included at **Appendix D**. The specific response to each of the comments on the Design Guidelines is provided in **Appendix A**.
- A preliminary assessment which demonstrates that the building envelopes proposed for Blocks 4A, 4B and Block Y are capable of achieving an acceptable design and amenity outcome is provided at Section 2.6.

- Revised Shadow Diagrams illustrating the shadows cast by the public pier building, the latest indicative building designs, and the current design for Central Barangaroo have been provided at **Appendix I**.

2.1 Public Benefit

The City of Sydney Council raised that the increased development yield does not correspond with any increased public amenity or public benefit commensurate with private gain to the proponents.

Concept Plan (Mod 8) will offer significant public benefits both directly and indirectly to the wider community, the State of NSW and the Nation as a whole.

The increase in floor space proposed under the proposed Modification is attributed to the landmark hotel building. The H1 Hotel building is intended to be operated by Crown Resorts as a world class six-star hotel resort. This building will also incorporate world-class VIP gaming facilities in addition to luxury apartments, first-class restaurants, bars, retail outlets, pool and spa facilities and conference rooms. The iconic building will be a new landmark for Sydney and will significantly contribute to the NSW and Sydney tourism economy.

There is expected to be flow on public benefits of this contribution to the tourism economy, with direct increases in employment and training opportunities. Other less tangible benefits will also result from the establishment of a new iconic building on Sydney's waterfront which provides new definition to Sydney's CBD.

A summary of the benefits of the new iconic hotel development are provided below:

- Enable Sydney to capitalise on the growth in Asian tourism, particularly high net worth and luxury focused tourists from China;
- Assist the NSW Government in meeting its objective of making Barangaroo an active and vibrant destination, with both a daytime and a night-time economy;
- The operation of the hotel will result in the creation (direct and indirect) of approximately 2,300 and 3,300 additional jobs during construction and 1,250 direct jobs post construction;
- Employment and training opportunities are to be established in Western Sydney and the inner city to offer staff targeted training. These training opportunities will include apprenticeship and schools-based traineeship programs and training for Indigenous Australians;
- Increasing the attractiveness of Sydney as a location for major domestic and international events;
- Encourage increased visitor/tourist spend both within the new development and in Sydney;
- Contribute to the identified shortage in hotel accommodation in Sydney through directly increasing the number of available rooms;
- Establishment of a new iconic and defining building on Sydney's waterfront land, contributing to redefining the world perception of Sydney and offering the community a stronger sense of place and pride in Sydney as a global city.

In addition to those direct public benefits listed above associated with the provision of the Landmark Hotel Building, Concept Plan (Mod 8) will also result in the following additional public benefits:

- The Project Development Agreement (PDA) signed between the NSW Government and Lendlease provides for significant land payments to the NSW

Government for development rights at regular intervals through the life of the development. Due to the increase in development potential associated with Concept Plan (Mod 8), the quantum of land payments under the PDA also proportionally increases resulting in a direct economic benefit to the State.

- Due to the increase in residential GFA contemplated in Concept Plan (Mod 8), the provision of Key Worker Housing will also proportionally increase (see Section 2.2).

Noting the additional public benefits proposed as part of Concept Plan (Mod 8) above, it is important to recognise the role of the Modification in contributing to the on-going overall public benefit of the Barangaroo South development. A selection of these benefits include:

- Regeneration of derelict and inaccessible waterfront into a vital and vibrant mixed use precinct, open to the public 24 hrs a day.
- Provision of public domain on the Barangaroo South site as works in kind, including new bridge pedestrian connections over Hickson Road and the creation of Waterman's Cove.
- Lendlease are providing \$40 million for public art. \$20 million of which will be spent within the Barangaroo South site, with the remainder provided to the BDA for allocation throughout all of Barangaroo.
- Amelioration of the under capacity drainage network and flooding issues in the northern part of the City through construction of major trunk drainage in Hickson Road (complete).
- Upgrade of Hickson Road to address flooding issues, create improved public-private interfaces on both sides of the street, and to improved landscape and public amenity. The works will also include additional bicycle parking, car parking and space for taxis.
- Contributions of 1% of the cost development are paid by the developer.
- The Concept Plan provides for a minimum of 12,000 sqm of Community uses spread throughout the entire Barangaroo area. Concept Plan (Mod 8) will see the provision of a minimum of over 7,000 sqm in community uses GFA, including a standalone building on the proposed pier, in Barangaroo South alone.
- Significant employment opportunities have been created both during and post construction. In particular, development of the site by Lendlease has involved the creation of the Barangaroo Skills Exchange (BSX), which is a joint initiative of Lendlease and the Western Sydney Institute of TAFE. As of 31 July 2015, the BSX has resulted in 12,089 accreditations including 544 indentured apprentices and 125 non-indentured trade qualifications. It is also envisaged that the BSX will continue to offer training opportunities for the local community after completion of the Barangaroo South development by Lendlease.
- The development proposal being delivered by Lendlease on the site has been referenced extensively by State and Commonwealth Government Agencies in generating increased local and international investment in NSW and Australia and is specifically identified in the State Government's Plan for Growing Sydney as having a significant role in achieving the strategic direction to make the Sydney CBD internationally competitive.

2.2 Key Worker Housing

The requirement to provide additional Key Worker Housing (KWH) on the Barangaroo South site was raised in both Council and some public submissions. A

number of submissions suggested that the percentage of KWH be substantially increased (to 10-20%) indicating that the current percentage was inadequate.

The approved Concept Plan (Mod 7) commitment to the provision of 2.3% of total residential floorspace as KWH on the Barangaroo South site has remained unchanged in Concept Plan (Mod 8). The current percentage was proposed by Lendlease as part of Concept Plan (Mod 4) and assessed and determined as part of that Modification as being appropriate. It is noted that similar submissions to increase the percentage to 10-20% were also made as part of that modification.

Given that the proposed residential floorspace on the site has been increased to a maximum of 154,000m², Lendlease's total commitment of KWH GFA will also proportionally increase to approximately 3,542m², assuming the full GFA cap is reached.

As the Concept Plan Modification includes a proportionate increase in the amount of KWH relative to the increase in residential accommodation the associated public benefit has increased proportionately. The proposed modification will therefore result in an increased quantum of KWH being provided and an increased public benefit as a result.

The longstanding commitment to KWH has been focused on a location near or adjacent to Hickson Road. Of the remaining buildings, only R5 or C1 therefore have the potential to accommodate the use. While both buildings have potential under the Concept Plan, the current proposal involves locating the KWH in the Renzo Piano designed Building R5.

2.3 Location of Hickson Park and Hotel

The City of Sydney Council and a number of members of the public criticised the Landmark Hotel Building's location on the foreshore instead of having open space at that location, and content that it will result in a poorly integrated park with low amenity.

The relocation of the Landmark Hotel Building was undertaken by the site's master architects, Rogers Harbour Stirk + Partners, in a holistic manner to ensure the changes achieve the optimum outcome for the site, including the public domain. Section 9.2.1 of the EAR that accompanied the Modification Application set out in detail the process that was undertaken for analysing the alternatives for relocation of the Landmark Hotel Building and why the final location was selected.

Concept Plan (Mod 8) provides unobstructed public access around the entire perimeter of Watermans Quay and along the foreshore and creates a variety of experiences along the foreshore and throughout the site that contribute to the liveliness of the area, protects the scenic qualities of Sydney Harbour and differs from the more naturalistic parkland experiences in the north.

A large quantum of open space is being provided on the Barangaroo site. The location of Hickson Park offers a distinct benefit as it expands the breadth of open space experiences available to the public on the Barangaroo site rather than providing a single open space experience along the foreshore.

Some submissions indicated concerns about the park suffering low amenity, specifically in relation to wind and solar access. Hickson Park's location and orientation is such that it provides significant protection from cold winter winds whilst also being open to direct sunlight throughout the day; a fact that represents a significant improvement to the environmental qualities of the waterfront during the winter months.

The majority of Hickson Park will receive unimpeded solar access on June 21, including during the key lunch time period (12pm to 2pm) where activity levels are expected to be higher. A small portion will be overshadowed between 2pm and 3pm, but the majority will remain free of shadow.

Whilst Hickson Park will at certain times experience overshadowing, it is the diversity of spaces that will ultimately determine the success of the open space network at Barangaroo. By providing alternative locations that benefit from differing conditions during different times of year it enables visitors, residents and workers at Barangaroo to select the location with the greatest amenity at that particular point in time.

The relationship of the buildings framed around Hickson Park will ensure that it benefits from a higher degree of vibrancy and activation when compared to the waterfront park shown in the approved Concept Plan.

The location of the park also has the additional advantage of connecting Hickson Road and the CBD more broadly with the green open space network being provided at Barangaroo. Instead of being separated from Barangaroo's green spine by buildings, the proposed location of Hickson Park better integrates with the City, and will connect pedestrians arriving at the site from the CBD all the way through to Barangaroo Point.

Whilst the detailed design of Hickson Park is still being developed, the intent is to create a truly public place, that is open and inviting for all people at all times. Objectives for the park design include:

- an outcome that will cater to a broad variety of users and uses, including periodic events;
- creation of a large lawn area, bordered by substantial trees, similar in experience to Bryant Park in New York;
- provision of appropriate soil depths to provide for significant tree growth;
- selection of high quality materials and finishes; and
- creation of clear linkages to and through the site from external areas.

A further package of information regarding the design currently under development formed part of the submission to the DRP, which is included at **Appendix B** for information.

2.4 Public / Open Space

A number of submissions raised concern with the potential that the quantum of publicly accessible space on the site was being reduced as a result of the proposed modification.

The approved Concept Plan incorporates a commitment to provide approximately 11 ha, (50%) Open Space on the Barangaroo Site. The preparation of the Concept Plan and indicative design has had the maintenance of public domain as a key objective for relocation of the hotel to a land based location.

In keeping with the commitment to provide approximately 11 ha of Open Space at the site and in order to achieve the above objective, Concept Plan (Mod 8) provides for 11.9ha of RE1 Public Recreation zoned open space area across the Barangaroo site, which represents 54% of the total site area. Within Barangaroo South, the area of RE1 zone has been reduced as a result of accommodating a larger site area for the hotel. The site area of the hotel has essentially been "extracted" from the previous area of water such that the public domain area (exclusive of water bodies) has been maintained (and slightly increased) at 53%.

In light of the overall benefits posed by Mod 8 (including the increase in total accessible public domain in Barangaroo South), the reduction in RE1 land in Barangaroo South is limited, appropriate and justified. A breakdown of public domain areas is provided in **Table 2**, which compares what was approved under Mod 4 and that proposed in Mod 8.

Table 2 demonstrates that the total accessible public domain within Barangaroo South will slightly increase under Concept Plan (Mod 8).

Table 2 – Breakdown comparison of open space

	Concept Plan Mod 4		Concept Plan Mod 8	
Total Site Area	78,000m²	100%	77,385m²	100%
Element	Area	%	Area	%
Buildings	31,000m ²	40%	35,200m ²	45.4%
Water	<i>Deep Water Cove</i>	2,000m ²	1,550m ²	2.0%
	<i>Surface Water Feature</i>	4,700m ²		
Parks, Squares & Promenade		31%	23,285m ²	30.0%
	<i>Additional Promenade</i>		1,375m ²	1.8%
	Subtotal:	31%	25,660m²	33.0%
Streets & Lanes	15,800m ²	20%	15,975m ²	20.6%
		100%		100%
Total Accessible Public Domain (including streets & lanes)	40,300m²	52%	41,635m²	53.6%

2.5 Impact on the Observatory

The City of Sydney, Sydney Observatory, National Trust and a number of public submissions raised concerns with the Modification resulting in heritage and observational impacts to the Sydney Observatory.

In relation to heritage impacts, the Heritage Impact Statement prepared by TKD as part of the EAR found that the proposed modifications will have some impact on the setting of the Observatory, though it is noted impacts already exist by virtue of the existing approved buildings. This setting is also already affected to some extent by existing development in the northern section of Central Sydney.

The taller building forms proposed will be more visible due to their increased height, however as the towers are also slimmer, breaks / gaps between buildings are supported enabling view corridors through the site. Therefore the essence of the visual impact and view corridors is retained and the relationship between the Sydney Observatory and the historic Millers Point housing will remain. Further the HIS found that the existing mature trees on Observatory Hill in the vicinity of the Observatory will ameliorate some of these impacts and other aspects of the Observatory's heritage significance will not be affected.

In relation to observational impacts, it is important to note that the primary role of the Sydney Observatory is for education and recreation purposes with its other functional qualities, including its role as a scientific facility, being subservient to that primary role particularly given its locational constraints. This is evident in the creation of newer, more appropriately located, observatories in New South Wales.

Lendlease and UNSW Global undertook an analysis of potential sky view loss and resultant impacts resulting from Concept Plan (Mod 8) and the potential impact on the functioning of the Sydney Observatory astronomical slightness as part of the EAR prepared for the Modification Application.

The detailed assessment determined that the views of the following four target objects are obstructed annually by the proposed Concept Plan (Mod 8) built form for a period of time during the night viewing hours between the end of August and October:

- Southern Cross – partial obstruction of any of the five stars of the Southern Cross between 4 August and 29 September
- Jewel Box Cluster – obstruction between 11 August and 6 October
- Omega-Centauri global cluster – obstruction occurs between 25 August and 6 October
- The Pointers – partial obstruction of both of the Pointers between 1 September and 6 October

The original Sky View Loss Report has also been supplemented with a further two astronomical reports directed at addressing the potential impact of the Hotel (see **Appendix G**) and responding to the Observatory's specific comments in detail (see **Appendix H**). The report prepared in response to the Observatory's specific comments maintains the conclusion that the impact is limited to only a small portion of the year and for only limited portions of the viewing times. The Report additionally highlights that weather conditions, Bright of Moon, existing urban conditions and the nature of the Observatory's instruments provide mitigating considerations in this respect. Additionally, the Report reiterates the view that viewing sessions may be organised to target alternative objects in order to maintain a high quality viewing experience and suggests a range of alternative targets in this respect. This is considered appropriate and reasonable given that the primary role of the Observatory is for education and recreation purposes.

The proposed changes to the Concept Plan do have an impact on the potential to view a limited number of target objects for a limited period during particular days or viewing sessions. It is considered that these impacts are limited and can be appropriately mitigated by strategies such as selecting an alternative target (see suggested targets in **Appendix G**) for the relatively short period that one might be affected.

Based on the existing conditions of the Sydney Observatory; the functioning of the Observatory; and the affected viewing times due to the Concept Plan (Mod 8) buildings; it has been determined that the potential impacts are relatively minor and acceptable.

2.6 Residential Design

The Department requested that a preliminary assessment against the Design Quality Principles of State Environmental Planning Policy 65- Design Quality of Residential Flat Development (SEPP 65) and the 'rules of thumb' in the Residential Flat Design Code (RFDC) is to be provided to demonstrate that the building envelopes proposed for Blocks 4A, 4B and Block Y are capable of achieving an acceptable design and amenity outcome.

Since receiving the request, SEPP 65 has been amended, and the RFDC has been replaced by the Apartment Design Guide (ADG). In light of this our response has been prepared having regard to SEPP 65 as amended and the ADG. It is also noted that the Design Guidelines and Statements of Commitments have also been revised to reflect the amendments to SEPP 65 (see Section 3.0).

The residential buildings shown as part of the Concept Plan documentation are presented only as an indicative outcome that may be accommodated within the building envelopes that form one of the key elements of the Concept Plan. In this respect, the application of the Design Quality Principles in SEPP 65 and the ADG can only be addressed at a conceptual level, with detailed assessment best deferred to subsequent Development Applications, where a developed proposal exists to allow testing. Notwithstanding this, Concept Plan (Mod 8) achieves the Design Quality Principles in SEPP 65 as follows:

- **Context:** The Modification provides a specific response to the site's context by locating buildings to maximise the amenity available through its water front location. The proposed scale of the residential towers continue a built form dialogue with the adjoining CBD, with the highest form at the northern end of the precinct to complete the city frame and book-end the city's north western edge.
- **Built Form and Scale:** The built form and scale of the residential buildings has been developed as part of developing the desired future character for Barangaroo under the Concept Plan. The Concept Plan envelopes in conjunction with the Design Guidelines will ensure an appropriate built form is achieved.
- **Density:** The high density environment proposed is appropriate for the site's CBD location close to employment, public transport, community facilities, and open space.
- **Sustainability:** The sustainability commitments under the Concept Plan in conjunction with the proposed building envelopes will ensure that a high level of sustainability will be achieved.
- **Landscape:** The residential towers have been developed as part of a wider master planning exercise which also included careful consideration of the public domain areas throughout the site, ensuring the residential will be integrated with the future landscape and provide a high level of amenity for residents.
- **Amenity:** Concept Plan (Mod 8) locates the residential floorspace where it maximises the highest amenity on the site, providing envelopes that allow for views, solar access, and natural ventilation.
- **Safety:** The location of the residential uses focused around the public domain will ensure that the public domain achieves high levels of passive surveillance and promotes a positive relationship between the public and private spaces on the site.
- **Housing Diversity & Social Interaction:** Concept Plan (Mod 8) continues to provide 2.3% of the residential accommodation for KWH ensuring that there will be a diverse mix of housing choice provided
- **Aesthetics:** The Concept Plan, in particular the Design Guidelines provide for a high level of aesthetics to be achieved as part of the future design of the buildings.

The Concept Plan (Mod 8) design will also achieve the objectives in Parts 4 and 5 of the ADG. In particular it provides for:

- high quality public open space by framing towers with podiums around Hickson Park;
- visual privacy through siting and orientation of the buildings to maximise views and outlook to the north and west;
- solar and daylight access by locating the buildings around Hickson Park where they have high exposure to northern light;
- natural ventilation through tall slender towers; and

- apartments with high quality private open space, layouts, sizes, and ceiling heights.

2.7 Planning Process

A number of public submissions have questioned whether a section 75W Modification is the correct planning process to give effect to the changes being contemplated on the site under Concept Plan (Mod 8).

An assessment has therefore been undertaken below to compare and contrast Concept Plan (Mod 7) and Concept Plan (Mod 8) to assist the Minister (or their delegate) to better consider the availability of the section 75W to Concept Plan (Mod 8).

DGRs and Environmental assessment commonalities between Mod 7 and Mod 8

The then Director General of the Department issued amended requirements for the preparation of the environmental assessment to accompany the Mod 8 Application. The amended DGRs required the Proponent to address, in detail, each of the relevant requirements of the Director General that had been previously issued under the EP&A Act in relation to the preparation of the environmental assessment that accompanied the original Barangaroo Concept Plan. The amended DGRs also required certain additional matters to be addressed.

The environmental assessment demonstrated that the Mod 8 Application did not result in environmental and other consequences that were significantly different to those approved under the Concept Plan in relation to these matters.

Strategic planning commonalities between Mod 7 and Mod 8

Concept Plan (Mod 7) and Concept Plan (Mod 8) have the following strategic planning commonalities:

- The overall range of land use types to be provided on the site, namely the creation of a new predominantly commercial focused CBD precinct that also incorporates residential, retail, tourist, community and recreation uses.
- The overall urban structure and public domain concept, namely approximately 50% of the site being provided as public open space concentrated along the foreshore and headland, with the southern portion of the site comprising mixed use development.
- The concept for the street and pedestrian connectivity and integration with the western edge of the CBD.
- The Project Urban Sustainability Framework (economic, environment and community).
- The Project principles for competitiveness, sustainability and liability.
- The approved Concept Plan Economic Strategies.
- The approved Concept Plan Community Strategies.
- The approved Concept Plan Environment Strategies.

The above items are fundamental elements of the approved strategic development outcomes for Barangaroo, and are significant to the extent that they encapsulate the underlying purpose of the project as a whole, and also the manner in which the project is intended to be implemented by the NSW State Government and its development partners over time. The items above provide for Barangaroo to deliver:

- an entirely new and significant commercial precinct for the Sydney CBD with a critical mass of works and diverse types of commercial floor space that will create commercial growth opportunities for the Sydney CBD and reinforce Sydney's competitiveness in the Pacific Rim;
- sufficient housing and community and social infrastructure into the precinct to assist in creating a vibrant community that connect to the existing CBD;
- benchmark leadership in environmentally sustainable design; and
- provision of a significant foreshore promenade link, significant waterfront open space for locals and workers, and cultural community facilities for residents, workers and visitors.

Importantly, there are no differences between Concept Plan (Mod 8) and Concept Plan (Mod 7) that affect the fundamental strategic planning elements of the approved development outcomes for Barangaroo that are identified above.

Physical commonalities and differences between Mod 7 and Mod 8

Concept Plan (Mod 8) and Concept Plan (Mod 7) have the following physical development commonalities:

- approximately 11 hectares of new public open space;
- a Foreshore promenade 1.4km in length connection Walsh Bay to King Street Wharf;
- a layout derived from the long north south dimension of the site;
- a street pattern that integrates with Walsh Bay, Millers Point, King Street Wharf and the Western Grid of the City;
- the introduction of harbour water into the site in the new coves modulating what was an industrial linear harbour edge;
- a public domain framework that incorporates a foreshore promenade, parks, squares and civic places, streets and pedestrian connections;
- two primary streets: a new north south local road (Barangaroo Avenue) proposed to provide local access, serve cyclists and acts as a significant pedestrian promenade fronting new buildings; and an existing street (Hickson Road) providing a collector level road function;
- a number of east west secondary streets that connect between Hickson Road and Barangaroo Avenue;
- a variety of pedestrian walkways that create permeability within the urban blocks between the streets;
- the maximum building heights within Development Blocks 2, 3, X, 5, 6 and 7; and
- active uses in the public domain including a variety of small buildings and structures.

The main physical differences from a planning perspective between Concept Plan (Mod 7) and Concept Plan (Mod 8) are:

- A decrease in area of the site of approximately 600m² representing an overall decrease of 0.003%. This decrease relative to the total area of the site is negligible.
- An increase in the total GFA to be accommodated within the Barangaroo site of 41,946m², representing an overall increase in GFA of 7.4%. The increase in GFA is relatively minor and strengthens the achievement of the original strategies discussed further below.

- An increase in the residential GFA of 54,237m². The increase equates to a 7% increase on the Barangaroo site, and is therefore considered minor relative to the GFA proposed for the site. The increase takes the maximum residential proportion from 23% to 30% and will still result in Barangaroo being a predominantly non-residential precinct.
- The relocation of Block Y from a public pier extending into the harbour, back onto the area of the site in front of the existing Blocks 4A, B and C, which is currently zoned RE1 Public Domain. Concept Plan (Mod 7) included a landmark hotel building, despite its physical relocation and change in form the intent in the Concept Plan for the hotel to be a landmark building remains consistent, and the Concept Plan will continue to provide 11ha of public open space.
- Redistribution (both increases and decreases) of the maximum permitted building heights within Development Blocks 1, 4A-C and Y. In Block Y the height maintains the hotel building's prominence as a landmark building. In Blocks 4A – C there continues to be there residential towers of varying heights that respond to the visual and built form relationship with the landmark hotel building.
- The size of the Southern Cove (Watermans Cove) has been amended and its location modified. Watermans Cove is generally within the same location on the site and the deep water part of the cove is of similar dimensions to approved cove.
- The provision of a 'gaming facility' has been included within the definition of Tourist Uses. A gaming facility was always permissible within the B4 Mixed Zone, however it has been included within the definition of Tourist Uses in order to clarify how it should be treated under the Concept Plan as part of any future application of a gaming facility on the site.

Whilst there are physical changes, relevantly, the Concept Plan, as approved, establishes a planning framework that has, as an overarching objective, the delivery of:

- Large floor plate commercial buildings that are in high demand amongst major tenant organisations and difficult to achieve within the existing Sydney city footprint.
- Conditions which allow the opportunity to capture regional and global headquarters and conversion into net investment and employment growth with significant long term benefits to the State and its economy.
- Opportunity for a new high value economic cluster to emerge based on existing strengths in the global economy.
- A commercial precinct at Barangaroo that reads as an organic extension of the existing CBD, offering a distinctly contemporary expression of urbanity with an emphasis on sustainability, walkability and village life.
- Sufficient housing and community related infrastructure into the precinct to reinforce the knitting of Barangaroo into the mainstream Sydney life and commerce.
- Hotel facilities that will attract patronage to the precinct on a "counter cyclical" basis to the commercial office space to add vibrancy to the area and to add to the range, diversity and availability of communal spaces for people in the precinct to meet, interact and collaborate as an extension to the workplace.
- Higher density development focussed towards the southern end of the site, linking into existing higher density development at King Street Wharf and the western edge of the CBD. The scale of development will reduce towards the northern end of the site, where built form meets the Headland Park.

Any modification proposal that seeks to provide additional GFA at Barangaroo to support and / or strengthen implementation of the above strategies would, be clearly within the scope of the development concept as contemplated and approved by the Minister as part of the Concept Plan. Therefore the actual quantum of GFA proposed is of lesser significance in this circumstance than is the question of whether or not the resultant development will nonetheless deliver upon the underlying objectives of the Barangaroo Concept Plan, as approved.

Barangaroo is a major renewal project intended to extend the footprint of the City of Sydney CBD by the creation of an entirely new and significant (in terms of GFA) precinct that creates commercial growth opportunities for the CBD, reinforces Sydney's competitiveness in the Pacific Rim and creates new cultural destinations for visitors.

The proposed modification under Concept Plan (Mod 8) will be of limited environmental consequence when compared to Concept Plan (Mod 7) having regard to the impacts assessed within this PPR (including within section 2) and the exhibited EAR and accompanying technical reports.

For the reasons set out above, it is open to the Minister to be reasonably satisfied that the Concept Plan (Mod 8) application is a modification that falls within the scope of section 75W.

3.0 Preferred Project

In response to the Department's preliminary assessment, and as a result of the ongoing design process, Lendlease has taken the opportunity to make some minor amendments to the exhibited scheme. The changes are outlined in Section 3.1 and a summary of the Modification for which approval is sought is provided at Section 3.2.

3.1 Changes to the Exhibited Modification

3.1.1 Watermans Cove and the Public Pier

The approval of the Ferry Hub and the emergence of a more final and detailed design for Watermans Cove has led to a reorientation of the pier as compared to that proposed in the exhibited Modification Application.

The previous angle of the structure was at odds with the now approved ferry wharves, and while the separation distance required was achieved, the opportunity has been taken to adjust the alignment of the pier to provide consistency with the ferry wharves.

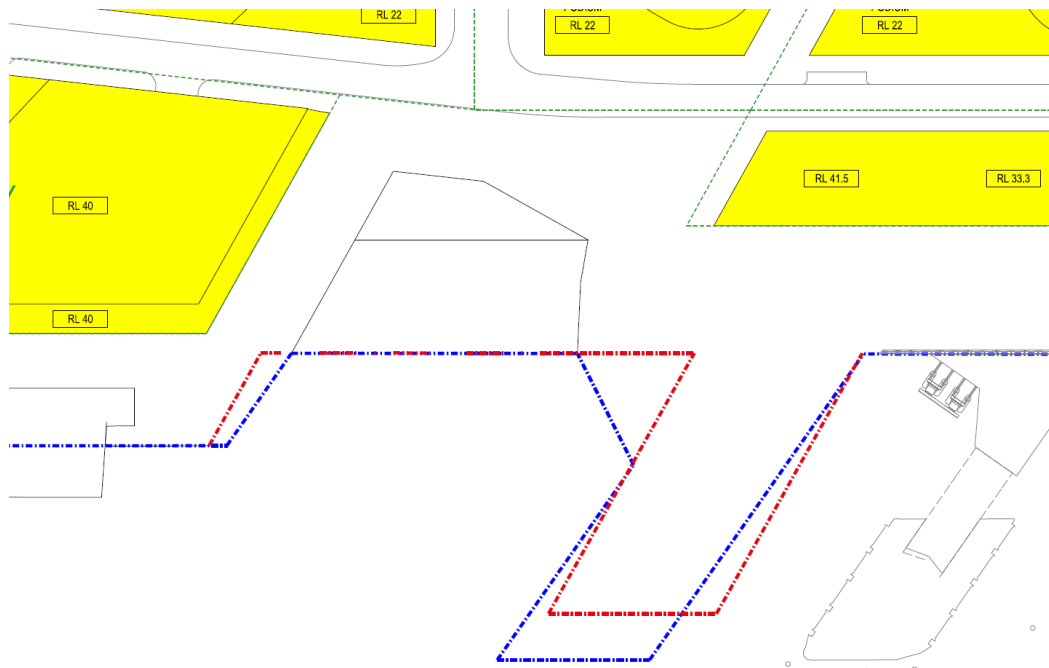
The Navigation Report Addendum prepared by Royal Haskoning (see **Appendix F**) supports the proposed refinement to the design from a navigation point of view.

Just as the ferry wharves incorporate a wide angled section on their northern side, the same form has been provided for the Pier. The purpose of this additional area is twofold. Firstly, the angled area provides a consistency of approach with the Ferry Wharves. Secondly, the revised boundary caters for appropriate design flexibility for the Watermans Cove (to be supported by a future Development Application). This change would allow for the cove to take on a form that can be directly integrated with the pier itself.

The community building located on the public pier will continue to be a maximum of 3 storeys with an approximate height of RL 17.

The Barangaroo site boundary has been adjusted slightly in order to accommodate a minor change to the proposed Public Pier. **Figure 1** illustrates the difference between the site boundary as shown in the Exhibited EAR and this PPR. **Figure 2** and **Appendix L** provides an updated version of the Building Envelope Plan.

The final Major Development SEPP and State and Regional Development SEPP maps will also be updated to reflect the revised site boundary.



LEGEND

- Exhibited Modification Site Boundary
- PPR Site Boundary

Figure 1 – Difference between the exhibited EAR and PPR Concept Plan (Mod 8) site boundary

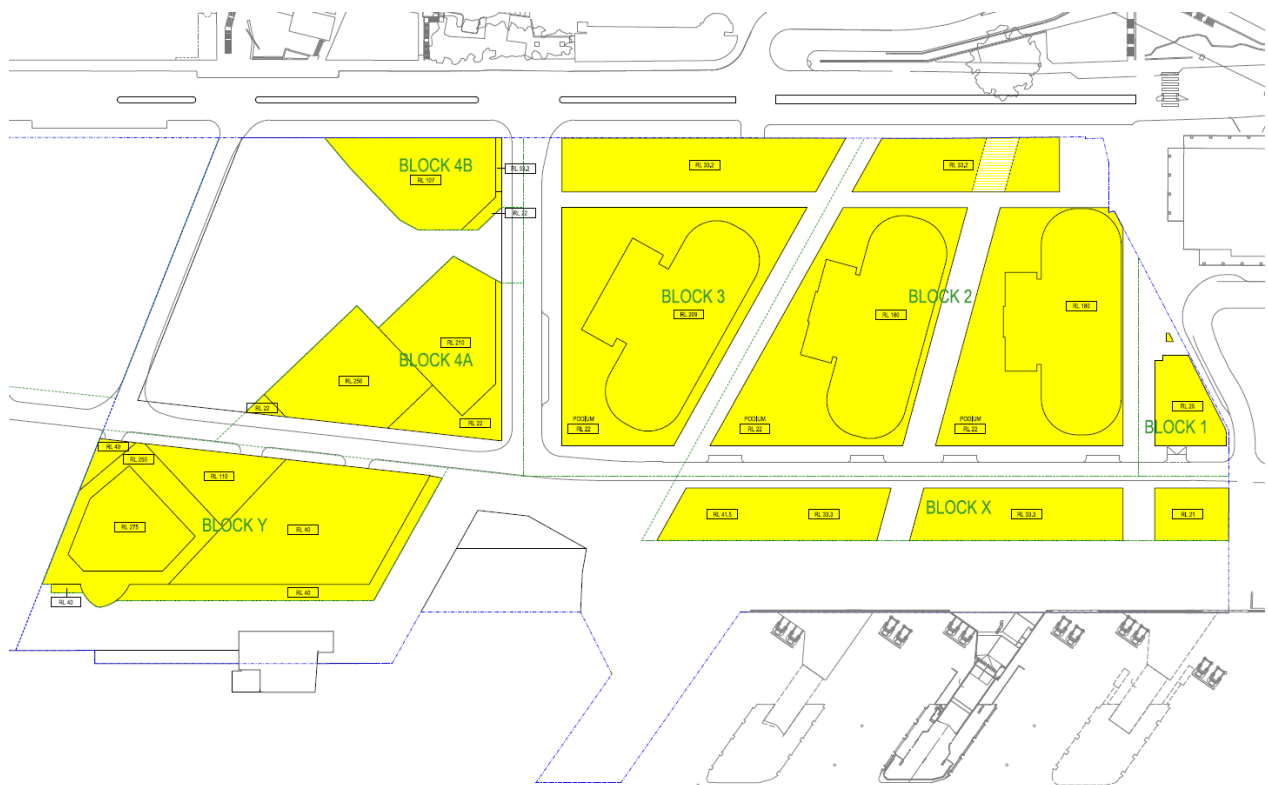


Figure 2 – Concept Plan (Mod 8) Building Envelope Plan

3.1.2 Revisions to the Barangaroo Design Guidelines

In response to the Department's preliminary assessment, a number of revisions have been made to the Design Guidelines. The changes include:

- Section 3.0, Table 1, 'Movement': additional characteristic added for *"Hickson Park to have a physical connection through and between the surrounding buildings to the waterfront."*
- Section 4.1, Performance Criteria: the following sub-point point has been added under the criteria to provide an integrated public open space and public domain network that includes: *"physical and visual connection between Hickson Park, Wulugul Walk and the adjoining Central Barangaroo to provide public access and view corridors."*
- Section 4.2, Table 2, 'Hickson Park': additional characteristic added: *"Promotes public accessibility, use and meaningful connections to the surrounding public domain, including Wulugul Walk"*
- Section 5.1.2: New Performance Criteria and Design Solution for winter gardens, including criteria for when they can be excluded from GFA:

Performance criteria		Design solution	
PC	<i>Apartments have access to useable outdoor open space. For apartments in towers, this takes the form of wintergardens to minimise the adverse impacts of wind at higher elevations. Wintergardens are of a high architectural design quality and are integrated with the design of the building</i>	DS3	<p><i>Wintergardens are encouraged in high-rise buildings where wind impacts do not support the provision of balconies. In such circumstances, wintergardens may not be considered GFA if they:</i></p> <ul style="list-style-type: none"> <i>a. are designed and constructed as a private external balcony with drainage, natural ventilation and finishes acceptable for use as an outdoor/indoor wintergarden space; and</i> <i>b. adopt transparent materials that maximise daylight access and views. Any non-transparent materials must not exceed a height of 1.4m</i>

The Guidelines have also been updated to reflect the final street and place names for Barangaroo South, recent amendments to SEPP 65, and the changes to the shape of Watermans Cove and the Public Pier outlined in Section 3.1.1 above.

3.1.3 Revised Statement of Commitments

In light of the recent amendments to SEPP 65 it is proposed to delete Statement of Commitments 90 – 97 which relate to residential amenity as they are either inconsistent with or duplicate the State policy.

As SEPP 65 and the ADG apply to the site (and are also referenced in the Design Guidelines) the deletion of these commitments will have no impact on the quality of the residential amenity being achieved on the site and importantly will remove confusion as to which standards apply during the detailed assessment of applications.

A revised Statement of Commitments is included at **Appendix K**.

3.2 Summary of Preferred Project

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 VIP gaming facility);
- 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 7.74ha 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. Whilst the total area of the Southern Cove has been reduced, the deep water harbour section remains approximately the same. Concept Plan (Mod 8) also serves to enhance the activation of the Southern Cove area with building frontages now provided on 3 sides.
- 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 up to 3,000m², with a maximum of 1,000m² of retail uses.
- The maximum tourist uses GFA permitted has been increased to 59,000m² and is 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 11ha of new public open space / domain on the Barangaroo site, with 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 residential 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)¹;
 - a maximum of 76,000m² of tourist uses GFA², 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.

Concept Plan (Mod 8) does not propose any amendments to Central Barangaroo or Barangaroo Point.

The proposed modifications to the Concept Plan depart from the existing development controls for the site established under the Major Development SEPP.

A 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;

¹ Residential uses include residential accommodation, multi unit housing, residential flat buildings, seniors housing, shop top housing and boarding houses, as defined in the Major Development SEPP and the Department Standard LEP Template and includes serviced apartments in separate ownership and titles (strata titled)

² Tourist uses include backpacker's accommodation, bed and breakfast accommodation and, hotel accommodation and serviced apartments, as defined in the Major Development SEPP and the Department Standard LEP Template, but does not include serviced apartments, unless they are in single ownership and title (no strata titling).

- 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.

In addition the changes to the site boundary necessitate an update to the Maps included in the State and Regional Development SEPP and Sydney Harbour SREP.

4.0 Conclusion

Lendlease has considered and responded to the issues raised in public, agency and council submissions and undertaken some design refinements to improve the overall development. The key amendments this PPR proposes to the Concept Plan Modification as exhibited include:

- amendments to the design of Waterman's Quay and the Public Pier to provide for an enhanced public domain experience and reflect the design of the approved Ferry Hub; and
- revisions to the Barangaroo South Design Guidelines to reflect feedback from the Department and the changes to Waterman's Quay and the Public Pier.

As outlined in the exhibited Concept Plan Modification EAR and this PPR, Concept Plan (Mod 8), the Major Development SEPP amendment and the State and Regional SEPP amendment enable the ongoing development of Barangaroo South as a world class mixed use precinct on prime waterfront land. Concept Plan (Mod 8) seeks to satisfy the findings of the Barangaroo Review, particularly through the relocation of the landmark hotel building from the pier on the water onto land within Barangaroo South. The modified design presents an appropriate built form and public domain outcome for the Barangaroo South site.

The Modification as proposed by the exhibited Concept Plan Modification EAR and this PPR will deliver a refined public domain and southern cove, both shaped to cater for special events. Concept Plan (Mod 8) increases the amount of open space on the waterfront, enhancing the usability of the space and the attraction of the waterfront for public uses. The community building, to be located on the public pier, will further reinforce the public ownership of the waterfront through providing 2,000m² of community floor space.

Based on the preceding assessment within this PPR and the exhibited EAR and the accompanying technical reports, it has been determined that on balance there are limited environmental impacts beyond those originally assessed and determined to be acceptable in the approved Concept Plan (Mod 7). The potential environmental impacts associated with Concept Plan (Mod 8) are manageable and where necessary, appropriate mitigation measures can be provided in the detailed stages of development for Barangaroo South.

In light of these planning merits, it is recommended that the Modification be approved.

Detailed Reponse to Submissions

JBA / Lendlease

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Response to Department, Agency and Council Submissions

Key Issues Raised		Lendlease Response
Department of Planning and Environment		
1	<p>Public Benefit</p> <p>The public benefits arising from the development of Barangaroo South are to be reviewed and clearly quantified.</p>	<p>Concept Plan (Mod 8) will offer significant public benefits both directly and indirectly to the wider community, the State of NSW and the Nation as a whole.</p> <p>The increase in floor space proposed under the proposed Modification is attributed to the landmark hotel building. The H1 Hotel building is intended to be operated by Crown Resorts as a world class six-star hotel resort. This building will also incorporate world-class VIP gaming facilities in addition to luxury apartments, first-class restaurants, bars, retail outlets, pool and spa facilities and conference rooms. The iconic building will be a new landmark for Sydney and will significantly contribute to the NSW and Sydney tourism economy.</p> <p>There is expected to be flow on public benefits of this contribution to the tourism economy, with direct increases in employment and training opportunities. Other less tangible benefits will also result from the establishment of a new iconic building on Sydney's waterfront which provides new definition to Sydney's CBD.</p> <p>A summary of the benefits of the new iconic hotel development are provided below:</p> <ul style="list-style-type: none"> ▪ Enable Sydney to capitalise on the growth in Asian tourism, particularly high net worth and luxury focused tourists from China; ▪ Assist the NSW Government in meeting its objective of making Barangaroo an active and vibrant destination, with both a daytime and a night-time economy; ▪ The operation of the hotel will result in the creation (direct and indirect) of approximately 2,300 and 3,300 additional jobs during construction and 1,250 direct jobs post construction; ▪ Employment and training opportunities are to be established in Western Sydney and the inner city to offer staff targeted training. These training opportunities will include apprenticeship and schools-based traineeship programs and training for Indigenous Australians; ▪ Increasing the attractiveness of Sydney as a location for major domestic and international events; ▪ Encourage increased visitor/tourist spend both within the new development and in Sydney; ▪ Contribute to the identified shortage in hotel accommodation in Sydney through directly increasing the number of available rooms; ▪ Establishment of a new iconic and defining building on Sydney's waterfront land, contributing to redefining the world perception of Sydney and offering the community a stronger sense of place and pride in Sydney as a global city. <p>In addition to those direct public benefits listed above associated with the provision of the Landmark Hotel Building, Concept Plan (Mod 8) will also result in the following additional public benefits:</p> <ul style="list-style-type: none"> ▪ The Project Development Agreement (PDA) signed between the NSW Government and Lendlease provides for significant land payments to the NSW Government for development rights at regular intervals through the life of the development. Due to the increase in development potential associated with Concept Plan (Mod 8), the quantum of land payments under the PDA also proportionally increases resulting in a direct economic benefit to the State. ▪ Due to the increase in residential GFA contemplated in Concept Plan (Mod 8), the provision of Key Worker Housing will also proportionally increase (see Section 2.2).

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised	Lendlease Response
	<p>Noting the additional public benefits proposed as part of Concept Plan (Mod 8) above, it is important to recognise the role of the Modification in contributing to the on-going overall public benefit of the Barangaroo South development. A selection of these benefits include:</p> <ul style="list-style-type: none"> ▪ Regeneration of derelict and inaccessible waterfront into a vital and vibrant mixed use precinct, open to the public 24 hrs a day. ▪ Provision of public domain on the Barangaroo South site as works in kind, including new bridge pedestrian connections over Hickson Road and the creation of Waterman's Cove. ▪ Lendlease are providing \$40 million for public art. \$20 million of which will be spent within the Barangaroo South site, with the remainder provided to the BDA for allocation throughout all of Barangaroo. ▪ Amelioration of the under capacity drainage network and flooding issues in the northern part of the City through construction of major trunk drainage in Hickson Road (complete). ▪ Upgrade of Hickson Road to address flooding issues, create improved public-private interfaces on both sides of the street, and to improved landscape and public amenity. The works will also include additional bicycle parking, car parking and space for taxis. ▪ Contributions of 1% of development cost are paid by the developer. ▪ The Concept Plan provides for a minimum of 12,000 sqm of Community uses spread throughout the entire Barangaroo area. Concept Plan (Mod 8) will see the provision of a minimum of over 7,000 sqm in community uses GFA, including a standalone building on the proposed pier, in Barangaroo South alone. ▪ Significant employment opportunities have been created both during and post construction. In particular, development of the site by Lendlease has involved the creation of the Barangaroo Skills Exchange (BSX), which is a joint initiative of Lendlease and the Western Sydney Institute of TAFE. As of 31 July 2015, the BSX has resulted in 12,089 accreditations including 544 indentured apprentices and 125 non-indentured trade qualifications. It is also envisaged that the BSX will continue to offer training opportunities for the local community after completion of the Barangaroo South development by Lendlease. ▪ The development proposal being delivered by Lendlease on the site has been referenced extensively by State and Commonwealth Government Agencies in generating increased local and international investment in NSW and Australia and is specifically identified in the State Government's Plan for Growing Sydney as having a significant role in achieving the strategic direction to make the Sydney CBD internationally competitive.
<p>Consideration is to be given to opportunities to provide further public benefits (on-site and/or off-site) commensurate with the proposed uplift in development yield. This may include the provision of increased affordable housing. The range of public benefits should be based on a clear identification and assessment of the social impacts that are directly related to the project and identify measures to enhance the positive impacts and strategies to avoid, manage, mitigate or offset potential impacts.</p>	<p>The previous section outlines the substantial public benefits arising as a result of Lendlease's development of the site and of MOD 8 specifically. As noted above, an increase in the development potential under MOD 8 results in a proportional increase in the provision of key worker housing, land payments to the NSW Government, employment opportunities, investment, tax revenue etc.</p>

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised	Lendlease Response
<p>The Statement of Commitments is to be revised to include any new commitments that are outcomes-focused and relevant to social impacts.</p>	<p>There are no changes to the existing Statement of Commitments in this regard as all matters relating to the increase in commitments relevant to social impacts are already included in an increase in the provision of KWH and monetary contributions for increased development under the PDA.</p> <p>It is noted that as part of the EIS for the Crown Sydney Hotel Resort DA that Crown propose to integrate responsible gambling procedures, staff training and support services (in conjunction with Mission Australia and/or other charity providers) for the hotel resort. Crown also propose to maintain a robust Health and Safety Management System to mitigate against any potential health impacts and issues arising from shift work.</p>
<p>Additionally, confirmation is to be provided in relation to the following:</p> <ul style="list-style-type: none"> Section 9.13 of the EIS suggests that affordable housing may be provided not only in Barangaroo South but the wider Sydney CBD. If it is the intention to satisfy the affordable housing obligations off-site, details should be provided to confirm this arrangement. 	<p>There is no intention to satisfy Key Worker Housing obligations outside of the Barangaroo South site. The longstanding commitment to Key Worker Housing has been focused on a location near or adjacent to Hickson Road. Of the remaining buildings, only R5 or C1 have the potential to accommodate the use. While both buildings have potential under the Concept Plan, the current proposal involves locating Key Worker Housing in the Renzo Piano designed R5 building.</p>
<ul style="list-style-type: none"> The proposed increase in GFA and the current commitment to provide 2.3% of GFA in the form of affordable housing alone would equate to the provision of approximately 3,542sqm of affordable housing GFA or some 50-70 dwellings, dependent on unit mix. In line with the above, the location and mix of housing to be provided should be confirmed 	<p>The commitment is to provide <i>Key Worker Housing</i> at 2.3% of Residential GFA on the site. Given that the proposed residential floorspace on the site has been increased to a maximum of 154,000 sqm, Lend Lease's total commitment of Key Worker Housing GFA will also proportionally increase to approximately 3,542 sqm, assuming the full GFA cap is reached. As stated above it is likely that the KWH will be provided in Building R5 as part of that application a mix of KWH dwelling types will be provided.</p>
<p>Built form/Urban Design</p> <p>Plans (floor plans and elevations) should be provided for the indicative building form proposed for Blocks 4A, 4B and Y and should demonstrate that the built form conforms with the proposed building envelopes.</p>	<p>The Planning Application for the Hotel (proposed Block Y) has now been lodged and contains specific information regarding the manner in which the proposed building is accommodated within the Concept Plan MOD 8 envelopes. The design of the residential towers within Blocks 4A and 4B by Renzo Piano Building Workshop is now well advanced and nearing the point of a Planning Application. Building floorplans have been prepared for each of the blocks (4A, 4B and Y) to illustrate the intended form of each building to be assessed in separate applications. Additionally, elevations and 3 dimensional views of each building within the context of Concept Plan MOD 8 envelopes has also been prepared. The package of indicative plans and 3Ds has been included at Appendix C for information purposes only. In addition Lendlease can provide the Department with the Building Envelope Diagram and proposals in CAD format with MGA coordinates in order to allow the Department to undertake its own assessment of the future buildings' consistency with the building envelopes.</p>

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised		Lendlease Response																		
The total GFA of these indicative buildings should be confirmed. The GFA proposed to be allocated to wintergardens should be provided as a separate GFA figure.	Wintergardens are proposed only in block's R4A and R4B, in the residential towers being designed by RPBW. Concept Plan MOD 8 seeks to exclude wintergardens from the calculation of permissible residential GFA on the site. Nonetheless, a breakdown of the current allocation of floorspace to wintergarden and typical residential use for each of the buildings is contained in the table below.																			
	<table><tr><th>Building</th><th>Total GFA (including Wintergarden) (m²)</th><th>Potential Wintergarden GFA (m²)</th></tr><tr><td>R4A</td><td>47,676</td><td>2,759</td></tr><tr><td>R4B</td><td>38,760</td><td>2,285</td></tr><tr><td>R5</td><td>19,091</td><td>116</td></tr><tr><td>Hotel</td><td>77,500</td><td>0</td></tr><tr><td>Total</td><td>183,027</td><td>5,160</td></tr></table>		Building	Total GFA (including Wintergarden) (m²)	Potential Wintergarden GFA (m²)	R4A	47,676	2,759	R4B	38,760	2,285	R5	19,091	116	Hotel	77,500	0	Total	183,027	5,160
	Building	Total GFA (including Wintergarden) (m²)	Potential Wintergarden GFA (m²)																	
	R4A	47,676	2,759																	
	R4B	38,760	2,285																	
	R5	19,091	116																	
Hotel	77,500	0																		
Total	183,027	5,160																		
A final set of drawings which illustrate the Barangaroo Masterplan South Concept Plan, the development blocks and the indicative building envelopes should be prepared. Any inconsistencies between the building envelope design and urban structure drawings in the proposed Barangaroo South Design Guidelines and the Barangaroo Masterplan South Concept Plan should be corrected.																				
The proposed drawings for Development Blocks and Building Envelopes have not been altered within this Response to Submissions/Preferred Project. All proposed buildings constituting the Indicative Design are located wholly within these blocks and envelopes (See Appendix C). A revised version of the Barangaroo South Design Guidelines has been prepared. The Blocks and Envelopes are consistent with those Guidelines (see Appendix D).																				
Further consideration should be given to amending the Barangaroo Masterplan South Concept Plan and the Design Guidelines to maximise the permeability through the podium of Block Y as it sits between the new Northern Park/Lime Street and the waterfront. A design response which opens-up the podium to the public and improves east-west connectivity should be considered.	The Barangaroo South Design Guidelines have been amended to include a guideline encouraging permeability through Block Y. While the guideline encourages pedestrian links to be provided through the building, they will be managed by the building owner. Notably, a Development Application for the Crown Sydney Resort has now been lodged and includes both east-west and north-south pedestrian routes through the building, which are intended to be open and available 24 hrs a day.																			

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised		Lendlease Response																																							
	Justification is to be provided for the public pier (and the community building) being built over the harbour, in light of the recommendations of the 2011 Barangaroo Review.	<p>The Barangaroo Review noted that the Concept Plan approval for a hotel on a pier located in Darling Harbour was valid. The Review also encouraged the NSW Government and Lendlease to investigate the relocation of the hotel elsewhere on the site (which is now the principal catalyst for MOD 8):</p> <p><i>While Lend Lease has zoning and Concept Plan approval for the hotel in the harbour, this Review suggests that it would be a significant demonstration of goodwill to relocate the hotel to else where on the site.</i></p> <p>Nowhere in the 2011 Barangaroo Review regard the discussion of the hotel is it highlighted that the pier, as a public element, should be considered in the same light. The pier was always primarily a public domain element, which happened to have a hotel located centrally on it. The change envisaged in MOD 8 maintains public access to the structure as a key element of the public domain providing a “over water” experience unique to Barangaroo. Rather than a Hotel, MOD 8 proposes a community building, supportive of the idea of the pier being a key component of the public domain experience of the Barangaroo site.</p>																																							
	Alternative sites considered for the provision of community GFA are to be provided.	<p>The Concept Plan requires a minimum of 12,000m² of Community Uses GFA be provided on the Barangaroo site. Community Uses GFA are defined in the currently approved Concept Plan and may be provided within both B4 and RE1 zoned areas – essentially, all parts of Barangaroo South are a potential location for Community Uses. As noted above, it is entirely appropriate that the pier, as a central focus of the public domain, also include a community facility. The current allocation of Community Uses on the Barangaroo South site (both approved and currently proposed) is detailed in the table below.</p> <table> <tr> <th>Community Use</th><th>Area</th><th>Comments</th></tr> <tr> <td>Child Care Centres</td><td>1,453</td><td>Approved in C3</td></tr> <tr> <td>Community Facility</td><td>3,650</td><td>Approved in R7 and subject to Planning approval in C5 and the RE1 Zone</td></tr> <tr> <td>Entertainment Facility</td><td>0</td><td></td></tr> <tr> <td>Information & Education Facility</td><td>0</td><td></td></tr> <tr> <td>Landside Ferry Facility</td><td>337</td><td>Approved in R7</td></tr> <tr> <td>Place of Public Worship</td><td>0</td><td></td></tr> <tr> <td>Public Administration Building</td><td>0</td><td></td></tr> <tr> <td>Public Hall</td><td>0</td><td></td></tr> <tr> <td>Recreation Facility</td><td>1,689</td><td>Proposed/approved in C3 and R7</td></tr> <tr> <td>Subtotal (GFA)</td><td>7,129</td><td></td></tr> <tr> <td>Recreation Area (non GFA)</td><td>23,817</td><td></td></tr> <tr> <td>TOTAL</td><td>30,946</td><td></td></tr> </table>	Community Use	Area	Comments	Child Care Centres	1,453	Approved in C3	Community Facility	3,650	Approved in R7 and subject to Planning approval in C5 and the RE1 Zone	Entertainment Facility	0		Information & Education Facility	0		Landside Ferry Facility	337	Approved in R7	Place of Public Worship	0		Public Administration Building	0		Public Hall	0		Recreation Facility	1,689	Proposed/approved in C3 and R7	Subtotal (GFA)	7,129		Recreation Area (non GFA)	23,817		TOTAL	30,946	
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Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised	Lendlease Response
The future use of Pope's Landing should be confirmed.	The "Pope's Landing" is not part of the Barangaroo site. The Concept Plan envisages an expansion of the waterfront promenade by 5m to the west as part of the holistic solution of accommodating the hotel. This area is located entirely over "land" that is owned by the NSW Government through RMS and will in part extend onto the Pope's Landing. The use of this, and other RMS controlled area will be subject to RMS approvals in the future.
A visual impact assessment is to be submitted analysing the visual impact of the public pier and the community building on the visual connectivity of the foreshore (i.e. views to south and north) and on views to the Barangaroo Ferry Hub.	The potential community building has not yet been designed, and therefore the visual impact on the visual connectivity of the foreshore and on views to the Ferry Hub cannot be accurately completed at this time. However, the approval of the Ferry Hub and the emergence of a more final and detailed design for Watermans Cove has led to a reorientation of the pier as compared to that proposed in the exhibited Modification Application. The previous angle of the structure was at odds with the now approved ferry wharves, and while the separation distance required was achieved, the opportunity has been taken to adjust the alignment of the pier to provide consistency with the ferry wharves. Just as the ferry wharves incorporate a wide angled section on their northern side, the same form has been provided for the Pier. The purpose of this additional area is twofold. Firstly, the angled area provides a consistency of approach with the Ferry Wharves. Secondly, the revised boundary caters for appropriate design flexibility for the Watermans Cove (to be supported by a future Development Application). This change would allow for the cove to take on a form that can be directly integrated with the pier itself. The community building located on the public pier will continue to be a maximum of 3 storeys with an approximate height of RL 17.
In addition to the above, the impact of the Public Pier on safety and navigation of the Barangaroo Ferry Hub is to be fully assessed by a suitably qualified expert.	The position, shape, size and location of both the Pier (as revised) and the proposed Water Taxi pontoon have been investigated by Royal Haskoning in relation to the Barangaroo Ferry Hub refer to Appendix E . The Report concludes that the location and size of the pier (as revised) and Water Taxi Pontoon will not have any adverse impact on the Ferry Hub.
Further consideration should be given to both the Barangaroo Masterplan South Concept Plan and the Design Guidelines to ensure that the new Northern Park, Barangaroo Central and the waterfront is visually and physically connected in order to improve public access and view corridors.	The Barangaroo South Design Guidelines have been amended (see Appendix D) to include a guideline encouraging visual and physical connection along the waterfront within Barangaroo South.
The Design Guidelines should be amended to include provisions to ensure that the design of the new Northern Park promotes public accessibility, use and meaningful connections to the surrounding public domain, including the foreshore.	Objectives regarding the creation of meaningful connections are noted and are fundamental criteria for public domain design and a future planning application. The Barangaroo South Design Guidelines have been amended (see Appendix D) to include a guideline that promotes public accessibility and use of meaningful connection to the surrounding public domain, including the foreshore.

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised	Lendlease Response
<p>Further consideration should be given to the design guidelines for Block 4B to provide an appropriate design response to reflect the lower building heights established for the site along Hickson Road. Justification for any change in design rationale should be provided.</p>	<p>No changes to Block 4B are proposed. The key elements that informed the proposed design and demonstrate why the Block 4B design is appropriate are as follows:</p> <ul style="list-style-type: none"> ▪ In order to maintain public domain area with the accommodation of the Crown project, the residential towers have become taller and have shifted southward into a more constrained area. ▪ Building separation in this northern part of the site is a key consideration, which has resulted in a need for R5 to move to the boundary. ▪ The width of Hickson Road, at 30m is significantly greater than most other streets in the city. This consequently provides for a building separation that is in excess of the general precedent. ▪ There is a continuity of the colonnade and podium levels along the entire street, so the pedestrian experience is maintained. ▪ A taller building aligned on the boundary combines with the KPMG Building on the south of the site to “bookend” the Barangaroo South development ▪ Low level views (up to 10 storeys) are improved along Hickson Road with the removal of around 50% of the continuous 10 storey frontage of the site to Hickson Road and replacement with a new park. ▪ R5 is scaled to relate directly to the Kent Street buildings.
<p>Further consideration should be given to the modelling of Block 4 to reduce impacts on the Sydney Observatory by way of increased light spill and by blocking views of key objects in the night sky at certain times of the year.</p>	<p>No changes to Block 4 are proposed. While it is noted that there is an impact on the ability to view a limited set of target objects from the Sydney Observatory, it is considered that the impact is limited and may be appropriately mitigated through the manner in which viewing sessions are managed and the selection of objects targeted for viewing. A further two reports have been commissioned from an acknowledged astronomy expert as part of this Response to Submissions (see Appendix F and Appendix G). The first report details the impact of the building envelope within which the Crown Sydney Hotel Resort is to be located. The second specifically addresses the issues raised in the Observatory’s submission to the project exhibition. This report maintains the view that impact is limited to only a small portion of the year and for only limited portions of the viewing times. The report additionally highlights that weather conditions, Bright of Moon, existing urban conditions and the nature of the Observatory’s instruments provide mitigating considerations in this respect. Additionally, the report reiterates the view that viewing sessions may be organised to target alternative objects in order to maintain a high quality viewing experience and suggests a range of alternative targets in this respect.</p>

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised	Lendlease Response
<p>The precise quantum of the public domain allocated to laneways, streets, the foreshore promenade, open space (parkland) and artificial waterbodies should be clarified in order to confirm compliance with Condition A1(2) of the Barangaroo Concept Plan approval which requires that "approximately 11 hectares of new public open space/public domain with a range of formal and informal open spaces serving separate recreational functions and including an approximate 2.2km public foreshore promenade".</p>	<p>The approved Concept Plan incorporates a commitment to provide approximately 11 ha (50%) of Open Space on the Barangaroo Site. The preparation of the Concept Plan and indicative design has had the maintenance of public domain as a key objective for relocation of the hotel to a land based location.</p> <p>Mod 8 provides for 11.9ha of RE1 zoned area across the Barangaroo site, which represents 54% of the total site area. Within Barangaroo South, the area of RE1 zone has been reduced as a result of accommodating a larger site area for the hotel. The site area of the hotel has essentially been "extracted" from the previous area of water such that the public domain area (exclusive of water bodies) has been maintained and slightly increased at 53%. A breakdown of public domain areas is provided in the table below, which compares that present at MOD 4 and that proposed in MOD 8.</p> <p>It is also considered that the proposed Concept Plan MOD 8 in fact better responds to Condition A1(2) in that a portion of the waterfront parkland that was present across the entire site north from the Cove has been relocated closer to Hickson Road and provides a larger and distinct alternative to what might be considered a singular public domain experience for the site. Additionally, the proposed Hickson Park is afforded significant solar access, particularly in winter, and offers protection to pedestrians and visitors from the cold southerly and south westerly winds prevalent in Winter. Revised shadow diagrams have been prepared to illustrate the Indicative design for both Barangaroo South and the Central Precinct (see Appendix H).</p>

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised		Lendlease Response																																																							
	The land-based and water-based areas of the overall Barangaroo site should be quantified resulting from the Headland Park's naturalistic shoreline, artificial water bodies, the relocated pier, the western extension of the promenade into Darling Harbour and the relocation of the hotel.	Areas of all features on the Barangaroo South site have been mapped and quantified, including changes to the water bodies. The table below provides a comparison of public domain area between MOD 4 and MOD 8:																																																							
		<table><tr><th></th><th colspan="2">Concept Plan Mod 4</th><th colspan="2">Concept Plan Mod 8</th></tr><tr><td>Total Site Area</td><td>78,000m2</td><td>100%</td><td>77,385m2</td><td>100%</td></tr><tr><td colspan="5"></td></tr><tr><td>Element</td><td>Area</td><td>%</td><td>Area</td><td>%</td></tr><tr><td>Buildings</td><td>31,000m²</td><td>40%</td><td>35,200m²</td><td>45.4%</td></tr><tr><td>Water</td><td>Deep Water Cove Surface Water Feature</td><td>2,000m² 4,700m²</td><td>2.5% 6.5%</td><td>1,550m² </td><td>2.0%</td></tr><tr><td>Parks, Squares & Promenade</td><td>24,500m² Additional Promenade Subtotal:</td><td>31% 31%</td><td>23,285m² 1,375m² 25,660m²</td><td>30.0% 1.8% 33.0%</td></tr><tr><td>Streets & Lanes</td><td>15,800m²</td><td>20%</td><td>15,975m²</td><td>20.6%</td></tr><tr><td colspan="2"></td><td>100%</td><td></td><td>100%</td></tr><tr><td>Total Accessible Public Domain (including streets & lanes)</td><td>40,300m²</td><td>52%</td><td>41,635m²</td><td>53.6%</td></tr></table>						Concept Plan Mod 4		Concept Plan Mod 8		Total Site Area	78,000m2	100%	77,385m2	100%						Element	Area	%	Area	%	Buildings	31,000m ²	40%	35,200m ²	45.4%	Water	Deep Water Cove Surface Water Feature	2,000m ² 4,700m ²	2.5% 6.5%	1,550m ² 	2.0%	Parks, Squares & Promenade	24,500m ² Additional Promenade Subtotal:	31% 31%	23,285m ² 1,375m ² 25,660m ²	30.0% 1.8% 33.0%	Streets & Lanes	15,800m ²	20%	15,975m ²	20.6%			100%		100%	Total Accessible Public Domain (including streets & lanes)	40,300m ²	52%	41,635m ²	53.6%
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The reduction in the size of Globe Square should be quantified and justified from an urban design perspective		Globe Square has not been reduced in size. The current approved area of the space under Concept Plan MOD 7 is approximately 1,750m ² , within which a community building is currently proposed. The proposed area of the equivalent space adjacent to Watermans Cove is 1,800m ² .																																																							
Details should be included in the Design Guidelines for wintergardens in order to support their exclusion from the GFA calculations and should include design quality, size restrictions and location/s. It is suggested that consideration be given to the draft provisions for wintergardens currently being prepared by the City of Sydney.		Consideration has been given to the City of Sydney's new provisions for wind effected balconies and additional guidance has been included within the revised Barangaroo South Design Guidelines relating to the design of wintergardens (see Appendix D).																																																							

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised	Lendlease Response
<p>Confirm whether the following structures which are shown on the drawing titled “Barangaroo South Masterplan- Indicative Design” form part of the Concept Plan:</p> <ul style="list-style-type: none"> floating water taxi dock; round water structure (use to also be confirmed) located in Globe Harbour; the structure immediately to the north of R8a (use to also be confirmed); and canopy shelter directly to the east of Globe Square. <p>The Department notes that should these elements form part of the Concept Plan then their proposed use and potential impacts should be relevantly justified, assessed and where relevant, included in the overall GFA.</p>	<p>The design representations in the Concept Plan are indicative only, and are provided to illustrate the potential outcomes that might result from the application of land use controls, heights etc. Design of all elements is progressed through later detailed planning applications.</p> <p>The water taxi pontoon does not form part of the Concept Plan Modification however it is shown as part of the Indicative Design to illustrate a potential outcome that may be generated outside of the Concept Plan. While there is recognition that such a facility may be beneficial to the precinct and that its provision is viewed favourably by Lend Lease, it is however recognised that the facility is located outside of the site’s boundary on “land” owned by RMS. In this respect, there are a number of landowner and operational issues that would need to be satisfied with RMS, Sydney Ports, operators etc that will need to be satisfied prior to formally proceeding. It is considered that at a Concept Plan level it is appropriate to identify the opportunity, with later processes and planning applications to define the detail and delivery. At the appropriate level of the Concept Plan, the Navigation Report prepared by Royal Haskoning already identifies and assesses the facility, noting that impacts are likely to be less than as may be experienced by the current Concept Plan.</p> <p>The round water structure within Watermans Cove is not directly part of the Concept Plan proposal and represents what might be considered a temporary installation for special events, similar in some respects to the Moonlight Cinema or Opera that has been undertaken on a regular basis in other parts of the Harbour.</p> <p>The Canopy structure that appears on some images is an indicative structure that has been under consideration as part of the public domain. As previously noted, design of the public domain will be undertaken through a separate process, and via a separate development application.</p> <p>The structure immediately to the north of Building R8 represents a potential allocation of the GFA proposed for “Active Uses in the Public Domain” that has been present in the Concept Plan since at least MOD 4. There is no commitment to this particular building/structure at this point, and therefore any future proposal and design will be assessed through a separate planning application. Notwithstanding, the floorspace potential of this and other similar spaces has been incorporated within the overall and site specific GFA caps for the project.</p>
<p>Design Guidelines</p> <p>The Design Guidelines should be revised to address the following matters:</p> <ul style="list-style-type: none"> incorporate drawings to illustrate the design intent of the design guidelines, including in relation to building setbacks and potential encroachment into the public domain 	<p>Setback controls are widely used in DCPs as they provide general guidance for built form outcomes on traditional sites which accommodate a single building determined by lot boundaries. However, because of the single ownership and masterplan, and unique geometry and orientation of the envelopes proposed it is difficult to quantify each individual setback provided as part of the Building Envelope Diagram called up in the setback controls. Accordingly it is more appropriate to deal with the built form is controlled by the envelopes. In order to assist the Department Lendlease can provide it with a digital file with MGA coordinates to enable the Department to assess any future building’s consistency with the setbacks that form part of the Building Envelope Diagrams. It is noted that all parts of buildings (with the exception of solar/wind mitigation devices) are to be located within the building envelopes.</p> <p>There is no encroachment into the public domain allowed or contemplated outside of activation provided through licenced retail seating, temporary installations and the like. It is considered that these are all adequately documented in the Guidelines.</p>

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised	Lendlease Response
<ul style="list-style-type: none"> include details for the use and set-out of the waterfront promenade and other public domain areas; 	<p>Design principles for the Waterfront Promenade, Wulugul Walk, have been established with the approval and delivery of the waterfront adjacent to R8 and R9. A similar approach is envisaged for the waterfront adjacent to the proposed Hotel and have been addressed within the Crown Sydney Hotel Resort Planning Application and a future planning application for the public domain. The Guidelines are intended as Built Form Guidelines, replacing those already present in the Concept Plan, and as such detailed requirements for design are not considered appropriate at this stage. Nonetheless, the sections at Appendix C illustrate both the current waterfront promenade and public domain approval adjacent to R8/R9 as well as the waterfront promenade and other public domain proposals adjacent to the proposed Crown Sydney Hotel Resort.</p>
<ul style="list-style-type: none"> quantify setback requirements 	<p>Because of the unique geometry and orientation of the envelopes proposed it is difficult to quantify each individual setback provided as part of the Building Envelope Diagram called up in the setback controls. In order to assist the Department Lendlease can provide it with a digital file with MGA coordinates to enable the Department to assess any future building's consistency with the setbacks that form part of the Building Envelope Diagrams.</p>
<ul style="list-style-type: none"> outline basement parking construction 	<p>Basement parking location and construction methodology is not considered appropriate for Built Form Design Guidelines, given these are focused on above ground appearance and relationships. Additionally, it is noted that basement parking is a permissible use under both the B4 and RE1 zones and that detail of parking requirements is appropriately deferred to future building development applications. The basement contemplates using the same construction methodology as completed the Stage 1A Basement.</p>
<ul style="list-style-type: none"> incorporate relevant design guidelines and provisions for all Blocks within Barangaroo South; and 	<p>All blocks have been addressed within the Design Guidelines. Rather than repetition of individual guidelines across blocks, the approach has been to prepare guidelines that apply in all locations, and then single out the "exceptions" for special attention in particular locations.</p>
<ul style="list-style-type: none"> Incorporate further details to address the other design issues outlined in this submission i.e. in relation to wintergardens and residential design/amenity. 	<p>It is considered that residential design/amenity issues are adequately and appropriately addressed as part of SEPP 65 requirements in respect of individual project applications. The Concept Plan is not seeking approval of individual residential buildings in this respect; it is concerned more with the building envelope and maximum amount of development that may occur on the site. Detailed consideration of residential design and amenity is instead best deferred to the point that design is developed and promulgated, being at the point of future development applications for residential buildings. It is noted the Design Guidelines have been updated to require consideration of the Apartment Design Guide.</p>
<p>The intent of DS31 in Section 5.1 .6 of the Design Guidelines should be confirmed, noting that this design solution permits the tower on Block Y to "come to ground on the western frontage and may penetrate the general western building envelope line by up to 9 metres".</p>	<p>The Design Solution, DS31 has been included to provide for the Hotel Building to come to ground directly in accordance with the design developed for the Crown Sydney Hotel Resort. The form of the Crown Sydney Hotel Resort accommodates a unique and sculptural architecture, developed and adopted through a competition process that has been undertaken concurrently with preparation of the Concept Plan MOD 8 documentation. As relocation of the Hotel, and accommodation of the Crown proposal is underpinning key driver of the Concept Plan Modification proposal, it is considered important that the key design attributes of the building may be accommodated in the Concept Plan approval.</p>
<p>Residential Design A preliminary assessment against the Design Quality Principles of State Environmental Planning Policy 65- Design Quality of Residential Flat Development and the 'rules of thumb' in the Residential Flat Design Code is to be provided to demonstrate that the building envelopes proposed for Blocks 4A, 4B and Block Y are capable of achieving an acceptable design and amenity outcome.</p>	<p>The Concept Plan is not concerned with detailed residential design and amenity. In fact, residential buildings are presented only as an indicative outcome that may be accommodated within the building envelopes that form one of the key elements of the Concept Plan. In this respect, the application of the Residential Design Code can only be addressed in a cursory nature. Detailed assessment is best deferred to subsequent Development Applications, where a developed proposal exists to allow testing. A basic assessment at the scale of the building envelopes has however been undertaken, and forms part of the PPR. Additionally, the Crown Sydney Hotel Resort Development Application has now been lodged and includes a fulsome assessment of SEPP 65 issues, while development applications for the remaining residential towers (by Renzo Piano Building Workshop) will also be lodged in the near future and will contain a detailed SEPP 65 assessment and justification.</p>

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	<p>Gross Floor Area</p> <p>The gross floor area (GFA) for all land uses should be confirmed including the apportionment of GFA proposed for service apartments, hotel and residential apartments</p>	<p>The EIS prepared for the Concept Plan MOD 8 application provides a breakdown for the maximum GFA allowable on the site, the maximum GFA allowable within each development block and the maximum GFA for each particular land use. It is noted that no serviced apartments are intended to be provided on the site.</p> <p>The Concept Plan also provides for flexibility in the use of the C1 building. As a result, the potential maximum floorspace for residential and tourism development has been set at a level that can accommodate a commercial, hotel or a residential use within this building. Noting that the Concept Plan provides flexibility for change, the attached table provides a current GFA breakdown for the Barangaroo South site according to the use categories that are approved or proposed under MOD 8. Two scenarios are presented in the table; the first is based on the development of the C1 building as commercial and retail, whereas the second adopts the flexibility afforded in MOD 8 to allow a residential and retail building.</p>																																																										
		<table><tr><th>Land Use</th><th>MOD 8 GFA (all Barangaroo)</th><th>Current Proposal for Barangaroo South</th><th>Current proposal for remaining Barangaroo</th><th>Barangaroo South incorporating C1 as Residential</th><th>Current proposal for remaining Barangaroo</th></tr><tr><td>Residential (Max)</td><td>183,000</td><td>143,479</td><td>24,000</td><td>153,683</td><td>24,000</td></tr><tr><td>Retail (Max)</td><td>34,000</td><td>23,335</td><td>1,750</td><td>23,335</td><td>1,750</td></tr><tr><td>Tourism (Max)</td><td>76,000</td><td>48,200</td><td>0</td><td>48,200</td><td>0</td></tr><tr><td>Community (Min)</td><td>12,000</td><td>7,129</td><td>11,210</td><td>7,129</td><td>11,210</td></tr><tr><td>Active Uses in RE1 (Max)</td><td>5,000</td><td>1,240</td><td>3,760</td><td>1,240</td><td>3,760</td></tr><tr><td>Subtotal</td><td>310,000</td><td>223,383</td><td>40,720</td><td>223,587</td><td>40,720</td></tr><tr><td>Commercial (Remaining GFA)</td><td>295,911</td><td>311,583</td><td>30,225</td><td>301,379</td><td>30,225</td></tr><tr><td>Total GFA</td><td>605,911</td><td>534,966</td><td>70,945</td><td>534,966</td><td>70,945</td></tr></table>						Land Use	MOD 8 GFA (all Barangaroo)	Current Proposal for Barangaroo South	Current proposal for remaining Barangaroo	Barangaroo South incorporating C1 as Residential	Current proposal for remaining Barangaroo	Residential (Max)	183,000	143,479	24,000	153,683	24,000	Retail (Max)	34,000	23,335	1,750	23,335	1,750	Tourism (Max)	76,000	48,200	0	48,200	0	Community (Min)	12,000	7,129	11,210	7,129	11,210	Active Uses in RE1 (Max)	5,000	1,240	3,760	1,240	3,760	Subtotal	310,000	223,383	40,720	223,587	40,720	Commercial (Remaining GFA)	295,911	311,583	30,225	301,379	30,225	Total GFA	605,911	534,966	70,945	534,966
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	<p>Details in relation to the probable apartment mix should be provided and should form the basis for the TMAP and associated traffic modelling</p>	<p>The TMAP already incorporates an assumed apartment mix that then forms the basis for associated traffic modelling. The TMAP has assumed the following dwelling mix:</p> <ul style="list-style-type: none">50% one bedroom units30% two bedroom units20% three bedroom units <p>This mix is typical of a large inner-city residential development; however the final mix will be confirmed at the development application stage for the individual residential towers.</p>																																																										

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised		Lendlease Response		
	Land Use In light of the advanced nature of the overall design of Barangaroo South, further details should be provided to confirm the location of the community buildings	Community uses can be accommodated both in the RE1 zone and the B4 zone and will be allocated over time through individual development approvals and tenant lease agreements. At present, and with the assumption of MOD 8 in place, the table below provides areas accommodated on the site, according to each of the elements included in the definition. It is important to recognise that outside of existing planning approvals for individual buildings, these total may only be considered indicative at this stage		
		Community Use	Area	Comments
		Child Care Centres	1,453	Approved in T1
		Community Facility	3,650	Proposed in T3, R7 and RE1 Zone
		Entertainment Facility	0	
		Information & Education Facility	0	
		Landside Ferry Facility	337	Proposed in R7
		Place of Public Worship	0	
		Public Administration Building	0	
		Public Hall	0	
		Recreation Facility	1,689	Proposed in T1 & R7
		Subtotal (GFA)	7,129	
		Recreation Area (non GFA)	23,817	
		TOTAL	30,946	
	Land Ownership Landowner's consent is to be provided from the Roads & Maritime Services and any other relevant landowner's (i.e. Ports Authority of NSW) to which the Barangaroo Concept Plan applies.	Landowners Consent has now been provided by Roads and Maritime Services. Regardless, it is noted that the delivery of any structure or proposal located outside of the current Barangaroo Delivery Authority lots is necessarily subject to landowner approval, lease and management conditions. As such, it is considered that the provision of landowner consent at the Concept Plan stage has little or no implication for the form, type and tenure of structures that may be delivered, and as such, deferral of landowner consent to individual future applications does not compromise the rights of present owners such as RMS.		
	Wind Assessment The Wind Assessment should be revised to take into account the impacts of the existing and proposed build form for Barangaroo Central and should demonstrate that the environmental conditions in the proposed new Northern Park and the surrounding public domain will be acceptable.	The wind assessment prepared by CPP and appearing as Appendix N of the Concept Plan Application incorporates all buildings within a 570m radius of the site. This includes Central Barangaroo, for which the proposed indicative buildings have been included in the assessment. The report contains discussion highlighting that the entire Concept Plan is likely to experience acceptable wind conditions for the types of uses that are envisaged within each of the public spaces. While the report highlights some locations that are likely to be more windy than others, it also recognises that appropriate solutions (if required) are available to mitigate excessive impact, and that these are best designed and assessed at the stage of detailed planning applications for individual buildings and the public domain.		

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Key Issues Raised	Lendlease Response
<p>Design solutions to improve the wind comfort rating for the new Public Park, the northern section of Lime Street (adjacent to the Casino) and the northern end of the Casino should be considered.</p>	<p>Based on the scope of a Concept Plan and supported by the Wind Assessment appearing at Appendix N, these issues are more appropriately considered at the stage of detailed planning applications for individual buildings and the public domain. It is noted in this respect that the Crown Sydney Hotel Resort has been lodged for approval and that design of the residential towers is well advanced and will likely be lodged for planning approval within Q3 of 2015. The public domain is also being designed concurrently and is forecast to be lodged in late 2015/early 2016.</p>
<p>Shadow Diagrams The shadow diagrams should be revised (or a separate set provided) to model the shadow impacts of the current approved and proposed (MP06_0162 MOD 9) built form for Barangaroo Central on Barangaroo South. In particular, the revised shadow diagrams should illustrate the impact of built form on the new Northern Park and the public domain.</p>	<p>The package of information provided to the Department and for each of the exhibition locations included shadow animations for mid-winter, mid-summer and equinox. Each of these animations included the currently proposed built form within Central Barangaroo. In addition to this information, static shadow diagrams (see Appendix H) have been updated to include the Central Precinct as it is currently understood. The shadow diagrams also include the proposed Renzo Piano Building Workshop Designs for the R4A, R4B and R5 residential towers.</p>
<p>Additionally, the shadows cast by the proposed public pier and the community building should be modelled including to demonstrate the impacts to the foreshore promenade</p>	<p>The proposed public pier is located at the same or lower level than the waterfront promenade. It therefore has no shadow impact on the waterfront promenade. The proposed Community Building is not yet at a stage of design or development resolution that will allow a definitive assessment of impact. This is best deferred to a future planning application. The Concept Plan Amendment provides for location of a building on the pier that may be no greater than 3 storeys. Given this overarching constraint, the revised shadow diagrams also include a potential building volume on the pier (see Appendix H).</p>
<p>Contamination A letter is to be provided from the Site Auditor confirming that the Other Remediation Works (South) Area Remediation Action Plan (ORWS RAP), as the overarching RAP, is sufficient for the entire Barangaroo South site (as proposed to be amended) and in this regard, sufficiently addresses the requirements of State Environmental Planning Policy 55- Remediation of Land in respect to the entire site and the proposed land-uses</p>	<p>The Barangaroo South site has been divided into four (4) separate areas, in terms of assessing remediation requirements per SEPP 55, with separate Remedial Action Plans (RAPs) prepared for each area. The ORWS RAP is not an overarching RAP for the site, but rather a RAP for one of these specific areas. The RAPs prepared for Barangaroo South comprise:</p> <ol style="list-style-type: none"> 1) ORWS RAP - Amended Remedial Action Plan, Barangaroo – ORWS Area (AECOM July 2011) 2) VMP/Block 4 RAP - Remedial Action Plan, NSW EPA Declared Remediation Site 21122 and Block 4 (Stage 1b) Development Works, Barangaroo, Millers Point, NSW (AECOM July 2013) 3) Crown RAP - Remedial Action Plan, Crown Hotel Development (Part of ORWN Area), Barangaroo South (AECOM April 2015) 4) Stage 1B Waterfront Public Domain RAP – currently being prepared <p>The above RAPs are prepared to support relevant Development Applications for the various development areas – at which time approval for proposed land uses are sought - and to address the requirements of SEPP 55. The Site Auditor has concluded that the remediation and validation approach set out in the RAPs is generally appropriate and the implementation of the RAPs will ensure that the site can be made suitable for the proposed (or approved) future land uses. The future works envisaged under the proposed Modification are generally consistent with what was contemplated with the RAPs prepared in relation to Stage 1A and 1B of Barangaroo South and can be appropriately managed by those documents without any amendments required to those documents.</p> <p>Further it is noted that the EPA in its submission concludes that “the environmental risks and impacts have been adequately assessed and will not significantly be increased by the proposed modification.” Accordingly a further letter from the Site Auditor has not been sought.</p>

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Key Issues Raised		Lendlease Response
	<p>Concrete Batching Plant Consider any changes to the Concept Plan approval which may be required to accommodate any changes to the location, operation and management of the concrete batching plant for Barangaroo South</p> <p>Statement of Commitments Demonstrate how the current proposed amendments to the Concept Plan meet the following commitments:</p> <ul style="list-style-type: none"> ▪ SoC 57- view retention ▪ SoC 58- view corridors ▪ SoC 60- Millers Point ▪ SoC 92- building depth ▪ SoC 93- building separation ▪ SoC 95- apartment mix ▪ SoC 96- solar access 	<p>The existing Concept Plan and SSD approvals provide for the location and use of a temporary concrete batching plant on the site to facilitate construction of the Barangaroo South development until November 2018. No changes to the existing approvals are considered warranted or necessary.</p> <p>Commitment 57 relates to future development within the Barangaroo site retaining views to Observatory Hill Park from public spaces on opposite foreshores; and to retain a panorama from Pymont Park around to the Harbour Bridge as seen from Observatory Hill Park. Commitment 58 relates to future development within the Barangaroo site providing adequate view corridors over and between new built form to maintain the key attributes of views from Millers Point. Commitment 60 relates to future development within the Barangaroo site retaining the ability to appreciate the Millers Point headland and the roofscape of terrace houses throughout Millers Point when viewed from public spaces on opposite foreshores.</p> <p>The changes proposed as part of Concept Plan MOD 8 are within the southern part of the Barangaroo site, south of Observatory Hill Park and Millers Point. Consequently the modification does not affect future development under Concept Plan MOD 8 being able to satisfy any of these commitments. Views from the relevant locations, such as Observatory Hill and Pymont Park were provided as part of the Visual Impact Assessment lodged with Modification Application and demonstrate the modifications have no impact on the significant views identified in the commitments.</p> <p>In relation to Commitments 92, 93, 95 and 96, these commitments mirror content within the Residential Flat Design Code (RFDC). Further consideration of residential amenity achieved by Concept Plan MOD 8 is provided as part of the PPR. It is also noted that in light of the recent amendments to SEPP 65, which included the replacement of the RFDC with the Apartment Design Guide (ADG), these commitments are no longer considered appropriate and are proposed to be deleted, noting that the ADG applies to all residential flat building development.</p>
Commonwealth Department of Infrastructure and Regional Development		
2	<p>Section 9.19 of the EAR makes reference to the Airports (Protection of Airspace) Regulations 1996 (Regulations) but it doesn't specifically note the need to obtain approval for any intrusion into Sydney Airport's prescribed airspace under the Regulations. Approval for controlled activities including buildings and crane activity are necessary under the Regulations following assessment by the Civil Aviation Safety Authority (CASA) and Airservices Australia.</p> <p>Specific requirements for lighting or marking of buildings or cranes can be imposed as conditions to the building approval under paragraph 14 (l)(b) of the Regulations and breaches of approval conditions are subject to significant penalties under sections 185 and 187 of the Airports Act 1996.</p>	<p>Noted. The relevant approvals will be obtained at the appropriate time. This Modification Application relates to the amendment of the approved Concept Plan. It is noted that approval under the Regulations has been granted for the Crown Sydney Hotel Resort and was included with that DA.</p> <p>Noted. This Modification Application relates to the amendment of the approved Concept Plan. It is noted that approval has been granted under the Regulations for the Crown Sydney Hotel Resort and was included with that DA.</p>

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Key Issues Raised		Lendlease Response
	The Department of Infrastructure and Regional Development Department recommends that proponents seek approval for construction cranes when they seek approval for the building, or if that is not possible to be aware that that approval for cranes may be limited by the physical characteristics of the airspace and require careful consideration and management. Where a proposed crane will intrude into the Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS) surface the Regulations only permit the Department to give an approval for up to three months and that is subject to the support of the airport operator.	Noted. The relevant approvals will be obtained at the appropriate time. This Modification Application relates to the amendment of the approved Concept Plan.
Department of Primary Industries		
3	Fisheries NSW has reviewed the proposed modification to the Barangaroo Concept Plan, in respect to the policies and provisions of the Fisheries Management Act 1994 and supports this proposal provided appropriate erosion and sediment control measures are used during construction.	Noted. This Modification Application relates to the amendment of the approved Concept Plan. Appropriate sediment and erosion control measures will be implemented during the construction of Barangaroo (subject to separate approvals).
	Fisheries NSW commends this amendment, as removal of the reclamation component associated with the previously proposed on-water hotel brings this proposal in alignment with State and Sydney Harbour level policies concerning reclamation.	Noted.
	Agriculture NSW advise that the selection of trees for landscaping should not include species that are declared a noxious weed. Further information is available at http://weeds.dpi.nsw.gov.au/ .	Noted. This Modification Application relates to the amendment of the approved Concept Plan. The selection of tree species will be the subject of future separate application(s).
NSW Office of Water		
4	Section 5 of the Mod 8 EAR indicates the proposed Concept Plan will result in alteration of the existing seawalls and creation of new shoreline. Where existing seawalls are to be altered, it is recommended: <ul style="list-style-type: none"> A more naturalised design is provided to improve the environmental value of the foreshore. 	Noted. This Modification Application relates to the amendment of the approved Concept Plan. The detailed design of the seawall will be the subject of a future separation application(s).
	<ul style="list-style-type: none"> Consideration is given to the Sydney Metropolitan Catchment Management Authority and Department of Environment and Climate Change NSW (2009). Environmentally Friendly Seawalls. A Guide to Improving the Environmental Value of Seawalls and Seawall-lined Foreshores in Estuaries. 	Noted. As above.
	<ul style="list-style-type: none"> The Amendments to the Statement of Commitments and Conditions of Approval reflect the above recommendation. 	Noted. The amended Statement of Commitments provided with the Response to Submissions reflect the comments of the NSW Office of Water.
Environmental Protection Authority		

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised		Lendlease Response
5	EPA concludes that the environmental risks and impacts have been adequately assessed and will not significantly be increased by the proposed modification.	Noted.
	EPA notes however that the Air Quality Impact Assessment (AQIA) shows that the cumulative impact of works on the entire Barangaroo site shows exceedances of the PM10 criteria. In light of the predicted exceedances of PM10 criteria EPA endorses the recommendation for the development and implementation of a comprehensive Air Quality Management Plan (AQMP) which includes a reactive air quality management strategy. The AQMP should include ongoing monitoring of emissions and potential impacts and where exceedances occur, provide for an appropriate management response. EPA endorses the proposal to extend the existing monitoring and reactive management plan to incorporate additional monitoring sites located close to the future stages of development to assist in mitigating the predicted exceedances of PM10 should they occur.	Noted.
	You will be aware that the BDA is the holder of Environment Protection Licence 13336 which covers the portion of the site under consideration and the EPA will require that any subsequent works relating to this Modification Application will need to be done to ensure compliance with the conditions attached to the EPL as varied from time to time.	Noted.
Port Authority of NSW		
6	Approval of the Harbour Master will be required for any disturbance of the sea bed as per clause 67 of the Management of Waters and Waterside Lands Regulations – N. S.W. Consultation with the Harbour Master is to occur in this respect.	Noted.
	The new pedestrian link bridge over Hickson Road (189 Kent Connection) must be constructed at a height sufficient to allow the passage of semi-trailers associated with Overseas Passenger Terminal port activity.	Noted.
	We also request that you update your system to reflect that we are now Port Authority of New South Wales and no longer Sydney Ports Corporation.	Noted.
Transport Road and Maritime Services		
7	Roads and Maritime has reviewed the submitted information and notes that installation of two new traffic signals and modification/removal of existing traffic signals are proposed as part of the modification of Barangaroo Concept Plan. However, details of these proposed traffic signals have not been included within the information provided. Roads and Maritime requests the applicant to provide concept plans for the proposed new traffic signals and for the removal of the existing traffic signals for review.	The proposed modification is to the Concept Plan only and details of the proposed traffic signals are to be developed. Further consultation with the RMS and the assessment of the signals should form part of the detailed applications for those signals.

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Key Issues Raised		Lendlease Response
	The development of these concept plans should be informed by detailed traffic modelling.	The Concept Plan has included an updated TMAP that provides an assessment of the impact of the proposed development. Further detailed modelling will be undertaken at the stage of individual proposals.
Sydney Water		
8	The increase in the maximum Gross Floor Area (GFA) and changes to the building heights for the site may impact on Sydney Water's Servicing Strategy for the development. The developer is required to contact Sydney Water and provide details about the preferred service provider commercial model and flow rates from the proposed buildings within the development site.	Lend Lease met with Sydney Water on 29 th July 2015 to discuss water and sewerage master planning for the project. An addendum to the original site servicing strategy was subsequently issued to Sydney Water and comments have recently been received. Lend Lease are currently preparing updated modelling and assessment for presentation to Sydney Water on 2 September 2015.
	Additionally, the developer may need to complete further hydraulic assessment to determine any changes to the Sydney Water systems that may be required to accommodate the modification.	Noted. See above comment
	The applicant will be required to follow Sydney Water Managing New Development Process to complete any requirements set by Sydney Water as part of obtaining a Section 73 Compliance Certificate.	Noted.
	The developer is required to contact Sydney Water and provide details about the preferred service provider commercial model and flow rates for the proposed buildings within the development site.	Noted.
Museum of Applied Arts and Sciences		
9	Impact of the proposal on the heritage significance of Sydney Observatory that is recognised as a UNESCO historically significant site, a state heritage item pursuant to the Sydney LEP 2012 and is also listed on the National Trust of Australia register.	The Heritage Impact Statement prepared by TKD as part of the EAR found that the proposed modifications will have some impact on the setting of the Observatory, though it is noted impacts already exist by virtue of the existing approved buildings. This setting is also already affected to some extent by existing development in the northern section of Central Sydney. The taller building forms proposed will be more visible due to their increased height, however as the towers are also slimmer, breaks / gaps between buildings are supported enabling view corridors through the site. Therefore the essence of the visual impact and view corridors is retained and the relationship between the Sydney Observatory and the historic Millers Point housing will remain. Further the HIS found that the existing mature trees on Observatory Hill in the vicinity of the Observatory will ameliorate some of these impacts and other aspects of the Observatory's heritage significance will not be affected.
	Sydney Observatory is in agreement with most of the statements in Section 3.2 and 3.3, excepting those relating to the building H1. The Report uses a mistaken definition of the view corridor, quoted as 210 to 225 degrees (section 3.2). This should be 210 to 235 degrees. The impact of the difference in the Azimuth Range is as follows:	Investigations undertaken for the Concept Plan Application were based on information provided by the Observatory. A further assessment has been undertaken to assess potential impacts that may arise from the proposed H1 hotel building (see Appendix G).
	<ul style="list-style-type: none"> (Section 3.3) claims the impact of the 275 metre Crown Casino and Residential Tower (H1) will not obstruct any of the Sydney Observatory view corridors. The H1 Tower will affect viewing of Omega Centauri. 	Investigations undertaken for the Concept Plan Application were based on information provided by the Observatory. A further assessment has been undertaken to assess potential impacts that may arise from the proposed H1 hotel building (see Appendix G).

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Key Issues Raised	Lendlease Response
<ul style="list-style-type: none"> The tables and impact times (Section 4.2) for the 250 metre residential tower (R4A) and the 210 metre residential tower (R4B) contain errors. These include viewing times when an object is behind the buildings. 	<p>A detailed response to each of the individual issues raised by the Sydney Observatory has been prepared by an acknowledged astronomical expert. This new and separate report is included at Appendix F. In summary, the report maintains the previous conclusions. While it is noted that there is an impact on the ability to view a limited set of target objects, it is considered that the impact is limited and may be appropriately mitigated through the manner in which viewing sessions are managed and the selection of objects targeted for viewing. The report maintains the view that impact is limited to only a small portion of the year and for only limited portions of the viewing times. The report additionally highlights that weather conditions, Bright of Moon, existing urban conditions and the nature of the Observatory's instruments provide mitigating considerations in this respect. Additionally, the report reiterates the view that viewing sessions may be organised to target alternative objects in order to maintain a high quality viewing experience and suggests a range of alternative targets in this respect.</p>
<p>The data based on the impact of cloud cover is based on Bureau of Meteorology records made at 9.00am and 3.00pm. Sydney Observatory records the impact of cloud cover on night viewing. These records indicate successful night viewing occurs on 70 percent of nights in the months August to October.</p>	<p>The report at Appendix G responds directly to this comment.</p>
<p>The Report (section 4.2) claims that the impact of the developments on night viewing can be reduced by changes to the structure and conduct of the night viewing program. The Building Code of Australia, not the facility, requires group size of maximum 22 people in the existing telescope dome. The viewing schedule can't be modified across multiple groups in the April-September period. To maximise viewing in this period, the program is structured to provide 3 or 4 groups of 20 within a 90 minute period in each session, based on two sessions per night.</p>	<p>The report at Appendix G responds directly to this comment.</p>
<p>Smog and Particulate Pollution (section 4.4) as well as scintillation do not impact a public observatory to the same extent as a research observatory. NSW Office of Environment and Heritage Air Quality data indicates a rolling fluctuation in Sydney, which is not increasing.</p>	<p>The report at Appendix G responds directly to this comment.</p>
<p>Section 1.3 refers to concerns expressed by Sydney Observatory about the impact of light spill in response to Modification 4 of MP06_0162, not the Modification currently on exhibition.</p>	<p>The report at Appendix G responds directly to this comment.</p>
<p>Section 5 should take into account the 2011 letter and eliminate up-lighting, not use blue lighting, and recommend sensor lighting. It does not reference the impact of light spill from the eastern facades of the three residential towers, will likely feature extensive use of glass, to maximise views to the city and Sydney Harbour.</p>	<p>The Concept Plan does not provide for approval of individual buildings and therefore does not contain any design proposals for these. While it is a logical assumption that the eastern facades of the proposed residential buildings are likely to have an extensive utilisation of glass, the assumption of significant light spill is not as clear cut. This is due to the fact that light spill controls on all new buildings are substantially more stringent than those that many of the existing buildings in the area were subject to. Additionally, it is considered that the light spill impacts of these buildings, the adjacent Bradfield Highway and the City in general stand to continue to have the major impact on light spill in the vicinity.</p>
<p>Sydney Observatory is in agreement with the Report (Section 3.1) that Barangaroo Central does not impact the Sun, Moon, Planets, Ring Nebula and Star Albireo.</p>	<p>Noted.</p>

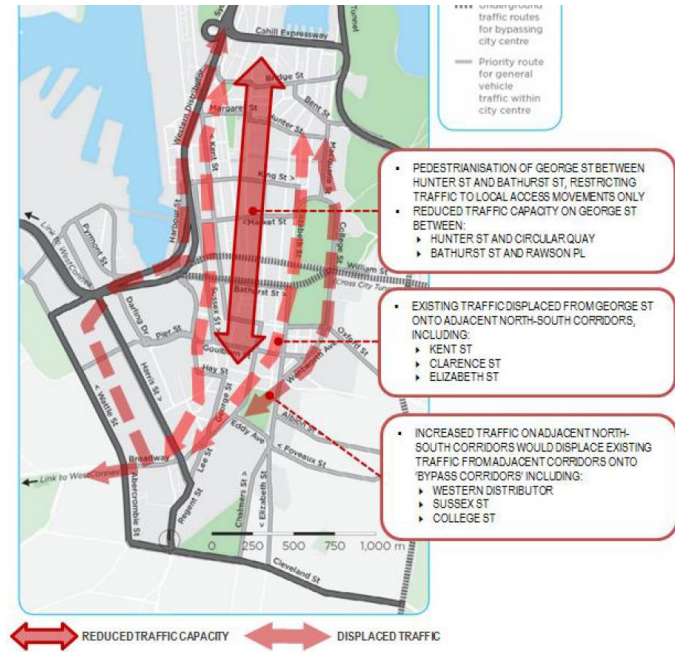
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Key Issues Raised		Lendlease Response
	The Report (Section 6.0) concludes the development will affect '53 viewing nights out of 326 annual viewing nights'. This represents 20% of the night viewing program. The Observatory agrees with this in terms of direct blockage but, because this does not indicate the year-long impact of light-spill from predominantly residential towers, and because the tables are based on seeing part of the Southern Cross as acceptable, the Museum disputes the author's conclusion that this impact is 'negligible'.	The report at Appendix F responds directly to this comment.
Transport for NSW		

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10	<p>Impact of the CBD Light Rail</p> <p>The proposed changes to George Street as a result of the proposed CBD Light Rail will increase traffic movement on the road work located within and adjacent to the Barangaroo Project. The changes to traffic movements have not been taken into account for the estimation of future traffic volumes for the traffic analysis in the TMAP. TfNSW requests that the proponent revises the traffic analysis to incorporate the changes to the traffic movements on the road work located within the Wynyard and Barangaroo Precincts to take into account the approved CBD light rail.</p>	<p>As noted in the TMAP, Transport for NSW is currently preparing a meso-scopic traffic model which considers the impacts on CBD streets following the completion of the Sydney light rail project. The EIS for the light rail project (specifically Technical Paper 1 – Transport Operations Report) provides no specific details with respect to changes in traffic volumes on Hickson Road adjacent to Barangaroo following the closure of George Street to general traffic. It should be noted that the Sydney City Centre Capacity Improvement Plan (RMS, November 2014) provides some detail with respect to the redistribution of traffic following the closure of George Street to general traffic. This plan illustrates the existing traffic displaced from George Street will be redirected onto adjacent north-south corridors, those being:</p> <ul style="list-style-type: none"> ▪ Kent Street ▪ Clarence Street ▪ Elizabeth Street ▪ Macquarie Street <p>Capacity improvements along both Clarence Street and Kent Street are proposed which are forecast to mitigate the impacts of this redistributed traffic.</p>  <p>Importantly 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 Concept Plan modification.</p>
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Key Issues Raised	Lendlease Response
<p>Linsig Intersection Analysis</p> <p>The table (within the response) provides the results of the Linsig intersection for Hickson Road/Napoleon Street and Sussex Street/Erskine Street intersections based on traffic reports prepared as part of the Barangaroo Development. This analysis indicated that the performance of the Hickson Road/Napoleon Street intersection, in comparison to Mod 4, operates above acceptable performance parameters. This impact will have to be mitigated. Additionally traffic analysis suggests the performance of the Sussex Street/ Erskine Street intersection will improve with an increase in traffic volume which requires clarification. TfNSW requests that the proponent updates transport assessment and reconsiders the operation of these intersections in conjunction with the operation of the Light Rail and identifies the impacts and mitigation measures (if required).</p>	<p>An amended TMAP has been prepared by Arup and is provided at Appendix I. This Report provides a comprehensive response to this comment.</p>
<p>Traffic Generation from Hotel</p> <p>Traffic generation from the proposed hotel has been estimated at 75 vehicle trips during the morning peak period and 213 vehicle trips during the afternoon peak period based on the traffic surveys undertaken at Crown Resort in Melbourne. No detailed information has been provided in the TMAP how these figures have been derived based on the surveys at Crown Resort in Melbourne. TfNSW is therefore unable to assess whether the traffic generation from the hotel is representative and potential impact identified. TfNSW requests that the proponent provide a detailed traffic generation estimation in relation to the traffic generation estimation for the hotel.</p>	<p>The methodology for determining the number of vehicle trips generated by the proposed hotel was outlined in Appendix A of the TMAP, and outlined below for reference.</p> <p><i>The methodology undertaking for forecasting the number of self-park traffic movements for Crown Sydney was as follows:</i></p> <ul style="list-style-type: none"> • <i>The number of black, platinum and gold members entering and exiting the Crown Melbourne basement car park over the course of an entire year (broken down each hour for every day of the week) was recorded.</i> • <i>Major event days (e.g. AFL grand final, Melbourne Cup) were excluded from the analysis to provide a typical representation</i> • <i>The data was then moderated based on the number of members anticipated for Crown Sydney relative to the total number in Crown Melbourne</i> • <i>A profile of activity was then generated for Crown Sydney which considered all anticipated self-park arrivals and departures. It should be noted that the data was not moderated to match the anticipated capacity of the Crown Sydney basement – which is likely to be lower than that at Crown Melbourne.</i>
<p>AM Peak Traffic Generation</p> <p>The traffic assessment inconsistently reports traffic generation estimates in Tables 6 and 10 and it is unclear which has been used in the traffic assessment. TfNSW is therefore unable to accurately assess the development impacts. TfNSW requests that future traffic flow for the AM Peak and PM Peak periods be reported in the TMAP.</p>	<p>An amended TMAP has been prepared by Arup and is included at Appendix I. This Report provides a comprehensive response to this comment.</p>

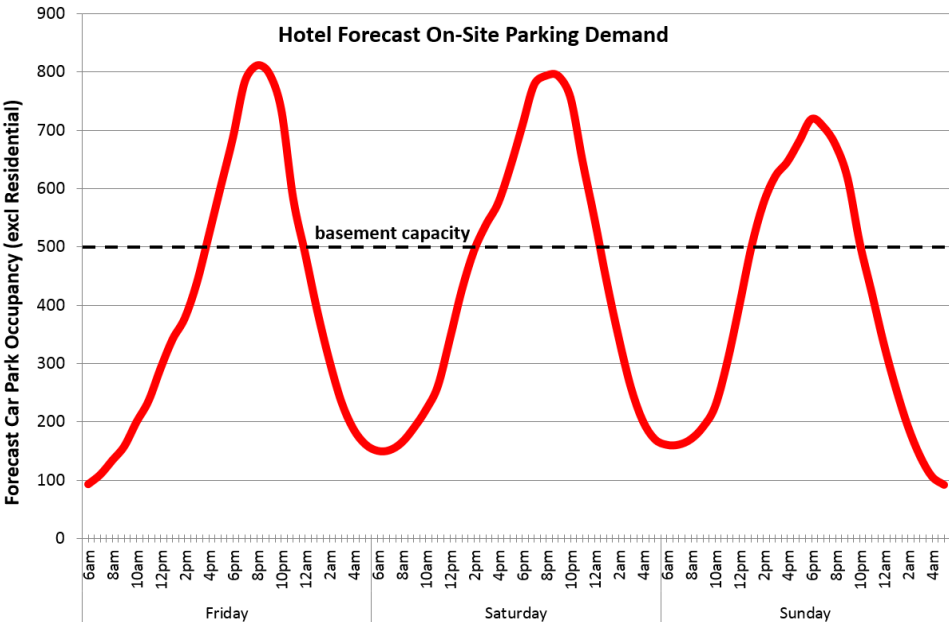
Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised	Lendlease Response
<p>Arrival and Departure Traffic Routes</p> <p>The arrival and departure routes shown in Figures 8 of the TMAP are based on the Barangaroo Integrated Transport Plan which was superseded by the CBD Access Strategy. Major traffic management changes to travel routes are expected to occur in the future with the proposed CBD light rail project. TfNSW requests that the proponent updates the TMAP to confirm arrival and departure routes are consistent with the CBD Access Strategy and includes proposed changes to travel routes due to the proposed CBD Light Rail project.</p>	<p>The arrival and departure routes indicated are consistent with the CBD access strategy and consider the changes to the road network as result of the CBD light rail project.</p>
<p>Traffic Signals at Shelley Street</p> <p>The TMAP proposes the existing traffic signals at the Hickson Road/Shelley Street intersection are to be removed. Barangaroo Integrated Transport Plan Working Group is currently investigating the retention of the Hickson Road/Shelley Street traffic signals after converting as a mid block signalised pedestrian crossing. TfNSW requests that the proponent consults with the Barangaroo Integrated Transport Plan Working Group to confirm the current status of the signals at the Hickson Road/Shelley Street intersection.</p>	<p>Noted. Lendlease will work with the Barangaroo Integrated Transport Plan Working Group to confirm the current status of the signals at the Hickson Road/Shelley Street intersection.</p>
<p>King Street Wharf Precinct</p> <p>No information is provided in the TMAP in relation to the traffic modelling and road network operation for the King Street Wharf Precinct. TfNSW is therefore unable to assess the impact of the proposal on the performance of the road network within the King Street Wharf Precinct. TfNSW requests that an updated TMAP includes traffic modelling and road network operation information for the King Street Wharf Precinct. TfNSW requests that an updated TMAP includes traffic modelling and road network operation information for the King Street Wharf Precinct.</p>	<p>The intersections assessed in the LinSig analysis represent those directly impacted by the proposed modification to the Concept Plan, and demonstrate little difference in the road network performance.</p> <p>Traffic modelling undertaken by Parsons Brinckerhoff in the Barangaroo precinct has previously considered the operation of the Erskine Street / Shelley Street signalised intersection within the King Street wharf precinct. This modelling considers the potential traffic changes as a result of the concept plan modification as well as land use uplift associated with the Barangaroo Central precinct. This modelling (provided within the updated TMAP) indicates the intersection performs satisfactorily in both peak hour periods, at Level of Service C and B in the AM/PM peak hours respectively.</p>
<p>Parking Assessment</p> <p>No detailed information has been provided in relation to the proposed dwelling mix for the residential component. No information is provided about the dwelling mix in the modification and TfNSW is therefore unable to comment on whether the parking provided on site complies with the parking rates adopted in the approved Concept Plan. TfNSW requests that the proponent provides the details in relation to the development mix for the additional 509 dwellings and the number of parking spaces assigned for each type of residential development in the TMAP</p>	<p>The TMAP provides an “indicative” mix in order to assess the potential parking requirements and establish the potential number of apartments for traffic generation assessment purposes. The mix selected for the TMAP is directed at both being a representative outcome of what might normally be expected, while also maximising the potential impact for assessment purposes. The actual mix will be identified in future Development Applications for the towers and re-tested accordingly.</p> <p>Concept Plan (Mod 8) does not propose to amend the parking supply rates established for the majority of land used in the approved Concept Plan (Mod 7). Due to the unique nature of the expected operations within the landmark hotel building, standard parking rates have not been identified; rather an indicative number of car spaces reflective of other similar operations has been adopted.</p>

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Key Issues Raised	Lendlease Response
<p>Car Parking Demand for the Hotel</p> <p>No analysis has been undertaken to demonstrate that sufficient supply is available for both visitors to public car parks and the hotel, that it is appropriate for the hotel to not cater fully for demand, or that circulating traffic will not impact the road network as traffic moves through the Precinct to access parking spaces. TfNSW requests that the proponent undertakes a detailed analysis to confirm that adequate public parking is available for visitors to Headland Park and Barangaroo Central and the hotel at Towns Place and Headland Park.</p>	<p>500 car parking bays are proposed within the hotel to service the non-residential components of the development. This quantum of parking was determined based on the expected daily profile of vehicular movements arriving and departing the site. A daily profile of activity was generated based on the current levels of traffic movements (both valet and self park) generated by the Crown Melbourne site over the course of an entire year. The data was moderated based on the number of members anticipated for the hotel relative to the total number in Crown Melbourne. The expected parking demand based on this analysis for the hotel is shown below.</p>  <p>The quantum of parking proposed (500 spaces) will meet the expected demand generated by the hotel on weekdays and for the majority of the time on weekends (Friday evening through Sunday). During these busy periods, other off-street car parks in close proximity to the hotel will be utilised to accommodate this residual demand. These off-street car parks typically accommodate demand generated by employees of nearby commercial buildings. The peak parking demand for the hotel coincides with off-peak periods for these commercial car parks – therefore creating the opportunity for the shared use of spaces. This results in an efficient allocation of parking across the Barangaroo precinct.</p>

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Key Issues Raised	Lendlease Response
<p>Bicycle Parking</p> <p>TfNSW requests that the proponent identifies and justifies the provision of bicycle parking for commuters and visitors as a result of the proposed modification in the TMAP. This should include provision of public bicycle parking and parking within buildings.</p>	<p>The rates of provision of bicycle parking and shower facilities are dictated by existing controls applying to the site, which remain unchanged in Concept Plan MOD 8. Appropriate facilities will be provided with each respective building in accordance with the Concept Plan requirements as part of the later separate and more detailed planning applications for buildings and the public domain. It is also noted that no commercial development is proposed in the northern part of the site and that approximately 1,100 bicycle spaces have already been approved and provided within the Stage 1A basement, along with 147 spaces at ground level in the public domain.</p>
<p>Coach Parking</p> <p>TfNSW requests that the proponent identifies and justifies the coach parking provision as a result of the proposed modification in the TMAP.</p>	<p>A preliminary allocation of kerbside space in vicinity of the hotel for coach set down / pick up is planned within the Concept Plan. Lendlease will work with the Barangaroo Integrated Transport Plan Working Group to confirm the final requirements for coach parking in the precinct.</p>
<p>Ferry Mode Share</p> <p>The ferry mode share of 4% has been adopted in the Transport Management Accessibility Plan (TMAP) prepared as part of the proposed modification. It is noted that the ferry mode share of 1% has been adopted as a target since the preparation of the Barangaroo Concept Plan in 2008. An increase in ferry mode share from 1% to 4% may have significant network implications. TfNSW requests that the proponent provides clear justification and the basis for the increase in ferry mode share in the TMAP.</p>	<p>The amended mode share is based on a worker transport survey carried out on a number of existing commercial buildings in the vicinity of the Barangaroo Site. This transport review identified a higher proportion of workers who travelled to the building via ferries, promoting a realistic increase in the targeted mode share for ferry use.</p>
<p>Ferry Services Operation</p> <p>The TMAP has not considered whether any water based construction activities impact upon the construction of the proposed Barangaroo Ferry Hub (if concurrent) or the operation of the ferry services. TfNSW requests that the proponent undertakes an impact assessment on ferry services as a result of the proposed modification to ensure that operations are not affected.</p>	<p>There is currently no detailed design proposal to enable definitive assessment of construction impacts of the proposed pier. It can be expected that at the time of a planning application for the pier that a construction impact assessment would be undertaken and that a principle of not impacting on ferry operations is implemented. It is also noted that there is an existing pier approved within Concept Plan MOD 7, which is in fact larger than that proposed under Concept Plan MOD 8, so in fact, any impacts may be expected to be less than those that may currently be experienced. The Navigation Report submitted with the Modification Application concluded that the impacts of the construction of the proposed Community Building and Public Pier would not be expected to impact adversely on navigation in Darling Harbour.</p>
<p>Navigation and Safety Assessment</p> <p>TfNSW requests that a detailed navigation and safety impact assessment be undertaken in consultation with TfNSW with regards to the following issues:</p> <ul style="list-style-type: none"> Impact of the clear berthing navigation area to the north of the northernmost wharf. A minimum width of 17.5m off the berthing face needs to be kept clear at all times for ferry movements. 	<p>Lendlease has confirmed to Transport for NSW on several occasions (through the Barangaroo Ferry Hub Working Group) that a minimum clear area of 17.5m will be maintained between the proposed pier and the northern most Ferry Wharf. As there is currently no design for the pier (within the area identified for its location) it is considered that a statement of commitment and/or approval condition to provide for a minimum 17.5m clearance is an appropriate response at this stage of development</p>
<ul style="list-style-type: none"> The Appendix K Navigation Report did not consider the proposed Barangaroo Ferry Hub wharves. The Barangaroo Ferry Hub does not yet have planning approval, however this application is well progressed. Information on wharf locations has been available to Lend Lease for some months, and the Environmental Impact Statement for Barangaroo Ferry Hub was on public display from December 2014. 	<p>An addendum to the Navigation Report providing further assessment of this issue is included at Appendix E.</p>

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Key Issues Raised	Lendlease Response
<ul style="list-style-type: none"> It is not clear from the application whether there is any intent for berthing of vessels on the public pier. This would be incompatible with the Barangaroo Ferry Hub, particularly on the southern face. Any proposed berthing should be considered in a navigational study which considers Barangaroo Ferry Hub. 	<p>There is currently no intent for vessel berthing on the western or southern sides of the public pier, however if this was to occur the impacts would be considered as part of the detailed application. The floating water taxi pontoon has been identified as indicative and would be the subject of a future separate application.</p>
<ul style="list-style-type: none"> Impact of lighting glare on navigational safety. A safeguard should be included that lighting design will ensure no lights are shining into the eyes of vessel masters on approach to Barangaroo Ferry Hub (or other vessels travelling in Darling Harbour). 	<p>The entire area adjacent to the ferry wharves has been approved and is either completed (public domain) or significantly advanced in construction (R8 & R9). As such the majority of any potential impact has already been addressed and mitigated. For future buildings and elements, the issue is most appropriately dealt with through the future detailed application(s).</p>
<ul style="list-style-type: none"> Impact of public pier and community building on the ferry masters line of sight to see other vessels coming from the north. 	<p>There is not considered to be any adverse impact on the vessel master (see attached Navigation Report by Royal Haskoning). Additionally it is noted that the proposed pier and ferry wharves are of equivalent length and therefore the line of sight from the southern wharf is equivalent to that of the northern wharf. Additionally, it is noted that the navigation channel for vessels coming from the north is on the western side, adjacent to Pyrmont – it is vessels moving from south to north that are more closely adjacent to the ferry wharves, and it is the ferry wharves themselves that are impacting on sight lines in this respect. Furthermore, additional surveillance of vessels in the channel is provided via a camera that has been provided within the commercial towers that is to be linked to a screen located on each wharf.</p>
<p>Impact on Bus Operation</p> <p>The proposed development has the potential to impact on bus operation and these impacts and potential mitigation measures have not been considered in the TMAP. If the revised modelling shows increase in delays to bus operations on Hickson Road and in the vicinity of the Barangaroo site, the analysis should consider the impact on any potential traffic queues on bus services and how to address any impacts on buses.</p>	<p>The cumulative traffic analysis indicates little difference in the road network performance due to the minor traffic increase arising from the Concept Plan modification. Changes in vehicle delays (including buses) are relatively minor in both the AM and PM commuter peak hours.</p>
<p>Amendments to the TMAP</p> <ul style="list-style-type: none"> Barangaroo Integrated Transport Plan has been largely superseded by the Sydney City Centre Access Strategy. Any reference should first be made to the Sydney City Centre Access Strategy and subsequently to the Barangaroo Integrated Transport Plan as required. 	<p>Noted</p>
<ul style="list-style-type: none"> Section 4.3.3 – the bus movements in Table 9 and 10 are based on 2008 information and needs to be updated. 	<p>While future bus routes (post 4 October) along Hickson Road have been announced by the NSW Government, the timetable of these services has not been publically released. We are therefore unable to update the forecast bus movements in Table 9 and 10. As noted, the bus movements noted in the TMAP are consistent with previous planning for the site.</p>
<ul style="list-style-type: none"> Section 4.7.1 – Napoleon Street is not the key link for cyclists as shown in Figure 14. 	<p>Noted. This has been updated in the TMAP (see Appendix I).</p>
<ul style="list-style-type: none"> Section 4.7.1 – Figure 15 does not reflect the Sydney Centre Access Strategy. The cycle route along College and Macquarie Streets is not an endorsed cycle route. 	<p>Noted. This has been updated in the TMAP (see Appendix I).</p>
<ul style="list-style-type: none"> Section 4.7.2 – figure 16 shows the promenade as a shared cycle route but in the text it is mentioned as not having cycling permitted. 	<p>Noted. This has been updated in the TMAP (see Appendix I).</p>

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Key Issues Raised		Lendlease Response
	<ul style="list-style-type: none"> Section 4.8.2 – the Wynyard Station upgrade was announced in May 2014. 	Noted. This has been updated in the TMAP (see Appendix I).
	<ul style="list-style-type: none"> Section 4.8.3 - The South West Rail Link is complete and now open 	Noted. This has been updated in the TMAP (see Appendix I).
	<ul style="list-style-type: none"> Section 4.8.4 - Rapid Transit Network plans announced in June 2014 	Noted. This has been updated in the TMAP (see Appendix I).
	<ul style="list-style-type: none"> Section 4.9 - Erskine Street is not a bus corridor and the paragraph in relation to Inner West bus services operating to Central is to be removed. 	Noted. This has been updated in the TMAP (see Appendix I).
	<ul style="list-style-type: none"> Section 4.10 – latest information in relation to the Barangaroo Ferry Hub needs to be included as per public announcements. 	Noted. This has been updated in the TMAP (see Appendix I).
	<ul style="list-style-type: none"> Section 4.12.1 - Light rail extension opened in March 2014 	Noted. This has been updated in the TMAP (see Appendix I).
	<ul style="list-style-type: none"> Section 4.12.2 – CBD and South East Light rail is expected to take 4 years to complete. 	Noted. This has been updated in the TMAP (see Appendix I).
	<ul style="list-style-type: none"> Section 2.1.4 - SSI 6727 has been submitted by TfNSW and was publicly exhibited from December 2014 to February 2015 	Noted. This has been updated in the TMAP (see Appendix I).
	<ul style="list-style-type: none"> Section 5.2 – Figure 11 incorrectly shows the northernmost wharf Barangaroo Ferry Hub dotted. As all three wharves are proposed, all should be included in diagrams 	Noted. This has been updated in the TMAP (see Appendix I).
	<ul style="list-style-type: none"> Section 9.8.4 - A State Significant Infrastructure application (SSI 6727) has been submitted by TfNSW 	Noted. This has been updated in the TMAP (see Appendix I).
	<ul style="list-style-type: none"> Section 9.8.4 – it is stated that the indicative location of the ferry wharves has not been amended this MOD and are generally consistent with those proposed in SSI 6727'. In a number of the diagrams included in Mod 8, the location of the wharves is incorrectly shown too far south, and is inconsistent with the SSI Application submitted in October 2014 and the EIS. All diagrams should show the wharves in their correct locations 	Noted. This has been updated in the TMAP (see Appendix I).
Heritage Division		
11	<p>The Heritage Division has considered the following to be the positive implications of the proposal:</p> <ul style="list-style-type: none"> Relocation of Block Y Hotel site onshore in response to stakeholder concern; The new public pier and community/retail building with approximately 2000m² for community uses; New public pier and Community/Retail Building with approximately 2000m² for community uses; Approximately 50% of Barangaroo South will be either public domain/publicly accessible open space; and New Northern Park, waterfront promenade in Barangaroo South. 	Noted.

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Key Issues Raised	Lendlease Response
<p>Aboriginal Archaeology Those areas requiring further archaeological testing comprise of the areas not yet substantially excavated in Blocks 2-4. Significant potential Aboriginal archaeology recording took place during excavation to construct the approved basement in Stage 1A Barangaroo South and as such these relevant areas will require no further testing.</p>	Noted.
<p>Landscape Existing mature fig trees in Observatory Park especially south-west of the Observatory complex (planted by the then State Astronomer and thus of heritage value themselves) screen some of existing urban towers from a number of Millers Point & Dawes Point heritage item views and setting. These trees will do the same for Barangaroo South.</p>	Noted.
<p>Surrounding Heritage Items There is likely to be adverse visual impacts on the settings of a number of adjacent or in-the-vicinity heritage items and conservation areas (Millers Point & Dawes Point Precinct (SHR item); The Rocks, Walsh Bay), being dominated by Barangaroo South tower blocks with no stepping or graduation of heights. Specifically, these comprise:</p> <ul style="list-style-type: none"> Grafton Bond Store – MOD 8 will dramatically alter its outlook and setting and as such will compound the impacts of the building footprints and envelopes. 	The heritage assessment provided with the Modification Application determined that there will be minimal impact to the Grafton Bond Store due to the location of revised building footprints and envelopes relative to the Bond Store's site. The Bond Store is close to the approved International Tower (C3, C4 and C5). The existing Concept Approval will change the setting of the building, and therefore the changes proposed have no impact on the current approval. There will be no impacts on views to the building within the public realm including views available from the north and north west along Hickson Road.
<ul style="list-style-type: none"> Walsh Bay Wharves Precinct – the impacts on the setting of this area, although the distance away will ameliorate much of this 	Any potential impacts on the Walsh Bay Wharves Precinct will be ameliorated by the location of Barangaroo South relative to the Precinct and the topography and character of development between the two locations.
<ul style="list-style-type: none"> MSB Stores Complex & MSB Stores Building – MOD 8 will have an adverse impact on the western setting of the buildings owing to the dramatically altered scale 	Some impacts may occur on the western setting of the MSB group. This is likely to be ameliorated to some extent by open space to the east of the proposed hotel. Existing views to the buildings along Hickson Road will not be impacted due to existing large scale developments to the north, south and east of the Complex.
<ul style="list-style-type: none"> Sydney Observatory – impacts on the available views of four target objects including the Southern Cross, Jewel Box cluster, Omega Centauri globular cluster and The Pointers, which will all be obstructed annually for 9 weeks during night viewing hours between August and October- the Observatory now operates as a museum and for some public night sky viewing, but not as an astronomical observatory~ due to constraints (light levels, air pollution etc). The modification will impact part of the significance although the applicant deems this impact acceptable and minimal. The use of this site as an Observatory is identified in the Statement of Significance for this site. 	An additional 2 reports have been prepared to address the Sky View Loss impacts and are included at Appendix F and G .
<ul style="list-style-type: none"> National Trust Centre – the proposal will impact the setting of this development and compound the existing urban impacts of nearby towers. 	The proposed modification will not have a significant impact on the National Trust Centre. The items eastern, southern, and south western settings are already characterised by large office and apartment buildings in the northern section of Central Sydney.

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City of Sydney Council		
12	<p>The casino/hotel tower should be set within Barangaroo commercial tower backdrop within the land zoned for development rather than in the prohibited public open space zone. The retention of the depth of Globe Harbour will help achieve the desired waterfront address to the relocated podium and tower.</p> <p>The large podium base of casino/hotel tower should be shrunk to fit the development potential outcomes. Building envelopes should be reduced in size to correspond to the developed designs for Block Y (hotel/casino) and Blocks 4A and 4B (residential towers), discouraging yet further increases in GFA and height, robbing the majority of the western CBD of shared western harbour views often needed to incentive redevelopment of redundant building stock.</p>	<p>The proposed Modification Application seeks to amend the zoning of the Barangaroo South site, providing a B4 Mixed Use zone within Block Y where the landmark hotel building will be provided and relocating the land zoned RE1 Public Open Space to the east to create Hickson Park. As such, the landmark hotel building will not be located in a prohibited zone.</p> <p>The proposed envelope for the landmark hotel building is reflective of the requirement to have a hotel building which achieves landmark status. The additional height proposed for this envelope will allow the building to achieve a landmark status on land, rather than a smaller tower located over the water.</p> <p>The View and Visual Impact Analysis provided with the Environmental Assessment Report identifies that view sharing principles have been incorporated into the proposed Modification Application.</p>
	Before assessments are concluded, the approved envelopes for Barangaroo Central should be included in the shadow modelling exercise to give a more accurate indication of the conditions in the Northern Park. Following this, the envelope for 4B should be adjusted to guarantee a built edge to Hickson Road that corresponds to the height and depth of C1 and C2/6. Controls should be developed to ensure good amenity for the Northern Park, a sun access plane for the blocks to the north of the park in Barangaroo Central.	The package of information provided to the Department and for each of the exhibition locations included shadow animations for mid-winter, mid-summer and equinox. Each of these animations included the currently proposed built form within the Central Precinct. In addition to this information, static shadow diagrams have been updated to include the Central Precinct as it is currently understood (see Appendix H). The shadow diagrams also include the proposed Renzo Piano Building Workshop Designs for the R4A, R4B and R5 residential towers.
	Buildings in the amended blocks must demonstrate a unifying identity for Barangaroo South that encompasses a variety of expression of form, materials and details.	A single architect has been selected for the design of the residential towers (Renzo Piano Building Workshop). This approach will see a strong unifying identity for this element of the project. The design of the hotel building, by Wilkinson Eyre Architects, while a fundamentally different building type is likely to have a number of similarities with the nearby residential buildings, most notable in terms of materiality.
	Relocate the casino/hotel block to land zoned for urban development east of Globe Street. Modification to demonstrate how negative wind effects are to be mitigated to suitable levels.	The proposed Modification Application seeks to amend the zoning of the Barangaroo South site, providing a B4 Mixed Use zone within Block Y where the landmark hotel building will be provided and relocating the land zoned RE1 Public Open Space to the east to create Hickson Park. A Wind Report was provided with the Modification Application which addressed wind conditions on the Site.

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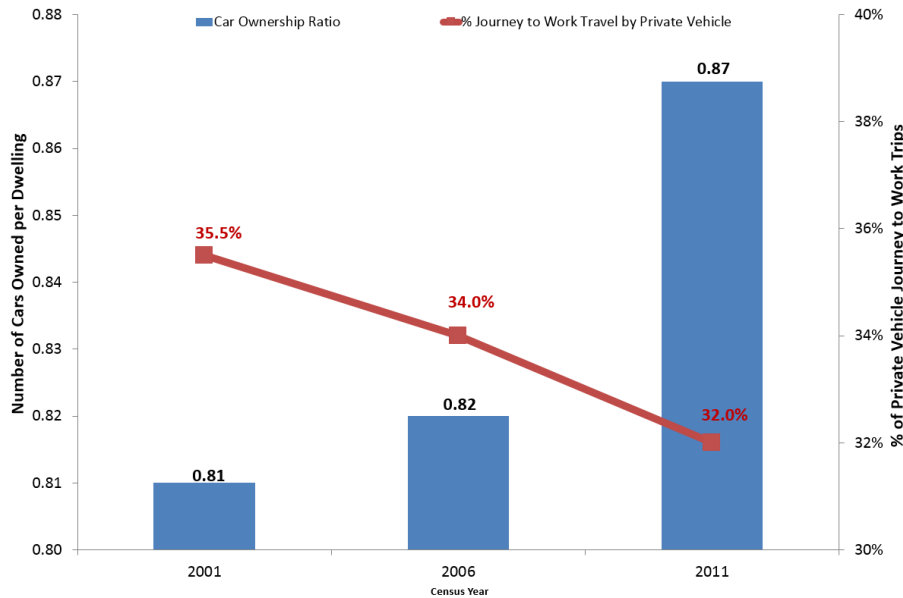
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	Any structural intrusions below the park should be at a minimum distance of 1.8m from the surface to allow for adequate growth of plants and trees within the park.	Detailed consideration of soil depth is appropriately considered at the time of the development application for the public domain. Provision of adequate soil depth for the successful planting of significant trees is a key objective for the design of public spaces on the site.
	Sun access modelling should be carried out to determine the desired amount of sunlight to the park, after intended use is identified, and determine relevant sun access planes for Barangaroo Central based on the current Concept Plan envelopes.	Barangaroo Central's building heights and locations are limited by the current Concept Plan. Concept Plan MOD 8 does not propose to alter these in any way. Sun access planes to protect the potential solar access to Hickson Park is a matter for a potential future proposal to alter Central's building heights, should such a proposal arise.
	The Concept Plan should include a fresh condition committing Barangaroo South to at least 10%, preferably 20% key worker housing (affordable housing), owing to the proposed uplift in residential GFA across the entire site	The provision of Key Worker Housing is not proposed to be amended as part of the Modification Application. Due to the proposed amendment to the maximum residential floor space, additional Key Worker Housing will be provided, resulting in a greater benefit to the wider community.

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<p>Given the significant increase in car parking, any traffic impacts from the proposal should be thoroughly tested and mitigation strategies agreed before any determination of the application to modify the approved Concept Plan. Specific omissions within the traffic modelling concerning light rail changes and RMS capacity improvements, during construction and post-commencement, should be addressed.</p>	<p>The increase in expected levels of car parking is related to the residential component of the site and the application of established car parking standards to this land use as presently required under the approved Concept Plan. It is important to note that the quantum of traffic generated by the residential uses is based on the total number of dwellings provided and is independent of the number of resident parking bays (allocated by number of bedrooms). The parking provision for residential uses responds to the level of car ownership expected. It is also noted that while parking numbers may have increased in Barangaroo South, there are in fact less commercial car spaces and therefore a lesser impact on Journey to Work traffic generation than what may be expected over a mix skewed more to commercial development. Likewise the key commitment of a maximum 4% journey to work traffic generation is maintained in Concept Plan MOD 8.</p> <p>Car ownership levels for residents of the Sydney Inner SLA have been steadily increasing over the past decade, rising from 0.81 cars/dwelling in 2001 to 0.87 cars/dwelling in 2011as shown in the figure belowError! Reference source not found. This is similar to the trends seen across much of Sydney, with cars becoming more affordable as tariffs fall with a larger stock of cheaper new cars and increasing household income.</p> <p>The census data also shows that while car ownership has risen over the past decade, private vehicle use for journey to work trips has decreased. This indicates that car ownership does not necessarily lead to car usage in the busy commuter peak periods, for areas well served by public transport such as Barangaroo.</p> <div><table><thead><tr><th>Census Year</th><th>Car Ownership Ratio (Cars per Dwelling)</th><th>% of Private Vehicle Journey to Work Trips</th></tr></thead><tbody><tr><td>2001</td><td>0.81</td><td>35.5%</td></tr><tr><td>2006</td><td>0.82</td><td>34.0%</td></tr><tr><td>2011</td><td>0.87</td><td>32.0%</td></tr></tbody></table></div>	Census Year	Car Ownership Ratio (Cars per Dwelling)	% of Private Vehicle Journey to Work Trips	2001	0.81	35.5%	2006	0.82	34.0%	2011	0.87	32.0%
Census Year	Car Ownership Ratio (Cars per Dwelling)	% of Private Vehicle Journey to Work Trips											
2001	0.81	35.5%											
2006	0.82	34.0%											
2011	0.87	32.0%											

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Key Issues Raised	Lendlease Response
Full parking demand for the casino/hotel, broken down in land uses, should be estimated and factored into the TMAP traffic generation predictions, intersection performance analysis and modal split targets	The traffic generation forecasts and traffic modelling that forms part of the TMAP (see Appendix X) has considered all the different components of the proposed hotel.
The future character of proposed streets must be demonstrated with illustrative street sections and discussion on the loss of on-street parking spaces.	<p>The level of detail requested in this comment is not required for a Concept Plan. The character of future streets will be determined as part of the future detailed application(s) for development consistent with the Concept Plan. It is noted however, that the nature of Barangaroo Avenue has been established in the Stage 1A public domain approval (now constructed).</p> <p>Previous iterations of the Concept Plan provided little more than basic estimations of potential on-street parking based on linear metres of roadway, spanning back to the original Concept Plan. This approach was reflective of there being no design prepared for the site, and all east-west links were considered as trafficable streets. Now that the first stage of Barangaroo South has been approved and completed with substantially less trafficable streets, a more accurate representation based on actual provision in Barangaroo South has been provided.</p>
Barton Street should be delivered as a complete road by Barangaroo South. This would impact on the area and the design of the park and any associated changes should be documented	The carriageway is to be delivered to enable the complete function of Barton Street within the Barangaroo South scope of works. The character of future streets will be determined as part of the future detailed application(s) for development consistent with the Concept Plan.
<p>The following should be included in MOD 8 for the design of Barton Street and the future Stage 1B public domain package:</p> <ul style="list-style-type: none"> ▪ An interim design showing what will be delivered as part of Barangaroo South, including all required temporary works for drainage lighting etc. ▪ A final design for the road once the opposite side is delivered by Barangaroo Central to show the areas of sacrificial works. ▪ An intersection design with Hickson Road in both the long and short term. 	The level of detail requested in this comment is over and above what is required for a Concept Plan.
All loading bays should be contained within buildings with site access points of minimal width to minimise adverse impacts on the public domain.	Noted. This is a detailed design issue which will be included where appropriate in the future separated application(s) for development. Notwithstanding, all loading areas are proposed to be located within basement areas, rather than on public streets
Increased cycling connections should be demonstrated to Barangaroo South. Clarify the extent of proposed cyclist access through-out Barangaroo South. A public bike hire facility is highly desirable and should be investigated.	Cycling connections to Barangaroo South are not the responsibility, or within the control, of the proponent. Barangaroo Avenue is the main cycle link through Barangaroo South and Hickson Road will border the Site on the east. The proponent is currently investigating the potential for a bike hire facility within Barangaroo South.
Reconcile the apparent disconnection between the need to provide sufficient pedestrian access to Barangaroo South versus the RMS desires to increase traffic capacity on surrounding streets. A Green Transport Committee should be established during the design of the subsequent buildings to ensure necessary walking and cycling infrastructure is installed and car parking reliance is minimised	The proponent is willing to be involved in a Green Transport Committee should one be established by RMS.
Confirm the location of, and capacity for, new bus infrastructure to service the demand of MOD 8 and Barangaroo South generally.	The location and capacity for new bus infrastructure is not the responsibility of the proponent. New bus infrastructure will be provided by Transport for New South Wales. It is noted that limited services will commence on Hickson Road as a result of light rail construction activities and that these may continue into the future.

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Key Issues Raised		Lendlease Response
	A light rail corridor should be preserved on Hickson Road with alignment to the centre of the road. NSW Planning and Environment needs to undertake or require, prior to finalisation of the Concept Plan modification, an analysis of the timing and delivery of long term public transport heavy rail improvements into Central Sydney.	Hickson Road design is not relevant to this Modification Application. A design proposal for the upgrade of Hickson Road is currently being progressed by Lend Lease, the BDA, and the City of Sydney. The design allows for the retrofitting of light rail along Hickson Road, consistent with Transport for NSW's requirements.
	View 7 should be amended to indicate the full height of the proposed towers as viewed from Observatory Hill. A more appropriate alternative location should be pursued for the casino/hotel tower so that it is located within the Barangaroo tower backdrop rather than north of the residential towers.	View 7 is reflective of the restrictions of a photographic lens and accounts for what a single view point in the human eye would see. This view is consistent with the Director-General Requirement's. The methodology for the views provided with the Modification Application is consistent with best practice and previous assessments. The proposed envelope for the landmark hotel building is reflective of the requirement to have a hotel building which achieves landmark status. The additional height proposed for this envelope will allow the building to achieve a landmark status on land, rather than a smaller tower located over the water. The EAR sets out the process that went into establishing the location of the hotel and why the proposed location was the most appropriate location on the site.
	The overshadowing of Darling Harbour and loss of visual connectivity between the two peninsulas of the harbour should not be permitted.	The shadowing impacts of the proposed Modification Application are acceptable given that the shadows will be slim and fast moving. A net improvement is proposed to shadowing on Darling Harbour, enhancing the recreational qualities of the Harbour from the current approved Concept Plan (as modified). Furthermore, the extent of shadow which falls on the western land side of Darling Harbour is limited in extent and restricted to the morning period. Furthermore, there is no proposal contained within Concept Plan MOD 8 that will impact on the ability to maintain unobstructed views between the Millers Point peninsula and the Pymont peninsula.
	The encroachment of the residential towers R4A and R4B upon view corridors from the Sydney Observatory telescopes towards the western sky ignore the national significance of these places and results in unacceptable adverse impacts that permanently limit the visitor experience of the Sydney Observatory's telescopes. A more appropriate alternative location should be determined for the casino/hotel tower, so that it is located within the Barangaroo tower backdrop rather than north of the residential towers Blocks R4A and R4B.	An additional 2 reports have been completed to address this issue (see Appendix F and Appendix G).
Leichhardt Council		
13	Leichhardt Council recommends that the State Government engage an independent body of experts to determine MOD 8 Concept Plan. In order to better manage the issue of governance (both real and perceived), the State Government could refer Concept Plan modifications at Barangaroo to the CSPC for determination.	The Planning Assessment Commission (PAC), an independent assessment authority, will determine the proposed Modification Application.

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<p>The EAR lodged in support of MOD 8 includes an artist's impression of the "landmark Hotel building" (refer to Figure 5 of the EAR report, prepared by JBA, March 2015). The ongoing use of this image, particularly by the State Government, gives the impression that the building has been approved. As a consequence, the public may be less inclined to be engaged at the public notification phase.</p>	<p>The image of the landmark hotel building is an artist's impression and has been utilised to illustrate the potential built form which could be achieved within the maximum envelope.</p>
<p>If approved, MOD 8 will result in buildings at Barangaroo that are taller than the CBD skyline and therefore inconsistent with the original height objectives for the Site, which was considered by in the Director-General's Report, as appropriate. The Proponent's justification to ignore the City's morphology in order to achieve the objectives of the Crown Hotel's brief and to achieve a landmark building are not sound planning reasons to so drastically change the visual impact of the City's skyline</p>	<p>The maximum proposed building height at Barangaroo South is below the tallest building in Sydney's CBD, being Sydney Tower. The built form and amended building siting is justified in Section 9.2 of the exhibited Environmental Assessment Report. The proposal does not ignore the City's morphology but has been designed with the specific intent to complete the city frame and book end the city's north western edge.</p>
<p>Despite the Sussex Penn Review recommendations, there is no additional commitment by the Proponent regarding key worker housing. The figure of 2.3% is a target figure. As a target, there is no onus on the Proponent to provide any Key Worker Housing. Leichhardt Council recommends that at the very least, the State Government should require that the Key Worker housing commitment is a minimum percentage of all proposed residential GFA, rather than a maximum percentage, as currently written.</p>	<p>Statement of Commitment No. 29 relates to the provision of Key Worker Housing, ensuring that there is a framework and requirement in place for the delivery of this housing. This commitment is not proposed to be amended as part of the Modification Application and the increase in residential GFA will allow for a corresponding proportional increase in KWH GFA. The provision of KWH also forms part of the Lendlease's PDA with the BDA for the site and is a requirement of the Concept Plan, not a 'target'.</p>
<p>Leichhardt Council recommends that at the very least, the State Government should require that the Key Worker housing commitment is a minimum percentage of all proposed residential GFA, rather than a maximum percentage, as currently written.</p>	<p>The provision of Key Worker Housing, which is expressed as a commitment to 2.3% of all residential GFA on the site, is not proposed to be amended as part of the Modification Application. Due to the proposed amendment to the maximum residential floor space, additional Key Worker Housing will be provided, resulting in a greater benefit to the wider community.</p>
<p>The Concept Plan (MOD 8) Heritage Report prepared by Tanner Kibble Denton Architects (Sept 2014), has negligible regard to the visual impact of the MOD 8 Concept Plan on the Sydney Opera House. The View and Visual Impact Analysis (February 2015), prepared by JBA lodged with MOD 8, includes an analysis of the view from the western forecourt of the Opera House, but does not take into account the impact of the proposal on the setting of the Opera House. Leichhardt Council recommends that the NSW Government undertake a Planning Study to protect the significance and setting of the Sydney Opera House, similar to the Victorian Government's Planning Study to protect the visual setting of Melbourne's Shrine of Remembrance.</p>	<p>The Heritage Report and View and Visual Impact Analysis provided with the Modification Application have been prepared in accordance with the DGRs. The Barangaroo Site is well removed from the location of the Opera House and will not be apparent in its immediate setting, therefore no further analysis is considered necessary.</p>

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Response to Industry Bodies / Persons

Key Issues Raised		Lendlease Response
Sydney Business Chamber		
1	The SBC believes that the key changes under the modification plan resulting from the decision to relocate the Crown Hotel away from the Harbour Pier onto land at Barangaroo South will improve the visual and public amenity of the Barangaroo site as a whole. The SBC supports these changes and believes they will not only improve the site itself but also and importantly improve the sites linkages with the western CBD and Millers Point. They believe that by allowing for an increase in the floor space of the Hotel development whilst maintaining the amount of green space on the site, as well as the improvements noted above, will achieve a significantly better outcome from the development in terms of both economic and social amenity.	Noted.
Green Building Council Australia		
2	The revised concept plan and Modification 8 will not in any way impede the ability of Lend Lease to achieve Green Star certification for the buildings or the precinct. The GBCA looks forward to continuing to work with Lend Lease to support them in the delivery of a productive, sustain able, liveable and resilient community at Barangaroo South	Noted.
Tourism and Transport Forum		
3	The MOD 8 proposal ensures that the Barangaroo precinct will be able to accommodate the construction of an iconic hotel and integrated resort while maintaining the publicly-usable space that covers more than half of the site. Achieving this balance is key to creating a high-quality cultural and entertainment hub. Proceeding with these modifications to the original concept plan will deliver a positive outcome for the liveability of Sydney but also to the city's appeal to domestic and international visitors.	Noted.
Echo Entertainment		

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Key Issues Raised		Lendlease Response
4	Assessment Process The need for transparency is paramount so as to ensure public confidence is maintained in the providence applied to the State's prominent entertainment, tourist and infrastructure assets, and particularly those which specifically operate in the casino resort sector. It is in the public interest, and the interests of the city and all the stakeholders, to ensure that the appropriate rigour and integrity is applied to the planning and development approval process for key infrastructure projects across NSW.	A planning assessment in relation to the availability of the s.75W modification power to MOD 8 is contained within Section 2.7 of the Response to Submissions Report and Preferred Project Report for MOD 8. For the reasons set out in that Report including in Section 2.7 it is open to the Minister to be reasonably satisfied as to MOD 8 being a modification within the meaning of s75W. Based on the assessment within the PPR Report and the exhibited EAR and the accompanying technical reports, the PPR Report concludes that on balance there are limited environmental impacts beyond those originally assessed and determined to be acceptable in the approved Concept Plan (Mod 7).
	Whether the environmental consequences of Mod 8, in various respects, is "limited" as compared to the Concept Plan either as most recently modified by way of Mod 7, or (as being even more potentially problematic) as compared to the original Concept Plan. Arguably, some, if not all of these changes (particularly when considered together), are not changes of limited environmental impact compared to what has been environmentally assessed, and hence may be said to be outside the compass of the modification power addressed in <i>Barrick v Williams</i> (2009) 74 NSWLR 733.	Please refer to the above response and to Section 2.7 of the Response to Submissions Report and Preferred Project Report for MOD 8.
	In our opinion, it is arguable that a fair minded lay observer, having knowledge of these material objective facts, might reasonably apprehend that the Minister might not bring an impartial and unprejudiced mind to the determination of the s75W modification in light of the private agreement between the NSW Government and Crown Resorts with a restricted gaming licence; see <i>Gwandalan Summerland Pt v Minister for Planning</i> (2009) 168 LORA 269 especially at [115] and following per Lloyd J.	Lendlease does not agree with this opinion. In light of the due planning process that has occurred in relation to MOD 8 so far, there is no credible information which supports an argument that the Minister for Planning might not bring an impartial, unprejudiced or independent mind to the determination of MOD 8.
	The extent of consultation with relevant public authorities is unknown, but the EARs suggests that there may have been no consultation with public authorities such as the Independent Liquor and Gaming Authority, Office of Liquor and Gaming, the Department of Health and the Department of Community Services, public authorities that are arguably relevant in relation to a proposal for a Casino.	Consultation was carried out in accordance with the Director-General Requirements issued for the Modification Application. The development application seeking approval for the specific use of a restricted gaming facility is under separate assessment by the Department of Planning and Environment. As part of the preparation of that application Crown consulted with the relevant government agencies in accordance with the Secretary's Requirements.

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Key Issues Raised		Lendlease Response
	<p>Compliance with the Concept Plan Approval</p> <p>Departure from design excellence condition of Mod 7, which states "The design review panel shall also be utilised for any significant changes to the Concept Plan, as determined by the Director General" C2(2) provides that the Proponent shall hold a design excellence competition for all development involving erection of a new building which will have height greater than RL 57 and erection of a new building on a site greater than 1,500 square metres. It is not known whether there has been a further design excellence competition or decision of the design review panel in relation to Mod 8 or the significant buildings.</p>	<p>The Secretary has sought the advice of the Design Review Panel on the proposed Modification in accordance with condition C2.</p> <p>This Modification Application relates to the amendment of the Barangaroo Concept Plan and does not seek approval for the erection of a new building which will have height greater than RL 57 of the erection of a new building on a site greater than 1,500 square metres. The detailed design of any future buildings will be the subject of a future separation application(s) and will be subject to the design excellence conditions included in the Barangaroo Concept Plan Approval.</p>
	<p>Condition C3A of Modification 7 required a traffic impact assessment, being an updated transport management and access plan, to be lodged "within three months of the determination of this Modification 6 ...". We are instructed that this has not been done, and there is no updated transport management and access plan. Any material disparity between the requirements of C3A and what has been provided in the EA, would arguably reinforce rather than resolve the issue.</p>	<p>The required traffic impact assessment has previously been provided to the Department. A further revised TMAP is provided at Appendix I.</p>
5	<p>Land Uses</p> <p>'Tourist uses' is not a defined use under the Standard Instrument, the definitions of which are called up by SEPP Major Development Part 12(3) with the closest defined term being 'tourist and visitor accommodation'. A 'Gaming Facility' is an incongruous addition to a list otherwise entirely comprised of tourist accommodation and it has impacts, in particular social as well as economic impacts, that are quite unique, potentially significant from an environmental assessment perspective and readily distinguishable from those impacts associated with 'tourist accommodation'.</p>	<p>'Tourist Uses' is a category of uses provided under the approved Barangaroo Concept Plan (as modified). Any specific use of a gaming facility will be the subject of a future separation application(s) which will assess the potential social and economic impacts of such as use. The appropriate time to assess the potential impacts of such a use is during the assessment of the detailed application seeking approval of the use. This approach is consistent with the remainder of the Sydney CBD which has been provided with a B8 Metropolitan zoning. Under this zoning, all development is permissible with consent if it is shown to be consistent with the zone objectives.</p>
	<p>There is no explanation of the floor area to be allocated to this land use (even broadly by way of a minimum/maximum range) nor is there any expansion on the specifics of that land use activity, which is variously referred to as a 'VIP Gaming facility' or alternatively, simply as a 'Casino'.</p>	<p>A maximum floor space allocation of 59,000m² is provided to tourist uses. Any specific use of a restricted gaming facility will be the subject of a future separate application(s) and will be detailed within that application(s).</p>
The National Trust of Australia (New South Wales)		

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Key Issues Raised		Lendlease Response
6	Heritage Assessment The Statement of Heritage Impact prepared by TKD architects states "there are no listed heritage items on the development site." This is clearly incorrect. In fact there are six Heritage Items that are sited within the Subject Land: <ul style="list-style-type: none"> ▪ The Sydney Harbour Maritime Control Tower- originally listed on NSW Ports Section 170 Heritage Register- Nominated for listing on the State Heritage Register and recommended by the Heritage Council for listing on the State Heritage Register. ▪ Dalgety's Bond Store Group ▪ Sewage Pumping Station No 14 (surface structure re located, subsurface structure buried) (State Heritage Register Listed) ▪ 19th Century Sandstone Sea Wall. ▪ Moore's Wharf & Stores Building, Town's Place & Dalgety Road ▪ Western edge of the State Heritage Register listed Millers Point & Dawes Point Village Precinct. 	The proposed Modification Application relates to Barangaroo South only, which does not include any of the listed heritage items.
	View Loss The views to the south-west from Observatory Hill Park will, in the Trust's view, be significantly adversely affected by the development which will be facilitated by the Concept Plan modification. Figure 42 in the Statement of Heritage Impact does not even indicate the full height of the proposed hotel tower.	<p>The Heritage Impact Statement prepared by TKD as part of the EAR found that the proposed modifications will have some impact on the setting of the Observatory, though it is noted impacts already exist by virtue of the existing approved buildings. This setting is also already affected to some extent by existing development in the northern section of Central Sydney. The taller building forms proposed will be more visible due to their increased height, however as the towers are also slimmer, breaks / gaps between buildings are supported enabling view corridors through the site. Therefore the essence of the visual impact and view corridors is retained and the relationship between the Sydney Observatory and the historic Millers Point housing will remain. Further the HIS found that the existing mature trees on Observatory Hill in the vicinity of the Observatory will ameliorate some of these impacts and other aspects of the Observatory's heritage significance will not be affected.</p> <p>The view provided in Figure 42 of the Statement of Heritage Impact is reflective of the restrictions of a photographic lens and accounts for what a single view point in the human eye would see. The methodology for the views provided with the Modification Application is consistent with best practice and previous assessments.</p>
Alex Greenwich Member for Sydney		
7	View Loss The hotel tower would dominate most views of the site from adjacent areas and reduce Barangaroo South's integration with the CBD and restrict historically significant panoramic views from: <ul style="list-style-type: none"> ▪ adjacent public parks and reserves such as Clyne Reserve and Munn Reserve, as well as Ballarat Reserve and Pyrmont Park; ▪ historic Observatory Hill outlooks; and ▪ view corridors from Hickson Road, Gas Lane and Lime Street. 	The proposed hotel building, will bookend the group of buildings which now increases in height from south to north will redefine the western face of the CBD as viewed from Ballarat Park and Pyrmont Pier Park. The visual impact assessment considers the impact of the Modification from the significant viewpoints and concludes that despite the taller building forms being more visible due to their increased height, as the taller buildings are also slimmer, breaks/gaps tween buildings enable view corridors through the site.

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<p>Claims that Sydney Observatory is in an "inappropriate" location to function as an observatory because of the existing light spill from the CBD and Sydney Harbour Bridge and the smog and pollution should be rejected. Sydney Observatory provides residents and visitors to Sydney opportunities to learn about astronomy and see stars and has served this purpose since the 19th Century. It must continue to do so for future generations.</p>	<p>The Environmental Assessment Report identified that the functional qualities of the Observatory, including its role as a scientific facility, are subservient to its educational role, particularly given its locational constraints. This is evident in the creation of newer, more appropriately located, observatories in New South Wales. The proposed changes to the Concept Plan do have an impact on the potential to view a limited number of target objects for a limited period during particular days or viewing sessions. It is considered that these impacts are appropriately mitigated by strategies such as selecting an alternative target for the limited period that one might be affected. Further details are attached on the updated Sky View reports at Appendix F.</p>
<p>Open Space The location of the approved waterfront park helps link South Barangaroo with Central Barangaroo and the Headland Park through continuous open space. Building a tower on this site would create a physical barrier that would reduce integration across Barangaroo. It is not enough to provide foreshore access around the perimeter of the site, the harbour must provide the focus for public recreation.</p>	<p>Concept Plan (Mod 8) will provide unobstructed public access around the perimeter of Globe Harbour and along the foreshore. It creates a variety of experiences along the foreshore that will contribute to the liveliness of the area, protect the scenic qualities of Sydney Harbour and differ from the more naturalistic parkland experience in the north.</p>
<p>Overshadowing The proposed modification would result in significant overshadowing of the Barangaroo South foreshore including Globe Harbour in the morning to early afternoon between Autumn and Spring. Lunch time is when the foreshore should be in highest demand but during the colder months there will be no sun and strong winds, making this open green space unpleasant and unattractive. Sydney Wharf and Darling Island would also be overshadowed and it is unclear whether open space and residential dwellings will be affected.</p>	<p>As part of Concept Plan (Mod 8) the size of Globe Harbour has been rationalised and its location modified to respond to the relocation of the landmark hotel building and subsequent creation of the Northern Park (Hickson Park). The proposed modification to the built form will enhance the activation of the Globe Harbour area with building frontages now provided on three sides. Further, the Shadow Diagrams provided with the Modification Application demonstrate an appropriate level of solar access within the Barangaroo South site, commensurate with the CBD location of the Site, and that the shadow impact on the foreshore on the southern part of the site and adjacent at King Street Wharf a in fact been reduced from that occurring under MOD 7. The Wind Assessment provided with the Modification Application has identified that the wind conditions will be appropriate subject to further detailed testing and mitigation measures. These measures will be provided in the future detailed application(s) for development as is appropriate.</p>
<p>Overshadowing will also omit the potential to Introduce solar powered initiatives such as solar powered street lighting.</p>	<p>Solar powered street lighting has not been and is not currently proposed, as is consistent with the remainder of Sydney's CBD which is a highly dense and urbanised environment. The proponent is committed to providing a high level of sustainability, as will be demonstrated in the future separate application(s) for development at Barangaroo South and the existing approvals for Barangaroo South. To this end it is acknowledge that the proponent is committed to delivering Australia's first carbon neutral precinct, and to this end that all power requirements of the public domain and black water treatment plant are being met by the provision of on-site solar.</p>
<p>Wind New building heights and relocations will increase wind tunnels along the Waterfront Promenade and in public lanes particularly Lime Street. Mitigations such as awnings and screens are limited and would only create clutter and reduce public space.</p>	<p>A Wind Impact Assessment prepared by Cermak Peterka Petersen was provided with the Modification Application. The results of this Assessment indicate that no locations exceeded the nominated pedestrian wind comfort criteria. It also found that all locations south of Globe Street are suitable for, at a minimum, pedestrian walking with many locations suitable for pedestrian standing and sitting. Generally, wind conditions along the foreshore are classified as suitable for pedestrian sitting or standing. Where not classified as suitable, the provision of landscaping or other similar measures will mitigate wind impacts to be acceptable. The provision of these measures as required will be detailed in the future separate application(s) for the development of Barangaroo South.</p>

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Key Issues Raised		Lendlease Response
	Traffic and Parking The modification proposes 500 new car spaces to cater for the casino section of the hotel, based on an assessment of Crown Casino in Melbourne parking demands, which are 800 cars at the maximum and 100 cars at the minimum. This is an absolute overestimation. Providing 500 parking spaces would encourage casino patrons to drive and add to congestion.	This Modification Application relates to the amendment of the Barangaroo Concept Plan. No detailed approval for the construction and use of car parking space is proposed. The construction and use of these spaces will be the subject of a future separate application(s).
	Removal of most kerbside parking is also proposed however the environmental impact assessment does identify how much will be removed or explain why spaces are being removed.	Previous iterations of the Concept Plan provided little more than basic estimations of potential on-street parking based on linear metres of roadway, spanning back to the original Concept Plan. This approach was reflective of there was no design prepared for the site, and all east-west links were considered as trafficable streets. Now that the first stage of Barangaroo South has been approved and completed with substantially less trafficable streets, a more accurate representation based on actual provision in Barangaroo South has been provided.
	The government must ensure that all planned public transport options are implemented.	Noted. The implementation of planned public transport options is not the responsibility of the proponent.
Irene Doutney Member for Sydney		
8	Heritage The proposal for MOD 8 is a stark departure from the nearby Millers Point Heritage Conservation area, and completely overwhelms the character that this area tries to preserve. The plans of MOD 8 do not attempt to enmesh or reflect the area's conservation sites, as seen through the concept design photos of the hulking towers that shadow over the area with an ultra-modern architecture style, completely unsympathetic to the heritage formations below.	The approved Concept Plan provided for a new high density urban precinct within Barangaroo South. The proposed modification does not seek to change the approved future character of Barangaroo South and therefore will still relate to the Millers Point Heritage Conservation area in the same manner. TKD Architects undertook a heritage assessment of the proposed Modification Application and found that there would be minimal to no impact on these items due to the distances between the items and Barangaroo South and the character of the existing setting of particular items. Any potential impacts are likely to be ameliorated by the topography and built form of the locality.
	The proposed development will affect many individual heritage landmarks scattered across the area; including: <ul style="list-style-type: none"> ▪ Miller Point and Dawes Point Village Precinct; ▪ Messenger's Cottage for Fort Phillip Signal Station; ▪ Fort Phillip Signal Station; ▪ Bureau of Meteorology; ▪ Fort Street Primary School site (and surrounding fig trees); ▪ National Trust Centre; ▪ Agar Steps; ▪ The former Grafton Bond Store in Miller Point; ▪ The former Moreton's Hotel; ▪ the former MWS stores; 	TKD Architects undertook a heritage assessment of the proposed Modification Application and found that there would be minimal to no impact on these items due to the distances between the items and Barangaroo South and the character of the existing setting of particular items. Any potential impacts are likely to be ameliorated by the topography and built form of the locality.

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Key Issues Raised	Lendlease Response
<ul style="list-style-type: none"> ▪ sandstone retaining wall of Sussex and Napoleon Streets and surrounding trees; ▪ heritage terraces and cottages of Munn Street and Merriman Street; ▪ terrace group on Agars Steps and Kent Street; ▪ Jenkins Street; ▪ Pyrmont Bridge; ▪ Jones Bay Wharf; ▪ the Sydney Harbour Bridge; ▪ Messenger's Cottage for Sydney Observatory and the Observatory Hill Park including Boer War Memorial, Bandstand, fences and landscape. 	
<p>The Sydney Observatory, as recently warned in a Sydney Morning Herald article (13/5/15) is under great threat with this proposal. The article speaks of the cultural significance that the observatory holds, with its Southern Cross views that have been a popular local and tourist hotspot. However, these unique views will be adversely affected if the high rise casino and hotel complex are constructed.</p>	<p>An additional 2 reports have been completed to address this issue (see Appendix F and G)</p>
<p>Further, I urge further investigation into JBA Planning's statement that 'heritage views will not be affected by the proposed Concept Plan Modification'. As one of the tallest buildings proposed in Sydney, it is clear that this building aims to be a statement piece of Sydney, which threatens to diminish other focus points in Sydney that have heritage and cultural value. This proposal adds no heritage or cultural value to our city, and will merely turn this area into an enclave for the rich.</p>	<p>The proposed amended building envelopes do not significantly obscure or impact existing heritage views. The proposal will allow for the delivery of modern buildings which are of a high quality and significantly contribute to the urban fabric of Sydney, complementing the heritage qualities of the city.</p>
<p>Overshadowing</p> <p>The released shadow effects of MOD 8 are detrimental to Darling Harbour and Jones Bay Wharf, a high value and iconic national destination of Australia. As the City of Sydney reports, the Harbour's waters will be overshadowed by MOD 8 in the mid to late morning hours throughout autumn and spring. This creates a further encroachment on the connectivity and ambiance of the harbour for half of every year, and should therefore not be permitted</p>	<p>The Shadow Diagrams provided with the Environmental Assessment Report illustrate the potential shadowing at hourly intervals between 9am and 3pm on 21 June, 21 March and 21 September, 21 December. It is considered that the shadowing impacts of the proposed Modification Application are acceptable given that the shadows will be slim and fast moving. A net improvement is proposed to shadowing on Darling Harbour, enhancing the recreational qualities of the Harbour from the current approved Concept Plan (as modified). Furthermore, the extent of shadow which falls on the western land side of Darling Harbour is limited in extent and restricted to the morning period.</p>

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Key Issues Raised		Lendlease Response
	Public Amenity and Benefit <p>The current proposal around MOD 8 is a severe delineation from the original vision of the site, which included plans for a foreshore park; a clear and needed amenity for public benefit, particularly in this part of the city. Instead, there are well-placed fears within the community that this proposal will “give the casino a waterfront exclusion zone”, limiting or excluding public access to this iconic position. It must not be forgotten that this development has been granted at the expense of once proposed public parkland and proposals to “(link the city by a network of generous public streets and new public transport”</p>	<p>The proposed Modification Application has been made in response to the findings and recommendations of the Sussex Penn Review, in particular the recommendation to relocate the landmark hotel building elsewhere on the site. The Modification Application provides for the relocation of the landmark hotel building and the consequential and related changes to the built form and public domain. The proposed envelope for the landmark hotel building is reflective of the requirement to have a hotel building which achieves landmark status. The additional height proposed for this envelope will allow the building to achieve a landmark status on land, rather than a smaller tower located over the water. Significant public benefits are provided through the proposed modification, as outlined in the PPR.</p>
	<p>The parkland that is proposed is inadequate, appearing as an afterthought to the casino/hotel, rather than as a functional, usable space. This is demonstrated through the likely wind pocket in which it is likely to sit.</p>	<p>The relocation of the landmark hotel building was undertaken by master architects RHS+P in holistic manner to ensure the changes achieved the optimum outcome for the public domain. Concept Plan (Mod 8) provides unobstructed public access around the entire perimeter of Globe Harbour and along the foreshore and creates a variety of experiences along the foreshore and throughout the site that continue to the liveliness of the area, protects the scenic qualities of Sydney Harbour and differs from the more naturalistic parkland experiences in the north. The location of Hickson Park in fact expands the breadth of open space experiences available to the public. Rather than a “wind pocket” its location and orientation is such that it provides significant protection from cold winter winds whilst also being open to direct sunlight throughout the day; a fact that represents a significant improvement to the environmental qualities of the waterfront during the winter months</p>
	<p>Further to this, crime rates are likely to increase due to the segregated public space which minimises casual public surveillance. The Star Casino, also owned by James Packer, has received exemption from lockout laws – a law implemented to reduce assault – and reports indicate that assault rates have doubled around the Star in 2014 to 76 reported assaults yet still it remains immune to the laws that govern its surroundings. While the Barangaroo site will also be exempt from this law, it is concerning to see at this stage, its disregard for crime in its conceptual stages.</p>	<p>This Modification Application relates to the amendment of the Barangaroo Concept Plan. No detailed approval for the construction and use of a gaming facility is proposed as part of this application. The proposed Modification Application also does not include any exemption from lockout laws. It is also noted that James Packer does not own any interests in Echo Entertainment Group Limited (Being the owner and operator of The Star in Sydney) as at the date of this document. The principles CPTED will be incorporated into the future design of the buildings and the public domain.</p>
	<p>The values of James Packer and his proposal for our city are very clearly enveloped in his push to make 20,000 square meters of gaming space a smoking space. Not only is this concerning in its blatantly profit-driven attack on health measures, but perhaps what is most concerning is that he has been successful in his attempts to overthrow smoking laws in NSW.</p>	<p>This issue is not a relevant consideration for the Concept Plan.</p>
	<p>MOD 8 incorporates a misleading report of public open space, including the new roads proposed for the vehicular access to the casino/hotel tower, which in fact accounts for a reduction in open space. I request an accurate report to be researched by an independent body in order to assess the true public open space in this proposal.</p>	<p>Previous sections have clarified that RE1 zoning continues to achieve the current commitment of 11ha (50%) open space for the Barangaroo site and that Public Domain on the Barangaroo South site (excluding water) maintains an area in excess of 50% of land area for publicly accessible open space.</p>

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised		Lendlease Response
	Affordable Housing Lend Lease is obliged to provide a nominal and ineffectual affordable housing amount up to 2.3% of its residential floor space. Considering the likely profits and homogenising affect that this Casino/Hotel will garner, this is absolutely insufficient, and indeed negligent in its social responsibility. I request that the Concept Plan incorporates a condition which commits Barangaroo South to 20% affordable housing, considering its substantial increase in height and bulk since its conception.	The provision of Key Worker Housing is not proposed to be amended as part of the Modification Application. Due to the proposed amendment to the maximum residential floor space, additional Key Worker Housing will be provided, resulting in a benefit to the wider community.
The Millers Point Dawes Point, The Rocks and Walsh Bay Resident Action Group (RAG)		
	The modification represents a dramatic and massive change to the current approved plan and as such it should not be treated as a modification but should be approached as a new concept plan, subject to a new approval process which could eventually be decided by the Planning Assessment Commission (PAC) after a full public hearing.	A planning assessment in relation to the availability of the s.75W modification power to MOD 8 is contained within Section 2.7 of the Response to Submissions Report and Preferred Project Report for MOD 8. For the reasons set out in that Report including in Section 2.7 it is open to the Minister to be reasonably satisfied as to MOD 8 being a modification within the meaning of s75W. Based on the assessment within the PPR Report and the exhibited EAR and the accompanying technical reports, the PPR Report concludes that on balance there are limited environmental impacts beyond those originally assessed and determined to be acceptable in the approved Concept Plan (Mod 7).
	The hotel, residential apartments and gaming facility are now proposed to be situated on land currently allocated to open space which conforms with the City Council's long standing planning objective of "keeping development at a low scale adjacent to the harbour-side".	The proposed Modification Application has been made in response to the findings and recommendations of the Sussex Penn Review, in particular the recommendation to relocate the landmark hotel building elsewhere on the site. The Modification Application provides for the relocation of the landmark hotel building and the consequential and related changes to the built form and public domain.
	The 275 metre hotel/casino/residences is of such a scale that it will dominate Central Barangaroo to the north - turning what was meant to be a people's park into a landscape frontage for the building. We note that approximately 48% of the floor space in the tower is proposed to be luxury apartments	The proposed envelope for the landmark hotel building is reflective of the requirement to have a hotel building which achieves landmark status. The additional height proposed for this envelope will allow the building to achieve a landmark status on land, rather than a smaller tower located over the water. The proposed residential component of the building is 22,600m ² . This represents 29% of the proposed building floorspace.
	The modification reduces the quantity of open space by classifying roads as open space. These roads are now included in the required open space allocation and effectively representing a significant reduction in the amount of real useable public space.	Previous sections have clarified that RE1 zoning continues to achieve the current commitment of 11ha (50%) open space for the Barangaroo site and that Public Domain on the Barangaroo South site (excluding water) maintains an area in excess of 50% of land area for publicly accessible open space.
	The "replacement" open space, hemmed in between tall towers, is severely overshadowed, poorly integrated into the street grid of Barangaroo, poorly connected to park land in the north and Darling Harbour to the south and does not relate to cross links to the city	This space provides a unique experience, different to other areas of open space with Barangaroo. The space will provide a high quality public domain, integrated with the three residential towers within Blocks 4 and 5 and will ensure that there is a sheltered space not located along the harbour foreshore. The park will receive an appropriate level of solar access during the day, commensurate with its location within Sydney's CBD.

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised		Lendlease Response
	The modification only allocates 2.3% of total residential floor space (incidentally increased from 129,000 to 183,000 square metres) to affordable/social housing. This affordable/social housing would be for staff employed on the site rather than the thousands of truly justified emergency workers (ambulance, police, nursing etc) who work in the city. The allocation of 2.3% sharply contrasts with the desperate need for such housing in the city and the clear target set by the City Council of 15%. It should be noted that the City of London aims at 20% affordable/social housing.	The provision of Key Worker Housing is not proposed to be amended as part of the Modification Application. There is a present commitment to 2.3% of residential GFA to be provided as key worker housing. Contrary to the issue raised, this KWH provision is not for staff employed on the site, but is for the wider community. Due to the proposed amendment to the maximum residential floor space, additional Key Worker Housing will be provided, resulting in a benefit to the wider community. The Housing Strategy, which sets out the methodology for procuring and managing this key worker housing, is not proposed to be amended.
	The residential tower to the east of the hotel/casino has been increased in height from 41.5 metres to 250 metres, further overshadowing the proposed new open space and dominating Central Barangaroo Park. The adjacent 220 metre and 107 metre apartment blocks exacerbate this situation.	The proposed building envelopes are located to the south of the Headland Park and Barangaroo Central, and will therefore not cast any shadow on these spaces. The shadow cast from the landmark hotel building envelope on the Northern Park will be during the afternoon, with solar access available during the majority of the day.
	Significant overshadowing would occur over the whole Barangaroo South foreshore including Globe Harbour, Sydney Wharf and Darling Island. This shadowing is excessive in the morning to early afternoon between autumn and spring severely reducing the amenity of workers and visitors.	The Shadow Diagrams provided with the Modification Application demonstrate an appropriate level of solar access within, and in the vicinity of, the Barangaroo South site, commensurate with the CBD location of the Site.
	Historically significant panoramic views from Millers Point will be severely impacted. Observatory Hill outlooks will be dominated by massive towers blocking horizon and sky views. Similar impacts will occur at Kline Reserve and Munn Reserve.	The Statement of Heritage Impact provided with the Proposed Modification assessed heritage views and concluded that no adverse impacts would result from the proposed modifications.
	The modification proposes to remove most kerbside parking, including that on Hickson Road from 275 spots to just 40. This will intensify the volume of traffic on the roads and make streets more dangerous and increasing the overflow of parking into Millers Point, Walsh Bay and Dawes Point	Previous Concept Plan Modifications estimates for on-street parking internal to the site were a basic estimate based on linear metres of potential roadway. MOD 8 just reflects the accuracy afforded by approval of Stage 1A public domain and additional design resolution of the Barangaroo South site. It should also be noted that the lower levels of on-street parking will contribute to reduced levels of traffic generation in the precinct as workers and visitors will be encouraged to travel via non-car modes. The concept plan proposes no changes to the level of on-street parking proposed for Hickson Road compared with previous modifications.
	We note in recent reports that contracts have been let for the construction of the hotel/casino/residential tower. This is an insult to the proper process of planning and consultation which the community expects the Government to implement on behalf of the citizens of New South Wales.	This is not relevant to the proposed Modification Application. This Modification Application relates to the amendment of the Barangaroo Concept Plan and does not include approval for the landmark hotel building.

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Response to Public Submissions

Key Issues Raised		Lend Lease Response
Assessment Process		
1	Details of the agreement between the Government and the Developer are hidden. There is widespread community concern over the lack of transparency concerning money paid by Lend Lease to develop the site and the pressure applied to the Public Service to prioritise commercial returns over the protection and support of the rights and interests of residents.	The agreement between Lend Lease and the NSW Government to develop Barangaroo South is public except for some details which are commercial-in-confidence, as is standard practice in such agreements. The Project Development Agreement is available on the Barangaroo Delivery Authority's website.
	By considering this development under Part 3A of the Environmental Planning and Environment Act, the Department is required to make a decision within 28 days from the end of the consultation period. The consultation period is too short and the period for making decisions is ridiculously short, given that these are decisions on a project, not just of great complexity but of huge public and personal impact for residents.	The Department of Planning and Environment is not required under the transitional arrangements of Part 3A to determine the application with 28 days of the exhibition concluding. The Planning Assessment Commission will determine the proposed Modification Application in due course.
	We would like to see a supervisory body such as Sydney city council play a role to ensure that problems of communication and information are regularly and speedily addressed.	The proposed Modification Application is being progressed through an established assessment process under the EP&A Act. This process is transparent, inclusive and independent, with additional rigour achieved through the determination of the Modification Application by the Planning Assessment Commission.
	It is questioned as to whether the proposal could be regarded as having 'limited environmental consequences' in the context of its capacity to be dealt with by way of a s75W modification. There is likewise concern as to whether the reconfiguration and amendment to land uses can be properly regarded as within the scope of a 'modification' and this is most directly relevant to the inclusion of the proposed Casino within the Hotel complex.	A planning assessment in relation to the availability of the s.75W modification power to MOD 8 is contained within Section 2.7 of the Response to Submissions Report and Preferred Project Report for MOD 8. For the reasons set out in that Report including in Section 2.7 it is open to the Minister to be reasonably satisfied as to MOD 8 being a modification within the meaning of s75W. Based on the assessment within the PPR Report and the exhibited EAR and the accompanying technical reports, the PPR Report concludes that on balance there are limited environmental impacts beyond those originally assessed and determined to be acceptable in the approved Concept Plan (Mod 7).
	It is requested that a public meeting on the current amendments be held so that the residents can be made aware of the application.	Public meetings are not intended to make residents aware of an application but to allow the PAC to hear public views on the Department's Assessment Report. It will be the decision of the PAC whether this process is necessary for this Modification.
Architectural Design		
2	The resulting blights on the Sydneyscape will mirror Harry Seidler's Blues Point Tower eyesore across the harbour.	The proposed Modification Application seeks to amend the building envelope within Block Y and Block 4. Approval is not sought for the detailed design of buildings. Separate applications will follow for the detailed design of the landmark hotel building and proposed residential towers. These applications will be subject to a merit assessment and existing requirements concerning Design Quality will apply.
	Incremental modifications are gradually eroding the objectives and best practice elements of the original design competition. If the height of the building must go to 250 metres, it should be a thin, featherlike building, as was proposed in one of the earlier concept plans.	Amongst other changes, the proposed Modification Application seeks to amend the building envelope within Block Y. The proposed envelope is reflective of the requirement to have a hotel building which achieves landmark status. The additional height proposed for this envelope will allow the building to achieve a landmark status on land, rather than a smaller tower located over the water. The detailed application for the Crown Sydney Hotel Resort illustrates that the proposed building under that application is smaller than the envelope proposed as part of the Concept Plan.
Scale of Development		

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised		Lend Lease Response
3	The proposed modifications include a hotel/casino (H1 Stage 1 RL 275 metres), a residential apartment building (R4 Stage 1 RL 250 metres), another residential apartment (R5 Stage 1 RL 107 metres) and an envelope for a future building unspecified with RL 200 metres. This is a massive increase in both height and envelope from that originally proposed for the casino/hotel and is more than was ever envisaged in the original application. There has been a cumulative increase in floor space with each modification of the concept plan, resulting in doubling the floor space of the original concept plan.	The proposed Modification Application has been made in response to the findings and recommendations of the Sussex Penn Review, in particular the recommendation to relocate the landmark hotel building elsewhere on the site. The Modification Application provides for the relocation of the landmark hotel building and the consequential and related changes to the built form and public domain.
	This area is not the CBD, it is part of an established, successful residential community. The public objects to the excessive height and bulk of the buildings in the Barangaroo development and asserts that this application for such a large increase in height and bulk does not include drawings or models of <i>all</i> the new buildings proposed for the site.	The Barangaroo Site has consistently been identified as the western portion of Sydney's CBD in a number of strategic documents and is a recognised area of Sydney's CBD. The submitted information provides Concept Plan drawings off all proposed amended building envelopes within Barangaroo South; the area of Barangaroo to which this Modification Application relates.
View Loss		
4	Concerns expressed by the Sydney Observatory regarding the impacts of the proposed new buildings on their highly active astronomy program which attracts over 180,000 visitors annually. The view of several important night sky objects will be obstructed by the proposed new buildings at certain times of the year, including: <ul style="list-style-type: none"> ▪ The Southern Cross ▪ The Pointers ▪ The Jewel Box Cluster (open star cluster) ▪ Centauri (globular star cluster) 	Lend Lease and UNSW Global has undertaken an analysis of potential sky view loss and resultant impacts resulting from Concept Plan (Mod 8) and the potential impact on the functioning of the Sydney Observatory astronomical slightness. A detailed assessment has determined the view s of the four target objects are obstructed annually by the proposed Concept Plan (Mod 8) built form for a period of time during the night viewing hours between the end of August and October. <ul style="list-style-type: none"> • Southern Cross – partial obstruction of any of the five stars of the Southern Cross between 4 August and 29 September • Jewel Box Cluster – obstruction between 11 August and 6 October • Omega-Centauri global cluster – obstruction occurs between 25 August and 6 October • The Pointers – partial obstruction of both of the Pointers between 1 September and 6 October The original report has also been augmented with a further two reports directed at addressing the potential impact of the Hotel and at responding to the Observatory's specific comments in detail. Based on the existing conditions of the Sydney Observatory; the functioning of the Observatory; and the affected viewing times due to the Concept Plan (Mod 8) buildings; it has been determined that the potential impacts are relatively minor and acceptable.
	Concerns regarding the obstruction of the views to the Dawes Point Rocks area from Pymont Point and Pymont Bridge.	The View and Visual Impact Analysis provided with the Environmental Assessment Report has assessed views in accordance with the Director-Generals Requirement and identifies that view sharing principles have been incorporated into the proposed Modification Application.
	Concerns regarding the proposed amendments and view loss from apartment within the Stamford on Kent and other adjacent mixed use towers. It is noted that the original development envelope was below a height of 100m and as such did not restrict harbour views from these towers.	As part of the Exhibited EAR an iPad was made publicly available at the Department that illustrated the view impact at multiple locations on each level of the affected Kent Street buildings. The View and Visual Impact Analysis provided with the Environmental Assessment Report identifies that view sharing principles have been incorporated into the proposed Modification Application.

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised		Lend Lease Response
Overshadowing		
5	The proposed casino/hotel and other towers referred to above will cast shadows over existing King Street Wharf apartments, Darling Harbour and right across the water to Pyrmont during the morning. Not only will this impact on the amenity for current residents but significantly reduce the appeal for tourism and the use of the entire promenade at the King Street Wharf for visitors to the city.	The Shadow Diagrams provided with the Environmental Assessment Report illustrate the potential shadowing at hourly intervals between 9am and 3pm on 21 June, 21 March and 21 September, 21 December. It is considered that the shadowing impacts of the proposed Modification Application are acceptable given that the shadows will be slim and fast moving. A net improvement is proposed to shadowing on Darling Harbour, enhancing the recreational qualities of the Harbour from the current approved Concept Plan (as modified). Furthermore, the extent of shadow which falls on the western land side of Darling Harbour is limited in extent and restricted to the morning period.
	The Block 4A, Block 4B and Block Y buildings obscure west-facing apartments for access to sunlight. Whilst Lend Lease asserts that the increased height of these buildings will have minimal impact on the Stamford on Kent, the developer's own modelling shows that they will overshadow the building's west-facing apartments and deprive them of the harbour views and solar access.	The Shadow Diagrams provided with the Environmental Assessment Report illustrate that overshadowing on surrounding residential buildings is limited in duration (the late afternoon period) and will not significantly affect the amenity of existing residents considering the CBD context of the site.
Site Access, Transport and Traffic		
6	The transport plan of 2012 states that there will be 24,000 persons living and working on the complex with 33,000 visitors per day, but this predates the present proposal. This new proposed development must surely cause a massive increase in these forecasted figures.	This Modification Application relates to the amendment of the Barangaroo Concept Plan. The future detailed application(s) for the remaining development of Barangaroo South will consider increased persons living within the precinct and the number of visitors per day.
	At present demand for public transport appears to far exceed availability. The nearest train station is Wynyard and the solution of the 'Wynyard Walk' would only pour masses of pedestrians into the Wynyard Station precinct.	There is an abundant provision of public transport within the Sydney CBD, which is continually being reviewed and extended by the NSW State Government. The development of Barangaroo will continue to support patronage of public transport and promote upgrades of existing public transport and provision of new links. It is noted that since the public exhibition of Concept Plan MOD 8 the State Government announced the provision of a new train station within Central Barangaroo.
	The other option is bus. Buses leaving Wynyard bus interchange heading north negotiate a route down Erskine and attempt a right-turn into Clarence. In peak hours this is treacherous. It is difficult to see how this overstretched facility can be easily expanded to meet the demand of Barangaroo.	The Sydney City Centre Access Strategy outlines a redesigned bus network which improves bus reliability and addresses congestion and capacity constraints. There are several proposals within the strategy relevant to Barangaroo including: <ul style="list-style-type: none"> • New bus routes to run to Barangaroo and Walsh Bay via the city centre, Napoleon Street and Hickson Road • Erskine street to act as a key east – west bus corridor in the northern CBD • Approximately every second bus service on key Inner West bus routes entering the city centre via Broadway will only operate to Central. This will reduce the number of buses unnecessarily entering the city centre. • Bus routes servicing the Eastern Suburbs will utilise Elizabeth Street. Passengers travelling to Barangaroo will alight at Martin Place and walk through the city and across Wynyard Walk.
	In your traffic report of 2012 the car is described as a "low target mode share for private vehicles at 4%". It is inconceivable that those who purchase an apartment in Barangaroo will not utilise their car. It is also inconceivable that patrons of the hotel and/or casino will come by any other means than the vehicle, private or taxi and the number of movements could potentially be high day and night.	The Barangaroo Transport Management Plan establishes targets for mode share, seeking to achieve a sustainable and realistic benchmark for different transport usage.

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Appendix A – Detailed Response to Submissions

Key Issues Raised		Lend Lease Response
	The points of entry and egress from Barangaroo are extremely limited. The exit at Towns Place leads to the labyrinth of small streets in the Rocks; the exit at Napoleon Street leading to Margaret Street is limited; the main exit will be via Sussex Street. The intersection of Sussex and Erskine has, over the years become increasingly difficult to negotiate. At peak hours it is almost impossible to turn right from Erskine into Sussex southbound with safety.	The key access points into/from Barangaroo are not proposed to be amended as part of this Modification Application.
	Walking- the topography of the area does not facilitate an easy walking path. There are steep grades to negotiate whichever route is taken to exit the site particularly on the northern access. This limits access for anyone with impaired mobility. The distances involved to the nearest transport hubs at Wynyard are 0.5 Km from Barangaroo South and 1.5km from Headland Park. The traffic report 2012 suggests that Taxis will be an important mode of transport if there is a question of mobility. I would suggest that this is not a financially viable option for the great majority of persons with restricted mobility.	The topography of the Barangaroo Site and its surrounds has been taken into account in the design of the proposed amendments to the Barangaroo Concept Plan. The proposed Modification Application does not significantly alter existing access arrangements and will continue to facilitate an environment which is accessible and connected. In general, all locations south of Globe Street are suitable for, at a minimum, pedestrian walking. However, it is noted that pedestrian links are envisaged to be upgraded for transport mode share targets to be achieved (such as Wynyard Walk).
	The proponent claims that the increase in traffic movements would be "minor". However, the Director-General requires an assessment of the "cumulative traffic impacts", and this is not to be found in the exhibition documents. There is a significant amount of additional residential FSR that is approved or under construction in the CBD (Darling Harbour, China Town, Town Hall etc) which once fully developed and completed will place additional pressure on CBD roads, service, parking and amenities which has not yet fully been taken into planning and consideration. By adding to the residential space and especially a circa 50% increase, it will just further exacerbate the situation, especially when there are only very limited public transport options to reach Barangaroo and heavily congested road networks in the CBD.	The expected traffic generation of Concept Plan (Mod 8), including cumulative traffic of the entire Barangaroo Site, has been identified and assessed against the existing operation of the surrounding road network. It has been determined that there will be little difference in the road network performance based on the expected traffic generation and distribution. Significant investment in infrastructure has been undertaken to provide Barangaroo with a high level of accessibility, particularly in regard to pedestrian access to Wynyard Station.
Land Uses		

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised		Lend Lease Response
7	The exhibition material associated with the Modification 8, specifically Appendix I of the Environmental Assessment Report (EAR) depicts an RE1 Public Recreation zone over the subject site. However, the proposed land zoning map which accompanies the exhibition material for the State Environmental Planning Policy (Major Development) 2005 amendment retains the B4 Mixed Use zoning over the site. From discussions between Primary Health Care and the Barangaroo Redevelopment Authority, it is understood that it is not the intention of the modification application to rezone the site to RE1 Public Recreation as shown in the EAR exhibition material. This position appears consistent with the content of Modification 8 where there is no strategic justification for a rezoning of the Dalgety Bond Store site. To avoid any doubt, we request that Appendix I of the EAR be modified as part of and preferred project report or submissions report so that the map in the EAR is consistent with the current zoning map under State Environmental Planning Policy (Major Development) 2005.	It is confirmed there was a drafting error on the map provided at Appendix I of the submitted Environmental Assessment Report. The exhibited SEPP Amendment material illustrated the correct zoning of the Barangaroo Site, which did not propose to amend the zoning of the Dalgety Bond Store site.
	The request for DGRs did not identify the Casino as a proposed new land use under Mod 8 and reflective of this, the DGRs issued do not refer to the Casino other than in respect of traffic/parking impact assessment. The omission of any reference to this land use in the request for DGRs is a fundamental flaw.	The provision of 'gaming facility' as a use permitted within Block Y has been assessed within the Modification Application commensurate with the status of a Concept Plan. The DA lodged for the Crown Sydney Hotel Resort is the application that seeks approval for the specific use and associated environmental impacts.
	An increase of 34,791m ² of commercial FSR and 4,000 m ² of retail FSR awarded in previous Mods has been requested to be redistributed to other uses. Rather than redistribution, this 38,791m ² increase in commercial and retail FSR previously awarded should be reduced as the justification for this increase of 38,791 can no longer be valid as it no longer required.	Floor space has been redistributed across the Barangaroo South Site to reflect up-to-date approvals on the Site and to allow for the ongoing of the Barangaroo South Site. As outlined in the submitted Environmental Assessment Report, the proposed Modification Application is necessary to relocate the landmark hotel from the water to land, which then results in a necessary reconfiguration of the remaining built form and floor space.
Wind		
8	Concerns regarding the effects of the proposal on wind in open public recreation area and ground level pedestrian access ways.	A Wind Impact Assessment prepared by Cermak Peterka Petersen was provided with the Modification Application. The results of this Assessment indicate that no locations exceeded the nominated pedestrian wind comfort criteria. It also found that all locations south of Globe Street are suitable for, at a minimum, pedestrian walking with many locations suitable for pedestrian standing and sitting. Generally, wind conditions along the foreshore are classified as suitable for pedestrian sitting or standing. Where not classified as suitable, the provision of landscaping or other similar measures will mitigate wind impacts to be acceptable.
Construction Management		

Barangaroo Concept Plan (Mod 8)

Appendix A – Detailed Response to Submissions

Key Issues Raised		Lend Lease Response
9	It is essential that construction approvals for the next stage of Barangaroo South continue the current restrictions on working hours. There should also be more stringent compliance conditions that amplify the need for the proponent to ensure there are no breakdowns of procedures, especially for out of hours work in relation to Noise, Air and Odour Impacts. Also that the use of noisy machinery on site (in particular generators) overnight or on Sundays is not permitted unless satisfactory noise barriers are in place. Furthermore, that the Department regularly undertake the random unannounced surveillance as outlined to the residents of the Stamford on Kent in correspondence of 18 March 2015 from Mr Marcus Ray, Deputy Secretary	This Modification Application relates to the amendment of the Barangaroo Concept Plan. The future detailed application(s) for the remaining development of Barangaroo South will address construction and construction noise impacts as appropriate.
Miscellaneous		
10	The proposal needs to address the issue of storm water run-off, as well as effective grease trap and recycling technology to prevent harbour pollution from the kitchens and other amenities from the casino/hotel.	This Modification Application relates to the amendment of the Barangaroo Concept Plan. The future detailed application(s) for the remaining development of Barangaroo South will address issues of stormwater runoff and other impacts regarding harbour pollution.
	Friends of Sydney Harbour are concerned that a floating heliport, or indeed a land-based heliport could be sought by the casino/hotel owner in future with little or no modifications needed to what has "popped up" in some but not all drawings labelled as "floating water taxi dock."	The proposed Modification Application does not include any floating heliport or land-based heliport. There is no intention to provide a floating or land-based heliport.
	A major negative of the scheme is the necessity to relocate the cruise ships to White Bay which are already threatening to leave Sydney as a berthing venue. This does not seem to have been considered at all and will impact massively on the city if the ships leave.	The White Bay Cruise Ship Passenger Terminal is already in operation and the proposed Modification Application has no bearing on the past relocation.
	Loss of privacy for residents along Kent Street.	The separation between the Kent Street buildings and Block 4B is approximately double the separation that is required under the Apartment Design Guide and will not have any adverse privacy impacts.

Reponse to Design Review Panel

Lendlease

MOD 8 DRP

RESPONSE TO THE DEPARTMENT OF PLANNING'S DESIGN REVIEW PANEL REQUEST FOR INFORMATION



On 15 June, Lend Lease received correspondence from the Department of Planning that provided detail of additional information required to assist the Design Review Panel in its assessment of the MOD 8 application. The correspondence also included the Department of Planning's summary of key issues to be addressed in the Preferred Project Report and Response to Submissions currently being prepared by Lend Lease.

While there is significant overlap between both sets of issues, a response to the DRG's Request for further information will need to take separate and initial priority. Once complete, much of the information may then be incorporated within the PPR/RTS being separately prepared.

Review of the Design Review Panel's request for further details indicates that there may be a significant misunderstanding regarding the role of a Concept Plan prepared under Part 3A of the EP&A Act. Specifically, the level of detail on key design issues is relevant to future development applications, rather than the broad considerations of the Concept Plan (height, GFA, land use, building envelope etc). Nonetheless there is significant value in providing the additional detail insofar as is possible in order that the DRG are provided comfort that the future applications that will follow the Concept Plan are both consistent with it, and of a design quality that the overall objectives for the site are not compromised

Accordingly, the following Table of Content has been prepared in order to guide the collation of response material and identify the responsibilities for preparation. Each section proposes a summary of the material to be prepared, along with a direct reference to the relevant DRP issues

Introduction and Context

The Role of a Concept Plan

Concept Plans were introduced as part of Part 3A of the EP&A Act as a means of dealing with complex and long term projects in a coherent way. Concept Plans were intended to be a high level planning approach that enabled consideration of the key environmental issues at the concept stage, to determine the environmental viability of a proposal before more detailed design and assessment was carried out. This would then allow for establishment of a framework for more detailed development of the proposal to occur at the relevant stage and time.

This approach is reflected in the approved Barangaroo Concept Plan and the various supporting documents that have been prepared to date, which only deal with the future development at a high level; providing a framework for key aspects such as the distribution of land uses, maximum GFAs and heights, and urban design / built form principles.

As a modification to the Concept Plan only, and not an application for the detailed design of the buildings, the documentation submitted as part of the Concept Plan (Mod 8) reflects the purpose of a Concept Plan to provide a framework to guide future development rather than a specific outcome. Accordingly the documentation submitted with Concept Plan (Mod 8) is consistent with the level of documentation that formed part of the original Concept Plan application and subsequent modifications, and is appropriate for its intended purpose.

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Notwithstanding the above, significant design development on the Hotel, Stage 1B residential towers and public domain has been advancing independently and has been provided in this document, and by presentation to the DRP, to illustrate the outcomes envisaged for the site following approval of Concept Plan (Mod 8) to assist the Design Review Panel with undertaking its assessment of the modification.

What the Concept Plan seeks to amend?

The Concept Plan (Mod 8) proposal comprises:

- Relocation of the landmark hotel building (Block Y) from extending over the harbour onto land within the site in front of the existing Blocks 4A, B and C and inclusion of the potential use of a gaming facility in part of the future hotel development;
- Revision of the layout of Blocks 4A – C;
- Amendment of the size and location of the Southern Cove and public domain;
- Replacement of the previous pier and landmark hotel building with a new public pier and Community Building;
- Redistribution of the Gross Floor Area (GFA), public domain and land uses across Development Blocks 1 – 3, 4A – C, X and Y;
- Increase in the maximum GFA on the site to provide for additional GFA within the hotel building;
- Increase in the height of the buildings within modified 'Block 4' and the relocated Block Y;
- Update of the Urban Design Controls to reflect the modified concept design; and
- Amendment of the conditions of the Concept Approval to reflect the modifications to development.

The modified development proposed in Concept Plan (Mod 8) also necessitates changes to the Terms of Approval and Statement of Commitments.

The Concept Plan Modification does not propose any amendments to Barangaroo Central or the Headland Park.

The proposed modifications to the Concept Plan depart from the existing development controls for the site, established under State Environmental Planning Policy (Major Development) 2005. These components consequently require a SEPP Amendment to reconcile the Major Development SEPP planning provisions with the Concept Plan Modification and more specifically to:

- Create new development blocks, redefine the existing development blocks, and reconfigure land uses in accordance with the Concept Plan Modification;
- Redefine the boundary between urban development and public recreation;
- Amend the site boundary to include the proposed public pier and additional foreshore promenade adjacent to the proposed hotel;
- Increase the maximum permissible GFA within the Barangaroo South development blocks to reflect the Concept Plan Modification; and
- Increase the maximum permissible height controls within the Barangaroo South blocks to reflect the changes in configuration of land uses and GFA across the site, whilst allowing flexibility for the design of individual buildings within the certainty of a structured framework.

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The Role of the RSH+P Master Plan

Whilst a 'Master Plan' has always been a component of the background material that informed the Concept Plan, there has never technically been an approved 'Master Plan' referenced as part of the Concept Plan. Rather, the Master Plan at the relevant point in time, has been translated into a framework that guides future development such as maximum heights and GFAs, built form principles and urban design controls etc.

Under approved Concept Plan the only part of the RSH+P Master Plan specifically referenced is called up in Condition B5, which requires future development proposals to address their consistency with the "Concept Plan Built Form Principles and Urban Design Controls". These Urban Design Controls were drafted around a particular architectural solution in the RSH+P Masterplan prepared for Concept Plan (Mod 4) and as such were not able to provide the requisite flexibility to accommodate the current building brief and resultant architecture to better respond to detailed conditions and market.

Concept Plan (Mod 8) retains the intent of Condition B5, however having had the experience of preparing multiple applications under the existing framework, Lend Lease identified the need for, and prepared a more contemporary and outcome based assessment framework for the future applications for development on the site. The existing Built Form Principles and Urban Design Controls (as modified) were consolidated and updated to reflect the latest RSH+P Masterplan, and then integrated with other key elements of the Concept Plan to form the 'Barangaroo South Design Guidelines' (the Design Guidelines).

The Design Guidelines therefore replace the only part of the previous Master Plan document that was formally approved. As a result the RSH+P Master Plan document has no formal role as part of Concept Plan (Mod 8) and as was the case with previous versions of the Concept Plan, was therefore only provided for information as the background document that informed the proposed modification.

How Mod 9 should be considered as part of the assessment?

Concept Plan (Mod 9) relates to Central Barangaroo which is being redeveloped separately to Lend Lease's project at Barangaroo South. 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 a proposal for Concept Plan (Mod 9) was imminent. Accordingly the assessment in Concept Plan (Mod 8) had regard to Concept Plan (Mod 9) where possible. However, no modification has been lodged for Concept Plan (Mod 9) and it is understood that the Barangaroo Delivery Authority is currently undertaking a further review of Central Barangaroo, as a result in a change of context brought about by the announcement of a new rail station in the Precinct.

In light of the uncertainty associated with Concept Plan (Mod 9) it is not possible to provide any additional information or assessment in relation to the cumulative impacts of the modifications. Rather Concept Plan (Mod 8) must be assessed independently of what might happen as part of Concept Plan (Mod 9) on the basis of what is currently approved for Central Barangaroo under Concept Plan (Mod 7). Should Concept Plan (Mod 9) be lodged in the future it will be required to have regard to Concept Plan (Mod 8) as appropriate.

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GFA and Land Use Mix

The current Concept Plan approval (MOD 7) provides a range of controls on the allocation of GFA across the site. These include:

- a maximum GFA across the entire Barangaroo site,
- a maximum GFA for individual blocks,
- a maximum GFA for “Active Uses “ in the Public Recreation Zone,
- a maximum and minimum GFA for residential uses,
- a maximum GFA for tourist uses
- A maximum GFA for retail uses
- A minimum GFA for community uses.
- No GFA controls on Commercial uses

Combined, these controls generate a confusing framework for the allocation of floorspace across the site, particularly in terms of how the land use maximum's relate to the overall maximum GFA. While constrained somewhat by the form of the existing approval, Concept Plan MOD 8 has attempted to address at least part of this confusion by improving clarity around the manner in which Community GFA and GFA within the public domain is represented.

As a headline figure, Concept Plan MOD 7 provides for a maximum GFA of 490,240 sqm spread across each of the Barangaroo South blocks (Block 1, 2, 3, 4, X & Y). This total is intended to accommodate any Community Uses within Mixed Use Zoned areas and may be augmented by a further maximum of 3,000 sqm of “Active Uses” in the Public Recreation Zone. By comparison, Concept Plan MOD 8 provides for a total of 535,186 sqm of total development potential in Barangaroo South, spread across all Mixed Use and Public Recreation Zoned Land in Barangaroo South. Of this total, a maximum of 3,500sqm and Active and Community Uses in the RE1 Zone.

Provide a list of GFA against use mix, in tabulated form, where residential is maximised, as a comparison for MOD 4 as against MOD 8 and MOD 9 for both Barangaroo South and for the whole Barangaroo site. Refer to pages 29-30 of Sussex Penn Reports 2011

Provide a summary of proposed areas covering the following: Maximum Retail GFA (for MOD 8 and across the whole of the Barangaroo site) and maximum tourist uses (for MOD 8 and across the whole of the Barangaroo site)

The key changes to the site are in relation to the proposed hotel and residential towers north of Waterman's Quay and Cove. Buildings in the southern part of the site are constructed, under construction, approved or approaching determination by the Department of Planning & Environment. In this respect, there is a high degree of certainty regarding the outcomes envisaged on the Barangaroo South site. This is not the case in relation to the Central Precinct, as only Concept approval has been granted.

With this in mind, the following table provides a GFA breakdown for the Barangaroo South site according to the use categories that are approved or proposed under MOD 8. The first column details the maximum (or minimum) areas applying to the entire site. The two adjacent pairs of columns then summarise the area to be provided in Barangaroo South for each Land Use and a current proposal for

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the remainder of the Barangaroo site, as provided by the BDA. Two scenarios are presented in this respect; the first is based on the development of the C1 building as commercial and retail, whereas the second adopts the flexibility afforded in MOD 8 to allow a residential and retail building.

It is important to note that the maximum residential GFA (defined by Block) has the effect of limiting the residential GFA achievable on the Barangaroo site outside of the South Precinct.

Land Use	MOD 8 GFA (all Barangaroo)	Current Proposal for Barangaroo South	Current proposal for remaining Barangaroo	Barangaroo South incorporating C1 as Residential	Current proposal for remaining Barangaroo
Residential (Max)	183,000	143,479	24,000	153,683	24,000
Retail (Max)	34,000	23,335	1,750	23,335	1,750
Tourism (Max)	76,000	48,200	0	48,200	0
Community (Min)	12,000	7,129	11,210	7,129	11,210
Active Uses in RE1 (Max)	5,000	1,240	3,760	1,240	3,760
Subtotal	310,000	223,383	40,720	223,587	40,720
Commercial (Remaining GFA)	295,911	311,583	30,225	301,379	30,225
Total GFA	605,911	534,966	70,945	534,966	70,945

Provide a reconciliation of the above GFA comparisons against the Mixed Land Use Types list on pages 9-11 of the TMAP within the MOD 8 application EAR

The development categories that are represented in the TMAP are not a direct match with the GFA categories existing in the Concept Plan. The TMAP uses standard names and definitions relevant to traffic generation studies, with the key difference being in the "Public" category. Many of the proposed Community uses on the Barangaroo site are directly representative of this "Public" category, and so a decision was taken to split the range of potential community uses between "Public" and "Retail/Other"

For Barangaroo South, the total in Concept Plan MOD 8 and the accompanying TMAP are closely aligned. The minor discrepancies for some categories of a few hundred square metres are the result of design refinement and flexibility in the Concept Plan and are insignificant in their impact on traffic. The following table illustrates a comparison of areas in the form presented in the TMAP. It can be

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seen in this table that the TMAP has assessed a marginally higher GFA for commercial and retail than what is represented in the final MOD 8 numbers. The implication is that while marginal, the traffic impact of the TMAP breakdown is more significant than the MOD 8 proposal

Land Use	TMAP	MOD 8 Concept Plan	Difference
Residential	167,479	167,479	0
Hotel/Tourist	48,200	48,200	0
Commercial	342,334	341,808	-526
Retail/Other	26,550	25,085	-1,465
Public/Active/Community	21,348	23,339	+1,991
TOTAL	605,911	605,911	0

Noting the project principles from the East Darling Harbour State Significant Site Proposal, Concept Plan and Environmental Assessment of 2006 (which stipulates a maximum of 25% of the site as residential GFA), advise the rationale for the proposed increase in Residential GFA

The Concept Plan has been amended on a number of occasions since 2006. Rather than the original Concept Plan, the relevant comparison is to MOD 7, which is the most recent approval. The current approval provides for a maximum residential floorspace of 128,763 sqm, which represents 22.8% of the total developable floorspace of the entire Barangaroo site. In Barangaroo South the current maximum allowable residential floorspace is 99,763 sqm, which represents 20.3% of the total floorspace allowable.

Concept Plan MOD 8 proposes a total of 154,000 sqm of residential floorspace in the Barangaroo South Precinct, representing 28.7% of the total floorspace allowable. As noted above, this total floorspace provides flexibility for the C1 building to be developed as Commercial, Residential or Tourism use. The current development proposal is for Commercial use, and if considered as such, the proportion of residential floorspace decreases to 26.8%

Both of these measures illustrate only a minor variation from the 25% objective quoted in 2006. The departure from MOD 7 is more significant in percentage terms, but has the benefit of broadening the activation of the site over a greater time period during any given day. Specifically, while Commercial floorspace remains the most significant use of the site, the increase in residential and community uses with the expanded hotel proposed in the development outcome now being pursued will have the impact of significantly contributing to another key objective for the site, being the creation of a vibrant mixed use precinct that offers vitality and activity throughout all parts of the day.

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In the context of objectives for Barangaroo as a whole, advise the rationale of the proposed increase in GFA

The Barangaroo Review encouraged the relocation of the Hotel from the over-water pier to an on-land location on the Barangaroo South site. An extended period of testing and negotiation with the NSW State Government, in concert with Government's acceptance of the Crown Integrated Resort through the Unsolicited Proposals process has led to an agreement to accommodate the proposed Hotel Resort on Barangaroo South in the identified location, subject to planning approval.

This decision has contributed to a redistribution of built form and land use on the site in order to provide a site redevelopment outcome that is both supportive of the original principles underpinning Barangaroo South, while also ensuring an appropriate and high quality relationship between all buildings and spaces on the site.

The following table illustrates the changes in floor space proposed through MOD 8. In summary, the total floorspace increase is equivalent to the change in hotel use generated by the Crown proposal. Throughout the remainder of the site, the changes represent a redistribution of the floorspace that was already present and permissible under Concept Plan MOD 7.

Development Block	Barangaroo South Current Approval	Proposed Mod 8	Change	%
Block 1 (R7)	9,400	1,927	-7,437	-79.5%
Block 2 (T2, T3, C2)	209,213	197,280	-11,933	-5.7%
Block 3 (T1, C1)	142,669	129,934	-12,735	-8.9%
Block 4A+4B+4C (R4a, R4b, R5)	77,050	106,137	+29,087	+37.8%
Block X (R8, R9, R1)	18,908	18,908	-	-
Block Y (Hotel)	33,000	77,500	+44,500	+134%
RE1 Zone (community use)	3,000*	3,500	+500	+16.6%
Total GFA (sqm)	490,240	535,186	44,946	9.1%

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Public Domain and Community Facilities

The detailed design of the public domain is not an issue relevant to the Concept Plan, and is instead deferred to subsequent development applications in the same manner as the individual buildings on the site.

The BDA are currently, and will remain, the owner of all public domain on the site. The process for design and delivery of the public domain is defined in the Project Development Agreement. As has been the case with Stage 1A of the project, once various contractual obligations have been satisfied, the proposed scheme will be consulted with key stakeholders, such as the City of Sydney, prior to the lodgement of a planning application and the contingent referral process it requires.

At present, public domain design for the remainder of the Barangaroo site is in its early stages. As basic principles however, the outcomes that have been established in Stage 1A of the site will be implemented in Stage 1B. The key changes to this established pattern are clearly the Waterman's Cove and Hickson Park locations, both of which are addressed at a high level in later sections.

While detailed design is at a formative stage, there is greater certainty around Concept Plan level aspects such as proposed zoning, Community Uses and public domain area. These are addressed within the individual responses below

Provide a descriptive clarification of what is included within "public open space" and what is included in "public domain" within both MOD4 and within the MOD 8 application, including any differences, eg Roads, Water, pathways, Open Space, etc

Provide a comparison of areas in sqm included within "public open space" versus "public domain" for MOD 4, MOD 8 and MOD 9, for the whole Barangaroo site, for Barangaroo Central and for Barangaroo South. Provide like for like tables/diagrams as required

The distinction between "Public Open Space" and "Public Domain" is as follows:

- *Public Domain* incorporates all areas of the site that are accessible to the public, without restriction. These spaces include parks and squares, streets and lanes and may be zoned either RE1 Public Recreation or B4 Mixed Use. Water (Waterman's Cove) has been excluded from these areas as they are generally not physically accessible (see below)

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- *Public Open Space* refers to all of those areas within the site boundary that are Zoned RE1 Public Domain only. They are all publicly owned spaces and incorporate areas of both land and water. The Concept Plan contains a commitment to provide a minimum of 50% of the Barangaroo Concept Plan site (11ha) as Public Open Space, which has been consistent since the original approval in 2008. The proposed Concept Plan MOD 8 remains consistent with this commitment by providing for 11.9 ha, or 54% of the total site as Public Open Space under the RE1 Zone



MOD 7 (Current approval)



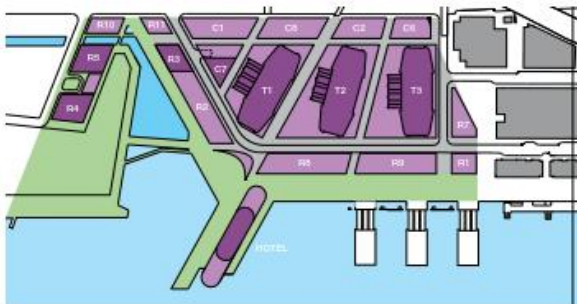
MOD 8 (proposed)

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The table and images below provides a breakdown of public domain areas on the Barangaroo South site under both MOD 4 and MOD 8, as well as a comparison across all of Barangaroo for each scenario. The material illustrates that the proportions of public domain across both the Barangaroo South precinct and the site as a whole have remained consistent under MOD 8. This has been achieved through exchanging the shallow water feature on the South Precinct for building area.



	Barangaroo South (ha)	%	Barangaroo Total (ha)	%
Public Domain (excluding water bodies)	2.45	31%	10.99	52%
Pedestrian walkways, squares, streets and laneways	1.58	20%	2.37	11%
Buildings (inc Hotel on pier)	3.10	40%	4.76	23%
Total (including water bodies)	7.80 ha		21.06 ha	

THE 2015 PROPOSED CONCEPT PLAN (MOD 8)



	Barangaroo South (ha)	%	Barangaroo Total (ha)	%
Public Domain (excluding water bodies)	2.41	31%	10.95	52%
Pedestrian walkways, squares, streets and laneways	1.59	21%	2.38	11%
Buildings	3.52	46%	5.18	25%
Total (including water bodies)	7.68 ha		20.94 ha	

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	Concept Plan Mod 4		Concept Plan Mod 8	
Total Site Area	78,000m ²	100%	76,800m ²	100%
Element	Area	%	Area	%
Buildings	31,000m ²	40%	35,200m ²	45.8%
Water	Deep Water Cove	2,000m ²	1,550m ²	2.0%
	Surface Water Feature	4,700m ²		
Parks, Squares & Promenade	24,500m ²	31%	22,700m ²	29.6%
	Additional Promenade		1,375m ²	1.8%
Subtotal:	24,500m ²	31%	24,075m ²	31.3%
Streets & Lanes	15,800m ²	20%	15,975m ²	20.8%
		100%		100%
Total Accessible Public Domain (including streets & lanes)	40,300m ²	52%	40,350m ²	52.1%

Envelope information/shadow diagrams for Barangaroo Central (MOD 9) to enable assessment of access to sunlight from within the Northern Park

Shadow animations were provided with the Concept Plan MOD 8 application as an electronic file and were also loaded on the iPad's that accompanied the exhibition. These animations included the indicative built form of the Central precinct and other surrounding areas, and were prepared in both plan and oblique angles for mid-winter, mid-summer and Equinox.

The static shadow diagrams that appeared in the documentation did not contain the context in Block 5. These will however be updated for the Response to Submissions.

Provide clarification of the varying dimensions of the promenade for the length of Barangaroo South, including dimensions to façade alignments, overhangs, external commercial reserves and other fixed elements from the water's edge

Concept Plan MOD 8 continues to provide for a continuous public domain promenade zone for the entire length of the Barangaroo South precinct. The Promenade is generally 30m for its entire length, though narrows at the northern 30m of the site, where there exists a need to maintain the existing deep water harbour edge for events such as Navy Week. There is also a narrower section around Waterman's Cove, though this is not inconsistent with the outcomes achieved under the existing approved Concept Plan

Within the 30m dimension, there is opportunity for an area of licenced retail seating, emergency vehicle access, a tree lined promenade, seating and a waterfront boardwalk. The dimensions of all of

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these areas provide ample capacity for pedestrian movement and use, even during major events, as has been documented and accepted in the Stage 1A Public Domain approval.

The Crown frontage is the only new element to this Concept Plan waterfront. The placement of the building has in part been governed by an objective to maintain the view corridor to Headland Park, which has in turn resulted in the expansion of the site westwards. While not undertaken for pedestrian capacity requirements, the expansion of the site westwards works to maintain the consistency of waterfront approach between Stage 1A and Stage 1B.

Sections describing the promenade in Stage 1A and Stage 1B are provided below.

Section through Wulugul Walk – Stage 1A

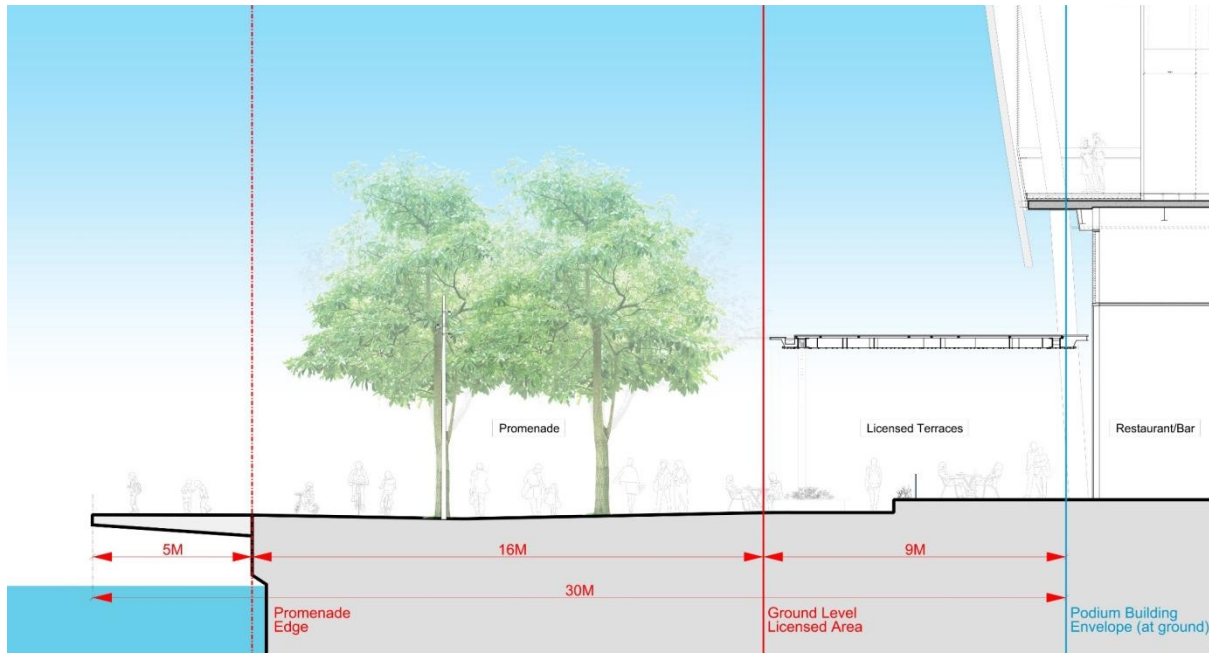


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Section through Wulugul Walk adjacent to Proposed Hotel



Confirm the implications of the proposed zoning of the pier in relation to height, built form and use

Provide detail of the proposed use(s) for the community building on the pier, with an explanation of their viability, relevance and appropriateness in the context of the analysis of community/social infrastructure (requested above)

The Pier is proposed to be zoned RE1 Public Recreation. Outside of typical public open space, potential uses under the Concept Plan (and NSW Standard Instrument) include a “retail kiosk” and various “Community Uses” (amongst others). A full definition of the permissible uses is provided in SEPP (Major Development).

The proposed use of the Pier has not yet been formulated and there is no design for a potential future building. The Concept Plan simply identifies the potential of the site and proposes a maximum Gross Floor area of 3,000sqm, with a maximum of 1,000sqm of this total being for retail type uses.

Under the Project Development Agreement between Lend Lease and the NSW Government, both the potential and process for furthering such potential into a development proposition is identified. Specifically, over the coming months, Lend Lease and the BDA will work collaboratively to identify an appropriate use and built form for the building on the Pier, within the constraints of the Concept Plan and PDA. This process is likely to involve consultations with key stakeholders, such as Council as well as commercial discussions with prospective tenants. Once a firm development proposal is reached, a more detailed design and Development Application process will be undertaken, in accordance with the Act.

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Provide a list of social/community facilities, services and infrastructure (including open space) to be provided for the proposed use and population mix. Include analysis and rationale for the proposal and proposed locations

Advise what provision for the cultural uses is included in Barangaroo South, including type, location, area and rationale for viability and appropriateness

Under the approved Barangaroo Concept Plan, "Community Uses" are defined as:

Community uses include child care centres, community facilities, educational establishments, entertainment facilities (other than cinemas and amusement centres), information and education facilities, landside ferry facilities, places of public worship, public administration buildings, public halls, recreation areas, recreation facilities (major, outdoor and indoor) as defined in Major Development SEPP and the Department of Planning's Standard LEP Template.

Community uses can be accommodated both in the RE1 zone and the B4 zone and will be allocated over time through individual development approvals and tenant lease agreements. At present, and with the assumption of MOD 8 in place, the table below provides areas accommodated on the site, according to each of the elements included in the definition.

Community Use	Area	Comments
Child Care Centres	1,453	Approved in T1
Community Facility	3,650	Proposed in T3, R7 and RE1 Zone
Entertainment Facility	0	
Information & Education Facility	0	
Landside Ferry Facility	337	Proposed in R7
Place of Public Worship	0	
Public Administration Building	0	
Public Hall	0	
Recreation Facility	1,689	Proposed in T1 & R7
Subtotal (GFA)	7,129	
Recreation Area (non GFA)	23,817	
TOTAL	30,946	

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Northern Park:

- *Provide design rationale for the spatial exchange of R4 and R5 and the open space, in terms of public benefit and civic space within Barangaroo as a whole*
- *Provide detail of the design of the northern Parkland including how it is intended to operate as a public space and to interface with built form*
- *Describe in detail the proposed nature, landscaping and uses of the northern park including depth and drainage design to support substantial mature trees*
- *Describe the proposed open space functionality, with drawings, including the proposed uses and design modulation within the park to support these uses*

As is the case with individual buildings, the Concept Plan does not propose or seek approval for the design of the public domain. Rather, approval is facilitated through subsequent development applications.

The BDA are currently, and will remain, the owner of all public domain on the site. The process for design and delivery of the public domain is defined in the Project Development Agreement. As has been the case with Stage 1A of the project, once various contractual obligations have been satisfied, the proposed scheme will be consulted with key stakeholders, such as the City of Sydney.

At present, public domain design for the remainder of the Barangaroo site is in its early stages. As basic principles however, the outcomes that have been established in Stage 1A of the site will be implemented in Stage 1B. The key changes to this established pattern are clearly the Waterman's Cove and Hickson Park.

While only in early stages of design, a number of key principles will underpin the public domain outcome:

- Creation of a truly public place, that is open and inviting for all people at all times
- An outcome that will cater to a broad variety of users and uses, including periodic events
- Creation of a large lawn area, bordered by substantial trees, similar in experience to Bryant Park in New York
- Provision of appropriate soil depths to provide for significant tree growth
- Selection of high quality materials and finishes
- Creation of clear linkages to and through the site from external areas

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Globe Harbour Road and Square

- *Provide a comprehensive design rationale for the reduction of Globe Harbour, the realignment of Globe Street and the removal of Globe Square. Address issues including access, use, amenity, legibility, permeability, open space and civic presence*
- *Given the relocation of the hotel off the pier (in response to concern about the reclamation of the harbour), provide the design rationale for the retaining the pier, the intentions of the proposed rezoning and the rationale for the proposed structure on the pier*

As previously noted, the reduction in Waterman's Cove has been undertaken in order to maintain "useable" public domain whilst also accommodating the expanded footprint of the proposed hotel. The deep water section of the cove remains equivalent to that contained in the current approval; the area removed was previously a shallow man-made water body perched over basement parking for the residential towers. Globe Square has not been reduced in size as a result of the changes. Conversely, the area is now larger in size than envisioned in the currently approved Concept Plan. Detailed design of this area is in its formative stages, and is being directed at ensuring the creation of a coherent and well-designed space that will contribute to the destination quality of the precinct.

Globe Street, or Waterman's Quay as it is now named has not been realigned. In the approved Concept Plan this street runs east-west and connects Hickson Road to Barangaroo Avenue. This alignment is consistent in MOD 8. The only change is a proposal to widen the road corridor from that approved and constructed in Stage 1A in order to create a tree lined boulevard and stronger entry statement for the precinct and connection to the water.

The Pier was always a public element, with continuous public access around a hotel footprint. The decision was to move the hotel, not the public element, which provides not only a "punctuation mark" on the waterfront alignment, but an opportunity for community engagement and a new and interesting experience, whilst also maintaining an equivalent area of public domain. The potential building to be located on the pier is also intended to assist in activating the adjacent spaces and contributes the management of winter wind impacts for the Cove, in the same manner that the former hotel was able to. The RE1 Public Recreation zoning of the site, the principles of the Concept Plan and Project Development Agreement also combine to ensure that any potential use is community based.

Hickson Road

- *Provide the rationale for the changed approach to the design of the Hickson Road Boulevard, such that R5 tower abuts the road without setbacks*

All buildings along the entire Hickson Road frontage of Barangaroo South are aligned to the property boundary. Each building is proposed to incorporate a ground level colonnade, the form of which has now been set with the approval of the C2 building at 9.5 m high and 4.0 m wide. This situation remains unchanged from the current approved Concept Plan, as does the height of the buildings at RL 33.2m south of Watermans Quay.

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The R5 building is the only remaining building fronting Hickson Road within Barangaroo South. While this building is scaled to relate to the height of buildings on Kent Street, the building is intended to maintain the approach of a continuous and consistent colonnade frontage. Likewise, there is a clear podium element to the building, which at the Hickson Road frontage is emphasised by the location of non-residential uses at ground and first floor levels. When combined with a continuity of approach in the upgrade of Hickson Road, the pedestrian experience remains unchanged.

A key element contributing to the location of the Crown Hotel Resort on the site has been to ensure that towers are appropriately positioned to maintain appropriate privacy and provide a coherent form across the site. Minimum separation distances and orientation of buildings are key elements in this regard, and combined, have significantly informed the placement of buildings. Relaxation of these constraints placed on the site in order to accommodate a setback from Hickson Road would in turn result in an undesirable proximity of buildings or less sustainable building forms.

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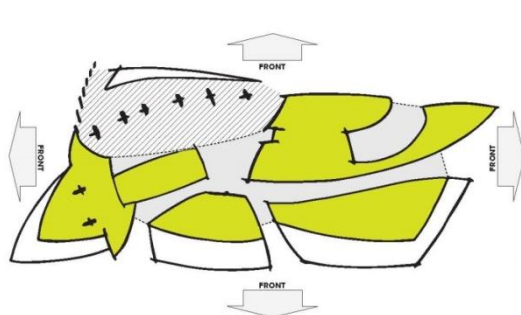
Hotel

The Concept Plan provides an envelope that supports the future delivery of the proposed Crown Hotel and provides for the permitted land uses in the B4 Zone in Barangaroo to be amended to include “gaming”. The Concept Plan then uses the key features of an Indicative Design to assess its potential environmental impact (shadowing, wind, traffic etc).

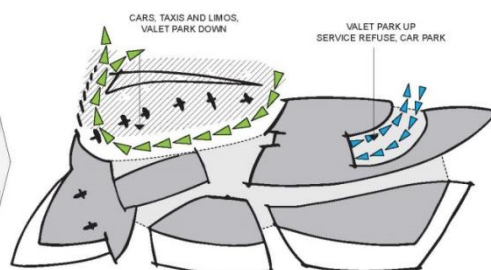
Given that the Crown Hotel has now been lodged for development approval, it is relevant to clarify the issues identified in the context of the actual design. In this respect the key issues identified by the Design Review Panel are addressed in summary form below. In addition, a more comprehensive Design Statement has been attached in order to provide further detail.

Further detail on the design of the podium including place making for spaces adjacent to the built form, amenity including wind and over-shadowing and spatial modulation - details of 24 hour physical permeability of the podium, visual permeability within and through the podium

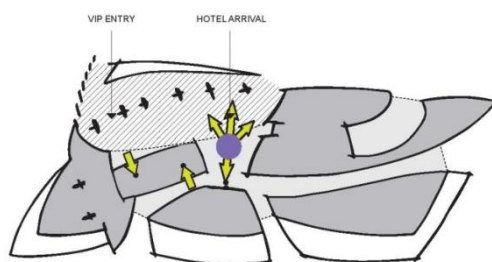
Crown Sydney Hotel Resort has four fronts: every side of the building is important and has a public face. The podium has a different materiality from the tower which reinforces its accessibility and permeability. All facades at ground level are active and above the majority of spaces, there are a series of canopies providing both shelter and shade. The building is truly porous, open and accessible and the permeability of the ground floor is represented in diagrammatic form below.



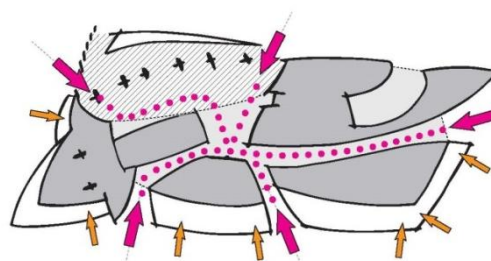
6.8.1 Frontage
The Crown Sydney Hotel Resort has four fronts or “front doors” each with significant public face.



6.8.2 Vehicle Circulation
All guest arriving by vehicle, arrive at the Porte-Cochère. Residents and goods vehicles turn off Lime Street onto a ramp which leads to the basement.



6.8.3 Guest Arrivals / Lobby Focus
From the Porte-Cochère guests enter into the main lobby. VIP guests have their own dedicated entrance.



6.8.4 Pedestrian Access and Permeability
The building's restaurant terraces can be accessed easily from the surrounding grade.

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Confirm the number of rooms in the hotel (number of keys) and the number of apartments, including whether any of the apartments are to be serviced apartments

The hotel component of the Crown Sydney Hotel Resort comprises 350 hotel keys and 66 Residential Apartments as described in the matrix below.

Crown Sydney Hotel / Apartment Mix Schedule			
Levels	Type	No. Hotel Keys	No. Residential Apartments
L6-22	Hotel	323	-
L29-33	Villas	25	-
L34-57	2 Bedrooms	-	28
	3 Bedrooms	-	32
L58-62	4 Bed (Sub-Penthouse)	-	5
L63-64	5 Bed (Penthouse)	-	1
L66	Super Villa	1	-
L67-69	Sky Villa	1	-
Total		350	66

Sustainability - provide details to explain how the sustainable design objectives will be delivered by the hotel/casino/apartment building (Block Y)

The Crown Sydney Hotel Resort will support the overarching sustainable principles of the Barangaroo precinct and forms an integral part of the wider infrastructure and energy initiatives on site. The building design is being developed to respond to the unique environment aspirations, which aims to achieve the following targets:

- 6 Star Green Star Custom Rating
- NABERS energy rating for the Hotel
- Residential component to comply with BASIX
- Extensive energy metering and sub-metering to support energy monitoring
- Provision of renewable energy through Photovoltaics
- Reduction of embodied carbon footprint of the base building of 20% compared to standard construction practices
- Rainwater harvesting and re-use (where possible, replace potable water uses with recycled or other water sources)
- Maximise diversion of operational and construction waste from landfill

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Provide a rationale for the intrusion of the north eastern corner of the podium and tower of Block Y, in the context of the master plan principles which consistently reference a radial fanned connection between the northern (Radial) Park and the waterfront. Refer p.34 of the Barangaroo South Master Plan

The site has several distinct relationships to open spaces and respects the masterplan fan principle and the dynamic it creates within the public realm. The northeast tip of the building houses the porte cochere with large glass blades that create a vibrant and transparent corner, with strong visual connections to the adjacent park. Direct pedestrian access has also been provided through the glass blades along the north face of the site.

Provide the design rationale for the adopted podium-with-tower typology, in the context of use mix, location on the site, morphology, Barangaroo built form and relationships to open space

Include the rationale for the proposed scale and massing of the podium and its architecture, including details such as proposed formal and architectural modulation, visual and physical permeability, in relation to the objectives for Barangaroo, the site arrangement, movement patterns, surrounding public spaces and legibility

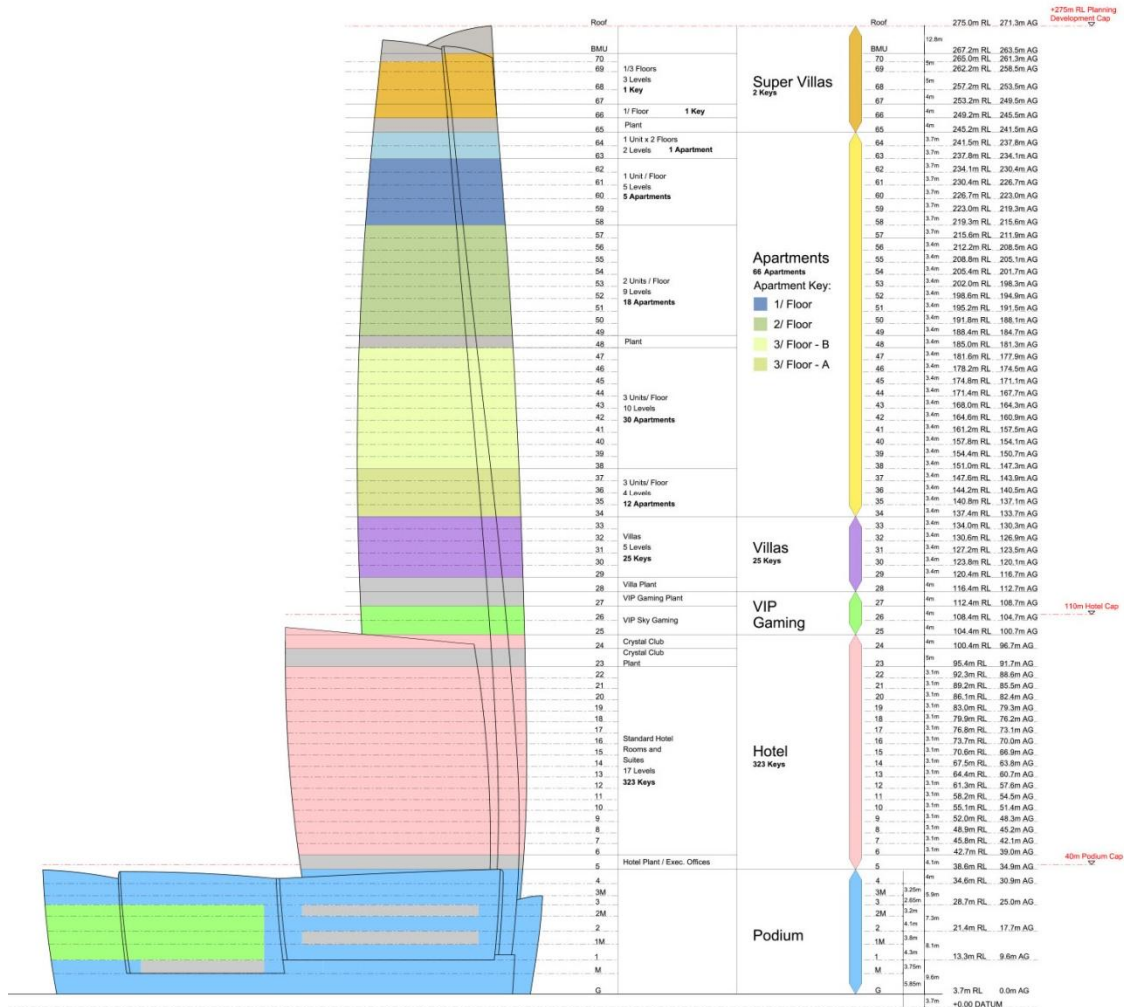
The scheme comprises three primary elements: the podium, the hotel (mid-rise) and the tower as per the diagrammatic section below.

The tower is articulated to read as if it comes to ground on the northern edge of the site, accentuating its verticality and separating it from the podium block. The tower form continually tapers towards the top, creating a slender and elegant form; with a slight rotation and twist to the shape as it rises up. The hotel is viewed as a separate, tapered 'petal' that pulls away from the main tower and reads as a complimentary form, which is sculpted at an angle when read in elevation.

The podium block is pulled in at the base to reduce the apparent massing of the built form, improving sight lines at ground level and exposure to daylight.

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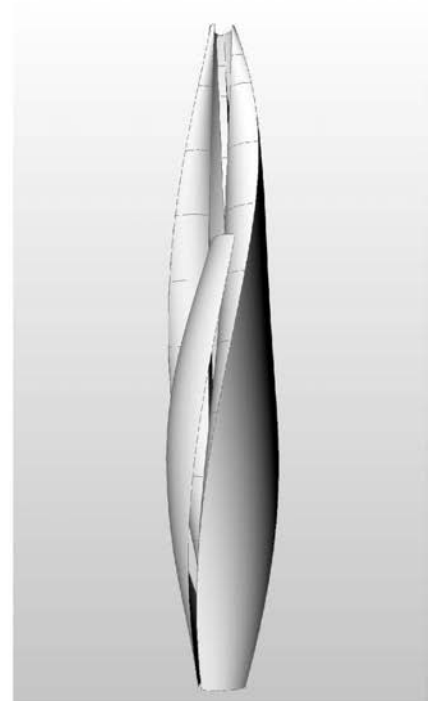
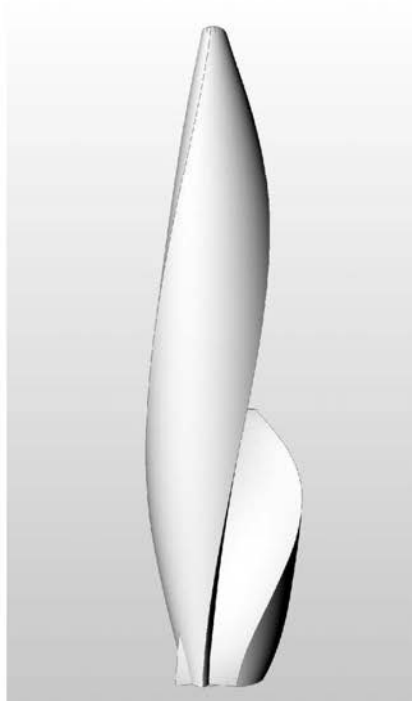
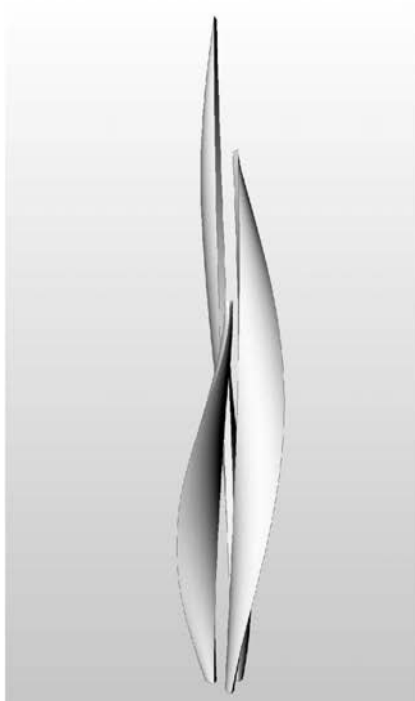
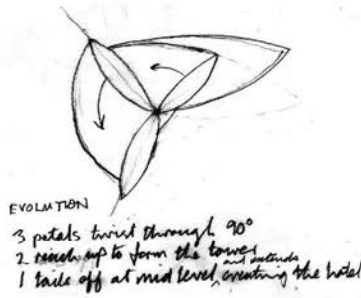
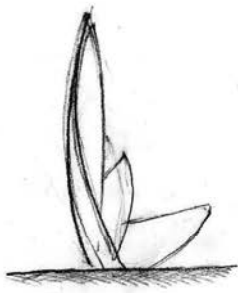


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of the skin is accommodated with a stepped setting out of rectilinear planar panels on the north and east elevations where there are high levels of transparency.



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Future Residential Towers (LLMP)

The residential towers illustrated in the Indicative Design were prepared by RSHP as part of the overall master planning package through 2013 and 2014. As noted, these are an indicative design and do not necessarily represent the eventual designs to be approved and constructed subsequent to the Concept Plan. RPBW have been appointed to prepare the design.

Given that the design for the residential towers is nearing the point of Development Application lodgement, it is relevant to clarify the issues identified in the context of the actual design. In this respect the key issues identified by the Design Review Panel are addressed below.

Provide details to explain how the sustainable design objectives will be delivered by the residential towers.

1. The Barangaroo South precinct will achieve a carbon neutral outcome. The first carbon neutral mixed use development in Australia.
2. The One Sydney Harbour towers will achieve a 5-Star Green Star design and as-built rating for multi-unit residential buildings.
3. Key initiatives to achieve these outcomes are:
 - a. A precinct wide chilled water system for air-conditioning that uses Sydney Harbour's sea water for heat rejection of the chilled water.
 - b. A recycled water plant that recycles black water to produce water for toilet flushing. The system produces more water than is needed for the precinct thus can provide Barangaroo Central with recycled water once it is developed.
 - c. A commitment to 20% reduction in embodied carbon within the buildings developed
 - d. The façade systems being developed for the towers will produce Australia's highest thermally efficient residential buildings.

Identify where the affordable housing will be located, including access points

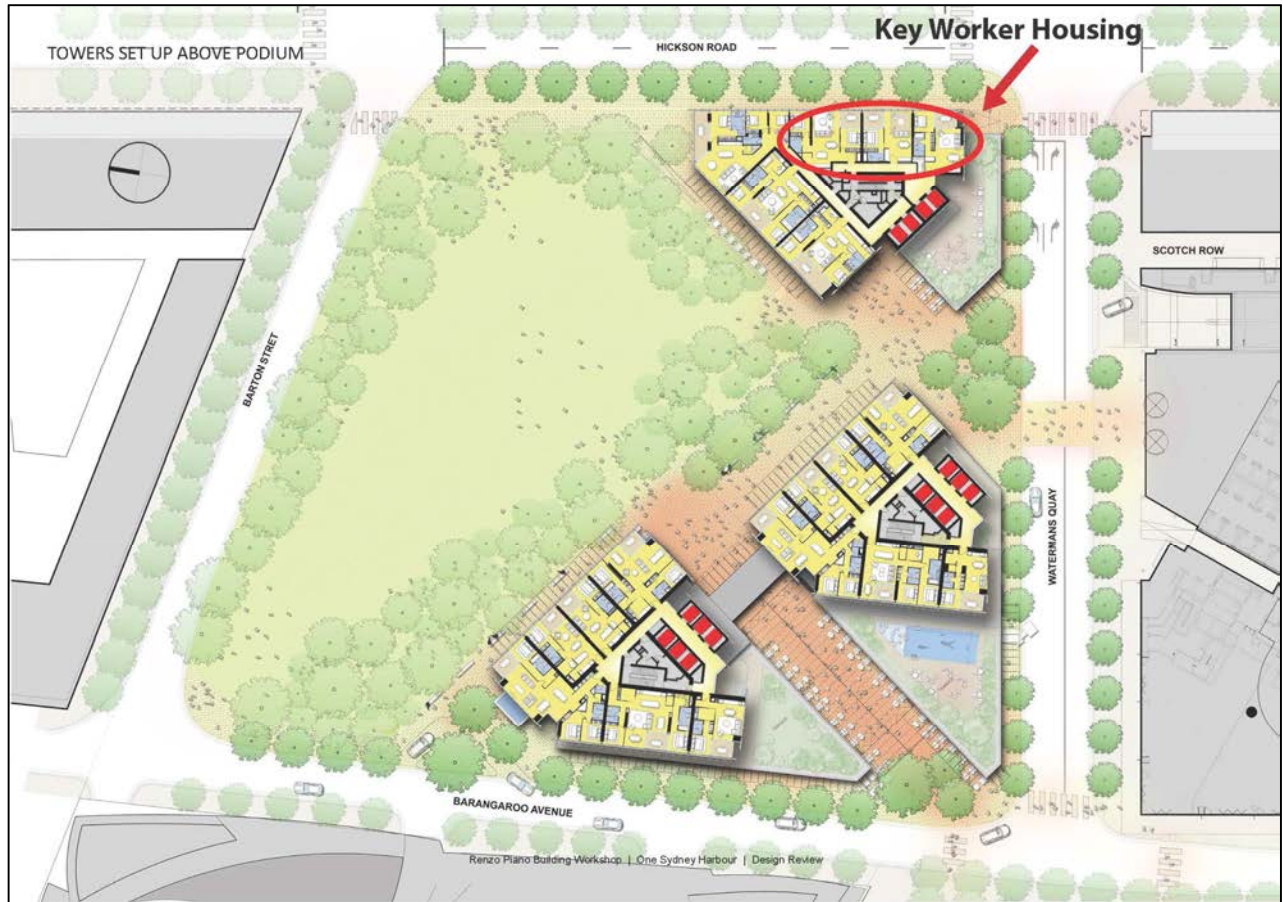
The current (MOD 7) Concept Plan commitment to provision of 2.3% of total residential floorspace as Key Worker Housing on the Barangaroo South site has remained unchanged in MOD 8. Given that the proposed residential floorspace on the site has been increased to a maximum of 154,000 sqm, Lend Lease's total commitment of Key Worker Housing GFA will also proportionally increase to approximately 3,542 sqm, assuming the full GFA cap is reached.

The longstanding commitment to Key Worker Housing has been focused on a location near or adjacent to Hickson Road. Of the remaining buildings, only R5 or C1 therefore have the potential to accommodate the use. While both buildings have potential under the Concept Plan, the current proposal involves locating Key Worker Housing in the Renzo Piano designed R5 building.

It is important to note that detailed location, form and design of Key Worker Housing is not an issue for the Concept Plan. However, the design of Building R5 is suitably advanced that further details can be identified. Specifically, Key Worker Housing is proposed on the Eastern side of the R5 floorplate, spread over floors 1 to 13. All of this housing is accessed from a separate lobby off Hickson Road, with parking provided in the shared basement at the same rates as other residential floorspace in the building.

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Provide details of the proposed Hickson Road Boulevard architecture and street interface (heights and setbacks) for its full length

All buildings along the Hickson Road frontage of Barangaroo South are aligned to the property boundary. Each building is proposed to incorporate a ground level colonnade. This situation remains unchanged from the approved Concept Plan, as does the height of the buildings at RL 33.2m south of Waterman's Quay.

The R5 building is the only remaining building fronting Hickson Road within Barangaroo South. This building is intended to maintain the approach of a continuous and consistent colonnade frontage. Consequently, the building maintains the 4m wide colonnade with a minimum height of 4.5 metres that is aligned with the colonnade south of Waterman's Quay.

The R5 Building has a proposed maximum height of RL107. This height is consistent with the height of residential towers on Kent Street. The Currently approved Concept Plan provides for a wall of buildings along the Hickson Road street edge of RL 33.2, which has the effect of blocking views and outlook from existing buildings on the eastern side. By providing for a single taller element pushed to the south of the site, views to the north-west are opened up for existing buildings and the ground

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plane. Additionally, the architectural form of a tower coming to ground is consistent with the southern part of the site where the KPMG building presents in a similar manner.



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Traffic and Access

The issues raised have all been addressed in the current TMAP, therefore it is necessary to address the issues specifically and individually within this section, and referring to the TMAP where necessary/appropriate.

It will also be useful to provide some more detailed commentary on the history of the TMAP and the nature of updates that have taken place through each of the 7 approved modifications. The role of the TMAP and a description of its relevance to the planning process is also necessary. Key DRP identified issues to be addressed include:

Advise the impact of revised traffic flows associated with the light rail on TMAP calculations

As noted in the TMAP, Transport for NSW is currently preparing a meso-scopic traffic model which considers the impacts on CBD streets following the completion of the Sydney light rail project. The EIS for the light rail project (specifically Technical Paper 1 – Transport Operations Report) provides no specific details with respect to changes in traffic volumes on Hickson Road adjacent to Barangaroo following the closure of George Street to general traffic.

It should be noted that the Sydney City Centre Capacity Improvement Plan (RMS, November 2014) provides some detail with respect to the redistribution of traffic following the closure of George Street to general traffic. This plan illustrates the existing traffic displaced from George Street will be redirected onto adjacent north-south corridors, those being:

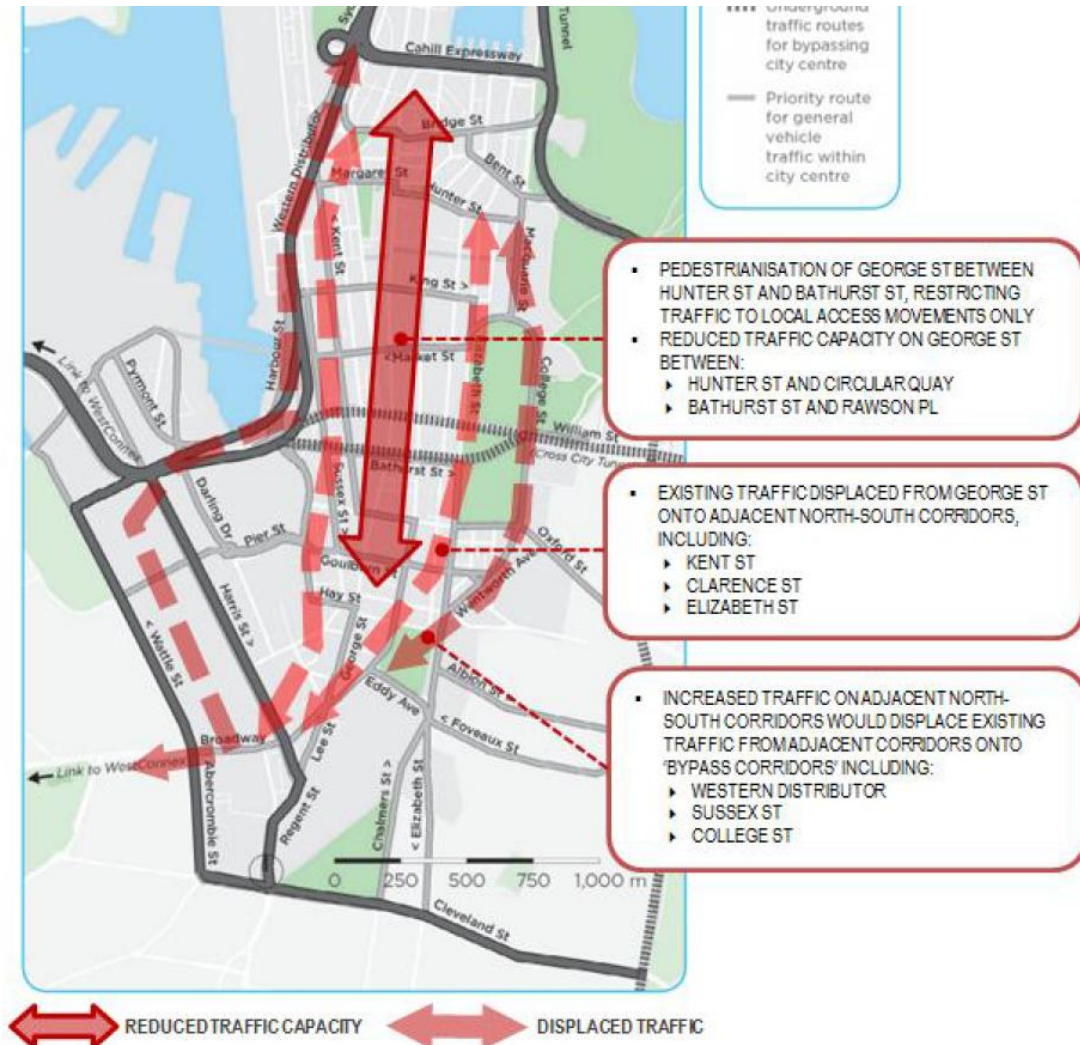
- Kent Street
- Clarence Street
- Elizabeth Street
- Macquarie Street

Capacity improvements along both Clarence Street and Kent Street are proposed which are forecast to mitigate the impacts of this redistributed traffic.

Importantly 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 Concept Plan modification.

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Advise the assumptions made about the population and demographic mix (eg 1, 2, 3 bedroom apartments) used by the TMAP and provide comment on the level of certainty of those assumptions

The TMAP has assumed the following dwelling mix:

- 50% one bedroom units
- 30% two bedroom units
- 20% three bedroom units

This mix is typical of a large inner-city residential development, however the final mix will be confirmed at the project application stage

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Advise what quantum of parking is provided for residential use in Barangaroo South and across the site as a whole

Advise what quantum of public parking is provided in Barangaroo South and across the site as a whole

Advise what quantum of on-street parking is provided in Barangaroo South and across the site as a whole

The quantum of parking proposed for the Barangaroo South precinct against the site as a whole is outlined in table below for the different land uses. It should be noted that this assessment considers the potential land use uplift associated with the Barangaroo Central site as envisaged in the "Modification to Barangaroo Concept Plan: Central Barangaroo and Headland Park" document issued to the Department of Planning and Infrastructure in March 2014.

Land Use	TMAP Mod 8+9		
	Barangaroo South	Remainder of site	Total
Commercial / Mix Use	599	48	647
Hotel	500	0	500
Residential	1448	757	2205
Parkland public car park	0	300	300
Total on site	2547	1105	3652
Hickson Road on-street parking	0	125	125
On-Street parking within Barangaroo	25	15	40
Public buildings	0	16	16
Ports Parking	0	0	0
Grand Total	2572	1261	3833

It is important to note that the quantum of traffic generated by the residential uses is based on the total number of dwellings provided and is independent of the number of resident parking bays. The parking provision for residential uses responds to the level of car ownership expected.

Car ownership levels for residents of the Sydney Inner SLA have been steadily increasing over the past decade, rising from 0.81 cars/dwelling in 2001 to 0.87 cars/dwelling in 2011 as shown in the

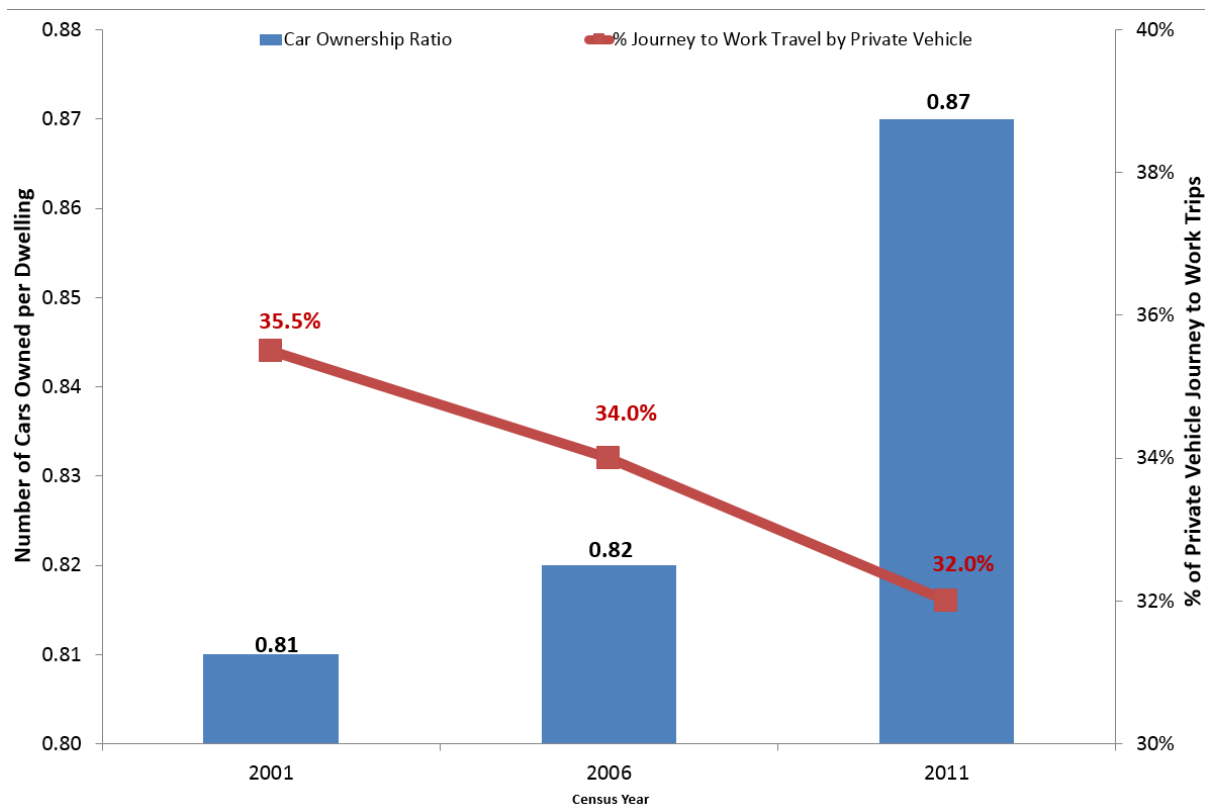
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figure below. This is similar to the trends seen across much of Sydney, with cars becoming more affordable as tariffs fall with a larger stock of cheaper new cars and increasing household income.

The census data also shows that while car ownership has risen over the past decade, private vehicle use for journey to work trips has decreased. This indicates that car ownership does not necessarily lead to car usage in the busy commuter peak periods, for areas well served by public transport such as Barangaroo.



Advise the rationale for the quantum of hotel/casino parking proposed

500 car parking bays are proposed within the hotel to service the non-residential components of the development. This quantum of parking was determined based on the expected daily profile of vehicular movements arriving and departing the site. A daily profile of activity was generated based on the current levels of traffic movements (both valet and self park) generated by the Crown Melbourne site over the course of an entire year. The data was moderated based on the number of members anticipated for the hotel relative to the total number in Crown Melbourne.

The expected parking demand based on this analysis for the hotel is shown below.

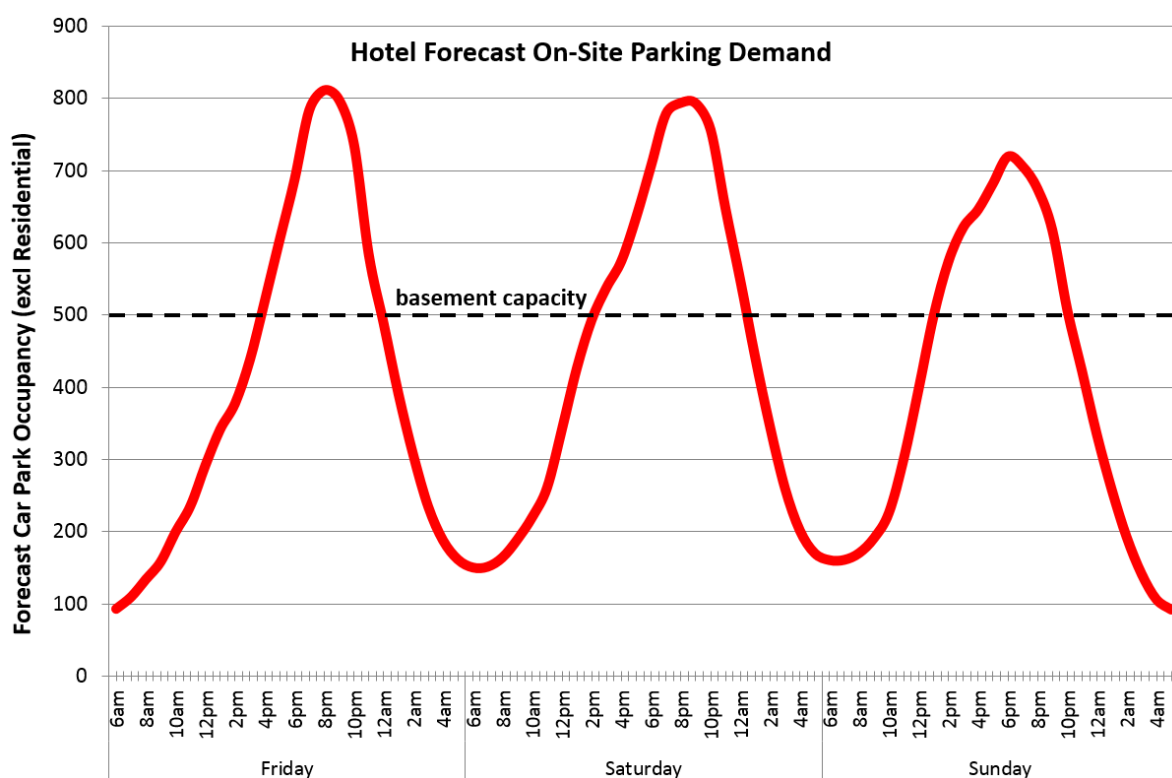
The quantum of parking proposed (500 spaces) will meet the expected demand generated by the hotel on weekdays and for the majority of the time on weekends (Friday evening through Sunday).

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During these busy periods, other off-street car parks in close proximity to the hotel will be utilised to accommodate this residual demand. These off-street car parks typically accommodate demand generated by employees of nearby commercial buildings. The peak parking demand for the hotel coincides with off-peak periods for these commercial car parks – therefore creating the opportunity for the shared use of spaces. This results in an efficient allocation of parking across the Barangaroo precinct.



Advise whether the train system in Central Sydney has the capacity for an additional 6,200 passengers in the busiest AM hour

The TMAP notes that approximately 6,200 people will arrive to the precinct in the AM peak hour. These people do not necessarily constitute 'additional' passengers on the train network. The vast majority are already travelling on the network to destinations in the CBD, in many cases Wynyard Station.

The NSW Government is committed to the construction of the Sydney Metro project, including the construction of a new underground station in Barangaroo. The Sydney Metro project, including a new rail crossing of Sydney Harbour, will significantly increase the carrying capacity of the overall rail network. Based on patronage modelling undertaken by Sydney Metro, delivery a new station at Barangaroo will in the morning peak, reduce entries and exits at both Wynyard Station and Martin Place station by approximately 5,000 passengers.

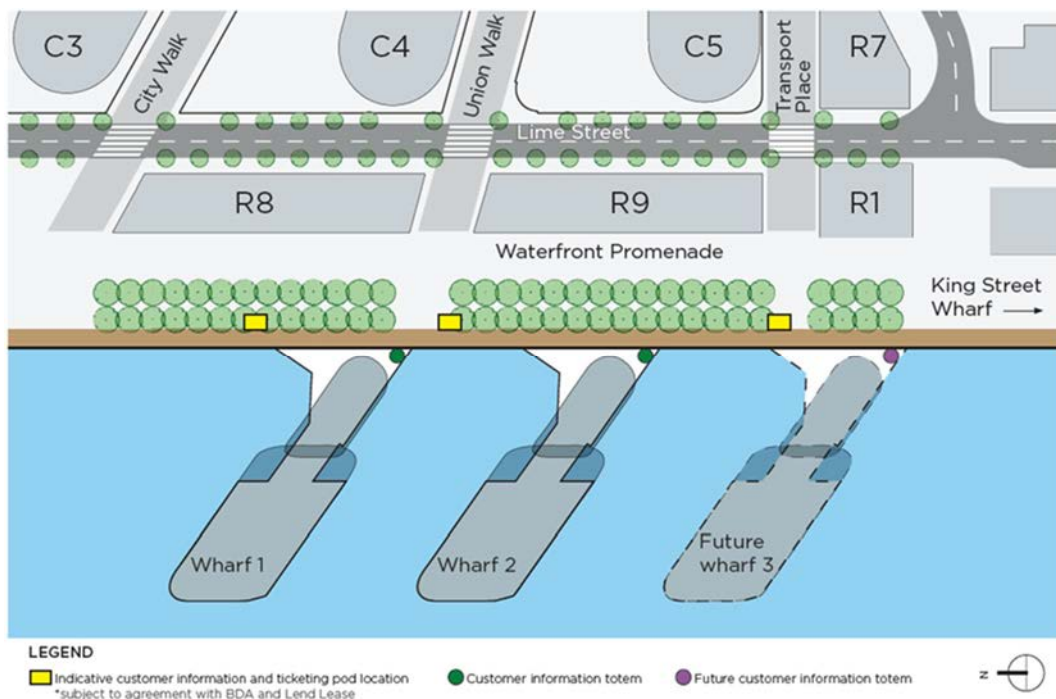
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Advise whether a third ferry wharf is proposed and, if so, please include it in the drawings

The Barangaroo Ferry Hub proposal initially commits to the construction of two wharves. However provision is made within the design for the construction of a third wharf based on future demand and uptake. The proposed location and form of the 3 wharves was detailed in a Planning Application by Transport for NSW and is illustrated below. It is understood that the current proposal is to commence construction with the northern two wharves, with the southernmost wharf to follow at a later date.



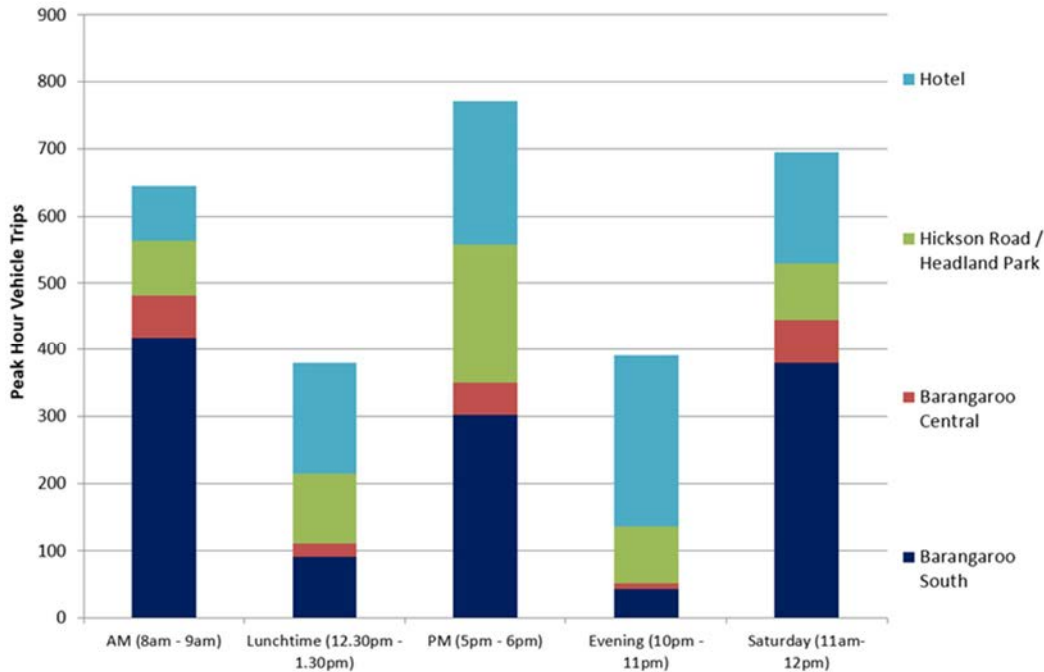
Source: Barangaroo Ferry Hub Submission Report (Transport for NSW, 2015)

Further information is required with respect to weekday versus weekend traffic volumes

A summary of the forecast weekend traffic volumes (during the peak hour, expected between 11am and 12pm) is shown in the figure below. This indicates the level of traffic generated during the Saturday peak hour is comparable to that during the AM and PM weekday periods. While the traffic generated by the commercial uses at Barangaroo is reduced compared to the weekday peaks, the residential uses are expected to generate higher levels of traffic movements on weekends.

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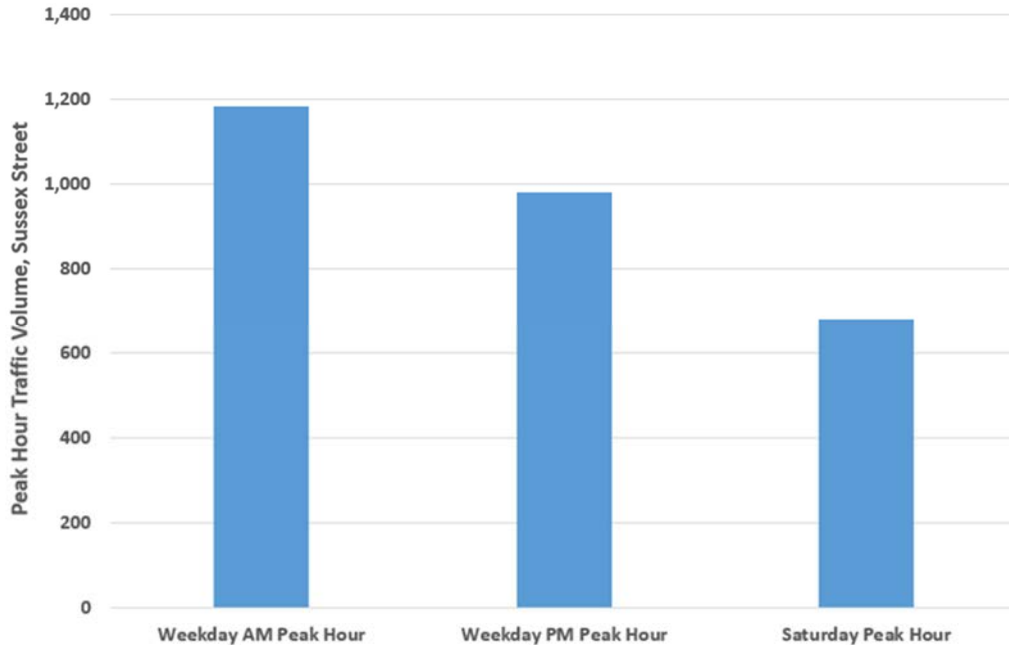
RESPONSE TO THE DEPARTMENT OF PLANNING'S DESIGN REVIEW PANEL REQUEST FOR INFORMATION



The Saturday peak hour from a road network operations perspective in the Sydney CBD is not as critical when considered in the context however of the level of background traffic on key roads. The figure below illustrates the volume of traffic during the respective peak hours on Sussex Street (near Napoleon Street) adjacent to the Barangaroo site. This shows that background traffic on a Saturday is 30% lower compared to the weekday PM peak hour and 40% lower compared to the weekday AM peak hour. This is to be expected as much of the traffic on CBD streets is related to the commercial uses in nearby areas which are not operating on weekends. As a result, nearby intersections in the Barangaroo precinct operate with spare capacity and may accommodate the forecast levels of traffic generated by the site.

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Further clarification of the "4% car mode share" is required

The Barangaroo Transport Management and Accessibility Plan, prepared by the Ministry of Transport (now Transport for NSW) in September 2008, outlined mode share targets for the *journey to work* component of the Barangaroo precinct. This included a target of 4% for all work related journeys into the precinct by car – in response to the current high car mode share (25%) into Central Sydney for work trips.

No targets were established for non-work related trips to Barangaroo. Work trips were considered critical given the high level of employment expected on the site and the likelihood of commercial uses generating private vehicle trips during peak hours should strict targets not be set.

This target was then the key underpinning factor in the reduction of Commercial Car spaces permitted on the site (at 1 space per 600sqm, the Commercial parking rate is half of that existing in the rest of the Sydney CBD).

Selected Indicative Architectural Drawings and Renders for Blocks 4A, 4B and Y

Renzo Piano Building Workshop, Wilkinson Eyre Architects



Crown Sydney Hotel Resort

Friday, 17 July 2015









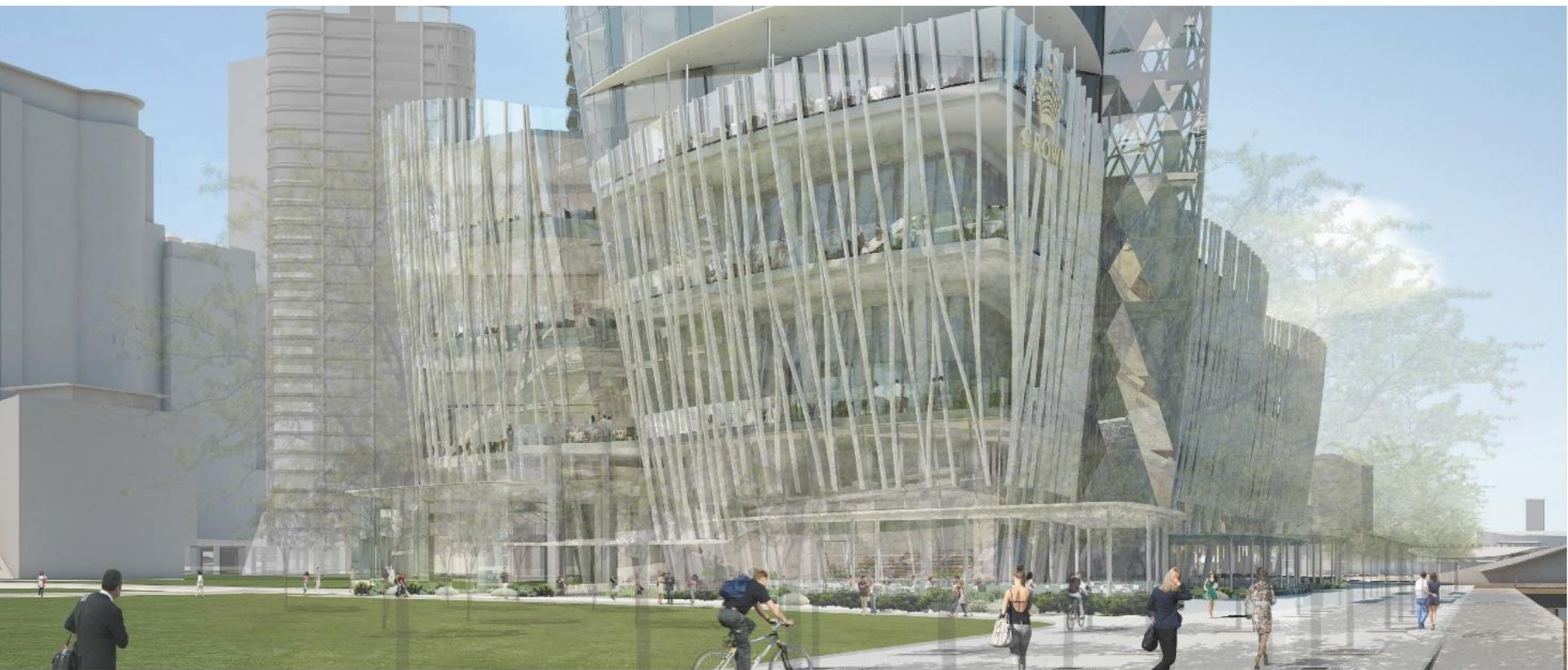




Podium / View 1: From Hickson Road















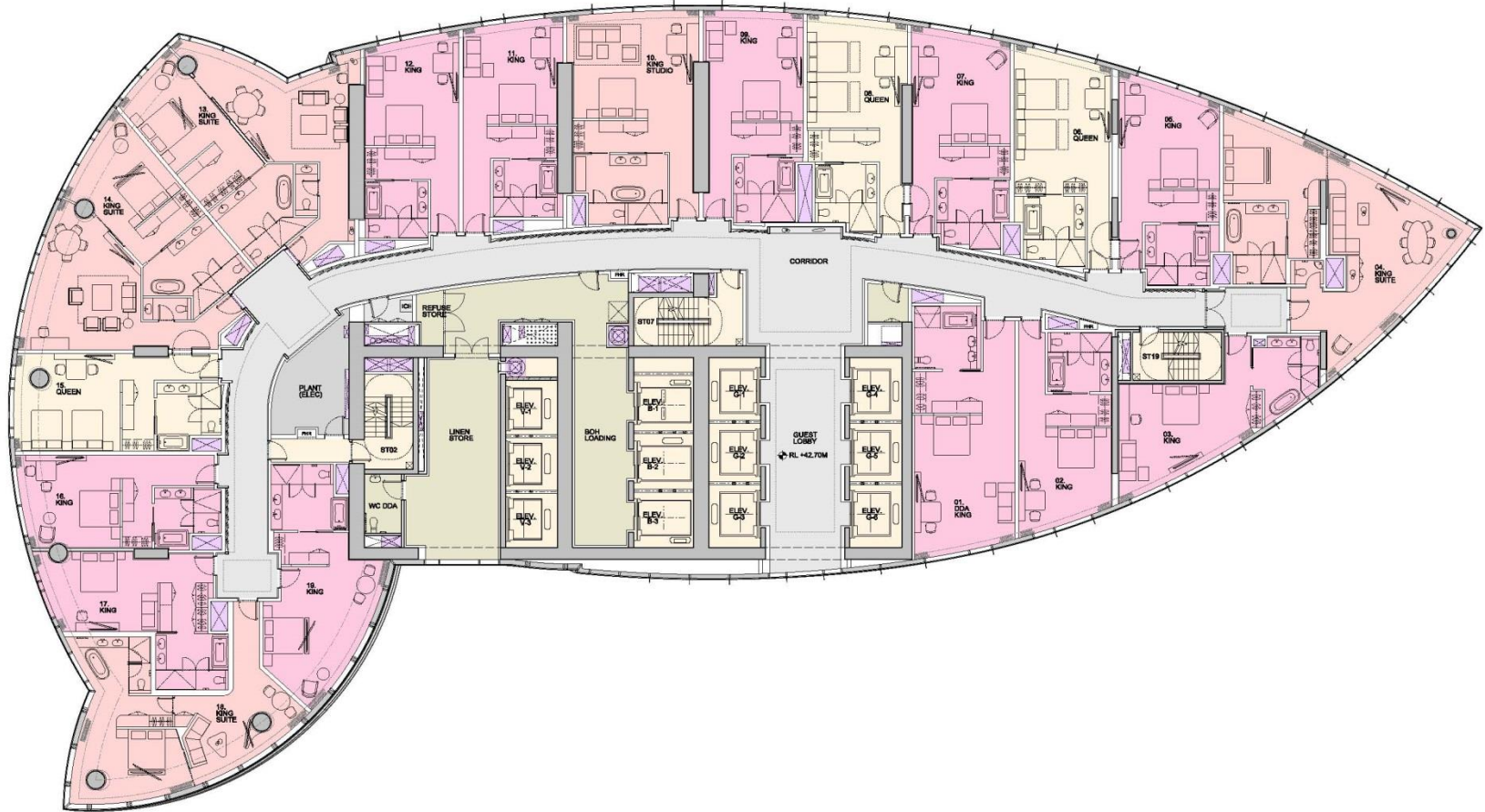


Podium / View 1: Lime Street looking North from
Globe Harbour









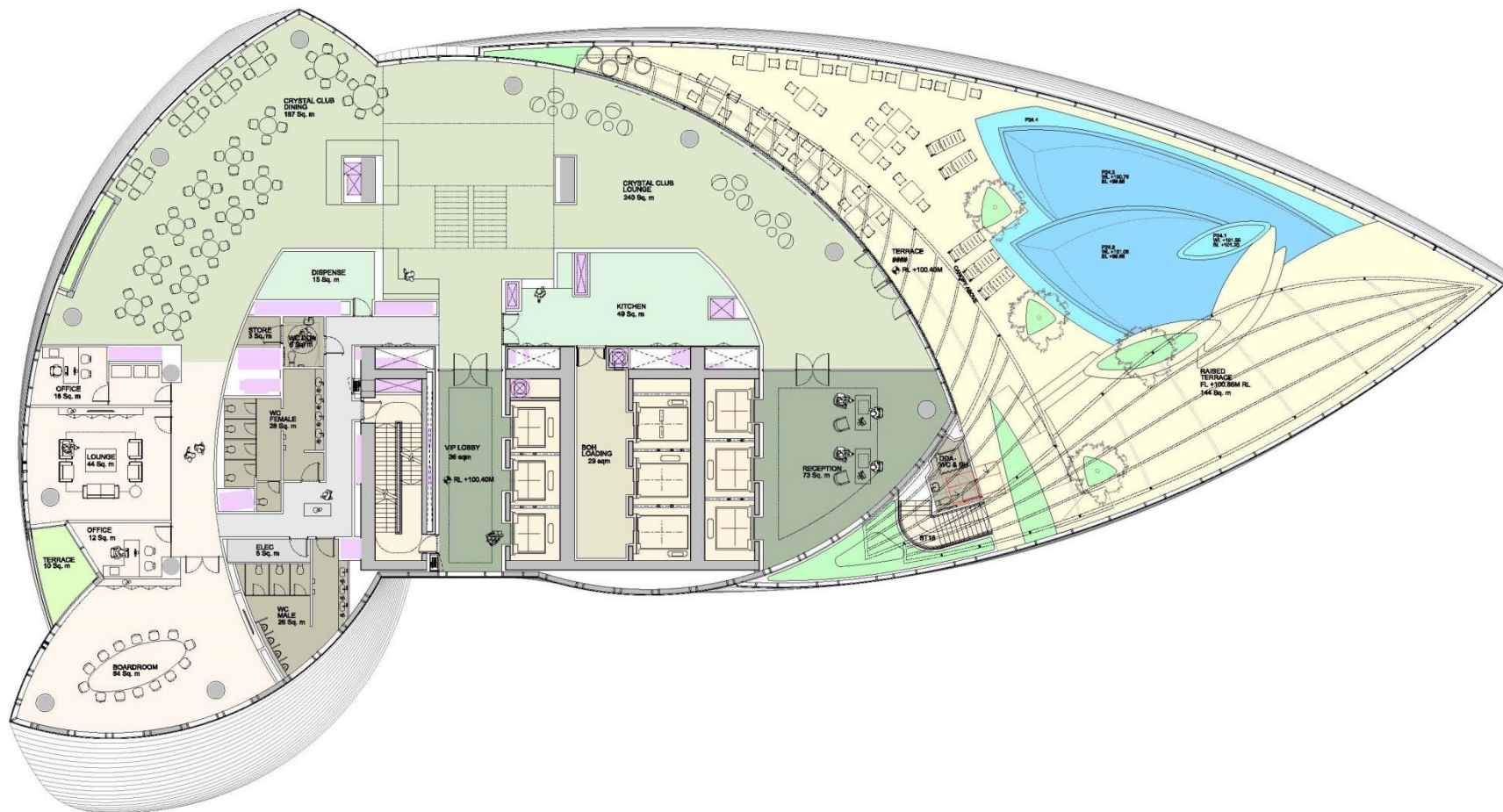
01 LEVEL 06 - HOTEL
1:100 @ A1

KING
 KING SUITE/STUDIO
 QUEEN
 HOR. CIRCULATION
 VERT. CIRCULATION
 RISER
 BOH

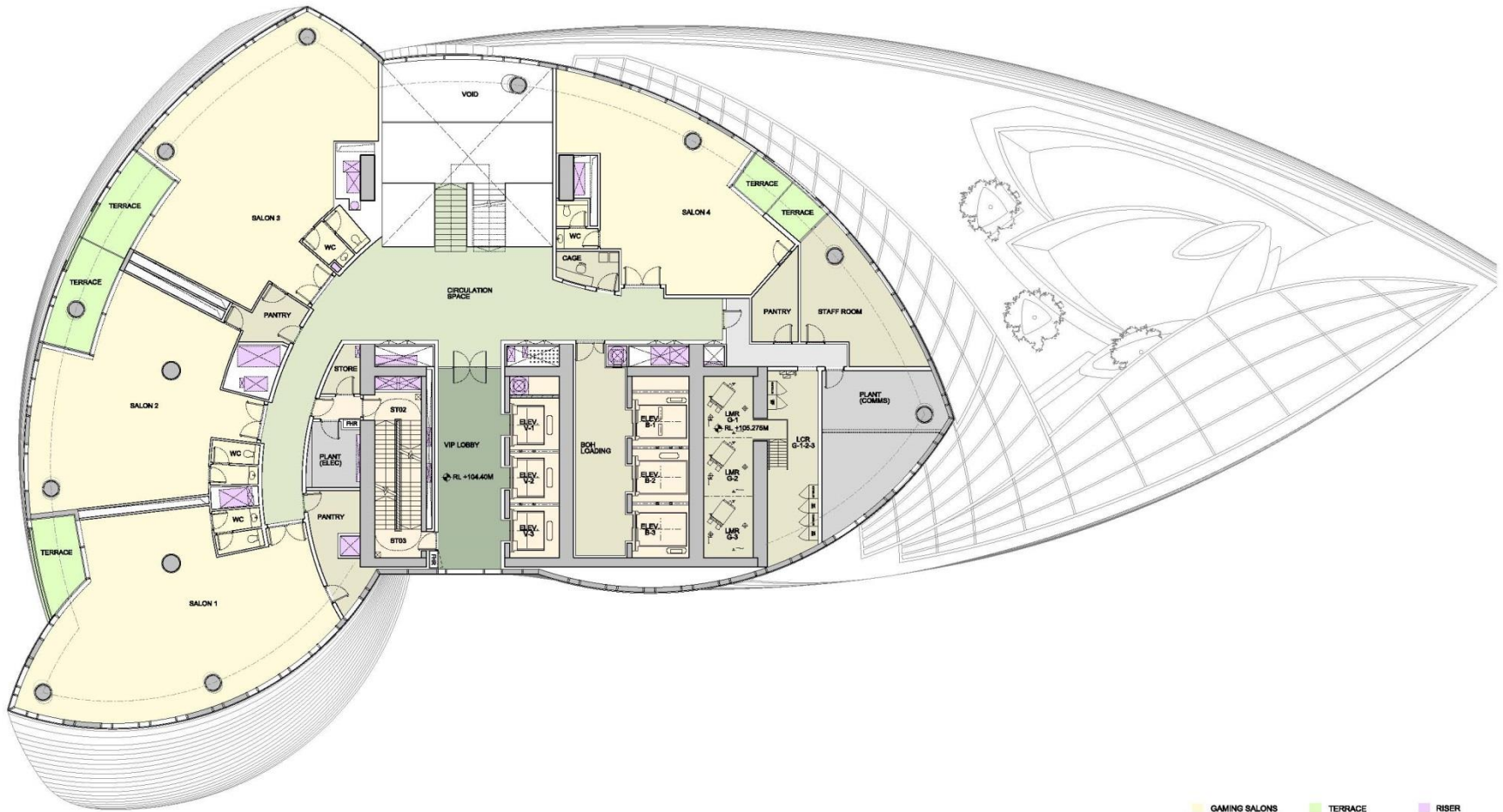


01 LEVEL 22 - HOTEL
1:100 @ A1

KING
 KING SUITE/STUDIO
 QUEEN
 HOR. CIRCULATION
 VERT. CIRCULATION
 RISER
 BOH

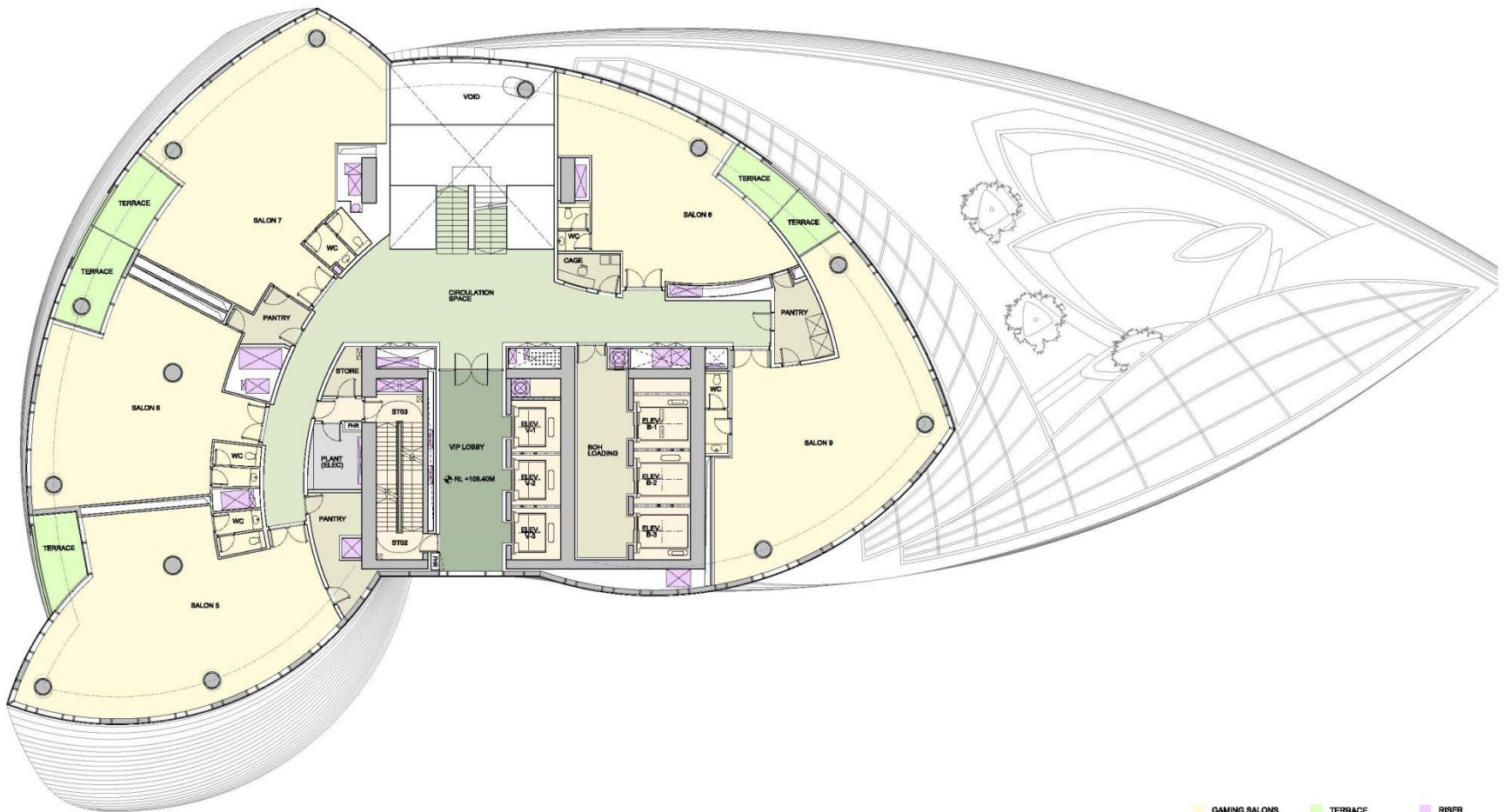


01 LEVEL 24
1:100 @ A1



B1 LEVEL 25 - SKY GAMING
1:100 @ A1

- GAMING SALONS TERRACE RISER
- LOBBY HOR. CIRCULATION BOH
- KITCHEN VERT. CIRCULATION PLANT



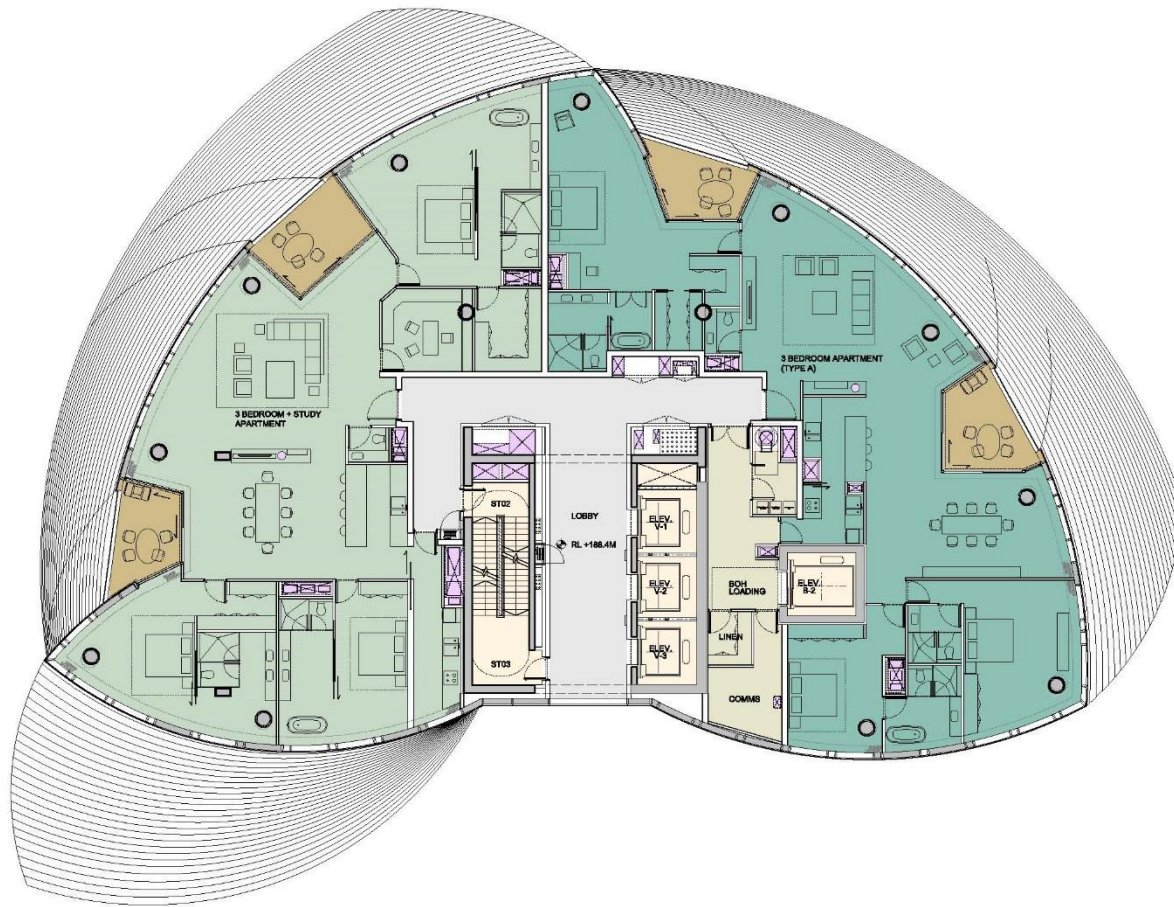
01 LEVEL 26 - SKY GAMING
1:100 @ A1

- | | | |
|-----------------|---------------------|---------|
| ■ GAMING SALONS | ■ TERRACE | ■ RISER |
| ■ LOBBY | ■ HOR. CIRCULATION | ■ BOH |
| ■ KITCHEN | ■ VERT. CIRCULATION | ■ PLANT |



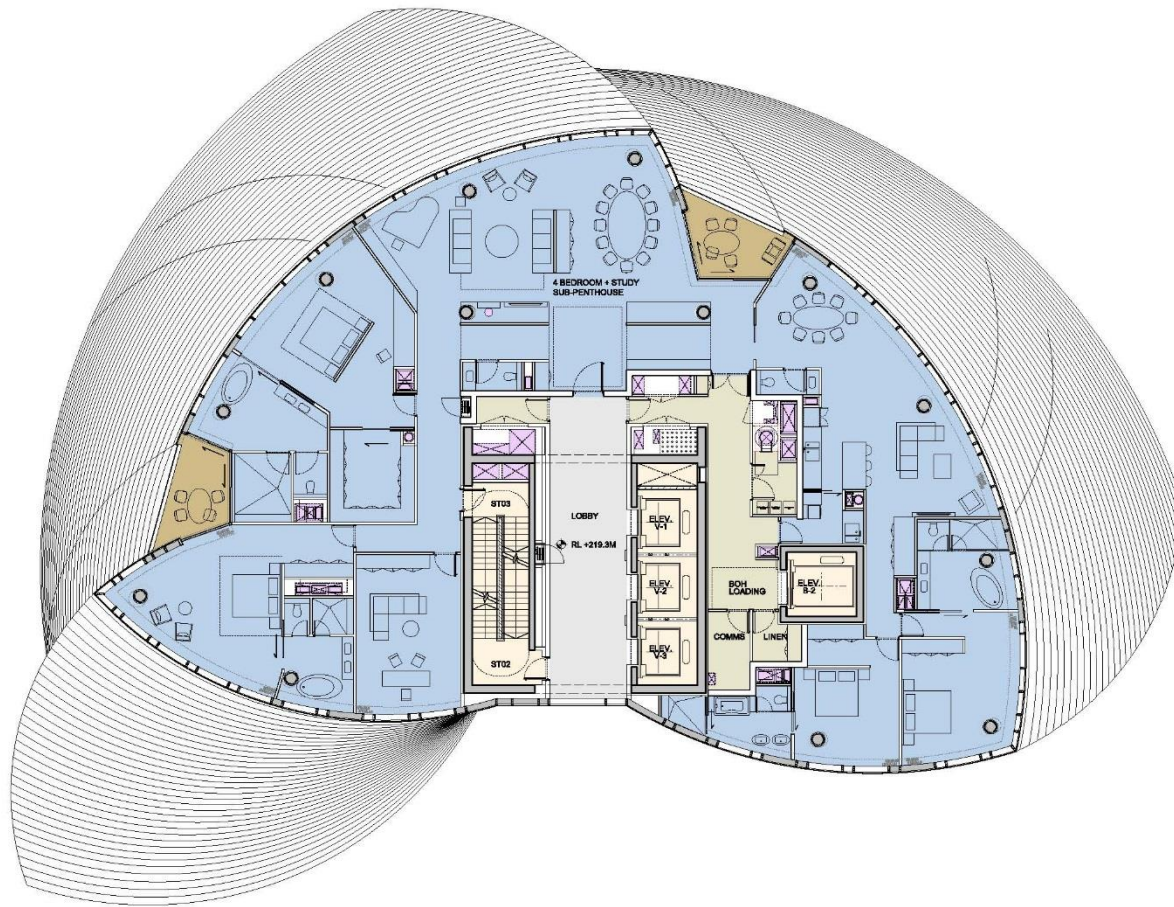
- 01 LEVEL 29
 1:10 @ A1
 Maximum Villa Floor:
 2-3 Bay Villa
 4-5 Bay Villa
 2 Bay Villa (Type 1)
 2 Bay Villa (Type 2)
 3 Bay Villa

- TERRACES
 PLANT
 CORES



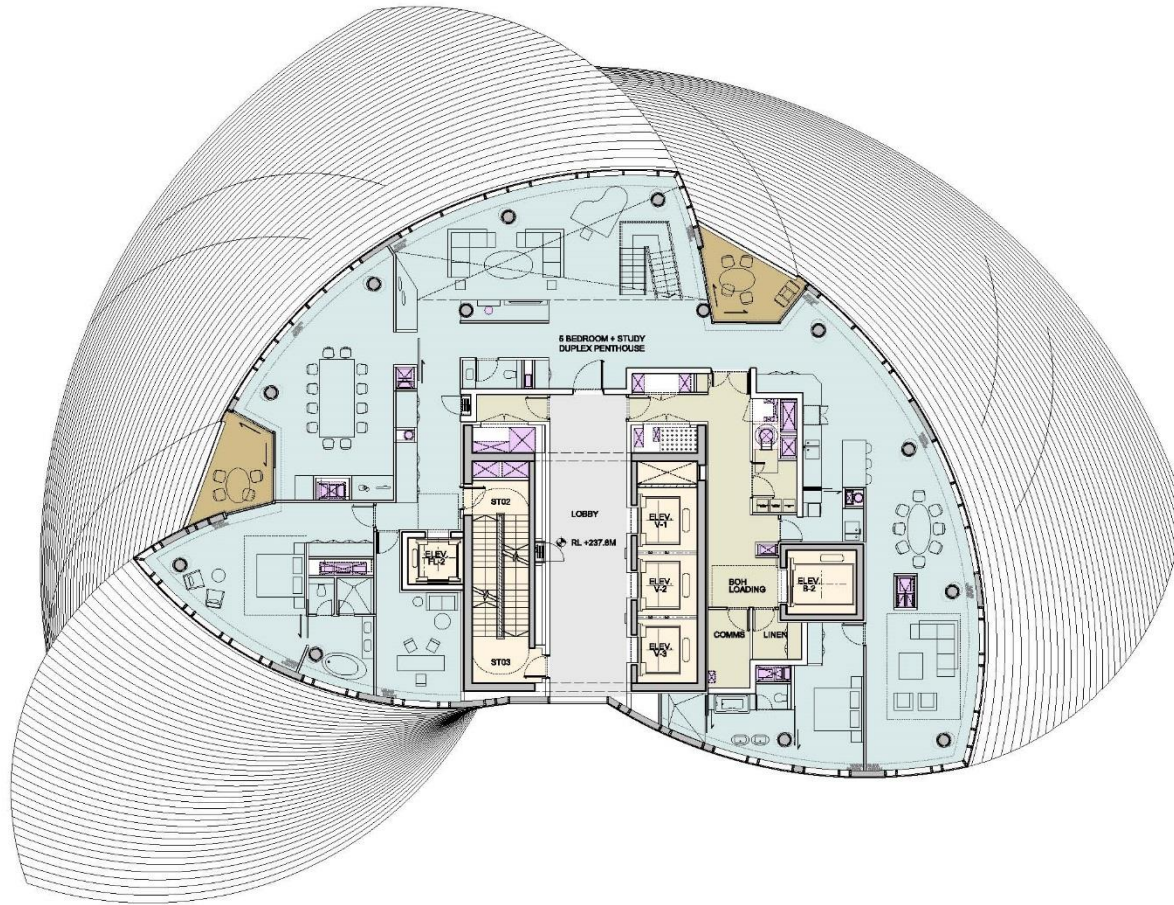
01 **LEVEL 49**
 110 @ A1
 Maximum 2 Apartment Floor:
 3 Bedroom + Study Apartment
 3 Bedroom Apartment (Type A)

TERRACES
 PLANT
 CORES



01 LEVEL 58
 110 @ A1
 Maximum 1 Apartment Floor:
 4 Bedroom + Study Sub-Penthouse

TERRACES
 PLANT
 CORES



01 LEVEL 63
 1110 @ A1
 Penthouse Duplex:
 6 Bedroom + Study - Level 00

TERRACES
 PLANT
 CORES



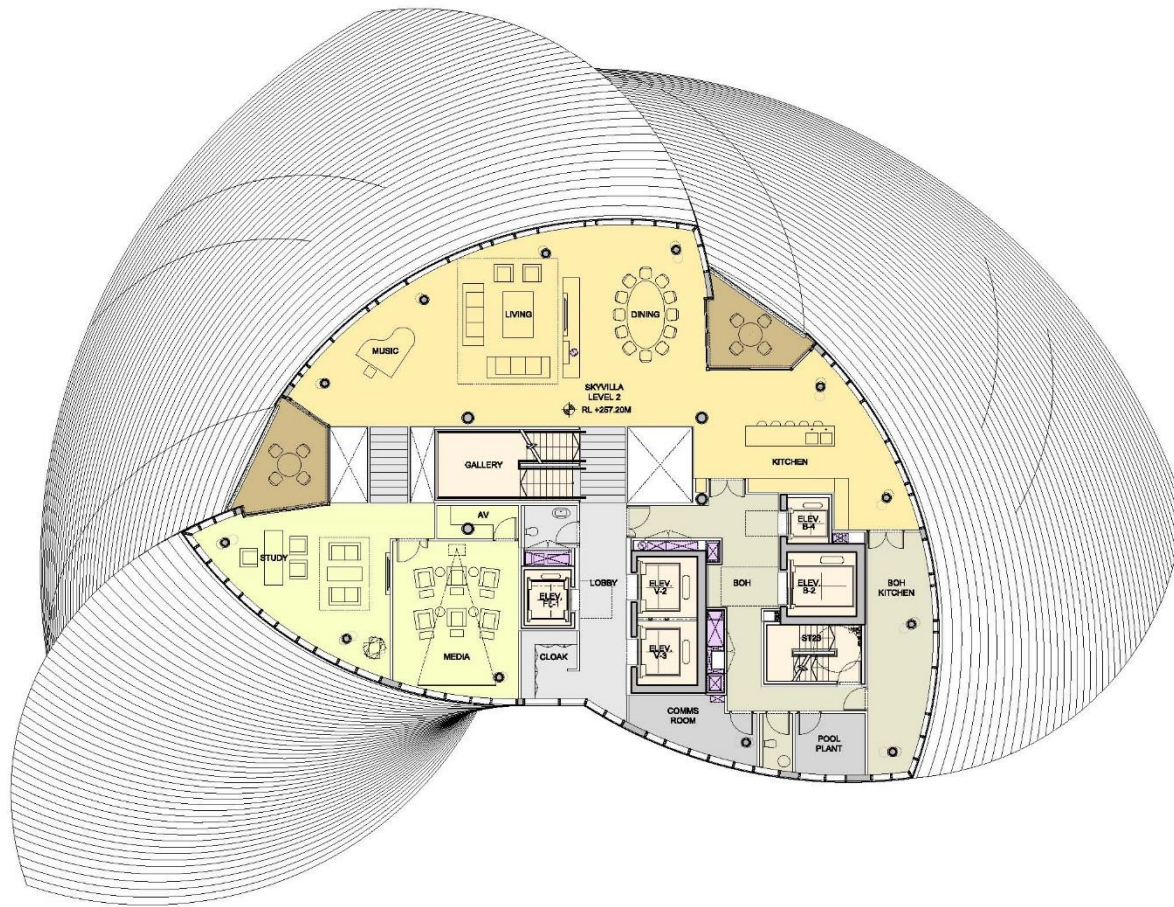
01 LEVEL 66
1:10 @ A1
Super Villa

TERRACES
PLANT
CORES
RISERS
CIRCULATION
BOH



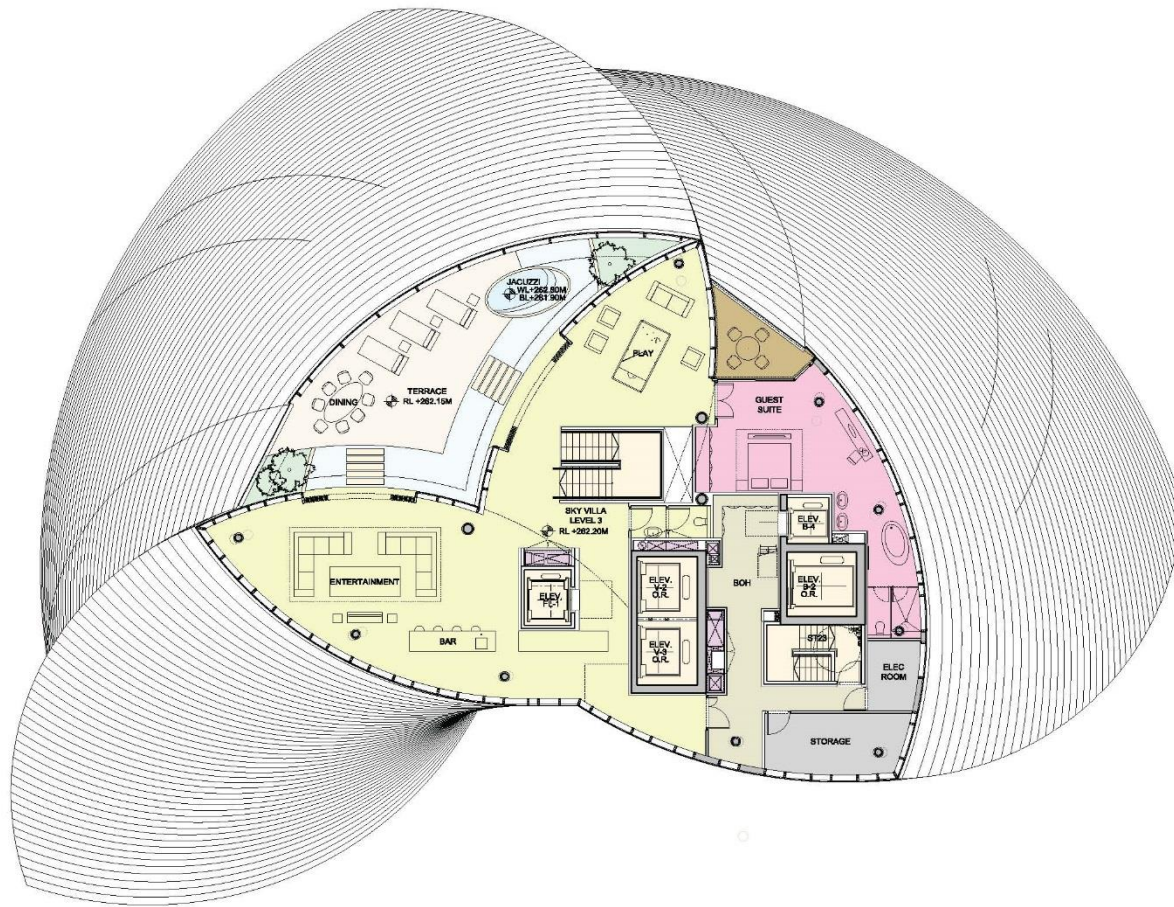
01 LEVEL 67
1100 G A1
Sky Villa
Level 1

TERRACES
PLANT
CORES
RISERS
CIRCULATION
BOH



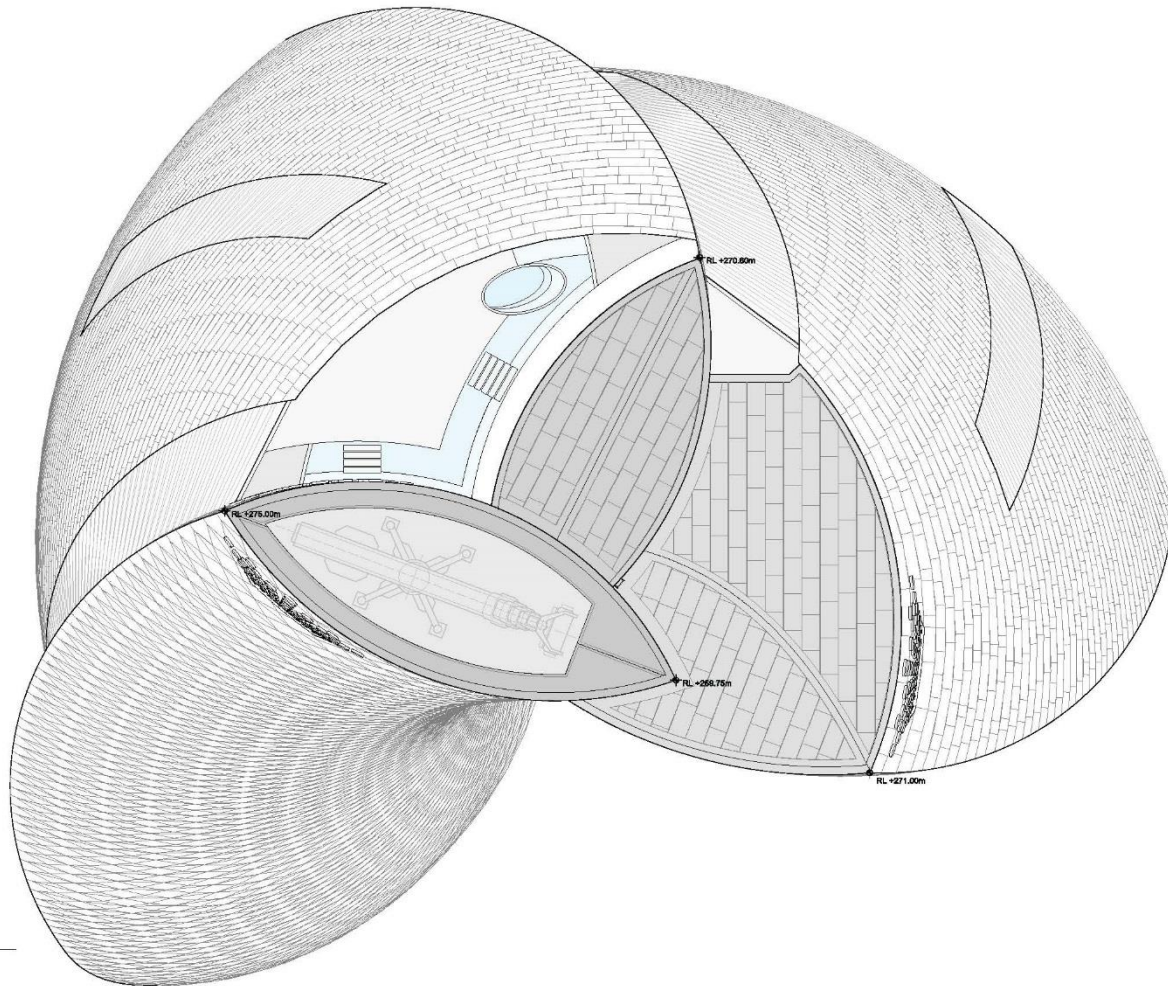
01 LEVEL 68
1:100 @ A1
Sky Villa
Level 2

TERRACES
PLANT
CORES
RISERS
CIRCULATION
BOH



01 LEVEL 69
1:100 @ A1
Sky Villa
Level 3

TERRACES
PLANT
CORES
RISERS
CIRCULATION
BOH



01 ROOF PLAN
1:100 A1

SYDNEY





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Podium Level 00 - Ground Floor Plan

A porte-cochère located off Barangaroo Avenue allows cars to stop directly in front of this entrance. The lobby is a double height space adjacent to a double height retail space on the north-east wing.

At the parkside the tower facade extends down, overlapping the lobby facade to define a protected area in front of it. An additional canopy on this extension deflects the downdraft generated by the R4A tower.

A similar canopy is located at the bottom of the north facade of R4B and at the north-west facade of R5 to protect the path and the outdoor area along the building's park front.

The building wing along the park has in all three towers the lobby to the residences of the tower and retail space with protected outdoor seating area. At the tower R5 the entrance to the Key Worker Housing is located along the colonnade on Hickson Road.

The triangular building shape at the podium is extended towards the south creating a back addition with a lower volume to all three buildings. More retail private outdoor residential spaces and services are in this volume that contribute to frame the street edges.



View from the Park showing R5 and R4B Entrances

Tower R5 Lobby – Watermans Quay

Tower R5 is the smallest of the three towers and has several elements at the lower levels that responds to its urban setting and role, it has a lower podium and one additional residential level that is lower than the other two towers. The lobby however is of the same height and connects directly into the lift lobby like R4B. Likewise it also faces into the triangular Plaza opposite R4B.

In addition there are thirteen levels of apartments allocated to Key Worker Housing (KWH) on the Hickson Road side of the tower. The lobby for KWH has accordingly been located on Hickson Road and within the colonnade that provides the pedestrian experience at ground level. This lobby provides access to the lifts dedicated to the KWH apartments.

Basement Entry – Watermans Quay

The project is serviced by one carpark entry that has been designed to take truck and car movements to the four level carpark below. The driveway has been located to provide an appropriate address for the tenants and meet all the traffic engineering requirements to service the opening off Watermans Quay. A loading dock on basement level 1 facilitates deliveries for the residents and the retailers.

4.6 The Podiums

The podiums are integral to the overall composition performing several roles. Firstly to reinforce the urban edges to the adjacent streets, demarcate the entrances and gateways for the residents and public, and provide a transitional scale for the towers and the relationship to the adjacent buildings, especially to the proposed Crown Hotel and International Tower One. The podiums also contain the access and egress points for residents, residential amenities, private open space, retail outlets and the service areas of the buildings.

RPBW worked from an early stage with all of the consultants to design the ground floor spaces and the podium levels. A series of workshops were held where the consultants could participate in the refinement of the design. Frequently these meetings utilised physical models to examine how elements of the project could be envisaged.



Render of the Strada from Barangaroo Avenue

The first podium levels of the proposed towers accommodate residential facilities, some retail and a glazed lower level to the link bridge.

The area of the first level of the tower R4A contains predominantly mechanical areas and the electrical substations that service the residential buildings. At this level a connection space bridges to the podium of tower R4B. This connection leads the residents from the elevator lobby of R4A to the communal areas located on the tower R4B and provides a glazed lounge area overlooking the park.

At the tower R5 at this level the podium is occupied by retail and services. The service area is located within the tower profile.



Podium Level 1 - First Floor Plan



Podium Level 2 - Second Floor Plan

The second levels of the podiums provide further activation with the residential amenities: with pools behind clear glass operable wintergarden facades, a gym area and landscaped terraces.

The second level of the R4A tower podium amenities consist of the lap pool, a plunge pool, steam and sauna spaces and associated changing rooms. The glass facade facing the park can be opened acting as a wintergarden allowing the breezes to enter.

At this level, a glazed connection between towers R4A and R4B links the gym space in the R4B podium to the pool space in R4A. On the south-west of the gym the residents can access a roof garden with an outdoor pool, visually screened by vegetation and protected from the wind by a fritted glass canopy.

On R4A, south of the elevator lobby, another accessible garden terrace overlooks Barangaroo Avenue towards Watermans Cove. The remaining space contains further mechanical areas facing onto Barangaroo Avenue.

On the R5 tower the second level of the podium is occupied by residences facing the park and communal spaces opening onto a roof garden.

The first floor of apartments overlooks the accessible landscaped roof gardens of the podiums that give the residents the opportunity to occupy the external space right to the edge of the building.

In the towers R4A and R4B the apartments occupy the north-east and west wings of the building while the service core and elevators face south-east. The staggered arrangement of the towers inhibits overlooking issues between apartments. For the same reason, the north-west end facade looking towards the proposed Crown Hotel is almost entirely opaque.

At the lower levels of the tower there is a reduced wind-load on the facades. This allows wintergardens on these lower levels to become permanently open balconies by removing the movable glass panel that encloses the space on the upper levels.



Low Rise Residential Plan



The architectural intent of the podium is to soften the arrival of the towers to the ground. The articulation of the three storey spaces creates an urban environment at a human scale that connects to the other adjacent buildings of the Barangaroo development. On the park side of the buildings, where views of the towers are unobstructed, the verticality prevails and the facades overhang the podium. On the south side the tower sits on top of the roof garden terrace of the podium.

View across Hickson Park towards the Plaza and Strada

Barangaroo South Design Guidelines

JBA

Barangaroo South

Draft Design Guidelines 2015

7 September 2015



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Part 1: Introduction

1.0 Introduction

1.1 Name of this document

This document is called the Barangaroo South Design Guidelines (the design guidelines).

1.2 Purpose of the design guidelines

The purpose of the design guidelines is to provide a framework to guide development of land at Barangaroo South, within the context of the Barangaroo Concept Plan.

1.3 Land to which the design guidelines apply

The design guidelines apply to development on land known as Barangaroo South at Barangaroo (the site) as shown at **Figure 1 – Land to which the design guidelines apply**.

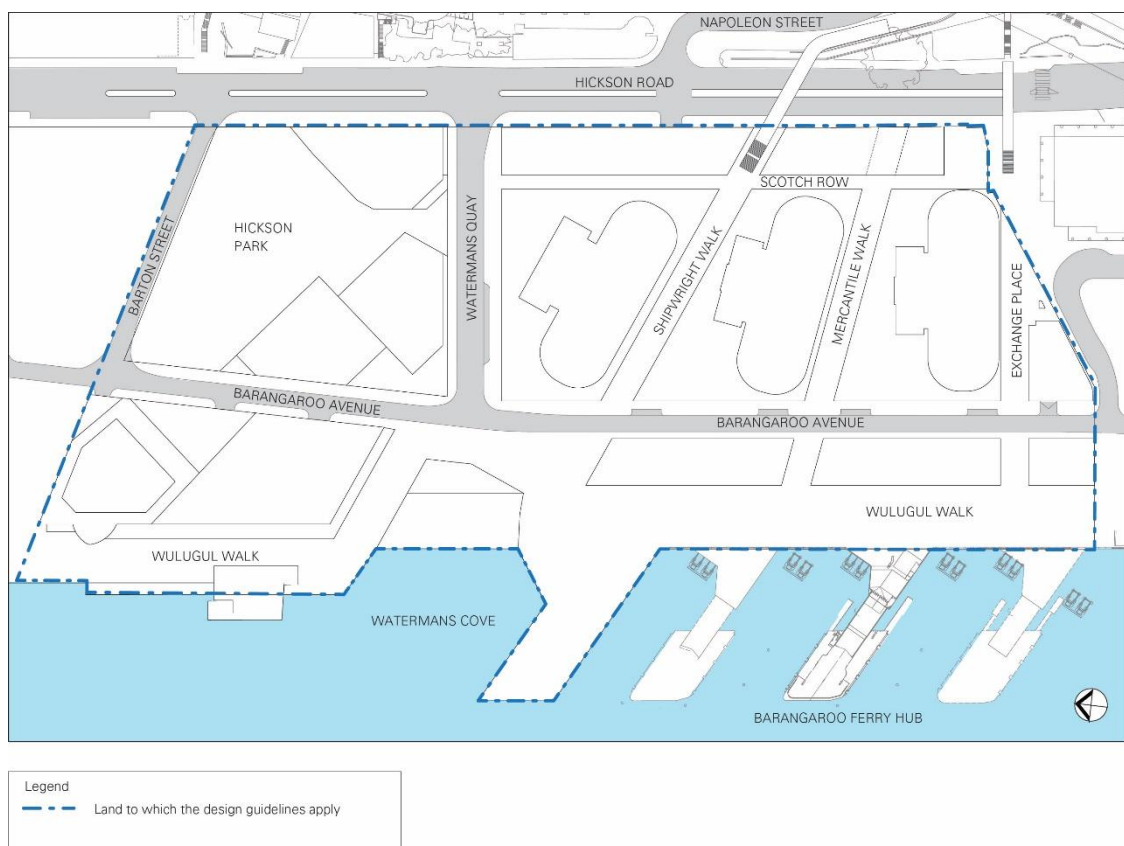


Figure 1: Land to which the design guidelines apply

1.4 Structure of the design guidelines

The design guidelines comprise five parts:

- Part 1 – Introduction, which outlines the intent and application of the design guidelines
- Part 2 – Vision and Principles, which identify the overall outcomes for the site
- Part 3 – Key Elements and Urban Structure, which provide the preferred layout of development on the site
- Part 4 – Open Space and Public Domain Guidelines, which provide performance criteria and design solutions for open space and public domain areas
- Part 5 – Built Form Guidelines, which provide performance criteria and design solutions for built form.

1.5 Application of the design guidelines

The design guidelines support the Barangaroo Concept Plan in establishing a framework for development on the Barangaroo South site. They are based on detailed planning undertaken for the site, including the Rogers Stirk Harbour + Partners Masterplan, Barangaroo Concept Plan Consolidated Instrument and Statement of Commitments.

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.

Vision and principles

The vision and principles represent the overall outcomes for the site.

Key elements and urban structure

The key elements provide an increased level of detail on the vision and principles, and the urban structure represents a spatial expression of the vision and principles. Variations to the urban structure are permitted where alternative layouts can demonstrate they address the vision and principles.

Performance criteria and Design Solutions

Performance criteria are consistent with and provide further detail on the vision and principles. They address matters that are considered important to achieving quality development outcomes on the site. The Design Solutions represent the preferred way of demonstrating achievement of the performance criteria. Should development adopt a Design Solution, it will be taken that it has achieved the relevant performance criteria.

Alternative design solutions

Should development not adopt a Design Solution, it may propose an alternative design solution. This alternative solution will be assessed against the relevant performance criteria. Should the relevant performance criteria not be satisfied, the applicant is to demonstrate that the proposal considers the vision and principles. Facilitating innovation and creativity through alternative design solutions is a fundamental aim of this planning framework. Consequently, when assessing a development application, the consent authority is to apply a flexible approach that allows consideration of reasonable alternative design solutions.

1.6 Relationship to other planning documents

The Design Guidelines provide guidance for development on the site. They are to be read in conjunction with other relevant documents including the Major Development SEPP and the Concept Plan approval. The guidelines are derived from the Rogers Stirk Harbour + Partners Master Plan (*note: the Master Plan does not play a role in the assessment of proposed development and is for illustrative purposes only*).

1.7 Terms and Acronyms

The names of all places, streets and laneways used in the design guidelines are for placeholder purposes only. Actual names will be determined in the future with the involvement of the NSW Government.

The following terms are used throughout these design guidelines.

Active uses	include cafe kiosks, retail kiosks, pavilions, ferry ticket office, public convenience (toilet facilities) and small equipment storage spaces and the like.
Commercial uses	include business premises, office premises, amusement centre and the like
Community uses	include child care centres, community facilities, educational establishments, entertainment facilities (other than cinemas and amusement centres), information and education facilities, landside ferry facilities, places of public worship, public administration buildings, public halls, recreation areas, recreation facilities (major, outdoor and indoor) and health services facility
Key worker housing	a use of premises for the provision of housing that is affordable, based on consideration of average income and costs associated with purchasing or renting housing, to any nurse, teacher, child-care worker, ambulance officer, member of the police force, member of the fire brigade or retirees with an income of approximately 50% of median household income for the Sydney (Statistical

	Division) (as that division is defined for the purposes of the Australian Bureau of Statistics)
Residential uses	include residential accommodation, multi unit housing, residential flat buildings, seniors housing, shop top housing and boarding houses
Retail uses	include food and drink premises, retail premises, markets and pubs and the like
Tourist uses	Tourist uses include backpacker's accommodation, bed and breakfast accommodation, hotel accommodation and serviced apartments, and gaming facility. Serviced apartments are only permitted to be included in the 'tourist uses' GFA if they are in single ownership and are not strata titled (refer to Condition B6(1) of the Barangaroo Concept Plan Determination)

The following acronyms are used throughout these design guidelines.

CPTED	Crime prevention through environmental design
GFA	Gross floor area
LEP	Local Environmental Plan
SEPP	State Environmental Planning Policy
TMAP	Transport Management and Access Plan

1.8 Figures

All figures in these guidelines are indicative only and are not to scale.

Part 2: Vision and Principles

2.0 Vision and Principles

1. **City's New Western Façade:** create an integrated new western frontage to the city centre. The slender ends of buildings above podium level are oriented to the waterfront to minimise perception of bulk from the harbour. Residential apartments and the Block Y podium facing the waterfront will mediate the scale between tower forms and the public promenade on the waterfront (Wulugul Walk).
2. **Hickson Road as a Boulevard:** promote the scale of Hickson Road as a grand boulevard. Buildings provide a consistent street wall definition to Hickson Road but with varied massing heights along the street frontage. Hickson Park connects with Watermans Quay.
3. **Buildings to Define Streets:** building facades are to define street alignments considering the differing character, scale and activation of the streets.
4. **North South Pedestrian Connections:** provide for pedestrian permeability through the blocks. The primary focus for north south pedestrian connections between blocks 2 to 4 includes Wulugul Walk, Barangaroo Avenue and Scotch Row. It is equally as important to provide east-west links through the main pedestrian walkways including Exchange Place, Shipwright Walk, Mercantile Walk and Watermans Quay.
5. **Marking the City Frame:** to continue a built form dialogue with the adjoining city, building heights across the site are in keeping with the rest of the city, with the highest form at the north of the precinct to complete the city frame and define the city's north western edge.
6. **Open Space within Blocks:** create laneways, courtyards, walkways and parklands around the edges of building blocks. Create a fine grain structure of laneways and streets permeating the blocks, as well as open space at podium level between the tower forms.
7. **View Sharing:** promote the equitable access to views towards the harbour, the built form is to be arranged to define street corridors and to allow view corridors from the existing private buildings to the east. Provide sky view corridors between residential towers from Napoleon Street, Bond Square and the Harbour Bridge.
8. **Orientation of Buildings:** create a new city skyline silhouette formed by the gaps between the slender towers. The orientation of the tower buildings are to relate to the fanning principle, while the long facades are to be facing to the north. Buildings facing Hickson Road and Wulugul Walk are to be generally orientated to the east and west to define the linear nature of the road.

Part 3: Key Elements and Urban Structure

3.0 Key elements and urban structure

The key elements are to be provided as part of development of the site are identified in **Table 1 – Key elements**.

The vision and principles for Barangaroo South as identified in section 2.0 of these Guidelines are spatially expressed in the urban structure for the precinct as shown in **Figure 2 – Urban structure** and **Figure 3 – Development blocks and indicative building envelopes**.

Performance criteria		Design solution	
PC	To ensure that development provides key elements whilst providing flexibility in the location and arrangement of these elements	DS1	Development provides the key elements in Table 1 – Key elements and is generally consistent with the structure at Figure 2 – Urban structure and Figure 3 – Development blocks and indicative building envelopes . Where variations are proposed, development is to demonstrate how the vision and development principles have been considered
		DS2	Development is to create a series of development blocks and building forms generally in accordance with Figure 3 – Development blocks and indicative building envelopes

Table 1: Key elements

Key element	Characteristics
Land use	<ul style="list-style-type: none"> Mixed use precinct including high density residential, significant new commercial, retail, tourist, community and open space uses. Predominantly residential uses, along with active ground levels comprising non-residential uses, are principally located along the harbour-front and adjoining Hickson Park and commercial office buildings are predominantly located in other parts of the site.
Built form	<ul style="list-style-type: none"> A general height pattern comprising lower-rise buildings adjoining the harbour and taller buildings located internal to the site is established. This general built form pattern is punctuated by an iconic, landmark building located next to the harbour. Taller buildings are generally provided in a podium and tower form, with the podium extending to all street boundaries to define the public domain. Human scale streetscapes are created at ground level. A diverse yet cohesive series of buildings is created. Different building heights and forms creates a modulated, visually interesting skyline.
Open space	<ul style="list-style-type: none"> Continuous publicly accessible foreshore open space is provided that integrates with adjoining open space north and south of Barangaroo South. A large new park is created at the site's northern end (Hickson Park). A compact, intimate plaza is created at the site's southern end that is the primary entry point to the site from Wynyard Walk and the city. A plaza space is created adjacent to Building C5 to create a strong and civic southern entry to the site.

- Watermans Cove is established as an active waterfront space and a focus for the city extension at Barangaroo.
- Foreshore levels at Watermans Cove are designed to provide opportunities for people to physically touch water.
- Open spaces are illuminated after dark with context appropriate lighting to create safe, inviting and dynamic places.

Movement

- The city's existing north-west oriented grid is extended into the site to reinforce already established east-west linkages.
- Streets have a radial, fanned arrangement that provides increased daylight and sunlight to the ground level and ensures that vistas expand towards the water.
- Pedestrian and cyclist movement is prioritised over vehicular movement.
- A integrated and varied network of streets are provided.
- Strong pedestrian connections are established between the site and adjoining areas.
- Development on the site helps to establish Hickson Road as a grand boulevard through the provision of a continuous pedestrian colonnade.

Note: Hickson Road is not within the direct control of the design guidelines

- 'Barangaroo Avenue' is established as the site's main retail and commercial street.
- Watermans Quay connects Hickson Road with Watermans Cove.
- 'Shipwright Walk' and 'Mercantile Walk' provide pedestrian connections between Hickson Road and the harbourfront.
- 'Exchange Place' provides a strong connection between CBD and the waterfront, including new ferry terminals.
- 'Scotch Row' is established as an intimate laneway that provides an pedestrian connection north-south through the site.
- Hickson Park will have physical connections through and between the surrounding buildings to the waterfront
- A series of through site links are provided through the commercial towers.

Community

- Provide opportunity for Community Uses to be incorporated within all residential and commercial buildings on the site.
- Provide the potential for a community facility on a new public pier adjoining Watermans Cove.
- Key worker housing is provided within a residential or commercial building adjacent to Hickson Road.

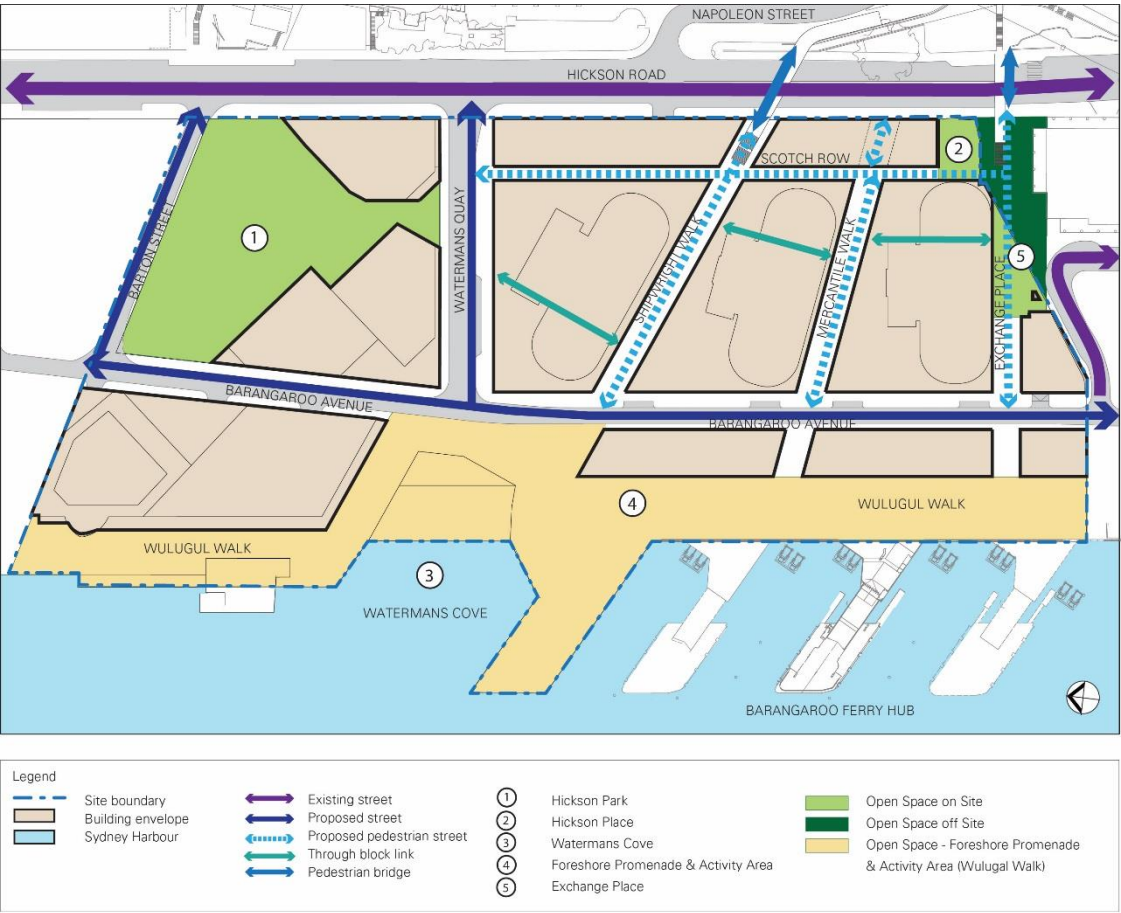


Figure 2: Urban structure

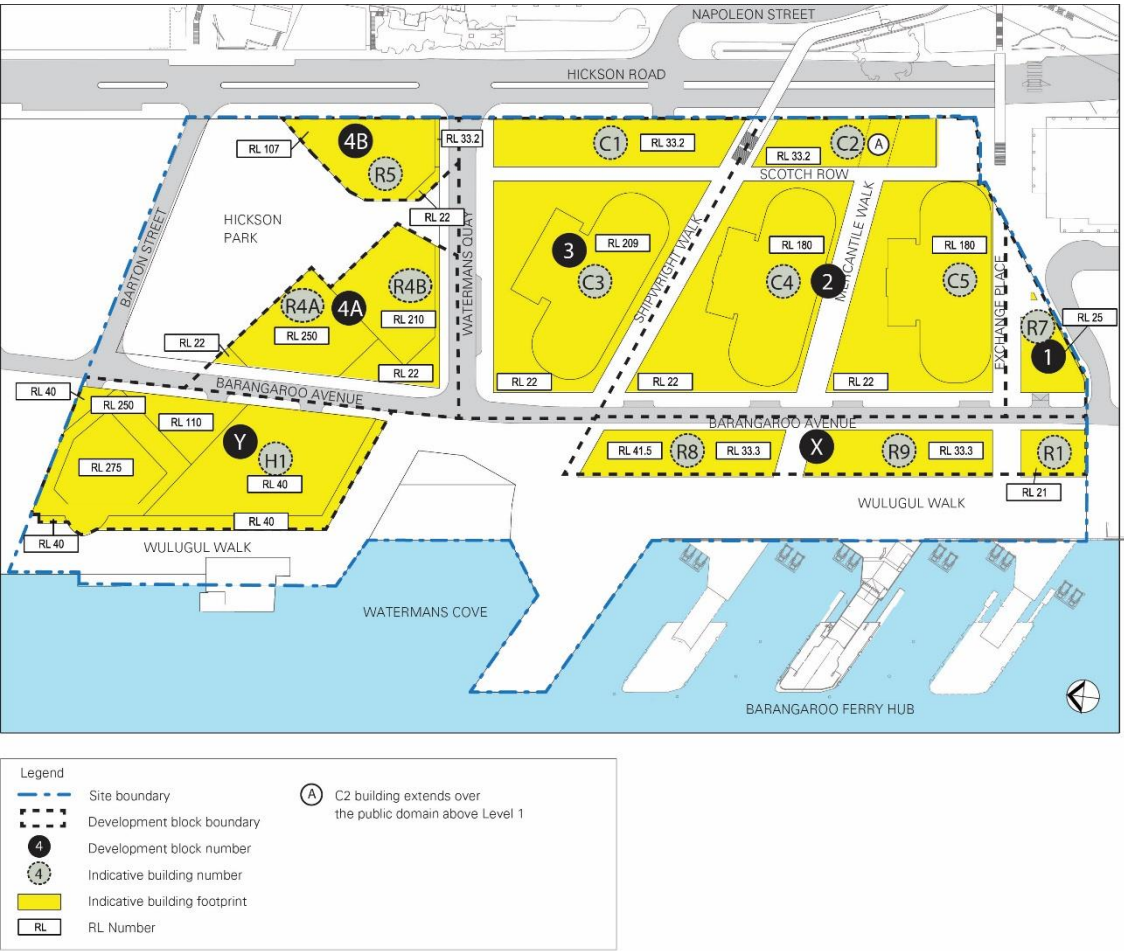


Figure 3: Development blocks and indicative building envelopes

Part 4: Design Guidelines

4.0 Open Space Guidelines

4.1 General

Performance criteria	Design solution
<p>PC To provide an integrated public open space and public domain network that includes:</p> <ul style="list-style-type: none"> a. a continuous pedestrian oriented foreshore promenade (Wulugul Walk) b. physical and visual connection between Hickson Park, Wulugul Walk and the adjoining Central Barangaroo to provide public access and view corridors c. an internal street system that <ul style="list-style-type: none"> i. defines development blocks ii. provides easy flow of people and vehicles iii. acts as a comfortable stage for activity and human interaction iv. creates a distinctive address for each building 	<p>DS1 Development occurs generally in accordance with Figure 2 – Urban structure</p>
<p>PC To create an attractive, safe and comfortable public domain that:</p> <ul style="list-style-type: none"> a. creates a unique and cohesive identity for Barangaroo South b. is consistent with the role of Barangaroo South as a key part of the CBD 	<p>DS2 Applications for public domain works demonstrate the achievement of this performance criteria</p>

4.2 Open Space Network

Performance criteria	Design solution
<p>PC To create a network of high quality, publicly accessible open spaces that:</p> <ul style="list-style-type: none"> 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 Central Barangaroo 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 	<p>DS1 Open space is provided generally in accordance with Figure 4 – Open space network and Table 2 – Open space network characteristics</p>

- 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

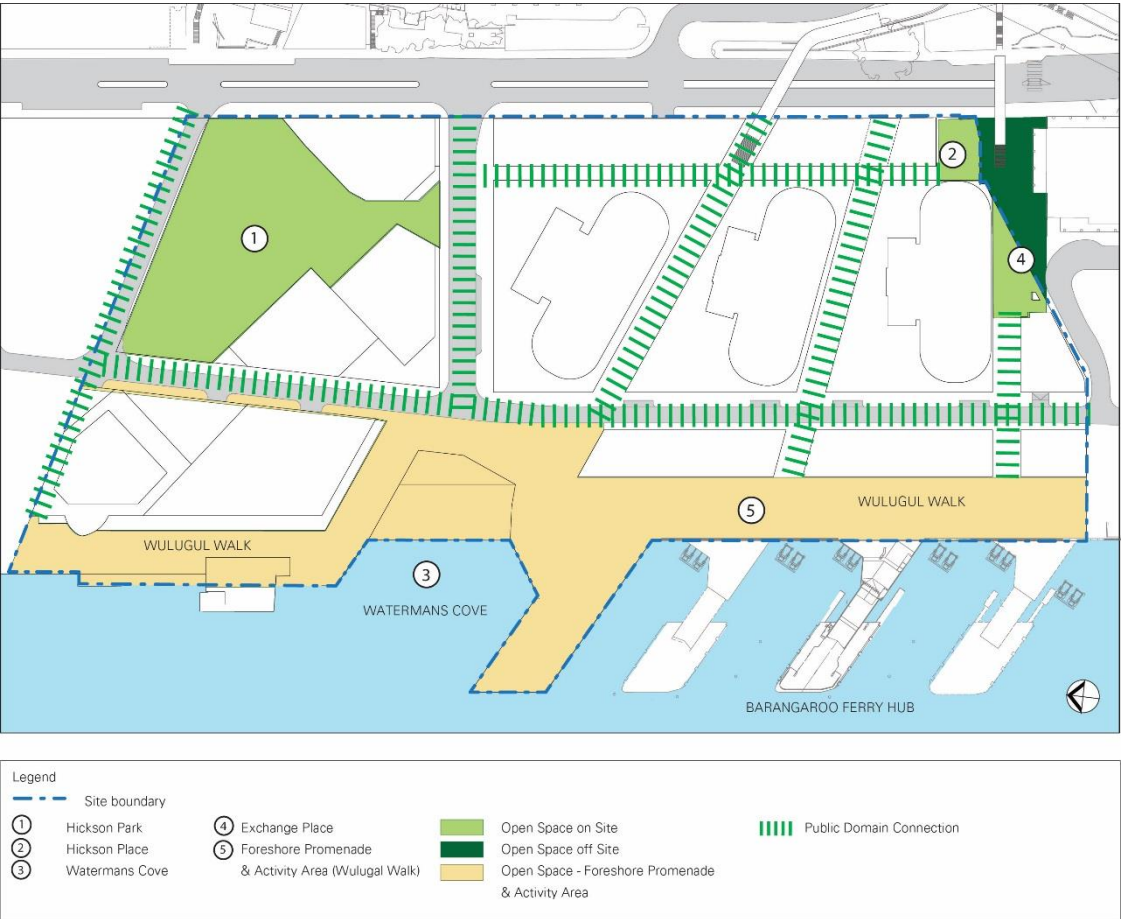


Figure 4: Open space network

Table 2: Open space network characteristics

Open space	Characteristics
Hickson Place	<ul style="list-style-type: none"> - A civic entry to the Barangaroo precinct from the south. - Is a vibrant, small scale plaza adjacent to the major pedestrian gateway to the site from the CBD. - Has a flexible design that enables it to be used for a variety of casual and organised activities, including outdoor food and drink establishments and other retail premises. - Incorporates a roofed structure that protects the plaza from wind effects.
Exchange Place	<ul style="list-style-type: none"> - A major address space located adjacent to the C5 lobby. - Provides a strong and civic setting for nearby buildings, both on the Barangaroo site and for those existing in adjacent locations. - Provides an opportunity for gathering, interaction and movement.
Hickson Park	<ul style="list-style-type: none"> - The site's major park and a focal point for the community. - Connects the Central Barangaroo parkland to Hickson Road. - Promotes public accessibility, use and meaningful connections to the surrounding public domain, including Wulugul Walk - Provides a large, informal grassed area and extensive tree planting for amenity and sustainability outcomes. - Due to its location, size and shape, has access to sunlight and daylight. - Provides amenity for adjoining residential premises. - Permeability, accessibility and casual surveillance is maximised by having frontage to three streets and engaging with the ground floor of the adjoining residential towers. - Provides an 'extension' of the plaza to the east of Hickson Road to assist in better integrating both sides of Hickson Road. - Is activated by active frontages on the ground floor of the residential buildings.
Wulugul Walk	<ul style="list-style-type: none"> - A key part of the broader, publicly accessible Sydney Harbour foreshore. - Continues the character of the Barangaroo Point and Central Barangaroo foreshore but is more urban as it relates to the urban precinct of Barangaroo South. - A focal point for activity, incorporating outdoor food and drink establishments, entertainment, recreation and walking. - Has a high level of amenity, with visual, and where appropriate, physical access to the harbour, and access to sunlight throughout the late morning and afternoon.
Watermans Cove	<ul style="list-style-type: none"> - An intimate incursion into the site from Darling Harbour that complements and enhances Wulugul Walk. - Provides a high amenity space that is a focal point for a range of activities, including informal relaxation and organised events. - Aligns with Watermans Quay to terminate a vista from Hickson Road and draw daylight into the site. <p><i>Note: the water edge configuration in this space may deviate from the more continuous 'wharf edge' condition of Wulugul Walk to provide access to the water.</i></p>

4.3 Street Network

Performance criteria	Design solution
PC To create a an integrated network of publicly accessible streets that: <ul style="list-style-type: none"> 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 Point and Central Barangaroo 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 Table 3 – Street characteristics , Figure 5 – Street network and Figure 6 – Pedestrian and cyclist network DS2 Apart from Watermans Quay and Barton Street, all other east-west streets are not open to vehicles DS3 Major pedestrian routes connect seamlessly with Barangaroo Avenue and Shelley Street to the south and Central Barangaroo to the north DS4 A continuous public walkway traverses the entire waterfront edge of the site DS5 The major points of pedestrian access to the precinct from the CBD are from the two bridges that connect from the east edge of Hickson Road to Shipwright Walk and Exchange Place DS6 All spaces in the public domain are designed to provide adequate and clear paths of travel DS7 Each commercial tower building incorporates a north-south public through-site link DS8 Scotch Row has a minimum width of approximately 6m with a defined eastern edge parallel to Hickson Road at ground level.

Table 3: Street characteristics

Street	Characteristics
Hickson Road <i>Note: Hickson Road is not within the direct control of the design guidelines</i>	<ul style="list-style-type: none"> - The precinct's eastern Gateway - A major public transport spine that will cater for buses and potential future light rail - Where possible, minimises traffic within the site by providing passenger drop-off zones - Includes layout and design measures to facilitate safe and efficient through movement of vehicles - Provides a comfortable pedestrian environment that includes protection from sun and rain
Scotch Row	<ul style="list-style-type: none"> - An intimate pedestrian laneway with a clear north/south view across Barangaroo South - The laneway is lined with ground floor active uses that have allocated spill-out spaces, allowing the activity of the buildings to engage with the laneway - Provides a transition from busy, vehicle-oriented Hickson Road to the pedestrian-oriented public realm in Barangaroo South

Street	Characteristics
	<ul style="list-style-type: none"> - The public domain treatment provides for active and passive uses to enliven the streetscape
Shipwright Walk and Mercantile Walk	<ul style="list-style-type: none"> - Intimate, human scale and activated pedestrian walkways that connect the city in an east-west direction to the waterfront - Integrates the public and private domains by including a co-ordinated palette of paving treatments between outdoor spaces and building lobbies - The walks are simple urban spaces with lively building edges where activity can spill out into the street - The public domain treatment is simple and uncluttered in order to contribute to a “civic” quality
Barangaroo Avenue	<ul style="list-style-type: none"> - The main north-south street through the site and the primary retail and commercial activity street - Connects with and continues the existing street to the south of the site and provides a connection with Central Barangaroo to the north - Layout and design is pedestrian-focused with a comfortable pedestrian scale and character - It is a complete street accommodating vehicle movement in a slow-speed environment, on-street parking/drop off, pedestrian paths on both sides of the carriageway, street trees and stormwater filtration
Watermans Quay	<ul style="list-style-type: none"> - Key east-west link connecting Hickson Road and Watermans Cove, conceived as the main landscaped boulevard - Whilst being the main vehicular entry to the site from the east, the street provides a high quality, safe and comfortable pedestrian experience - North-south movement across the street between development in the southern part of the site and the northern part of the site is facilitated through design measures
Exchange Place	<ul style="list-style-type: none"> - A major pedestrian thoroughfare and southern gateway to the precinct - Connects the CBD, Wynyard rail station and the ferry terminals - Integrates the public and private domains by including a co-ordinated palette of paving treatments between outdoor spaces and building lobbies - The public domain treatment is simple and uncluttered in order to contribute to a “civic” quality

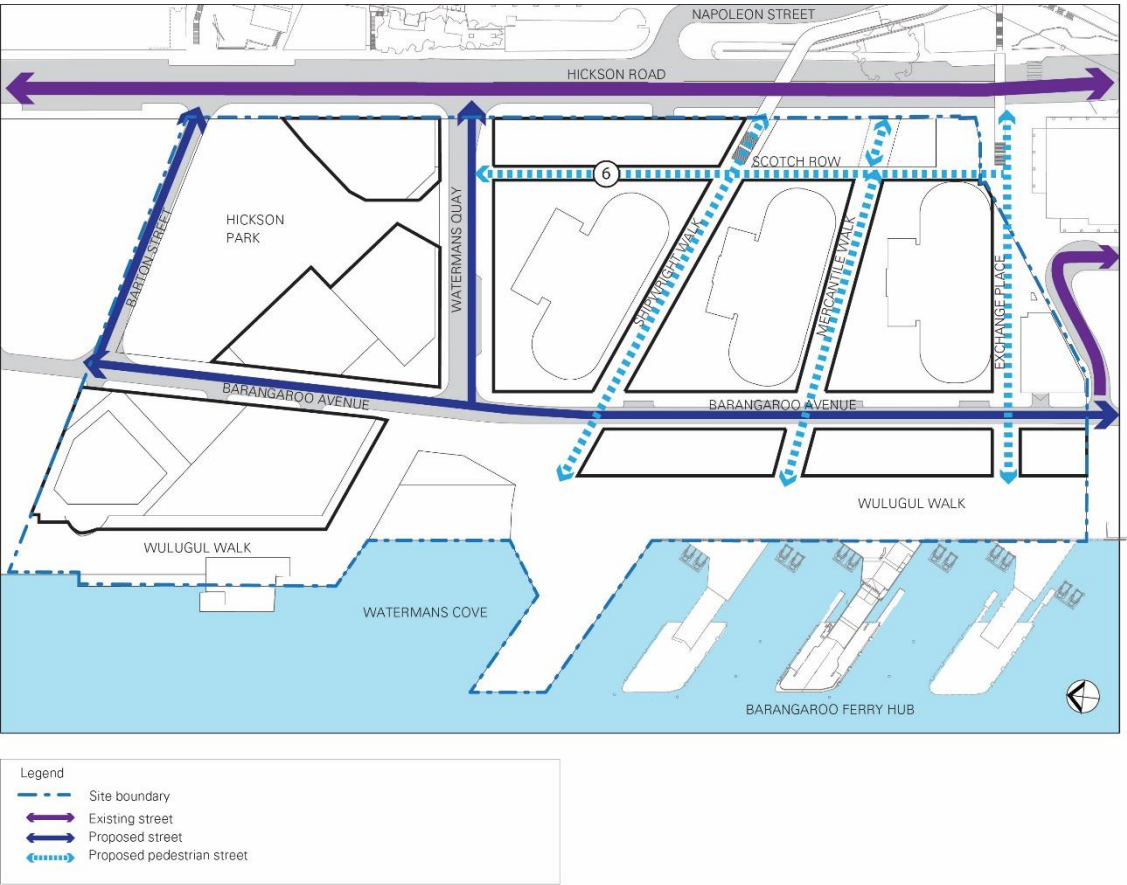


Figure 5: Street network

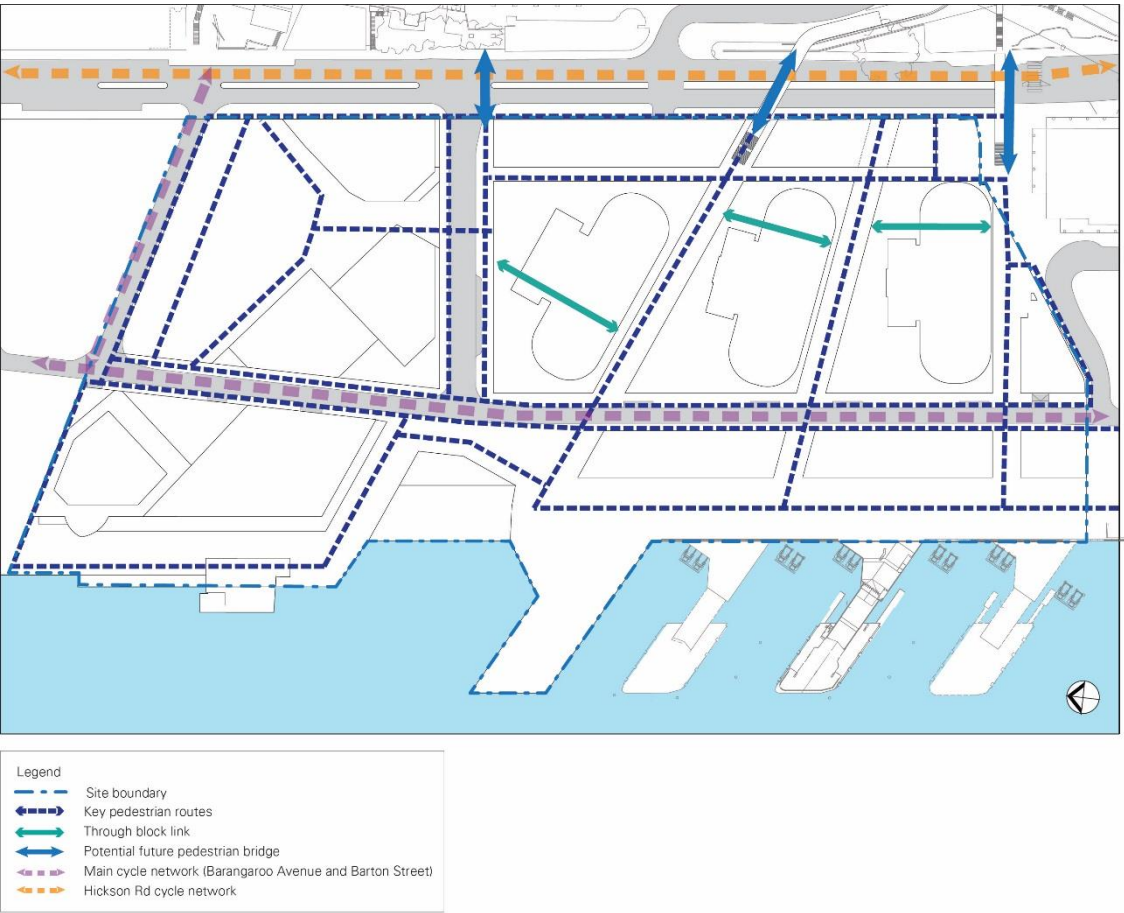


Figure 6: Pedestrian and cyclist network

5.0 Built Form Guidelines

These built form guidelines apply to the entire Barangaroo South site. Where appropriate, exceptions or additional, more specific requirements are also provided on a Block basis. For example, for 'building mass and location, the performance criteria and design solutions listed under the 'general' heading will apply to all development and for Blocks 4A and 4B, more specific provisions relating building height also apply.

5.1.1 Building envelopes

Performance criteria	Design solution
<p>PC Building mass is sited and is of a scale that:</p> <ul style="list-style-type: none"> a. is consistent with the role of the site as a major extension of the Sydney CBD b. creates attractive, comfortable streetscapes c. creates an integrated network of streets and public spaces d. is set back from Sydney Harbour e. provides a high level of amenity, including enabling adequate sunlight, daylight access and natural ventilation to the public domain f. creates an active, vibrant and attractive public domain 	<p>DS1 Building envelopes are in accordance with the Barangaroo South Building Envelope Plan approved in the Barangaroo Concept Plan</p> <p><i>Note: Environmental mitigation measures, such as solar shading devices and other façade articulation may extend outside the development envelopes by a maximum of 600mm</i></p>

5.1.2 Residential Amenity

Performance criteria	Design solution
<p>PC Residential development achieves a high level of internal amenity and minimises impact upon the amenity of other existing and proposed residential development, including allowing for adequate solar access, natural ventilation, private open space and acoustic and visual privacy</p>	<p>DS1 The design of Residential Apartment Buildings is to have regard to the 'Design Criteria' in the Apartment Design Guide</p> <p>DS2 Landscape spaces for future residents are generally provided in the in the form of balconies, wintergardens and roof terraces</p> <p>DS3 Living rooms and private open spaces for at least 70% of apartments across the site should receive a minimum of 2 hours direct sunlight between 9 a.m. and 3 p.m. in mid-winter(excluding south-facing units)</p> <p>DS4 The maximum number of single aspect apartments with a southerly aspect (SW-SE) is 15% of all apartments proposed</p> <p><i>Note: where this cannot be achieved, development must demonstrate how site constraints and orientation prohibit the achievement of these standards and how energy efficiency is addressed</i></p>

Performance criteria		Design solution	
PC	Development encourages housing choice and affordability	DS1	A minimum of 2.3% of all approved residential GFA is provided as key worker housing
		DS2	Housing across the site should provide a variety of types, sizes and configurations
PC	Apartments have access to useable outdoor open space. For apartments in towers, this takes the form of wintergardens to minimise the adverse impacts of wind at higher elevations. Wintergardens are of a high architectural design quality and are integrated with the design of the building	DS3	Wintergardens are encouraged in high-rise buildings where wind impacts do not support the provision of balconies. In such circumstances, wintergardens may not be considered GFA if they: <ul style="list-style-type: none"> a. are designed and constructed as a private external balcony with drainage, natural ventilation and finishes acceptable for use as an outdoor/indoor wintergarden space; and b. adopt transparent materials that maximise daylight access and views. Any non-transparent materials must not exceed a height of 1.4m

5.1.3 Car Parking & Servicing

Performance criteria		Design solution	
PC	Car parking and servicing:	DS1	Carparking is provided in accordance with the Barangaroo Concept Plan
	a. balances on-site carparking to accommodate reasonable provision with encouraging alternative modes of transport to the private motor vehicle	DS2	On-site parking areas comply with AS2890.1:2004
	b. is safe, functional and convenient	DS3	For commercial buildings, a minimum of 1 shower for every 10 bicycle spaces is provided
	c. ensures buildings can be adequately serviced by service and delivery vehicles	DS4	Building servicing and loading facilities are designed to adequately cater for forecast building demand
	d. is located and designed to not visually dominate the public realm	DS5	Service/delivery areas accord with AS2890.2:2002 subject to driveways complying with City of Sydney Council's requirements

5.1.4 View Sharing

Preamble

Extensive investigations into views have already been undertaken and documented as part of planning for the site. These investigations have proven that on balance, the impact on existing views is generally acceptable. Consequently, provided that development does not significantly depart from the Building Envelopes and key parts of these design guidelines, further assessment of the impact of development on views, including those obtained from individual dwellings, will not be required.

Performance criteria		Design solution	
PC	Development is located and designed to: <ol style="list-style-type: none"> provide a balance between enabling significant development on the site and protecting valued, key existing views from the public domain protect existing views corridors obtained from the public domain to iconic, landmark places that contribute to the sense of place and character of the CBD and its immediate surrounds protect the key attributes of existing public domain view corridors from Millers Point to maintain its amenity, character and sense of place, in particular its connection to the harbour enable views and outlooks from private premises to existing and proposed new attractive elements in the urban landscape, including Sydney Harbour, the open sky, parkland and streetscapes create an attractive new part of the CBD that contributes to the image and character of Sydney, in particular when viewed from the west 	DS1	Public domain and built form are located along a radial fan arrangement as shown in Figure 2 – Urban structure and Figure 3 - Development blocks and indicative building envelopes
		DS2	Adequate view corridors over and between new built form are created to maintain the following key attributes of public domain views from Millers Point: <ol style="list-style-type: none"> views to significant tracts of the water the junction of Darling Harbour and the Harbour proper the opposite foreshores panoramic qualities of existing views the most distinctive views to landmark structures
		DS3	Hickson Park is located and has a sufficient area and dimensions, in particular an east-west depth relative to Kent Street, to contribute to a perception of open space for existing residential premises on Kent Street that currently have views across the site to Sydney Harbour
		DS4	Built form frames views of Sydney Harbour and the sky when viewed from both the public and private realms
		DS5	Tower elements are separated to provide multiple view corridors to Sydney Harbour from existing development east of Hickson Road
		DS6	View corridors are vertical in form, and where possible, each view corridor enables appreciation of the interface between the land edge of Barangaroo and Sydney Harbour
		DS7	Residential towers can be distinguished as separate building forms

5.1.5 Overshadowing

Preamble

Extensive investigations into overshadowing have already been undertaken and documented as part of planning for the site. These investigations have proven that on balance, the impact of additional shadows is generally acceptable. Consequently, provided that development does not significantly depart from the Building Envelopes and key parts of these design guidelines, further assessment of overshadowing, including the preparation of additional overshadowing studies, will not be required.

Performance criteria		Design solution	
PC	Development is located and designed to:	DS1	Public domain and built form are located and designed in accordance with Figure 2 – Urban structure and Figure 3 – Development blocks and indicative building envelopes
	a. provide a balance between enabling significant development on the site and creating a comfortable, high amenity public domain	DS2	Development bulk and form is generally in accordance with Part 6 – Built Form Guidelines of these Design Guidelines
	b. provide direct sunlight access to Wulugul Walk and Hickson Park and facilitate daylight access to other parts of the public domain	DS3	At least 50% of Wulugul Walk receives direct sunlight for a minimum of 2 hours between 9am and 3pm on 21 June
	c. achieve an appropriate level of solar access for other new areas of public open space considering its orientation, scale or dimensions and desired future character		
	<i>Note: for example, significant shadowing of Scotch Row is acceptable due to its north-south alignment, narrow width and desired future character as an intimate, pedestrian scale place</i>		

5.1.6 Building mass and location

Performance criteria		Design solution	
General			
PC	To ensure building mass :	DS1	Building mass is located in accordance with Figure 3 - <i>Development blocks and indicative building forms</i>
	a. is appropriate within the envelope		
	b. responds to adjacent buildings		
	c. incorporates vertical massing as an integral part of the composition of towers where in tower form		
	d. creates interesting building shapes		
For Block 1			
		DS2	Building mass is located to enable clear views of the C5 podium from the south
		DS3	Building height takes advantage of views west to the harbour over lower rise buildings
		DS4	Building form creates a street wall that responds to the height of the C5 podium

Performance criteria	Design solution
	For Block 2
	DS5 Maximum horizontal floor plate length of the north and south elevation of each tower is 87m measured from glass line to glass line
	DS6 Maximum primary floor plate depth of each tower is 32m measured from glass line to glass line <i>Note: Expressed structure, shading devices and secondary floor plate is allowable outside this dimension</i>
	DS6 Predominant podium height is a minimum of 3 storeys and a maximum of RL22
	DS7 The height and/or floor area above RL 160 in one of the towers is reduced
	For Blocks 2 and 3
	DS8 Towers are located west of Scotch Row
	DS9 Hickson Road buildings are comparatively lower in height compared to the tower forms
	DS10 Hickson Road buildings are visually interesting through the use of articulation, including through lighter and smaller roof top forms such as canopies
	For Block 3
	DS11 Maximum horizontal floor plate length of the north and south elevation of each tower form is 87m measured from glass line to glass line
	DS12 Maximum primary floor plate depth of each tower form is 32m measured from glass line to glass line <i>Note: Expressed structure, shading devices and secondary floor plate is allowable outside this dimension</i>
	DS13 Podium height is a minimum predominant height of 3 storeys and a maximum of RL22
	DS14 The north-east part of the podium maintains a cohesive relationship with the tower and the Hickson Road buildings
	For Block 4A and 4B
	DS15 The height of the towers within the block is varied and ascends in height from east to west
	DS16 Vertical massing is expressed in the design and facades of towers in block 4A

Performance criteria	Design solution
	<p>DS17 Towers proposed in Block 4A are separated to emphasise their verticality</p> <p>DS18 Podiums are built to the edge of the envelope on Watermans Quay</p> <p>DS19 Towers may be built to the edge of the envelope</p>
	For Block X
	<p>DS20 Over 70% of buildings have a consistent height</p> <p>DS21 The predominant height of the building mass fronting Wulugul Walk is 6 or 7 storeys above ground level</p> <p>DS22 Building height generally increases from south to north</p> <p>DS23 Any elements taller than the prevailing building height such as pop-ups do not result in buildings exceeding 9 storeys in height</p> <p>DS24 The southernmost building should achieve a lesser height than other buildings in the development block.</p> <p>DS25 On the easterly oriented facades, a minimum of 1m setback from the building envelope is required on the ground floor</p> <p>DS26 Above Ground floor level the westerly oriented facades to have a minimum 3m setback</p> <p><i>Note: Open and enclosed balconies are allowed to protrude into the setback zones</i></p>
	For Block Y
	<p>DS27 The height of building mass increases northwards</p> <p>DS28 Tower building mass tapers to the top of the building</p> <p>DS29 The building has a distinct podium and tower form</p> <p>DS30 The bulk of the podium massing is a maximum of RL40</p> <p>DS31 The tower form is permitted to come to ground on the western frontage and may penetrate the general western building envelope line by up to 9m</p>

5.1.7 Tower setbacks

Performance criteria		Design solution	
General			
PC	To set back taller building elements from streetwalls to reduce their impact on the public domain, define public spaces and create a distinct podium and tower form	DS1	Setbacks are generally in accordance with the Building Envelope Plan in the Concept Plan
		For Blocks 4A and 4B	
		DS2	Predominant tower mass is set back from Watermans Quay by a minimum of 2m
		For Block Y	
		DS3	<p>The primary western building façade is set back at least 25m from the existing harbour edge. Within the minimum average 25m setback:</p> <ul style="list-style-type: none">at ground level, building activation in the form of restaurants, cafes, terraces, open balconies and the like may extend to within 16m of the existing harbour edge (ie within a zone of up to 9m)at podium levels, terraces, open balconies and the like may extend to within 19m of the existing harbour edge (ie within a zone of up to 6 metres)The tower form is permitted to come to ground on the western frontage and may extend to within 20m from the existing harbour edge at ground level and to within 16m of the existing harbour edge above ground level
		DS4	The primary southern building facade is to be setback an average of at least 17m from the proposed Watermans Cove edge. Within the minimum average 17m setback, building activation and articulation in the form of restaurants, cafes, terraces, open balconies and the like may extend to within 12m of the proposed Watermans Cove edge (ie within a zone of up to 5m)

5.1.8 Street walls

Performance criteria		Design solution	
General			
PC	To create cohesive, active and human scaled streetwalls that: a. define and enclose the public domain and create a highly urban character b. mitigate the visual impact of taller building elements on the public domain and increase the level of sunlight and daylight access to the public domain c. contribute to the creation of a vibrant and active public domain d. establish spaces that articulate and define facades	DS1	Street walls incorporate active uses such as commercial, retail or residential uses and are designed to provide casual surveillance opportunities to the public domain through the use of measures such as large, transparent windows, balconies and other openings
		DS2	Street walls are physically permeable and activate the adjoining public domain
		DS3	Podium height is compatible with the streetscape form in the surrounding area, creates a co-ordinated streetscape and appropriately engages and frames the public domain
		For Block 2	
		DS4	The streetwall height on Hickson Road is of a scale that complements development on the eastern side of Hickson Road
		DS5	A colonnade is established along Hickson Road that has a consistent width and height appropriate to encourage its use and is integrated into the proportions of adjoining buildings
		DS6	The Hickson Road building’s southern face considers the character of Hickson Place
		For Block 3	
		DS7	A colonnade is established along Hickson Road that has a width and height that is appropriate to encourage its use and is integrated into the proportions of adjoining buildings
		For Block 4A and 4B	
		DS8	Podium streetwalls define Watermans Quay, Barangaroo Avenue and Hickson Road
		DS9	Building form creates a street wall with a one storey minimum height for most of the public accessible ground floor facade.
		DS10	A colonnade is established along Hickson Road that has a consistent width and height appropriate to encourage its use and is integrated into the proportions of adjoining buildings
		DS11	Watermans Quay retail, commercial and podiums respond appropriately to the termination of Scotch Row

5.1.9 Building Articulation

Performance criteria		Design solution	
General			
PC	To establish an articulated, well-proportioned building mass that: a. responds to its context b. clearly articulates consistent elements of the building c. includes vertical and horizontal breaks d. encourages interesting forms with their own distinct character e. reduce the appearance of the Hickson Road building mass and bulk by articulating its form and clearly delineating top floor elements f. provides activation at the ground floor level of the the Block Y podium to Hickson Park and Sydney Harbour	DS1	Vertical and horizontal articulation is provided to minimise perception of building mass
		DS2	Where along Exchange Place, Shipwright Walk and Mercantile Walk, podium facades are simple and uncluttered in order to contribute to a “civic” quality
		DS3	Where along Transport Exchange Place, City Shipwright Walk and Union Mercantile Walk, vertical tower elements are continued to the ground through facade expression at podium level <i>Note: application of this provision means that continuous awnings are not required along the walks</i>
		DS4	The incorporation of sustainability measures is encouraged
		DS5	Buildings incorporate measures that enhance access to natural light, cross ventilation and solar shading
		DS6	Internal access to natural light is encouraged through design responses such as transparent windows
		DS7	Tower forms optimise access to natural light
		DS8	Devices designed to articulate the building façade are encouraged. Building elements that moderate environmental conditions may extend beyond the building envelope by up to 600mm
		For Block 1	
		DS9	Building mass articulation responds to adjoining buildings, including the C5 podium and R1 as shown in Figure 3 - Development blocks and indicative building forms
		DS10	Building mass is a ‘pavilion’ typology and encourages permeability at the ground floor
		DS11	The building does not have a dominant facade or orientation
		For Blocks 2 and 3	
		DS12	Building envelope and floor plates are articulated and modulated, using a range of architectural components such as prows, corner redents, vertical villages, expressed lift cores, bay windows and other structural

Performance criteria	Design solution
	expression
	For Block 4A and 4B
	DS13 A visually permeable frontage to Hickson Park is provided
	DS14 Towers come to the ground where facing Hickson Park and are dominant through lower levels of the building
	DS15 A complementary relationship is established between the towers in Blocks 4A and 4B
	DS16 In order to mitigate wind impacts on balcony spaces, wintergardens are encouraged. In such circumstances, wintergardens may not be considered GFA
	For Block X
	DS17 The articulation of R1 should have no dominant façade or orientation
	DS18 The articulation of R1 responds to the proportions of its neighbours particularly R7 to its east.
	For Block Y
	DS19 The buildings incorporates elements that articulate and enliven facades
	DS20 In order to mitigate wind impacts on balcony spaces, wintergardens are encouraged. In such circumstances, wintergardens may not be considered GFA

5.1.10 Building Legibility

Performance criteria	Design solution
General	
PC To articulate constituent elements of buildings and in particular ensure elements of the building and structure are legible at the base of the building and that towers have their own unique identity however are also complementary and appear as a cohesive composition	DS1 Separate, structural tower elements are clearly expressed in the facade DS2 Facade elements are expressed through the use of measures such as shading and wind amelioration devices
	For Blocks 2 and 3
	DS3 Visible parts of the tower's primary structure are to extend to the ground plane and be expressed as a separate element from the podium
	For Block 4A and 4B

Performance criteria	Design solution
	DS4 Building form relates to the public realm at lower levels <i>Note: this may be achieved through tower and podium form or similar configuration</i>
	DS5 The separate primary components of the building are expressed and include additional elements such as balconies or winter gardens
	DS6 Visual permeability is provided to the tower lobbies at the ground floor from Hickson Park
	DS7 Consider a common architectural expression for towers in Block 4A and 4B
	For Block X
	DS8 Building form includes a cohesive modulation of elements such as open and enclosed balconies
	DS9 The separate primary components of the building are expressed and include additional elements such as the open and enclosed balconies
	For Block Y
	DS10 Building composition clearly defines a base, a middle and a top with well-balanced vertical and horizontal proportions
	DS11 The tower form may extend through to connect with the ground plane on the western frontage
	DS12 Building entries are clear and able to be readily distinguished
	DS13 Building function may be expressed in massing and articulation

5.1.11 Ground Floor Permeability and Accessibility of Public Realm

Performance criteria	Design solution
General	
PC To provide permeability and accessibility through Barangaroo South	DS1 Ground floor permeability is in accordance with Figure 5 – <i>Street network</i> and Figure 6 – <i>Pedestrian and cyclist network</i>
	DS2 Public access around the block is to be maintained on all edges
	DS3 Building entries are clearly articulated and visible from the public domain

Performance criteria	Design solution
	DS4 Scotch Row is not less than 50% open to the sky
	DS5 Safety of the public realm is maximised through lighting, minimisation of concealed areas, active frontages and other design measures
	DS6 For security purposes, through site links may be closed at certain times
	DS7 Public accessibility is maintained through and on the east, west and southern edges of Hickson Place
	For Blocks 4A and 4B
	DS8 Ground floor retail and residential lobbies engage with Hickson Park, including providing opportunities for informal casual surveillance and active edges
	DS9 Lobby entry canopies are located to address streets and parks
	DS10 Consider lobby street presence on Barangaroo Avenue, Watermans Quay and Hickson Road.
	For Block Y
	DS11 The ground place encourages openness and accessibility of buildings
	DS12 Building entries establish a public sense of arrival and engagement
	DS13 Secondary links open to public access providing additional routes between Barangaroo Avenue, Globe Harbour and the Waterfront

5.1.12 Ensuring Quality of Rooftops

Performance criteria	Design solution
General	
PC To ensure rooftops are designed to provide:	DS1 Roof forms incorporate architectural elements
a. an articulated built volume	DS2 Architectural treatment is provided to lift shafts and overrun control rooms
b. legibility	DS3 Exposed mechanical equipment is avoided
c. architectural quality	DS4 Good quality materials that are durable, hardwearing and sustainable are to be used
d. where appropriate, opportunities for private open space or public enjoyment and appreciation of the city	DS5 Where appropriate, roof design is to integrate
e. sustainability features where	

Performance criteria	Design solution
appropriate	<p>sustainability features</p> <p>DS6 The architectural treatment of the roof and its form is to be designed and coordinated to be coherent with its adjacent context</p> <p>For Block 1</p> <p>DS7 Public access and activation of the roof responds to views of the harbour to the west</p> <p>DS8 Variation in roof articulation between separate towers in development block 4A is encouraged</p> <p>For Block X</p> <p>DS9 Roofs incorporate a maximum of 60% accessible terraces</p> <p>For Block Y</p> <p>DS10 Public access to roofs and terraces for entertainment, recreation or viewing activities is encouraged where appropriate</p>

5.1.13 Articulated Facades

Performance criteria	Design solution
General	
<p>PC To ensure that building façades are articulated, designed and detailed to:</p> <ol style="list-style-type: none"> define building functions and massing ensure the architectural quality of facades To contribute to the carbon neutral aims for Barangaroo South flexible, durable and able to achieve longevity activate Hickson Place as a space for civic gathering and social interaction that accommodates significant movement corridors at its edges 	<p>DS1 Building functions and massing are articulated with appropriate cladding design and detailing</p> <p>DS2 High quality materials such as steel, glass, concrete, timber and aluminium are used as primary façade materials.</p> <p>DS3 Facades are expressed to be compatible with those its neighbouring buildings</p> <p>DS4 External shading devices are applied to provide light and shade and visual interest and may extend beyond the building envelope by a maximum of 600mm</p> <p>DS5 Relief and protrusions provide depth and layering of facades</p> <p>DS6 Mirrored and heavily tinted facades are to be avoided</p> <p>DS7 Depth and layering of facades is achieved through relief and protrusions</p> <p>DS8 Environmentally sustainable design on facades is encouraged</p>

Performance criteria	Design solution
	DS9 Facades longer than 60m are modulated above podium level by a distinctive and significant architectural elements
	For Block 2
	DS10 Façade design and materials along Hickson Road are cohesive
	DS11 A digital facade may be integrated in the southern facade of C2/C6 building to activate Hickson Place for civic gathering and interaction

5.1.14 Active Frontages

Performance criteria	Design solution
General	
PC To provide active frontages to create a vibrant and active public domain and promote the establishment and success of key streets	DS1 Active frontages are generally in accordance with Figure 7 – Active frontages <i>Note: active frontages can include stairs, entrances and lobbies, however exclude parking entrances and fire escape doors</i>
	DS2 Active frontages include active retail uses such as shops, restaurants or cafes and other uses where internal activity can be viewed from the public domain and that engage with the public domain
	DS3 Active frontages maximise engagement with the public domain through orienting activity to the street and incorporating measures such as large, transparent windows, indoor / outdoor seating areas, large entries, attractive display areas and high quality finishes
	DS4 The location and design of building service areas, parking areas & loading docks minimises adverse impacts on the streetscape, including safe and direct pedestrian movement and visual appearance
	DS5 Driveways do not visually dominate the street. Where possible (within engineering constraints) driveway width is to be minimised
	DS6 Carparking entrances are set back from the street alignment
	DS7 Loading docks are not located on Hickson Road or Barangaroo Avenue
	DS8 Hickson Place is activated with retail uses, including a small scale retail pavilion

Performance criteria	Design solution
	For Block Y
	DS9 Building service areas and loading docks are located in the basements and no loading or deliveries are provided at ground level

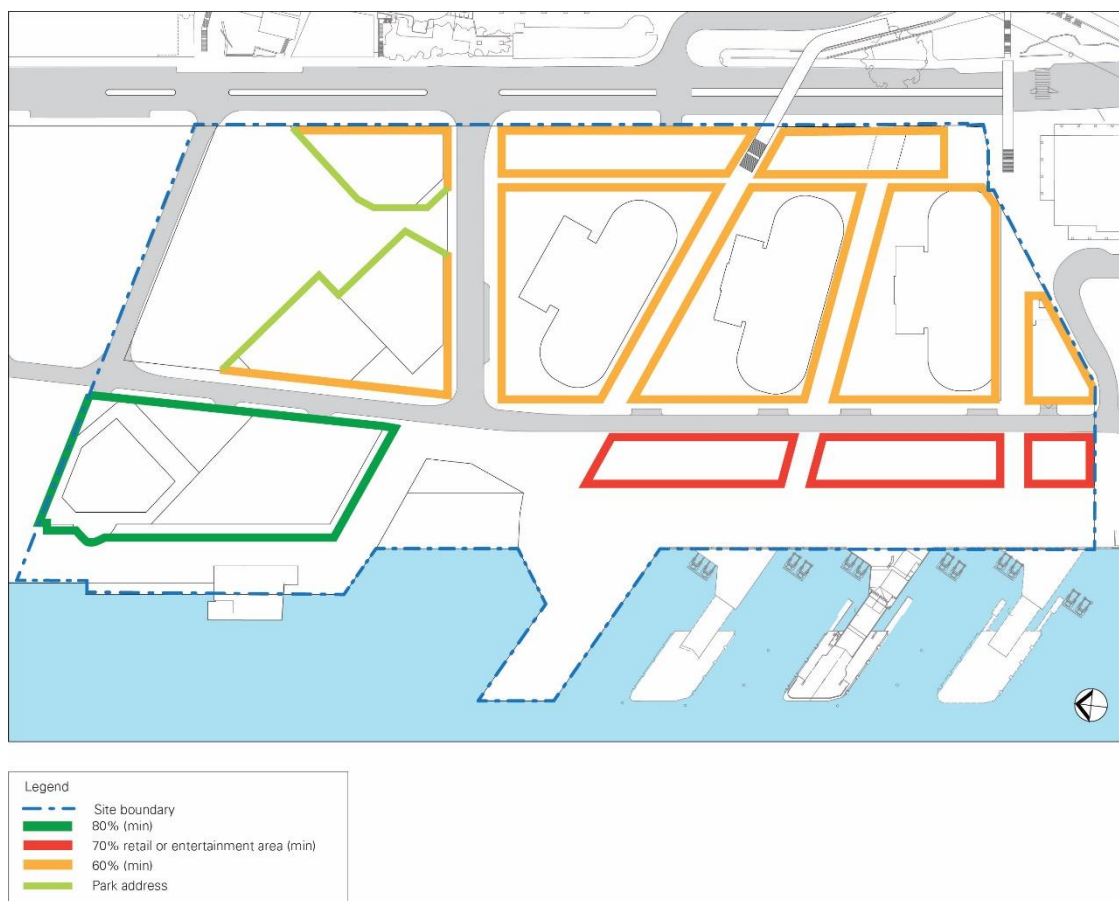


Figure 8: Active frontages

5.1.15 Ground Plane and Pedestrian Comfort

Performance criteria	Design solution
General	
PC Awnings do not detract from the "civic" quality of the 'walks'	DS1 Awnings are not required (although not excluded) in Shipwright Walk, Mercantile Walk or Exchange Place and do not detract from the legibility of vertical tower elements coming to the ground through the podium
For Block Y only	
PC Buildings are located in a co-ordinated way that respond well to each other at the ground plane	DS2 Buildings are sited generally in accordance with Figure 2 – Urban structure
PC To ensure buildings increase the comfort of	DS3 Buildings incorporate devices that provide shelter from direct sunlight and rain for

Performance criteria		Design solution	
	the public domain by: a. maximising sunlight to external public spaces b. where appropriate, providing shelter from direct sunlight and rain		pedestrians at the ground level <i>Note: where used, canopies and their support structures may protrude beyond the block boundary</i>
PC	To emphasise accessibility of the public realm in and around the buildings	DS4	Functions at the lower levels of the building are to be open and inviting to the general public
PC	To maintain a strong visual connection to Sydney Harbour	DS5	Canopies and awnings do not dominate or unreasonably impact views or vistas towards the Sydney Harbour or past the building along public footpaths or Wulugul Walk

5.1.16 Signage

Performance criteria		Design solution	
Signage			
PC	To ensure that the location, size, appearance and quality of building signage is appropriate and is integrated into the overall design of the building	DS1	Each building application is to include details of appropriate primary signage zones for building identification or tenant branding
		DS2	Retail and other tenant signage outside of primary signage zones is to be addressed by a signage strategy / approval
		DS3	The size and location of signage is to be proportional and located appropriately to the architecture of the building
		DS4	Signage is appropriate at podium and tower levels (and mid-rise in respect of the hotel building)
		DS5	Signage to be considered as part of the overall design of the building
		DS6	Signage is to contribute to a diverse streetscape

Navigation Report Addendum

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Date: 2 September 2015

**Subject: BARANGAROO CONCEPT PLAN (MP06_0162 MOD8),
RESPONSE TO SUBMISSIONS ON NAVIGATION MATTERS**

1 INTRODUCTION

On 14 September 2014, Royal HaskoningDHV completed, on behalf of Lend Lease (Millers Point) Pty Limited, a Navigation Impact Assessment for the Barangaroo Concept Plan Amendment (MP06_0162 MOD8), referred to hereafter as Modification 8 or Mod 8. At the time of completion of the Navigation Impact Assessment for Mod 8, the concept for the Barangaroo Ferry Hub was only indicative and navigation matters associated with the Ferry Hub were not considered.

NSW Planning & Environment has now reviewed public and agency submissions received in respect of Mod 8 and has requested that Lend Lease (Millers Point) Pty Limited respond to a number of issues which include, among other things, the following issue in respect of the Public Pier:

“the impact of the Public Pier on safety and navigation of the Barangaroo Ferry Hub is to be fully assessed by a suitably qualified expert”

Lend Lease (Millers Point) Pty Limited engaged Royal HaskoningDHV to prepare a response to this issue, as set out herein. The authors of the response are Peter Horton and Greg Britton, who were responsible for the 19 September 2014 Navigation Impact Assessment.

2 DESCRIPTION OF BARANGAROO FERRY HUB

The Barangaroo Ferry Hub is proposed by Transport for NSW and is located immediately south of the Public Pier. It will serve Sydney's newest commercial district and provide increased capacity for ferry services to meet future demand.

The general arrangement of the Ferry Hub and its relationship to the Public Pier is shown on Lend Lease Drawing B10_AMP_08_0092, a copy of which is attached. Key features of the Ferry Hub are as follows:

- three new floating ferry wharves with a landing and ramp to connect the floating pontoon to the land;
- two berthing faces for ferries on each pontoon;
- new facilities for customer safety and comfort at each wharf, including seating, lighting, passenger information display and weather protection;

- integrated electronic ticketing system for public transport in Sydney using the Opal card; and
- public amenities such as bins, ticket vending machines, wayfinding and signage.

Initially two wharves would be constructed, the northern and the central wharf. The third, southern, wharf would be built in the future when the demand for ferry services necessitates this.

The design development of the Barangaroo Ferry Hub has been undertaken in liaison with Lend Lease (Millers Point) Pty Limited having regard to the adjacent proposed Public Pier. In particular the following design outcomes have been achieved, all important considerations for navigation and safety:

- the alignment of the southern side of the Public Pier has been arranged to be parallel to the orientation adopted for the wharves;
- the navigation clearance between the northern berthing face of the northernmost wharf and the Public Pier exceeds the navigation clearance adopted between the berthing face of the wharves and the fender piles defining the individual berthing boxes for the ferry hub;
- the Public Pier does not project any further into Darling Harbour than the ferry wharves (a distance of approximately 65m).

3 DESCRIPTION OF THE PUBLIC PIER

The Public Pier is located immediately north of the Ferry Hub. As noted above, the alignment of the Pier is parallel to the orientation of the ferry wharves, the clearance to the Pier from the northernmost ferry wharf is in excess of ferry manoeuvring requirements, and the Pier does not project into Darling Harbour further than the ferry wharves (that is, the Pier does not extend into the navigation channel within Darling Harbour).

The proposed Pier may accommodate a Community Building of up to three storeys in height set back from the edges of the Pier. A boardwalk of variable surface level will extend around the perimeter of the Pier. The public pier does not include any berthing facilities for vessels on the southern and western sides, and may have a variety of level changes to add to the interest and engagement qualities of the structure. The design of the pier and potential building has not yet been formalised, and will be the subject of a later and specific public domain development application.

4 NAVIGATION ASSESSMENT

4.1 Barangaroo Ferry Hub Environmental Impact Statement

In the Barangaroo Ferry Hub Environmental Impact Statement (EIS), navigation and safety issues associated with a potential ferry hub at Barangaroo were considered. These considerations were in the full knowledge of the proposed Public Pier. Significantly, the EIS did not refer to any navigation or safety issues as a consequence of the proposed Pier. This is considered reasonable on the basis of the orientation, clearance and maximum projection of the Pier, and absence of any proposed berthing facilities at the Pier, as noted in Section 3.

4.2 Potential Issues During Construction

It is possible that the Public Pier would be constructed after the Barangaroo Ferry Hub is constructed and operational. As such, there is potential for the construction of the Public Pier to impact on operations of the Ferry Hub.

In order to manage the potential for construction impacts, as a mitigation measure a Construction Vessel Traffic Management Plan should be prepared before the commencement of construction work on the Public Pier in consultation with the Port Authority of NSW, Roads and Maritime Services, and Transport for NSW.

The construction methodology for the Public Pier should minimise or avoid encroachment of construction barges into the adjacent navigation channel and the ferry manoeuvring area north of the northernmost ferry wharf. This can be achieved by delineating the work area with navigation marker buoys and sequencing the pile driving so the construction barges and anchoring systems are 'inbound' of the buoys.

4.3 Potential Issues During Operation

In the Barangaroo Ferry Hub EIS, it was recommended that there was preparation and implementation of a Vessel Traffic Management Plan prior to commencement of operations at the Barangaroo Ferry Hub, supported by a risk assessment. This Plan and risk assessment was in the context of possible congestion of vessels and adverse impact on waiting times. The Public Pier was not referred to in this discussion and would not be expected to impact on congestion as it is located outside the navigation channel and does not introduce any additional vessels to the area.

The clearance provided between the northern face of the northernmost ferry wharf and the Public Pier is greater than the width of the berth boxes provided within the Ferry Hub. Accordingly, the Public Pier would not be expected to impact on navigation and safety. However, as an added precaution, it is recommended that fender piles be installed adjacent to the southern side of the Public Pier to delineate a berth box for the northernmost ferry berth. This would guard against any accidental vessel collision with the southern side of the Public Pier which includes a public boardwalk along its edge.

5 SALUTATION

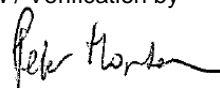
We trust the above meets your requirements. Please contact Greg Britton or Peter Horton should you require any clarification or additional information.

Yours faithfully
HASKONING AUSTRALIA



Greg Britton
Managing Director

Review / Verification by _____ Date



.....2/9/15
Peter Horton, Principal Coastal Engineer

Refer to Drawing B10_AMP_08_0092 attached

Sky View Loss Response

UNSW Global



COMMERCIAL-IN-CONFIDENCE

Report prepared on behalf of Expert Opinion Services
A business of UNSW Global Pty Limited

BARANGAROO SOUTH PROJECT

**Sydney Observatory Sky View Loss
Assessment - Detailed Response to the Issues
Raised in Sydney Observatory's Submission to
NSW Planning and Environment**

for

Lend Lease Group
Your reference:

by

Mr George Georgevits (B.E. Hons)
Consulting Engineer

Date of Issue: 11 August 2015
Our Reference: J085821

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1. TERMS OF REFERENCE

1.1 QUALIFICATIONS

- 1 This report was prepared by George Georgevits, managing director and principal consulting engineer for Power and Digital Instruments Pty Ltd (PDI).
- 2 I have an honours degree in electrical engineering and 40 years experience as an engineer, specialising in the fields of communications, electronics and power.
- 3 In addition, I am presently undertaking a PhD in Astrophysics at the University of New South Wales.
- 4 My PhD work has entailed the use of the 1.3 metre UK Schmidt Telescope and the 0.5 metre Automated Patrol Telescope, both located at Siding Spring Observatory, Coonabarabran NSW.
- 5 I have conducted presentations of my work at a number of overseas and Australian conferences on Astrophysics.
- 6 An article referencing my work has appeared in Science magazine (see Appendix 2), and it has been cited in a paper appearing in Nature.
- 7 I have co-authored a Chapter in a textbook on the outer solar system.
- 8 I have owned and operated a number of small astronomical telescopes over the years.
- 9 I am thus very familiar with observational astronomy and also the astronomical objects that are the subject of this matter.
- 10 A brief CV for George Georgevits is provided in Appendix 3 and a brief capability statement for PDI is provided in Appendix 4.

1.2 TERMS OF ENGAGEMENT

- 11 I have been engaged by Lend Lease to provide astronomical advice in relation to this matter.
- 12 I have prepared two reports dated 23 September 2014 (the first report) and 21 May 2015 (the second report) addressing the loss of sky view from Sydney Observatory North Dome due to the construction of residential Towers R4a (SSD 6964), R4b (SSD 6965) and the Crown Hotel.
- 13 The first report specifically addressed the viewing concerns raised by Sydney Observatory at a meeting with Lend Lease in December 2013, in terms of specified sky targets and viewing corridors.
- 14 The second report addresses additional viewing concerns raised by Sydney Observatory in recent correspondence wherein the azimuth of their required viewing corridor has been increased so that it now includes additional sky target(s) potentially obscured by the Crown Hotel building (**the Hotel**).
- 15 On 7 May 2015, the Museum of Applied Arts and Sciences (**MAAS**) made a submission (**the MAAS submission**) to NSW Department of Planning and Environment (**the Department**) in the form of a formal response to the development application submitted to the Department by Lend Lease for the Barangaroo South Mod 8 Concept Plan (MP06_0162MOD8).
- 16 The MAAS submission consisted of a covering letter that addresses the following:
- the relevant background information concerning the history and significance of the Observatory,
 - a summary of their position concerning the impact that the Barangaroo project will have on sky view from Sydney Observatory and on their observing operations ,
 - a detailed report that has been prepared as a response to my first report.

- 17 I have been instructed to provide a detailed response to the issues raised in the MAAS submission.

2. SITE VISIT AND GENERAL COMMENTS ON OBSERVING CONDITIONS AT OBSERVATORY HILL

- 18 I personally visited the observatory during daytime on 19 May 2015 in order to get a first hand appreciation of the issues raised in the MAAS submission and earlier correspondence from the observatory, and to see if there were any other relevant factors that had not previously been explored.



Fig 2.1 – View of the site looking North

- 19 I did not attend a night time observing session.
- 20 I was advised by the observatory receptionist that their observing sessions run for approximately 90 minutes, typically have 20 attendees and that it was necessary to book ahead because the sessions were well attended and heavily booked.
- 21 I was further advised that due to the number of attendees and the limited duration of each session, typically no more than 5 sky targets are viewed during any one observing session.

- 22 The observatory has a number of telescopes at its disposal for observing, ranging in size from the 16" Meade mounted in the North Dome down to 8" and smaller, portable instruments suitable for setting up in the courtyard.



Fig 2.2 – View of South and North Domes, and courtyard, looking North

- 23 The view from the courtyard is much more restricted at low altitudes than that from the North Dome, due to its lower elevation and the presence of trees (see Fig 2.2).
- 24 Thus the issues raised in the MAAS submission are applicable primarily to the sky view as seen from the North Dome.
- 25 From my inspection of the site and environs, I also noted that there were a number of tall city buildings much closer to the site than the Barangaroo development (see Figs 2.3 to 2.8 below).



Fig 2.3 – Other close-by tall buildings, with the Barangaroo site and associated crane visible immediately to the right of the cream coloured residential tower. The grey tower on the left also appears to be residential.



Fig 2.4 – High rise buildings in the background looking approximately South from the observatory courtyard. The grey tower in Fig 2.3 is also just visible on the far right.



Fig 2.5 – Closeup photo of the Highgate building taken from just outside the observatory North Dome, with the Barangaroo development immediately behind on the right.

- 26 There are a number of other high-rise commercial buildings in close proximity to the observatory that would present bright light sources at night.

- 27 These would contribute to the unwanted light pollution and background sky brightness.



Fig 2.6 – Looking South from near the North Dome



Fig 2.7 – Other high-rise light sources looking South East from the courtyard)



Fig 2.8 – Other high-rise light sources looking South East from outside the observatory grounds

- 28 These high-rise buildings are all older than the Barangaroo development and presumably have no measures in place to control night time light output.
- 29 In addition, there is the Sydney Harbour Bridge and other brightly lit nearby Sydney icons, such as the Opera House and the Sydney passenger terminal, all very bright night time light sources.



Fig 2.9 – Sydney Harbour Bridge viewed from Observatory Hill

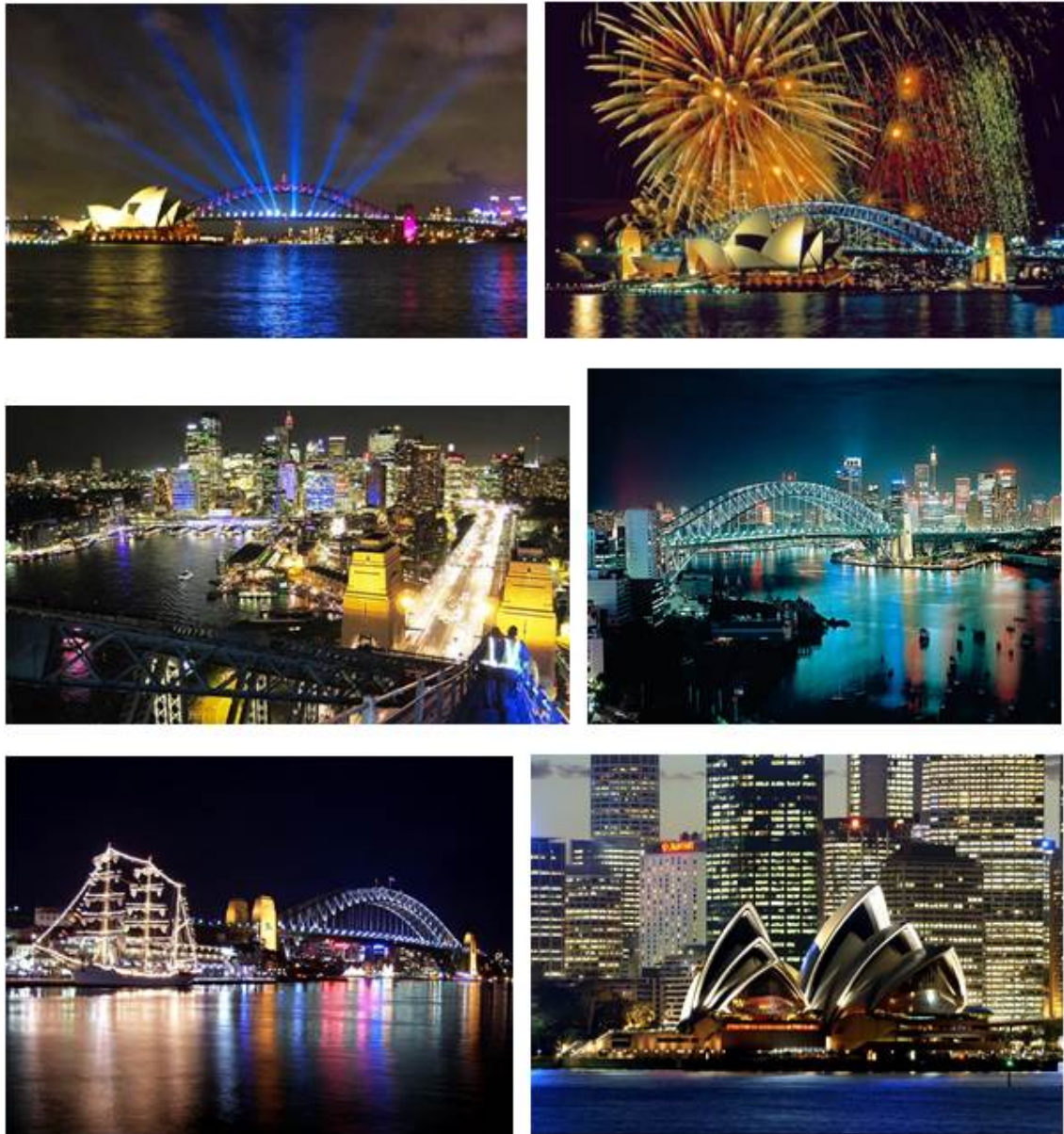


Fig 2.10 – Sydney Harbour Bridge and other nearby brightly lit Sydney icons.

The centre right photo, taken from the lower North Shore, west of the Bridge, clearly shows the sky glow above the Sydney CBD due to the large number of bright light sources.

- 30 In addition, special events on and around Sydney Harbour often involve very bright lighting and also particulate pollution when fireworks are involved.
- 31 The Earth's atmosphere scatters light, so that when viewing a sky object, the brightness of the background sky near the target object is a function of, amongst other things, the amount of upward directed light near the observer and the air mass through which the object is observed.

- 32 Thus the background sky is brighter at lower observation altitudes because of the greater air mass in the viewing path.
- 33 There are so many existing bright light sources near the observatory that, in my opinion, observing conditions are poor, even on the best nights, due to the brightness of the background sky.
- 34 The additional light emanating from the Barangaroo development buildings, when completed, may further degrade the situation, though in my opinion the impact on observing will be marginal to no impact at all.
- 35 As upward directed light control measures will be incorporated in the design of these buildings, the impact on observing is expected to be much less than that of the other, closer existing buildings, where light control measures are unlikely to have been implemented.
- 36 I have no way of confirming whether light control measures have been implemented in the other nearby buildings. However, the residential apartments will be fitted with a variety of internal lighting arrangements, depending in the personal choices of the occupants, and will contain other bright light sources (e.g. large plasma screens). These cannot be controlled and may emit significant light in the direction of the observatory during observing sessions.
- 37 For the reason given in 32 above, the adverse effect of these bright light sources can be minimised by observing sky objects at high altitudes.

3. THE MAAS SUBMISSION COVERING LETTER

SUMMARY IMPACT

- 38 Sydney Observatory is only open for observing at specific times on specific nights of the year (refer Appendix 1).
- 39 The site currently operates as an astronomical museum with a public outreach program.
- 40 Its long tradition of significant astronomical activity is noted, but is not considered relevant to the issue at hand - I was advised by the receptionist that scientific observing from the site ceased sometime in the 1980's.
- 41 The report prepared by UNSW Global does not describe the additional impacts generated by Mod 8 on the Observatory as "negligible".
- 42 I disagree that there are inaccuracies in the report I prepared through UNSW Global.
- 43 I agree that the Mod 8 concept plan buildings will have some effect on the time during which the stated four objects are visible from the North Dome of the Observatory during August and September of each year.
- 44 I also note that the Celestron telescope that is mounted in the North Dome and used by the observatory for these observing sessions cannot be used to view the Southern Cross in its entirety, because the field of view of this telescope is too small to fit the whole of the Southern Cross.
- 45 Rather than address the percentages of lost viewing opportunity as presented in the MAAS Submission covering letter, I have addressed all of the issues in detail by providing a point by point response to the Sydney Observatory review report.

- 46 As to whether the obstruction caused by the Mod 8 design will impact the Observatory's capacity to generate visitation and related revenue, in my opinion, this is unlikely because:
- During August and September of each year (the only months where the specified sky targets are affected), there are plenty of other sky target objects that are far better placed in the sky for viewing than the four objects in question, and some of these could be selected for viewing,
 - Only five objects are viewed during each observing session,
 - The vast majority of visitors are not going to know beforehand which objects are suitably placed in the sky for viewing, and the four objects in question are not visible for part of the year anyway, because they are either too close to or set below the horizon,
 - Thus prospective visitors are unlikely to not visit the observatory on the basis that, for example, the Southern Cross is not visible on any particular night,
 - There are literally hundreds of other interesting objects in the sky suitable for viewing with a moderate size telescope, and the observatory could, and in order to provide the best possible viewing experience, should choose objects that are much better placed in the sky for viewing.
- 47 I note that the final paragraph of the covering letter states that the Observatory conducts three guided astronomy sessions each night.
- 48 This appears to conflict with the information contained in the attached report from Sydney Observatory and with their advertised observing schedule which states that during the period in question (August to September of each year), two observing sessions are conducted (refer Appendix 1).
- 49 In my first and second reports, I have prepared the lost viewing time analysis on the basis that the observatory conducts two observing sessions per night.

4. THE MAAS SUBMISSION REPORT

4.1 IMPACT OF THE CONCEPT PLAN ON SYDNEY OBSERVATORY OPERATIONS

50 In my responses below, I have provided the relevant excerpts from the
Sydney Observatory report that accompanied the MAAS submission, followed
by my comments.

Building H1 limits viewing of the globular cluster Omega Centauri.

51 I agree that Building H1 reduces the viewing opportunities for Omega Centauri
during the month of August and for the beginning of September each year.

52 However, this sky object is relatively faint (visual magnitude ~3.6), and
observing it at low altitude under bright sky conditions such as those found at
Sydney Observatory (with or without the Barangaroo development) would
produce very poor results.

53 In my view, during the month of August, when ω Centauri is low in the sky, a
far better approach would be to observe another similar globular cluster that is
at a much higher altitude at that time of year (e.g. 47 Tucanae – see Fig 4.1
below).



Fig 4.1 – Photos of 47 Tucanae (left) and ω Centauri (right)

Buildings R4A and R4B limit viewing of the constellation Southern Cross, the star Alpha Centauri (and its companion Pointer star Beta Centauri) and star cluster the Jewel Box.

54 As detailed in my first report, the viewing opportunities for these four sky targets are reduced by buildings R4A and R4B during the months of August and September each year.

55 However, similar comments apply to these objects, in so far as:

1. as they are best observed when they are at higher altitudes in the sky,
2. typically only five objects are viewed during each observing session,
3. there are literally hundreds of other interesting sky target objects to choose from.

Building H1 limits viewing of Omega Centauri during both the first and second evening viewing sessions. In the first session it causes a loss of viewing on 28 days, or 15% of the presently available viewing days. It causes a loss of viewing for 20 hours and 46 minutes, or 8% of the presently available viewing time. In the second viewing session it causes a loss of viewing on 41 days, or 21% of the presently available viewing days. It causes a loss of viewing for 27 hours and 23 minutes, or 11% of the presently available viewing time.

56 I have provided a table of progressive dates and times where the Crown Hotel obstruction causes loss of viewing opportunity for sky target ω Centauri from Sydney Observatory in Fig 6.6 of my second report.

57 I consider further comparisons such as the percentage of viewing days and hours lost somewhat meaningless and disingenuous because factors such as weather, bright of Moon, major Sydney events involving light shows etc. also have a major impact on viewing opportunities, and how viewing opportunities are defined also affects these statistics (see section 4.2, paragraph 84 below for details).

58 Most importantly, ω Centauri is a relatively faint sky object, and viewing it at low elevation under bright sky conditions will yield a very poor image.

- 59 I reiterate that ω Centauri is not a good choice of sky target under these conditions, and that other similar globular clusters that are at higher altitude at this time (such as 47 Tucanae) would provide a far better viewing experience.

Buildings R4A and R4B limit viewing of the star Alpha Centauri during the second viewing session only. They cause a loss of viewing on 57 days, or 25% of the presently available viewing days. They cause a loss of viewing for 45 hours and 11 minutes, or 15% of the presently available viewing time.

Buildings R4A and R4B limit viewing of the Southern Cross during both the first and second sessions. In the first session they cause a loss of viewing on 32 days, or 18% of the presently available viewing days.

They cause a loss of viewing for 24 hours and 38 minutes, or 9% of the presently available viewing time. In the second session they cause a loss of viewing on 41 days, or 21% of the presently available viewing days. They cause a loss of viewing for 27 hours and 7 minutes, or 10% of the presently available viewing time.

Buildings R4A and R4B limit viewing of the Jewel Box during both the first and second sessions. In the first session they cause a loss of viewing on 22 days, or 12% of the presently available viewing days. They cause a loss of viewing for 15 hours and 55 minutes, or 6% of the presently available viewing time. In the second session they cause a loss of viewing on 46 days, or 22% of the presently available viewing days. They cause a loss of viewing for 29 hours and 8 minutes, or 11% of the presently available viewing time.

- 60 In Fig 4. of my first report I have provided a table showing the times during which obstructions of these specific sky targets caused by buildings R4A and R4B takes place.

- 61 For the reasons given in paragraph 57 above, I do not consider further calculations of viewing loss times or percentages warranted or productive.

- 62 These selected target objects are at very low altitudes at this time and in my opinion, other sky targets at higher altitudes, where the background sky is darker, would provide a far better viewing experience (keeping in mind that each session is typically limited to only five sky objects).

The whole Barangaroo South precinct, but particularly buildings R4A, R4B and H1, will spill light to the sky reducing the contrast between the background sky and objects viewed from Sydney Observatory making objects more difficult to view.

63 I agree that these buildings will spill some light to the sky, but I reiterate that:

- The other closer high rise buildings where light control measures are unlikely to have been implemented will have a much greater adverse effect, and
- It is not good practice to observe sky objects (particularly faint objects) at low altitude under bright background sky conditions due to the adverse effects of observing through the larger air mass (higher background sky brightness and more air turbulence).

Conclusion

- The Mod 8 concept plan buildings have significant impact on viewing of the Southern Cross, Alpha-Centauri, the Jewel Box, Omega Centauri and other objects both by way of increased light spill and by blocking the view at certain times of the year.

64 I agree that the Mod 8 concept plan may have an impact; the issue of whether it significantly affects the observatory's operations is subjective, and in terms of light spill, it may marginally degrade what is already a very poor observing site.

65 In terms of obstruction, it will impact on the viewing of the listed sky targets for about two months of each year, but the listed targets will be very low in the sky, and there are many other sky targets of interest far better placed for viewing at that time and would provide a much better observing experience.

66 Apart from the Moon and planets, the following are some suggested alternate interesting sky targets that are better placed in the sky for viewing at that time of year (August-September):

- Constellation of Scorpius,
- Antares (giant red star),
- Butterfly cluster (beautiful open cluster of blue stars),

- Small Sagittarius star cloud (a gap in the dust lanes of the Milky Way that permits viewing of millions of distant stars that reside in a distant arm of our galaxy),
 - Ptolemy's Cluster (a bright open cluster of blue stars),
 - Yed Prior and Yed Posterior (well separated double star),
 - Lagoon Nebula (an emission nebula – a giant star forming region of glowing gas, rather faint but should be OK to view in the Observatory's larger telescopes).
-
- From 12 to 25% of available viewing days and from 6 to 15% of the available viewing time of these iconic objects will be lost if the Mod 8 buildings are constructed.

67 I have not calculated the percentages of lost viewing time as this is somewhat subjective, for the reasons provided in paragraph 57 above.

4.2 RESPONSE TO THE UNSW GLOBAL IMPACT ASSESSMENT

Sydney Observatory was not consulted in the course of the completion of the Report prepared by Mr George Geogevits on behalf of Expert Opinion Services, a business unit of UNSW Global.

68 This is true. However, my instructions stated that Sydney Observatory was consulted prior to the engagement of UNSW Global.

69 This is evidenced by the material contained in the appendix of the first report. Consultations defined the viewing corridors investigated (and which now have been augmented by the observatory).

The Report prepared by UNSW Global states the impacts and functioning of Sydney Observatory due to the Mod 8 Concept Plan 'are negligible'.

70 I disagree – nowhere in my report does it state that the impacts are “negligible”.

The detailed assessment indicates:

- Building H1 is excluded from the report. The Crown casino and residential tower is included in the Concept Plan and will impact night sky viewing and will cause light spill.

71 I agree. Building H1 was not part of my brief for the preparation of the first report, as it was not listed by the observatory in their identification of key targets for analysis.

72 I also agree that the Crown Hotel and residential towers as described in the Concept Plan will impact night sky viewing and may cause some light spill.

- The Report is based on information 'determined in consultation with Sydney Observatory' in mid-2013. The data was provided prior to the announcement of the scale of the Barangaroo South Development.

The Report (section 2.1) has misquoted and included erroneous information and interpretation of the viewing corridors provided by Sydney Observatory in November 2013.

The data provided relates to the altitudes and azimuths required to view the Southern Cross, Jewel Box, Alpha Centauri and Omega Centauri.

The view corridors included in the View Impact Assessment were not determined in consultation with Sydney Observatory and represent the principal difference in impact assessment that informs the comments provided in this submission.

73 I am not in a position to comment on this. I prepared the first report on the basis of the brief that was provided to me by Lend Lease.

- Sydney Observatory is in agreement with most of the statements in Section 3.2 and 3.3, excepting those relating to the building H1. The Report uses a mistaken definition of the view corridor, quoted as 210 to 225 degrees (section 3.2). This should be 210 to 235 degrees. The impact of the difference in the Azimuth Range is as follows:
 - (Section 3.3) claims the impact of the 275 metre Crown Casino and Residential Tower (H1) will not obstruct any of the Sydney Observatory view corridors. The H1 Tower will affect viewing of Omega Centauri.
 - The tables and impact times (Section 4.2) for the 250 metre residential tower (R4A) and the 210 metre residential tower (R4B) contain errors. These include viewing times when an object is behind the buildings.

74 The viewing times were calculated using building obstruction data provided as part of the brief.

- The data based on the impact of cloud cover is based on Bureau of Meteorology records made at 9.00am and 3.00pm. These indicate that 50 percent of **days** are affected. Sydney Observatory records the impact of cloud cover on **night** viewing. These records indicate successful night viewing occurs on 70 percent of nights in the months August to October.

75 I only had access to Bureau of Meteorology weather data when preparing my first and second reports, and in my view, it is best practice to use this source to obtain meteorological data in Australia.

76 Successful observing may be possible on 70 percent of nights because it is always possible to view some parts of the sky when partial cloud cover is present.

77 However, it may not be possible to view the target objects in question, depending on the position of individual clouds, so I very much doubt that it is possible to view the four sky targets in question on 70% of nights during August to October, particularly as they are at low altitude and hence have a higher probability of being obstructed by cloud (because we are looking through more air mass at low altitude).

- The Report (section 4.2) claims that the impact of the developments on night viewing can be reduced by changes to the structure and conduct of the night viewing program. This is not an option, for a number of operational reasons. The Building Code of Australia, not the facility, requires group size of maximum 22 people in the existing telescope domes.

The Report claims the viewing schedule can be adjusted to enable the affected targets to be viewed first. This cannot be achieved across multiple groups in the April-September period. To maximise viewing in this period, the program is structured to provide 3 or 4 groups of 20 within a 90 minute period in each session, based on two sessions per night.

78 I am not privy to the observatory's "operation reasons", so I cannot comment on this issue, other than to say that I find it hard to believe that their viewing schedules have no flexibility whatsoever, given that they typically observe only five sky targets during each observing session.

- Smog and Particulate Pollution (section 4.4) as well as scintillation do not impact a public observatory to the same extent as a research observatory. NSW Office of Environment and Heritage Air Quality data indicates a rolling fluctuation in Sydney, which is not increasing.

79 I agree that these factors may not be as important for a public observatory as for a research facility.

80 Nevertheless, the observatory is arguing against a slight degradation in what are already very poor observing conditions, and this issue could be circumvented altogether if the observatory chose other, more suitable, target objects that are at a high altitude at that time of year.

81 This would provide much better image quality and a better user viewing experience, given the significant limitations of the observatory site.

- The Report (section 1.3) refers to concerns expressed by Sydney Observatory about the impact of light spill, in a letter dated June 2011. These comments were in response to Modification 4 of MP06_0162, not the Modification currently on exhibition.

The comments were made when the concept for Barangaroo South included a 170m high casino, hotel and residential tower. The residential hotel/casino is now proposed at 275 metres in height. The emphasis in this letter was on Barangaroo Central, transport, the Headland Park and cultural linkages.

- The lighting impact analysis (Section 5.0) should take into account the 2011 letter and eliminate up-lighting, not use blue lighting and recommend sensor lighting. It does not reference the impact of light spill from the eastern facades of the three residential towers, will likely feature extensive use of glass, to maximise views to the city and Sydney Harbour.

82 I cannot comment on these issues as they are outside the scope of my brief.

- Sydney Observatory is in agreement with the Report (Section 3.1) that Barangaroo Central does not impact the Sun, Moon, Planets, Ring Nebula and Star Albireo.

83 No further comment.

- The Report (Section 6.0) concludes the development will affect '53 viewing nights out of 326 annual viewing nights'. This represents 20% of the night viewing program. The Observatory agrees with this in terms of direct blockage but, because this does not indicate the year-long impact of light-spill from predominantly residential towers, and because the tables are based on seeing part of the Southern Cross as acceptable, the Museum disputes the author's conclusion that this impact is 'negligible'.

84 I reiterate that nowhere in my report does it state that the impact of the Mod 8 buildings is "negligible".

85 The calculation of percentage lost viewing times is subjective, it being dependent on the following factors:

- What is defined as acceptable viewing time.
- How the building outlines are defined.
- What tolerance is allowed for light spill.
- If part of a target is not visible for even part of an observing session, even though it could be observed during another part of the same session, whether it should be considered as lost viewing opportunity.
- Whether a night of partial cloud cover should be included as an acceptable viewing night.
- Whether the nights during Bright of Moon are included in acceptable viewing nights for ω Centauri or other faint targets.
- Whether nights when nearby events use bright lighting (e.g. Vivid Festival), or fireworks events causing heavy particulate pollution (e.g. New Year's Eve, Australia Day, Vivid Festival) are also considered to be acceptable viewing nights.
- The Crown Hotel has an unusual curved shape, so accurate definition of the building silhouette and hence the exact times when any specific target is obscured becomes difficult.
- The observatory has now advised that they sometimes conduct multiple groups per session, and this may impact on the calculation of lost viewing opportunity for the specified sky targets.

- However, such multiple observing sessions cannot all be conducted from North Dome due to space restrictions. I was advised by the receptionist that viewing is sometimes conducted with other telescopes from the courtyard. If they are conducted from the courtyard, the available sky view is very different, due to the presence of trees and the lower altitude of the observing site. Thus, the same view restrictions do not apply. A separate view loss analysis would be required to see what effect the Mod 8 buildings in question have on the sky view from various locations within the courtyard. It is possible that the Mod 8 buildings may not be visible at all from some parts of the courtyard. Similarly, from the courtyard, trees will have a much greater obstruction effect in some directions. I have not investigated this in detail as it has not been part of my brief to date.
- In addition, for practical reasons, such courtyard viewing sessions would have to be conducted with one of the observatory's smaller, portable telescopes. The disadvantages of viewing at low elevations become more important when using a smaller aperture telescope because the image brightness decreases (due to the lower light gathering power of smaller telescopes) and the adverse effects of turbulence increase with decreasing telescope aperture size.

86 I cannot comment further on the effects of light spill from the Mod 8 buildings, other than to say that I am advised that measures will be taken in the design of the buildings to minimise its effects wherever possible.

4.3 DETAILED RESPONSE

1.0 Introduction

2.0 Sydney Observatory Concerns

87 I have not provided commentary on these aspects of the detailed response by
Sydney Observatory, as the issues concerning what correspondence was
provided, when and by whom were outside the scope of my brief.

88 Regarding the azimuth and elevation ranges to be considered, these were
defined in my brief, and I prepared the reports on this basis.

3.0 View Analysis

89 The Sydney Observatory response highlights perceived deficiencies in my first
report in relation to building H1 (the Crown Hotel).

90 Building H1 was not part of the brief for the first report.

4.0 Timing Analysis

91 The timing analysis provided by Sydney Observatory lists in detail the
calculated number of hours and minutes of lost viewing opportunity for each
target object.

92 This analysis was based on a different set of assumptions to that of the
reports that I prepared, so I expect the outcomes to be different.

93 For the reasons given in paragraph 85 above, the assumptions on which any
such analysis is based is subjective.

5.0 Lighting Impact

Sydney Observatory is an astronomical observatory, it is not a research observatory. The location, the atmospheric conditions and the various present constraints do not prevent public observing.

- 94 In my view, the issue is not whether some factor(s) prevent public observing, but rather what sky targets provide the best observing experience during any given month, under what amounts to poor observing conditions caused by a range of site specific factors, including nearby brightly lit city buildings.

The Sydney Harbour Bridge is not the worst source of light pollution. The general aggregate light pollution from the city, and particularly city buildings are the most significant source of light pollution – additional buildings of Mod 8 plan would significantly increase the light pollution effect on Sydney Observatory. The Mod 8 buildings *cannot* have zero “increased light spill effect on Sydney Observatory”.

- 95 I am not so sure about this, if the reflected light from the Bradfield Highway leading up to the Harbour Bridge is included (see Fig 2.10 above, middle left photo).

- 96 The Bradfield Highway approach to the Harbour Bridge is located immediately adjacent to the Sydney Observatory site (see Fig 4.2 below).

- 97 However, given that some existing residential high rise buildings also very close to the observatory and are unlikely to have implemented light pollution control measures (see section 2. above), the effect of these buildings is likely to be similar.

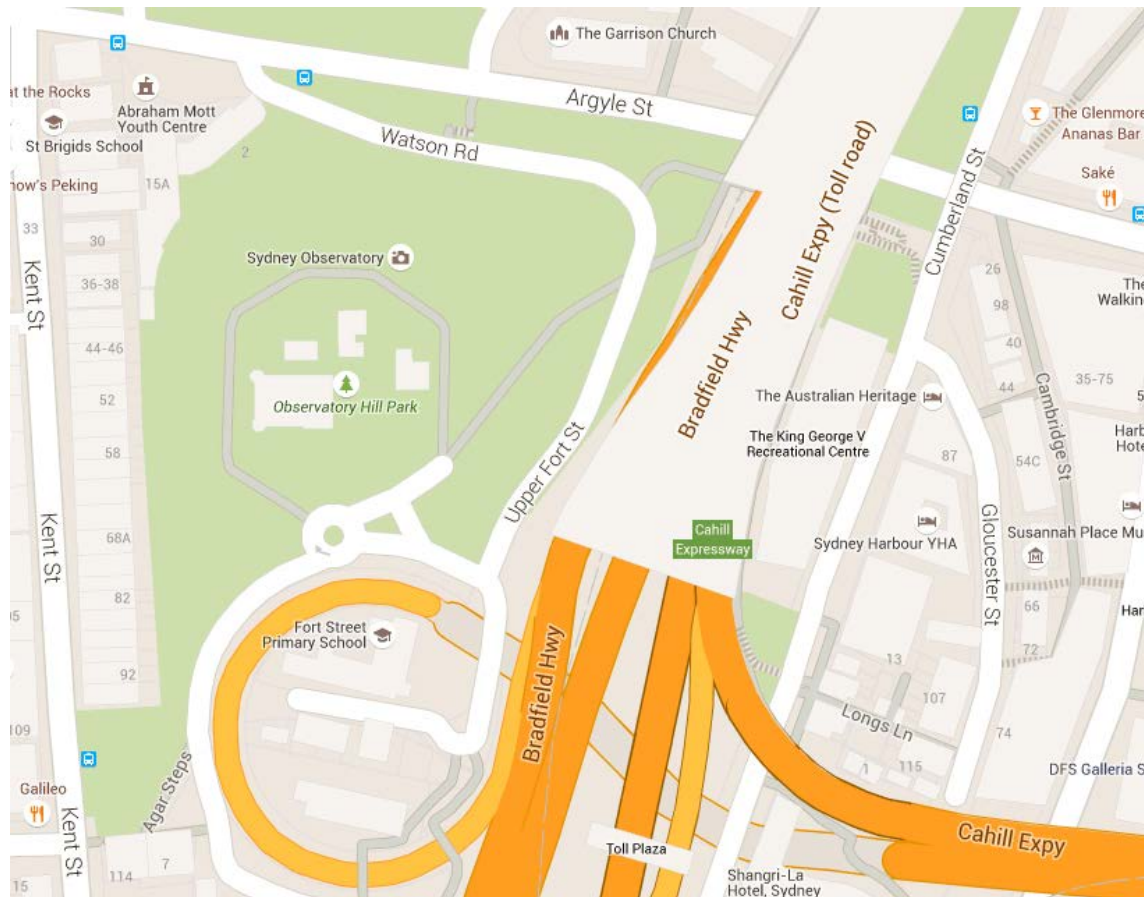


Fig 4.2 - Site map showing the proximity of the Harbour Bridge approach roadway.

6.0 Conclusion

- 98 These relate solely to the content of my first report – building H1 was not part of my brief for the first report.

Overall conclusions

The Mod 8 concept plan buildings have significant impact on viewing of the Southern Cross, Alpha-Centauri, the Jewel box, Omega Centauri and other objects both by way of increased light spill and by blocking the view at certain times of the year. From 12 to 25% of available viewing days and from 6 to 15% of the available viewing time of these iconic objects will be lost if the Mod 8 buildings are constructed.

- 99 Agreed that the Mod 8 buildings have an impact, but the calculated percentage number of viewing days and available viewing times are subjective.

Viewing of alternative objects is not reasonable. The four objects considered here are core objects, the brightest objects of their type and the most visually appealing and educationally effective objects for the public to view. This is the case regardless of how low in the sky these objects are viewed. Sydney Observatory views these objects more than others for these very good reasons.

- 100 Again, this is a subjective issue. The audience for Sydney Observatory would have very little astronomical knowledge or experience with observing. In my view, a lay person would have a better observing experience looking at sky targets high in the sky, where the image quality is relatively good, than at something low down, where weather conditions, turbulence and sky glow degrade the image.

- 101 Regarding suitable sky targets, there are a large number of interesting objects to choose from, and, in my view, the fact that the Southern Cross or some other iconic object is not visible at certain times of the year would not dissuade people from attending observatory viewing sessions. After all, some of the listed objects are not visible for parts of the year, because they are below the horizon. This is part of observational astronomy.

The location of Sydney Observatory, the weather, scintillation, smog and existing light pollution are not relevant to this issue. The issue is the *additional* impact on viewing and *additional* light spill caused by the Mod 8 buildings and Barangaroo South.

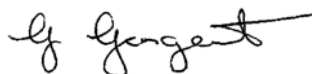
102 I agree that the Mod 8 buildings and Barangaroo South will have some impact on viewing from Sydney Observatory.

103 I disagree that it will have a significant effect on their public observing business activities, and Sydney Observatory has not provided any substantiation for this assertion.

The impacts on the functioning of Sydney Observatory by the Mod 8 Concept Plan will not be 'negligible'. The conclusion drawn in the Report is incorrect and not supported by the evidence.

104 I did not say the impact of the Mod 8 Concept Plan is "negligible".

105 The reports I have prepared were done on a factual basis.



George Georgevits
B.E. (Hons)

APPENDIX 1

Sydney Observatory Public Viewing Schedule

9/15/2014

Hours and charges | Sydney Observatory



**sydney
observatory**
PART OF THE POWERHOUSE MUSEUM



Hours and charges

Hours and charges

[Night visit \(online bookings\)](#)

[Night group visit](#)

[Day visit](#)

[Day group visit](#)

[Special events](#)

[School holiday program](#)

[Private telescope viewing](#)

[Booking conditions](#)

[How to get here](#)

[Facilities, food, access](#)

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NIGHT VISIT

Open nightly Monday to Saturday except Good Friday,
Christmas Day and Boxing Day holidays. Open Sunday nights;
during school holidays.

Bookings are necessary for night sessions (of approximately 90
minutes duration). Phone (02) 9921 3485 or [book online](#).

Night telescope/3D theatre session times

April to September – 6.15pm and 8.15pm

October and November – 6.15pm

December and January – 6.30pm

February and March – 8.15pm

Night charges for telescope/3D theatre sessions

Adult – \$18

Child (4 to 15 years) – \$12

Concession – \$14

Family (1 adult and up to 3 children;
or 2 adults and up to 2 children) – \$50

Member (adult) – \$16

Member (child) – \$11

Member (family) – \$43

Sessions are held regardless of weather. If viewing through the
telescopes is not possible due to sky conditions, a fun digital
planetarium session is provided instead.

All night visits must be booked and prepaid prior to arrival at the
Observatory. Payment for night tickets is not refundable.
However if you notify us by phone on 9921 3485 by noon on the
day you are scheduled to attend your night visit, we can either
transfer your booking to another available night; or offer you a
'rain check' ticket, valid for three months from first booking, to
the same value as your original booking.

Debit and credit card fees: As part of a NSW Government
requirement, Sydney Observatory applies a surcharge on all
transactions made by debit or credit cards. Surcharge rates are
determined on a cost-recovery basis only. No surcharge is
incurred when paying with EFTPOS, cheque or cash. Payments
made on VISA and Mastercard attract 0.40%

Review your visit on facebook

Would you like to tell others about your visit to Sydney
Observatory? Then you might like to [review your visit on
facebook](#).

DAY VISIT

Open 10am – 5pm daily

except Good Friday, Christmas Day and Boxing Day holidays

Open 10am – noon New Years Eve

Day telescope/3D theatre session times

Monday to Friday (school term) – 2.30pm, 3.30pm and 4.00pm

Weekends and school holidays – 11am, noon, 2.30pm and
3.30pm

Bookings are not required for day sessions.

Day charges for telescope/3D theatre sessions

Adult – \$10

Child (4 to 15 years) or concession – \$8

Family (1 adult and up to 3 children;
or 2 adults and up to 2 children) – \$26

Member adult – \$6

Member child (4 to 15 years) or concession – \$4

Member family (1 adult and up to 3 children;
or 2 adults and up to 2 children) – \$16

Daytime admission for a self-guided visit to the gardens and the
Observatory exhibitions is free – but does not include visits to
the telescope towers, telescope viewings and 3D theatre
sessions.

Debit and credit card fees: As part of a NSW Government
requirement, Sydney Observatory applies a surcharge on all
transactions made by debit or credit cards. Surcharge rates are
determined on a cost-recovery basis only. No surcharge will be
incurred when paying with EFTPOS, cheque or cash. Payments
made on VISA and Mastercard will attract 0.40%

The Powerhouse Museum is an Affiliate of the NSW
Government's Department of Ageing, Disability and Home
Care's Companion Card program. This means that carers who
accompany a person with a disability will be eligible for free
entry on presentation of their Companion Card. For more
information visit www.companioncard.org.au



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[Visit the Powerhouse Museum](#)

1003 Upper Fort St, Millers Point, NSW, 2000.

Bookings / enquiries: PH: (02) 9921 3485

[NSW Government](#)

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email: observatory@phm.gov.au

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APPENDIX 2

Science Article

ASTRONOMY

Twinkling Stars May Reveal Stuff of Early Solar System

Australian researchers say dips in the brightness of stars may tell of a vast array of objects beyond the planets, but others aren't so sure

CATANIA, ITALY—The Kuiper Belt, resting place of much of the detritus left over from the creation of the solar system, may contain many more small objects than previously thought. Australian astronomers scanned the outer reaches of the solar system by looking for a brief dimming of the light of distant stars as subkilometer-sized bodies passed in front of them. Preliminary results presented at a workshop here earlier this month* suggest that huge numbers of such objects lurk beyond the orbit of Neptune. Although most Kuiper Belt researchers are cautious, studies by some other teams suggest the Australians may be onto something. "If this is true, it would be fantastic," says Alessandro Morbidelli of the Observatoire de la Côte d'Azur in Nice, France, because information about the smaller denizens of the Kuiper Belt cannot be found any other way.

Astronomers have found more than 1000 bodies in the Kuiper Belt, including an object known as 2003 UB₃₁₃ (nicknamed Xena) that is slightly larger than Pluto. But because they are several billion kilometers away, even the most powerful telescopes can't see Kuiper Belt objects smaller than about a hundred kilometers across. Researchers are keen to know more about their size distribution, as it would shed light on the early youth of the solar system.

An effort to fill that gap has been going on since last year. The Taiwanese-American Occultation Survey (TAOS) operates three automated 50-centimeter telescopes at Lu-Lin Observatory, Taiwan, which scan starlight for telltale dimming that signals a Kuiper Belt object passing in front of, or "occulting," the star. So far, the survey has drawn a blank. Team member Federica Bianco of the Harvard-Smithsonian Center for Astrophysics (CfA) in Cambridge, Massachusetts, says TAOS can't observe very brief dips in brightness, so it is capable of spotting only the relatively rare objects larger than a few kilometers in diameter.

* Trans-Neptunian Objects: Dynamical and Physical Properties, Catania, Italy, 3–7 July.

But George Georgevits and Michael Ashley of the University of New South Wales in Sydney and Will Saunders of the Anglo-Australian Observatory in Siding Spring say the Kuiper Belt may teem with objects too small for TAOS to see. Using a fast detector at the 1.2-meter U.K. Schmidt Telescope in Siding Spring, they saw well over a thousand brief brightness dips, each lasting for a tenth of a second or less, while monitoring dozens of stars for about 2 weeks.

"It's very important work, and they should certainly continue," Morbidelli says. "But the

and check." But Georgevits counters that he has checked and ruled out every other possible cause of the stellar winks.

So are the results real? "Well, it seems they are observing *something*," says David O'Brien of the Planetary Science Institute in Tucson, Arizona, although he adds that no one has yet carried out a detailed statistical analysis of the Australian results. According to O'Brien, collisions in the Kuiper Belt may have produced hordes of small objects. "If confirmed, these results could tell us something about the strength properties of Kuiper Belt objects," he says.

Some other studies support the Australian results. Taiwanese astronomers have uncovered similar brief occultations of the well-known x-ray source Scorpius X-1 in data from NASA's Rossi X-ray Timing Explorer satellite. A team led by astronomer Ping-Shien Wu of the National Tsing Hua University in Hsinchu

presented the finding in April at the Chinese Astronomical Society Taiwan's meeting in Taichung and is due to publish it in *Nature* next month. And at the Catania workshop, Françoise Roques of the Paris Observatory described three brief occultations detected with the 2-meter Bernard Lyot Telescope in the French Pyrenees, which Roques says may also represent small Kuiper Belt objects.

Not everyone is convinced. "They have to do more checks on possible false alarms," says Matthew Lehner of CfA. For instance, the dips might be caused by unknown effects in Earth's atmosphere. To avoid these, you need to observe from space, says Lehner, who is part of a team that has pitched to NASA a \$425 million occultation mission called Whipple, which would detect Kuiper Belt objects as well as comets in the much more distant Oort Cloud.

Meanwhile, Georgevits hopes to raise half a million dollars for a purpose-built ground-based telescope equipped with a very fast video camera. Such a device could survey the whole Kuiper Belt for a fraction of the cost of a space mission, he says. And although his team's preliminary results raised

some eyebrows, everyone agrees on the need for a more comprehensive search. Says O'Brien: "Small Kuiper Belt objects will never be observed directly. Occultation surveys have a lot of potential to fill in this gap."

—GOVERT SCHILLING

Govert Schilling is an astronomy writer in Amersfoort, the Netherlands.



When worlds collide. Two icy bodies crash in the Kuiper Belt in this artist's depiction. Could such collisions have populated the belt with tiny objects?

results so far are very strange," because current theories of the evolution of the solar system do not predict huge numbers of small Kuiper Belt objects. Michael Brown of the California Institute of Technology in Pasadena, who discovered 2003 UB₃₁₃, adds that "the believability factor [of these results] isn't very high. Unfortunately, you can never go back

CREDIT: DAN DURDA/IAAA

APPENDIX 3

Curriculum Vitae

Brief Curriculum Vitae for George Georgevits

1. In 1972 I was awarded a cadetship with the then Postmaster General's Department to complete my Bachelor of Electrical Engineering degree at University of NSW.
2. I graduated in 1974 with honours.
3. I have 40 years experience as an electrical engineer, specialising in the fields of telecommunications, electronics and power.
4. In 1981 I founded Power and Digital Instruments Pty Ltd. (PDI) with a view to establishing a consulting engineering practice specialising in communications and electronics. A brief capability statement for PDI appears in Appendix 4.
5. Through PDI, I have successfully completed thousands of engineering projects for some 300 corporate and government clients.
6. PDI also owns and operates a test and measurement laboratory. The primary function of this laboratory is to conduct a wide variety of electrical tests on various types of active and passive components and equipment using sophisticated laboratory test equipment.
7. In addition, I regularly write technical articles on topical communications and power technology issues for *Cabling Connections*, *Cabling Home Solutions* and *Electrical Connections* magazines, these being Australian trade journals.
8. Although my formal qualifications relate primarily to electrical engineering, I also have extensive experience with the concepts of physics, electromagnetic waves, advanced mathematics and errors in measurements.
9. I am presently undertaking a part-time PhD in Astrophysics at the University of NSW.
10. My work Astrophysics has been cited in an article in the internationally recognised journal *Science* and also referenced in an article appearing in *Nature*.

APPENDIX 4

Capability Statement for PDI

POWER AND DIGITAL INSTRUMENTS PTY LTD.



Electronics and Communications Consulting Engineers

ACH 882 855 763

POSTAL:
P.O. BOX 422
ROSEVILLE NSW 2069

BUSINESS OFFICE:
66A FINDLAY AVE
ROSEVILLE NSW AUSTRALIA

TEL: +61 2 9411 4442

ABN 21 002 065 769

Jan'14

CAPABILITY STATEMENT

FIELDS OF EXPERTISE:

- Data Cabling Systems and Components - Design, Testing and Certification
- Voice and Data Communications and Telephony Technology
- Radio Communications, HF, VHF, UHF and Microwave
- Power Systems, Equipment, Distribution Networks & Providers
- Assessment of Damages Claims for Communications, Power and Gas Infrastructure
- Communications Equipment and Service Suppliers and Carriers
- Lightning Protection, Surge Suppression and Earthing Systems
- Electronics Design, Manufacturing, Test & Measurement and Troubleshooting
- Equipment and Component Testing and Certification
- Computer Networks and Computer Technology
- Project Management and Specification
- Regulatory and Legal Aspects of Power and Communications Systems, Networks and Equipment and Standards Compliance
- Patent Specification Technical Preparation and Advice

SPECIFIC AREAS OF WORK:

- Testing and Certification of Cat 7A, 7, 6A, 6, 5e, 5 and Fibre Optic Components, Cables and Installations to EIA, ISO & Australian standards
- Cat 6A, Cat 6 and Cat 5e Connector Design and Testing
- Optical Fibre Cabling Technologies, including Testing
- Power Systems and Equipment, Cabling, Testing, Magnetic Field Radiation Surveys
- Troubleshooting and Testing Installed Cabling Networks
- Lightning and Surge Protection, System Design and Testing
- Earthing System Design and Testing and Power Co-ordination
- RF Test and Measurement (PDI has a well equipped test lab)
- Radio Interference, Noise, EMC investigations and RF Sweeps for Debugging
- Assessment of Damages Claims for Insurance Purposes
- Troubleshooting Electronics and Computer Circuits and Systems
- Electronics Design, Analogue, Digital and RF
- Electronics Manufacturing and Reliability Engineering
- Specialised Software Development and Interface
- Process Control, Automation, Instrumentation and Data Acquisition
- PABX Systems, Voice Over IP, Key Systems, Mobile and Cordless Telephony

METHODOLOGY

Mr Georgevits has an Honours degree in Electrical Engineering and 38 years experience in the industry as a consulting engineer.

Mr Georgevits is managing director of PDI (established in 1980). PDI has a well-proven track record in engineering consultancy, test & measurement, electronics troubleshooting and computer technology. PDI operates a well-equipped test and measurements laboratory.

PDI has successfully completed thousands of engineering projects for over 300 corporate and government clients.

Consultancy work is carried out primarily by the Principal, Mr George Georgevits. In addition, suitably qualified associates may be called upon from time to time, as required, to meet the specialised demands of particular projects.

ENGAGEMENT

Engagement to perform consultancy work is carried out on a contract basis. Fees may be structured on a fixed lump sum basis for clearly defined tasks, or on an hourly rate for other work, as required and mutually agreed with the Client.

PDI offers a completely independent advisory service. PDI has no affiliations with suppliers of equipment or services.

BRIEF LIST OF REFERENCES

Some Current Assignments:

- Amphenol Canada Corporation (Connector Manufacturer)
- Connection Magazines Pty Ltd (Cabling Magazine)
- Clayton Utz Lawyers
- Knapp AG (warehouse distribution logistics)
- NSW Crown Solicitor's Office
- PRYSMIAN Telecom Cables & Systems Australia Pty Ltd
- QBE Insurance (Aust) Ltd (all states)
- Technical Assessing Pty Ltd (Loss adjusters)
- Thiess Ltd.
- Tyco Electronics, was ADC Communications (Krone)
- University of NSW Communications Services

Some Completed Assignments:

- Acheron Project – James Cameron's Submarine (Avatar & Terminator fame)
- Australian Astronomical Observatory
- Australian National University (ANU)
- Bluescope Steel – Port Kembla Steelworks
- Clipsal Datacomms (Schneider Electric)
- Lantek Electronics – Taiwan (Connector Manufacturer)
- Leighton Contractors M2 Tunnel Widening (Major Projects Contractors)
- Molex Industrial Division (connector manufacturer - US)
- Tenix Group (Major Projects Construction & Defence Contractors)
- Underwriting Agencies of Australia Pty Ltd (Insurance)

Crown Hotel Sydney Observatory Sky View Loss Assessment

UNSW Global



COMMERCIAL-IN-CONFIDENCE

Report prepared on behalf of Expert Opinion Services
A business of UNSW Global Pty Limited

BARANGAROO SOUTH PROJECT

CROWN HOTEL

SYDNEY OBSERVATORY SKY VIEW LOSS ASSESSMENT

for

Lend Lease Group

Your reference:

by

George Georgevits

Consulting Engineer

Date of Issue: 21 May 2015

Our Reference: J085821

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1. TERMS OF REFERENCE

1.1 QUALIFICATIONS

- 1 This report was prepared by George Georgevits, managing director of and principal consulting engineer for Power and Digital Instruments Pty Ltd (PDI).
- 2 I have an honours degree in electrical engineering and 40 years experience as an engineer, specialising in the fields of communications, electronics and power.
- 3 In addition, I am presently undertaking a PhD in Astrophysics at the University of New South Wales.
- 4 My PhD work has entailed the use of the 1.3 metre UK Schmidt Telescope and the 0.5 metre Automated Patrol Telescope, both located at Siding Spring Observatory, Coonabarabran New South Wales.
- 5 I have conducted presentations of my work at a number of overseas and Australian conferences on Astrophysics.
- 6 An article referencing my work has appeared in Science magazine (see Appendix 2), and it has been cited in a paper appearing in Nature.
- 7 I have co-authored a Chapter in a textbook on the outer solar system.
- 8 I have owned and operated a number of small astronomical telescopes over the years.
- 9 I am thus very familiar with observational astronomy and also the astronomical objects that are the subject of this matter.
- 10 A brief CV for George Georgevits is provided in Appendix 3 and a brief capability statement for PDI is provided in Appendix 4.

1.2 TERMS OF ENGAGEMENT

- 11 I have been engaged by Lend Lease to provide astronomical advice in relation to this matter.
- 12 I have prepared a report dated 23 September 2014 (**the first report**) addressing the loss of sky view from Sydney Observatory North Dome due to the construction of residential Towers R4a (SSD 6964) and R4b (SSD 6965) associated with the Barangaroo South project.
- 13 The first report specifically addressed the viewing concerns raised by Sydney Observatory at a meeting with Lend Lease in December, 2013, in terms of specified sky targets and viewing corridors.
- 14 The present matter concerns recent correspondence received from Sydney Observatory wherein the azimuth of their required viewing corridor has been increased to include the proposed Crown Hotel building (**the Hotel**) that is also associated with the Barangaroo South project.
- 15 The present report provides an assessment of the loss of sky view from Sydney Observatory (North Dome) as a result of the obstruction caused by the Hotel.
- 16 I have been provided with a brief (**the Brief**), including a letter of instruction and copies of various correspondences from Sydney Observatory that outline their new areas of concern.
- 17 As part of the Brief, Lend Lease has provided me with a set of drawings that depict viewing angles from Sydney Observatory towards the Hotel.
- 18 I have included relevant information from my first report in this report for convenience, including various site drawings, the make, model and location of the telescope used by Sydney Observatory for night time astronomical

observing, the opening hours for the observatory (refer Appendix 1) and so forth.

19 I have also made my own enquiries in relation to certain aspects of this matter.

20 Where I have used material from other sources for this report, I have provided the relevant references.

2. OBSERVATIONAL ASTRONOMY – A VERY BRIEF PRIMER

21 In the southern hemisphere, the night sky appears to rotate clockwise around a point in the sky known as the South Celestial Pole (see Fig 2.1).

22 This point represents the intersection of the extension of the southern end of the Earth's axis of rotation with the sky plane.

23 Thus the sky plane completes one rotation every 24 hours, which means it rotates at a constant angular velocity of 15° per hour.

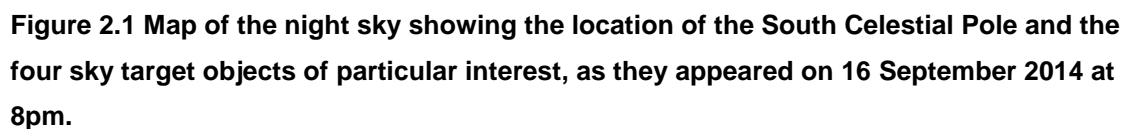
24 Thus, in order to observe a sky plane object through a telescope, the telescope must first locate the object and then track it as the sky rotates.

25 The Sun rising in the East and setting in the West is a good example of the effect of the Earth's rotation.

26 In addition to this rotation, the Earth moves in its orbit around the sun, completing one revolution approximately every 365.25 days.

27 Thus, at any particular location (e.g. Sydney), at any particular time (e.g. 8:00pm), and at any particular altitude and azimuth (**alt/az**) co-ordinate on the sky plane (e.g. 26° , 210°), a different part of the sky will appear at that co-ordinate location at 8:00pm on each day of the year.

- 28 Another way of looking at this is that at any particular time, the same part of the sky will be at a different location, depending on the time of year.
- 29 For example, on the 1st September, at 8:00pm, α Centauri is at alt/az 43°, 216°.
- 30 On 1st October, at 8:00pm, it is at alt/az 23°, 213°, the change being due to the fact that the Earth has moved further along in its orbit around the Sun.



3. SYDNEY OBSERVATORY

3.1 OBSERVING SESSIONS

- 31 Sydney Observatory is only open for observing at specific times on specific nights of the year (refer Appendix 1).
- 32 Thus in order to assess the impact on viewing caused by any particular obstruction, the required target object locations in the sky must be tracked throughout the year so as to determine when or even if they intersect with the obstructed area of sky during times when the observatory is conducting observing sessions, and if so, for what proportion of each of the observatory's observing sessions.
- 33 I personally visited the observatory on 19 May 2015, but I did not attend an observing session.
- 34 I was advised by the observatory receptionist that their observing sessions run for approximately 90 minutes and typically have 20 attendees.
- 35 They have a number of telescopes at their disposal for observing, ranging in size from the 16" Meade mounted in the North Dome down to 8" and smaller portable instruments suitable for setting up in the courtyard.
- 36 I am further advised that due to the number of attendees and the limited duration of each session, typically no more than five sky targets are viewed during any one observing session.

3.2 SKY TARGETS SUITABLE FOR OBSERVING FROM SYDNEY IN AUGUST AND SEPTEMBER

- 37 The part of the sky visible from any particular location depends upon its latitude and longitude, the time of day and the time of the year.
- 38 As this matter concerns obstruction of the view of the Globular Cluster ω Centauri from Sydney Observatory, in the evenings up to 10:00pm during the months of August and September, it is instructive to note some examples of other interesting sky objects that may be viewed from Sydney in the evenings during this time of the year.
- 39 The following is by no means an exhaustive list of astronomical objects of interest that may be successfully viewed through a small telescope:
- The Moon;
 - The planets Venus, Mars, Jupiter and its moons, Saturn and its moons and rings, and Uranus. These are not all visible simultaneously during August and September - it depends on where in their orbits they happen to be each year. Usually at least two are visible. For example, at the time of writing, Venus, Jupiter and Saturn are visible at night;
 - 47 Tucanae (a globular star cluster). This cluster is very similar to ω Centauri in appearance and rises just as ω Centauri is setting. So it would make a good alternative target when ω Centauri is no longer visible;
 - Small Sagittarius Star Cloud – a small patch of sky containing millions of stars – part of the Milky Way.
- 40 The constellation Scorpius is high in the sky and is ideally positioned for observing. The following list represents a few of the many interesting objects to be found in Scorpius:
- The constellation Scorpius – a pattern of bright stars in the shape of a scorpion – easy to discern;
 - Antares – a giant red star;
 - The Butterfly Cluster – a small open cluster of blue stars;

- Ptolemy's cluster in the tail of Scorpius – a small, bright open cluster of blue stars;
- Messier M4 – a globular cluster;
- Messier M62 – a globular cluster.

4. OBSERVING ISSUES AT SYDNEY OBSERVATORY

41 A number of factors affect the ability to conduct astronomical observations from any particular location.

42 These factors determine whether observing is even possible, and if so, the quality of the image presented by the telescope.

43 The following sections describe some of these factors and how they affect observing from Sydney Observatory.

4.1 CLOUD COVER

44 Depending on the nature of the clouds, this can degrade the transparency of the atmosphere to the point where it becomes opaque at visible wavelengths, making observing impossible.

45 With translucent clouds, observing is possible, but scattered light from the various bright light sources (e.g. Harbour Bridge, the Moon) will degrade the observed images by reducing the contrast between the observed object and the background sky and altering the observed colours.

- 46 The Bureau of Meteorology statistics state the following for the weather station at Observatory Hill:

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Mean number of clear days	6.8	5.3	7.1	9.1	9.5	9.1	12.0	13.4	10.9	8.1	6.0	6.6	103.9	56 1955 2010
Mean number of cloudy days	13.4	13.0	12.8	10.7	10.8	10.9	8.7	7.7	8.5	11.4	12.5	12.8	133.2	56 1955 2010

Figure 4.1 – 56 year average BOM weather data for Observatory Hill

- 47 From this, we can see that, on average, there will be a roughly a ~50% chance of some cloud and about 30% chance of total cloud cover on any particular day.

4.2 SMOG AND PARTICULATE POLLUTION

- 48 Smog and particulate pollution carried by the air affects the transparency of the atmosphere.
- 49 It causes selective absorption of the short wavelengths of light (blue end of the spectrum), making images look redder (hence the bright orange sunsets during bushfire season).
- 50 Smog is worse looking at low altitude across the western suburbs of Sydney, and it tends to be worse in summer under certain weather pattern conditions.
- 51 It can also be bad during bushfires, and during ground cover burn off activities in winter and spring.
- 52 Smog will also scatter light from bright light sources (e.g. Harbour Bridge, the Moon, nearby tall buildings – see Figs 4.2 to 4.4 below).
- 53 Bright lights have the effect of increasing the overall background sky brightness.

- 54 These effects will degrade the observed image because the image contrast is reduced and the colours are changed.



Figure 4.2 – View from the observatory towards SW. These building are much closer to the observatory than the Hotel and would contribute significantly to light pollution and background sky brightness.



Figure 4.3 – These buildings are to the SE and would also contribute significantly to light pollution and background sky brightness (North Dome in right foreground).



Figure 4.4 – The Harbour Bridge is in the NE direction and represents another very bright source of light at night.

4.3 SCINTILLATION

- 55 Scintillation is caused by light passing through turbulent air.
- 56 It results in image distortions that fluctuate with time (the apparent twinkling of stars when viewed with the naked eye is one manifestation of scintillation).
- 57 Scintillation is a function of the amount of turbulence present at the time of observing and the air mass through which an object is observed.
- 58 The minimum column of air through which light has to pass occurs for sky targets directly overhead (i.e. at zenith).
- 59 As we move away from zenith towards the horizon, the column of air through which we have to look (and hence the amount of turbulence it contains) increases.
- 60 The air mass at 30° altitude is twice that at zenith (90° altitude), and therefore the scintillation effects are much worse.

61 The effect then worsens more and more rapidly as the horizon is approached.

62 Scintillation effects also worsen with increasing air temperature (heat haze)
and with increasing humidity.

63 For these reasons, the best astronomical observing conditions on Earth are to
be found on high mountains and on the high central plateau of Antarctica.

64 The sky view obstructions discussed both in this report and my first report all
occur at or below 30° altitude.

4.4 BRIGHT OF MOON

65 As the Moon orbits the Earth, it returns to the same position in the sky relative
to the background stars every 27.3 days (this known as its sidereal period).

66 The surface of the Moon is visible to us because it is illuminated by the Sun
(except at New Moon, when it is only illuminated by sunlight reflected from the
Earth), and part of this sunlight is reflected by its surface back towards the
Earth.

67 During the days near and at full moon (known as Bright of Moon), the Moon is
a very bright sky object (~33,000 times brighter than the brightest star in the
sky (Sirius) at Full Moon).

68 Consequently, it illuminates the whole of the background sky (which is why the
background sky appears to be a bluish grey at times of Full Moon, rather than
black).

69 The effect is most severe on the night of Full Moon and generally significant
for about four nights either side of the night of Full Moon.

- 70 It can significantly degrade the quality of an astronomical image viewed through a telescope, particularly if the viewed object is faint.
- 71 It affects our ability to observe faint sky objects (such as ω Centauri) due to the decreased contrast between the desired target object and the illuminated background sky.
- 72 The effect is made worse under degraded observing conditions, such as may be caused by the issues outlined in Sections 4.1 to 4.3 above.

5. SYDNEY OBSERVATORY SKY VIEW LOSS ASSESSMENT

5.1 BACKGROUND

- 73 The Sydney Observatory is located on Observatory Hill at The Rocks, Sydney New South Wales, about 600m SW of the Sydney Harbour Bridge.
- 74 The observatory building was built between 1857 and 1859 and is now part of the Powerhouse Museum.
- 75 Due to the glare of the city lights (the nearby tall buildings and Harbour Bridge in particular), the low altitude of the site and its proximity to water, seeing conditions are relatively poor at the observatory even on the best nights.
- 76 For this and other reasons, research astronomy has not been conducted at the site for many years.
- 77 The observatory does, however, conduct public astronomical observing sessions from the North Dome building using a 16" Meade Schmidt Cassegrain telescope (**the telescope**) and smaller telescopes set up elsewhere on the grounds.
- 78 The times of the observing sessions vary, depending on the time of year.

79 It is understood that the observatory conducts one observing session during summer, commencing at 8:15pm and two during winter, commencing at 6:15pm and 8:15pm respectively, and that each session is of about 90 minutes duration.

80 A complete list of published observatory opening hours is provided in Appendix 1.

5.2 IMPACT OF THE HOTEL BUILDING ON SKY VIEW

81 The proposed Hotel building has a height of 275 metres and will be located approximately 440 metres south west of the Sydney Observatory North Dome building.

82 The heritage listed trees in the park surrounding the observatory do not extend sufficiently far North to cover the azimuth angle range containing the Hotel (see Figs 5.1, 5.2 and 5.3 below; the trees shown in Fig 5.3 appear to have been drawn incorrectly).

83 Thus viewing from the telescope is presently unobstructed essentially all the way down to the horizon within the azimuth angle range projected by the Hotel.



Figure 5.1 – Google Maps satellite photo of Observatory Hill showing the extent of heritage listed trees presently surrounding the site and the direction of view from the North Dome towards the Hotel site

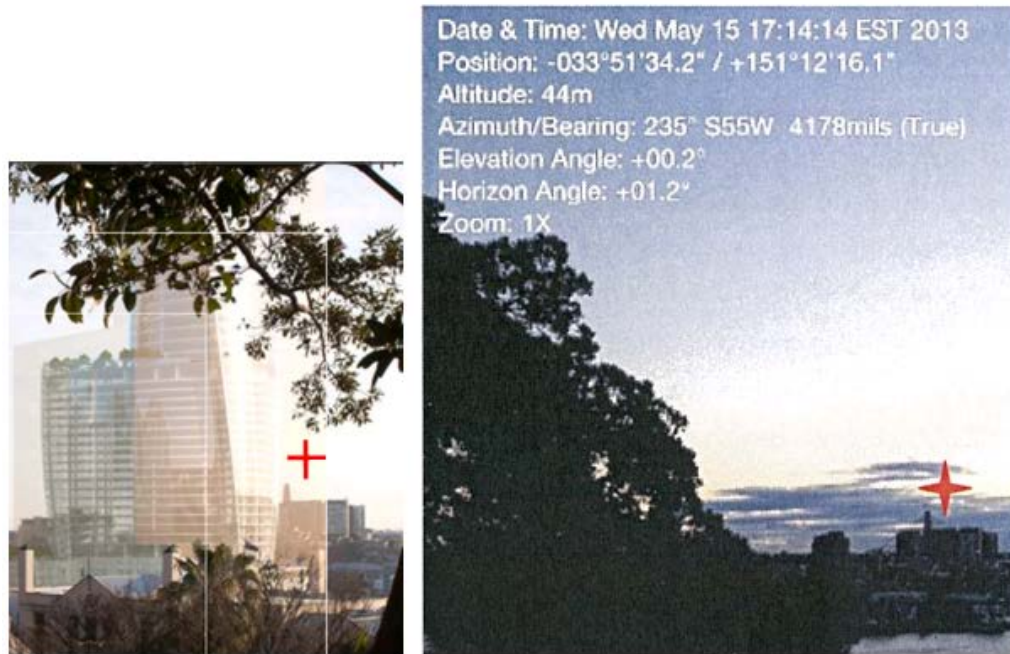


Figure 5.2 – Proposed Concept Plan Amendment (Mod 8) showing the indicative design for the Hotel (left) and the present view in the same direction from North Dome of the Observatory (right). The red crosses signify 236° azimuth angle.

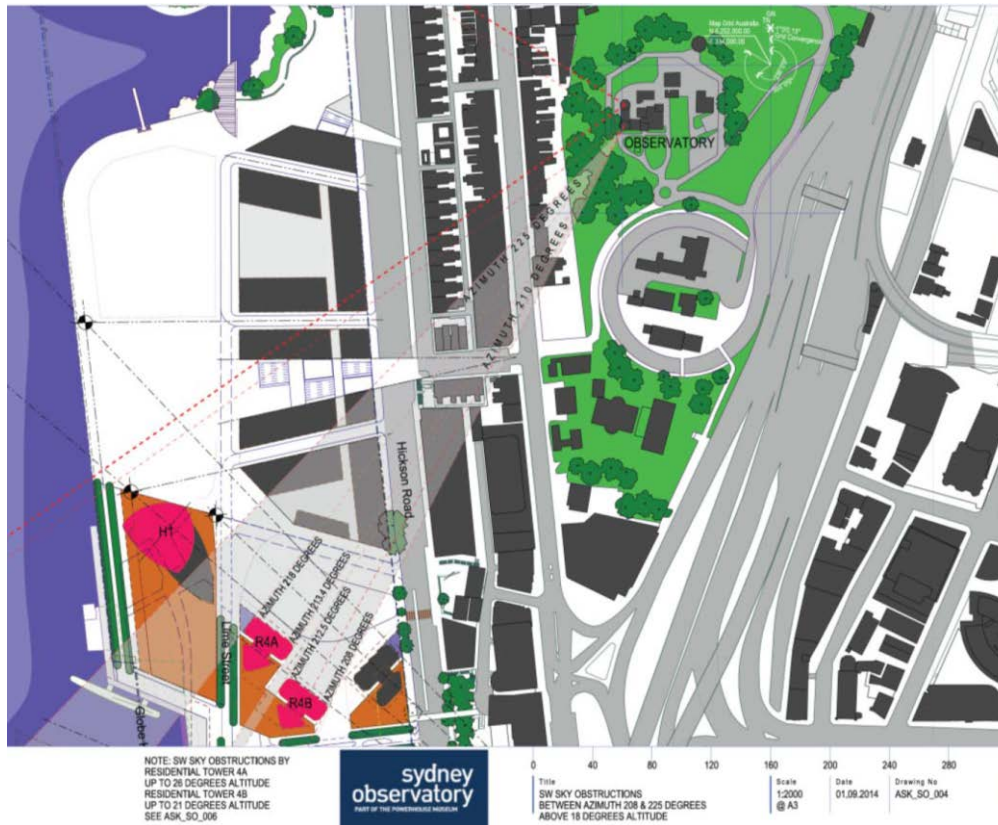


Figure 5.3 – View corridor diagram from Sydney Observatory (the footprint of the Hotel is marked as H1 at lower left). Although viewing angles are shown from the South Dome building, they are essentially the same from the North Dome building.

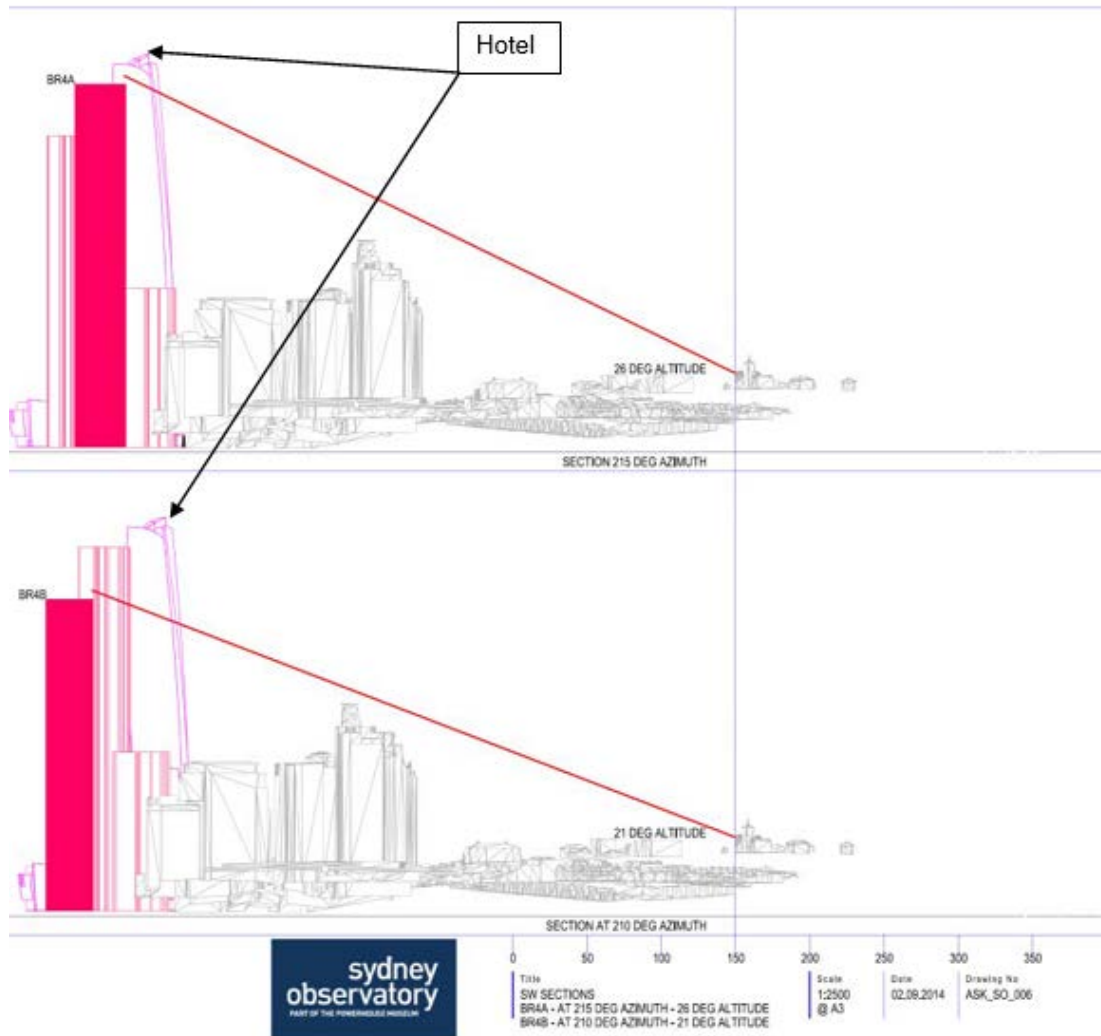


Figure 5.4 – View loss diagrams showing altitude of the residential towers 4a and 4b, with the outline of the Hotel also shown immediately to the right.

- 84 Based on the information contained in the drawings that were provided as part of the Brief (see Figs 5.3 and 5.4 above), the Hotel building will obscure a block of sky approximately $\sim 30^\circ \times 6.3^\circ$ (altitude x azimuth) over an azimuth range of approximately 225.7° to 232.0° (see Fig 5.5 below).
- 85 Sydney Observatory has now indicated that their area of concern for loss of sky view includes the azimuth angle range containing the Hotel.

86 They have advised that the view of the following night sky object of interest is likely to be obstructed by the Hotel at certain times of the year when viewed from the telescope in the North Dome.

- ω Centauri (a globular star cluster)

87 The aim of this report is to independently quantify the degree to which the observatory's ability to observe ω Centauri is reduced due to the obstruction caused by the Hotel.

88 Sydney Observatory had previously expressed concerns about the ability to view the following night sky objects:

- The Southern Cross;
- The Pointers;
- The Jewel Box Cluster (open star cluster).

89 Lend Lease also suggested assessing the following other sky objects:

- Ring Nebula (in Cygnus);
- Sun, Moon and planets.

90 All of these objects are assessed in this report against the sky view obstruction caused by the Hotel.

91 Figure 5.5 below depicts a sky map showing the location of the four objects suggested by the observatory, plus the area of sky obscured by the Hotel (red) and that obscured by residential towers 4a and 4b (green).

92 Note that I have (generously) allocated a rectangular block on the sky map for the area of sky obscured by the Hotel.

93 In reality, the building is tapered significantly towards the top (see Fig 5.4), so a rectangular block allows a reasonable margin near the top for possible light spill effects.

- 94 I do not have quantitative data for the building lighting arrangements, so further analysis of the possible effects of light spill is not possible.

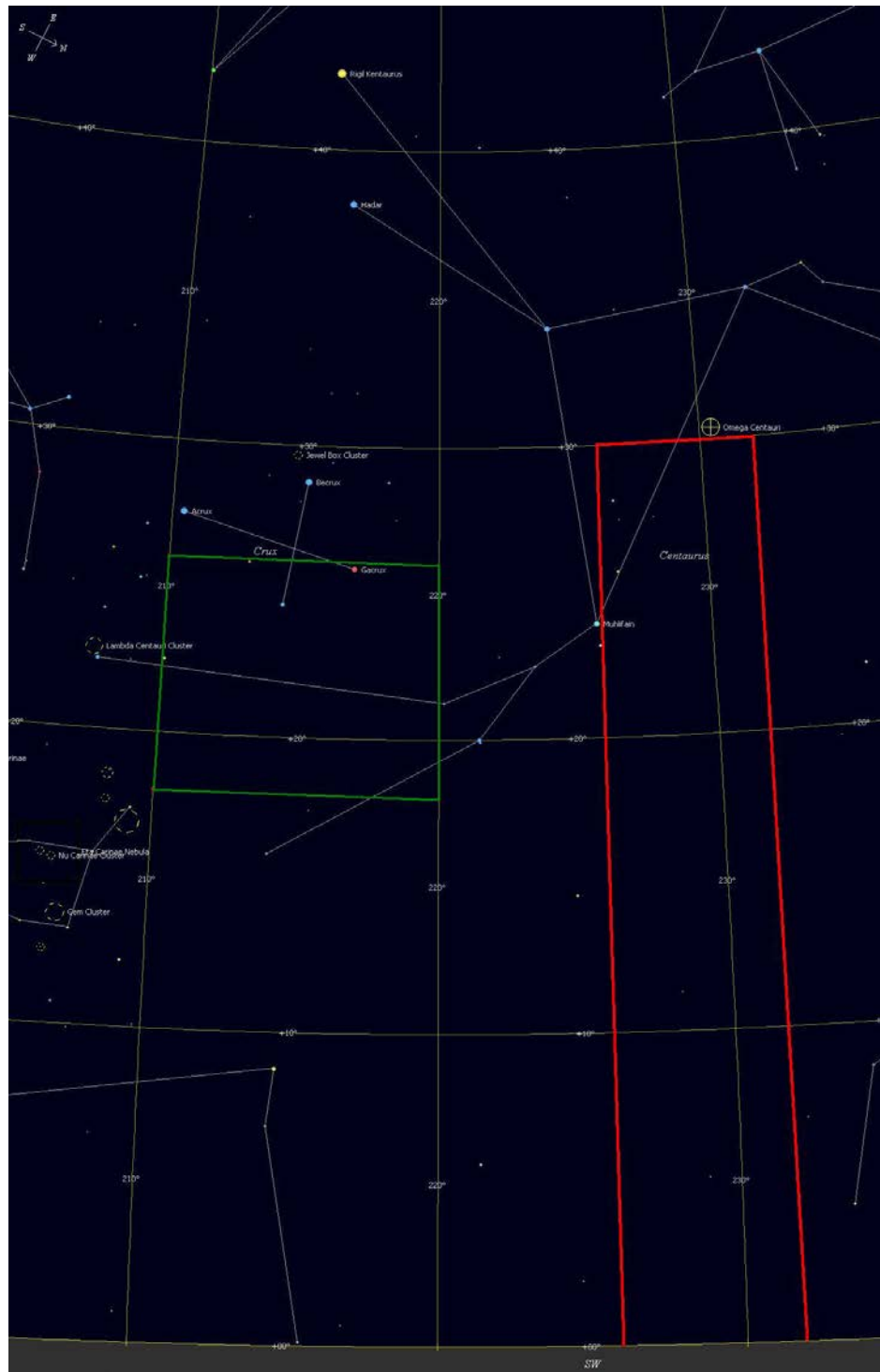


Figure 5.5 – Sky map showing the area of sky obscured by the Hotel (red), with ω Centauri just entering, as it will appear at 7:00pm on 17 September 2015. Also shown is the area of obstruction caused by the residential towers 4a and 4b (green), with the Southern Cross just entering. The area under the green rectangle is obscured by trees.

- 95 Figure 5.5 approximately covers azimuth angles 205° to 235° and altitude angle from the horizon (0°) up to 45° .
- 96 As the four objects of concern listed in paragraphs 86 and 88 above all rotate clockwise about the South Celestial Pole (a point not shown on the sky map of Figure 5.5, but located far to the left, at azimuth 180° and altitude 34° – see Fig 2.1), it is clear that the only sky object of interest obscured by the Hotel at certain times of the year is ω Centauri.
- 97 The findings in my first report indicated that the additional sky objects suggested by Lend Lease were unaffected by the obstruction caused by the residential towers 4a and 4b.
- 98 Due to their position in the sky, the viewing of these objects is similarly unaffected by the obstruction caused by the Hotel.

6. FINDINGS AND CONCLUSIONS

6.1 FINDINGS

- 99 Globular star cluster ω Centauri passes through the area of sky that is obstructed by the Hotel during the times at which Sydney Observatory runs observing sessions only in the months of August, September and early October each year.
- 100 During these months, Sydney Observatory runs two observing sessions, commencing at 6:15pm and 8:15pm respectively, with each running for approximately 90 minutes.
- 101 The table in Figure 6.6 below summarises, on a week by week basis, the variations in the time interval during which the Hotel obscures or adversely affects the view of ω Centauri from the observatory, plus the total length of observing session time during which this occurs.

- 102 The tabulated data is given only for the Monday night of each week for the months concerned.
- 103 The week to week changes are immediately apparent, and the daily changes may be derived by interpolating the weekly data.
- 104 ω Centauri passes into the red area on the sky map (i.e. area of obstruction or possible degradation due to light spill) for a maximum period of 73 minutes.
- 105 Each session conducted by the observatory lasts for ~90 minutes.
- 106 Hence viewing of ω Centauri is affected by the Hotel for only parts of the observatory's observing session times during all three months.
- 107 The observatory should normally have a predetermined schedule of target objects to be viewed during each observing session.
- 108 If the target viewing schedule were to be appropriately arranged by the observatory, the number of sessions where ω Centauri could not be viewed due to the obstruction caused by the hotel could be significantly reduced.
- 109 It may also be possible to observe ω Centauri once it has passed behind the Hotel and re-emerged half way down on the left side of the building, albeit under very poor conditions due to its low altitude by this time and also due to some likely light spill from the Hotel itself.
- 110 The values tabulated in Figure 6.6 represent the absolute worst case situation.
- 111 The nights where the Hotel partly affects the available viewing times for ω Centauri in only one observing session are shaded in yellow.
- 112 The nights where the two consecutive observing sessions are each partly affected are shaded in orange.

- 113 Note that the table in Figure 6.6 finishes at the first week of October.
- 114 In the weeks following, it is still twilight for much of the first observing session, making viewing of a faint object like ω Centauri impractical, and the target has set by the time the second observing session starts.

Sydney Observatory														
Sky View Loss Assessment - Crown Hotel														
Sky Target Objects of Concern:														
TARGET OBJECT	Obstructed Area:	enters	leaves	enters	leaves	enters	leaves	enters	leaves	enters	leaves	enters	leaves	
Omega Centauri	Date (Monday):	04/08/2014	11/08/2014	18/08/2014	25/08/2014	01/09/2014								
	Times:	21:52 23:05	21:25 22:38	20:57 22:10	20:30 21:43	20:02 21:15								
	Duration of Session Obstruction	0:00	0:20	0:48	1:13	1:00								
	Date (Monday):	08/09/2014	15/09/2014	22/09/2014	29/09/2014	06/10/2014								
	Times:	19:35 20:48	19:07 20:20	18:40 19:53	18:12 19:25	17:45 18:58								
	Duration of Session Obstruction	0:43	0:43	1:05	1:10	0:43								
			Only one observing session affected											
			Both observing sessions affected											
Observatory Telescope Specifications:														
Make:	Meade													
Model:	LX200													
Type:	Schmidt Cassegrain													
F ratio	f/10													
Focal length	4064mm													
Clear aperture	406mm													
Field of view	5.7 deg.													
Obstructed Area:														
	Altitude range	0	30	degrees										
	Azimuth range	225.7	232	degrees										

Figure 6.6 – Table indicating progressive dates and times where the Hotel obstruction causes loss of viewing opportunity for sky target ω Centauri from Sydney Observatory

6.2 FACTORS AFFECTING OBSERVING FROM SYDNEY OBSERVATORY

Weather

115 Based on Bureau of Meteorology (**BOM**) weather data for Observatory Hill for September:

- on average, there will be some cloud present for about half of the time;
- there will be 10.9 clear days;
- there will be 8.5 days when it is totally clouded over.

116 And for October:

- on average, there will be some cloud present for almost half of the time;
- there will be 13.4 clear days;
- there will be 7.7 days when it is totally clouded over.

117 Based on the above BOM data, approximately half of the observatory's observing nights are likely to be affected by cloud cover of some form and observing will not be possible at all on about half of these nights.

Seeing Conditions from Observatory Hill

118 The seeing conditions for the lower parts of the Western sky will generally be poor due to its low altitude, the large air mass through which the target object is viewed, the light pollution from nearby bright sources such as the Harbour Bridge, street lights and city buildings where no attempt has been made to minimise light directed upwards, the effects of smog, scintillation, humidity and so forth.

Bright of Moon

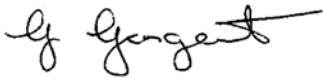
119 Light from the Moon increases the brightness of the background sky, reducing the contrast of faint sky objects.

- 120 Bright of Moon will adversely affect viewing of ω Centauri for about seven consecutive nights out of every 28 nights on average, centred on Full Moon.

6.3 CONCLUSIONS

- 121 From the list of sky targets of concern provided by Sydney Observatory, only the viewing of ω Centauri will be affected by the presence of the Hotel building.
- 122 Observing ω Centauri from the observatory will be compromised for at least half of the available observing nights during August/September due to adverse weather conditions and/or periods of bright of moon, and it will not be possible at all for about half of these due to total cloud cover.
- 123 In general, viewing targets in the vicinity of sky obstructed by the Hotel would be done under observing conditions that are far from ideal, and the image quality would be relatively poor on most nights.
- 124 It is recognised that observing for public outreach activities does not have the same demanding requirements as observing for research purposes, and that observing from the centre of the City is still considered satisfactory for public education purposes.
- 125 For this reason, the presence of a new large building such as the Hotel is not expected to have a major detrimental impact on the observatory's night time activities, even though it will obscure an iconic sky object for parts of some observing sessions for about two months of the year.
- 126 There is only time to observe five sky targets during each observing session and there are many other similar (but somewhat smaller) globular clusters much better placed in the sky for observing at that time of year than ω Centauri.

- 127 As I have listed in Section 3.2 above, there are also many other interesting potential sky target objects located high in the sky at that time of year.
- 128 In my opinion, these would provide better quality images and a better viewing experience than trying to view ω Centauri low down near the SW horizon.



George Georgevits
B.E.(Hons)

APPENDIX 1

Sydney Observatory Public Viewing Schedule

9/15/2014

Hours and charges | Sydney Observatory



**sydney
observatory**
PART OF THE POWERHOUSE MUSEUM



Hours and charges

Hours and charges

[Night visit \(online bookings\)](#)

[Night group visit](#)

[Day visit](#)

[Day group visit](#)

[Special events](#)

[School holiday program](#)

[Private telescope viewing](#)

[Booking conditions](#)

[How to get here](#)

[Facilities, food, access](#)

[Birthday parties](#)

[Tourist operators](#)



NIGHT VISIT

Open nightly Monday to Saturday except Good Friday,
Christmas Day and Boxing Day holidays. Open Sunday nights;
during school holidays.

Bookings are necessary for night sessions (of approximately 90
minutes duration). Phone (02) 9921 3485 or [book online](#).

Night telescope/3D theatre session times

April to September – 6.15pm and 8.15pm

October and November – 6.15pm

December and January – 6.30pm

February and March – 8.15pm

Night charges for telescope/3D theatre sessions

Adult – \$18

Child (4 to 15 years) – \$12

Concession – \$14

Family (1 adult and up to 3 children;
or 2 adults and up to 2 children) – \$50

Member (adult) – \$16

Member (child) – \$11

Member (family) – \$43

Sessions are held regardless of weather. If viewing through the
telescopes is not possible due to sky conditions, a fun digital
planetarium session is provided instead.

All night visits must be booked and prepaid prior to arrival at the
Observatory. Payment for night tickets is not refundable.
However if you notify us by phone on 9921 3485 by noon on the
day you are scheduled to attend your night visit, we can either
transfer your booking to another available night; or offer you a
'rain check' ticket, valid for three months from first booking, to
the same value as your original booking.

Debit and credit card fees: As part of a NSW Government
requirement, Sydney Observatory applies a surcharge on all
transactions made by debit or credit cards. Surcharge rates are
determined on a cost-recovery basis only. No surcharge is
incurred when paying with EFTPOS, cheque or cash. Payments
made on VISA and Mastercard attract 0.40%

Review your visit on facebook

Would you like to tell others about your visit to Sydney
Observatory? Then you might like to [review your visit on
facebook](#).

DAY VISIT

Open 10am – 5pm daily

except Good Friday, Christmas Day and Boxing Day holidays

Open 10am – noon New Years Eve

Day telescope/3D theatre session times

Monday to Friday (school term) – 2.30pm, 3.30pm and 4.00pm

Weekends and school holidays – 11am, noon, 2.30pm and
3.30pm

Bookings are not required for day sessions.

Day charges for telescope/3D theatre sessions

Adult – \$10

Child (4 to 15 years) or concession – \$8

Family (1 adult and up to 3 children;
or 2 adults and up to 2 children) – \$26

Member adult – \$6

Member child (4 to 15 years) or concession – \$4

Member family (1 adult and up to 3 children;
or 2 adults and up to 2 children) – \$16

Daytime admission for a self-guided visit to the gardens and the
Observatory exhibitions is free – but does not include visits to
the telescope towers, telescope viewings and 3D theatre
sessions.

Debit and credit card fees: As part of a NSW Government
requirement, Sydney Observatory applies a surcharge on all
transactions made by debit or credit cards. Surcharge rates are
determined on a cost-recovery basis only. No surcharge will be
incurred when paying with EFTPOS, cheque or cash. Payments
made on VISA and Mastercard will attract 0.40%

The Powerhouse Museum is an Affiliate of the NSW
Government's Department of Ageing, Disability and Home
Care's Companion Card program. This means that carers who
accompany a person with a disability will be eligible for free
entry on presentation of their Companion Card. For more
information visit www.companioncard.org.au



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[Visit the Powerhouse Museum](#)

1003 Upper Fort St, Millers Point, NSW, 2000.

Bookings / enquiries: PH: (02) 9921 3485

[NSW Government](#)

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email: observatory@phm.gov.au

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APPENDIX 2

Science Article

ASTRONOMY

Twinkling Stars May Reveal Stuff of Early Solar System

Australian researchers say dips in the brightness of stars may tell of a vast array of objects beyond the planets, but others aren't so sure

CATANIA, ITALY—The Kuiper Belt, resting place of much of the detritus left over from the creation of the solar system, may contain many more small objects than previously thought. Australian astronomers scanned the outer reaches of the solar system by looking for a brief dimming of the light of distant stars as subkilometer-sized bodies passed in front of them. Preliminary results presented at a workshop here earlier this month* suggest that huge numbers of such objects lurk beyond the orbit of Neptune. Although most Kuiper Belt researchers are cautious, studies by some other teams suggest the Australians may be onto something. "If this is true, it would be fantastic," says Alessandro Morbidelli of the Observatoire de la Côte d'Azur in Nice, France, because information about the smaller denizens of the Kuiper Belt cannot be found any other way.

Astronomers have found more than 1000 bodies in the Kuiper Belt, including an object known as 2003 UB₃₁₃ (nicknamed Xena) that is slightly larger than Pluto. But because they are several billion kilometers away, even the most powerful telescopes can't see Kuiper Belt objects smaller than about a hundred kilometers across. Researchers are keen to know more about their size distribution, as it would shed light on the early youth of the solar system.

An effort to fill that gap has been going on since last year. The Taiwanese-American Occultation Survey (TAOS) operates three automated 50-centimeter telescopes at Lu-Lin Observatory, Taiwan, which scan starlight for telltale dimming that signals a Kuiper Belt object passing in front of, or "occulting," the star. So far, the survey has drawn a blank. Team member Federica Bianco of the Harvard-Smithsonian Center for Astrophysics (CfA) in Cambridge, Massachusetts, says TAOS can't observe very brief dips in brightness, so it is capable of spotting only the relatively rare objects larger than a few kilometers in diameter.

* Trans-Neptunian Objects: Dynamical and Physical Properties, Catania, Italy, 3–7 July.

But George Georgevits and Michael Ashley of the University of New South Wales in Sydney and Will Saunders of the Anglo-Australian Observatory in Siding Spring say the Kuiper Belt may teem with objects too small for TAOS to see. Using a fast detector at the 1.2-meter U.K. Schmidt Telescope in Siding Spring, they saw well over a thousand brief brightness dips, each lasting for a tenth of a second or less, while monitoring dozens of stars for about 2 weeks.

"It's very important work, and they should certainly continue," Morbidelli says. "But the

and check." But Georgevits counters that he has checked and ruled out every other possible cause of the stellar winks.

So are the results real? "Well, it seems they are observing *something*," says David O'Brien of the Planetary Science Institute in Tucson, Arizona, although he adds that no one has yet carried out a detailed statistical analysis of the Australian results. According to O'Brien, collisions in the Kuiper Belt may have produced hordes of small objects. "If confirmed, these results could tell us something about the strength properties of Kuiper Belt objects," he says.

Some other studies support the Australian results. Taiwanese astronomers have uncovered similar brief occultations of the well-known x-ray source Scorpius X-1 in data from NASA's Rossi X-ray Timing Explorer satellite. A team led by astronomer Ping-Shien Wu of the National Tsing Hua University in Hsinchu

presented the finding in April at the Chinese Astronomical Society Taiwan's meeting in Taichung and is due to publish it in *Nature* next month. And at the Catania workshop, Françoise Roques of the Paris Observatory described three brief occultations detected with the 2-meter Bernard Lyot Telescope in the French Pyrenees, which Roques says may also represent small Kuiper Belt objects.

Not everyone is convinced. "They have to do more checks on possible false alarms," says Matthew Lehner of CfA. For instance, the dips might be caused by unknown effects in Earth's atmosphere. To avoid these, you need to observe from space, says Lehner, who is part of a team that has pitched to NASA a \$425 million occultation mission called Whipple, which would detect Kuiper Belt objects as well as comets in the much more distant Oort Cloud.

Meanwhile, Georgevits hopes to raise half a million dollars for a purpose-built ground-based telescope equipped with a very fast video camera. Such a device could survey the whole Kuiper Belt for a fraction of the cost of a space mission, he says. And although his team's preliminary results raised

some eyebrows, everyone agrees on the need for a more comprehensive search. Says O'Brien: "Small Kuiper Belt objects will never be observed directly. Occultation surveys have a lot of potential to fill in this gap."

—GOVERT SCHILLING

Govert Schilling is an astronomy writer in Amersfoort, the Netherlands.



When worlds collide. Two icy bodies crash in the Kuiper Belt in this artist's depiction. Could such collisions have populated the belt with tiny objects?

results so far are very strange," because current theories of the evolution of the solar system do not predict huge numbers of small Kuiper Belt objects. Michael Brown of the California Institute of Technology in Pasadena, who discovered 2003 UB₃₁₃, adds that "the believability factor [of these results] isn't very high. Unfortunately, you can never go back

CREDIT: DAN DURDA/IAAA

APPENDIX 3

Curriculum Vitae

Expert Opinion Services

CURRICULUM VITAE

George GEORGEVITS

Qualifications

Bachelor of Engineering (Honours)
 Specialising in Communications and Electronics
 The University of New South Wales, 1974

Present Position

Consulting Engineer, Managing Director & Principal Consultant
 Power and Digital Instruments Pty Ltd (PDI)
 PDI specialises in providing engineering consultancy in the fields of communications, electronics and power.

Areas of Expertise/ Special Interests

- Cabling systems and components - design, testing and certification for standards compliance
- Data communications networks, systems and devices
- LANs, computer networks and computer technology
- Voice communications and telephony technology
- Mobile phones, mobile networks and billing system analysis
- Radio communications, HF, VHF, UHF and microwave
- Audio systems and audio engineering
- Lightning, lightning protection and earthing systems - design and testing for standards compliance
- Communications service providers and Carriers
- Investigation and assessment of damages claims for communications, power and gas infrastructure
- Damages claims for electrical/electronic devices and systems
- Electronics design, manufacturing and test & measurement
- Equipment and component testing and performance certification
- Communications project assessment, specification and management
- Regulatory and legal aspects of communications and power
- Standards compliance and best practice
- Patent specification technical preparation and advice
- Advanced mathematics and physics, analysis of data, errors in measurements
- I am a member of Standards Australia committee CT001-02 "Testing of Fibre Optic Cabling"

- I am currently undertaking a PhD in Astrophysics
- I speak fluent Hungarian and basic French

Professional Experience

1980 - present

Managing Director & Principal Consulting Engineer

Power and Digital Instruments Pty Ltd

Fields of expertise are as described in the company capability statement (provided separately). PDI has successfully completed thousands of assignments for more than 200 corporate and government clients over a 40 year period.

Major multi-national corporate clients have included:

- Acheron Project (DEEPSEA Challenge Expedition for film director Jim Cameron – Avatar fame)
- ADC Krone
- Amphenol (Canada)
- Belden USA
- Lantek (Taiwan)
- LS Cable Co (Korea)
- Molex (USA and Aus)
- Molex Industrial Division (USA)
- Schneider Electric Asia Pacific (Hong Kong)
- Sunf Pu Technology Co Ltd (Taiwan and China)
- Tyco Electronics Inc. (China and Aus)
- Surtec Industries (Taiwan)

Corporate Australian clients have included:

- Amber Technologies P/L
- Allianz Insurance
- Bluescope Steel Port Kembla Steelworks
- Campus Living Villages P/L
- CGU Insurance Ltd
- Charles Taylor Adjusting
- Clipsal Aust P/L
- Coffey Geosciences P/L
- Connection Magazines
- Crawford & Co (Loss adjusters – all states)
- Cunningham Lindsay (loss adjusters)
- Eaton Powerware P/L
- Echelon Adjusting P/L
- FDC Technologies Pty Ltd
- Hall & Wilcox, Lawyers

- Hicksons, Lawyers
- Jarman McKenna Lawyers
- Jardine Lloyd Thompson
- Jeffery & Katauskas P/L (Geophysics)
- Lumley General Insurance
- McCabe Terrill Lawyers
- Novis health Care
- NRMA
- Omega Power Equipment Pty Ltd
- Pells Sullivan Meynink (Engineering Consultants)
- Prysmian Cables (was Pirelli)
- QBE Insurance Ltd, (all states + overseas)
- Stowe Electrical
- Technical Assessing Pty Ltd
- Thiess Ltd.
- Underwriting Agencies of Australia
- Wotton & Kearney, Lawyers
- ZIP Heaters
- Zurich Insurance Ltd

Government & semi government clients have included:

- ACT Electricity & Water (ACTEW, now TransACT)
- Anglo Australian Observatory
- Aust Bureau of Statistics
- Aust. Tax Office
- Aust. National University
- Civil Aviation Authority
- NSW Crown Solicitor's Office
- NSW Police Service
- Queensland Health
- RAN
- Sydney Market Authority
- Tasmania Police
- State Rail Authority of NSW
- University of NSW Expert Opinion Services
- University of NSW Voice Services Group
- Western Power Corporation

1980 – 1982

Senior Consulting Engineer

Laurie Systems Engineers.

Design and oversee installation of communications systems and networks for Woodside LNG project, North-West Shelf, Western Australia and Santos Ltd, Cooper Basin oil and natural gas projects, South Australia.

1974 – 1980

Various telecommunications engineering positions

- PMG's Dept, then
- Telecom Australia, then
- Telstra, including two years with Lines Practices and Protection Section
- Four years on exchange installation projects;
- the last position held at Telstra prior to resigning was senior engineer in charge of the State Design Laboratory, New South Wales

Specific Areas of Work

- Testing and Certification of Cat 7, 6A, 6, 5e, 5 and Twisted Pair Cabling Components, Cables and Installations to EIA, ISO & Australian standards
- Cat 6A, Cat 6 and Cat 5e Cabling Connector Design and Testing
- Troubleshooting and Testing Installed Cabling Networks
- Lightning and Surge Protection System Design and Testing
- Earthing System Design and Testing and Power Co-ordination
- Power Systems and Cabling, including Magnetic Field Radiation Surveys
- RF Test and Measurement (PDI has a well equipped test lab)
- Radio Interference, Noise, EMC investigations and RF Sweeps for Debugging
- Optical Fibre Cabling Technologies, including Testing
- Investigation and Assessment of Damages Claims for Insurance Purposes
- Computer Systems, Software, Hardware and Networks
- Troubleshooting Electronics Circuits and Systems
- Electronics Design, Analogue, Digital and RF
- Electronics Manufacturing and Reliability Engineering
- Specialised Software Development and Interface
- Process Control, PLC's, Instrumentation and Data Acquisition
- Telecommunications Networks and Broadband Technology
- Fixed Line and Mobile Telephone Telephony
- PABX Systems, Key Systems and Cordless Telephony

Methodology

PDI was established in 1980, and has a well-proven track record in engineering consultancy, test & measurement and project management. PDI has a well-equipped lab, with balanced pair RF transmission measurements as required for LAN cabling systems and components being a house specialty.

Consultancy work is carried out primarily by the Principal, Mr George Georgevits. In addition, suitably qualified associates may be called upon from time to time as required to meet the specialised demands of particular projects.

Mr Georgevits has an Honours degree in Electrical Engineering and over 35 years experience in the industry as a consulting engineer.

Engagement

Engagement to perform consultancy work is carried out on a contract basis. Fees may be structured on a fixed lump sum basis for clearly defined tasks, or on an hourly rate for other work, as required and mutually agreed with the Client.

A completely independent advisory service is offered. PDI has no affiliations with suppliers of equipment or services.

APPENDIX 4

Capability Statement for PDI

POWER AND DIGITAL INSTRUMENTS PTY LTD.



Electronics and Communications Consulting Engineers

ACH 882 855 763

POSTAL:
P.O. BOX 422
ROSEVILLE NSW 2069

BUSINESS OFFICE:
66A FINDLAY AVE
ROSEVILLE NSW AUSTRALIA

TEL: +61 2 9411 4442

ABN 21 002 065 769

Jan'14

CAPABILITY STATEMENT

FIELDS OF EXPERTISE:

- Data Cabling Systems and Components - Design, Testing and Certification
- Voice and Data Communications and Telephony Technology
- Radio Communications, HF, VHF, UHF and Microwave
- Power Systems, Equipment, Distribution Networks & Providers
- Assessment of Damages Claims for Communications, Power and Gas Infrastructure
- Communications Equipment and Service Suppliers and Carriers
- Lightning Protection, Surge Suppression and Earthing Systems
- Electronics Design, Manufacturing, Test & Measurement and Troubleshooting
- Equipment and Component Testing and Certification
- Computer Networks and Computer Technology
- Project Management and Specification
- Regulatory and Legal Aspects of Power and Communications Systems, Networks and Equipment and Standards Compliance
- Patent Specification Technical Preparation and Advice

SPECIFIC AREAS OF WORK:

- Testing and Certification of Cat 7A, 7, 6A, 6, 5e, 5 and Fibre Optic Components, Cables and Installations to EIA, ISO & Australian standards
- Cat 6A, Cat 6 and Cat 5e Connector Design and Testing
- Optical Fibre Cabling Technologies, including Testing
- Power Systems and Equipment, Cabling, Testing, Magnetic Field Radiation Surveys
- Troubleshooting and Testing Installed Cabling Networks
- Lightning and Surge Protection, System Design and Testing
- Earthing System Design and Testing and Power Co-ordination
- RF Test and Measurement (PDI has a well equipped test lab)
- Radio Interference, Noise, EMC investigations and RF Sweeps for Debugging
- Assessment of Damages Claims for Insurance Purposes
- Troubleshooting Electronics and Computer Circuits and Systems
- Electronics Design, Analogue, Digital and RF
- Electronics Manufacturing and Reliability Engineering
- Specialised Software Development and Interface
- Process Control, Automation, Instrumentation and Data Acquisition
- PABX Systems, Voice Over IP, Key Systems, Mobile and Cordless Telephony

METHODOLOGY

Mr Georgevits has an Honours degree in Electrical Engineering and 38 years experience in the industry as a consulting engineer.

Mr Georgevits is managing director of PDI (established in 1980). PDI has a well-proven track record in engineering consultancy, test & measurement, electronics troubleshooting and computer technology. PDI operates a well-equipped test and measurements laboratory.

PDI has successfully completed thousands of engineering projects for over 300 corporate and government clients.

Consultancy work is carried out primarily by the Principal, Mr George Georgevits. In addition, suitably qualified associates may be called upon from time to time, as required, to meet the specialised demands of particular projects.

ENGAGEMENT

Engagement to perform consultancy work is carried out on a contract basis. Fees may be structured on a fixed lump sum basis for clearly defined tasks, or on an hourly rate for other work, as required and mutually agreed with the Client.

PDI offers a completely independent advisory service. PDI has no affiliations with suppliers of equipment or services.

BRIEF LIST OF REFERENCES

Some Current Assignments:

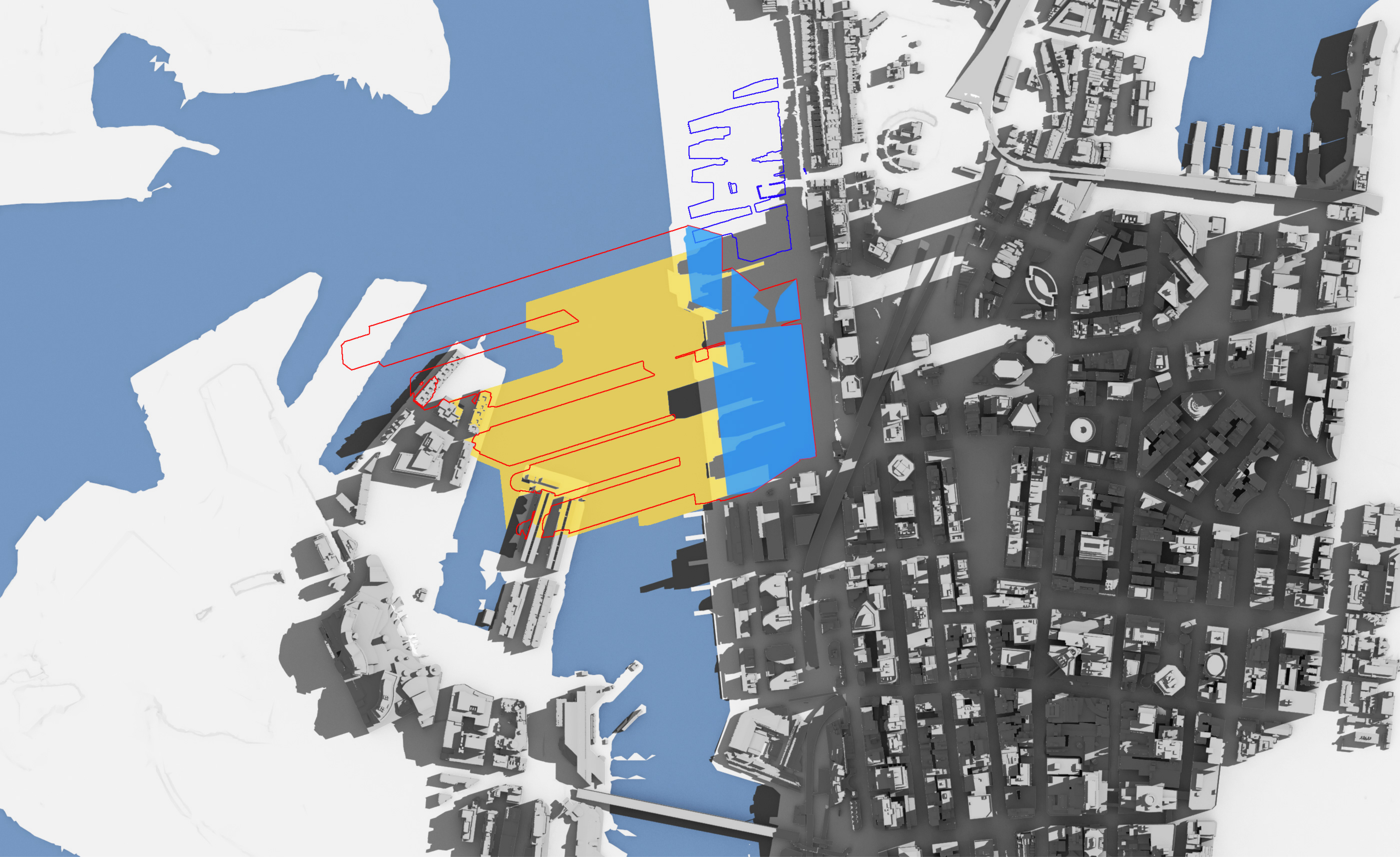
- Amphenol Canada Corporation (Connector Manufacturer)
- Connection Magazines Pty Ltd (Cabling Magazine)
- Clayton Utz Lawyers
- Knapp AG (warehouse distribution logistics)
- NSW Crown Solicitor's Office
- PRYSMIAN Telecom Cables & Systems Australia Pty Ltd
- QBE Insurance (Aust) Ltd (all states)
- Technical Assessing Pty Ltd (Loss adjusters)
- Thiess Ltd.
- Tyco Electronics, was ADC Communications (Krone)
- University of NSW Communications Services

Some Completed Assignments:

- Acheron Project – James Cameron's Submarine (Avatar & Terminator fame)
- Australian Astronomical Observatory
- Australian National University (ANU)
- Bluescope Steel – Port Kembla Steelworks
- Clipsal Datacomms (Schneider Electric)
- Lantek Electronics – Taiwan (Connector Manufacturer)
- Leighton Contractors M2 Tunnel Widening (Major Projects Contractors)
- Molex Industrial Division (connector manufacturer - US)
- Tenix Group (Major Projects Construction & Defence Contractors)
- Underwriting Agencies of Australia Pty Ltd (Insurance)

Revised Shadow Diagrams

Virtual Ideas



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st March, 9am

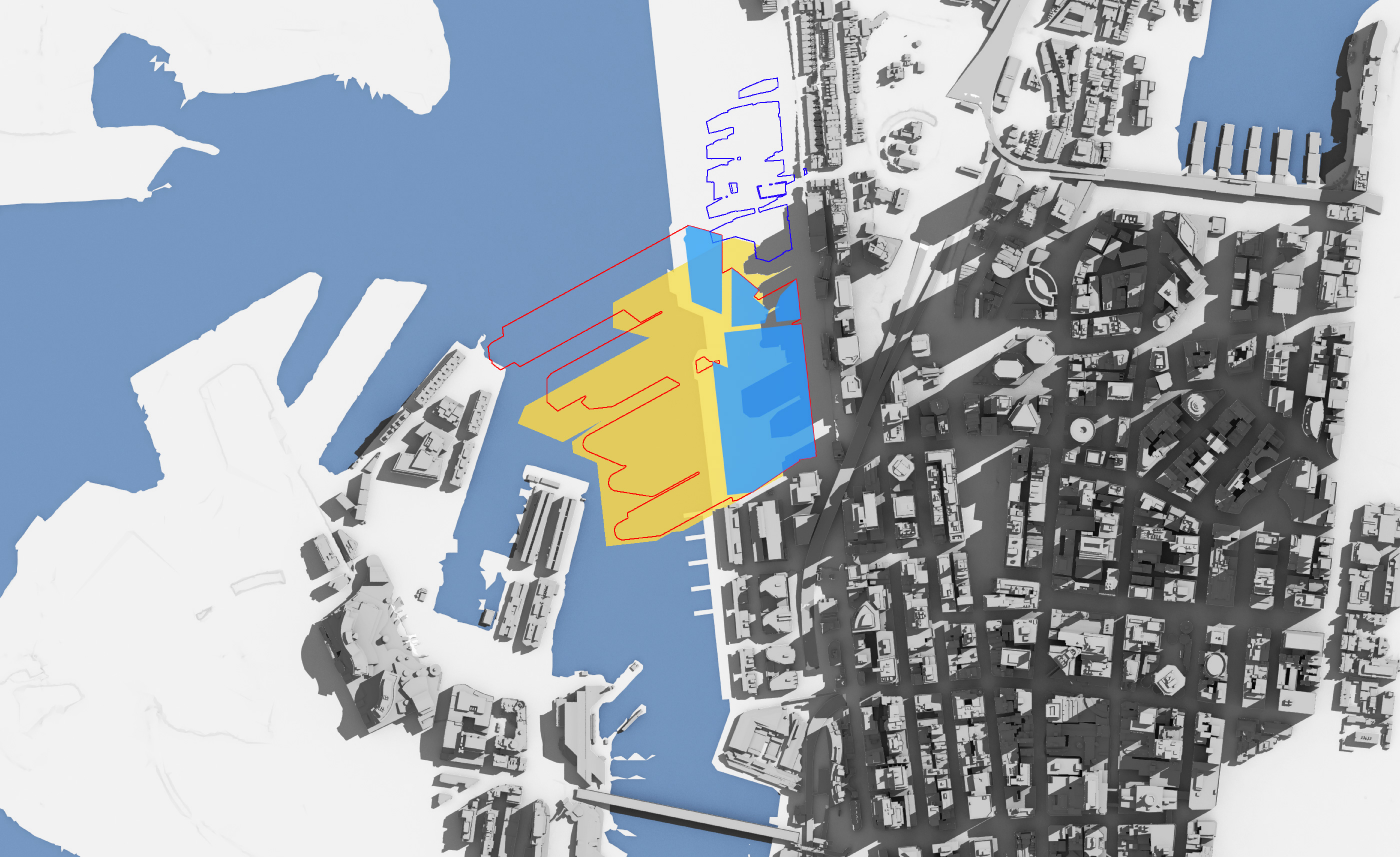
Approved Concept Plan (Mod 6)
SEPP Block Shadows

Proposed Concept Plan (Mod 8)
Building Envelope Shadow

Central Barangaroo
Indicative Building Design

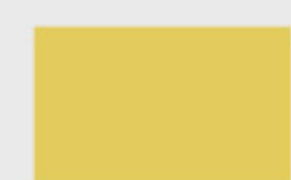
Proposed Concept Plan (Mod 8)
SEPP Block Footprint

Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st March, 10am



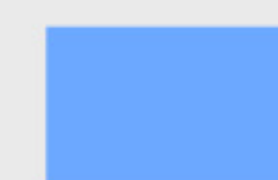
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Proposed Concept Plan (Mod 8)
Building Envelope Shadow



Central Barangaroo
Indicative Building Design



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SEPP Block Footprint

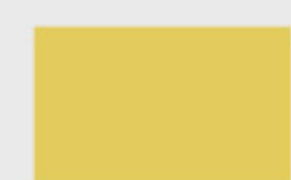


Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st March, 11am



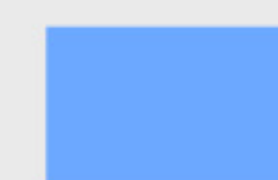
Approved Concept Plan (Mod 6)
SEPP Block Shadows



Proposed Concept Plan (Mod 8)
Building Envelope Shadow



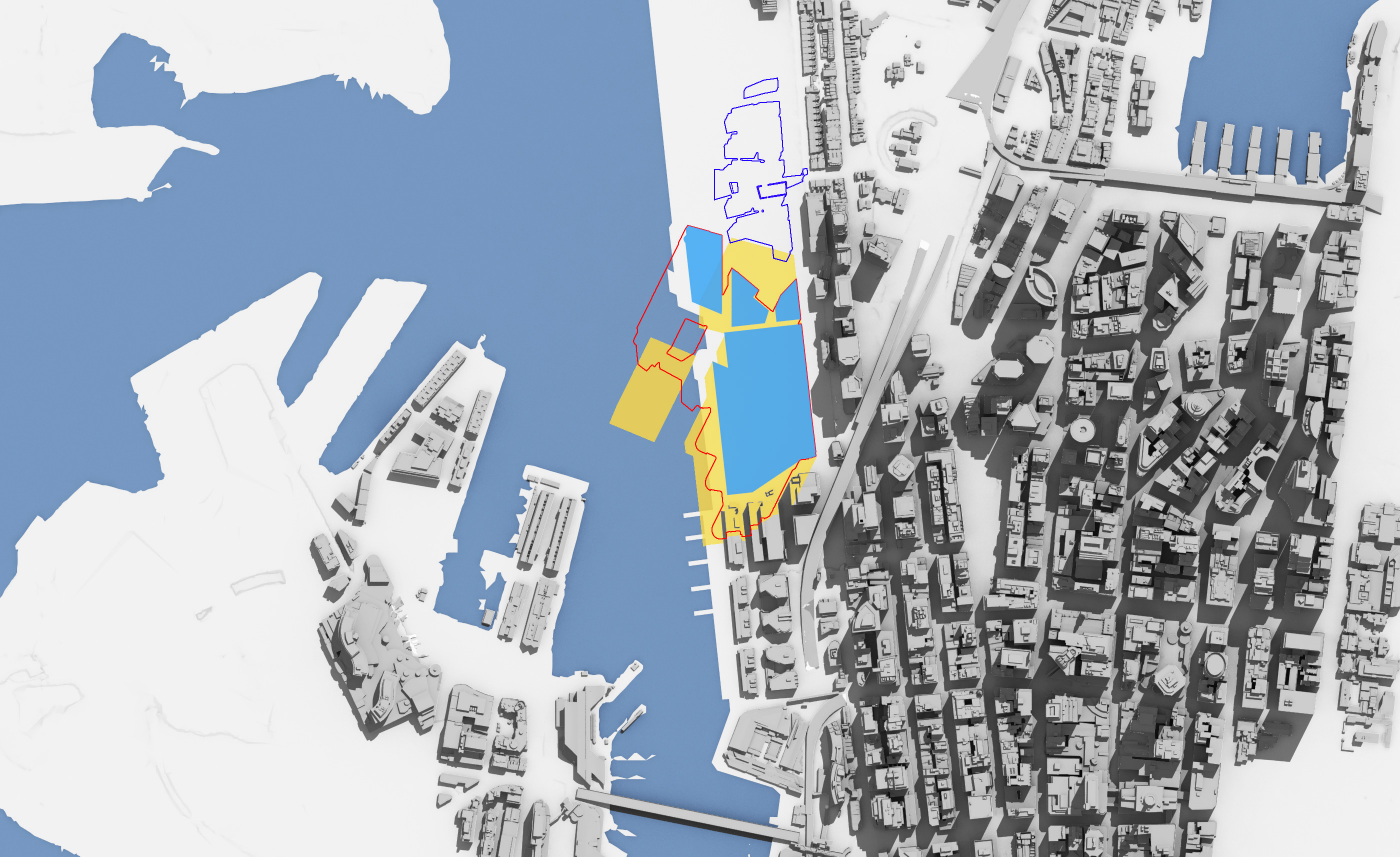
Central Barangaroo
Indicative Building Design



Proposed Concept Plan (Mod 8)
SEPP Block Footprint




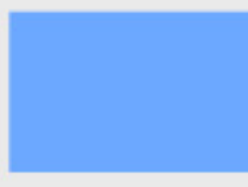



Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st March, 12pm

 Approved Concept Plan (Mod 6) SEPP Block Shadows	 Proposed Concept Plan (Mod 8) Building Envelope Shadow	 Central Barangaroo Indicative Building Design	 Proposed Concept Plan (Mod 8) SEPP Block Footprint	 Shadows cast by Existing City Buildings
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Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st March, 1pm



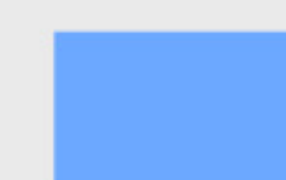
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SEPP Block Shadows



Proposed Concept Plan (Mod 8)
Building Envelope Shadow



Central Barangaroo
Indicative Building Design



Proposed Concept Plan (Mod 8)
SEPP Block Footprint



Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st March, 2pm



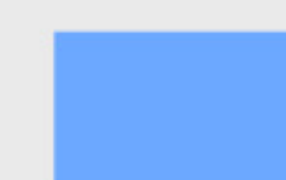
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Building Envelope Shadow



Central Barangaroo
Indicative Building Design



Proposed Concept Plan (Mod 8)
SEPP Block Footprint

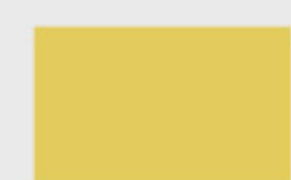


Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st March, 3pm



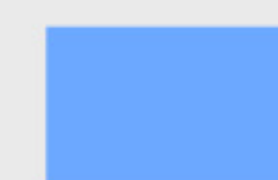
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SEPP Block Shadows



Proposed Concept Plan (Mod 8)
Building Envelope Shadow



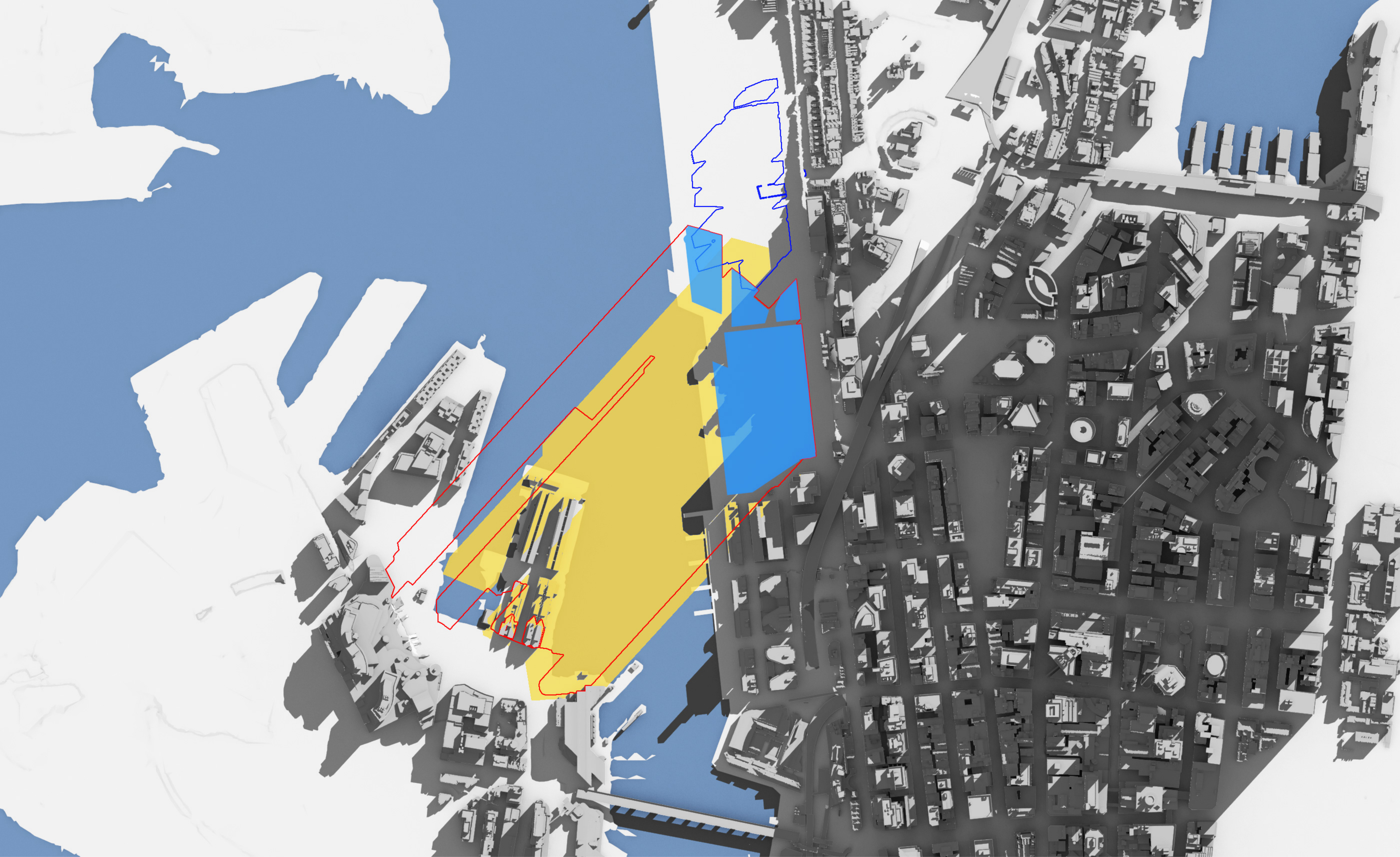
Central Barangaroo
Indicative Building Design



Proposed Concept Plan (Mod 8)
SEPP Block Footprint



Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st June, 9am

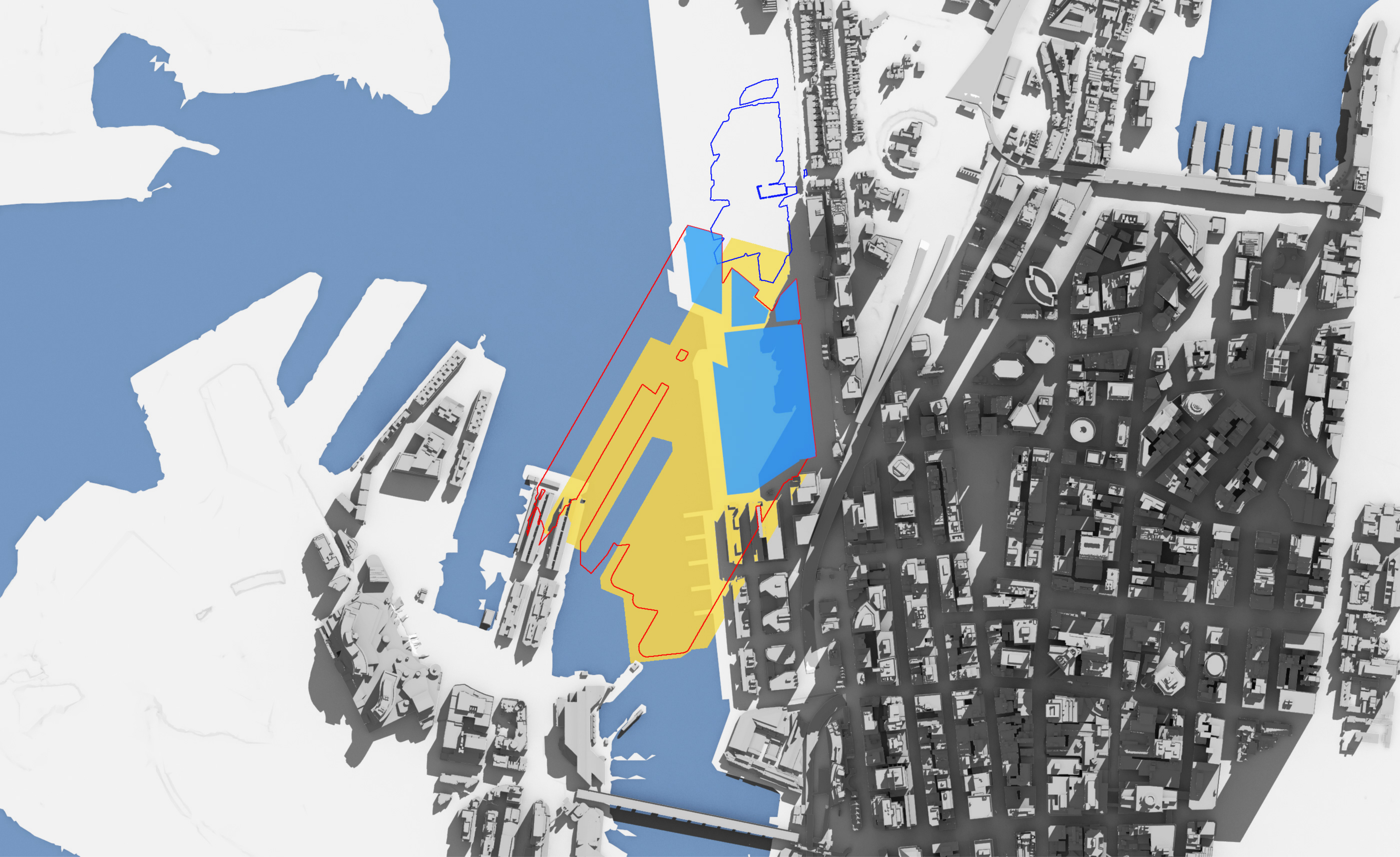
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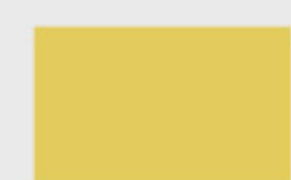
Proposed Concept Plan (Mod 8)
SEPP Block Footprint

Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st June, 10am



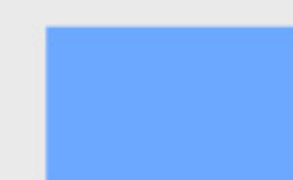
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SEPP Block Shadows



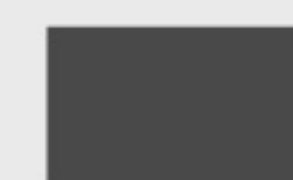
Proposed Concept Plan (Mod 8)
Building Envelope Shadow



Central Barangaroo
Indicative Building Design



Proposed Concept Plan (Mod 8)
SEPP Block Footprint




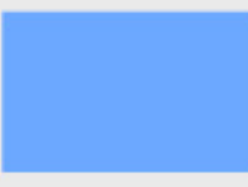



Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st June, 11am

 Approved Concept Plan (Mod 6) SEPP Block Shadows	 Proposed Concept Plan (Mod 8) Building Envelope Shadow	 Central Barangaroo Indicative Building Design	 Proposed Concept Plan (Mod 8) SEPP Block Footprint	 Shadows cast by Existing City Buildings
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Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st June, 12pm

Approved Concept Plan (Mod 6)
SEPP Block Shadows

Proposed Concept Plan (Mod 8)
Building Envelope Shadow

Central Barangaroo
Indicative Building Design

Proposed Concept Plan (Mod 8)
SEPP Block Footprint

Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st June, 1pm

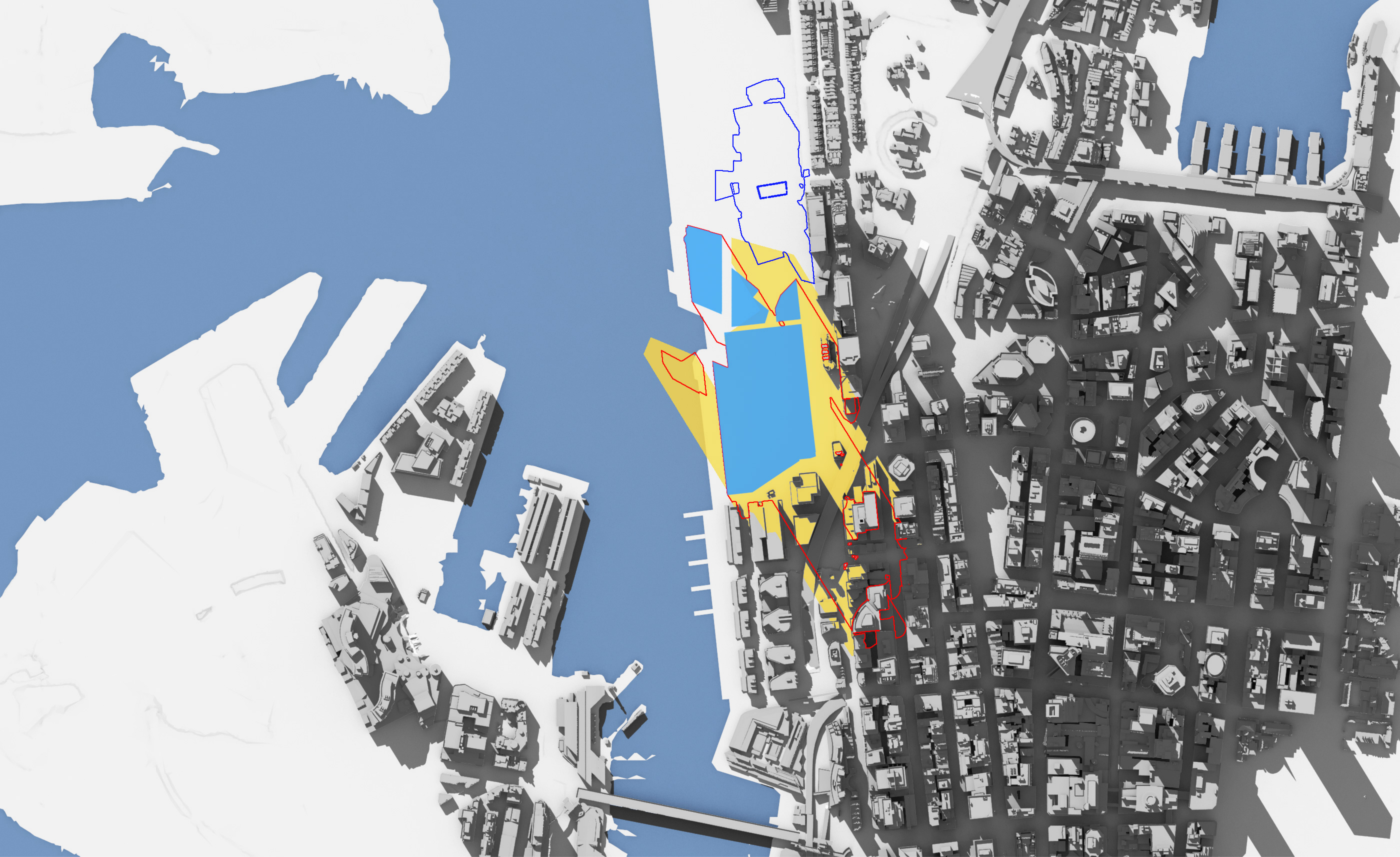
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SEPP Block Shadows

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Building Envelope Shadow

Central Barangaroo
Indicative Building Design

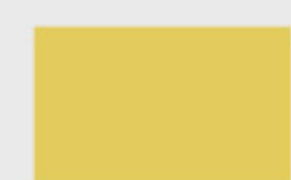
Proposed Concept Plan (Mod 8)
SEPP Block Footprint

Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st June, 2pm



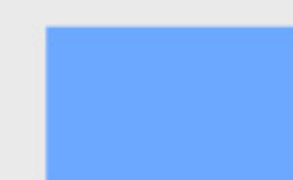
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SEPP Block Shadows



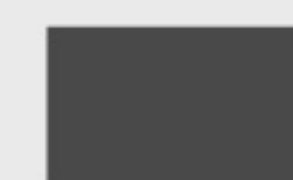
Proposed Concept Plan (Mod 8)
Building Envelope Shadow



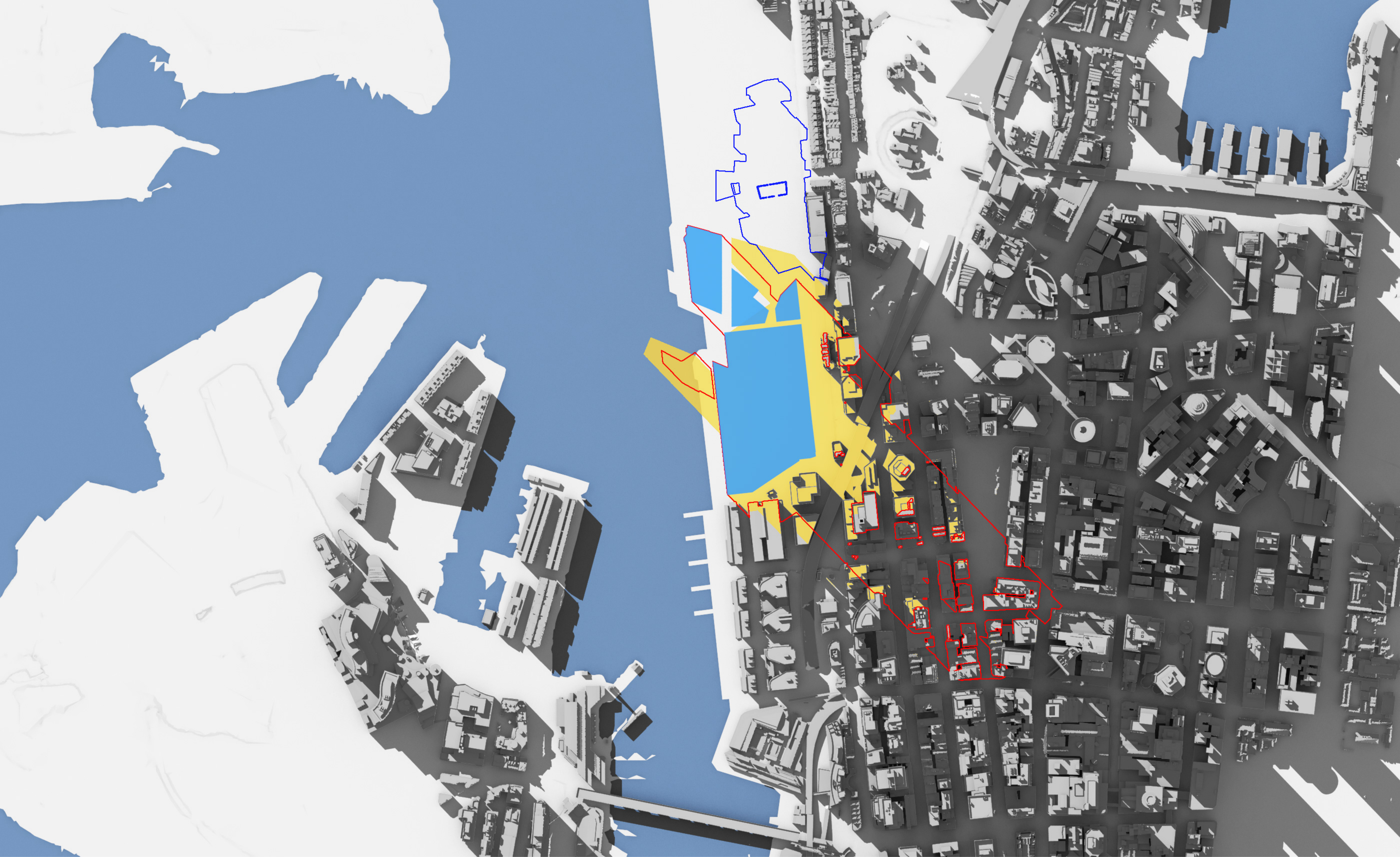
Central Barangaroo
Indicative Building Design



Proposed Concept Plan (Mod 8)
SEPP Block Footprint



Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st June, 3pm

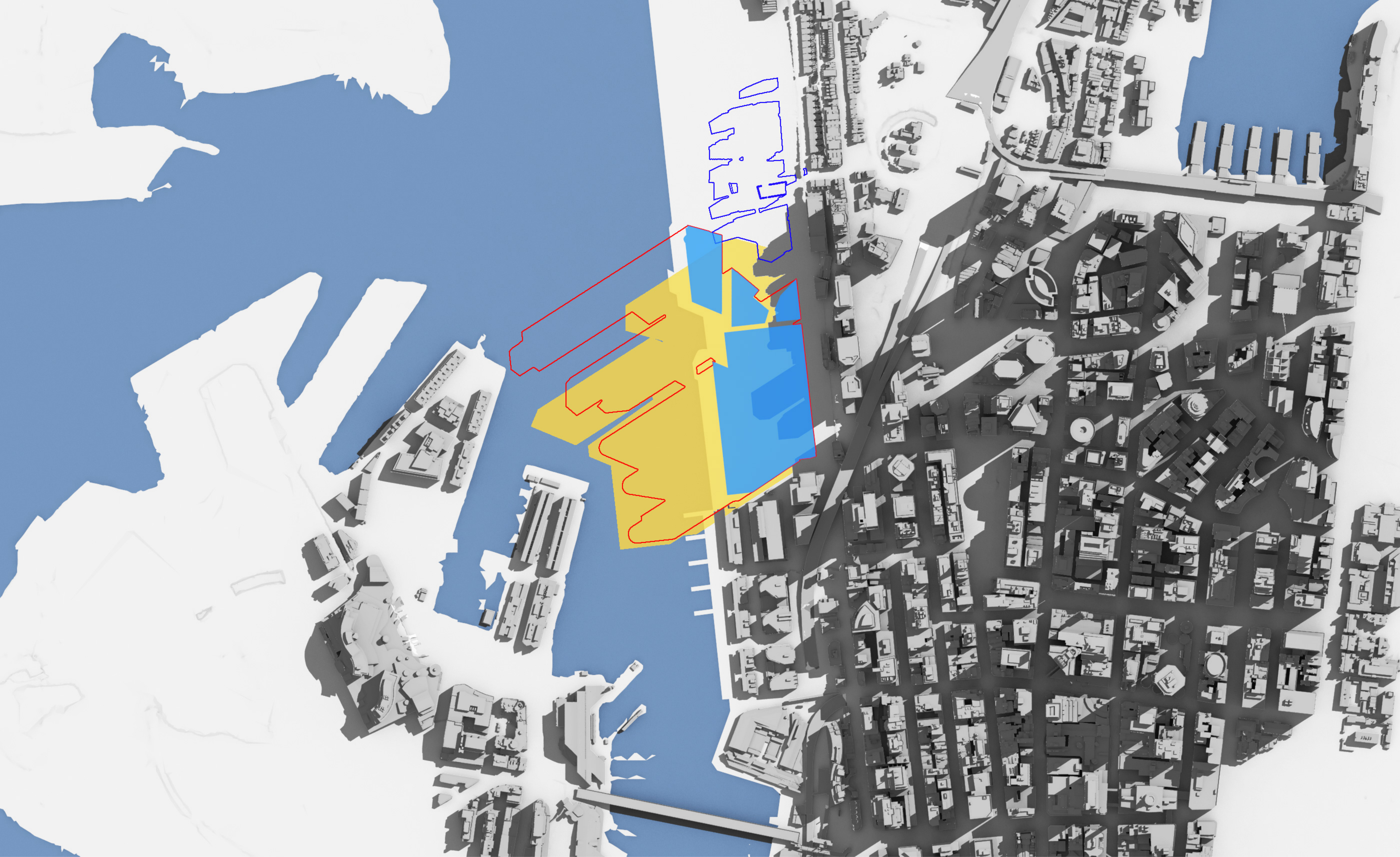
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SEPP Block Shadows

Proposed Concept Plan (Mod 8)
Building Envelope Shadow

Central Barangaroo
Indicative Building Design

Proposed Concept Plan (Mod 8)
SEPP Block Footprint

Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st September, 9am

Approved Concept Plan (Mod 6)
SEPP Block Shadows

Proposed Concept Plan (Mod 8)
Building Envelope Shadow

Central Barangaroo
Indicative Building Design




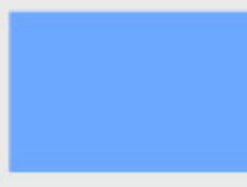

Proposed Concept Plan (Mod 8)
SEPP Block Footprint

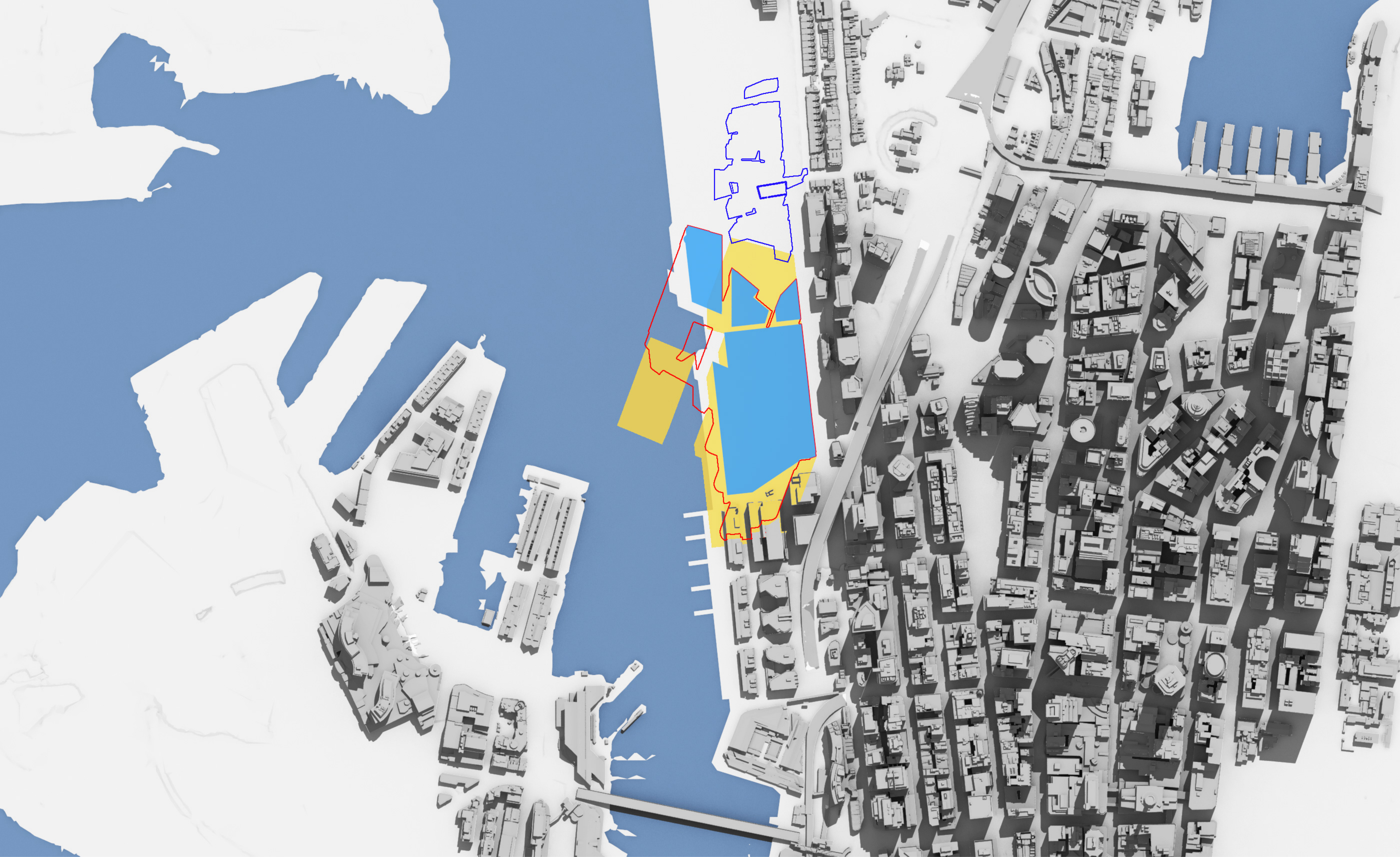
Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

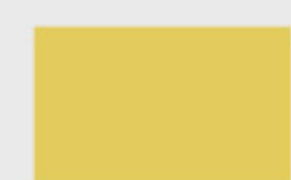
21st September, 10am

 Approved Concept Plan (Mod 6) SEPP Block Shadows	 Proposed Concept Plan (Mod 8) Building Envelope Shadow	 Central Barangaroo Indicative Building Design	 Proposed Concept Plan (Mod 8) SEPP Block Footprint	 Shadows cast by Existing City Buildings
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Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st September, 11am



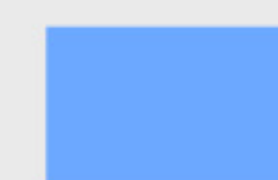
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SEPP Block Shadows



Proposed Concept Plan (Mod 8)
Building Envelope Shadow



Central Barangaroo
Indicative Building Design



Proposed Concept Plan (Mod 8)
SEPP Block Footprint

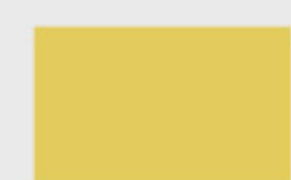


Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st September, 12pm



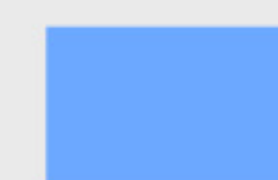
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SEPP Block Shadows



Proposed Concept Plan (Mod 8)
Building Envelope Shadow



Central Barangaroo
Indicative Building Design



Proposed Concept Plan (Mod 8)
SEPP Block Footprint

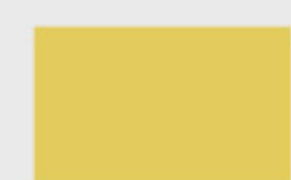


Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

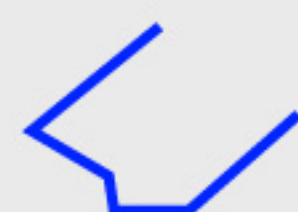
21st September, 1pm



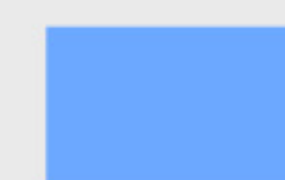
Approved Concept Plan (Mod 6)
SEPP Block Shadows



Proposed Concept Plan (Mod 8)
Building Envelope Shadow



Central Barangaroo
Indicative Building Design



Proposed Concept Plan (Mod 8)
SEPP Block Footprint



Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st September, 2pm

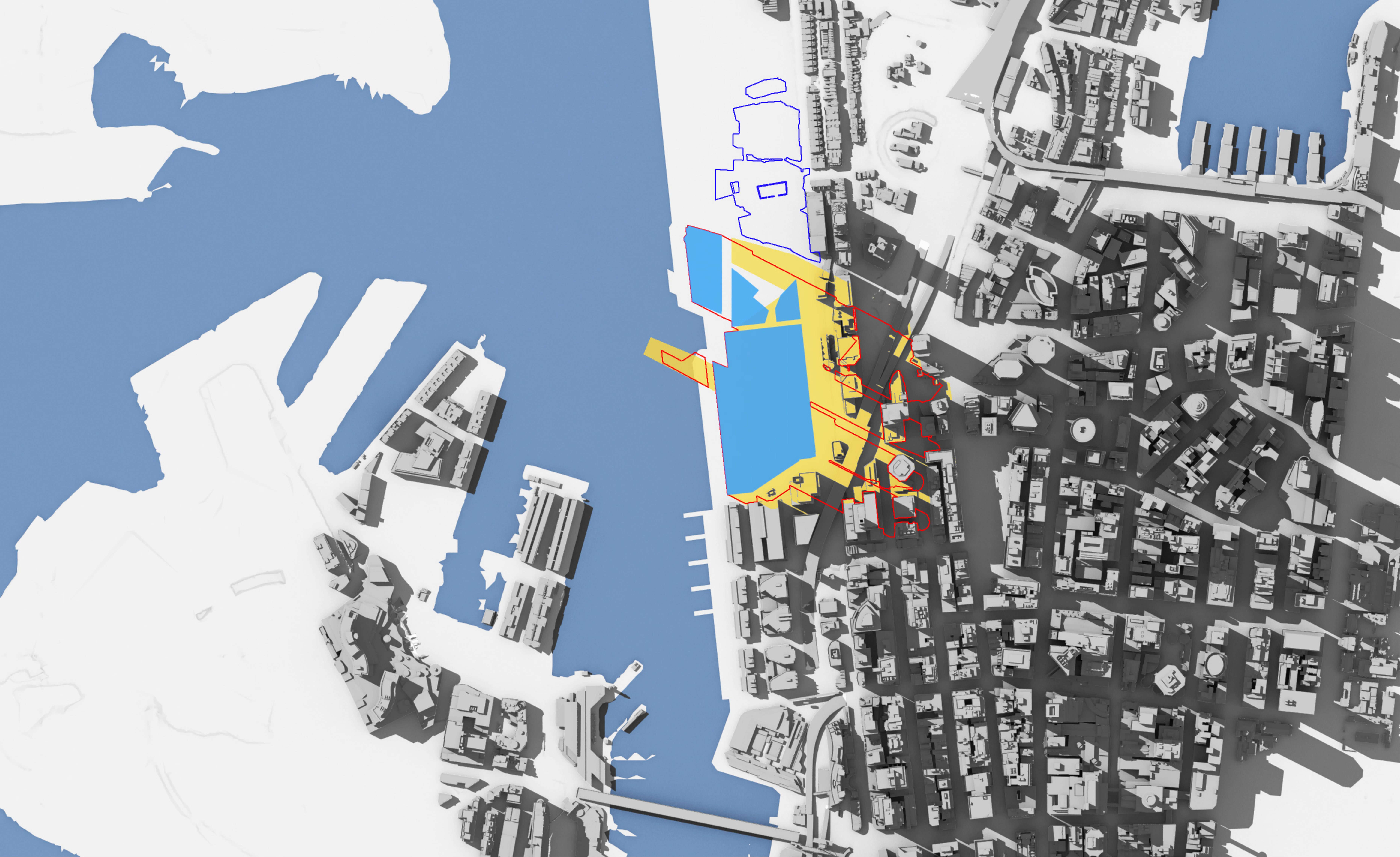
Approved Concept Plan (Mod 6)
SEPP Block Shadows

Proposed Concept Plan (Mod 8)
Building Envelope Shadow

Central Barangaroo
Indicative Building Design

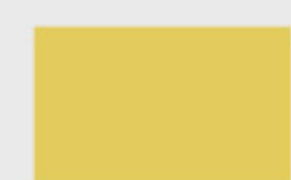
Proposed Concept Plan (Mod 8)
SEPP Block Footprint

Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

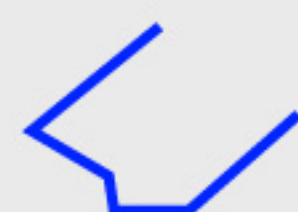
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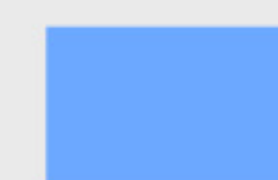
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SEPP Block Shadows



Proposed Concept Plan (Mod 8)
Building Envelope Shadow



Central Barangaroo
Indicative Building Design



Proposed Concept Plan (Mod 8)
SEPP Block Footprint



Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st Dec, 9am



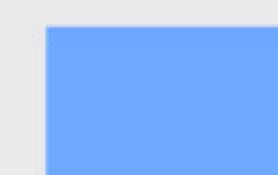
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SEPP Block Shadows



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Building Envelope Shadow



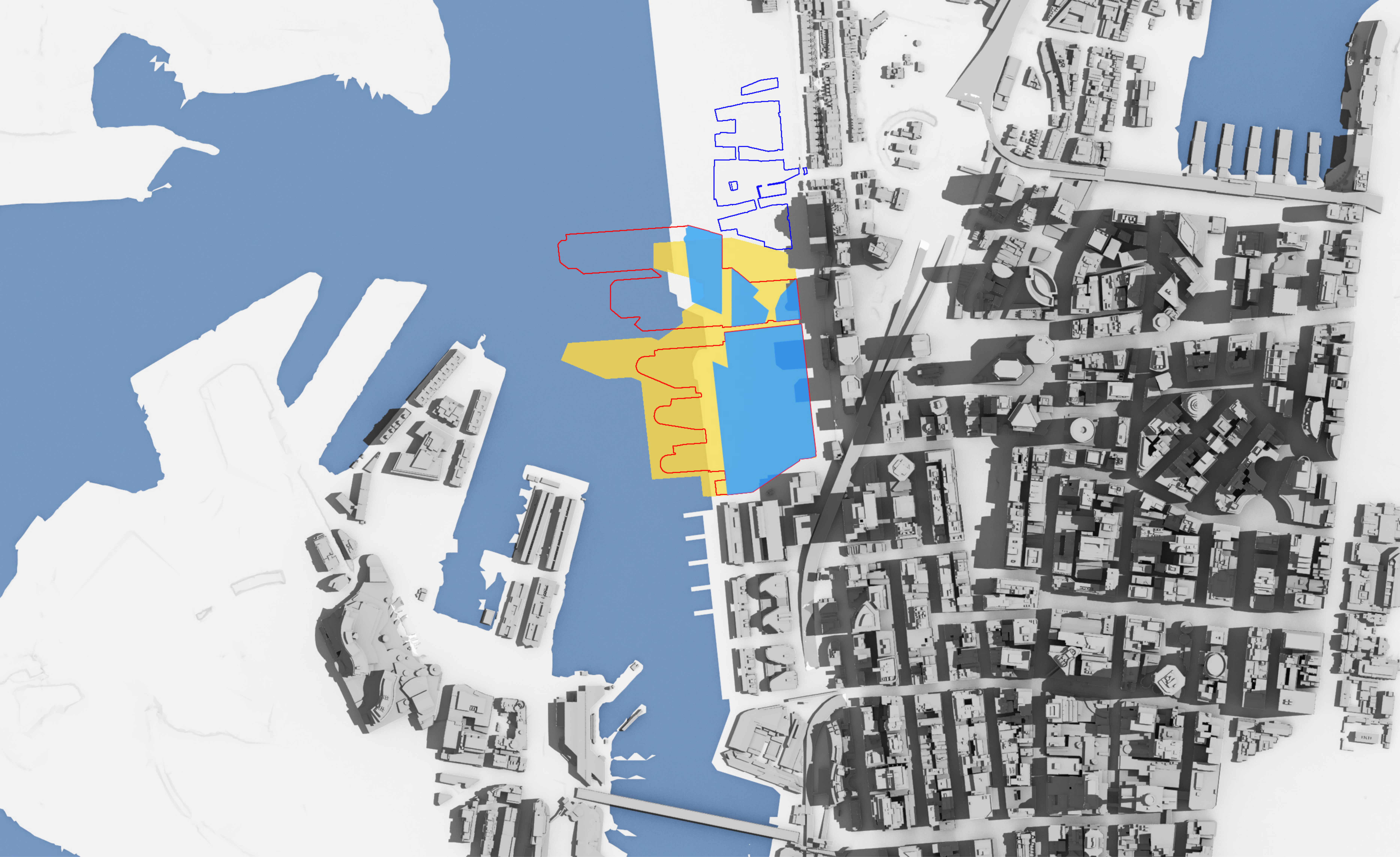
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Indicative Building Design



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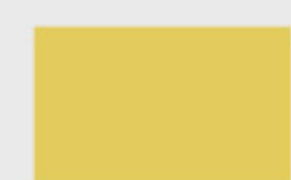


Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

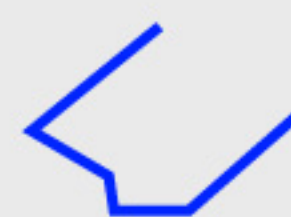
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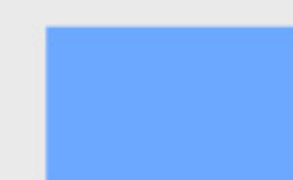
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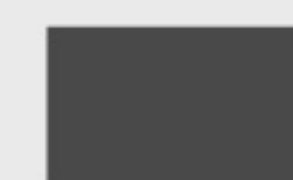
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Building Envelope Shadow



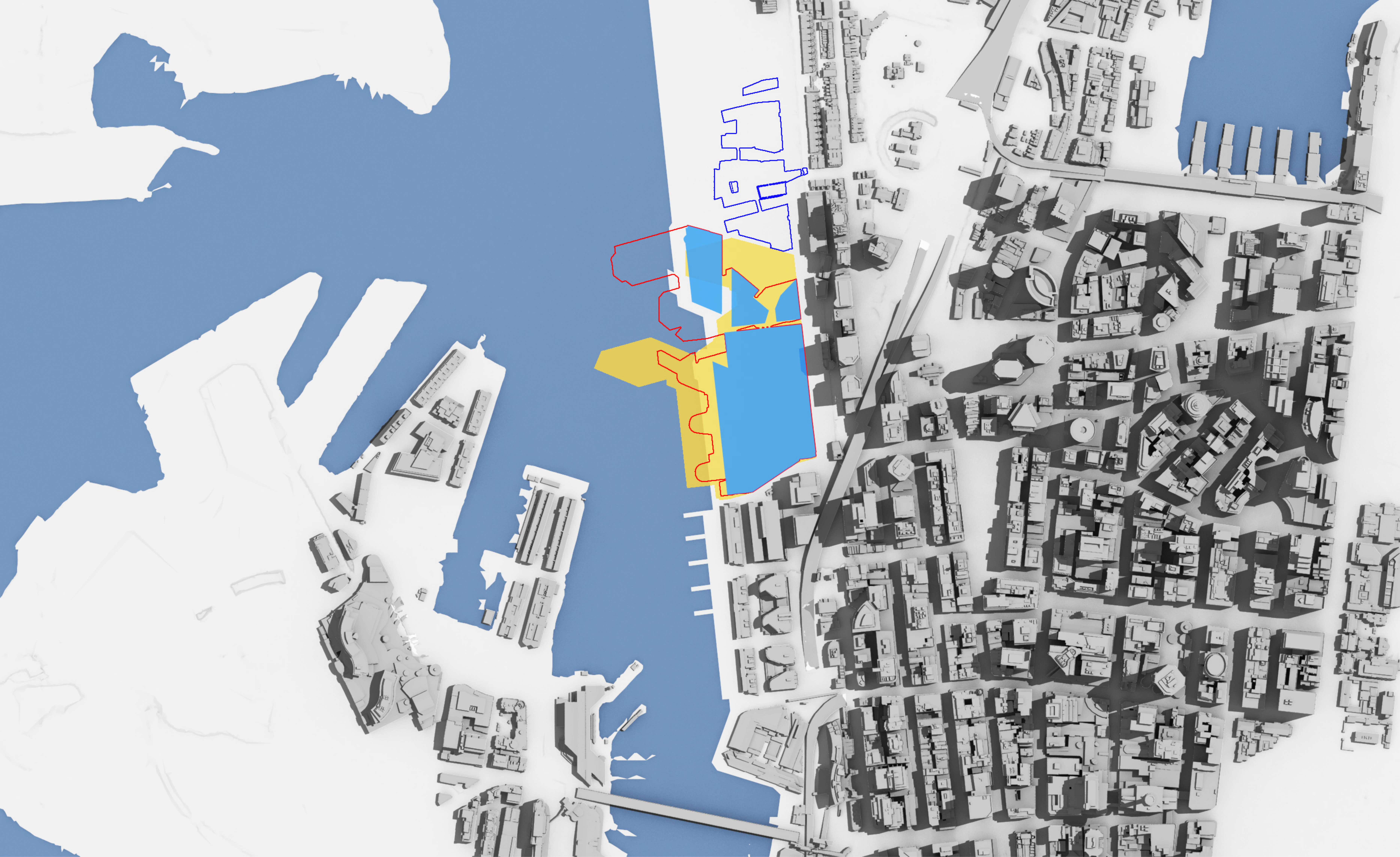
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Indicative Building Design



Proposed Concept Plan (Mod 8)
SEPP Block Footprint



Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st Dec, 11am

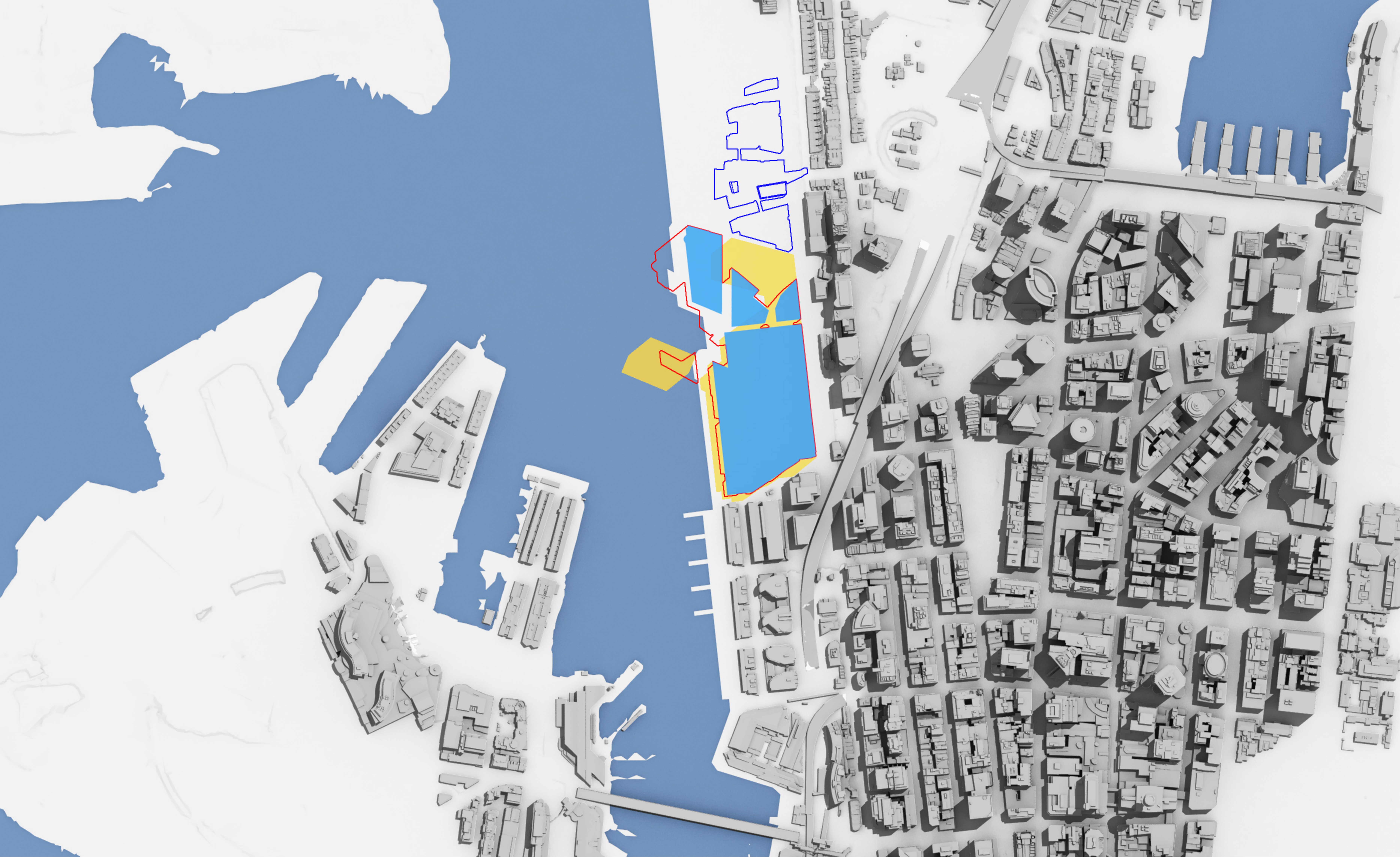
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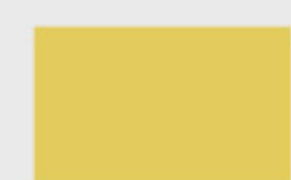
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SEPP Block Footprint

Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st Dec, 12pm



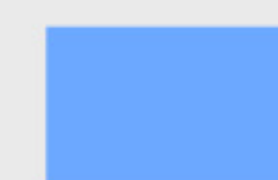
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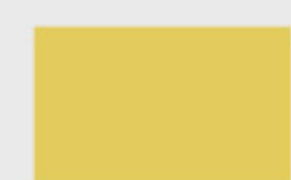


Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st Dec, 1pm



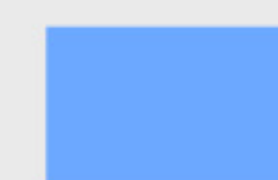
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SEPP Block Shadows



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Building Envelope Shadow



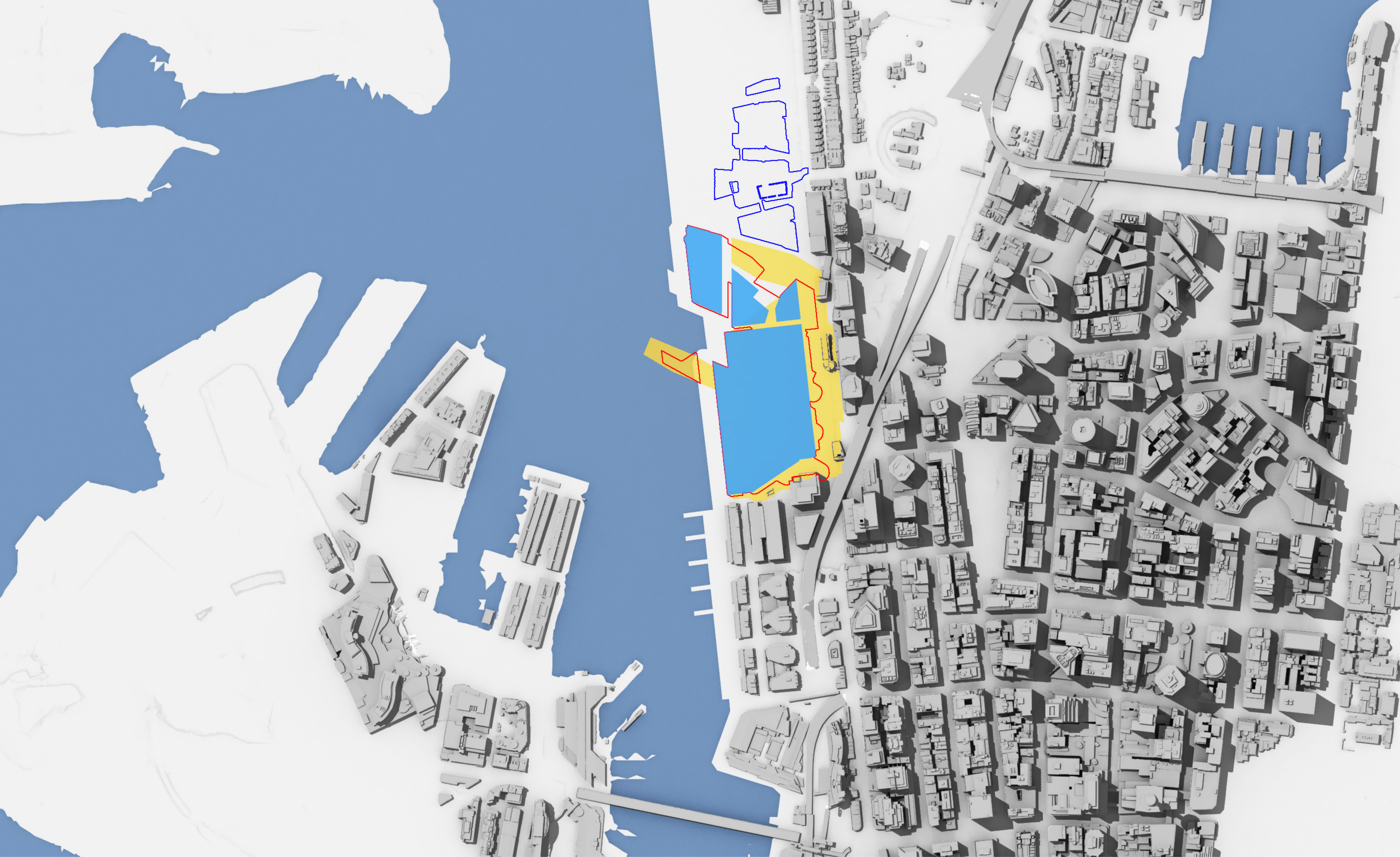
Central Barangaroo
Indicative Building Design



Proposed Concept Plan (Mod 8)
SEPP Block Footprint



Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

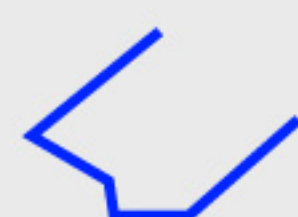
21st Dec, 2pm



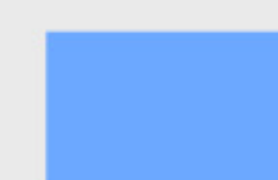
Approved Concept Plan (Mod 6)
SEPP Block Shadows



Proposed Concept Plan (Mod 8)
Building Envelope Shadow



Central Barangaroo
Indicative Building Design



Proposed Concept Plan (Mod 8)
SEPP Block Footprint



Shadows cast by Existing
City Buildings



Barangaroo South Concept Plan Amendment (Mod 8) - SEPP Block Shadow Study

21st Dec, 3pm

Approved Concept Plan (Mod 6)
SEPP Block Shadows

Proposed Concept Plan (Mod 8)
Building Envelope Shadow

Central Barangaroo
Indicative Building Design

Proposed Concept Plan (Mod 8)
SEPP Block Footprint

Shadows cast by Existing
City Buildings

Revised TMAP

Arup

Lend Lease Pty Ltd

**Barangaroo South Concept Plan
(MP06_0612 MOD8)**

**Transport Management and
Accessibility Plan**

Rev A | 2 September 2015

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 222061-15

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ARUP

Executive Summary

This report supports a modification to Concept Plan (MP06_0162) submitted to the Minister for Planning and Infrastructure pursuant to Section 75W of Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act), addressing the relevant Director General Requirements (DGRs)

This Transport Management and Accessibility Plan (TMAP) report addresses the changes that have come about as a result of the proposed floor space modifications as well as any changes to the future public transport plans announced by the NSW Government. Although there have been changes in the Gross Floor Area (GFA) and site layout, the transport principles and assumptions for the analysis has remained consistent with the original TMAP for the Barangaroo South site prepared by the NSW Government in September 2008 - including the rates for calculating population, parking and trip generation, as well as the journey to work mode share target of only 4% trips by car.

The Barangaroo site has been divided into three distinct redevelopment areas (from north to south) – the Headland Park, Barangaroo Central and Barangaroo South (also known as Barangaroo Stage 1). Although the Concept Plan Amendment only relates to Barangaroo South, this report considers the whole precinct to maintain consistency of the analysis when compared to previous traffic studies for the overall Barangaroo site.

Planning for Barangaroo included a process of developing a Concept Plan that provided for a public recreation area and a mixed use area. The proposed modification to the Concept Plan seeks to:

- Relocate the landmark building (Block Y) from the harbour onto the land in the Barangaroo South site in front of the existing Blocks 4A, B and C;
- Revise the layout of Blocks 4A-C;
- Amend the size and location of the Southern Cove and public domain;
- Redistribute the GFA, public domain and land uses across development blocks 1-3, 4A-C, X and Y;
- Increase the maximum GFA on the site to provide for additional GFA within the hotel building and redistribution of land uses;
- Increase the height of the buildings within modified 'Block 4' and the relocated Block Y; and
- Amend the conditions of the Concept Approval to reflect the modifications to development.

The latest modification of the Concept Plan (Mod 8) seeks approval for total floor area for the whole site of 605,911m² GFA across Barangaroo, comprised of:

- (a) a maximum of 183,028m² and a minimum of 84,595m² residential GFA;
- (b) a maximum of 76,000m² GFA for tourist uses (of which a maximum of 59,000m² may be located in Barangaroo South);
- (c) a maximum of 34,000m² GFA for retail uses (of which a maximum of 30,000m² may be located in Barangaroo South);

(d) a maximum of 5,000m² GFA for active in the Public Recreation zone (3,500m² of which will be in Barangaroo South); and

(e) a minimum of 12,000m² GFA for community uses that may be located within the Public Recreation or Mixed Use zones.

For the purposes of this assessment, particularly with respect to the traffic generation and traffic modelling undertaken, a mix land use types has been assumed for Barangaroo based the per land use category GFA limits nominated above, as proposed to be modified. These are as follows:

- 342,334m² commercial;
- 48,200m² hotel/tourist;
- 6,848m² public;
- 167,479m² residential;
- 26,500m² retail/other uses; and
- 14,500 m² active/community uses.

The TMAP report has considered the transport recommendations and findings of a number of key planning documents relevant to the Barangaroo Precinct, those being:

- Sydney City Centre Access Strategy
- Barangaroo Integrated Transport Plan;
- NSW Long Term Transport Masterplan;

Initial planning approval for Barangaroo South was based on the principle of achieving high usage of public transport, walking and cycling as a method of travel to work, with a target of 4% by car. The mode split targets have been largely retained in this TMAP report, with the exception of ferry trips. With the provision of a new ferry hub at Barangaroo South it is expected that a minimum of 4% of all journey to work trips to Barangaroo will be undertaken via ferry.

Traffic analysis has been undertaken using the same transport principles and assumptions that were used for TMAP September 2008 including the rates for calculating population, parking and trip generation. The analysis has considered the cumulative traffic impacts arising from the changes in GFA relating to both Barangaroo South (i.e. the proposed modification) and the Barangaroo Central precinct. A comparison of the traffic generation forecast under the Modified Concept Plan (Mod 2) and the proposed modification (Mod 8 + 9) is listed in Table 1 below.

Table 1 Traffic generation comparison

Time Period	Direction	TMAP 2008 (Mod 2 GFA)	TMAP Mod 4	TMAP Mod 8	TMAP Mod 8 + Mod 9
AM Peak Hour	In	348	347	336	349
	Out	260	268	317	369
	Two-way	608	614	653	718
PM Peak Hour	In	299	290	390	424
	Out	452	447	389	398
	Two-way	751	736	779	821

A corridor traffic model (using the LinSig 3.2 software package) was developed to assess the future road network performance arising from the Concept Plan modification. The modelling has considered the cumulative traffic impacts of the Barangaroo development, including traffic generated by Barangaroo Central and Headland Park. The modelling indicates little difference in the road network performance due to the minor traffic increase arising from the Concept Plan modification. Changes in vehicle delays are relatively minor in both the AM and PM commuter peak hours.

Car parking will be provided at the same parking ratios as used in TMAP September 2008, excluding for the hotel. Approximately 1,700 car parking bays are envisaged for the residential component of the development - based on an indicative dwelling mix. The quantum of traffic generated by the residential uses is based on the total number of dwellings provided and independent of the number of resident parking bays. The number of on-street parking spaces within Barangaroo has reduced from 275 envisaged in the TMAP September 2008 to 40.

The Barangaroo precinct will be served by a number of pedestrian and public transport enhancements planned to be delivered in the coming years, including:

- Wynyard Walk pedestrian bridge and tunnel;
- City Walk pedestrian bridge;
- Expansion of the Sydney CBD cycleway network;
- Upgrades to Wynyard Station;
- Introduction of new bus routes to Barangaroo and Walsh Bay via the city centre;
- Provision of new taxi ranks within the Barangaroo precinct;
- Construction of a new ferry hub at Barangaroo; and
- Construction of the CBD and South East Light Rail link;

These improvements will accommodate the future population of the Barangaroo precinct by providing a number of viable (non private vehicle) transport options – meeting the mode split target for journey to work trips by private vehicle of 4%. The works will be delivered primarily from government agencies with the exception of the commitments made by Lend Lease under their Project Development Agreement with the Barangaroo Delivery Authority.

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1 Introduction

1.1 Background

This report supports a modification to Concept Plan (MP06_0162) submitted to the Minister for Planning pursuant to Section 75W of Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The proposed application is the outcome of negotiations between Lend Lease and the NSW Government, including the Barangaroo Delivery Authority, to relocate the approved landmark hotel building site from a pier over Sydney Harbour to a location on land elsewhere on the Barangaroo South site. It also incorporates a number of related changes to the urban design guidelines to maintain an appropriate built form and public domain outcome for the Barangaroo South site.

1.2 Overview of the Proposed Modification

The proposed modification to the Concept Plan seeks to:

- Relocate the landmark building (Block Y) from the harbour onto the land in the Barangaroo South site in front of the existing Blocks 4A, B and C;
- Revise the layout of Blocks 4A-C;
- Amend the size and location of the Southern Cove and public domain;
- Redistribute the GFA, public domain and land uses across development blocks 1-3, 4A-C, X and Y;
- Increase the maximum GFA on the site to provide for additional GFA within the hotel building and redistribution of land uses;
- Increase the height of the buildings within modified 'Block 4' and the relocated Block Y; and
- Amend the conditions of the Concept Approval to reflect the modifications to development.

It is also proposed to amend Part 12 of Schedule 3 of the Major Development SEPP to reconcile the SEPP with the modifications to the Concept Plan, including amending the location of the RE1 and B4 Mixed Use zone boundaries.

1.3 Site Location

Barangaroo is located on the north western edge of the Sydney Central Business District. It is 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 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 Headland Park, Barangaroo Central and Barangaroo South. Concept Plan (Mod 8) relates to Barangaroo South only as shown in Figure 1.



Figure 1 Indicative Site Boundary for Barangaroo South

1.4 Planning History

On 9 February 2007 the Minister approved a Concept Plan for the site and on 12 October 2007 the land was rezoned to facilitate its redevelopment. The Approved Concept Plan allowed for a mixed use development involving a maximum of 388,300m² of gross floor area (GFA) contained within 8 blocks on a total site area of 22 hectares.

A condition of consent also required two enlarged water intrusions into the Barangaroo site, one at the northern end and one at the southern end and the creation of a natural northern headland.

Modification No. 1 was approved in September 2007 which corrected a number of minor typographical errors.

On 25 February 2009 the Minister approved Modification No. 2 to the Concept Plan. The Approved Concept Plan as modified allowed for a mixed use development involving a maximum of 508,300m² of GFA contained within 8 blocks on a total site area of 22 hectares.

On 11 November 2009 the Minister approved Modification No. 3 to the Concept Plan to allow for a modified design for the Headland Park and Northern Cove. The Approved Concept Plan as modified allowed for a mixed use development involving a maximum of 489,500m² of GFA contained within 7 blocks on a total site area of 22 hectares.

On 16 December 2010 the Minister approved Modification No. 4 to the Concept Plan. The Approved Concept Plan as modified allowed for a mixed use development involving a maximum of 563,965m² of GFA contained within 7 blocks on a total site area of 22 hectares, an increase in height of a number of the proposed towers within Barangaroo South, the establishment of the new pier and landmark building extending into the Harbour; and reconfiguration and activation of the public waterfront area through the introduction of uses including retail and residential to the west of Globe Street.

Modification No. 5 was withdrawn.

Modification No.6 was approved in March 2015 to re-align a number of the block boundaries without changing the overall GFA.

Modification No.7 was approved in April 2015 which permitted the use of the concrete batching plant over the entire site, without changing the overall GFA.

1.5 Purpose of Report

This report has been prepared in support of the Concept Plan Amendment (MP06_0162 MOD 8), addressing the relevant Director General Requirements. This document was prepared with reference to the amendment to the “Barangaroo Transport Management and Accessibility Plan, Request for Detailed Proposal - Barangaroo South” issued by the NSW Government in 2008 (TMAP September 2008) and the “Transport Management and Accessibility Plan Supplementary Report” prepared by Arup in 2010 (Supplementary TMAP 2010). Since the 2008 TMAP was prepared, there have been some changes which have implications for the precinct, including:

- Modifications to the planned floor space mix;
- Changes to the future public transport network serving the precinct; and
- Adjustments in the road network layout (both internal and external to the site)

The main transport principles have remained unchanged including journey to work mode share target of only 4% trips by car.

1.6 Responses to Director Generals Requirements

Table 2 below summarises the responses to the transport related issues addressed in the DGR MP06_0162 MOD 8 – key issues 8 (transport management, traffic and car parking and vehicular access) and 9 (pedestrian and cycle access).

Table 2: DGR Summary

DGR No.	Issue	Report Reference
8 - Transport Management, Traffic & Car Parking and Vehicular Access		
8.1	Undertake an assessment of future transport needs associated with Barangaroo Central and the Headland Park, including a clear understanding of the travel task for all modes at different times of the day (peak, off-peak and other peak periods relevant to differing uses) and week; and confirmation or modification (with justification) to the AM and PM peak commute mode share targets for Barangaroo as outlined in the Barangaroo Integrated Transport Plan 2012.	Section 3.2 & 0
8.2	Analyse the operation of existing and future transport networks (all modes) to understand the implications for Barangaroo, The analysis of the future road network operations needs to focus on intersections in the north-west quadrant of the CBD in the vicinity of Barangaroo, in particular, address the road network in the King Street Wharf area to ensure that intersections such as Erskine Street and Lime Street and Lime Street itself are modified to cater for the different traffic demands that Barangaroo South will bring to the network.	Section 4.3 & 4.4
8.3	Analyse car parking provision and how traffic generation (number of vehicles and time of access) will be managed in response to capacity limitations on the road network, The car parking breakdown shall identify all approved car parking numbers, and all potential car parking numbers across the whole of the Barangaroo site.	Section 4.5

DGR No.	Issue	Report Reference
8.4	Undertake a corridor model analysis of the road network, including an analysis of traffic generation and circulation, and service vehicle arrangements as a consequence of the modification; and demonstrate the potential to accommodate additional vehicular movements (including private vehicles, buses, commercial traffic and cyclists) in the surrounding road network.	Section 4.4
8.5	Undertake an assessment of the public transport network and associated pedestrian linkages and demonstrate that additional people movements can be accommodated by the surrounding public transport network.	Section 4.6 through to Section 4.13.
8.6	Outline late night transport provision to support the hotel and casino.	Section 4.14
8.7	Outline the timing and responsibility for delivering the transport network to serve Barangaroo,	Section 5.4
8.8	Prepare a comprehensive Traffic Management and Accessibility Plan, including an assessment of all of the above matters and: <ul style="list-style-type: none"> - cumulative regional traffic impacts, including but not limited to, local and regional intersections and road improvements, and vehicular access options; - impacts from changes to Barangaroo South (MOD 9); - amendments to accommodate future bus service provision on Hickson Road (in consultation with Transport for NSW); - identify provision for taxi ranks and coach parking on site; - the timing and cost of infrastructure works and identification of funding; - package of travel demand management measures for workers, residents and visitors to the site. - emergency vehicle access arrangements; and - proposed loading dock provisions and access arrangements to loading docks and car parks. 	This document
9 - Pedestrian & Cycle Access		
9.1	Outline the future cycleway network and demonstrate direct cycle connections between Barangaroo South and the strategic cycleway network as outlined in the Sydney City Centre Access Strategy.	Section 4.7
9.2	Outline provisions for walking and demonstrate provision for direct walking connections	Section 4.6

In addition to addressing the above DGRs, the traffic modelling contained within this TMAP report addresses Condition C3A of the approved Concept Plan in relation to the proposed Modification 8.

2 Transport and Access Planning Framework

2.1 Methodology

The TMAP September 2008 was derived from the iterative process that commenced in 2006. This involved refinement of the Barangaroo concept and development details, establishment of the statutory planning and approvals framework, and preparation of the initial Transport concept based on investigation of various transport and access matters. The Statement of Commitments and development of the Concept Plan Modification facilitated the more detailed assessment of transport and access matters in a series of supporting studies including detailed Paramics modelling. These have provided the basis for the TMAP September 2008. This previous work informed this TMAP report.

Since the TMAP September 2008 (Mod 2) was released a Transport Report was carried out to support the Modified Concept Plan (Mod 4). The study used reiterated the transport principles outlined in the TMAP September 2008 report as a basis for the analysis of the traffic impacts for the modification. Although the Mod 4 study is considered, this current TMAP report uses the TMAP September 2008 and associated reports as the basis for comparison, given the transport modelling and road network analysis underpinning the 4% car mode share was undertaken at this point in time.

2.2 Service Principles

The service principles of Barangaroo with regards to mode split targets, opportunity to create a transport hub and provide good access to public transport remain largely unchanged from that described in the September 2008 TMAP. These principles are outlined below.

- meet the mode split targets and provide access to existing public transport bus and rail services;
- provide access to public transport to/from the site without prejudicing the majority of existing passengers to and from the CBD;
- provide the opportunity for integration with envisaged future public transport projects;
- not preclude the opportunity to create a major multimodal transport interchange with ferry, rail and bus services; and
- provide safe and convenient access to all, including the mobility impaired.

2.3 Scope of Investigations

2.3.1 Sydney City Centre Access Strategy

The Sydney City Centre Access Strategy was released by the NSW Government in December 2013 following a period of public review. The document outlines the NSW Government's key strategies for transport access to, and within, the Sydney CBD. A summary of the key elements of the strategy relevant to Barangaroo include:

- Commitment to the construction of a new ferry hub at Barangaroo South and new ferry routes to provide more opportunities to access Barangaroo via public transport ;
- New bus routes to run to Barangaroo and Walsh Bay via the city centre, Napoleon Street and Hickson Road, with the major bus stop serving the precinct to in the area surrounding Wynyard Station on York, Clarence and Kent Streets;
- Commitment to the completion of the Wynyard Walk bridge and tunnel which will provide a direct and accessible pedestrian connection between Barangaroo and Wynyard Station;
- Identification of new taxi rank locations within Barangaroo South;
- Commitment to the implementation of light rail along George Street through the CBD;
- Completion of the city cycleway network, including new bi-directional cycle routes on Castlereagh Street and Pitt Street and the identification of new routes into Barangaroo via the Pyrmont Bridge and Sydney Harbour Bridge cycleways;
- Upgrades to Wynyard Station including better interchange facilities for rail, bus and ferry customers at the station and at Barangaroo; and
- Improving visitor information including wayfinding and signage to CBD destinations and transport hubs in major visitor precincts such as Barangaroo.

2.3.2 NSW Long Term Transport Masterplan

The NSW Long Term Transport Master Plan was released in December 2012 and outlines a 20 year plan for the direction of transport services across NSW. The plan presents an integrated approach to transport planning and identifies the roles different modes of transport play in meeting the future needs of the State population.

The Master Plan aims to integrate public transport services to maximise future use as well as improve the overall customer experience. The master plan discusses the implementation of the 'Opal' card – the future integrated public transport ticketing system for NSW.

2.3.3 Barangaroo Integrated Transport Plan

The Barangaroo Integrated Transport Plan (BITP) was released in August 2012, which was prepared by a taskforce chaired by Transport for NSW and included City of Sydney, BDA, Lend Lease and other Government agencies. The plan outlines a series of transport strategies and actions to accommodate the significant employment growth in the northern CBD over both the short and long term. A selection of the recommended actions includes:

- Plan for investigation of a future bus corridor along Hickson Road in lieu of light rail;
- To accommodate the significant increase passenger throughput over the short and long term (up to 26%), prepare a costed implementation plan to upgrade the station and improve capacity;
- Investigate options to relieve congestion at the Wynyard bus interchange and increase the number of bus stops and layovers;
- Construct Wynyard Walk, City Walk Bridge and other bridges over Hickson Road as per existing planning approvals;
- Improving cycling access to Barangaroo by extending the City of Sydney's bicycle network, including upgrading existing bicycle shoulder lanes on Hickson Road; and
- Locate sufficient taxi ranks in consultation with City of Sydney, BDA and the Taxi Council.

3 Barangaroo Development

3.1 Proposed Maximum GFAs

The latest modification of the Concept Plan (Mod 8) seeks approval for total floor area for the whole site of 605,911m² GFA across Barangaroo, comprised of:

- (a) a maximum of 183,000m² of residential GFA;
- (b) a maximum of 76,000m² GFA for tourist uses (of which a maximum of 59,000m² may be located in Barangaroo South);
- (c) a maximum of 34,000m² GFA for retail uses (of which a maximum of 30,000m² may be located in Barangaroo South);
- (d) a maximum of 5,000m² GFA for active in the Public Recreation zone (3,500m² of which will be in Barangaroo South); and
- (e) a minimum of 12,000m² GFA for community uses that may be located within the Public Recreation or Mixed Use zones.

For the purposes of this assessment, particularly with respect to the traffic generation and traffic modelling undertaken, a mix land use types has been assumed for Barangaroo based the per land use category GFA limits nominated above, as proposed to be modified. These are as follows:

- 342,334m² commercial;
- 48,200m² hotel/tourist;
- 6,848m² public;
- 167,479m² residential;
- 26,500m² retail/other uses; and
- 14,500 m² active/community uses.

3.1.1 Barangaroo South

The latest modification of the Concept Plan seeks approval for total floor area for the Barangaroo South site of 535,186m² GFA. This comprises of:

- (a) a maximum of 154,000m² of residential GFA;
- (b) a maximum of 59,000m² GFA for tourist uses;
- (c) a maximum of 30,000m² GFA for retail uses;
- (d) a maximum of 3,500m² GFA for active uses in the Public Recreation zone, which may include Community Uses.

For the purposes of this assessment, a mix land use types has been assumed for the Barangaroo South Site based the per land use category GFA limits nominated above, as proposed to be modified. These are as follows:

- 312,109m² commercial;
- 48,200m² hotel/tourist;
- 3,598m² public;
- 143,479m² residential; and
- 24,300m² retail/other uses.

In addition, up to 3,500m² of active uses are planned for Barangaroo South

3.1.2 Barangaroo Central

It is understood that, following preliminary discussions with the Barangaroo Delivery Authority, there are likely to be future changes to the permissible floor space in the Barangaroo Central development. This has been considered for the purposes of the traffic modelling and forecasting exercise. Based on early planning for the precinct, the assumed floor space mix for Barangaroo Central is as follows:

- 25,000m² commercial;
- 20,000m² public;
- 75,000m² residential; and
- 5,000m² retail/other uses.

3.1.3 Total Floor Space

The GFA allocation per activity is shown in Table 3 for the above mentioned approvals and modifications of the Concept Plan.

Table 3 Total GFA's for the Barangaroo Development

	Commercial	Hotel/Tourist	Public	Residential	Retail/ Other Uses	Total
Consolidated Concept Plan from 2007						
Consolidated Concept Plan	253,000	35,800	5,000	75,000	31,000	399,800
TMAP September 2008 – Concept Plan Modification for additional commercial (Mod 2)						
Concept Plan	373,000	35,800	5,000	75,000	31,000	519,800
Modified Concept Plan for Headland Park (Mod 3)						
Concept Plan (Mod 3)	371,500	30,000	4,750	64,000	30,750	501,000
Mod 4						
Barangaroo South	323,700	33,000	13,000	99,763	33,777	503,240
Barangaroo Central	30,225	0	3,250	24,000	1,750	59,225
Concept Plan (Mod 4)	353,925	33,000	16,250	123,763	35,527	562,465
Mod 8						
Barangaroo South	312,109	48,200	3,598	143,479	24,300	531,686
Barangaroo Central	30,225	0	3,250	24,000	1,750	59,225
Active/Community Uses						14,500
Concept Plan (Mod 8)	342,334	48,200	6,848	167,479	26,500	605,911

3.2 Site Population

The assumptions used for estimating the population numbers are summarised in Table 4 below. These population assumptions are consistent with those previously utilised in the TMAP September 2008.

Table 4 Site Population Assumptions

Land Use	Floor Space	Density	Site Population
Commercial	337,109m ²	1 employee / 20m ² GFA	16,855
Hotel/Tourist	48,200m ²	1 employee / 20m ² GFA	2,410
Public	23,598m ²	1 employee / 20m ² GFA	1,180
Retail/Other Uses	32,580m ²	1 employee / 20m ² GFA	1,629
Sub-Total: Workers			22,074
Workers On-site per Day¹			20,198
Residential	218,479m ²	2 residents / 100m ² GFA	4,370

¹ Consistent with previous TMAPs, it has been assumed 8.5% of workers would not be on-site on a typical day

3.3 Mode Share Targets

Initial planning approval for Barangaroo South was based on the principle of achieving high usage of public transport, walking and cycling as a method of travel to work. Journey to work mode share by car is targeted at 4% which will be achieved through minimal on-site parking and promotion of travel demand management plans. These mode split targets were adopted in the Barangaroo Integrated Transport Plan.

The overall mode split targets have been largely retained for the Barangaroo site from the TMAP September 2008, with the exception of ferry trips. The current TMAP assigns only a 1% mode to ferry for journey to work. With the provision of a new ferry hub at Barangaroo South (further described in section 0), it is expected that a minimum of 4% of all journey to work trips to Barangaroo will be undertaken via ferry. This is at the lower end of the target ferry mode share outlined in the Barangaroo Integrated Transport Plan – similar to the rest of the northern CBD. The BITP notes that potentially up to 8% of works trips via ferry is achievable should existing travel patterns for workers near Circular Quay be replicated at Barangaroo. Large tenants in this area already record ferry mode share as high as 7% indicating that there is good potential for an increased ferry mode share with increased services and improved frequencies.

The increase in ferry mode share will likely result in a reduction of other public transport modes. A reduction of 2% by train and 1% by bus has been assumed in this study.

Table 5 Mode Share Targets

Mode	TMAP Mod2	TMAP Mod8	Number
Car (driver / passenger)	4.0%	4.0%	808
Bus / Light Rail	20.0%	19.0%	3,636
Train	63.0%	61.0%	12,321
Ferry	1.0%	4.0%	808
Other (pedestrian, cyclists, motorcycles, taxi)	12.0%	12.0%	2,424
Total	100%	100%	20,198

4 Transport and Access Service Strategy

4.1 Site Access

The site access arrangements for Barangaroo South are shown in Figure 2 for:

- Pedestrians
- Cyclists
- Service vehicles
- Cars to basement and hotel

The key pedestrian routes are focused on Wynyard Walk which provides connection to Wynyard Station for train and bus passengers. This new pedestrian infrastructure, as provided for in the Sydney City Centre Access Strategy, will provide a direct and accessible pedestrian connection between Barangaroo and Wynyard Station.

Cyclists will access the basement bicycle parking facility via a dedicated bicycle entry on Hickson Road. Cyclists will use Hickson Road, Sussex Street and Napoleon Street bicycle routes for access.

Service vehicles access the basement loading area from Globe Street and arrive and depart from Hickson Road.

Emergency vehicles gain access within the precinct along Globe Street and Lime Street where they can stop to gain foot access to City Walk, Union Walk and Transport Place. Emergency vehicles may also traverse Shelley Street and Sussex Street/Hickson Road.

Cars access the Stage 1A basement parking areas via vehicle ramps onto Globe Street and Lime Street with a basement egress available onto Hickson Road opposite Napoleon Street. Two vehicular entry and exit points are currently envisaged for cars utilising the Stage 1B basement, with access provided from the northern end of Globe Street.

The primary vehicle access route into the hotel will be via Hickson Road and Globe Street. Key aspects of the access strategy for the hotel include:

- A new porte-cochere to be located within the site boundary;
- Entry and exit for vehicles utilising valet parking to be located at the northern end of Lime Street within the porte-cochere; and
- A consolidated basement entry/exit for service vehicles, as well as self-park patrons and residents further south on Lime Street

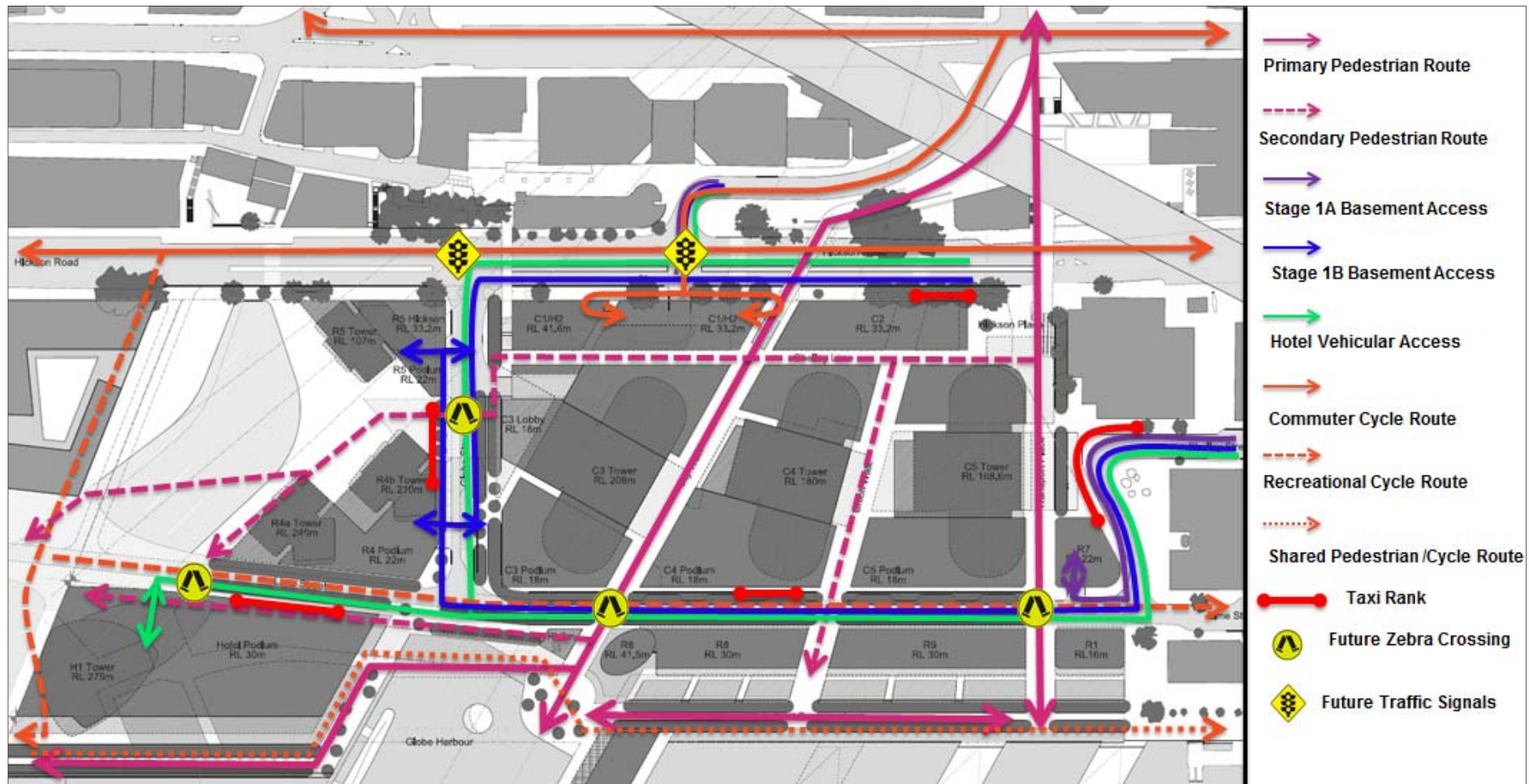


Figure 2 Barangaroo Site Access

Note: The location of the Barangaroo Ferry Hub wharves have been updated since the completion of this figure

4.2 Road Network Layout

There have been a number of amendments to the road network layout assumed in the TMAP September 2008. Some roads in Barangaroo South and the surrounding precinct will now be pedestrian ways rather than vehicular access routes. Modifications to the road network serving Barangaroo since the TMAP September 2008 are as follows:

- Following the completion of the Wynyard Walk development and approval from the RMS, the northern section of Shelley Street (previously known as Margaret Street West) will be closed to vehicular traffic. The existing traffic signals at the Shelley Street / Sussex Street intersection will be removed.
- Napoleon Street West will no longer serve as a vehicular access route through the precinct. The western approach of the Hickson Road / Napoleon Street intersection will instead function as an exit from the Stage 1A basement car park via a new signalised intersection.
- The northern entry to the commercial car park and loading dock is via Globe Street, north of Napoleon Street. This serves as an entry only for commercial vehicles, and both an entry and exit for service vehicles. This intersection will be upgraded to traffic signals in the ultimate configuration.
- An entry to the commercial and residential car park levels is provided via an access adjoining Lime Street in the south-west corner of the basement. This serves as an entry and exit.

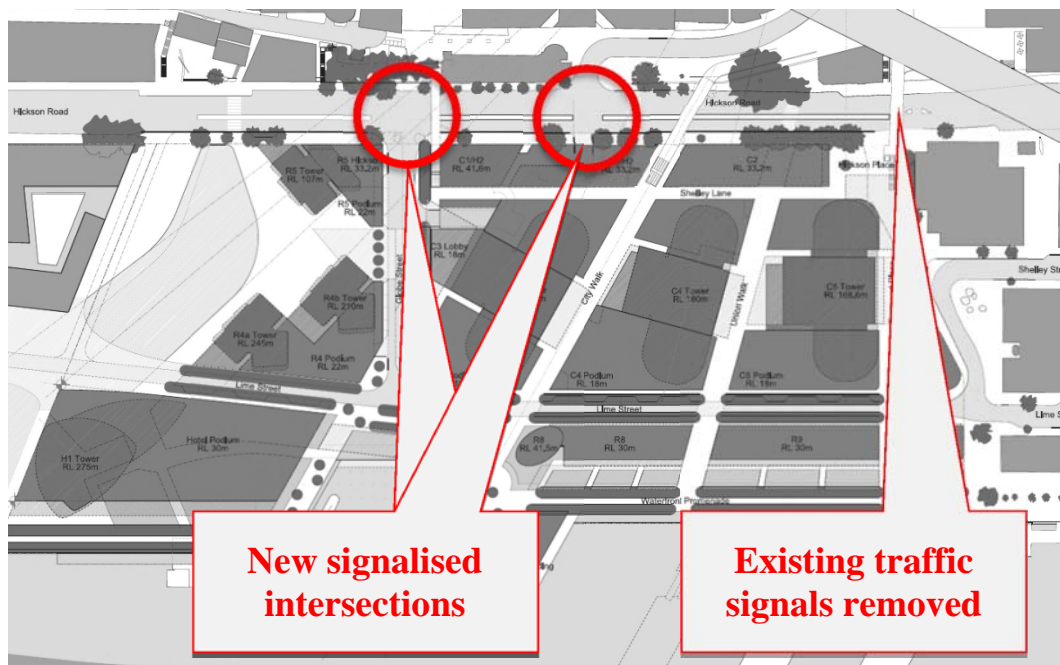


Figure 3 Road Network Layout

4.3 Road Network Operations

4.3.1 TMAP September 2008

Paramics modelling of Sydney CBD was utilised to test traffic options with different traffic generations and traffic management measures and is outlined in the MWT Modified Concept Plan – Transport Report, July 2008. The modelling concluded the road network would operate satisfactorily based on the modified concept plan development, with a 4% journey to work car mode share.

Peak hour traffic generation based on the proposed land use mix outlined in the September 2008 TMAP is summarised in Table 6.

Table 6 Traffic Generation TMAP September 2008 Modified Concept Plan Mod 2

Traffic generation as per Barangaroo TMAP September 2008			AM Peak Hour 8am – 9am				PM Peak Hour 5pm – 6pm			
Land Use	Variable	Variable number	trip rate ²	no of trips	In	Out	trip rate	no of trips	In	Out
Light Vehicles										
Residential	dwelling	750	0.14	105	21	84	0.09	68	54	14
Commercial	car space	622	0.26	162	129	32	0.26	162	32	129
Retail	car space	52	0.4	21	17	4	0.4	21	4	17
On street parking	car space	275	0.4	110	88	22	0.8	220	88	132
Public off street parking	car space	300	0.04	12	10	2	0.4	120	24	96
Hotel	rooms	730	0.1	73	15	58	0.1	73	58	15
Sub total				482	279	203		663	261	402
Heavy vehicles										
Service vehicles				60	30	30		0	0	0
Coaches				0	0	0		22	11	11
Sub total				60	30	30		22	11	11
Total traffic generation				542	309	233		685	272	413
<i>Public Transport (Bus)</i>				<i>66</i>	<i>39</i>	<i>27</i>		<i>66</i>	<i>27</i>	<i>39</i>
Total additional traffic				608	348	260		751	299	452

² Refer Masson Wilson Twiney Modified Concept Plan Report, July 2008 (Section 4.6)

4.3.2 Concept Plan Modification Mod 4

In December 2010 Modification No. 4 to the Concept Plan was approved, allowing for a mixed use development involving a maximum of 563,965m² of GFA. The implications for traffic generation resulting from the approved scheme are summarised in Table 7 below.

Table 7 Traffic Generation TMAP September 2010 Modified Concept Plan Mod 4

Traffic generation as per Barangaroo TMAP September 2008			AM Peak Hour 8am – 9am				PM Peak Hour 5pm – 6pm			
Land Use	Variable	Variable number	trip rate ³	no of trips	In	Out	trip rate	no of trips	In	Out
Light Vehicles										
Residential	dwelling	1166	0.14	163	33	131	0.09	105	84	21
Commercial	car space	590	0.26	153	123	31	0.26	153	31	123
Retail	car space	62	0.4	25	20	5	0.4	25	5	20
On street parking	car space	275	0.4	110	88	22	0.8	220	88	132
Public off street parking	car space	300	0.04	12	10	2	0.4	120	24	96
Hotel	rooms	249	0.1	25	5	20	0.1	25	20	5
Sub total				488	278	211		648	252	397
Heavy vehicles										
Service vehicles				60	30	30		0	0	0
Coaches				0	0	0		22	11	11
Sub total				60	30	30		22	11	11
Total traffic generation				548	308	241		670	263	408
<i>Public Transport (Bus)</i>				66	39	27		66	27	39
Total additional traffic				614	347	268		736	290	447

³ Refer Masson Wilson Twiney Modified Concept Plan Report, July 2008 (Section 4.6)

4.3.3 Concept Plan Modification Mod 8 (Barangaroo South)

Peak hour traffic generation has been analysed to reflect the revised GFAs (as proposed in Table 3) for this Concept Plan modification. All assumptions from TMAP September 2008 and MWT Modified Concept Plan – Transport Report, July 2008 including traffic generation rates and parking ratios have remained the same for this analysis, excluding the proposed hotel.

Given the unique nature of the future hotel, the most appropriate method to forecast traffic generation is to refer to an existing development with comparable characteristics. The Crown resort in Melbourne was selected as a suitable site which will provide similar uses to that of the proposed hotel at Barangaroo.

To facilitate this study, Arup was provided with parking and traffic data by Crown for a number of their properties in Melbourne. This included both video surveillance footage and entry/exit data from Crown's car parking areas. This is described in detail in Appendix A of this report.

Table 8 Traffic Generation TMAP, Mod 8 (Barangaroo South)

2015 Concept Plan (MOD 8)			AM Peak Hour				PM Peak Hour			
Land Use	Variable	Variable Number	trip rate	no of trips	In	Out	trip rate	no of trips	In	Out
Light Vehicles										
Residential	Dwelling	1675	0.14	234	47	188	0.09	151	121	30
Commercial	car space	568	0.26	148	118	30	0.26	148	30	118
Retail	car space	50	0.4	20	16	4	0.4	20	4	16
On-Street Parking	car space	40	0.4	16	13	3	0.8	32	13	19
Public Off Street Parking	car space	300	0.04	12	10	2	0.4	120	24	96
Hotel*				75	51	24		213	147	66
Cultural / Civic				8	6	2		8	2	6
Sub Total				513	260	253		691	340	351
Heavy Vehicles										
Service vehicles				70	35	35		0	0	0
Coaches				4	2	2		22	11	11
Sub Total				74	37	37		22	11	11
Total traffic generation				587	297	290		713	351	362
<i>Public Transport (Bus)</i>				<i>66</i>	<i>39</i>	<i>27</i>		<i>66</i>	<i>39</i>	<i>27</i>
Total Additional Traffic				653	336	317		779	390	389

* See Appendix A for further detail

The following common assumptions have been used, consistent with those utilised in the TMAP September 2008:

- 1 residential unit provides an average of 100m²
- Commercial and public trips split 80% in / 20% out during AM and 80% out / 20% in during PM
- Residential trips split 80% out / 20% in during AM and 80% in / 20% out during PM
- Public use parking at Headland Park assumed to generate at retail rate during PM peak hour and at 10% of that level during AM peak hour
- No net change in traffic generation during peak hours will occur as a result of the conversion of the existing 270 ninety degree parallel spaces to 125 short term on-street car parking spaces on Hickson Road
- Bus numbers were based on the Barangaroo Bus Service Strategy, Transport and Traffic Planning Associates April 2008

A key change since the TMAP September 2008 concerns the number of on-street parking spaces within the precinct. Current planning for Barangaroo South and Central allows for approximately 40 parking spaces on the local streets - a significant reduction from the 275 assumed in the TMAP September 2008. This is a result of both the pedestrianisation of some streets in the precinct and the design progression of Globe Street and Lime Street, which will accommodate only a small number of on-street parking spaces.

It should be noted that the traffic generation rate for the residential component of the site is based on the number of dwellings provided, and is independent of the number of parking bays provided.

4.3.4 Traffic Generation Comparison

A comparison of the traffic generation forecast under the Modified Concept Plan (Mod 2) and the proposed modification (Mod 8) has been undertaken and is listed in Table 9 and illustrated in Figure 4.

Comparison has been made with the traffic forecast in the TMAP September 2008 (Mod 2) given the transport modelling and road network analysis underpinning the 4% car mode share was undertaken at this point in time. The previous 2010 TMAP (Mod 4) reiterated the transport principles outlined in the TMAP September 2008. The traffic generation forecasts outlined in the Mod 4 TMAP have been included as reference material.

Table 9 Traffic generation comparison

Time Period	Direction	TMAP 2008 (Mod 2 GFA)	TMAP Mod 4	TMAP Mod 8
AM Peak Hour	In	348	347	336
	Out	260	268	317
	Two-way	608	614	653
PM Peak Hour	In	299	290	390
	Out	452	447	389
	Two-way	751	736	779

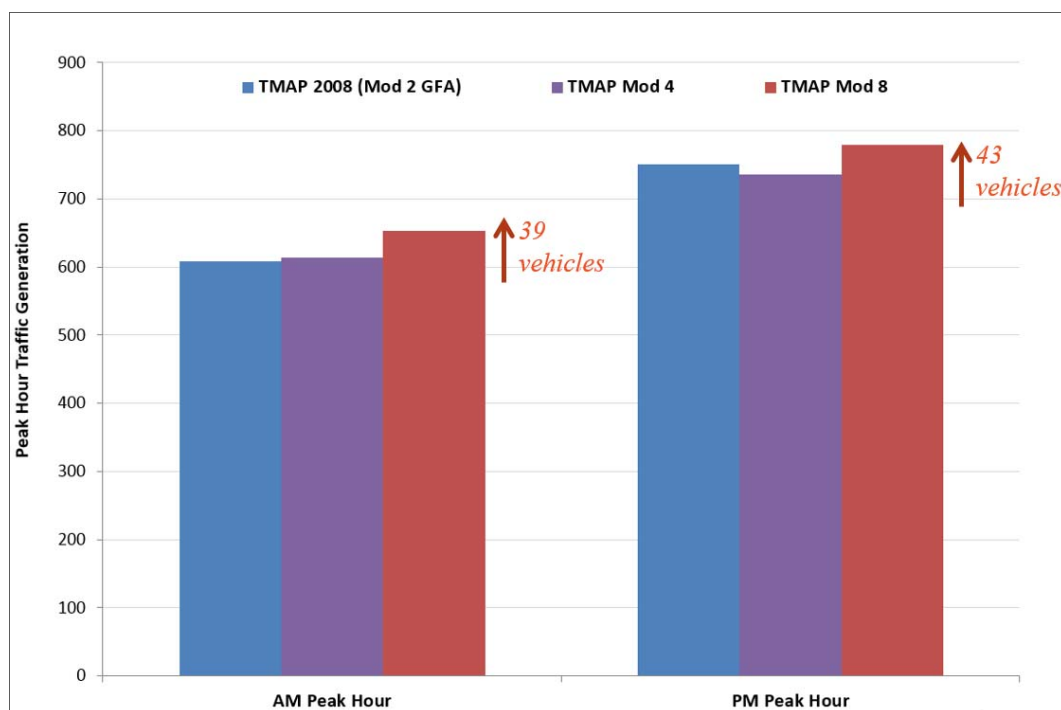


Figure 4 Traffic Generation Comparison

4.3.5 Peak and Off Peak Traffic Generation

The mix of land uses proposed within the Barangaroo precinct will generate trips during both the traditional commuter peak hours (i.e. 7am-10am and 4pm-7pm) and other times of the day – e.g. lunchtime peak, evening peak and weekend peak. Traffic generation for the hotel is expected to be highest in the evening after 7pm and on weekends – therefore not coinciding with the road network peak hours.

Figure 5 below provides an illustration of the variation in traffic generated by the entire Barangaroo development (Mod 8) throughout a typical weekday. This demonstrates that traffic generated during the lunchtime and evening peak hours is expected to be less than that in the commuter peak hours. Evening peak hour traffic is forecast to be less than half of that the PM commuter peak hour. The hotel is anticipated to be the primary generator of vehicular traffic from the entire Barangaroo site in the evening peak hour.

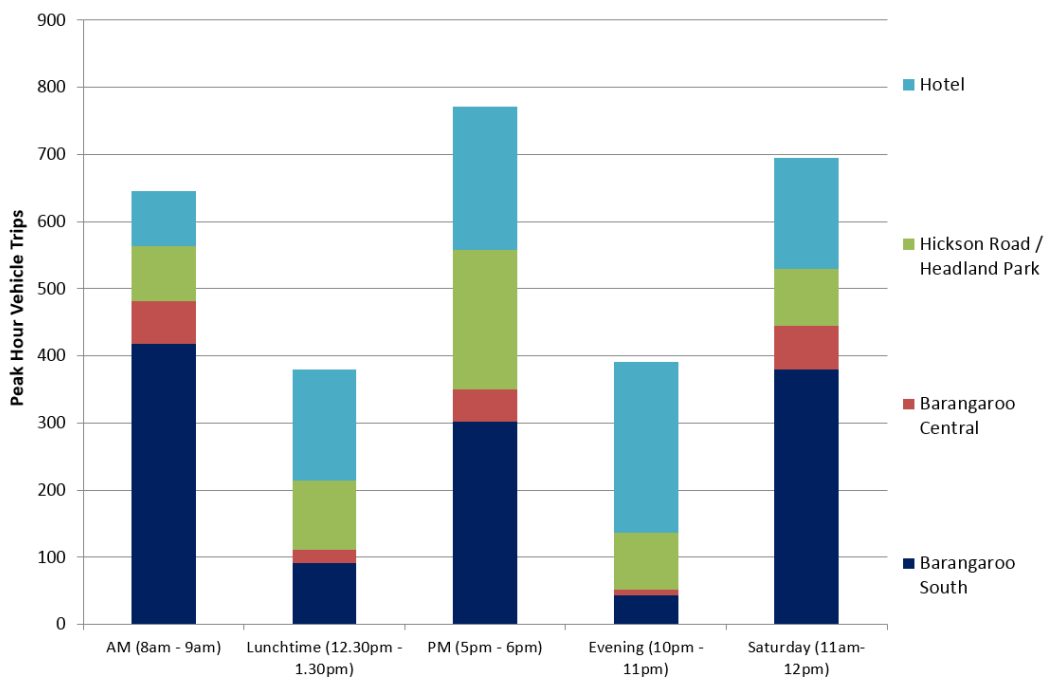


Figure 5 Off Peak Traffic Generation (Mod 8)

4.4 Road Network Modelling

4.4.1 Description

The operation of the road network following the full development of Barangaroo (including the potential uplift to Barangaroo Central) has been modelled using the LinSig analysis software. The LinSig model has considered the revised road network layout as described in Section 4.1 of this study.

The modelling does not consider the redistribution of traffic arising from the changes in transport conditions in the CBD following the introduction of the light rail on George Street. It is understood that Transport for NSW is currently preparing a mesoscopic traffic model which considers the traffic impacts of this proposal. The results of this analysis were not available at the time of writing. It should be noted that the Sydney City Centre Capacity Improvement Plan (RMS, November 2014) provides some detail with respect to the redistribution of traffic following the closure of George Street to general traffic. This plan illustrates the existing traffic displaced from George Street will be redirected onto adjacent north-south corridors, those being:

- Kent Street
- Clarence Street
- Elizabeth Street
- Macquarie Street

Capacity improvements along both Clarence Street and Kent Street are proposed which are forecast to mitigate the impacts of this redistributed traffic.

Importantly 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.

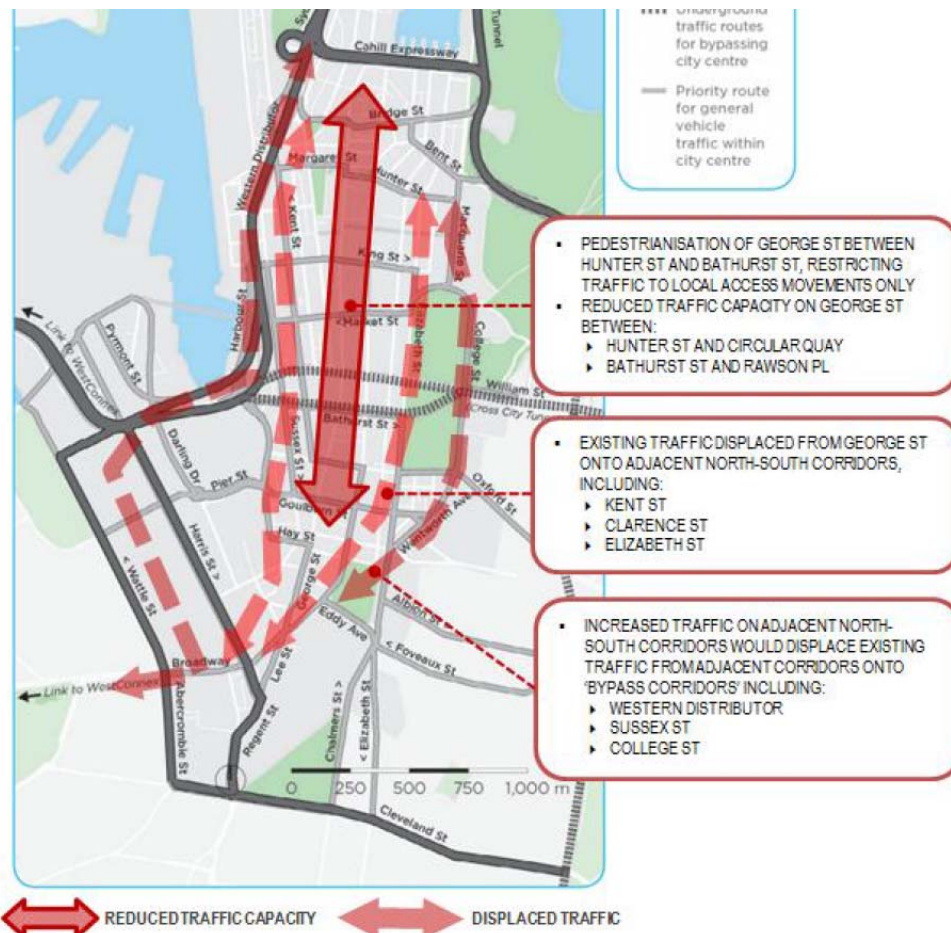


Figure 6 Traffic redistribution following opening of Sydney CBD Light Rail

Source: Sydney City Centre Capacity Improvement Plan (RMS, November 2014)

4.4.2 Traffic Volumes

Traffic counts were undertaken for this study in the Barangaroo precinct in July 2013 and are presented in Figure 7 and Figure 8.

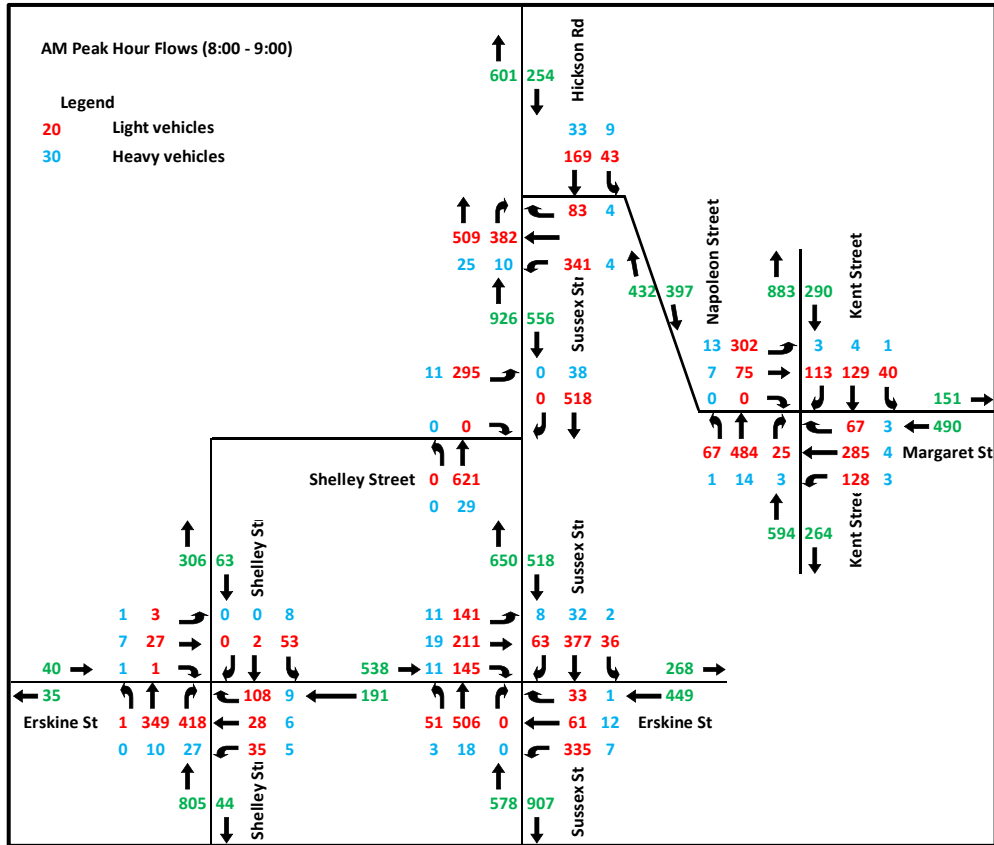


Figure 7 AM Peak Hour Traffic Flows, July 2013

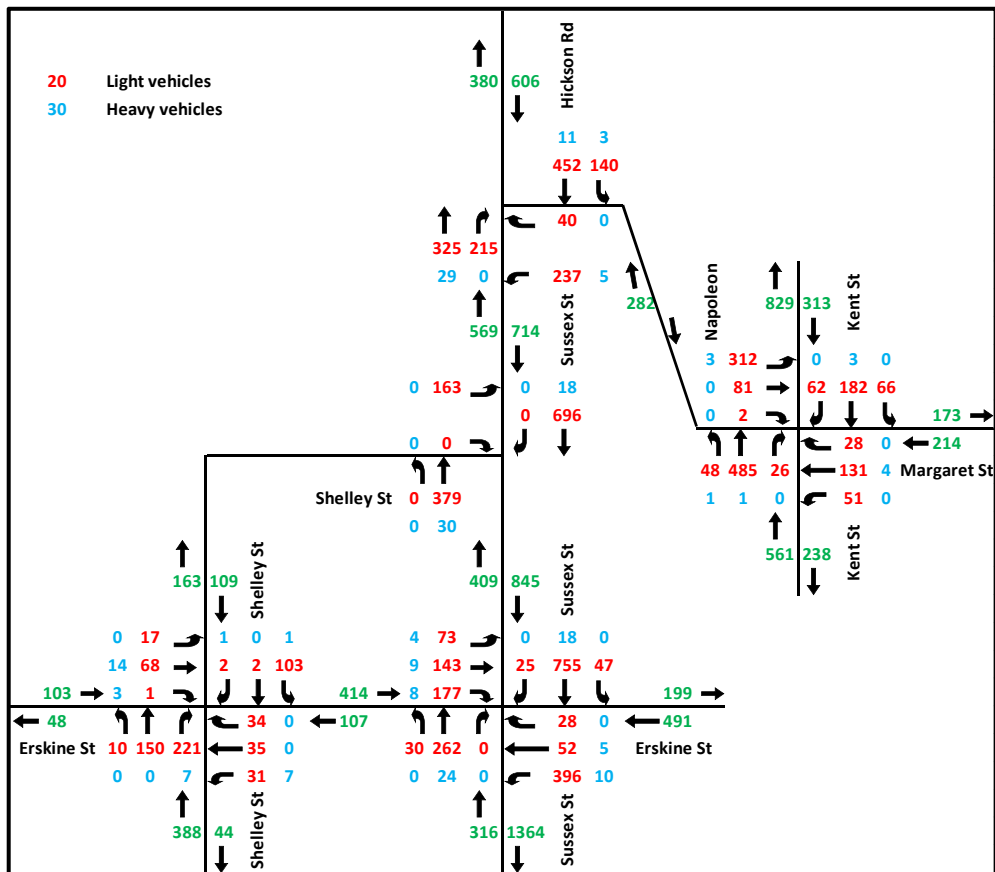


Figure 8 PM Peak Hour Traffic Flows, July 2013

4.4.3 Traffic Distribution

Existing Traffic

The closure of the northern section of Shelley Street following the completion of the Wynyard Walk development will necessitate a redistribution of traffic currently turning left from Shelley Street into Sussex Street. These traffic movements have been redistributed as follows:

- 50% will travel via Lime Street and Globe Street North; and
- 50% will turn right from Shelley Street into Erskine Street and then left into Sussex Street

This redistribution is based on current traffic patterns which indicate that of the vehicles previously turning left from Shelley Street into Sussex Street, approximately half would turn right onto Napoleon Street and the remaining half would continue north along Hickson Road.

Development Traffic

Traffic associated with the new development has been distributed across the road network based on Journey to Work Census data, consistent with the assumptions outlined in the MWT Modified Concept Plan – Transport Report, July 2008.

Table 10 Development Traffic Distribution

Direction	Route	Distribution
North	Harbour Bridge	40.7%
East	Eastern Distributor	22.9%
	William Street	1.5%
	Oxford Street	4.1%
South	Harbour Street	8.6%
West	Western Distributor	21.8%
Sydney Inner	-	0.4%
Total		100%

These key approach and departure routes are consistent with previous Concept Plan modifications, as well as those illustrated in the BITP (Figure 9).



Figure 9 Arrival and Departure Traffic Routes

Source: Barangaroo Integrated Transport Plan, Figure 7

4.4.4 Intersection Operation

A corridor traffic model (using the LinSig 3.2 software package) was developed to assess the future road network performance arising from the Concept Plan modification. This modelling software allows intersections to be modelled in a single network and provides signal optimisation to reflect future traffic conditions within the Barangaroo precinct.

Within the LinSig model, the lane capacity at a number of locations was manually reduced to reflect queue spillback from downstream and upstream intersections that currently occurs during peak hours. The following capacity adjustments were applied in the model.

Table 11 Capacity adjustments at key intersections

Intersection	Approach	Movement	Capacity Adjustment
Kent Street / Napoleon Street / Margaret Street	South	Through	20% reduction (PM only)
	West	Through	50% reduction (PM only)
Sussex Street / Erskine Street	South	Through	20% reduction (AM only)
	North	Through	50% reduction (PM only)

It is understood that the RMS and Transport for NSW are currently investigating the reinstatement of a second eastbound traffic lane on Margaret Street. This lane was removed following the closure of the Kent Street pedestrian tunnel to provide additional footpath capacity on Margaret Street. This new traffic lane has not been included within the LinSig traffic model. Provision of this measure would significantly reduce the extent of queue spillback experienced in the PM peak hour for eastbound vehicles – therefore improving the operation of the Kent Street / Napoleon Street / Margaret Street intersection.

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

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

The performance of intersections in an urban environment is measured in terms of its Level of Service (LoS). Levels of service ranges from A (very good) to F (over capacity with significant delays). This is described in the RTA Guide to Traffic Generating Developments as summarised in Table 12. Across the Sydney CBD road network, it is not uncommon for intersections to operate at Level of Service E or F (at capacity) during commuter peak hours.

Table 12 Intersection level of service

Level of Service	Average Vehicle Delay (seconds)	Traffic Signals and Roundabouts	Priority Intersections ('Stop' and 'Give Way')
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity. At signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity; requires other control mode
F	>71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing; requires other control mode

Another common measure of intersection performance is the degree of saturation, which provides an overall measure of the capability of the intersection to accommodate additional traffic. A DOS of 1.0 indicates that an intersection is operating at capacity.

The results of the traffic modelling are summarised in Table 13 below. Full analysis is provided as an Appendix B.

Table 13 Traffic Modelling Results

Peak	Intersection	TMAP 2008 (Mod 2 GFA)			TMAP Mod 8+9		
		LOS	DOS	AVD (sec)	LOS	DOS	AVD (sec)
AM	Sussex Street / Erskine Street	B	0.60	27	B	0.60	27
	Hickson Road / Napoleon Street	E	1.00	68	E	1.00	69
	Kent Street / Margaret Street	B	0.69	25	B	0.77	26
	Hickson Road / Globe Street	B	0.65	15	B	0.62	16
PM	Sussex Street / Erskine Street	E	0.97	59	D	0.97	55
	Hickson Road / Napoleon Street	D	0.94	48	D	0.92	43
	Kent Street / Margaret Street	B	0.81	24	B	0.75	23
	Hickson Road / Globe Street	A	0.48	11	A	0.47	11

The cumulative traffic analysis indicates little difference in the road network performance due to the minor traffic increase arising from the Concept Plan modification. Changes in vehicle delays are relatively minor in both the AM and PM commuter peak hours.

In both scenarios analysed, the forecast queue length at the northern approach of the Hickson Road / Sussex Street intersection is forecast to spill back to the Hickson Road / Globe Street 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.

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'.

Traffic modelling undertaken by Parsons Brinckerhoff in the Barangaroo precinct has previously considered the operation of the Erskine Street / Shelley Street signalised intersection within the King Street wharf precinct. This modelling considers the potential traffic changes as a result of the concept plan modification as well as land use uplift associated with the Barangaroo Central precinct. This modelling (provided within Appendix B) indicates the intersection performs satisfactorily in both peak hour periods, at Level of Service C and B in the AM/PM peak hours respectively.

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

4.4.5 Saturday Traffic

A summary of the forecast weekend traffic volumes (during the peak hour, expected between 11am and 12pm) was previously shown in Figure 5. This indicates the level of traffic generated during the Saturday peak hour is comparable to that during the AM and PM weekday periods. While the traffic generated by the commercial uses at Barangaroo is reduced compared to the weekday peaks, the residential uses are expected to generate higher levels of traffic movements on weekends.

The Saturday peak hour from a road network operations perspective in the Sydney CBD is not as critical when considered in the context of the level of background traffic on key roads. The figure below illustrates the volume of traffic during the respective peak hours on Sussex Street (near Napoleon Street) adjacent to the Barangaroo site. This shows that background traffic on a Saturday is 30% lower compared to the weekday PM peak hour and 40% lower compared to the weekday AM peak hour. This is to be expected as much of the traffic on CBD streets is related to the commercial uses in nearby areas which are not operating on weekends. As a result, nearby intersections in the Barangaroo precinct operate with spare capacity and may accommodate the forecast levels of traffic generated by the site.

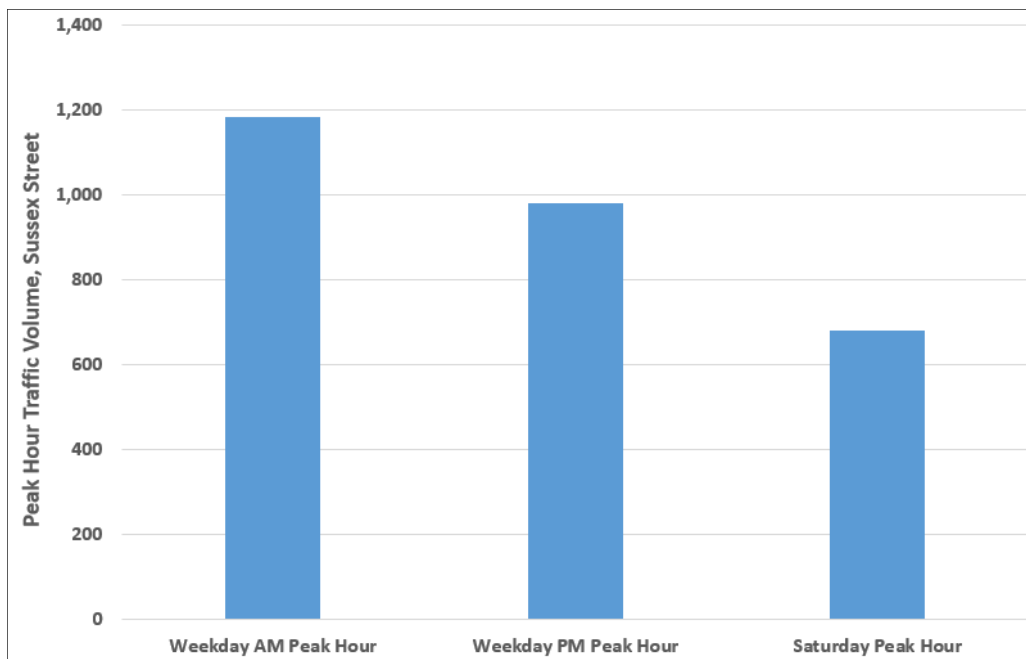


Figure 10 Peak hour traffic volumes – Sussex Street Sydney

4.5 Car Parking

4.5.1 Summary

This car parking analysis has been based at the same parking ratios as used in TMAP September 2008, excluding for the hotel. These rates are summarised below.

Table 14 Parking Rates

Land Use and Activity	Parking Rate
Commercial	1 space / 600m ² GFA
Retail	Based on the City of Sydney LEP2005 rates for 'other' uses.
Residential	Bedsitter: 0.5 spaces / dwelling 1 bed: 0.5 spaces / dwelling 2 bed: 1.2 spaces / dwelling 3 bed: 2.0 spaces / dwelling 3+ bed: 2.0 spaces / dwelling
Hotel	n/a
Hickson Road on-street parking	n/a
On-Street parking within Barangaroo	n/a
Headland Park Off-Street car park	n/a

The parking numbers presented in this section are nominal numbers extrapolated from:

- The assumed GFA mix described in Section 3 and an indicative dwelling mix for residential uses (which may be subject to change), applying the approved car parking rates specified under the Concept Plan; and
- An assessment of parking demand and management in relation to hotel uses.

The parking numbers are presented below for the purposes of presenting the potential parking needs of development under the Concept Plan, as proposed to be modified. Actual parking numbers may vary from those presented in this report and will be confirmed in the relevant applications to carry out development contemplated by the Concept Plan.

While the proposed GFA may potentially provide for more car parking on the site, this has not resulted in a significant increase in traffic generation in the vicinity of the site as demonstrated in Section 4.4.

Table 15 Comparison of Potential Parking Supply Spaces

Land Use	TMAP Mod 2	TMAP Mod 4	TMAP Mod 8
Commercial / Mix Use	673	652	647
Hotel	146	156	500*
Residential	771	1,166	1,688^
Parkland public car park	300	300	300
Total on site	1,187	2,274	3,652
Hickson Road on-street parking	125	125	125
On-Street parking within Barangaroo	275	275	25 (Barangaroo South) 15 (Barangaroo Central)
Public buildings	16	16	16
Ports Parking	140	0	0
Grand Total	2,446	2,690	3,318

^ Based on indicative dwelling mix for residential uses. Final residential car parking provision to be determined at a later stage of the planning process

* Includes parking related to the serviced apartments, retail and gaming component, and based on expected demand based on surveys of comparable facility. Excludes residential component. See Appendix A for further information

It is important to note that the quantum of traffic generated by the residential uses is based on the total number of dwellings provided and is independent of the number of resident parking bays. The parking provision for residential uses responds to the level of car ownership expected.

Car ownership levels for residents of the Sydney Inner SLA have been steadily increasing over the past decade, rising from 0.81 cars/dwelling in 2001 to 0.87 cars/dwelling in 2011. This is similar to the trends seen across much of Sydney, with cars becoming more affordable as tariffs fall with a larger stock of cheaper new cars and increasing household income.

The census data also shows that while car ownership has risen over the past decade, private vehicle use for journey to work trips has *decreased*. This indicates that car ownership does not necessarily lead to car usage in the busy commuter peak periods, for areas well served by public transport such as Barangaroo.

This trend is illustrated in Figure 11.

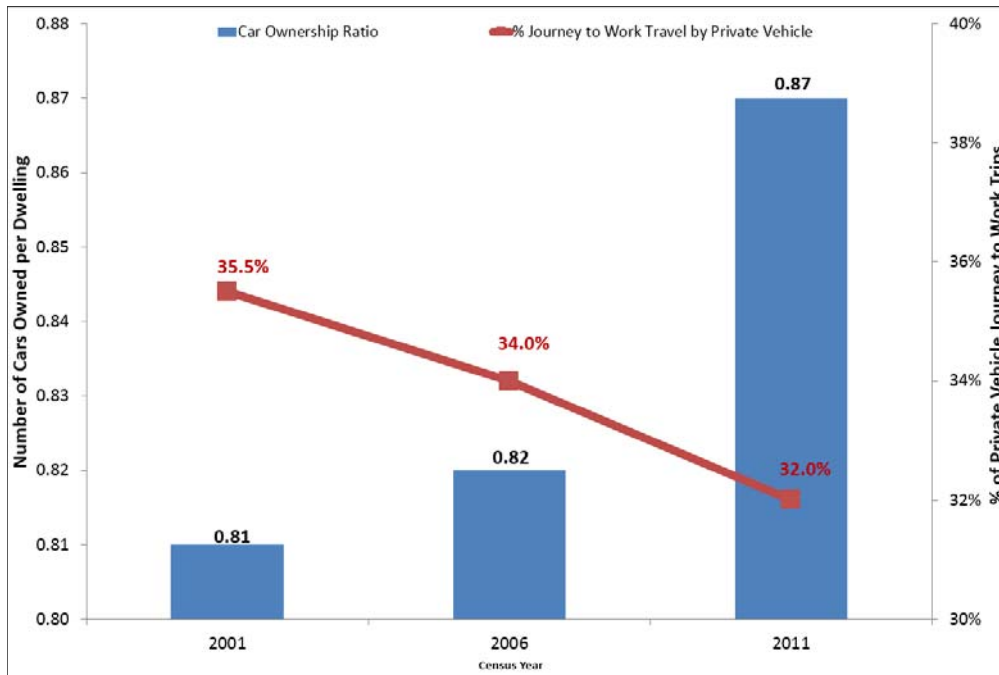


Figure 11 Trends in car ownership and private vehicle usage, Sydney SLA

4.5.2 On-Street Parking

Since the September 2008 TMAP there has been further development with respect to planning for on-street parking within the Barangaroo precinct. A number of internal roads previously envisaged are now dedicated pedestrian routes. Further, the design development of both Lime Street and Globe Street has progressed to a stage where it is now known that space available for on-street parking is limited. The number of on-street parking spaces within Barangaroo has reduced from 275 to 40 (25 in Barangaroo South, 15 in Barangaroo Central).

4.5.3 Hotel Parking

500 car parking bays are proposed within the hotel to service the non-residential components of the development. This quantum of parking was determined based on the expected daily profile of vehicular movements arriving and departing the site. A daily profile of activity was generated based on the current levels of traffic movements (both valet and self park) generated by the Crown Melbourne site over the course of an entire year. The data was moderated based on the number of members anticipated for the hotel relative to the total number in Crown Melbourne.

The expected parking demand based on this analysis for the hotel is shown below.

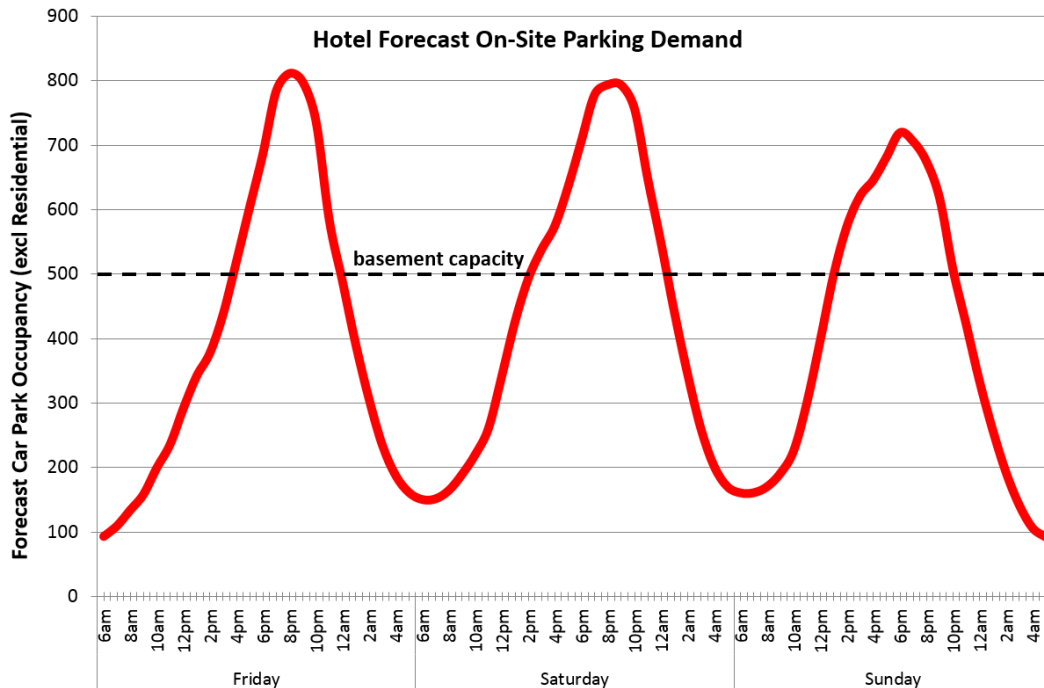


Figure 12 Hotel forecast parking demand

The quantum of parking proposed (500 spaces) will meet the expected demand generated by the hotel on weekdays and for the majority of the time on weekends (Friday evening through Sunday).

During periods when car parking demand may exceed visitors and staff of the hotel will be required to either use alternate transport or find parking in the surrounding road network and off-street publicly accessible commercial car parks. As demonstrated in Figure 13, there are numerous existing off-street publicly accessible commercial car parks located in proximity to the proposed hotel site which are expected to have sufficient capacity to accommodate any additional demand for car parking for the hotel (excluding residential uses) during the evenings.

Shared parking arrangements could also be established with nearby commercial buildings as an appropriate and efficient means of managing parking requirements. For example The Star has a similar arrangement with the Harbourside Car Park.

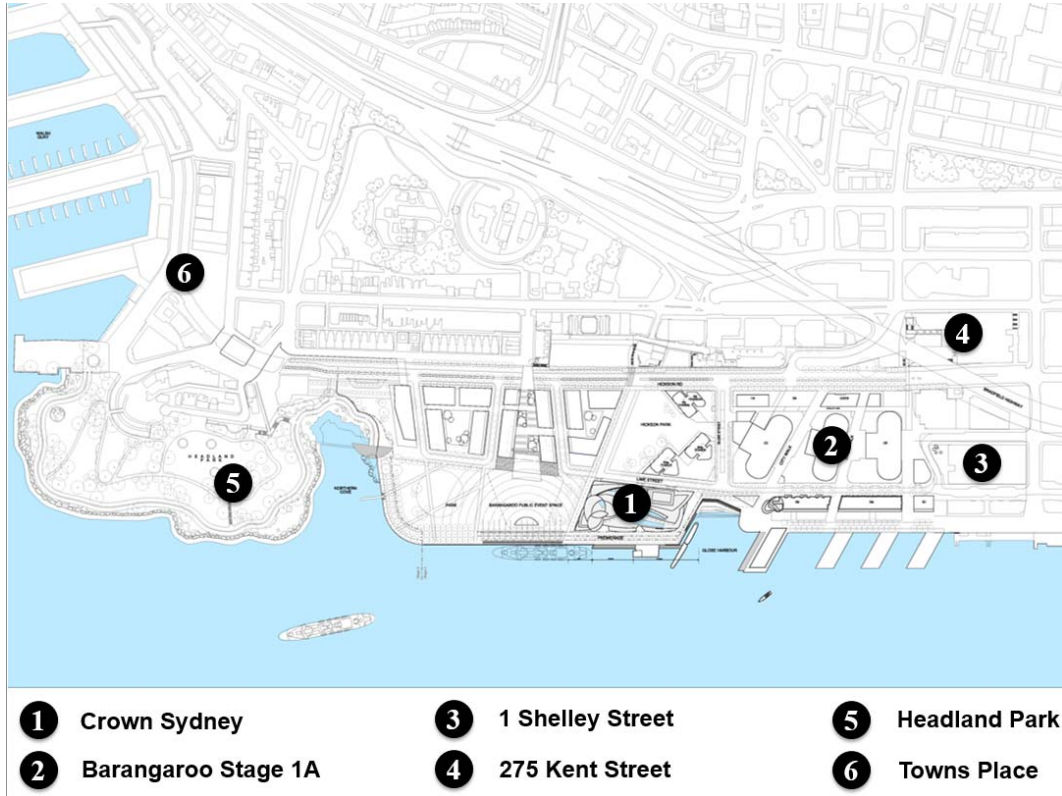


Figure 13 Public Off-Street Car Parks

4.5.4 Car Park Management

The provision of car parking will be staged depending on the timing of the various components of the development. It is likely that various elements of car parking areas are managed in differing forms. The residential cars are likely to be managed through the owners corporation and transferred with individual apartments. The residential car parks will have controlled access. The commercial and retail car parking is likely to be managed as a common pool by a single operator.

4.6 Pedestrian Linkages

4.6.1 Pedestrian Context and Needs

High levels of pedestrian access are essential to achieving the low car mode share target that is critical to making the Barangaroo development successful. The committed mode share target for “Other” (which includes pedestrians and cyclists) is 12% for the journey to work to Barangaroo.

The Barangaroo Pedestrian Precinct Demand strategy, developed by Arup for Lend Lease (in conjunction with the Barangaroo Delivery Authority) in 2013, provides a summary of expected weekday, weekend, and event populations across the Barangaroo development site. This gives an estimation of the anticipated foot traffic along major pedestrian routes over different time periods.

The strategy identified high pedestrian activity at all times of the day travelling along two major corridors, those being:

- From Wynyard Station, across the Wynyard Walk bridge and through to the Barangaroo Ferry Hub and waterfront promenade; and
- From Wynyard Station, across City Walk bridge and through to Lime Street and the waterfront promenade.

A summary of the maximum expected pedestrian flows along key walkways is presented in Table 16.

Table 16: Maximum Hourly Pedestrian Movements

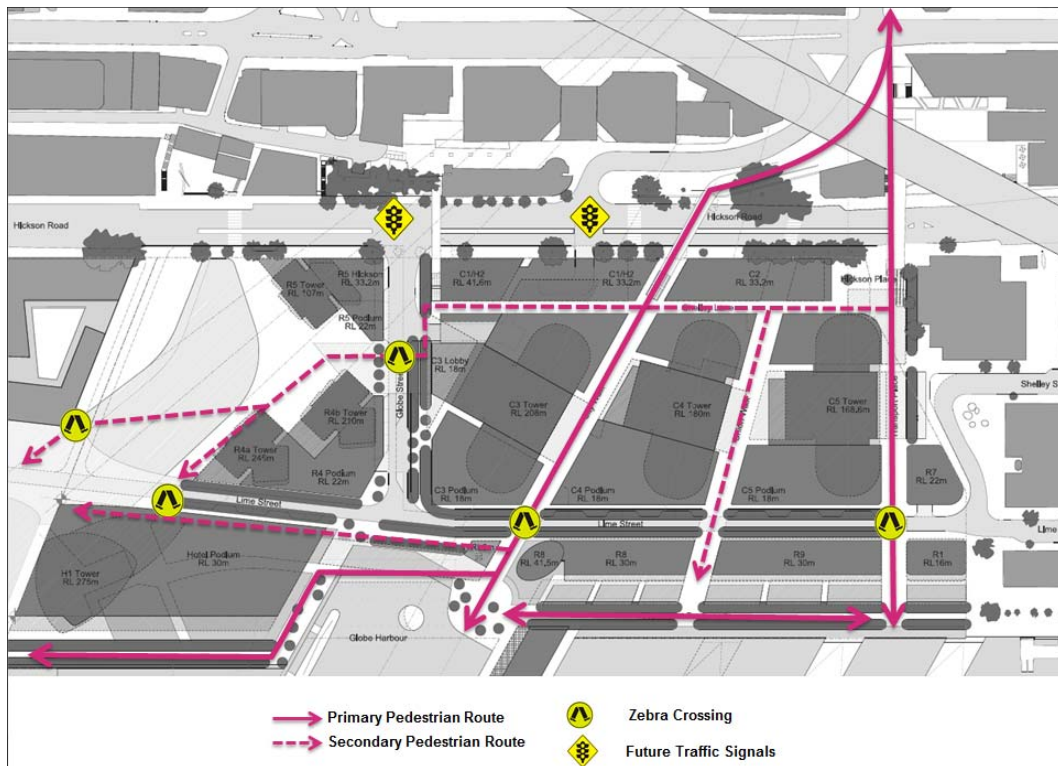
Link	Weekday AM	Weekday Midday	Weekday PM	Weekday Evening	Weekend
City Walk Bridge	3,827	2,366	3,180	2,557	1,829
Wynyard Walk Bridge	6,846	2,336	4,341	2,721	1,551
City Walk	4,637	4,926	4,196	2,759	1,880
Union Walk	3,463	3,105	2,744	1,087	583
Transport Place	5,342	2,144	3,426	2,457	1,436
Foreshore Promenade	748	2,091	1,448	793	2,294

It should be noted that the pedestrian volumes presented above represent a conservative scenario where the population densities and occupancy rates assumed for the various land uses within Barangaroo are higher than those in this TMAP report. This served the purpose of providing an estimate of the maximum number of pedestrian movements along various routes to inform the design of pedestrian walkways within Barangaroo South and ensure the peak pedestrian access demands may be accommodated. This is the case as described in the ensuing sections.

4.6.2 Pedestrian Routes and Facilities

For AM and PM peak period trips by workers at Barangaroo, the main pedestrian desire lines will be between the commercial development in the southern end of the site and Wynyard public transport hub. The main desire lines will change in the midday peak more towards mid-city areas. Outside peak periods, pedestrians will focus more strongly on access to Walsh Bay and King Street wharf areas along the waterfront promenade, as well as Wynyard and mid-city.

Appropriate at-grade pedestrian crossing facilities (either pedestrian signals or zebra crossings) are planned throughout the precinct to ensure pedestrians are provided with safe and efficient road crossing opportunities along key desire lines.



4.6.3 Pedestrian Linkages

For the ultimate Barangaroo development the following pedestrian linkages are proposed:

Wynyard Walk: The NSW Government has commenced work on Wynyard Walk (previously Barangaroo Pedestrian Link), a direct pedestrian link between the new Barangaroo development and Wynyard Station and transport interchange. The Wynyard Walk will provide a high level of access to public transport for the growing western corridor of the CBD, including Barangaroo and the King Street Wharf. Wynyard Walk will allow people to access Barangaroo from Wynyard Station in approximately six minutes. The Wynyard Walk bridge (over Sussex Street) will open in 2015, with the new tunnel connection to open in 2016. The proposed route for Wynyard Walk is shown in Figure 15.



Figure 15 Wynyard Walk (Source: REF April 2012, Transport for NSW)

City Walk Bridge: A new pedestrian link bridge over Sussex Street/Hickson Road located close to the intersection of Hickson Road and Napoleon Street which links into the Wynyard Walk. The facility will enhance connectivity between Barangaroo South and the Wynyard Station precinct. The bridge is forecast to be operational by 2015. An overview of the City Walk Bridge alignment is presented in Figure 16.

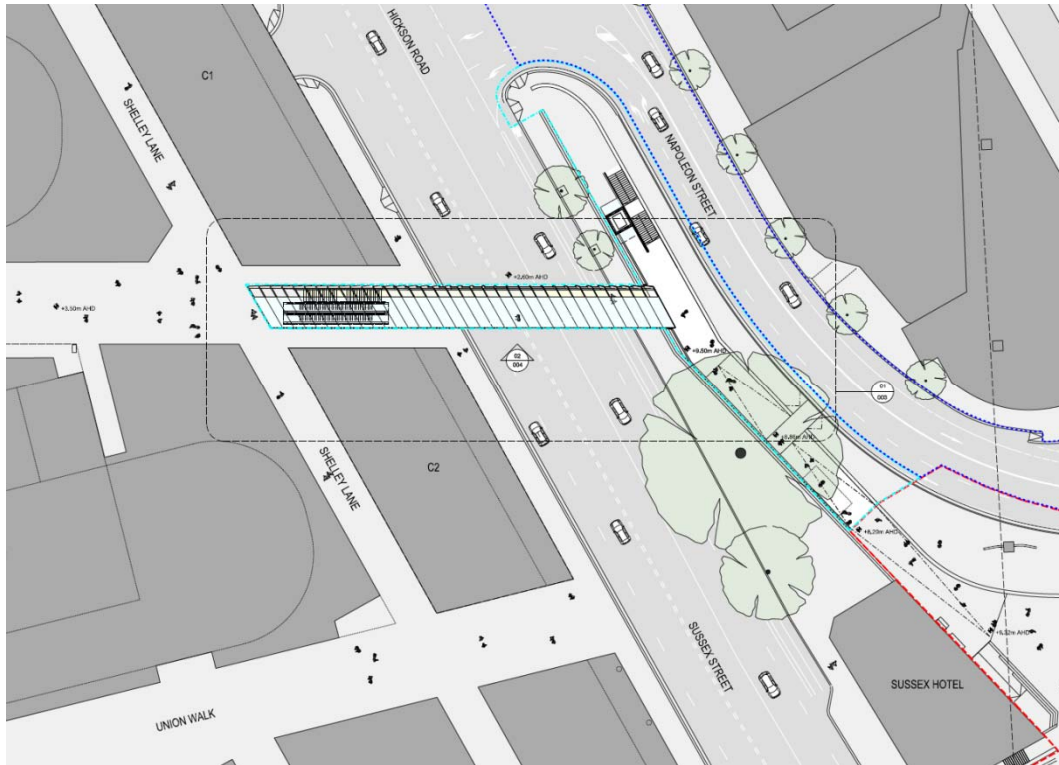


Figure 16 City Walk Bridge

A number of additional pedestrian connections are proposed to service the Barangaroo Central and Headland Park precincts. This includes new pedestrian bridges over Hickson Road at High Street and Jenkins Street, as well as a permeable internal pedestrian network which provides connections to Barangaroo South. These are consistent with the connections identified in the Barangaroo Integrated Transport Plan as illustrated in Figure 17.

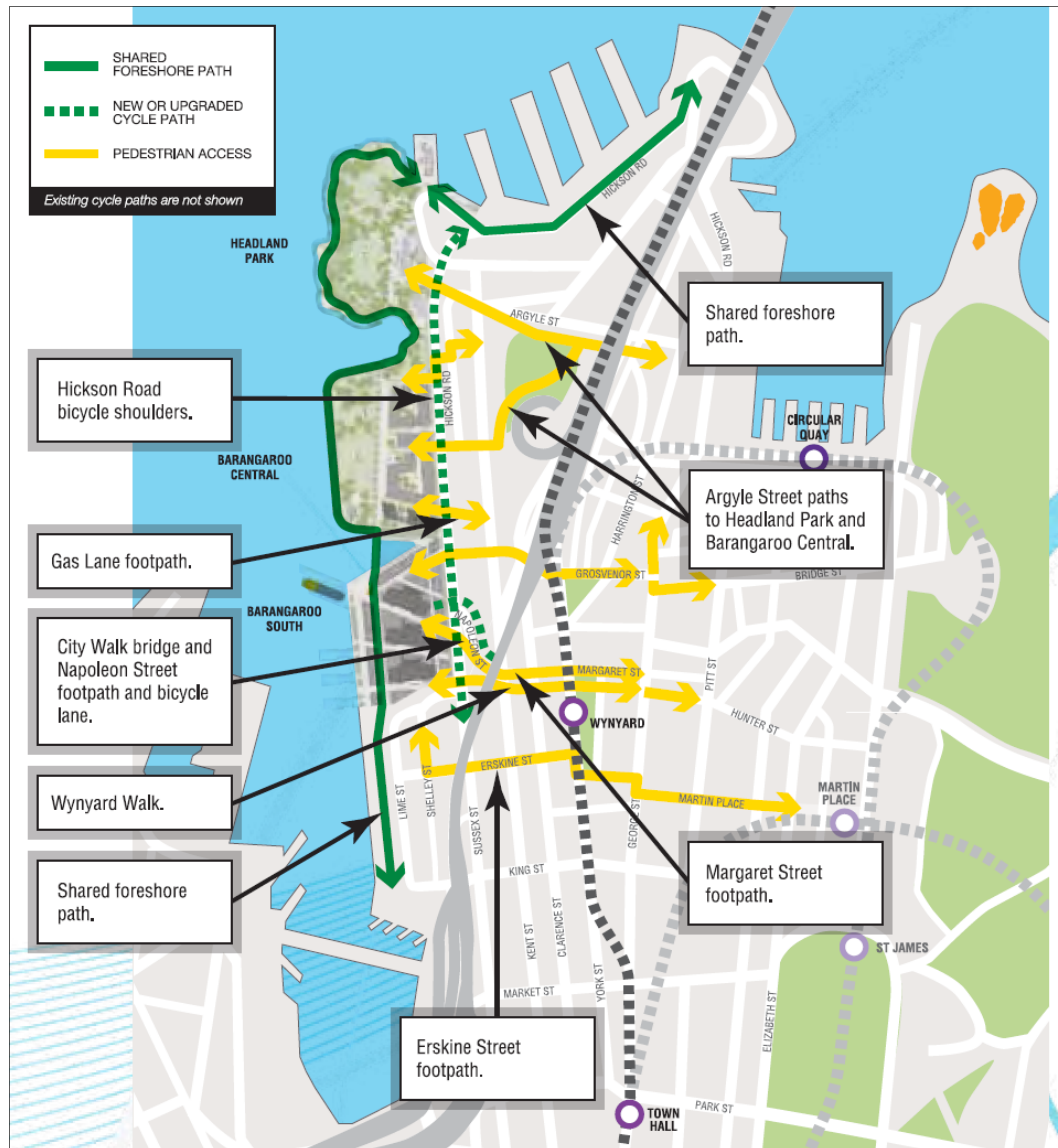


Figure 17 Pedestrian Routes

Source: Barangaroo Integrated Transport Plan, Figure 5

4.7 Cycling

4.7.1 External Bicycle Network

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. Measures proposed include:

- Extending the Kent Street cycleway south to Liverpool Street
- Construction of a bi-directional cycleway on Liverpool Street
- Construction of a bi-directional cycleway on Castlereagh Street and Pitt Street, providing a new north-south connection through the CBD
- Extending the existing King Street cycleway to Castlereagh Street
- Extending the east- west cycleway along Park Street to Castlereagh Street

The Strategy's strategic cycleway network map (see Figure 18) 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.



Figure 18 Strategic Cycleway Network Map

Source: Sydney City Centre Access Strategy (NSW Government, 2013)

The primary route for riders travelling to Barangaroo South from the north (via the Sydney Harbour Bridge cycleway) will be via the new cycleway along Napoleon Street. This is consistent with the City of Sydney cycling strategy. An alternative route exists via Argyle Street, Dalgety Road and Hickson Road. Many cyclists will find this route attractive given the low traffic volumes and the available road space.

Napoleon Street will form a link for cyclists travelling between the Building R4B and the existing separated cycleway on Kent Street. An on-road bicycle lane has recently been installed for eastbound riders (uphill), with a mixed traffic environment in the westbound direction.

A bi-directional separated cycleway is envisaged on the eastern side of Hickson Road, up to the intersection with Towns Place. This is currently under investigation by Lend Lease in conjunction with the road authority and other stakeholders. Beyond this point, the existing single direction on-road cycle lane will facilitate the movement of cyclists onwards towards The Rocks and Circular Quay. It is assumed the cycleway will commence at Shelley Street, which will provide a link to the new Transport Place.

4.7.2 Internal Bicycle Network

Cycling within Barangaroo will be confined to the internal road network, i.e. along Watermans Quay and Barangaroo Avenue. These will function as mixed traffic streets given the relatively low levels of vehicular traffic and anticipated 40km/hr speed limit. On-road bicycle symbols can be provided at minimum 200m intervals towards the centre of the travel lane to signify to drivers the presence of cyclists along these routes. The route along Barangaroo Avenue will connect with a recreational cycle route which continues through Barangaroo Central and into Headland Park.

The foreshore promenade will primarily act as a pedestrian pathway however cycling will not be prohibited. A low speed environment will be promoted where cyclists will be required to give way to pedestrians at all times. This will be similar to the operation of the adjacent King Street Wharf and Darling Harbour.

Access for cyclists to the Stage 1B will be via the vehicle access ramp at the western end of Watermans Quay, designated as a recreational bicycle route. The low vehicle speeds (signposted speed limit expected to be 40km/h) and traffic volumes along Watermans Quay make this a suitable cycling route. Cyclists travelling to the hotel will also utilise Watermans Quay and enter via the vehicle access ramp.

The recommended internal cycle network is outlined in Figure 19.

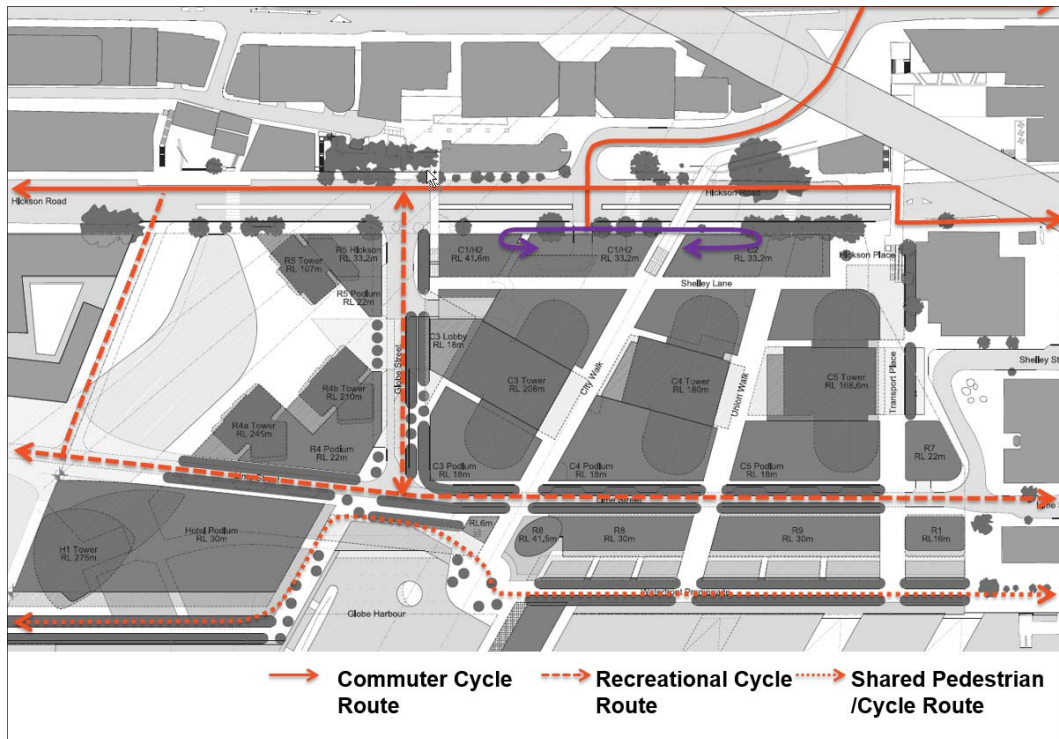


Figure 19 Barangaroo Internal Bicycle Network

Note: The location of the Barangaroo Ferry Hub wharves have been updated since the completion of this figure

4.7.3 Bicycle Parking and End of Trip Facilities

A minimum target of 5% of the commercial building occupants provided with a bicycle parking space has been adopted which aligns with the mode share target of 4% of journey to work by bicycle. Complementary end of trip facilities (e.g. lockers, showers and change rooms) will be provided for staff throughout the development.

Short term visitor bike parking will be available in the permanent public domain adjacent to major buildings. Bicycle parking spaces will be provided in the basement to meet the needs of the buildings tenants.

4.8 Heavy Rail and Metro Rail

The NSW Long Term Transport Masterplan released in December 2012 outlines a 20 year plan and includes the following rail projects for Sydney:

- North West and South West Rail Lines
- Second Harbour Crossing including new city rail line
- Wynyard Station improvement works

4.8.1 North West Metro

Although the Metro scheme has been cancelled by the NSW Government, the metro corridor under Barangaroo South is being maintained.

4.8.2 Wynyard Station

A significant number of work trips into Barangaroo are anticipated to occur by rail, with Wynyard Station to act as the major transport hub. Actions relating to Wynyard Station in the Sydney City Centre Access Strategy include:

- Better interchange facilities for rail and bus passengers at the station and at Barangaroo.
- Station refurbishment.
- Station upgrade in the longer term.

In May 2014 the NSW Government announced a \$100 million upgrade of Wynyard Station. The works include an upgrade to the CBD station's concourse and platforms, new lighting, tiling and signage to improve wayfinding. Major construction for the Wynyard Station upgrade commenced in June 2015 and is expected to finish in 2016. Key features of the works include:

- New, premium fixtures and finishes, such as lighting, tiling and painting;
- Widened paid concourse and ticket gates;
- Reduced clutter on the concourse and platforms;
- Upgraded existing and new platform stairs to improve pedestrian circulation and reduce queuing;
- New wayfinding and signage to make it easier for customers to move in and around the Station;
- Improving operational reliability through upgraded services and removal of redundant services; and
- Renovated back of house areas, including new and relocated Station Manager's office.

4.8.3 North West/South West Rail Link

The South West Rail Link opened to the public in early 2015 and includes:

- A new 11.4-kilometre rail line from Glenfield to Leppington
- Two new stations located at Edmondson Park and Leppington, including commuter car parking
- A train stabling facility at Rossmore
- An upgrade of the existing Glenfield Station and bus/rail interchange, including new commuter car parking construction of Glenfield North and Glenfield South rail flyovers

4.8.4 Sydney Metro

Sydney Metro is the next major rail project identified in Sydney's Rail Future. Sydney Metro scope has been developed to meet the Project objectives and deliver key elements of Stages 4 and 5 of Sydney's Rail Future.

In June 2015 the NSW Government announced the Sydney Metro concept, including the Sydney Harbour Crossing and Western Extension to Bankstown proposals. The project would extend rapid transit under Sydney Harbour, through the central business district (CBD) of Sydney and west to Bankstown, with capacity to run up to 30 trains per hour in each direction through the city on the new line.

The Project represents a major increase in the capacity of Sydney's rail network, providing a 60 per cent increase in the number of trains in the peak periods and catering for an extra 100,000 customers per hour. Sydney Metro would significantly improve reliability across the rail network by addressing current and emerging constraints such as train crowding, platform and station crowding, and network complexity.

Sydney Metro Northwest is currently under construction and includes eight new fully accessible railway stations and 4,000 commuter car parking spaces. Metro services will start in the first half of 2019 with a train every four minutes in the peak, or 15 trains an hour.

In June 2015 the NSW Government announced a new station would be constructed at Barangaroo as part of the Sydney Metro project. Based on patronage modelling undertaken by Sydney Metro, delivery a new station at Barangaroo will in the morning peak, reduce entries and exits at both Wynyard Station and Martin Place station by approximately 5,000 passengers. This station will significantly improve public transport access for people traveling to and from the Barangaroo precinct.

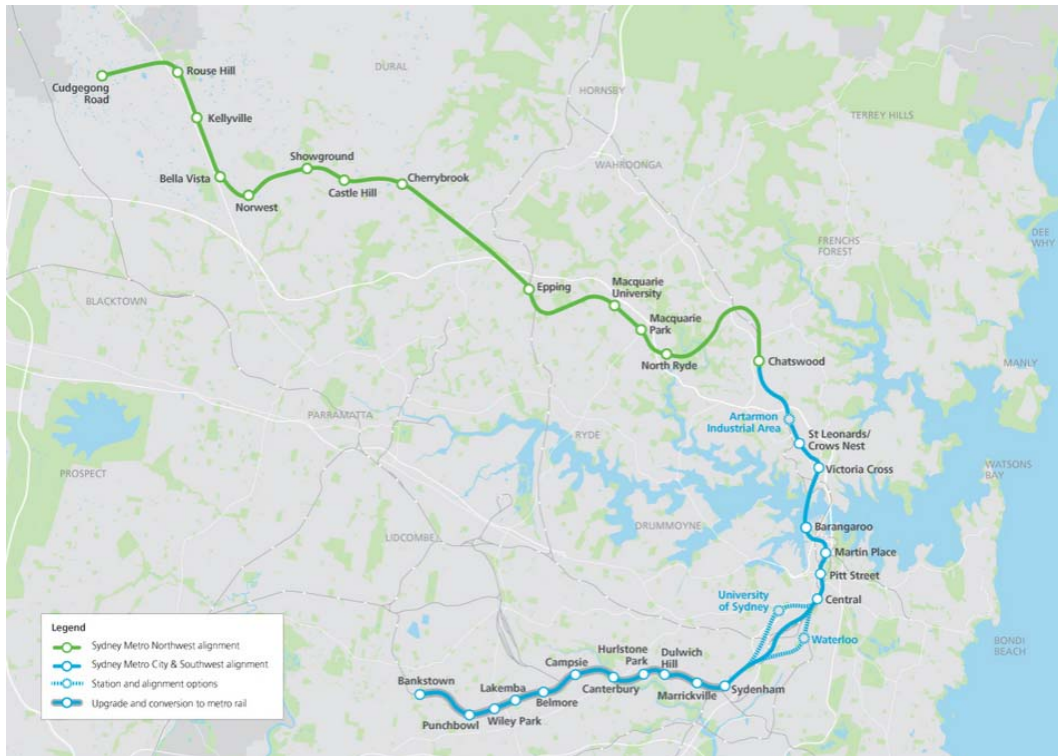


Figure 20 Sydney Metro Project

Source: Transport for NSW

4.9 Bus Services

The Sydney City Centre Access Strategy outlines a redesigned bus network which improves bus reliability and address congestion and capacity constraints. Some of the key proposals relevant to the Barangaroo development include:

- New bus routes will run to Barangaroo and Walsh Bay via the city centre, Napoleon Street and Hickson Road
- The major bus stop precinct serving Barangaroo will be in the area surrounding Wynyard Station on York, Clarence and Kent Streets.
- Approximately every second bus service on key Inner West bus routes entering the city centre via Broadway will only operate to Central. This will reduce the number of buses unnecessarily entering the city centre. The remaining services will continue to the northern end of the city centre via Elizabeth Street northbound and Castlereagh Street southbound.
- Bus routes servicing the Eastern Suburbs will utilise Elizabeth Street. Passengers travelling to Barangaroo will alight at Martin Place and walk through the city and across Wynyard Walk

The future city centre bus network is summarised in Figure 21.

Locations for new bus stops to serve the future routes along Hickson Road and Sussex Street are currently being investigated by Transport for NSW. These stops would be in close proximity to Barangaroo South and provide good accessibility for commuters and visitors travelling to the precinct.

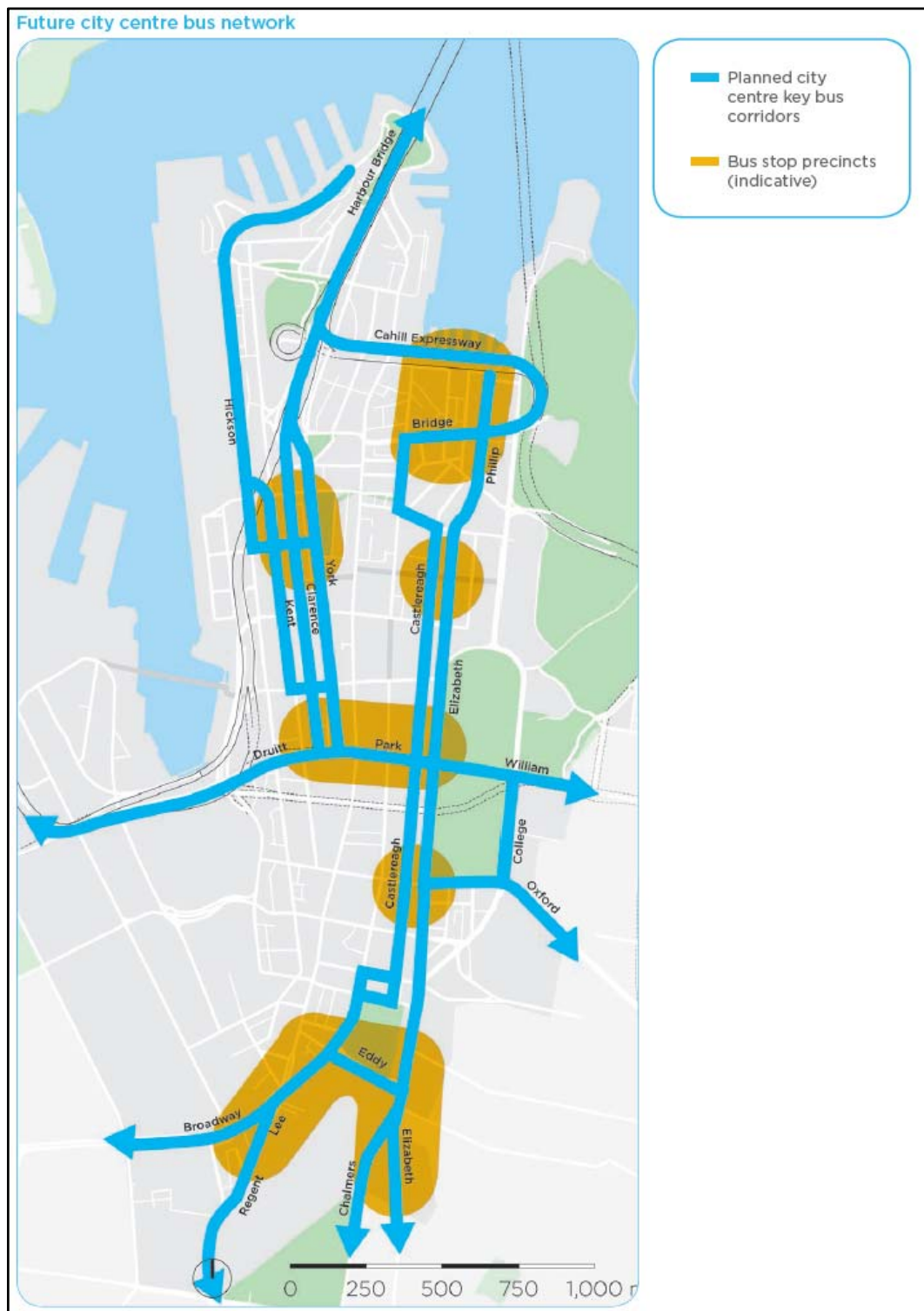


Figure 21 Future City Centre Bus Network

Source: Sydney City Centre Access Strategy (NSW Government, 2013)

In July 2015 the NSW Government announced a series of bus routes will directly service the Barangaroo precinct. These services all run along Hickson Road adjacent to Barangaroo South, terminating at Walsh Bay, and include:

- Route 311
- Route 324
- Route 325

These services are to be operational from 4 October 2015, and are illustrated in Figure 22 below.

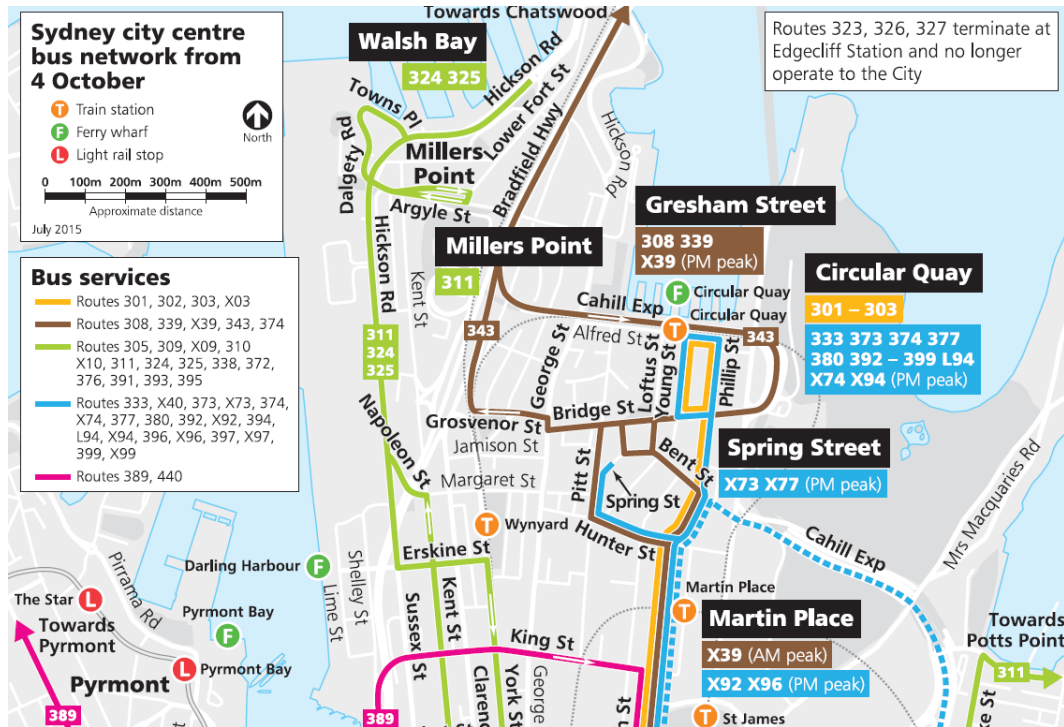


Figure 22 Bus services post 4 October 2015

4.10 Water Based Transport

Existing commuter ferry services providing access to Barangaroo and the CBD arrive and depart from King Street Wharf (number 3) and Circular Quay.

The Sydney City Centre Access Strategy commits to constructing a new ferry hub at Barangaroo, delivered in time for major tenants moving in to the development. This new wharf will support the commercial development of the precinct, with new ferry services anticipated from the east and north, as well as the existing western ferry catchments.

The new ferry hub will service the new development and connect ferry users to the western and midtown parts of the city centre via the Wynyard Walk link. It will reduce capacity constraints on the Circular Quay terminal and will bring additional ferry services and routes directly to Barangaroo. The Barangaroo Ferry Hub proposal initially commits to the construction of two wharves. However provision is made within the design for the construction of a third wharf based on future demand and uptake

A planning application for the construction and operation of a ferry hub was lodged to the Department of Planning and Environment in December 2014. The proposal is currently under review.

An illustration of the proposal is shown in Figure 23 below.

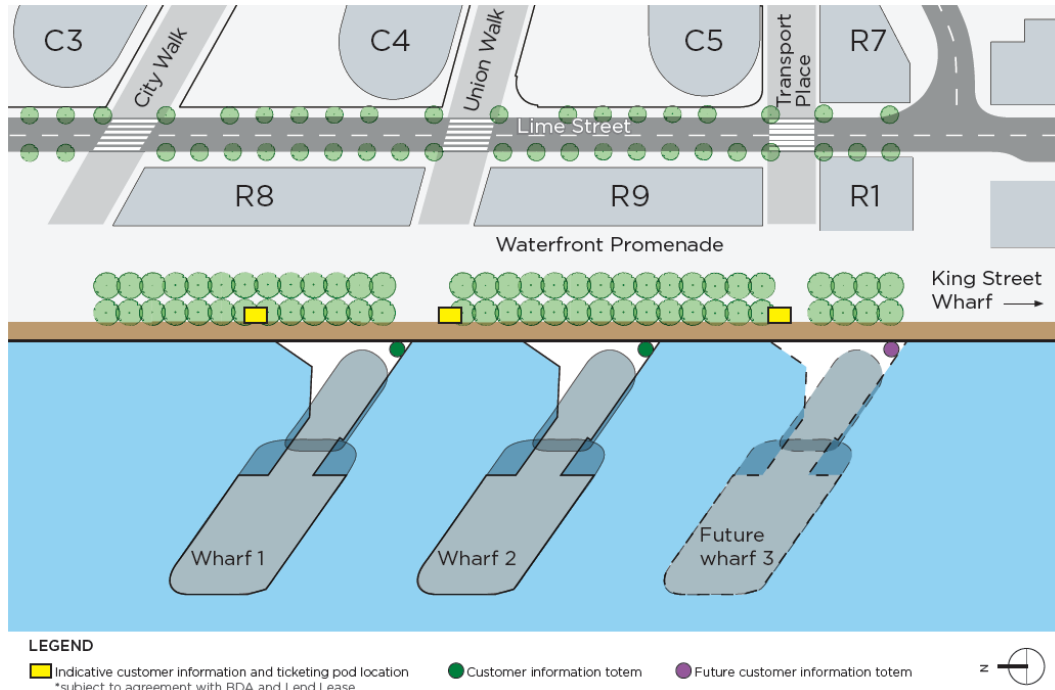


Figure 23 Barangaroo Ferry Wharf

Source: Barangaroo Ferry Hub Submission Report (Transport for NSW, 2015)

4.11 Coaches

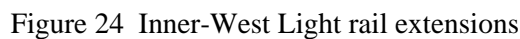
Allocation of kerbside space in vicinity of the hotel for coach set down / pick up is planned within the Concept Plan. This will service tour groups travelling to and from the hotel to other areas of Sydney. Additional on-street set-down and pick up space is understood to be provided within the Barangaroo Central precinct.

4.12 Light Rail

In December 2012, the NSW Government released 'Sydney's Light Rail Future'. This document details plans for expanding the existing light rail network to the Sydney CBD and South Eastern Sydney as well as the completion of the Inner West Light Rail extension. It could be expected that public transport patronage to Barangaroo from the inner west would shift mode from bus and rail as a result of these extensions.

4.12.1 Inner West Light Rail Extension

The first stage of the inner-west light rail extension is a 5.6km extension running between Lilyfield and Dulwich Hill as shown in Figure 24. It will run from the current light rail terminus at Lilyfield, along the disused freight rail corridor, to Dulwich Hill. The extension opened in March 2014.



The CBD and South East Light Rail link will connect Circular Quay to the The CBD and South East Light Rail link will connect Circular Quay to the University of New South Wales via Anzac Parade and Alison Road. The integration of existing and planned light rail networks would further enhance patronage by this mode to Barangaroo. This link will include the pedestrianisation of a 1 kilometre section of George Street, between Bathurst and Hunter Streets. Construction commenced in 2015.



Figure 25 CBD and South East Light Rail Route Map

4.13 Taxis

A number of taxi ranks are proposed throughout the Barangaroo South precinct to serve the commercial, resident and visitor population. These will be strategically located to serve major buildings including the hotel, residential buildings and commercial towers, in line with the objectives outlined in the Barangaroo Integrated Transport Plan. Taxis will form an important component of the transport network serving Barangaroo, particularly for tourists and those departing the precinct late at night.

Current planning also allows for taxi ranks at the following locations:

- Western side of Sussex Street, opposite the Sussex Hotel;
- Northern side of Globe Street adjacent to Stage 1B development;
- Northern side of Shelley Street adjacent to Transport Place;
- Eastern side of Lime Street opposite the T2 building; and
- Western side of Lime Street near the hotel.

A summary of the taxi ranks currently planned for Barangaroo South is shown in Figure 26.

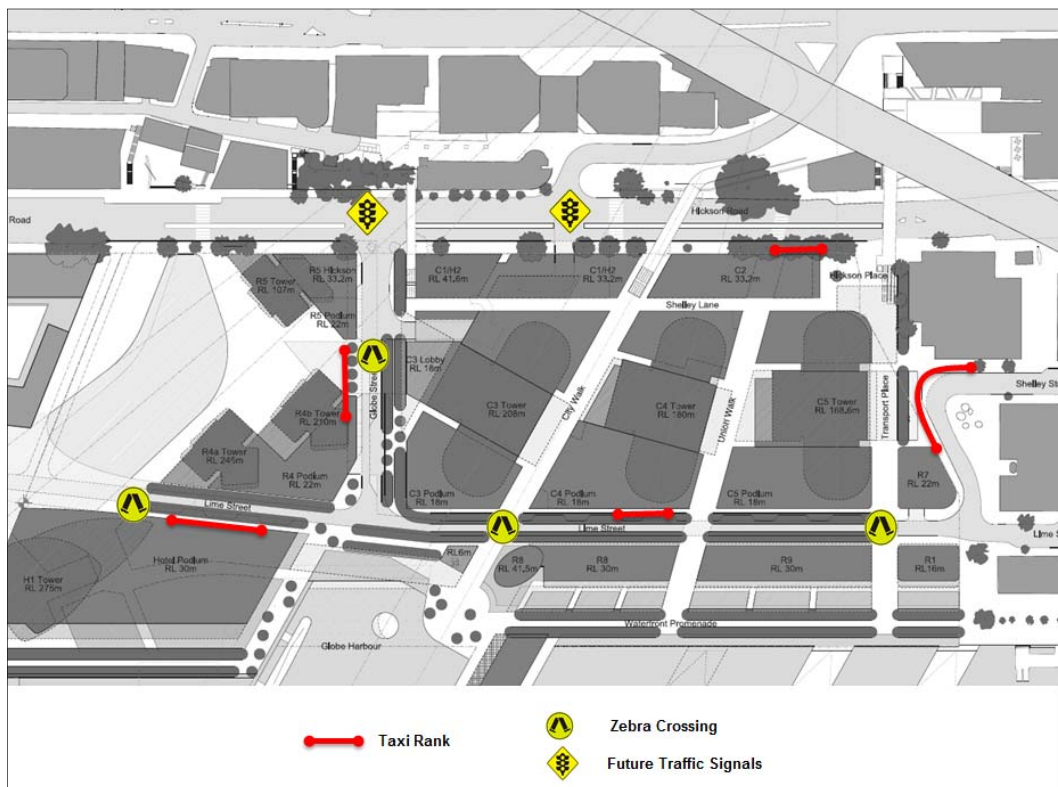


Figure 26 Proposed Taxi Ranks

Note: Indicative only, not to scale

Note: The location of the Barangaroo Ferry Hub wharves have been updated since the completion of this figure

Planning for taxi ranks in the Barangaroo precinct is currently ongoing, in consultation with key stakeholders including City of Sydney, Transport for NSW, the Barangaroo Delivery Authority and the RMS.

4.14 Late Night Transport Network

Barangaroo is a mixed use precinct which will generate activity at all hours of the day, including in the evening and late at night. A number of transport alternatives will be available at these times, including:

- Train services from Wynyard which run until 1am on weeknights on several routes, resuming again at 4.30am. On weekends the last train service departs Wynyard at 1.41am.
- Ferry services at the future Barangaroo Ferry Hub are expected to run until midnight seven days a week;
- Taxi services will provide an important form of late night transport for users, as they currently do at King Street Wharf. Taxis will be available at all hours of the night at the strategic taxi ranks identified in Section 4.13. These ranks will likely be managed during busy periods to accommodate the increased demands expected in the evening.

As bus planning for the precinct is currently still in progress, the availability of buses as a late night transport option is still to be confirmed.

5 Summary of Requirements

5.1 Transport and Accessibility Framework

The transport and accessibility framework includes: overarching requirements, detailed requirements and timing and funding of relevant infrastructure.

5.2 Overarching Requirements

The main requirement for delivering a good quality transport network at Barangaroo is meeting the mode split target for journey to work trips with a very low private vehicle use of 4% and high use of public transport. The largest challenge will be meeting the 61% base mode share for rail which will require the provision of a safe and efficient pedestrian connection between the site and Wynyard station. This is being delivered through:

- The construction of the Wynyard Walk bridge and tunnel;
- The construction of the City Walk bridge; and
- \$100 million upgrade of Wynyard Station to provide additional capacity including upgraded existing and new platform stairs to improve pedestrian circulation and reduce queuing.

5.3 Detailed Requirements

5.3.1 Road Network

- The journey to work mode share targets including the low share for car travel must be implemented;
- The proposed network must provide cohesive connections from Barangaroo to CBD streets and regional roads;
- Signalisation of intersections along Hickson Road at Napoleon Street and Glove Street will provide the primary vehicular access and egress points from Barangaroo South;
- Timely delivery and funding of the required road and intersection upgrades is essential; and
- All proposed road network changes and improvements are subject to approval by the road authority.

5.3.2 Car Parking

- The parking rates adopted in this TMAP based on an assumed land use mix are to be applied;
- On-street parking supply must be short stay only and limited in number; and
- Limited parking is to be provided at Headland Park to cater for leisure and tourist requirements.

5.3.3 Pedestrian Connections

- The main route between Barangaroo and Wynyard Station will be facilitated via the Wynyard Walk – a high quality pedestrian connection which provides direct access to Barangaroo;
- Design and delivery of the Wynyard Walk is to be undertaken by the NSW Government; and
- Other grade separated connections between existing streets and Barangaroo will be implemented, including the City Walk pedestrian bridge.

5.3.4 Rail Services

- Improvements to Wynyard Station are proposed to be by the NSW Government to accommodate the significant increase passenger throughput over the short and long term; and
- The construction of the North West Rail Link and South West Rail Link will improve rail access for those travelling to Barangaroo

5.3.5 Bus Services

- The Sydney City Centre Access Strategy outlines a redesigned bus network which improves bus reliability and address congestion and capacity constraints;
- New bus routes will run to Barangaroo and Walsh Bay via the city centre, Napoleon Street and Hickson Road; and
- Bus stops must be provided on Hickson Road to service new bus routes into Barangaroo

5.3.6 Ferry

- The introduction of a new ferry wharf at Barangaroo will improve accessibility via this mode of transport

5.3.7 Cycling

- The delivery of an enhanced cycleway network as outlined in the Sydney City Centre Access Strategy will provide improved connectivity to local and regional bicycle routes; and
- The inclusion of facilities for cyclists (e.g. bicycle parking) within the development in Barangaroo will promote travel via this mode.

5.3.8 Light Rail

- Design and delivery of light rail through the CBD and inner west by the NSW Government has the potential to shift mode from bus and rail as a result of these extensions.

5.3.9 Travel Planning

A series of Travel Demand Management Plans for the commercial and residential buildings in Barangaroo South has already been prepared in previous project applications. These plans outline measures that will be encouraged of future tenants to support sustainable modes of travel to Barangaroo and reduce car dependency. A summary of these measures are outlined below.

General Marketing and Promotion

The objectives of the TDMP will only be achieved with the support of building employees. Marketing the benefits and promoting the sustainable alternatives available are therefore crucial in encouraging staff to adopt the TDMP measures. It is important that at an early stage, staff are made aware of the need for the TDMP, and that it is emphasised that the measures are being introduced to support and encourage people to use cars more wisely. In addition to raising general awareness, any successes achieved will be fully publicised to staff in order to motivate them to use sustainable modes of transport.

- A dedicated webpage for employees commercial buildings will be created to include travel information section containing information on cycle parking and useful links to public transport websites specific to the office location.;
- Support and promote events such as National Bike Week, Bike2Work Days, walk to work day to staff through, broadcast messages and intranet.

Reducing The Need To Travel

To ensure that sustainable transport options are promoted to staff when making journeys for work purposes, and to reduce the need to travel, the following measures should be implemented. These measures require implementation by staff members across the building.

- Active promotion of the office teleconferencing facilities as an alternative to face to face meetings. This can be achieved by placing 'reducing the need to travel' as an item on internal group meeting agendas;
- Include teleconference meetings as a standard option in client proposals in preference to face to face meetings where practical; and
- Consider a more formal approach to working from home and actively encourage staff to consider this option. Include working from home as an item on the agenda for internal group meetings.

Spreading Travel Demand

Currently the highest travel demand occurs in the peak periods between 7am and 9am and 4pm to 6pm. Public Transport services are in lower demand and road congestion is lower during the inter peak and off peak. Tenants could be encouraged to implement flexible working hours allowing the employees to arrive at work and leave work during the shoulders of the peak e.g. start work at 10am and finish at 6.30 pm or start at 7am and finish at 3.30pm.

Travel During the Working Day

To provide staff with a choice of convenient sustainable transport option for work – related travel during the working day the following initiatives should be promoted:

- Use of the Sydney Trains network to travel to places that are on or near a train line;
- Walk to places that are close by rather than taking the taxi;
- Promotion of the taxi pooling system which would cross check for common destinations and inform the passenger of possible taxi pooling options.

Cycling

In order to activate and promote cycling the following measures should be taken:

- Provide Sydney cycle maps to staff;
- Participate in annual events such as 'Ride to Work Day';
- Provide secure bicycle parking and end of trip facilities for building staff
- Broadcasts in staff areas should have news of events / generic posters promoting cycling;
- Staff who cycle to work should be encouraged to form a Bicycle User Group in order to provide a body of regular cyclists who can discuss issues relating to the provision of on-site cycling facilities and the maintenance of off-site cycle routes; and
- Set up 'Bike Buddies' scheme for less confident staff interested in cycling.

Public Transport

To promote the use of public transport work related trips and journeys to/from Barangaroo.

- Create and maintain an intranet 'Public Transport links page' containing useful links to journey planning websites in Sydney;
- Consider reimbursing or partially reimbursing staff for journey to work trips made by public transport;
- Consider providing interest-free loans for staff to buy an annual ticket for public transport;
- Provide useful public transport maps and promotional items to potential and current public transport users; and
- Investigate the possibility of purchasing an Opal Card for general use of building staff for business journeys, in lieu of cars and taxis

Walking

Specific Travel Plan measures designed to encourage more walking trips to and from work by those employees living within a reasonable distance.

- Produce walking related articles for inclusion in the office newsletter focussing on 'walking champions' to highlight best practise in walking to business meetings;

- Create and maintain an intranet ‘useful walking routes’ containing useful routes to key parts of the Sydney CBD, including public transport terminals at Wynyard, Circular Quay, Martin Place and Town Hall rail stations;
- Participate in Walk to Work day.

Staff Induction

To ensure new members of staff are aware of the Travel Demand Management Plan, all new staff members should be made aware of the Plan as part of their induction process. The TDMP section of the induction should provide new starters with the following:

- A brief introduction to the TDMP and its purpose;
- Tour of the office to include a visit to cycle parking areas and shower and changing facilities; and
- Provision of TDMP information which would include information on incentives to use sustainable means of transport e.g. /taxi share system.

Visitor Travel / Site Access Information

For internal site access information, consider developing an interactive map to show useful walking routes, nearby public transport terminals and popular cycling routes to work, expanded to include additional local information useful to staff such as nearby shops and services or locations for recreational activities

5.4 Delivery and Timing

The various transport initiatives outlined in this strategy will be delivered primarily from government agencies with the exception of the commitments made by Lend Lease under their Project Development Agreement with the Barangaroo Delivery Authority. This is summarised in Table 17 below.

Table 17 Delivery and Timing of Transport Measures

Measure	Description	Responsibility for Delivery	Estimated Timing
Road network modifications	Signalisation of Hickson Road / Napoleon Street	Lend Lease, City of Sydney and BDA	2015
	Signalisation of Hickson Road / Globe Street	Lend Lease, City of Sydney and BDA	Prior to the opening of Stage 1B
Pedestrian connections	Wynyard Walk	TfNSW	2016
	City Walk Bridge	Lend Lease	2015
	Union Walk and City Walk (at-grade routes)	Lend Lease	2015
	Foreshore Walk	BDA	From 2015
Bicycle connections	Hickson Road bi-directional cycleway	BDA and City of Sydney	To be confirmed
	Napoleon Street eastbound cycle lane	BDA and City of Sydney	2015
Bus and coach services	Allocation of space on Hickson Road to accommodate future bus stops	TfNSW, City of Sydney and BDA	2015
	Allocation of kerbside space in vicinity of the hotel for coach set down / pick up	Lend Lease and BDA	To be confirmed
Taxi services	Provision of taxi ranks serving Barangaroo South	Lend Lease and City of Sydney	From 2015
Water based transport	Barangaroo Ferry Hub	TfNSW	2016

6 Conclusions

This Transport Management and Accessibility Plan (TMAP) report supports a modification to Concept Plan (MP06_0162) submitted to the Minister for Planning pursuant to Section 75W of Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act). This report addresses the changes that have come about as a result of the proposed floor space modifications as well as any changes to the future public transport plans announced by the NSW Government. The report has considered the transport recommendations and findings of a number of key planning documents relevant to the Barangaroo Precinct, those being:

- Sydney City Centre Access Strategy
- NSW Long Term Transport Masterplan
- Barangaroo Integrated Transport Plan

Initial planning approval for Barangaroo South was based on the principle of achieving high usage of public transport, walking and cycling as a method of travel to work, with a target of 4% by car. The mode split targets have been largely retained in this TMAP report, with the exception of ferry trips which has increased to a minimum of 4% of all journey to work trips.

A cumulative traffic analysis has been undertaken which considers the development of the entire Barangaroo precinct - using the same transport principles and assumptions that were used for TMAP September 2008. A corridor traffic model was developed which assessed the future performance of the road network serving the precinct. The modelling indicated little difference in the road network performance due to the minor traffic increase arising from the Concept Plan modification. Changes in vehicle delays were found to be relatively minor in both the AM and PM commuter peak hours.

Car parking will be provided at the same parking ratios as used in TMAP September 2008, excluding for the hotel. Approximately 1,700 car parking bays are envisaged for the residential component of the development - based on an indicative dwelling mix. The quantum of traffic generated by the residential uses is based on the total number of dwellings provided and independent of the number of resident parking bays. The number of on-street parking spaces within Barangaroo has reduced from the 275 envisaged in the TMAP September 2008 to 40 – consistent with the transport planning principles for the precinct.

The Barangaroo precinct will be served by a number of pedestrian and public transport enhancement planned to be delivered in the coming years, including:

- Wynyard Walk pedestrian bridge and tunnel;
- City Walk pedestrian bridge;
- Expansion of the Sydney CBD cycleway network;
- Upgrades to Wynyard Station;
- Introduction of new bus routes to Barangaroo and Walsh Bay via the city centre;
- Provision of new taxi ranks within the Barangaroo precinct;
- Construction of a new ferry hub at Barangaroo; and
- Construction of the CBD and South East Light Rail link;

These improvements will accommodate the future population of the Barangaroo precinct by providing a number of viable (non private vehicle) transport options – meeting the mode split target for journey to work trips by private vehicle of 4%. The works will be delivered primarily from government agencies with the exception of the commitments made by Lend Lease under their Project Development Agreement with the Barangaroo Delivery Authority.

Appendix A

Hotel Traffic and Parking Generation Methodology

A1 Hotel Forecast Traffic Generation

A1.1 Methodology

The primary document relating to traffic impact assessments in NSW is the RMS's *Guide to Traffic Generating Developments*. Traffic generation forecasts are typically based on rates per m² of GFA development for each type of land use, or other factors including parking provision or dwelling numbers. Rates are usually derived from one of the following two sources:

- Standard rates contained in the RMS's *Guide to Traffic Generating Developments*; or
- Rates estimated on the basis of surveys of existing developments similar to the proposed development.

Traffic generation rates are heavily influenced by factors such as public transport availability, availability and cost of parking, mixed use and complementary nature of various land use components and peak traffic generation hours. The RMS guide notes that:

Surveys of existing developments similar to the proposal, can also be undertaken and comparisons may be drawn. By simplifying generation rates, site-by-site variations from the average are not taken into account.....Departures from the average generation rates for individual development proposals may be adopted, in which case such a departure should be justified with relevant supporting facts.

Given the unique nature of the proposed hotel at Barangaroo South, the most appropriate method to forecast future traffic generation is to refer to development with similar characteristics (e.g. with components of retail, tourist and gaming facilities). The Crown resort in Melbourne was identified as a suitable site.

To facilitate this study, Arup was provided with parking and traffic data by Crown. This included both video surveillance footage and entry/exit data from Crown's car parking areas. This is further described in the sections below.

A1.2 Self-Park Traffic Movements

The methodology undertaken for forecasting the number of self-park traffic movements for the proposed hotel was as follows:

- The number of black, platinum and gold members entering and exiting the Crown Melbourne basement car park over the course of an entire year (broken down each hour for every day of the week) was recorded.
- Major event days (e.g. AFL grand final, Melbourne Cup) were excluded from the analysis to provide a typical representation.
- The data was then moderated based on the number of members anticipated for The proposed hotel relative to the total number in Crown Melbourne
- A profile of activity was then generated for the proposed hotel which considered all anticipated self-park arrivals and departures. It should be noted that the data was not moderated to match the anticipated capacity of the hotel basement – which is likely to be lower than that at Crown Melbourne.

Screenshots of the porte-cocheres taken from the surveillance footage are shown in Figure 27 and Figure 28.



Figure 27 Crown Melbourne VIP Gaming Porte-Cochere



Figure 28 Crown Melbourne Hotel Porte-Cochere

The forecast number of self-park arrivals and departures for a typical Friday and Saturday (the busiest days of the week) is shown in Figure 29 and Figure 30. The number of vehicles generated Monday to Thursday are generally significantly lower than those experienced on Fridays on Saturdays.

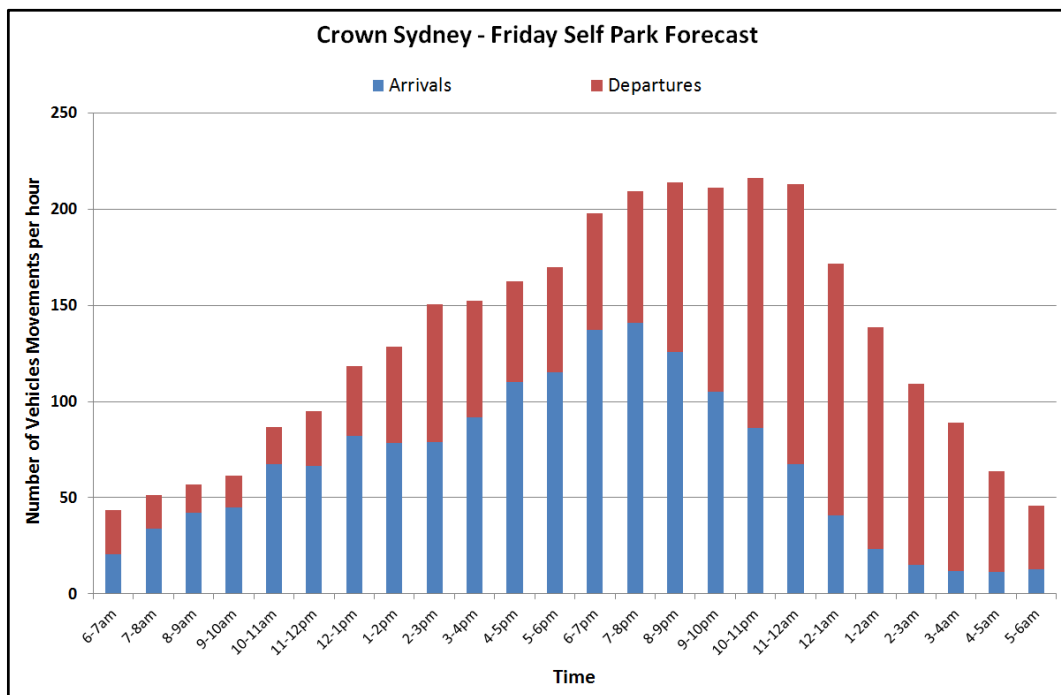


Figure 29 Friday Self-Park Traffic Movements

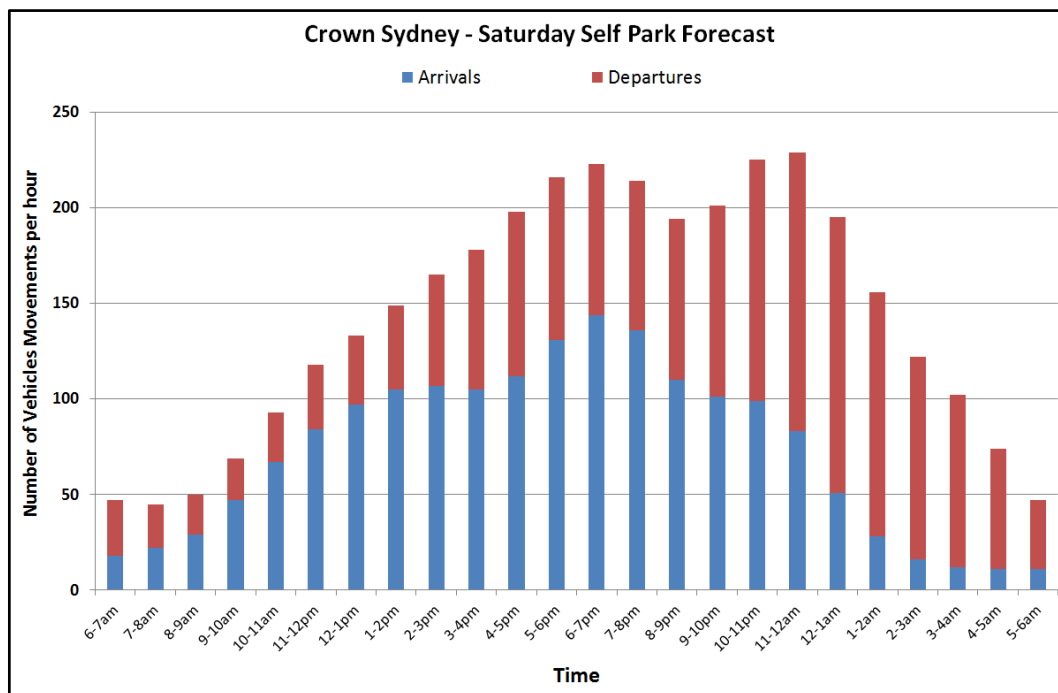


Figure 30 Saturday Self-Park Traffic Movements

A1.3 Valet Movements

Arup studied surveillance footage of the Crown Melbourne southern and eastern porte-cochere to determine potential valet use over a typical Friday and Saturday. Traffic counts of chauffeured cars and valet vehicles were conducted between 7am and midnight to determine the likely level of traffic generated by the proposed hotel. These counts included traffic movements related to the hotel, VIP gaming, restaurant and function room uses.

The forecast number of valet arrivals and departures at the hotel porte-cochere for a typical Friday and Saturday are shown in Figure 31 & Figure 32.

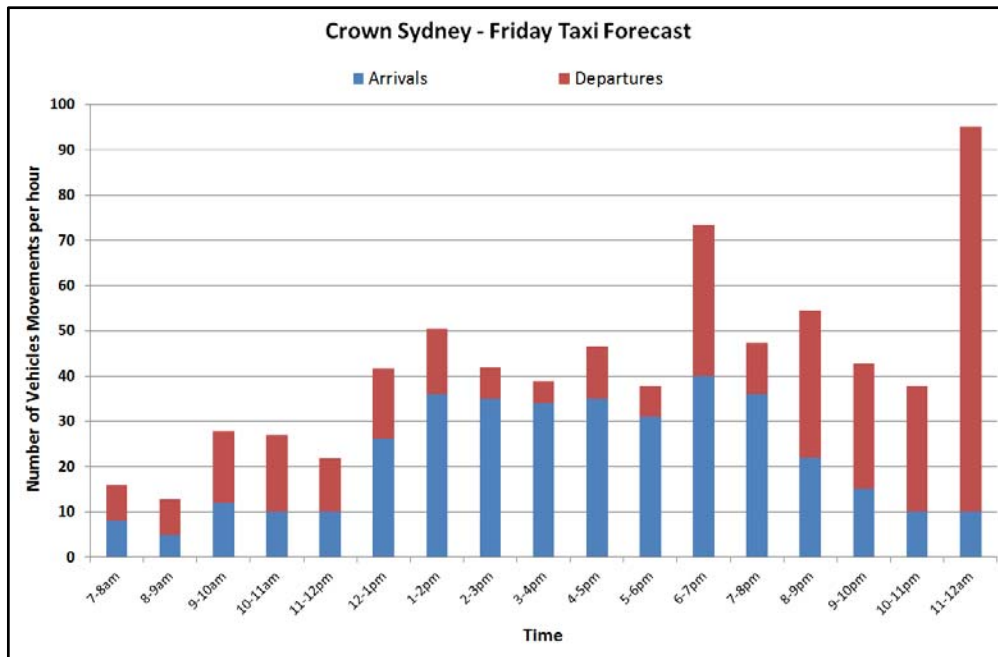


Figure 31 Friday Valet Traffic Movements

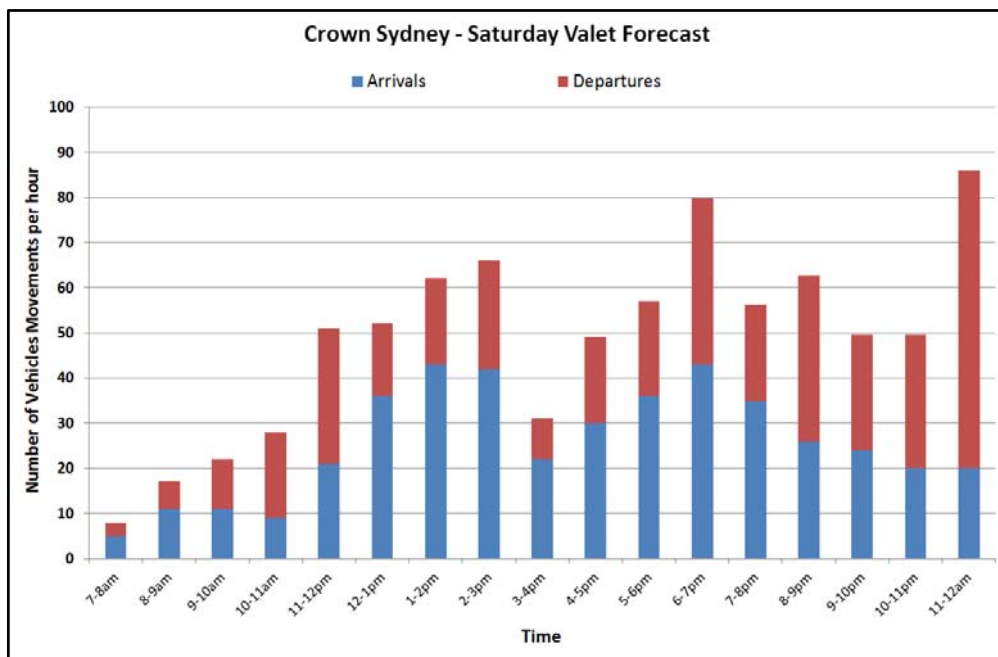


Figure 32 Saturday Valet Traffic Movements

A1.4 Service Vehicle Movements

To estimate the likely level of service vehicles generated by The proposed hotel, Arup studied video footage of similar loading dock facilities in two Crown properties in Melbourne. Surveillance footage was studied between 5am and 5pm for Friday 30 August which is typically the busiest day of the week in terms of loading activity. The properties studied were:

- Crown Metropol (658 rooms plus restaurant, bar & retail)
- Crown Promenade (465 rooms plus restaurant, bar & conferencing)

Screenshots of the two loading docks taken from the surveillance footage are shown in Figure 33 and Figure 34. Key findings are as follows:

- During the AM peak period (7am – 10am), where pedestrian and vehicle volumes are generally highest, there were no more than 10 service vehicle movements generated by either Crown Metropol or Crown Promenade. This indicates that the majority of vehicle movements are more likely to occur during the middle of the day
- The majority of service vehicle movements were observed to be smaller delivery vans, with the remainder consisting of waste pick-ups, food deliveries and small to medium trucks (medium rigid vehicles)

The detailed survey results are provided in Table 18 and Table 19.



Figure 33 Crown Metropol Loading Dock



Figure 34 Crown Promenade Loading Dock

Table 18 Crown Promenade Loading Dock Counts

Vehicle Type	Total Service Vehicle Movements per Hour (In + Out)												Total In	Total Out	Total Movements	% of Total
	5-6AM	6-7AM	7-8AM	8-9AM	9-10AM	10-11AM	11-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM				
Van	0	3	2	3	2	0	3	0	6	5	3	2	15	14	29	57%
Truck	0	1	1	0	2	2	2	3	4	3	1	1	10	10	20	39%
Garbage Vehicle	0	0	0	0	0	2	0	0	0	0	0	0	1	1	2	4%
<i>Total</i>	<i>0</i>	<i>4</i>	<i>3</i>	<i>3</i>	<i>4</i>	<i>4</i>	<i>5</i>	<i>3</i>	<i>10</i>	<i>8</i>	<i>4</i>	<i>3</i>	26	25	51	100%

Table 19 Crown Metropool Loading Dock Counts

Vehicle Type	Total Service Vehicle Movements (In + Out)												Total In	Total Out	Total Movements	% of Total
	5-6AM	6-7AM	7-8AM	8-9AM	9-10AM	10-11AM	11-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM				
Van	0	0	0	0	5	6	1	2	3	4	1	2	12	12	24	62%
Truck	0	0	0	0	0	0	0	2	0	2	2	1	4	3	7	18%
Garbage Vehicle	0	0	1	3	0	0	2	0	1	1	0	0	4	4	8	20%
<i>Total</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>3</i>	<i>5</i>	<i>6</i>	<i>3</i>	<i>4</i>	<i>4</i>	<i>7</i>	<i>3</i>	<i>3</i>	20	19	39	100%

Based on these surveys, a revised profile of service vehicle movements for a busy Friday at the proposed hotel has been developed. This has assumed a total of 51 service vehicle movements, in line with that recorded at Crown Promenade. The breakdown of these movements is shown in Table 20 below

Table 20 Hotel Forecast Service Vehicle Movements

Time Period			<i>Hotel Forecast Service Vehicle Movements</i>			
			<i>Vans</i>	<i>Trucks</i>	<i>Garbage Vehicles</i>	Total
5:00	to	6:00	0	0	0	0
6:00	to	7:00	3	1	0	4
7:00	to	8:00	2	1	0	3
8:00	to	9:00	3	0	0	3
9:00	to	10:00	2	2	0	4
10:00	to	11:00	0	2	2	4
11:00	to	12:00	3	2	0	5
12:00	to	13:00	0	3	0	3
13:00	to	14:00	6	4	0	10
14:00	to	15:00	5	3	0	8
15:00	to	16:00	3	1	0	4
16:00	to	17:00	2	1	0	3
Total Service Vehicle Movements			29	20	2	51
% of Total Movements			57%	39%	4%	100%

A1.5 Parking Provision

A1.5.1 Parking for Non-Residential Uses

Based on the anticipated number of arrival and departures into the hotel basement (refer sections A1.2 and A1.3), the total parking demand for the proposed hotel can be estimated. This forecast demand, shown over a peak weekend period, is shown in Figure 35.

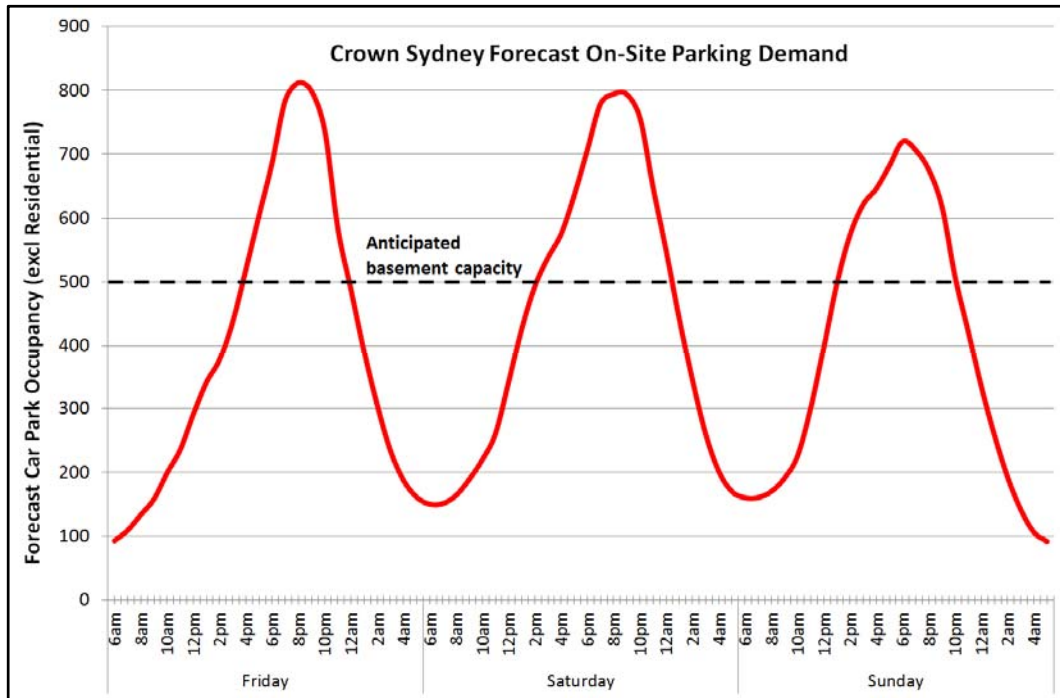


Figure 35 Hotel Forecast Car Parking Demand

This profile demonstrates car parking demand (excluding residential uses) will peak at approximately 800 spaces – above the anticipated 500 spaces to be allocated for non-residential uses. Other off-street car parks in the precinct, such as in the Barangaroo South 1A basement, may be utilised to accommodate the shortfall of approximately 300 spaces during peak periods.

A1.5.2 Parking for Residential Uses

The level of parking for residential uses will be dependent on the final dwelling mix, however will be based on the following maximum car parking rates (consistent with those in Section 4.5 of the main report)

- Studio apartment: 0.25 spaces / unit
- 1 bed apartment: 0.50 spaces / unit
- 2 bed apartment: 1.2 spaces / unit
- 3 bed apartment: 2 spaces / unit

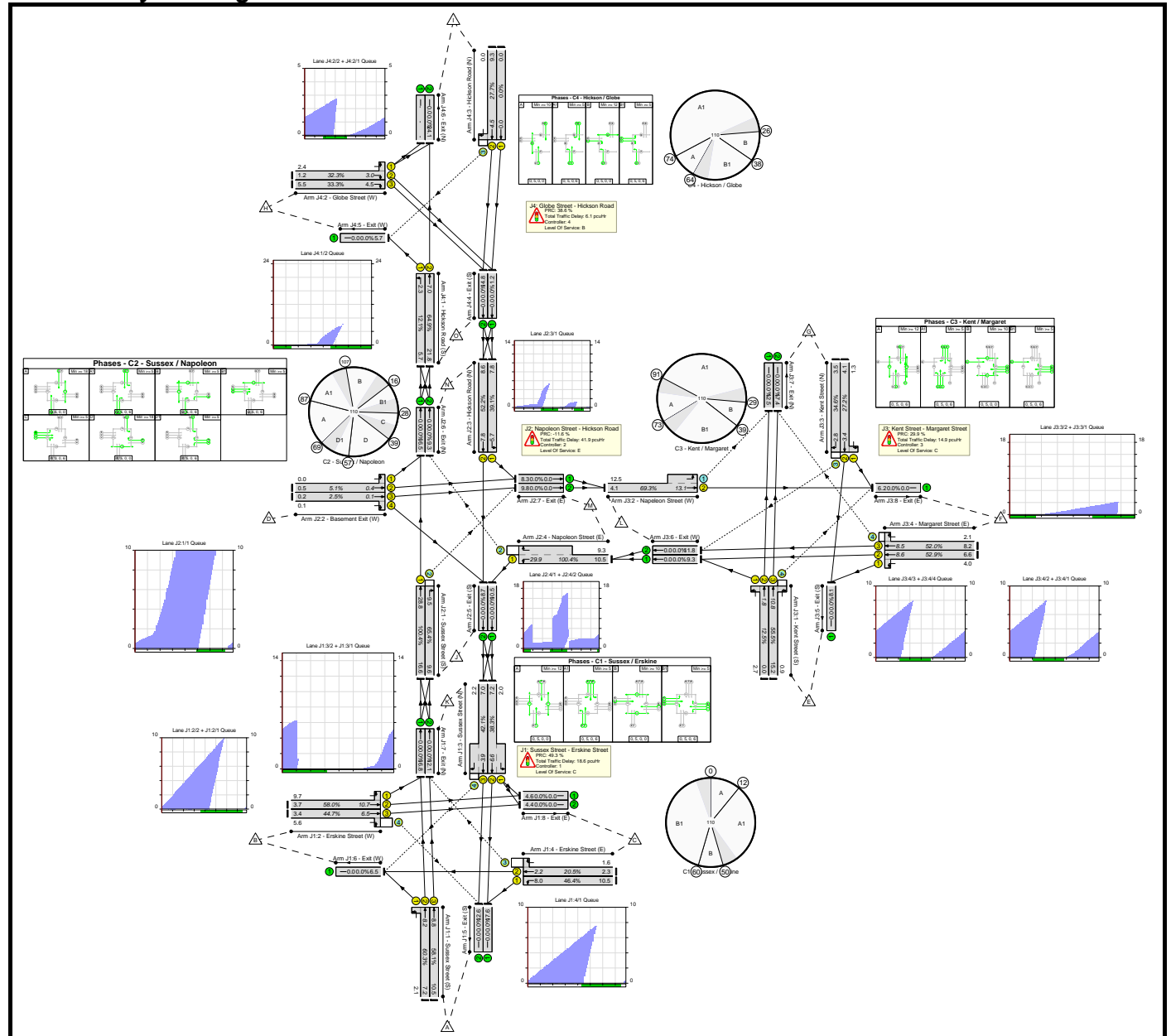
Appendix B

LinSig Traffic Modelling Outputs

Basic Results Summary

Scenario 2: 'AM Mod2' (FG9: 'AM Future MOD2 Traffic', Plan 1: 'Future (with Basement)')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Max. Back of Uniform Queue (pcu)	Mean Max Queue (pcu)
Network: Linsig Modelling	-	-	100.4%	-	-	-	-	-
J1: Sussex Street - Erskine Street	-	-	60.3%	-	-	-	-	-
1/2+1/1	Sussex Street (S) Left Ahead	U	60.3%	37.4	303	1440:1440	7.4	8.2
1/3	Sussex Street (S) Ahead	U	58.1%	32.4	342	1440	8.1	8.8
2/2+2/1	Erskine Street (W) Left Ahead	U	58.0%	30.2	436	1800:1800	10.0	10.7
2/3+2/4	Erskine Street (W) Right Ahead	U+O	44.7%	27.8	294	1800:1440	6.1	6.5
3/2+3/1	Sussex Street (N) Ahead Left	U	38.3%	18.4	300	1800:1800	6.3	6.6
3/3+3/4	Sussex Street (N) Ahead Right	U+O	42.1%	17.3	301	1800:1440	3.5	3.9
4/1	Erskine Street (E) Left	U	46.4%	28.3	342	1800	7.6	8.0
4/2+4/3	Erskine Street (E) Ahead Right	U+O	20.5%	23.1	128	1440:1440	2.1	2.2
J2: Napoleon Street - Hickson Road	-	-	100.4%	-	-	-	-	-
1/1	Sussex Street (S) Ahead	U	100.4%	120.7	542	1800	16.6	28.8
1/2	Sussex Street (S) Right	O	65.4%	34.4	315	1800	8.6	9.5
2/2+2/1	Basement Exit (W) Left Ahead	U	5.1%	45.3	15	1800:1800	0.4	0.4
2/3+2/4	Basement Exit (W) Right Ahead	U	2.5%	44.8	8	1800:1800	0.1	0.1
3/1	Hickson Road (N) Left	U	39.1%	13.4	256	1800	5.4	5.7
3/2	Hickson Road (N) Ahead	U	52.2%	30.8	282	1800	7.3	7.8
4/1+4/2	Napoleon Street (E) Left Right	U+O	100.4%	94.5	649	1800:1800	16.5	29.9
J3: Kent Street - Margaret Street	-	-	69.3%	-	-	-	-	-
1/2+1/1	Kent Street (S) Left Ahead	U	12.5%	24.4	88	1800:1800	1.7	1.8
1/3+1/4	Kent Street (S) Ahead Right	U+O	55.5%	20.1	526	1800:920	10.2	10.8

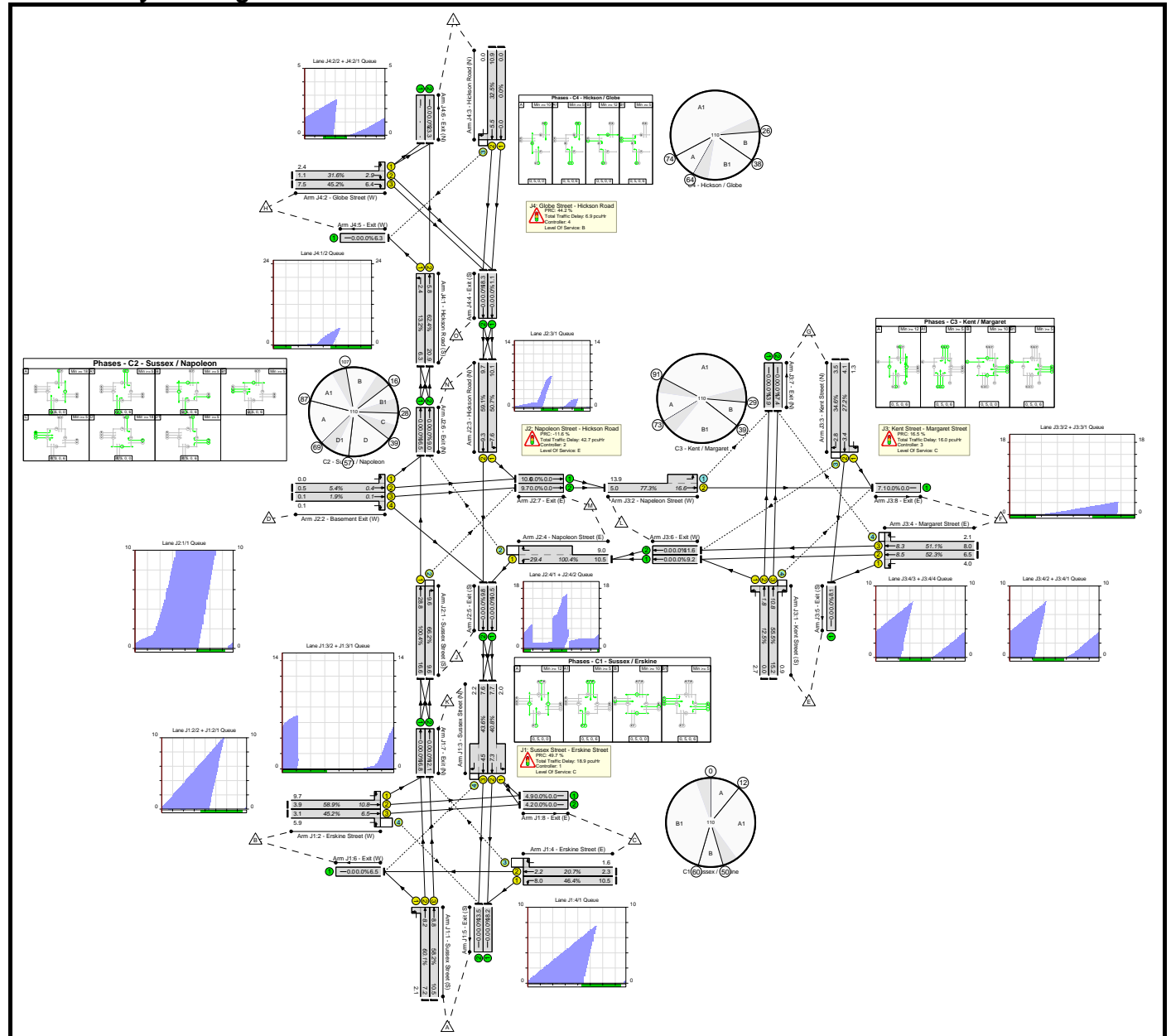
Basic Results Summary

2/2+2/1	Napeleon Street (W) Left Ahead	U+O	69.3%	19.5	544	920:1800	12.0	13.1
3/2+3/1	Kent Street (N) Ahead Left	U	27.2%	19.9	174	1800:920	3.2	3.4
3/3	Kent Street (N) Right	O	34.6%	35.2	116	1800	2.5	2.8
4/2+4/1	Margaret Street (E) Left Ahead	U	52.9%	33.3	348	1800:1800	8.0	8.6
4/3+4/4	Margaret Street (E) Ahead Right	U+O	52.0%	33.5	339	1800:1800	8.0	8.5
J4: Globe Street - Hickson Road	-	-	64.9%	-	-	-	-	-
1/1	Hickson Road (S) Left	U	12.1%	5.3	188	1800	2.2	2.3
1/2	Hickson Road (S) Ahead	U	64.9%	8.1	714	1800	6.1	7.0
2/2+2/1	Globe Street (W) Right Left	U	32.3%	44.2	117	1800:1800	2.8	3.0
2/3	Globe Street (W) Right	U	33.3%	34.9	180	1800	4.3	4.5
3/1	Hickson Road (N) Ahead	U	0.0%	0.0	0	1800	0.0	0.0
3/2+3/3	Hickson Road (N) Ahead Right	U+O	27.7%	12.4	304	1800:1800	4.3	4.5
<div>C1 - Sussex / ErskinePRC for Signalled Lanes (%): 49.3Total Delay for Signalled Lanes (pcuHr): 18.63Cycle Time (s): 110</div> <div>C2 - Sussex / NapoleonPRC for Signalled Lanes (%): -11.6Total Delay for Signalled Lanes (pcuHr): 41.88Cycle Time (s): 110</div> <div>C3 - Kent / MargaretPRC for Signalled Lanes (%): 29.9Total Delay for Signalled Lanes (pcuHr): 14.95Cycle Time (s): 110</div> <div>C4 - Hickson / GlobePRC for Signalled Lanes (%): 38.6Total Delay for Signalled Lanes (pcuHr): 6.10Cycle Time (s): 110</div> <div>PRC Over All Lanes (%): -11.6Total Delay Over All Lanes(pcuHr): 81.56</div>								

Basic Results Summary

Scenario 3: 'AM Mod8' (FG5: 'AM Future MOD8 Traffic', Plan 1: 'Future (with Basement)')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Max. Back of Uniform Queue (pcu)	Mean Max Queue (pcu)
Network: Linsig Modelling	-	-	100.4%	-	-	-	-	-
J1: Sussex Street - Erskine Street	-	-	60.1%	-	-	-	-	-
1/2+1/1	Sussex Street (S) Left Ahead	U	60.1%	37.3	302	1440:1440	7.4	8.2
1/3	Sussex Street (S) Ahead	U	58.2%	32.5	343	1440	8.1	8.8
2/2+2/1	Erskine Street (W) Left Ahead	U	58.9%	30.4	443	1800:1800	10.1	10.8
2/3+2/4	Erskine Street (W) Right Ahead	U+O	45.2%	28.1	295	1800:1440	6.1	6.5
3/2+3/1	Sussex Street (N) Ahead Left	U	40.8%	18.3	318	1800:1800	6.9	7.3
3/3+3/4	Sussex Street (N) Ahead Right	U+O	43.6%	17.2	320	1800:1440	4.1	4.5
4/1	Erskine Street (E) Left	U	46.4%	28.3	342	1800	7.6	8.0
4/2+4/3	Erskine Street (E) Ahead Right	U+O	20.7%	23.0	129	1440:1440	2.1	2.2
J2: Napoleon Street - Hickson Road	-	-	100.4%	-	-	-	-	-
1/1	Sussex Street (S) Ahead	U	100.4%	120.7	542	1800	16.6	28.8
1/2	Sussex Street (S) Right	O	66.2%	35.0	315	1800	8.7	9.6
2/2+2/1	Basement Exit (W) Left Ahead	U	5.4%	45.4	16	1800:1800	0.4	0.4
2/3+2/4	Basement Exit (W) Right Ahead	U	1.9%	44.6	6	1800:1800	0.1	0.1
3/1	Hickson Road (N) Left	U	50.7%	15.4	332	1800	7.1	7.6
3/2	Hickson Road (N) Ahead	U	59.1%	33.0	319	1800	8.6	9.3
4/1+4/2	Napoleon Street (E) Left Right	U+O	100.4%	95.1	639	1800:1800	16.2	29.4
J3: Kent Street - Margaret Street	-	-	77.3%	-	-	-	-	-
1/2+1/1	Kent Street (S) Left Ahead	U	12.5%	24.4	88	1800:1800	1.7	1.8
1/3+1/4	Kent Street (S) Ahead Right	U+O	55.5%	20.1	526	1800:920	10.2	10.8

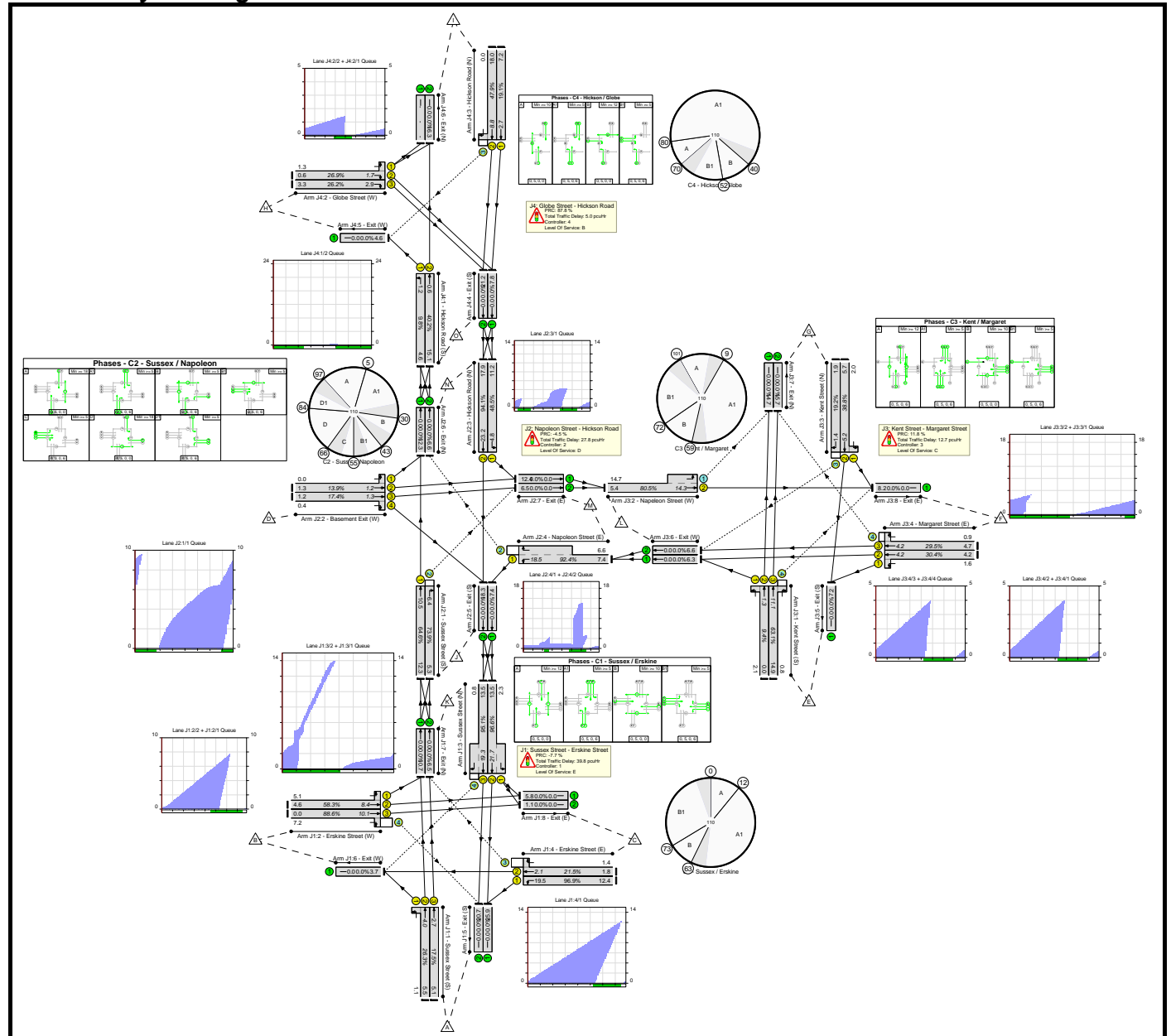
Basic Results Summary

2/2+2/1	Napeleon Street (W) Left Ahead	U+O	77.3%	24.1	619	920:1800	14.9	16.6
3/2+3/1	Kent Street (N) Ahead Left	U	27.2%	19.9	174	1800:920	3.2	3.4
3/3	Kent Street (N) Right	O	34.6%	35.2	116	1800	2.5	2.8
4/2+4/1	Margaret Street (E) Left Ahead	U	52.3%	33.1	344	1800:1800	7.9	8.5
4/3+4/4	Margaret Street (E) Ahead Right	U+O	51.1%	33.3	333	1800:1800	7.8	8.3
J4: Globe Street - Hickson Road	-	-	62.4%	-	-	-	-	-
1/1	Hickson Road (S) Left	U	13.2%	5.3	206	1800	2.4	2.4
1/2	Hickson Road (S) Ahead	U	62.4%	7.5	686	1800	4.9	5.8
2/2+2/1	Globe Street (W) Right Left	U	31.6%	44.2	114	1800:1800	2.7	2.9
2/3	Globe Street (W) Right	U	45.2%	37.2	244	1800	6.0	6.4
3/1	Hickson Road (N) Ahead	U	0.0%	0.0	0	1800	0.0	0.0
3/2+3/3	Hickson Road (N) Ahead Right	U+O	32.5%	12.9	356	1800:1800	5.2	5.5
<div>C1 - Sussex / Erskine C2 - Sussex / Napoleon C3 - Kent / Margaret C4 - Hickson / Globe</div> <div>PRC for Signalled Lanes (%): 49.7 PRC for Signalled Lanes (%): -11.6 PRC for Signalled Lanes (%): 16.5 PRC for Signalled Lanes (%): 44.2 PRC Over All Lanes (%): -11.6</div> <div>Total Delay for Signalled Lanes (pcuHr): 18.91 Total Delay for Signalled Lanes (pcuHr): 42.75 Total Delay for Signalled Lanes (pcuHr): 16.02 Total Delay for Signalled Lanes (pcuHr): 6.92 Total Delay Over All Lanes(pcuHr): 84.60</div> <div>Cycle Time (s): 110 Cycle Time (s): 110 Cycle Time (s): 110 Cycle Time (s): 110</div>								

Basic Results Summary

Scenario 5: 'PM Mod2' (FG10: 'PM Future MOD2 Traffic', Plan 1: 'Future (with Basement)')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Max. Back of Uniform Queue (pcu)	Mean Max Queue (pcu)
Network: Linsig Modelling	-	-	96.9%	-	-	-	-	-
J1: Sussex Street - Erskine Street	-	-	96.9%	-	-	-	-	-
1/2+1/1	Sussex Street (S) Left Ahead	U	26.3%	18.2	216	1800:1440	3.8	4.0
1/3	Sussex Street (S) Ahead	U	17.5%	15.8	166	1800	2.6	2.7
2/2+2/1	Erskine Street (W) Left Ahead	U	58.3%	39.8	320	1800:1800	7.7	8.4
2/3+2/4	Erskine Street (W) Right Ahead	U+O	88.6%	86.0	237	1800:920	6.9	10.1
3/2+3/1	Sussex Street (N) Ahead Left	U	96.6%	61.8	515	920:1800	14.0	21.7
3/3+3/4	Sussex Street (N) Ahead Right	U+O	95.1%	56.6	466	900:1440	12.9	19.3
4/1	Erskine Street (E) Left	U	96.9%	103.7	406	1440	12.2	19.5
4/2+4/3	Erskine Street (E) Ahead Right	U+O	21.5%	31.8	106	1440:1800	2.0	2.1
	-	-	94.1%	-	-	-	-	-
1/1	Sussex Street (S) Ahead	U	64.6%	40.1	402	1800	9.6	10.5
1/2	Sussex Street (S) Right	O	73.9%	63.9	174	1800	5.0	6.4
2/2+2/1	Basement Exit (W) Left Ahead	U	13.9%	46.5	41	1800:1800	1.1	1.2
2/3+2/4	Basement Exit (W) Right Ahead	U	17.4%	46.3	54	1800:1800	1.2	1.3
3/1	Hickson Road (N) Left	U	48.5%	16.0	365	1800	4.3	4.8
3/2	Hickson Road (N) Ahead	U	94.1%	65.3	585	1800	17.3	23.2
4/1+4/2	Napoleon Street (E) Left Right	U+O	92.4%	53.6	459	1800:1800	13.6	18.5
J3: Kent Street - Margaret Street	-	-	80.5%	-	-	-	-	-
1/2+1/1	Kent Street (S) Left Ahead	U	9.4%	22.7	69	1440:1800	1.3	1.3
1/3+1/4	Kent Street (S) Ahead Right	U+O	63.1%	21.8	512	1440:920	10.2	11.1

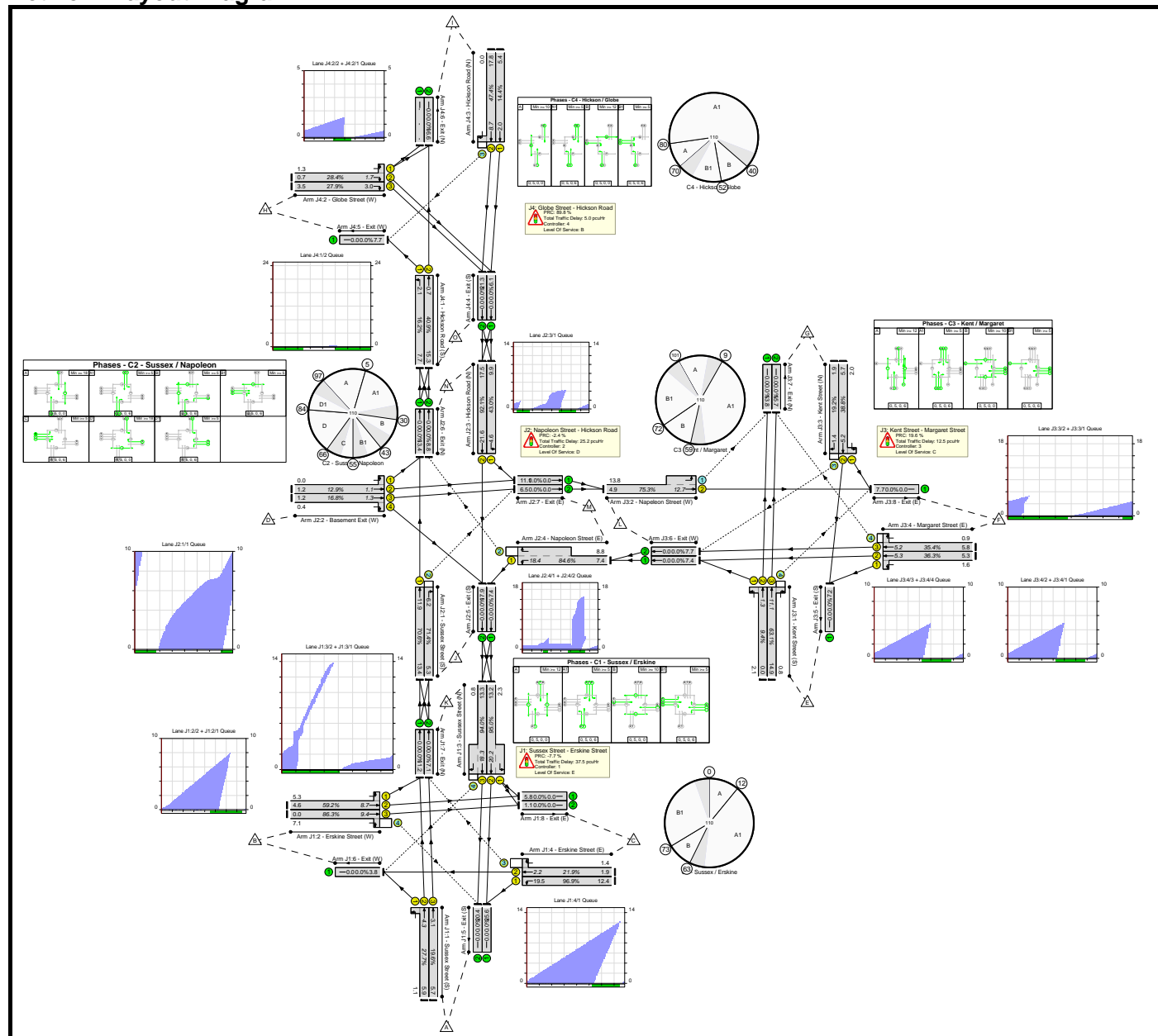
Basic Results Summary

2/2+2/1	Napeleon Street (W) Left Ahead	U+O	80.5%	21.3	658	920:1440	12.3	14.3
3/2+3/1	Kent Street (N) Ahead Left	U	38.8%	22.3	251	1800:920	4.9	5.2
3/3	Kent Street (N) Right	O	19.2%	33.4	62	1800	1.3	1.4
4/2+4/1	Margaret Street (E) Left Ahead	U	30.4%	30.7	189	1800:1800	4.0	4.2
4/3+4/4	Margaret Street (E) Ahead Right	U+O	29.5%	30.7	182	1800:1800	4.0	4.2
J4: Globe Street - Hickson Road	-	-	47.9%	-	-	-	-	-
1/1	Hickson Road (S) Left	U	9.8%	2.0	152	1800	1.1	1.2
1/2	Hickson Road (S) Ahead	U	40.2%	2.9	493	1800	0.3	0.6
2/2+2/1	Globe Street (W) Right Left	U	26.9%	52.9	62	1800:1800	1.5	1.7
2/3	Globe Street (W) Right	U	26.2%	40.9	107	1800	2.7	2.9
3/1	Hickson Road (N) Ahead	U	19.1%	8.2	235	1800	2.6	2.7
3/2+3/3	Hickson Road (N) Ahead Right	U+O	47.9%	11.1	588	1800:1800	8.3	8.8
<div>C1 - Sussex / Erskine C2 - Sussex / Napoleon C3 - Kent / Margaret C4 - Hickson / Globe</div> <div>PRC for Signalled Lanes (%): -7.7 PRC for Signalled Lanes (%): -4.5 PRC for Signalled Lanes (%): 11.8 PRC for Signalled Lanes (%): 87.8 PRC Over All Lanes (%): -7.7</div> <div>Total Delay for Signalled Lanes (pcuHr): 39.81 Total Delay for Signalled Lanes (pcuHr): 27.85 Total Delay for Signalled Lanes (pcuHr): 12.72 Total Delay for Signalled Lanes (pcuHr): 4.95 Total Delay Over All Lanes(pcuHr): 85.33</div> <div>Cycle Time (s): 110 Cycle Time (s): 110 Cycle Time (s): 110 Cycle Time (s): 110</div>								

Basic Results Summary

Scenario 6: 'PM Mod8' (FG6: 'PM Future MOD8 Traffic', Plan 1: 'Future (with Basement)')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Max. Back of Uniform Queue (pcu)	Mean Max Queue (pcu)
Network: Linsig Modelling	-	-	96.9%	-	-	-	-	-
J1: Sussex Street - Erskine Street	-	-	96.9%	-	-	-	-	-
1/2+1/1	Sussex Street (S) Left Ahead	U	27.7%	18.4	229	1800:1440	4.1	4.3
1/3	Sussex Street (S) Ahead	U	19.6%	16.1	186	1800	2.9	3.1
2/2+2/1	Erskine Street (W) Left Ahead	U	59.2%	40.1	325	1800:1800	8.0	8.7
2/3+2/4	Erskine Street (W) Right Ahead	U+O	86.3%	79.8	231	1800:920	6.7	9.4
3/2+3/1	Sussex Street (N) Ahead Left	U	95.0%	53.1	507	920:1800	13.8	20.2
3/3+3/4	Sussex Street (N) Ahead Right	U+O	94.0%	52.0	461	900:1440	12.7	18.3
4/1	Erskine Street (E) Left	U	96.9%	103.7	406	1440	12.2	19.5
4/2+4/3	Erskine Street (E) Ahead Right	U+O	21.9%	31.8	108	1440:1800	2.1	2.2
	-	-	92.1%	-	-	-	-	-
1/1	Sussex Street (S) Ahead	U	70.6%	43.7	439	1800	10.7	11.9
1/2	Sussex Street (S) Right	O	71.4%	60.2	174	1800	5.0	6.2
2/2+2/1	Basement Exit (W) Left Ahead	U	12.9%	46.3	38	1800:1800	1.0	1.1
2/3+2/4	Basement Exit (W) Right Ahead	U	16.8%	46.3	52	1800:1800	1.2	1.3
3/1	Hickson Road (N) Left	U	43.0%	15.9	324	1800	4.2	4.6
3/2	Hickson Road (N) Ahead	U	92.1%	59.3	573	1800	16.8	21.6
4/1+4/2	Napoleon Street (E) Left Right	U+O	84.6%	33.2	531	1800:1800	15.8	18.4
J3: Kent Street - Margaret Street	-	-	75.3%	-	-	-	-	-
1/2+1/1	Kent Street (S) Left Ahead	U	9.4%	22.7	69	1440:1800	1.3	1.3
1/3+1/4	Kent Street (S) Ahead Right	U+O	63.1%	21.8	512	1440:920	10.2	11.1

Basic Results Summary

2/2+2/1	Napeleon Street (W) Left Ahead	U+O	75.3%	17.4	613	920:1440	11.2	12.7
3/2+3/1	Kent Street (N) Ahead Left	U	38.8%	22.3	251	1800:920	4.9	5.2
3/3	Kent Street (N) Right	O	19.2%	33.4	62	1800	1.3	1.4
4/2+4/1	Margaret Street (E) Left Ahead	U	36.3%	31.7	225	1800:1800	5.0	5.3
4/3+4/4	Margaret Street (E) Ahead Right	U+O	35.4%	31.7	218	1800:1800	4.9	5.2
J4: Globe Street - Hickson Road	-	-	47.4%	-	-	-	-	-
1/1	Hickson Road (S) Left	U	16.2%	2.2	252	1800	2.0	2.1
1/2	Hickson Road (S) Ahead	U	40.9%	2.9	502	1800	0.3	0.7
2/2+2/1	Globe Street (W) Right Left	U	28.4%	52.9	66	1800:1800	1.5	1.7
2/3	Globe Street (W) Right	U	27.9%	41.2	114	1800	2.9	3.0
3/1	Hickson Road (N) Ahead	U	14.4%	7.9	177	1800	1.9	2.0
3/2+3/3	Hickson Road (N) Ahead Right	U+O	47.4%	11.0	582	1800:1800	8.2	8.7
C1 - Sussex / Erskine C2 - Sussex / Napoleon C3 - Kent / Margaret C4 - Hickson / Globe	PRC for Signalled Lanes (%): PRC for Signalled Lanes (%): PRC for Signalled Lanes (%): PRC for Signalled Lanes (%): PRC Over All Lanes (%):	-7.7 -2.4 19.6 89.8 -7.7	Total Delay for Signalled Lanes (pcuHr): Total Delay for Signalled Lanes (pcuHr): Total Delay for Signalled Lanes (pcuHr): Total Delay for Signalled Lanes (pcuHr): Total Delay Over All Lanes(pcuHr):	37.52 25.16 12.53 5.00 80.21	Cycle Time (s): Cycle Time (s): Cycle Time (s): Cycle Time (s): Cycle Time (s):	110 110 110 110 110		

MOVEMENT SUMMARY

 Site: I-11 Erskine Street / Shelley Street Mod 8&9 AM

Base Layout

Erskine Street / Shelley Street

Mod 8 & Mod 9 AM

Signals - Fixed Time Cycle Time = 110 seconds (User-Given Phase Times)

 Network: Erskine Street Model
Mod4+Mod9 AM Base Layout

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Shelley Street (S)													
1	L2	144	5.1	144	5.1	0.363	16.6	LOS B	5.2	37.5	0.73	0.69	25.1
2	T1	135	0.0	135	0.0	0.363	12.0	LOS A	5.2	37.5	0.73	0.69	33.1
3	R2	558	7.0	558	7.0	0.986	71.7	LOS F	31.0	229.9	0.98	1.13	8.3
Approach		837	5.5	837	5.5	0.986	52.6	LOS D	31.0	229.9	0.90	0.99	12.0
East: Erskine Street (E)													
4	L2	42	12.5	42	12.5	0.115	11.7	LOS A	0.8	6.2	0.44	0.52	30.9
5	T1	74	8.6	74	8.6	0.535	14.0	LOS A	3.8	28.5	0.68	0.66	11.1
6	R2	123	7.7	123	7.7	0.535	21.6	LOS B	3.8	28.5	0.83	0.74	23.1
Approach		239	8.8	239	8.8	0.535	17.5	LOS B	3.8	28.5	0.72	0.68	21.9
North: Shelley Street (N)													
7	L2	17	50.0	17	50.0	0.073	26.3	LOS B	0.4	4.0	0.86	0.68	18.2
8	T1	2	0.0	2	0.0	0.011	21.2	LOS B	0.1	0.5	0.86	0.57	27.7
9	R2	1	0.0	1	0.0	0.011	25.8	LOS B	0.1	0.5	0.86	0.57	19.7
Approach		20	42.1	20	42.1	0.073	25.7	LOS B	0.4	4.0	0.86	0.67	19.5
West: Erskine Street (W)													
10	L2	4	25.0	4	25.0	0.185	20.1	LOS B	1.8	13.0	0.79	0.62	25.5
11	T1	179	4.1	179	4.1	0.185	16.2	LOS B	2.1	15.1	0.79	0.62	11.4
12	R2	2	50.0	2	50.0	0.185	20.0	LOS B	2.1	15.1	0.79	0.62	25.0
Approach		185	5.1	185	5.1	0.185	16.3	LOS B	2.1	15.1	0.79	0.62	12.2
All Vehicles		1281	6.7	1281	6.7	0.986	40.4	LOS C	31.0	229.9	0.85	0.87	13.2

PHASING SUMMARY

 Site: I-11 Erskine Street / Shelley Street Mod 8&9 AM

Base Layout

Erskine Street / Shelley Street

Mod 8 & Mod 9 AM

Signals - Fixed Time Cycle Time = 110 seconds (User-Given Phase Times)

Phase times specified by the user

Sequence: I-11 AM

Movement Class: All Movement Classes

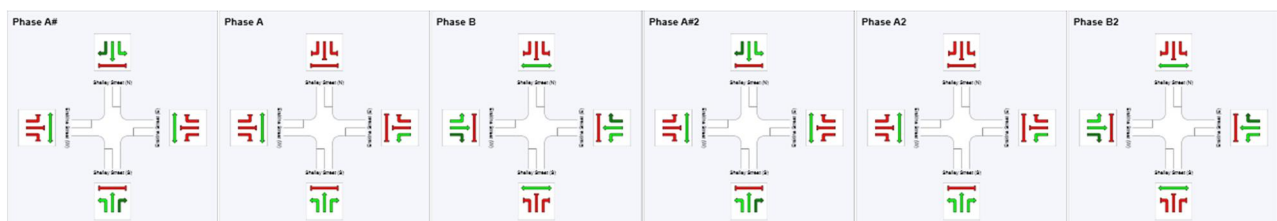
Input Sequence: A#, A, B, A#2, A2, B2

Output Sequence: A#, A, B, A#2, A2, B2

 Network: Erskine Street Model
Mod4+Mod9 AM Base Layout

Phase Timing Results

Phase	A#	A	B	A#2	A2	B2
Reference Phase	Yes	No	No	No	No	No
Phase Change Time (sec)	0	18	33	55	73	88
Green Time (sec)	12	9	16	12	9	16
Yellow Time (sec)	4	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2	2
Phase Time (sec)	18	15	22	18	15	22
Phase Split	16 %	14 %	20 %	16 %	14 %	20 %



MOVEMENT SUMMARY



Site: I-11 Erskine Street / Shelley Street Mod 8&9 PM

Base Layout

Erskine Street / Shelley Street

Mod 8 & Mod 9 PM

Signals - Fixed Time Cycle Time = 110 seconds (User-Given Phase Times)



Network: Erskine Street Model
Mod4+Mod9 PM Base Layout

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Shelley Street (S)													
1	L2	120	7.9	120	7.9	0.224	16.5	LOS B	2.9	21.1	0.70	0.69	24.3
2	T1	39	0.0	39	0.0	0.224	11.9	LOS A	2.9	21.1	0.70	0.69	32.4
3	R2	299	2.5	299	2.5	0.633	19.6	LOS B	6.8	48.4	0.86	0.82	21.1
Approach		458	3.7	458	3.7	0.633	18.1	LOS B	6.8	48.4	0.80	0.77	23.1
East: Erskine Street (E)													
4	L2	40	18.4	40	18.4	0.122	20.7	LOS B	0.8	6.3	0.72	0.68	22.6
5	T1	67	0.0	67	0.0	0.251	14.1	LOS A	1.9	13.0	0.68	0.60	11.8
6	R2	36	0.0	36	0.0	0.251	18.0	LOS B	1.9	13.0	0.68	0.60	26.6
Approach		143	5.1	143	5.1	0.251	16.9	LOS B	1.9	13.0	0.69	0.62	20.3
North: Shelley Street (N)													
7	L2	57	1.9	57	1.9	0.100	15.9	LOS B	1.0	6.9	0.65	0.69	24.1
8	T1	2	0.0	2	0.0	0.009	10.1	LOS A	0.1	0.7	0.60	0.53	34.8
9	R2	3	33.3	3	33.3	0.009	14.9	LOS B	0.1	0.7	0.60	0.53	27.3
Approach		62	3.4	62	3.4	0.100	15.7	LOS B	1.0	6.9	0.65	0.68	24.7
West: Erskine Street (W)													
10	L2	2	0.0	2	0.0	0.272	20.6	LOS B	2.6	19.4	0.81	0.65	25.6
11	T1	220	6.7	220	6.7	0.272	16.9	LOS B	2.6	19.4	0.81	0.65	11.0
12	R2	4	75.0	4	75.0	0.272	20.8	LOS B	2.3	17.1	0.81	0.65	24.0
Approach		226	7.9	226	7.9	0.272	17.0	LOS B	2.6	19.4	0.81	0.65	11.7
All Vehicles		889	5.0	889	5.0	0.633	17.5	LOS B	6.8	48.4	0.77	0.71	20.6

PHASING SUMMARY



Site: I-11 Erskine Street / Shelley Street Mod 8&9 PM

Base Layout

Erskine Street / Shelley Street

Mod 8 & Mod 9 PM

Signals - Fixed Time Cycle Time = 110 seconds (User-Given Phase Times)

Phase times specified by the user

Sequence: I-11 PM

Movement Class: All Movement Classes

Input Sequence: A, B, A2, B2

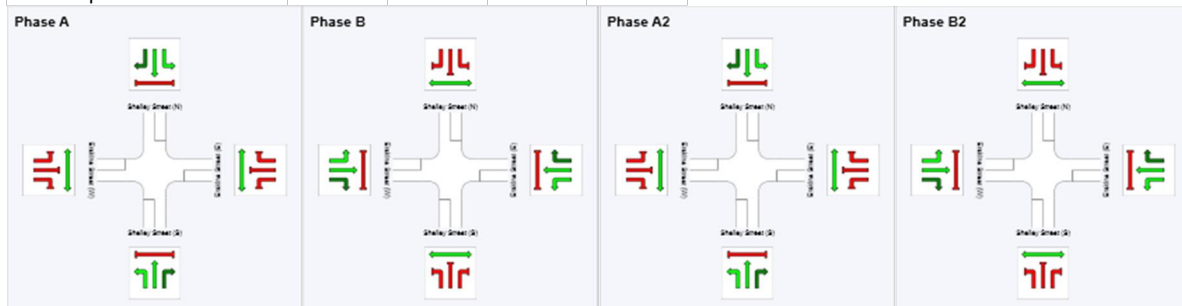
Output Sequence: A, B, A2, B2



Network: Erskine Street Model
Mod4+Mod9 PM Base Layout

Phase Timing Results

Phase	A	B	A2	B2
Reference Phase	Yes	No	No	No
Phase Change Time (sec)	0	33	55	88
Green Time (sec)	27	16	27	16
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	33	22	33	22
Phase Split	30 %	20 %	30 %	20 %



Revised Statement of Commitments

JBA



Appendix K - Proposed Amendments to the Statement of Commitments

The table below outlines the proposed changes to the Statement of Commitments, with words to be deleted shown in ~~***bold italics strike through***~~ and words to be included in ***bold italics***. Where required an explanation of the proposed amendment is provided below the relevant commitment.

Condition / Commitment		Concept Plan Modification 8 (s.75W)
Concept Plan Statement of Commitments		
1.	A Design Excellence Strategy that clearly articulates a process to achieve quality in both the private built form and the detailed design of the public domain (streets, pedestrian connections, parks and squares) is to be prepared.	To be submitted to the Barangaroo Planning Reference Group or equivalent body prior to the lodgement of any relevant project application relating to the buildings or to the establishment of the public domain, other than for demolition or early/site preparation work and remediation.
2.	The Design Excellence Strategy may include the preparation of site specific design guidelines, articulate a process(es) for the conduct of design competitions for major developments and the design of public open spaces, and/or establish a competitive process for individual development sites.	
3.	A Technical Working Group is to be established to prepare the Design Excellence Strategy. The membership of the Working Group is to be determined by the proponent team and the Barangaroo Planning Reference Group (under its terms of reference dated 26 November 2006).	
4.	The Terms of Reference is to be consistent with the requirements for the preparation of the Design Excellence Strategy specified in this Statement of Commitments and are to be endorsed by the Barangaroo Planning Reference Group or equivalent body.	
5.	The Design Excellence Strategy is to be submitted by the Working Group to the Barangaroo Planning Reference Group of the equivalent body. The Barangaroo Planning Reference Group or equivalent body will report to the IPCC on relevant matters as recommended by the proponent team and the Working Group. The Proponent will report to the Barangaroo Delivery Authority on recommendations from the Working Group.	
6.	Following endorsement, the Design Excellence Strategy is to be made publicly available in a manner to be determined by the Barangaroo Planning Reference Group or equivalent body.	
7.	The following Implementation Plans will be prepared for the site as a whole and/or specific components or stages of the project: <ul style="list-style-type: none"> Public Domain Plan(s) Transport Management & Access Community & Social Plan(s) Utility Services and Infrastructure 	To be submitted to the Barangaroo Planning Reference Group or equivalent body prior to the lodgement of any relevant project application relating to the buildings or to the establishment of the public domain, other than for demolition or early/site preparation work and remediation.
8.	The Implementation Plans are to: <ul style="list-style-type: none"> Verify the scope and accurately cost all of the social and physical infrastructure needed to support the proposed development. Identify the relevant requirements for timing and staging of provision of that facility, service or physical infrastructure Identify any relevant Government agency policy initiatives that will need to be in place to deliver specific outcomes Provide details with respect to the funding mechanisms for the delivery of identified infrastructure Provide sufficient detail to enable proponent to enter into planning agreements with developers, relevant Government agencies, City of Sydney Council and/or Minister for Planning if and as required to collect contributions for the provision of infrastructure either through a cash contribution or works-in-kind 	

9.	Technical Working Groups are to be established to prepare each of the Implementation Plans. The membership of the Working Group is to be determined by the proponent team and the Barangaroo Planning Reference Group or equivalent body (under its terms of reference dated 26 November 2006), and may include or consult with representatives from the Sydney Harbour Foreshore Authority, Department of Planning, City of Sydney Council, State Transit Authority, Sydney Ferries Corporation, Railcorp, Sydney Ports, NSW Maritime, Department of Housing, NSW Roads and Traffic Authority, Sydney Water and/or other infrastructure providers as is determined appropriate.	To be submitted to the Barangaroo Planning Reference Group or equivalent body prior to the lodgement of any relevant project application relating to the buildings or to the establishment of the public domain, other than for demolition or early/site preparation work.
10.	The Terms of Reference are to be consistent with the requirements for the preparation of the Implementation Plans specified in this Statement of Commitments and are to be endorsed by the Barangaroo Planning Reference Group or equivalent body. The Barangaroo Planning Reference Group or equivalent body will report to the IPCC on relevant matters as recommended by the proponent team and the Working Group. The Proponent will report to the Barangaroo Delivery Authority on recommendations from the Working Group.	
11.	The Implementation Plans may be updated throughout the development of the project. Following endorsement, the Implementation Plans are to be made publicly available in a manner to be determined by the Barangaroo Taskforce or equivalent body or equivalent body.	
12.	<p>The Public Domain Plan/Plans referred to at Commitment 7 is to include the following as generally described in the Concept Plan:</p> <ul style="list-style-type: none"> • An introductory explanation of types, hierarchy, interrelationships of spaces & appropriateness of spaces to end users of the public domain • New Headland Park • Waterfront parks and squares • A fore shore promenade • An informal sports playfield • A north south pedestrian promenade street • An internal street system that 1) defines development blocks, 2) provide easy flow of people and vehicles 3) acts as a comfortable stage for activity and human interaction 4) creates a distinctive address for each new development building and 5) creates a connection between Hickson Road and the Harbour Edge • on street bicycle lanes to create a route utilising Napoleon Street, Napoleon Street extension, proposed Globe Street • an off street cycle route within Headland Park to link between the proposed Globe Street and Hickson Road • Shared use of pedestrian promenade street by bicycles 	To be submitted to the Barangaroo Planning Reference Group or equivalent body prior to the lodgement of any relevant project application relating to the buildings or to the establishment of the public domain, other than for demolition or early/site preparation work and remediation.
13.	<p>Within the framework of the future Public Domain Plan(s), a Headland Park Sub Plan will be prepared for the Headland Park. The Plan will address:</p> <ul style="list-style-type: none"> • All planning, accessibility and design issues related to the connectivity of the Headland Park to its surrounding development; • Incorporate traffic and transport planning, event management and recreational capacity; • Proposals and options to increase cultural experiences at the Headland Park • Measures to provide for the diverse activation of the parklands while being sensitive to local community needs • Crime Prevention Through Environmental Design safety strategies • Heritage conservation and adaptive reuse as part of the urban landscape design, including management and interpretation • Sustainability program for the headland park at design, construction and operations stages 	
14.	<p>To inform the preparation of the Headland Park Sub Plan a Recreational Plan will be prepared which will consider the following:</p> <ul style="list-style-type: none"> • The desires of the general and local communities • Transport needs and connections 	

<ul style="list-style-type: none"> • Activation of the parkland spaces • Cultural and recreational needs • The park location and space capacity constraints including the relationship to the increasing population to the city and Barangaroo • Universal access • Operation times, events and management <p>15. The Public Domain Plan(s) is to provide details with respect to the following:</p> <ul style="list-style-type: none"> • Indicative levels in parks, edge conditions of parks and pedestrian connections through parks • Materials and planting • Safe and convenient walking routes and facilities • Street furniture • Design standards for road network (dimensions, materials, drainage), kerb parking and loading spaces, crossings, cycling, and taxi facilities, including bicycle parking facilities). All extensions to the existing road network within the Barangaroo site are to comply with the geometric requirements of the RTA road design guide. • Mix of parking/loading/other kerb controls • Design guidelines/requirements for integrated water management/water sensitive urban design consistent with Water Management Plan • Design requirements and details relating to recreational facilities • Requirement for public parking structure of up to 300 spaces in Headland Park area <p>16. The Public Domain Plan is to incorporate a Public Art Strategy.</p> <p>17. In addition to the general matters specified above, the Public Domain Plan is to address:</p> <ul style="list-style-type: none"> • The future ownership and maintenance of parks • The feasibility both conceptually and financially of establishing the elevated Headland topography 	
<p>18. The Transport Management and Access Plan (TMAP) referred to at Commitment 7 is to be prepared following:</p> <ul style="list-style-type: none"> • An assessment of the area wide traffic impacts of the development on the Sydney CBD road network using the RTA's PARAMICS traffic modelling (including the effects of changes to the bus service network) • The preparation of the TMAP or equivalent to investigate the following: <ul style="list-style-type: none"> (a) A cohesive street network connecting land use components and local roads within and to CBD streets and regional roads; (b) The method by which traffic estimation figures are generated; (c) Identification of public transport service opportunities and constraints with a view to encouraging a high level of travel by public transport, walking, and cycling; (d) Likely traffic impacts on local and regional intersections – including the key junctions for buses at Clarence Streets at Market Street; (e) Identification of local and regional infrastructure improvements (f) The timing of traffic and public transport infrastructure improvements so they are in line with the staged development of the Barangaroo Site. • The PARAMICS model is to be used in an iterative manner during the preparation of a TMAP or equivalent to test: <ul style="list-style-type: none"> (a) Impact on traffic operation of changes to pedestrian movements and volume configuration (b) Different bus access strategies (c) Variations in traffic generation estimates (depending on the relative attractiveness of pedestrian, rail, and bus access) 	<p>To be submitted to the Barangaroo Planning Reference Group or equivalent body prior to the lodgement of any relevant project application relating to the buildings or to the establishment of the public domain, other than for demolition or early/site preparation work and remediation.</p>

<ul style="list-style-type: none"> • The outcomes of the area wide traffic impact modelling are to form part of the consideration of the physical road transport infrastructure to be addressed in the preparation of the TMAP. <p>19. The Transport Management and Access Plan is to consider</p> <ul style="list-style-type: none"> • Design and construction of a traffic signal controlled intersection at Sussex Street/Napoleon Street to facilitate main point of vehicular entry into development site intersection (to RTA requirements). • The feasibility of future specialist transport services to the sight (including light rail, boutique tourist bus services, river metro route) and the need to protect possible future alignments for these services. This is to include a possible future light rail system with appropriate reservation of road space on Hickson Road. • Off-site improvements to facilitate pedestrian and cycle access between the site, Wynyard Railway Station, Millers Point, the Rocks, Circular Quay and Dawes Point. This is to include consideration of pedestrian links to existing bus services and the potential for grade separated connections between the site/Hickson Road and Wynyard Station, which will meet pedestrian desire line and provide physical linkages to the adjoining residential areas of Millers Point, which will facilitate easy access to and regular use of the services, facilities and public spaces at Barangaroo by existing local communities. Consideration of off site pedestrian improvements is only where those improvements can be demonstrated to positively improve the amenities of the proposed development and its connections to the surrounding developments. Consideration of more general public domain improvements for the benefit of the wider CBD is not required. • Options for the extension/amendment of bus services. Initial options include extensions to services from QVB, and the east-west bus link (Erskine Street, Wynyard Street and Regimental Square) and services which currently terminate at Wynyard. This is to include consideration of the need for any offsite traffic works to provide for improved east –west bus movements relating to servicing of the site. • Any options for extended bus services to the site subject to endorsement by the Ministry of Transport (MoT), State Transit Authority (STA) will be progressively provided in line with the staged development of Barangaroo. • Bus stops and access, including the location of bus stops along Hickson Road, and any relocation of existing stops. • Provision of off-road layover facilities for buses and coach drop-off and parking, including the need for on-street tourist coach parking facilities at the northern end of the site (in Hickson Road and Munn Street) • Provision of passenger wharf facilities, including at least one public ferry wharf with appropriate landside facilities adjacent to the site. The role of this commuter/tourist/recreational wharf, and possible adjustments to ferry services is to be the subject of consultation with Sydney Ferries/MoT/NSW Maritime/Sydney Ports Corporation. • Feasibility of creating a westward extension of Grosvenor Street to Kent Street and provision of two way vehicular access to Kent Street. • Realignment and/or retention of Margaret Street along the southern boundary of the site and land use implications of such changes. • Desirability of replacing existing all day (10 hour) on-street parking in Hickson Road by parallel shorter term parking. <p>19. Future project applications will address consistency with the Transport Management and Access Plan (Supplementary) prepared by Arup and dated July 2010, where relevant.</p>	
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<p>20. The Community and Social Plan/Plans at Commitment 7 is to include provision for the following facilities within the Barangaroo site, as relevant:</p> <p>Social:</p> <ul style="list-style-type: none"> • A multi-purpose facility designed to accommodate a range of community programs. The facility will have the capacity to accommodate an innovative mix of functions and tenancies, including complimentary commercial concessions, and with the potential to respond to social needs. • A minimum of two long day-care and early learning centres. <p>Health:</p> <ul style="list-style-type: none"> • A range of outdoor spaces, linkages and facilities designed to enable active recreation including walking/jogging, informal team sports, outdoor exercise, court games, and non-motorised water sports. • A range of outdoor spaces, structures and/or buildings for relaxation, social interaction, and passive recreation. <p>Cultural:</p> <ul style="list-style-type: none"> • Consideration of floor space for cultural industries and/or cultural industries development. This may be achieved in conjunction with the development of the community infrastructure. • A flexible outdoor venue for city scale cultural events. <p>Recreation:</p> <ul style="list-style-type: none"> • A harbour foreshore walk/cycle path linking King Street Wharf and Millers Point. • Active sports areas and associated toilet, change and shower facilities. • A regional play space with an innovative, engaging mix of facilities and environmental features to function as a major destination for families. • Public open spaces immediately adjacent to residential areas designed to allow a range of passive recreation activities attractive to residents and regional visitors. • Well-designed pedestrian linkages allowing easy and safe access to recreational spaces and facilities from commercial and residential areas within East Darling Harbour and from Millers Point, Walsh Bay, Kent Street, and King Street Wharf. • The Public Domain Plan(s) is to adopt design requirements and details relating to social, health, recreation and community facilities. <p>21. The design requirements and details relating to the facilities noted at Commitment 20, and in particular to the health and recreation facilities are to be incorporated into the Public Domain Plan.</p> <p>22. Development should be generally undertaken in conformance with the recommendations of the Community Plan prepared by Barangaroo Delivery Authority and Lend Lease (Millers Point) Pty Ltd (July 2010), as relevant.</p>	<p>To be submitted to the Barangaroo Planning Reference Group or equivalent body prior to the lodgement of any relevant project application relating to the buildings or to the establishment of the public domain, other than for demolition or early/site preparation work and remediation.</p>
<p>23. The Utility Services Infrastructure Plan/Plans referred to at Commitment 7 is to include and provide details in relation to the following within the Barangaroo site:</p> <ul style="list-style-type: none"> • Infrastructure requirements for integrated water management, including stormwater treatment, as determined through the preparation of the Integrated Water Management Plan at Commitment 24. • Type, extent and location of utility services (power, gas, water, sewer, stormwater, communications) consistent with the ESD principles and other commitments incorporated within the Statement of Commitments. • Coordinated response to infrastructure design and delivery on the site and consideration of infrastructure benefits to the adjoining precincts. 	<p>To be submitted to the Barangaroo Planning Reference Group or equivalent body prior to the lodgement of any relevant project application relating to the buildings or to the establishment of the public domain, other than for demolition or early/site preparation work and remediation.</p>

<p>24. As part of the preparation of the future Utility Services Infrastructure Plan:</p> <ul style="list-style-type: none"> • Further investigations are to be undertaken with respect to the existence of any services (such as pipes and cables) and structures within the Barangaroo site. Consultation with Railcorp to be undertaken on this issue. • Locations for electricity sub-stations and transformers are to be examined. No sub-stations or transformers are to be placed in above-ground public domain areas, but instead installed underground or in buildings. • Appropriate investigations are to be undertaken to ensure that the impact on safety, integrity and operation of NSW rail network – through the development's effect on traction (electrical power supply on the operation of current City underground rail network – is appropriate. 	
<p>25. An Integrated Water Management Plan/Plans is to be prepared for future development. The Integrated Water management Plan is to incorporate a Water Demand Management Plan</p> <p>26. The Water Demand Management Plan/Plans is to include an investigation of possible schemes to reduce potable water demand through source substitution. A "fit-for-purpose" approach to alternative sources of water for substitution of potable mains water for non potable use is to be included in the Plan. In line with BASIX (and extending to commercial properties)</p> <p>27. The Wastewater Management Plan/Plans is to include an investigation of schemes to manage wastewater from the residential and commercial buildings as a resource</p> <p>28. The Stormwater Management Plan/Plans is to include an investigation of the feasibility of on-site treatment of stormwater from external catchments at Millers Point to national best practice standards. Where feasible.</p>	<p>To be submitted to the Barangaroo Planning Reference Group or equivalent body prior to the lodgement of any relevant project application relating to the buildings or to the establishment of the public domain, other than for demolition or early/site preparation work and remediation.</p>

<p>29. A Housing Strategy is to be prepared that:</p> <ul style="list-style-type: none"> • Identifies preferred mix of housing opportunities defined by price, dwelling type and dwelling size. • Incorporates intermediate housing tenure options. • Sets a suitable intermediate housing component as a proportion of total housing provision. • Includes a range of mechanisms to subsidise the development of the intermediate housing component. • Retains land provided for intermediate housing in Government ownership with leases up to 99 years. <p>30. A Technical Working Group is to be established to prepare the Housing Strategy. The membership of the Working Group is to be determined by the proponent team and the Barangaroo Planning Reference Group (under its terms of reference dated 26 November 2006), or equivalent body.</p> <p>31. The terms of Reference of the Technical Working Group is to consistent with the requirements for the preparation of the Housing Strategy specified in this Statement of Commitments and endorsed by the Barangaroo Delivery Authority or equivalent body.</p> <p>32. The Housing Strategy is to be submitted by the Working Group to the Barangaroo Planning Reference Group of the equivalent body. The Barangaroo Planning Reference Group or equivalent body will report to the IPCC on relevant matters as recommended by the proponent team and the Working Group. The Proponent will report to the Barangaroo Delivery Authority on recommendations from the Working Group.</p> <p>33. Following endorsement, the Housing Strategy is to be made publicly available in a manner to be determined by the Barangaroo Planning Reference Group or equivalent body.</p> <p>34. Within Barangaroo South up to 2.3% of all approved residential GFA will be provided as key worker housing.</p>	<p>To be submitted to the Barangaroo Planning Reference Group or equivalent body prior to the lodgement of any relevant project application for development within the Mixed Use Zone other than for demolition or early/site preparation work.</p> <p>To be demonstrated as part of any relevant project application for residential development which relates to Barangaroo South.</p>
<p>35. A Marketing and Promotion Strategy/Strategies is to be prepared to promote Barangaroo's and the broader Sydney region's development opportunities to international companies, investors and property brokers. The Strategy(ies) will cover the lifespan of the redevelopment and focus on attracting investment from outside the Sydney region and State. The Strategy will emphasise the unique attributes of the site such as the lifestyle and work force skills available in this urban waterfront precinct.</p> <p>36. A Technical Working Group is to be established to prepare the Marketing and Promotion Strategy. The membership of the Working Group is to be determined by the proponent team and the Barangaroo Planning Reference Group (under its terms of reference dated 26 November 2006), or equivalent body.</p> <p>37. The terms of Reference of the Technical Working Group is to consistent with the requirements for the preparation of the Marketing and Promotion Strategy specified in this Statement of Commitments and endorsed by the Barangaroo Delivery Authority or equivalent body.</p> <p>38. The Marketing and Promotion Strategy(ies) is to be submitted by the Working Group to the Barangaroo Planning Reference Group of the equivalent body. The Proponent will report to the Barangaroo Delivery Authority on recommendations from the Working Group.</p> <p>39. Following endorsement, the Marketing and Promotion Strategy(ies) is to be made publicly available in a manner to be determined by the Barangaroo Planning Reference Group or equivalent body.</p>	<p>To be submitted to the Barangaroo Planning Reference Group or equivalent body prior to the lodgement of any relevant project application for development within the Mixed Use Zone other than for demolition or early/site preparation work.</p>

<p>40. A Retail Management Plan(s) is to be prepared to guide and encourage right mix of retail to establish Barangaroo as a distinctive retail precinct. The Plan will include innovation management strategies, foster design leadership & encourage originality and differentiation.</p> <p>41. The Retail Management Plan(s) is to be drafted to adapt to retail trends and changes over time by having in place a set of coordinated retail management guidelines for the site that will refresh the offerings, yet ensure consistency of vision and connection between the office and residential blocks, while maintaining an appropriate mix and market positioning of the Barangaroo retail precinct.</p> <p>42. The Retail Management Plan(s) is to include opportunities for ephemeral retailing events, such as markets and festivals, which are consistent with the overall images or brand of the precinct.</p> <p>43. A Technical Working Group is to be established to prepare the Retail Management Plan(s). The membership of the Working Group is to be determined by the proponent team and the Barangaroo Planning Reference Group (under its terms of reference dated 26 November 2006), or equivalent body.</p> <p>44. The terms of Reference of the Technical Working Group is to consistent with the requirements for the preparation of the Retail Management Plan(s) specified in this Statement of Commitments and endorsed by the Barangaroo Delivery Authority or equivalent body.</p> <p>45. The Retail Management Plan(s) is to be submitted by the Working Group to the Barangaroo Planning Reference Group of the equivalent body. The Barangaroo Planning Reference Group or equivalent body will report to the IPCC on relevant matters as recommended by the proponent team and the Working Group. The Proponent will report to the Barangaroo Delivery Authority on recommendations from the Working Group.</p> <p>46. Following endorsement, the Retail Management Plan(s) is to be made publicly available in a manner to be determined by the Barangaroo Planning Reference Group or equivalent body.</p>	<p>To be submitted to the Barangaroo Planning Reference Group or equivalent body prior to the lodgement of any relevant project application for development within the Mixed Use Zone other than for demolition or early/site preparation work.</p>
<p>47. Off-street bicycle parking and shower facilities are to be provided within buildings in line with the following minimum rates: Commercial: the number of bicycle spaces shall be 4% of the commercial GFA/20sqm. The minimum number of showers shall be 1 for every 10 bicycle spaces. Residential: 1 space per dwelling; and Other uses: 6 bicycle spaces for every 100 Other Uses car parking spaces. <i>Note: Residential spaces can be provided within the dwelling's basement storage area.</i></p> <p>48. All on-site parking areas to comply with AS2890. 1:2004.</p> <p>49. Maximum car parking rates are:</p> <ul style="list-style-type: none"> • Commercial Uses – 1 space /600m² GFA • Residential <ul style="list-style-type: none"> • 1 bedroom unit – 1 space / 2 units • 2 bedroom unit – 1.2 spaces / unit • 3 bedroom unit – 2 spaces / unit • Other Uses – City of Sydney rates • Passenger terminal – subject to a future traffic report based on demand estimates. <p>50. All building servicing & loading facilities are to accord with City of Sydney Council's rates.</p>	<p>At the stage of any relevant project application.</p>

<p>51. All service/delivery areas to accord with AS2890. 2:2002 subject to driveways complying with City of Sydney Council's requirements.</p> <p>52. A Heritage Impact Statement is to be prepared for the sewage pumping station to guide its future treatment. The Heritage Impact Statement is to consider the following options:</p> <ul style="list-style-type: none"> • retention of Pumping Station in situ, albeit buried, as a future archaeological resource; or • its relocation and adaptive reuse within Barangaroo site (including a recommended methodology for this course of action); • its relocation to a relevant location (including a recommended methodology for this course of action) ; or • recommendations for its interpretation both within the Barangaroo site and elsewhere, should the study conclude that this is the most appropriate course of action. <p>53. The Heritage Impact Statement is to be prepared in consultation with a heritage experienced engineer to ensure minimum alteration and damage to the fabric. Moving the whole structure in one piece should be investigated.</p> <p>54. If the Heritage Impact Statement recommends either relocation or demolition, archival recording of the structure will be prepared in accordance with the NSW Heritage Office's Guidelines.</p> <p>55. A Conservation Management Plan (CMP) will be prepared by an appropriately qualified heritage practitioner for the Dalgety's Bond Store in accordance with the NSW Heritage Office's Guidelines and in consultation with the NSW Heritage Office. Any proposal for major alterations and additions to the building site will be guided by the CMP.</p> <p>56. Future development Views from public spaces on opposite foreshores to Observatory Hill Park will be retained. Panoramas from Pymont Park around to the Harbour Bridge (from Observatory Hill Park) will also be retained.</p> <p>57. Future development within the Barangaroo site is to retain views to Observatory Hill Park from public spaces on opposite foreshores; and to retain a panorama from Pymont Park around to the Harbour Bridge as seen from Observatory Hill Park, and as shown within the approved Concept Plan (as modified) by the photomontage images included in the Heritage Impact Statement prepared by City Plan Heritage, amended by the Barangaroo Modification Report dated June 2008 prepared by MG Planning (as it applies to Block 5, 6 and 7) and subsequently amended the View Impact Analysis prepared by JBA Planning (November 2010) in support of the Concept Plan Modification Preferred Project Report, also prepared by JBA Planning (November 2010) and the Visual Impact Analysis prepared by JBA (September 2014) in support of the Concept Plan Modification Report as that document applies these documents apply to Barangaroo South.</p> <p>58. Future development within the Barangaroo site is to provide adequate view corridors over and between new built form to maintain the key attributes of views from Millers Point. The key attributes to be retained are:</p> <ul style="list-style-type: none"> • views to significant tracts of the water, • the junction of Darling Harbour and the Harbour proper, • the opposite foreshores, • panoramic qualities of existing views and, • the most distinctive views to landmark structures, <p>59. All the above shown within the approved Concept Plan (as modified) and illustrated by the photomontage images included in the Heritage Impact Statement prepared by City Plan Heritage.</p> <p>60. Future development within the Barangaroo site is to retain the ability to appreciate the Millers Point headland and the roofscape of terrace houses throughout Millers Point when viewed from public spaces on opposite foreshores. The detailed design of future development within Barangaroo should ensure a relationship</p>	<p>At the stage of any relevant project application relating to the specific structure/heritage item.</p>
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<p>between new built form and existing structures and design details within Millers Point Conservation Area. Consultation is to be undertaken with NSW Heritage as part of detailed project Application Stage.</p> <p>61. An appropriately experienced and qualified heritage practitioner will be engaged to prepare Advice and a Schedule of Conservation Works that will guide the conservation of the sandstone wall on the eastern side of Hickson Road as part of the construction of any proposed pedestrian bridge across Hickson Road. The Advice and Schedule of Conservation Works will inform the design of the proposed Hickson Road bridge and, in particular, how it meets the wall, and shall include conservation works to the palisade fence, sandstone piers and plinth, the cutting wall, the existing High Street steps (southern end), in-filled steps (northern end), and the substation at the southern end. Any new fence elements shall be sympathetic to the existing significant fence fabric</p> <p>62. A Conservation Management Strategy (CMS) will be prepared by an appropriately experienced and qualified heritage practitioner for the Moreton's Hotel in accordance with the NSW Heritage Office's guidelines and in consultation with the NSW Heritage Office. The CMS will provide specific guidelines and conservation policies for the implementation and construction of any pedestrian walkway running through (with owner's consent) or alongside the Hotel, but will not address the whole Moreton's Hotel site.</p> <p>63. A Heritage Impact Statement (HIS) will accompany any application for works to Munn Street or in the vicinity of the Munn Street terraces. That HIS will include an assessment of how the development proposed satisfies the following Principles:</p> <ul style="list-style-type: none"> • The design of the building proposed adjacent to the west of the Terraces will be sympathetic in bulk and scale and retain a reasonable level of amenity for the occupants of the Terraces. • Works to Munn Street will retain and conserve the front verandas, other building elements of significance along the southern frontage and the remnant cross walls and floors from the demolished terraces attached to the western elevation. • Works to Munn Street will retain and conserve significant landscape elements associated with the former street and the Terraces, such as the sandstone retaining walls and fences. <p>64. A Conservation Management Strategy (CMS) should be prepared for the Moores Wharf Building in accordance with the NSW Heritage Office guidelines if a change of use or activity is proposed that requires substantial alteration to the place. The CMS will provide guidelines for the adaptive reuse of the building, which will be implemented in association with any development application for the building. The CMS will also suggest other appropriate uses in addition to the current use as Ports Security administration, particularly uses related to harbour activities.</p> <p>65. A Heritage Impact Statement is to be prepared in relation to the proposed relocation and reuse of sandstone seawall in the vicinity of the Headland Park.</p> <p>66. The proposed pedestrian bridges over Hickson Road will include conservation works to the palisade fence, sandstone piers and plinth, the cutting wall, the existing steps (southern end), in-filled steps (northern end), and the substation at the southern end. The conservation works will be implemented through preparation and adoption of a Schedule of Conservation Works. Any new fence elements will be sympathetic to the existing significant fence fabric. An appropriately experienced and qualified heritage practitioner will be engaged to provide advice on the construction of the pedestrian bridge, how it meets the wall, and the conservation of the wall.</p> <p>67. A Heritage Impact Statement will be prepared to assess the significance of the Harbour Control Tower. The Heritage Impact Statement will be undertaken using the State Heritage Register criteria for listing.</p>	
<p>68. All affected potential historical archaeological sites or 'relics' of Local and State significance are to be subject to professional Archaeological Assessment in accordance with Heritage Council guidelines. The assessment must address both terrestrial and maritime archaeological resources and must be prepared by a practitioner (or practitioners) with both terrestrial and maritime experience. The Assessment must consider the desirability and staging of any proposed archaeological excavation and/or recording before construction works commence and also other mitigation strategies such as archaeological monitoring (or watching brief) during construction works.</p>	<p>To be assessed at the stage of any development application/project application involving surface disturbance.</p>

69. A Research Design including an Archaeological Excavation Methodology will be prepared in accordance with the Heritage Council's guidelines for each site which is impacted by the proposal. Those documents will be prepared for the approval of the Director of the Heritage Branch, Department of Planning. The archaeological Excavation Director will be a qualified archaeologist, and will meet the current Excavation Director Criteria for State significant sites as published by the NSW Heritage Council.
70. After archaeological works are undertaken, a copy of final excavation report(s) will be prepared and lodged with the Heritage Branch, Department of Planning, to the State Library of NSW and also to the Local Studies Library in the City of Sydney. The information within the final excavation report will be in accordance with Heritage Branch requirements.
71. A repository for the relics salvaged from any historical archaeological excavations will be nominated by Barangaroo Delivery Authority.
72. An appropriately experienced and qualified heritage practitioner specialist consultants in heritage, landscape, interpretation, historical archaeology and maritime archaeology are to be appointed.
73. An appropriately experienced and qualified heritage practitioner will be engaged to prepare an Interpretation Plan for the whole EDH site in accordance with the NSW Heritage Office Heritage Interpretation Policy. The Plan will explore various cultural, social and environmental themes related to the site including, but not limited to:
- The natural landscape
 - Aboriginal history
 - Manipulation of the landscape
 - Maritime industry, trade and commerce
 - Labour, workers and social movements
 - Archaeology
- The plan will make recommendations for:
- Public Art
 - Naming
 - Interpretive Signage and Installations
 - Display of Archaeological Deposits
 - Built Form Strategies
- The plan will also include strategies for:
- Staged Implementation
 - Ownership
 - Identification of Responsible Stakeholders
 - Future Maintenance
 - any individual demolished, dismantled or buried heritage items
 - historic/significant buildings retained within the precinct
 - the public domain areas of the precinct.
74. After completion of the archaeological fieldwork, the findings of the archaeological work are to be incorporated into the Interpretation Plan.

<p>75. Photographic and archival recording of all affected heritage items, as identified in the specialist reports prepared as part of the Environmental Assessment for the project, will be undertaken prior to the commencement of any construction activity. Recording will be completed in accordance with the Guidelines issued by the Heritage Council of NSW. Copies of these photographic recordings will be made available to the Heritage Branch, Department of Planning, to the State Library of NSW and also to the Local Studies Library in the City of Sydney.</p> <p>76. Specialist consultants in heritage, landscape, interpretation, historical archaeology and maritime archaeology will be nominated for the Barangaroo project. The consultants will have appropriate qualifications and experience commensurate with the scope of works. The name and experience of the consultant/s will be submitted to the Director of the Heritage Branch, Department of Planning, for approval prior to commencement of works. The heritage consultant/s will advise on detailed design resolution of new heritage related works, undertake site inductions, and inspect design and installation of services involving heritage items and fabric (to minimise impacts on significant fabric and views) and manage the implementation of the conditions of approval for the project. A report by the principal heritage consultant (illustrated by works photographs) will be submitted to Director of the Heritage Branch, Department of Planning for approval, advice and comment within 6 months of the completion of works, any impacts/damage and corrective works carried out.</p> <p>77. The Director of the Heritage Branch, Department of Planning is to be notified in writing within 14 days of the demolition of any heritage item listed on a Section 170 Register by the relevant government agency responsible for that Register.</p>	
<p>78. There is to be an environmental focus on the Water, Energy, Micro-Climate, Environmental Quality/Amenity, Landscape, Transport, Waste and Materials strategies for the development. Each building on site will achieve the primary benchmark of a "5 star" standard of Commercial: Green Star 5 star, and Residential: Green Star Residential score >60, and each development will be required to demonstrate how it satisfies each of the following Key Performance Indicators for each of the ESD focus areas referred to below.</p> <p>79. There is to be a 35% reduction in Potable Water Consumption compared to a standard practice development and a 40% reduction in flow to sewer compared to a standard practice development.</p> <p>80. There is to be a 35% reduction in Greenhouse Gas Emissions compared to a standard practice development. 20% of power is to be purchased from low impact, renewable sources or alternatively there should be a 20% reduction in GHG emissions through carbon offsets. The purchase of renewable energy should be at World Best Practice level.</p> <p>81. Key public open spaces (parks and squares) are to receive direct sunlight in mid-winter.</p> <p>82. Primarily non-invasive species are to be used on the site.</p> <p>83. Ensure that there is sufficient public transport to achieve points under the public transport credit for Green Star Rating Tools for commercial buildings and a future Green Star tool for residential buildings.</p> <p>84. Centralised recycling areas are to be provided in all buildings and 100% of waste bins for public use are to allow for waste separation.</p> <p>85. Wind tunnel modelling and verification of proposed treatments will be carried out at the building design application stage due to the significant exposure of the site to the southerly and westerly winds. Any development proposal for the southern portion of the site should be subjected to a wind tunnel study, carried out in accordance with the procedures outlined in industry recognised guidelines such as the Australasian Wind Engineering Society Quality Assurance Manual.</p>	<p>Wind and ESD Reports to be lodged with each relevant project application. To be demonstrated with each application (as relevant).</p>
<p>86. Further site investigations and assessments will be undertaken prior to a Remedial Action Plan (RAP) being prepared. The RAP may be prepared in stages that follow the progressive redevelopment of the site and development blocks. The RAP will address a range of known existing site conditions.</p> <p>87. A Technical Working Group is to be established to oversee the preparation of the RAP. The membership of the Working Group is to be determined by the proponent team and the Barangaroo Planning Reference Group (under its terms of reference dated 26 November 2006). The Terms of Reference of the Technical Working Group are to be consistent with this Statement of Commitments and endorsed by the Barangaroo Planning Reference Group.</p> <p>88. The RAP is to be submitted by the Working Group to the Barangaroo Planning Reference Group. The Barangaroo Planning Reference Group will report to the IPCC on relevant matters as recommended by the Working Group. The Project Team will report to the SHFA Board on recommendations from the Working Group.</p> <p>89. Following endorsement, the RAP is to be made publicly available in a manner to be determined by the Barangaroo Planning Reference Group.</p>	<p>To be submitted to the Barangaroo Planning Reference Group or equivalent body prior to the lodgement of any development application/ project application involving site disturbance.</p>

<p>90. Building Types: In terms of the classifications under the Residential Flat Design Code (RFDC), generally the residential buildings on the EDH site are to consist of Row Apartment, Courtyard Apartment, Slab (Block), Tower and Hybrid building types.</p> <p>91. Building Heights, Floor Space Ratios and Setbacks: All building heights and setbacks are to comply with the development block envelope controls contained within the Concept Plan.</p> <p>92. Building Depth: The maximum building depth, as measured from glass to glass excluding balconies, limited to 18 metres. In Row Apartment, Courtyard Apartment, Slab (Block) types, 15 metres glass to glass is preferred.</p> <p>93. Building Separation: Building separations should have regard to separation distances set out in the RFDC. Where smaller separation distances are provided consistent with the Concept Plan urban design envelopes, the amenity, privacy and solar access to existing and proposed dwellings and the public domain need to be adequately considered.</p> <p>94. Landscape Design: generally, landscape spaces for future residents of the EDH will be in the form of roof terraces and balconies. All private landscape design should be consistent with the design principles set out on pp46-47 of the RFDC. Due to the frontage to the extensive new harbour-side park, the proposed street tree planting and the adjacency to the city centre, there is no requirement for deep soil planting within blocks.</p> <p>95. Apartment Mix: Housing across the EDH site should provide a variety of types, sizes and configurations. Flexible live / work housing types are highly appropriate for the city centre fringe location.</p> <p>96. Solar Access: Living rooms and private open spaces for at least 70 % of apartments in a development should receive a minimum of 3 hours direct sunlight between 9 a.m. and 3 p.m. in mid winter. For up to 30% of dwellings, 2 hours is required (excluding south-facing units).</p> <p>97. Single Orientation Apartments: Apartment buildings should aim to maximise cross ventilation. The number of single aspect apartments with a southerly aspect (SW-SE) should be limited to a maximum of 10% total of the total units proposed. Developments which seek to vary from the minimum standards must demonstrate how site constraints and orientation prohibit the achievement of these standards and how energy efficiency is addressed.</p>	<p><i>To be demonstrated/assessed in any relevant development application/project applications for residential development.</i></p>
<p>These commitments are proposed to be deleted as they either duplicate or are inconsistent with the recent amendments to SEPP 65 which applies to all residential development on the site.</p>	
<p>98. All future development applications/project applications will be required to include a Noise Impact Assessment & Mitigation Measures report. All noise emissions from buildings' plant and equipment to be at levels complying with the recommendations of the NSW EPA Industrial Noise Policy. When setting noise emission limits for each site, the cumulative impact of noise emissions from all the sites in the fully developed precinct shall be taken into account.</p> <p>99. Any future traffic management plans will incorporate strategies that minimise transportation noise levels associated with vehicle movements</p> <p>100. To prevent negative impacts resulting from the ordinary operation of the passenger terminal and other community facilities, the envelope of buildings constructed within EDH should be designed to limit sound intrusion from these noise sources. Typical noise levels in occupied spaces adjacent to these noise sources during peak usage periods should comply with the recommended noise levels in AS2107.</p> <p>101. Plans of management developed for noise generating community facilities shall contain measures that seek to balance the use of these facilities with the amenity of nearby potentially sensitive land uses.</p> <p>102. Where deemed appropriate, the facades of new residential and commercial buildings along Hickson Road should be designed to reduce traffic noise levels in occupied spaces in accordance with the levels recommended in AS 2107.</p> <p>103. Noise emissions from patrons within proposed licensed premises will be assessed during development approval against Liquor Administration Board Guidelines and appropriate plans for managing patrons' arrival/departure developed.</p> <p>104. All future development application/project applications will be required to include a Construction Management Plan incorporating measures for managing construction noise and vibration emissions including time limits on audible construction activities.</p>	<p>Noise Impact Assessment and Mitigation Measures report to be submitted with all relevant development applications/project applications.</p>

<p>105. The built form of development blocks within Barangaroo South will follow the Urban Design Controls and Built Form Principles as set out in Section 5 of the Rogers Stirk Harbour + Partners Urban Design Report (June 2010) and as amended by the Barangaroo South Concept Plan Modification prepared by JBA Planning dated August 2010 and the Urban Design Controls and Built Form Principles as set out in Section 2 of the Rogers Stirk Harbour + Partners Supplementary Urban Design Report appended to the Barangaroo South Concept Plan Modification Preferred Project Report prepared by JBA Planning dated November 2010. Final designs for each development block will be prepared by development partners who will be subject to the Design Excellence Strategy.</p> <p>106. The built form of development blocks 5, 6 and 7 inclusive will follow the Design Principles, Design Requirements, and Development Controls as set out in Part B and as amended by the Barangaroo Modification Report dated June 2008 prepared by MG Planning. Final designs for each development block will be prepared by development partners who will be subject to the Design Excellence Strategy.</p> <p>107. The built form of development Blocks 2 to 4 inclusive shall be consistent with the performance-based urban design controls contained in the Urban Design Controls and Built Form Principles as set out in Section 5 of the Rogers Stirk Harbour + Partners and as amended by the Urban Design Controls and Built Form Principles as set out in Section 2 of the Rogers Stirk Harbour + Partners Supplementary Urban Design Report appended to the Barangaroo South Concept Plan Modification Preferred Project Report prepared by JBA Planning dated November 2010. In cases where the design is not consistent with the control objectives, justification should be given as to why the control was not applicable and what attributes of the design have been provided in lieu to ensure that the Urban Design Controls and Built Form Principles of the approved Concept Plan (as modified) or design excellence can be achieved.</p> <p>108. The built form of development Block 5 shall be consistent with the performance based urban design controls contained in Table 1 to Section 2.1.1 of the Barangaroo Part 3A Modification Report – Commercial Floor Space Preferred Project Report prepared by MG Planning dated October 2008. In cases where the design is not consistent with the control objectives, justification should be given as to why the control was not applicable and what attributes of the design have been provided in lieu to ensure that the Built Form Principles of the Consolidated Concept Plan or design excellence can be achieved.</p>	
<p>Commitments 105 and 107 are proposed to be deleted to remove reference to the Rogers Stirk Harbour + Partners Urban Design Report which has been superseded by the Barangaroo South Design Guidelines.</p>	
<p>109. All future development applications for commercial uses will be required to address how the proposal:</p> <ul style="list-style-type: none"> • Complements, connects with and extends the commercial activity of the existing Sydney CBD; • Contributes to the character of Barangaroo as a unique business address; • Offers opportunities for major corporate tenants; • Where appropriate includes a mix of support related commercial and retail offerings such as convenience retail, personal services, cafes, bars and health and recreation facilities; • Enhances and encourages walking and cycling and connectivity to public transport services; • Provides a clear interface to the public domain and includes publicly accessible open space or pedestrian connections and arcades within the private development. 	<p>To be demonstrated/assessed as part of any development/ project application for commercial uses.</p>
<p>110. Sydney Ports Corporation to be consulted on redevelopment that affects operation of the Wharf & Passenger Terminal, any additional passenger terminal, the harbour control tower and the harbour safety function in the Moore's wharf building, including potential use of the new harbour inlet by non-motorised recreational craft.</p> <p>111. Transfer of the HCT to Barangaroo Delivery Authority not to be undertaken until such BDA and Sydney Ports satisfied on selection of alternate suitable site, transfer of existing equipment and staff & uninterrupted operations under the Port Safety Operating Licence.</p> <p>112. Sydney Ports to be consulted on the detailed exclusion zone requirements for the Wharf & Passenger Terminal at future project application stages of development.</p>	<p>Subject to consultation with Sydney Ports.</p>

<p>113. Operation of the Wharf 8 Passenger terminal to continue uninterrupted during its temporary relocation while the final new building is constructed and during the relocation back to the existing location in the new facilities.</p> <p>114. Moore's Wharf and the HCT to be fenced off for security purposes prior to future public access on site.</p> <p>115. Sydney Ports and NSW Maritime to be consulted regarding any proposals associated with Port Operational requirements that result in the extension of structures alongside or over water into Sydney Harbour.</p> <p>116. Future car parking for the Wharf 8 Passenger Terminal will be provided consistent with the current car parking provisions for the facility, and subject to the needs of the future terminal.</p>	
<p>These commitments are proposed to be deleted as they are no longer relevant since the removal of the Wharf 8 Passenger terminal from the Barangaroo Site.</p>	
<p>117. Ongoing consultation with Government agencies including the City of Sydney Council (Strategic Planning Department, Community Services and Programs Unit, and Recreation and Community Services Unit), Department of Housing NSW, NSW Maritime, Railcorp, Sydney Ports, NCOSS, Private landowners, and community stakeholders will take place according to established planning and development approval procedures.</p> <p>118. NSW Maritime is specifically to be consulted in relation to the following:</p> <ul style="list-style-type: none"> Any proposal that has the potential to impact upon navigational safety. The potential to expand ferry and charter boat operations within the redevelopment site. On-going maintenance of seawalls, launching and berthing facilities. Proposed encroachments into NSW Maritime's land at Darling Harbour. The development of the proposed coves and inlets which will become part of the navigable waters of Sydney Harbour. Other issues which will inevitably arise from the interface with NSW Maritime's land. Port Security matters. <p>119. Further consultation and information sessions will be held as necessary to communicate the redevelopment process and to ensure all stakeholders have the opportunity to keep up to date on the progress of the redevelopment.</p>	Ongoing
<p>120. All future development to be designed in accordance with CPTED principles.</p>	To be demonstrated/assessed as part of any relevant development/ project application
<p>121. An Environmental and Construction Management Plan will be required as part of any future development on the site.</p> <p>122. All construction contractors, subcontractors and personnel to be inducted and informed by the nominated heritage consultant/s prior to commencing work on site.</p> <p>123. Significant heritage items and built elements that are retained to be adequately protected during the works.</p> <p>124. The future detailed design of the Headland Park including the northern cove, Globe Street and adjacent Block 7 is to be prepared in accordance with the Headland Park Urban Design Framework and Preferred Project Parkland Objectives detailed in the "Barangaroo Headland Parklands Urban Design Report" prepared by Conybeare Morrison (August 2009).</p>	To be demonstrated/assessed as part of any relevant development/ project application
<p>125. The future detailed design of the Headland Park including the northern cove, Globe Street and adjacent Block 7 is to be prepared in accordance with the Headland Park Urban Design Framework and Preferred Project Parkland Objectives detailed in the "Barangaroo Headland Parklands Urban Design Report" prepared by Conybeare Morrison (August 2009).</p>	To be demonstrated as part of any project application which relates to the Headland Park and surrounds.
<p>126. The future detailed design of Barangaroo South including the Southern Cove Watermans Cove, and public domain areas is to be prepared generally in conformance with the following reports and documentation:</p> <ul style="list-style-type: none"> Environmental Assessment Report prepared by JBA Planning (August 2010 September 2014) Urban Design Statement prepared by Rogers Stirk Harbour + Partners (August 2010) 	To be demonstrated as part of any relevant project application which relates to Barangaroo South

<ul style="list-style-type: none"> • Public Domain Plan prepared by Aspect/Oculus (July 2010) • Stakeholder Consultation Strategy prepared by Lend Lease (July 2010) • Transport Management and Access Plan (Supplementary) prepared by Arup (August 2010 September 2014) • Streetscape and Public Domain Report – Response to Director General's Requirements prepared by Aspect / Oculus (July 2010) • Overarching Remedial Action Plan prepared by ERM (June 2010) • Remedial Action Plan – Other Remediation Works prepared by AECOM (May 2010) • View Impact Analysis prepared by JBA Planning (August 2010 September 2014) • Wind Impact Assessment prepared by Arup and Cermak Peterka Petersen Pty Ltd (July 2010 September 2014) • Acoustic Report – Operations prepared by Arup (July 2010) • Community Plan prepared by Lend Lease / Barangaroo Delivery Authority (July 2010) • Metro Interaction Report prepared by Arup (July 2010) • Marine Ecology, Water Quality Report and Contaminated Sediment Impact Assessment prepared by Worley Parsons (July 2010) • Navigation Report prepared by Worley Parsons (July 2010 September 2014) • Air Quality Impact Assessment prepared by AECOM (July 2010 September 2014) • Waste Management Plan prepared by Arup (July 2010) • Building Barangaroo Economic Impacts prepared by Centre for International Economics (July-August 2010) • Infrastructure Concept Plan prepared by Arup (July 2010 September 2014) • Stormwater Concept Plan prepared by Arup (July 2010 September 2014) • Sea Level and Climate Change Report prepared by Arup (July 2010) • ESD Report prepared by Arup (July 2010 September 2014) • Covering Letter and Non-Indigenous Archaeological Assessment undertaken by Casey and Lowe (July 2010 September 2014) • Aboriginal Archaeological and Cultural Heritage Assessment prepared by Comber Consultants (July 2010 September 2014) • Archaeological Research Design and management Strategy prepared by Casey and Lowe (July 2010) • Aboriginal Archaeological Management Plan and Research Design prepared by Comber Consultants (July 2010 September 2014) • Geotechnical Report prepared by Arup (July 2010) • Noise and Vibration Management Plan prepared by Acoustic Logic (July 2010 September 2014) 	
<p>This commitment is proposed to be amended to reflect the proposed modifications to the Concept Plan which seek to amend the Southern Cove to Watermans Cove. The reports and documentation listed in this commitment are proposed to be updated to account for the documentation provided with the proposed modification.</p>	
<p>127. In addition to the reports and documents identified in Commitment No. 126, the future detailed design of Barangaroo South including the Southern Cove Watermans Cove and public domain areas is to be prepared generally in conformance with the following reports and documentation:</p> <ul style="list-style-type: none"> • Preferred Project Report prepared by JBA Planning (November 2010): • Supplementary Urban Design Report prepared by Rogers Stirk Harbour + Partners (November 2010) • Barangaroo South Urban Design Report – Streets and Laneways within Blocks 2 and 3 prepared by Hassell (November 2010) • Globe Square Performance Standards prepared by Lend Lease (November 2010) • Design Guidelines for Hotel Drop Off and Globe Square prepared by Lend Lease (November 2010) 	<p>To be demonstrated as part of any relevant project application which relates to Barangaroo South</p>

<ul style="list-style-type: none"> Visual Impact Analysis prepared by JBA Planning (November 2010 September 2014) Barangaroo: A New Gateway to Growth of the Financial Services Sector prepared by Jones Lang La Salle (November 2010) 	
This commitment is proposed to be amended to reflect the proposed modifications to the Concept Plan which seek to amend the Southern Cove to Watermans Cove. The reports and documentation listed in this commitment are proposed to be updated to account for the documentation provided with the proposed modification.	
<p>128. Any future project application for the Southern Cove Watermans Cove specifically will address:</p> <ul style="list-style-type: none"> Total amount of fill to be excavated Potential remediation works and confirmation that the proposed location can be made suitable for its proposed use Potential Water quality impacts Potential public domain treatments, including any foreshore treatments (boardwalks, landscaping and the like) Potential activities within the Southern Cove Watermans Cove upon completion 	To be submitted with the relevant project application for the Southern Cove Globe Harbour .
This commitment is proposed to be amended to reflect the proposed modifications to the Concept Plan which seek to amend the Southern Cove to Watermans Cove.	
<p>129. Future project applications for the public pier and landmark building shall address:</p> <ul style="list-style-type: none"> the need for remediation works and confirmation that the proposed location can be made suitable for its proposed use water quality impacts public domain treatments, including any foreshore treatments (boardwalks, landscaping and the like) ground floor activities on the public pier and access across the Waterfront Promenade the provision of a management plan to guide the future operation of the hotel pick up/drop off facility 	To be submitted with the relevant project application for the public pier and landmark building .
This commitment is proposed to be modified to reflect the movement of the landmark hotel back onto land from Darling Harbour.	
130. Any future application for a VIP Gaming use should be accompanied by a Social Impact Assessment prepared by a suitably qualified consultant which details the social benefits and disbenefits of the use.	To be submitted with the relevant application for a VIP Gaming use.
This commitment is proposed to be added to ensure that all of the potential social benefits and disbenefits are addressed at the appropriate stage being the detailed assessment of an application for a VIP Gaming use at Barangaroo South.	

Revised Building Envelope Plan

Lendlease

