



# CROWN SYDNEY HOTEL RESORT

ARCHITECTURAL DESIGN STATEMENT

JUNE 2015



WilkinsonEyre Architects

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# **CROWN SYDNEY HOTEL RESORT**

## **ARCHITECTURAL DESIGN STATEMENT**

PROJECT APPLICATION DESIGN REPORT FOR  
CROWN SYDNEY HOTEL RESORT

JUNE 2015

## SITE LOCATION AND CONTEXT

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

The 22ha Barangaroo site is generally rectangular in shape and has a 1.4 kilometre harbour foreshore frontage, with an eastern street frontage to Hickson Road. The site has been divided into three distinct redevelopment areas (from north to south) – the Headland Park, Barangaroo Central and Barangaroo South, and has been subject to multiple investigations that detail the physical and natural characteristics of the site.

## PURPOSE OF REPORT

This report has been prepared on behalf of Crown Resorts Limited to accompany a State Significant Development Application (SSDA) for the Crown Sydney Hotel Resort at Barangaroo. The Hotel Resort is proposed in accordance with the approved Barangaroo Concept Plan (as modified) and is located within Barangaroo South..

## CROWN SYDNEY HOTEL RESORT DEVELOPMENT

The Crown Sydney Hotel Resort development will comprise a single high rise building that will include a hotel, VIP gaming facilities and residential apartments. More specifically approval is sought for:

- construction and use of a hotel, VIP gaming facilities and residential apartment building with associated retail and restaurant uses and a basement car park to accommodate parking and servicing allocated to the proposed uses within the development, comprising a total Gross Floor Area of approximately 77,500m<sup>2</sup> and a maximum building height of approximately 271 metres (RL 275);
- associated building signage; and
- provision of services and utilities required to service the building.

## LANDMARK BUILDING

Crown is proposing to develop and operate Sydney's first six-star luxury hotel resort at Barangaroo South. The Crown Sydney Hotel Resort will be a world-class tourist offering, helping Sydney compete with other global destinations and become a landmark attraction for millions of international and domestic visitors. Sydney's hotels are not competitive with the best luxury hotels in Asia and the city is missing out on a valuable segment of the Asian luxury tourist market. Sydney has a significant opportunity to capitalise on the enormous growth in Asian tourism – particularly high net worth tourists from China. To realise this opportunity, Sydney needs a luxury hotel resort that is designed, constructed and operated to the best world-class standards.

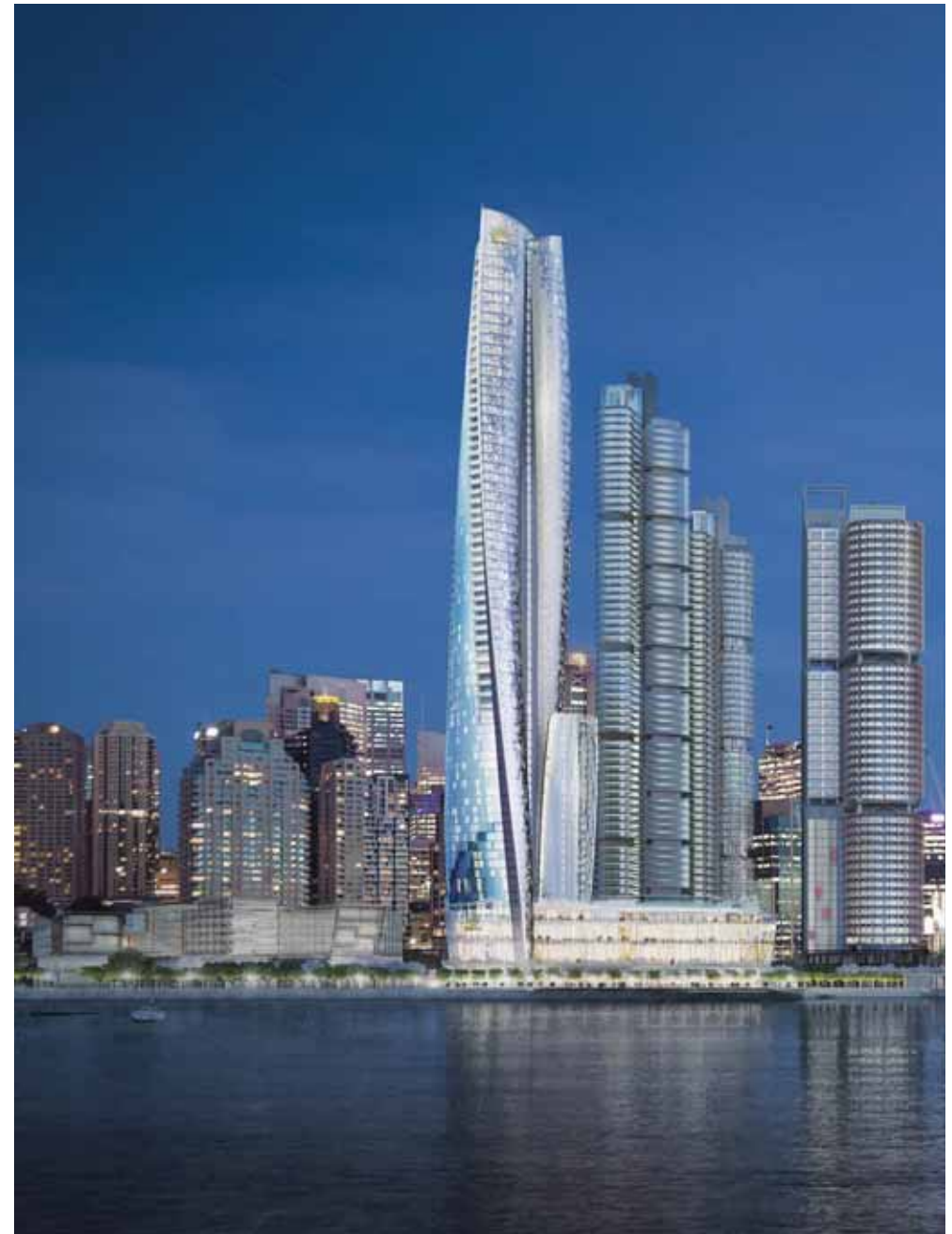
### **The Crown Sydney Hotel Resort will be a landmark building and a key tourist attraction**

To ensure that the Crown Sydney Hotel Resort is an architecturally iconic addition to Barangaroo and Sydney Harbour, an international design competition was conducted to identify a principal architect with an iconic design. Following the advice of an expert advisory panel, Crown selected Wilkinson Eyre's design for the Crown Sydney Hotel Resort. Crown and Wilkinson Eyre are committed to ensuring that the Crown Sydney Hotel Resort is a landmark building that will complement Sydney icons like the Harbour Bridge and the Opera House. The futuristic design takes its inspiration from three twisting petals, featuring a white veil of sculptured glass rising above Sydney Harbour.

Wilkinson Eyre's founding director, Chris Wilkinson, commented:

"My ambition is to create a sculptural form that will rise up on the skyline like an inhabited artwork, clad in a white veil of glass with differing levels of transparency, striking a clear new image against the sky."

Source: Daily Telegraph (16 May 2013)





## NSW TOURISM

### **Crown Sydney will help New South Wales achieve its tourism goals**

Given the immense opportunity provided by tourists from China and other Asian countries, the world class quality of the Crown Sydney Hotel Resort and Crown's understanding of Asian visitors will assist New South Wales in meeting its ambitious tourism targets. The Commonwealth Government's 2012 'Australia in the Asian Century White Paper' suggested that the tourism industry needed to develop greater luxury experiences to attract Asian tourists, and singled out Crown's tourism offering as an example of what is required to succeed:

*"Importantly, the tourism industry needs to develop culturally relevant products to capitalise on growing Asian interest in Australia as a tourist destination. This will mean developing sophisticated luxury urban tourism opportunities, such as those offered by Crown Limited, as well as showcasing Australia's outstanding natural beauty."*

Source: Australian Government, 'Australia in the Asian Century White Paper' (October 2012)

In addition, the Crown Sydney Hotel Resort will assist Sydney to compete with the best cities in the world for major international conferences and events and will provide a strategic addition to the stock of hotel accommodation in Sydney.

### **The Crown Sydney Hotel Resort will also help Sydney capture a greater share of the mainstream tourism segment**

The location of a globally recognised building on the harbour near the Sydney Harbour Bridge and the Sydney Opera House will also assist in attracting mainstream international tourists to Barangaroo. The design of the Crown Sydney Hotel Resort will allow the general public to access the ground floor of the luxurious building and also enjoy the restaurants and bars which will have views of Sydney Harbour and the Barangaroo precinct.

## WORLD CLASS VIP GAMING FACILITIES

The VIP gaming facilities at Crown Sydney will comprise world-class private gaming rooms and luxury gaming salons for international, interstate and local members. These facilities will be of a standard sufficient to compete against the best VIP gaming facilities in Singapore, Macau and Las Vegas.

The VIP gaming facilities at Crown Sydney will significantly reduce the potential for problem gambling issues to arise given:

- There will be no poker machines;
- There will be no low limit tables; and
- The VIP gaming facilities will be for members and their guests only – no general public.

If these three criteria were applied to Crown Melbourne, only 5% of Crown Melbourne's local gaming customers would be playing in such a restricted gaming facility.

## AN ACTIVE AND VIBRANT DESTINATION

### **Crown Sydney will help the New South Wales Government meet its objective of making Barangaroo a more vibrant precinct**

The Crown Sydney Hotel Resort will help the New South Wales Government meet its objective of making Barangaroo an active and vibrant destination, both during the day and at night. Andrew Wilson, Lend Lease's Managing Director of Barangaroo South recently outlined the major benefits Crown Sydney would bring to the Barangaroo precinct including:

"Social – by enriching the mix of uses and activation along the waterfront to provide a vibrant area during and beyond office hours, and at weekends. Visual – by creating an architectural "post card" statement along the foreshore and an iconic marker for Barangaroo and for Sydney."

Source: Letter from Lend Lease, 'World class hotel at Barangaroo South' (18 March 2013)

The Crown Sydney Hotel Resort will utilise world's best practice design and will be sympathetic to the surrounding environment at Barangaroo South and Barangaroo Central to create a unique opportunity for tourists to experience the proposed cultural amenities and parklands. The hotel will integrate with the cultural and public space at the heart of Barangaroo South and serve as a destination for both locals and visitors. It will be vibrant and active; celebrate its unique location and position on the harbour; and become a focal point for the western edge of the city that is loved and embraced by Sydneysiders.

## STATUS OF THE CROWN SYDNEY HOTEL RESORT

In November 2013, the NSW Parliament has passed legislation enabling Crown Sydney to offer VIP gaming on a designated site on Barangaroo South adjacent to Sydney Harbour. The NSW Independent Liquor Gaming Authority issued a restricted gaming licence to Crown Sydney in July 2014 which permits the operation of VIP gaming facilities within the Crown Sydney Hotel Resort from November 2019 onwards. The development of Crown Sydney remains conditional on the granting of all necessary planning approvals.



# CONTENTS

<b>1</b>	<b>INTRODUCTION</b>	<b>9</b>
<b>2</b>	<b>DESIGN EXCELLENCE</b>	<b>10</b>
2.1	Design Process	10
2.2	Design Team	10
2.3	Crown Resorts Limited	12
<b>3</b>	<b>CONTEXT</b>	<b>14</b>
3.1	Regional Context	14
3.2	Local Context	14
3.3	Barangaroo Masterplan	15
<b>4</b>	<b>ARCHITECTURAL CONCEPT</b>	<b>16</b>
4.1	Scheme Design Introduction	16
4.2	Architectural Concept	17
4.3	Geometric Derivation	18
4.4	Orientation	19
4.5	Design Development	20
<b>5</b>	<b>SITE ANALYSIS</b>	<b>28</b>
5.1	Site Description	28
5.2	Physical Features	28
5.3	Site Extents	29
5.4	Sunpaths and Overshadowing	30
5.5	Wind	31
5.6	Views	32
5.7	Planning Envelopes	34
5.8	Sitewide Connectivity	36
5.9	Relationship to Open Spaces	37
<b>6</b>	<b>SCHEME</b>	<b>38</b>
6.1	Scheme Massing and Scale	38
6.2	Massing Context	38
6.3	Building Separation	40
6.4	Views	41
6.5	External Landscape Areas	41
6.6	Scheme Programme	42
6.7	Public Realm	44
6.8	The Podium Built Form	46
6.9	The Podium Levels	48
6.10	Podium Public Realm: East Side	50
6.11	Podium Public Realm: North Side	52
6.12	Podium Public Realm: South Side	53
6.13	Porte-Cochère	54
6.14	Public Realm: Canopies And Terraces	56
6.15	Podium Programme	62
6.16	Podium Rooftop Landscaping	64
6.17	Hotel	66

6.18	Hotel Crystal Club Terrace	70
6.19	VIP Sky Gaming	71
6.20	Hotel Villas	72
6.21	Tower Residential	73
6.22	Hotel Super Villa and Sky Villa	74
6.23	Basement	76
6.24	Structures	80
<b>7</b>	<b>FAÇADE DESIGN</b>	<b>84</b>
7.1	Façade Typologies and Conditions	85
7.2	Tower Façade: Rectilinear Façade	88
7.3	Tower Façade: Rectilinear Façade Terrace Zone	90
7.4	Tower Façade: Diagrid Façade	92
7.5	Tower Façade: Hotel Façade	96
7.6	Façade Materiality	99
7.7	Stone Tracery and Terraces	102
7.8	Three Types of Veil	103
<b>8</b>	<b>RESIDENTIAL DESIGN</b>	<b>112</b>
8.1	Residential Introduction	112
8.2	Apartment Layouts	112
8.3	Access to Sunlight	118
8.4	Natural Ventilation	119
8.5	Views	120
8.6	Minimising South Facing Units	120
<b>9</b>	<b>LANDSCAPE &amp; PUBLIC REALM</b>	<b>122</b>
9.1	Site Location	122
9.2	Introduction	122
9.3	Landscape Areas	123
9.4	Public Domain and Surrounding Landscape Context	124
9.5	Materials	127
9.6	Perimeter Landscape Zones	128
9.7	Lime Street and The Porte-Cochère	129
9.8	The Promenade	130
9.9	Globe Harbour	131
9.10	The Park	132
9.11	Main Hotel Pool and Function Areas	133
9.12	VIP And Residents Pool and Function Areas	134
9.13	Crystal Club, VIP and Executive Guests Pool and Terraces	135
9.14	Sky Villa Garden Terrace	136
9.15	Materials	137
9.16	Plantings	138

<b>10</b>	<b>SUSTAINABILITY</b>	<b>140</b>
10.1	Sustainability Summary	140
10.2	District Cooling Plant	140
10.3	Recycled Water Usage	140
10.4	Sewer Drainage	141
10.5	Rain Water Collection	141
10.6	Energy Usage: PV / Solar Thermal	141
10.7	Natural Ventilation	141
10.8	Design Coordination Services Model	142
<b>11</b>	<b>ACCESS / CIRCULATION</b>	<b>144</b>
11.1	Services Arrivals	144
11.2	Residential And Self-Park	144
11.3	Car Arrivals At Porte-Cochère	145
11.4	Valet Operations	145
11.5	Bicycle Parking	146
<b>12</b>	<b>AREA</b>	<b>148</b>
12.1	Area Schedule	148

<b>APPENDIX A</b>	Wilkinson Eyre Architects Drawings
<b>APPENDIX B</b>	St. Legere Landscape Drawings
<b>APPENDIX C</b>	SEPP65 & RFDC Compliance Checklist
<b>APPENDIX D</b>	Shadow Study
<b>APPENDIX E</b>	Visual Impact Photomontage
<b>APPENDIX F</b>	Signage Locations
<b>APPENDIX G</b>	Architectural Visualisations









# 1.0

## INTRODUCTION

The 22 disused hectares at Barangaroo represent a hugely exciting prospect for Sydney. The site offers a landmark opportunity to create a vibrant place to live, work and enjoy the spectacular waterfront.

Three distinct redevelopment areas – the Headland, Barangaroo South and Barangaroo Central – will showcase a sustainable and exciting future. Barangaroo South is the first phase of Sydney's largest redevelopment project of the century.

Crown Resorts Limited are proposing a landmark six star hotel resort on the north-west of the site, which will be branded Crown Sydney Hotel Resort, for which this SSDA is being submitted by Wilkinson Eyre Architects.

Wilkinson Eyre was appointed by Crown Resorts Limited to design Crown Sydney Hotel Resort in May 2013, following an international design competition.

The Approved Concept Plan establishes the urban design principles and planning framework for the redevelopment of the Barangaroo site. It defines the desired outcomes for the precinct and sets the broad parameters for sustainable redevelopment through a series of concept strategies.

Crown Sydney Hotel Resort is located in the Barangaroo South area of the Approved Concept Plan. It is 69 storeys, a maximum building height of approximately 271 metres (RL 275) and approximately 77,500m<sup>2</sup> GFA. The building comprises three main elements: the podium, the hotel and the tower. The basement levels house plant, parking and associated loading facilities.

The Architectural Design Statement also describes how Crown Sydney Hotel Resort will help make Barangaroo South a vibrant, mixed-use destination which offers round-the-clock activities and inspiration for tourists, visitors, Sydneysiders and workers at the new commercial buildings and existing Sydney CBD. The thriving podium will create a perpetual sense of activity and contribute to the liveliness of the Barangaroo precinct and existing CBD.

Crown Sydney Hotel Resort will help transform and rejuvenate the unexploited Barangaroo site to create a sustainable, dynamic destination; the tower will be an outstanding addition to the Sydney skyline as well as possess a fully integrated podium with a human scale.



# 2.0

## DESIGN EXCELLENCE

Wilkinson Eyre's design for the Crown Sydney Hotel Resort established a commitment to high quality design from the outset, to create a world-class destination for Sydney.

### 2.1 DESIGN PROCESS

Wilkinson Eyre's design ethos is characterised by a commitment to achieve the best possible design solution within the constraints of the brief, programme, context and budget. Within each project we invest great effort in our understanding of the physical and cultural context, whether historically sensitive or not, then shape our responses accordingly, leading to an informed and effective architecture; this approach will ensure an iconic design that delivers both as a local landmark which engages with the public sphere, as well as a luxurious international destination.

### 2.2 DESIGN TEAM

Wilkinson Eyre is one of the UK's leading architectural practices, with a portfolio of national and international award-winning projects, several of which have achieved popular landmark status. The practice has designed highly successful projects in diverse market sectors including hotels, leisure, residential and waterside public realm.

Wilkinson Eyre has undertaken complex, high profile projects with confidence since the practice was first established in 1983. We are committed to creating a sense of celebration and innovation in our architecture – at the same time as developing pragmatic, sustainable and, most importantly, deliverable solutions to the brief. In the long term we aim to develop this philosophy, continuing to reinforce our reputation for creating truly memorable architecture that maintains relevance through forethought and intelligent design.



Cooler, Conservatories, Gardens by the Bay, Singapore



Guangzhou International Finance Center

Wilkinson Eyre has received over 200 design awards, shortlistings and commendations. These include back-to-back success for prestigious RIBA Stirling Prize in 2001 and 2002, and the RIBA Lubetkin Prize for an unprecedented two consecutive years. The award, for the best new international building by a British architect, was awarded to Wilkinson Eyre for the Guangzhou International Finance Center in 2012, and the Cooled Conservatories at Singapore's Gardens by the Bay in 2013. We have received 33 RIBA Awards, 33 Civic Trust Awards and 33 Structural Steel Awards. Seven of our projects were awarded Millennium Product status, and a further seven have either won or been commended for the British Construction Industry (BCI) Awards.

The design for Crown Sydney Hotel Resort has been led by directors Chris Wilkinson and Paul Baker, and supported by a team of dedicated architects, visualisers and model-makers.

Chris Wilkinson is a principal and founder of Wilkinson Eyre Architects. After gaining experience in a number of top UK practices, he set up Chris Wilkinson Architects in 1983, formed a partnership with Jim Eyre in 1987 and established Wilkinson Eyre Architects in 1999. With a passion for architecture and design, he has helped develop the profile of Wilkinson Eyre Architects as a leading international architectural practice. In addition to his management coordination role, he leads design and takes responsibility for projects with co-director Jim Eyre. He has directed the practice's cultural and educational work in addition to commercial, leisure and infrastructure projects.

Paul Baker joined Wilkinson Eyre Architects in 1990; he has over thirty years of architectural experience across a very broad spectrum of building types. Since 1995 he has led teams working on a variety of projects with a common theme of destinations. Paul's most recent experience includes the cooled conservatories at Gardens by the Bay, winner of World Building of the Year at WAF2012 (World Architecture Festival 2012) and the RIBA Lubetkin Prize 2013.

Paul has a particular interest in holistic design, and how architecture can be integrated into its context across the disciplines of urban design, landscape architecture, planning and environment and in particular, how it can contribute to long-term sustainability and regeneration.



## 2.3 CROWN RESORTS LIMITED

Crown Resorts Limited (Crown) is an Australian company which owns and operates world-class luxury resorts, with properties and investments in Melbourne, Perth, Macau and London.

Every year Crown's Australian resorts attract approximately 25 million visitors. Crown's resorts are renowned globally, particularly in Asia, for their focus on luxury accommodation, service, quality dining and shopping experiences and world-class gaming and entertainment facilities.

Crown also leads the way with Indigenous employment, having received a number of prestigious awards for its Indigenous employment programs. Working with respected organisations like the National Centre of Indigenous Excellence (NCIE), Crown aims to offer job opportunities to 2,000 Indigenous Australians by 2021.

Crown has already made significant contributions to the local economy in Melbourne and Perth, directly and indirectly supporting employment for 23,200 full time equivalent positions across the Victorian economy and 7,700 across the Western Australian economy. As two of Australia's most visited tourist destinations, employment at Crown's Australian resorts has increased significantly from 10,065 people in 2005 to over 14,400 in 2012, making each of them the largest single-site employer in their respective states.

Crown Melbourne is a leading world-class luxury resort, featuring over 1,600 hotel rooms and VIP villas, spas, swimming pools, luxury retail outlets, signature restaurants, a convention centre, gaming areas and live entertainment venues. Crown Perth, formerly Burswood Entertainment Complex, was acquired in 2004 and has since been modernised and expanded to create a world-class resort.

Outside of Australia, Crown Aspinall's is an exclusive high-end London casino, and one of only five licensed high-end casinos in London's prime West End entertainment district. Crown also has a 33.7% interest in Melco Crown Entertainment Limited, owning and operating one of the largest leading integrated resorts in Macau: City of Dreams. Through this joint venture, Crown has played a leading role in the development of City of Dreams and MCE's first hotel resort, Altira Macau. Crown's investment in Macau gives it a significant strategic advantage in its drive to attract high net worth Asian tourists and VIP customers to its Australian resorts.







# 3.0

## CONTEXT



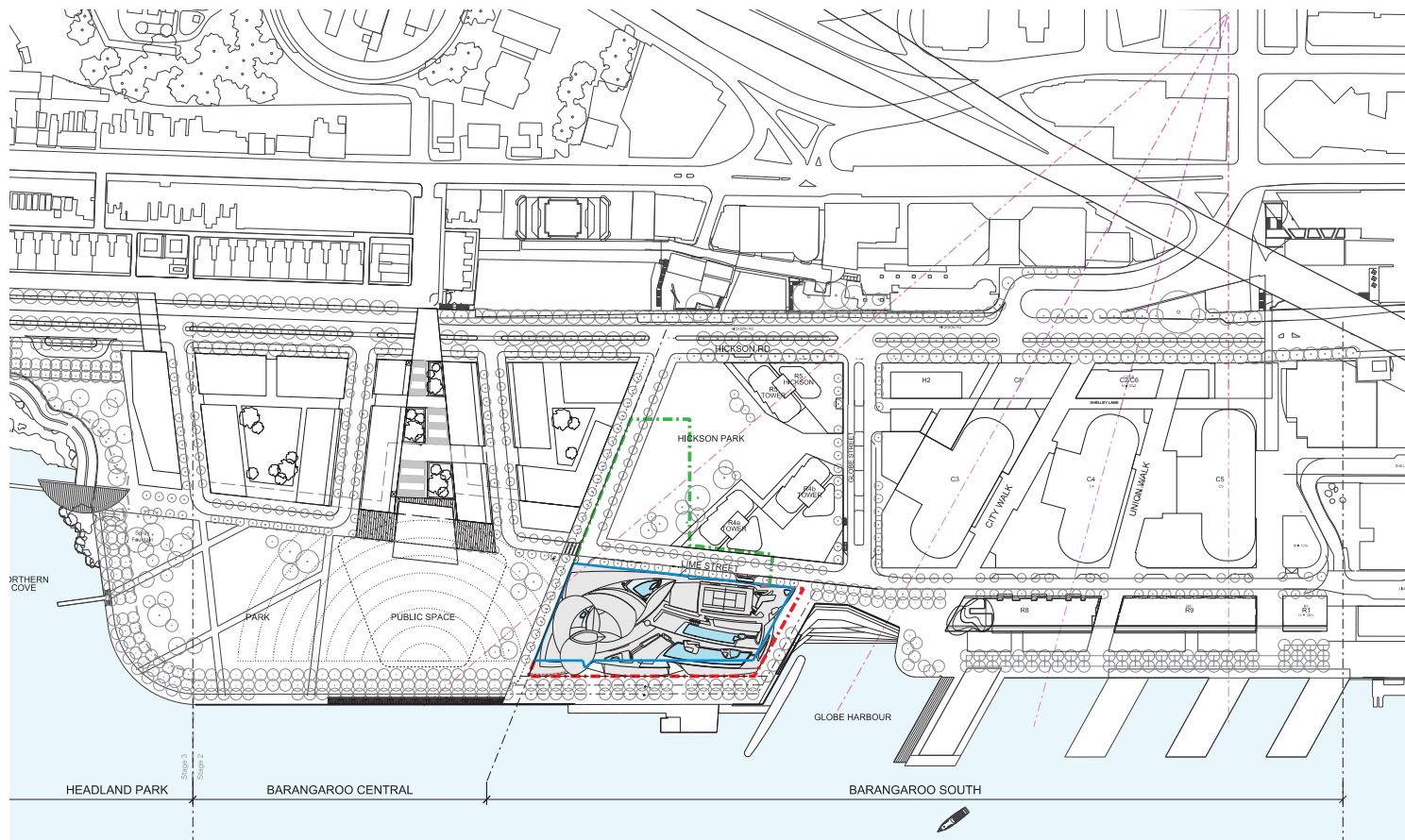
### 3.1 REGIONAL CONTEXT



### 3.2 LOCAL CONTEXT

Being centrally located on the waterfront in Barangaroo, Crown Sydney Hotel Resort is in an extremely prominent position within the city. The scheme will have a strong connection to the waterfront of the city and will address the prominent areas and spaces nearby: Darling Harbour and King's Wharf located to the south, to the north-west Balmain East and Goat Island. Located to the north and north-east are Walsh Bay, Sydney Harbour Bridge and the Sydney Opera House.





Context plan

### 3.3 BARANGAROO MASTERPLAN

The Crown Sydney Hotel Resort scheme forms part of the overall Barangaroo masterplan application. The Barangaroo development is an important urban initiative to create new parklands, waterside promenades, a sustainable business development and a new 6 star hotel facility, the Crown Sydney Hotel Resort.

Rogers Stirk Harbour are the masterplanners for Barangaroo South. The adjacent plan represents the key massing forms, masterplan controls and constraints, as part of the 'Modification 8' submission to the Barangaroo masterplan application.

#### Key

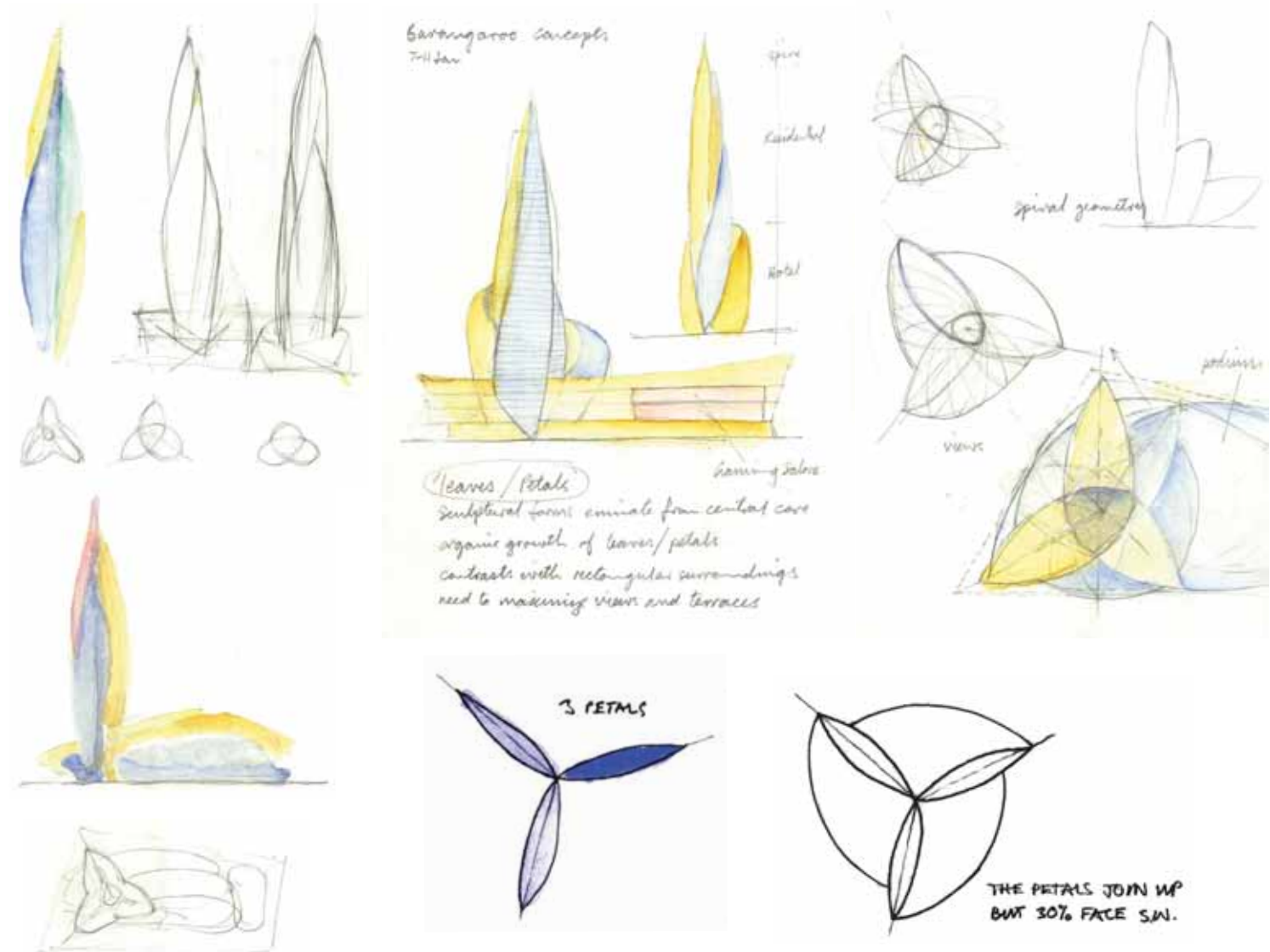
- Application Site Boundary
- - - Extent of Basement Level Works
- - - Extent of Ground Level Licensed Area

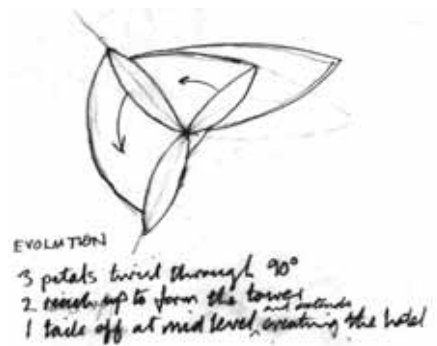
# 4.0

## ARCHITECTURAL CONCEPT

### 4.1 SCHEME DESIGN INTRODUCTION

Wilkinson Eyre was appointed as architects for the Crown Sydney Hotel Resort building in May 2013 following an international design competition. The winning design, which was chosen by a distinguished list of judges, was released to the press by James Packer at a conference in the Sydney Opera House and was featured in many national and international newspapers and journals.





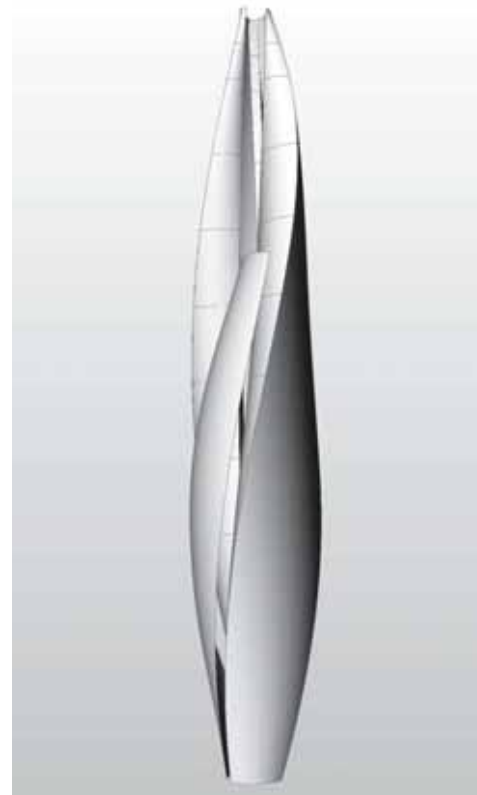
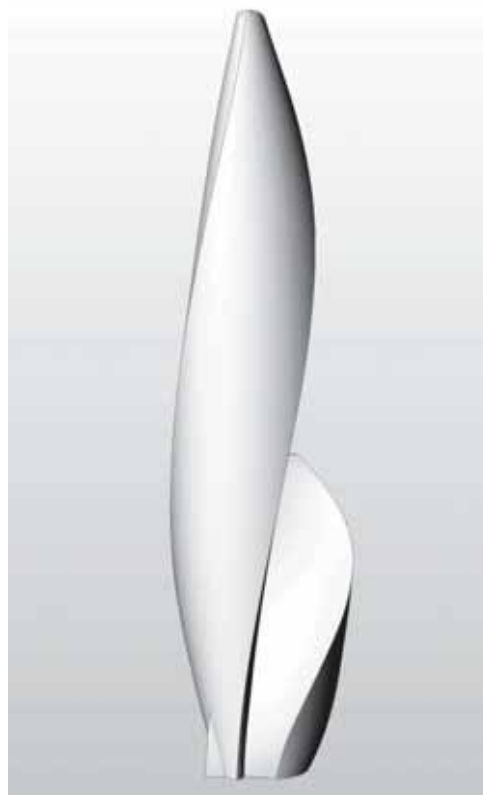
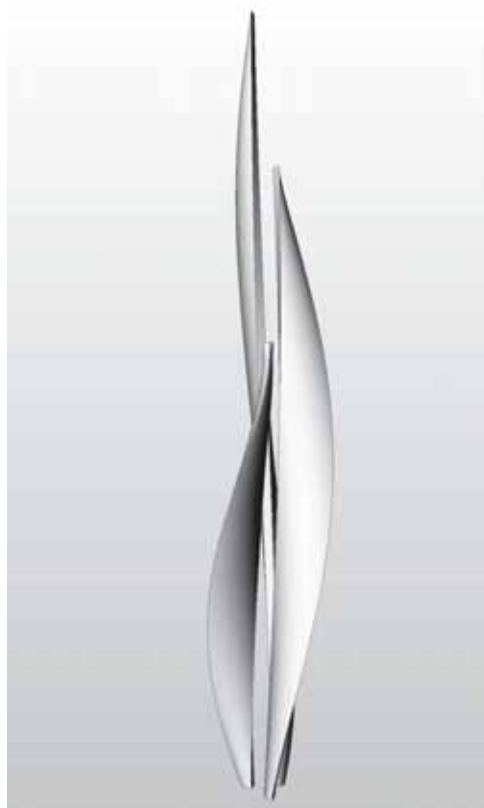
## 4.2 ARCHITECTURAL CONCEPT

The response to the site has been to create a sculptural form that will rise up the skyline like a habitable piece of artwork, contrasting with the many rectangular forms which create the backdrop to the harbour.

A 271m high tower, clad in a light silvery veil of glass with differing levels of transparency, will create a striking image against the sky. Its curved geometry emanates from a concept of three petal forms that twist and rise together, one tailing off and spreading out to form the main hotel accommodation with the whole composition visually grounded by a curvilinear four storey podium.

The geometry of the tower is complex and was derived from parametric 3D modelling. It accommodates a 60 degree twist in the outer skin whilst maintaining a rectangular core. This is facilitated by a spiral layout of villas and apartments on the upper levels whilst the majority of the hotel rooms are stacked vertically in their own wing.

The twisting form helps to maximise the views of the Opera House and Sydney Harbour Bridge and the curvature 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.

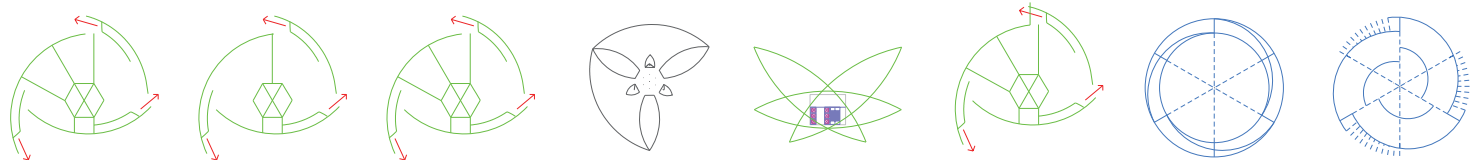
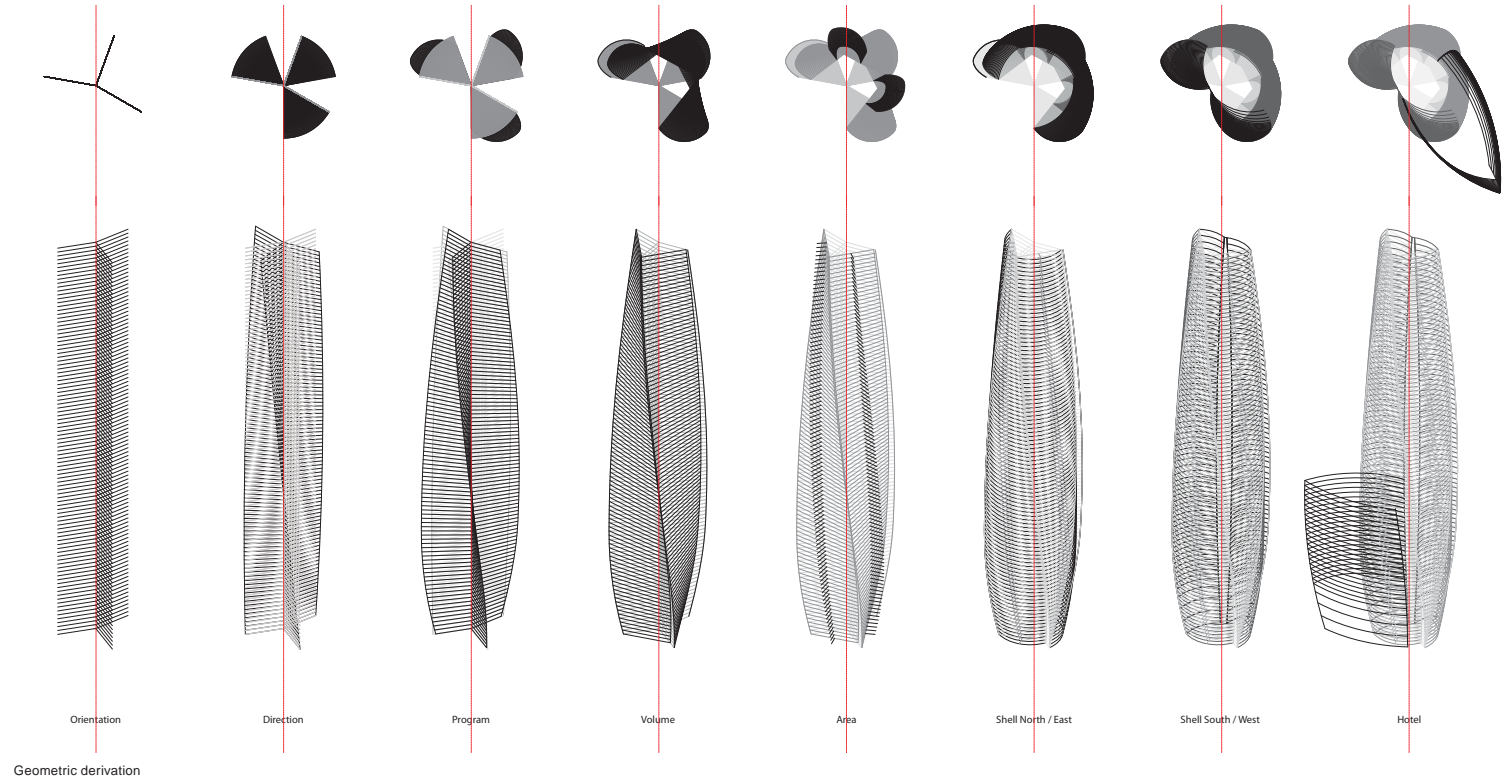


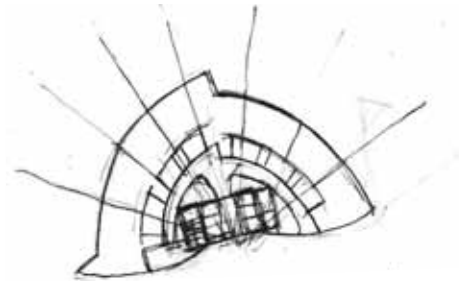
Design derivation



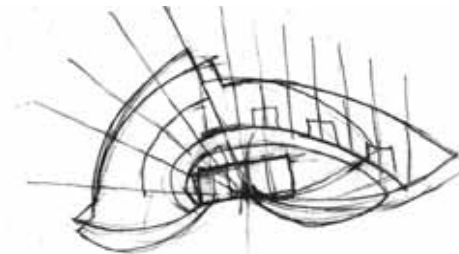
### 4.3 GEOMETRIC DERIVATION

The geometry starts at the base as three petals aligned to the site, one facing north and the other two stretching to the east and west extents of the boundary. As the tower rises the petals twist, maximising the façade exposed to the primary vista of the Harbour Bridge and the Opera House. The three separate petals are then joined to create the inhabitable space and the silhouette is sculpted to efficiently distribute the area within the form between the hotel and residential components.





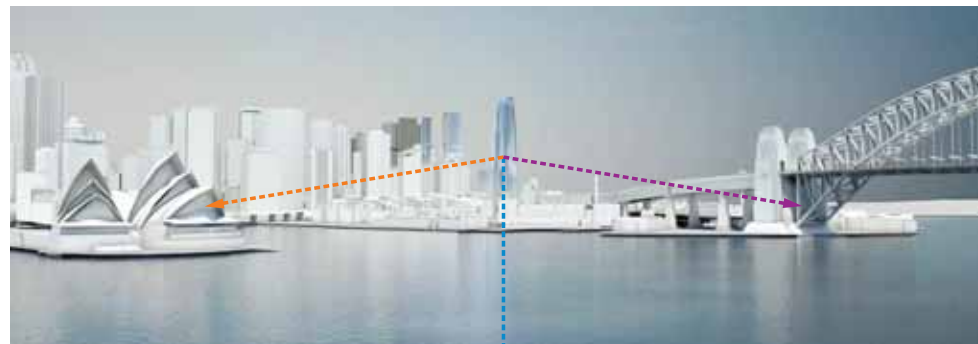
*Upper levels of tower maximise views*



*Hotel floors stretch out to the south*



Principle view analysis



Principle view analysis

## 4.4 ORIENTATION

The twist of the tower is aligned so that the centre of the twist is midway between the bisector of the two icons in Sydney: the Harbour Bridge and the Opera House. The geometry is therefore fundamentally derived by the local significant context, and focuses on this celebrated vista. The hotel 'petal' also unfolds to maximise its aspect to this critical view and align the scheme with the masterplan.

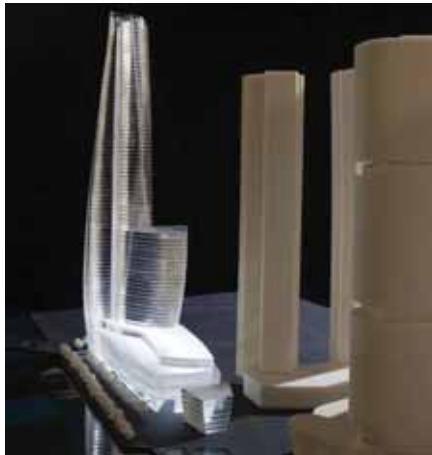
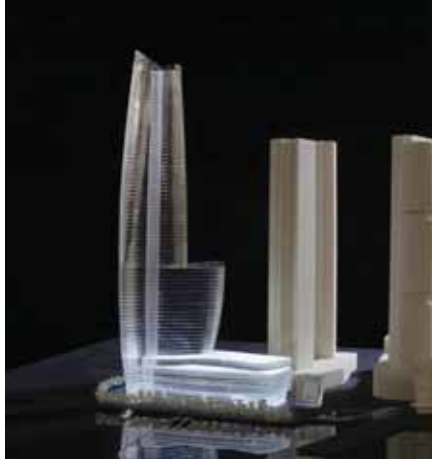


## 4.5 DESIGN DEVELOPMENT

Throughout the design process, the scheme has been extensively modelled both physically and digitally to test the form and massing from multiple viewpoints within the city of Sydney. This a critical exercise that must go through multiple iterations; given such a prominent position with a high degree of visibility, it is essential that the design process continually tests and improves the architecture.

The scheme design exists in a virtual model of the city of Sydney as illustrated in the images and views here. Physical modelling, derived from the computer models using 3D printing techniques, allows for continual refinement to the architectural and sculptural form.









Aerial view from west









View from Robert Street (day)





View from Robert Street (night)



View from Pyrmont Bridge, Darling Harbour





View from Balmain East



# 5.0

## SITE ANALYSIS

### 5.1 SITE DESCRIPTION

Barangaroo is located on the north-western edge of the Sydney Central Business District (CBD). It is bounded by Sydney Harbour to the west and the Rocks to the north. The Sydney Harbour Bridge approach is to the north-east.

The Crown Sydney Hotel Resort scheme is located in the north-western corner of the Barangaroo South site. Bounded on the north by Barangaroo Central and by Barangaroo promenade to the west.

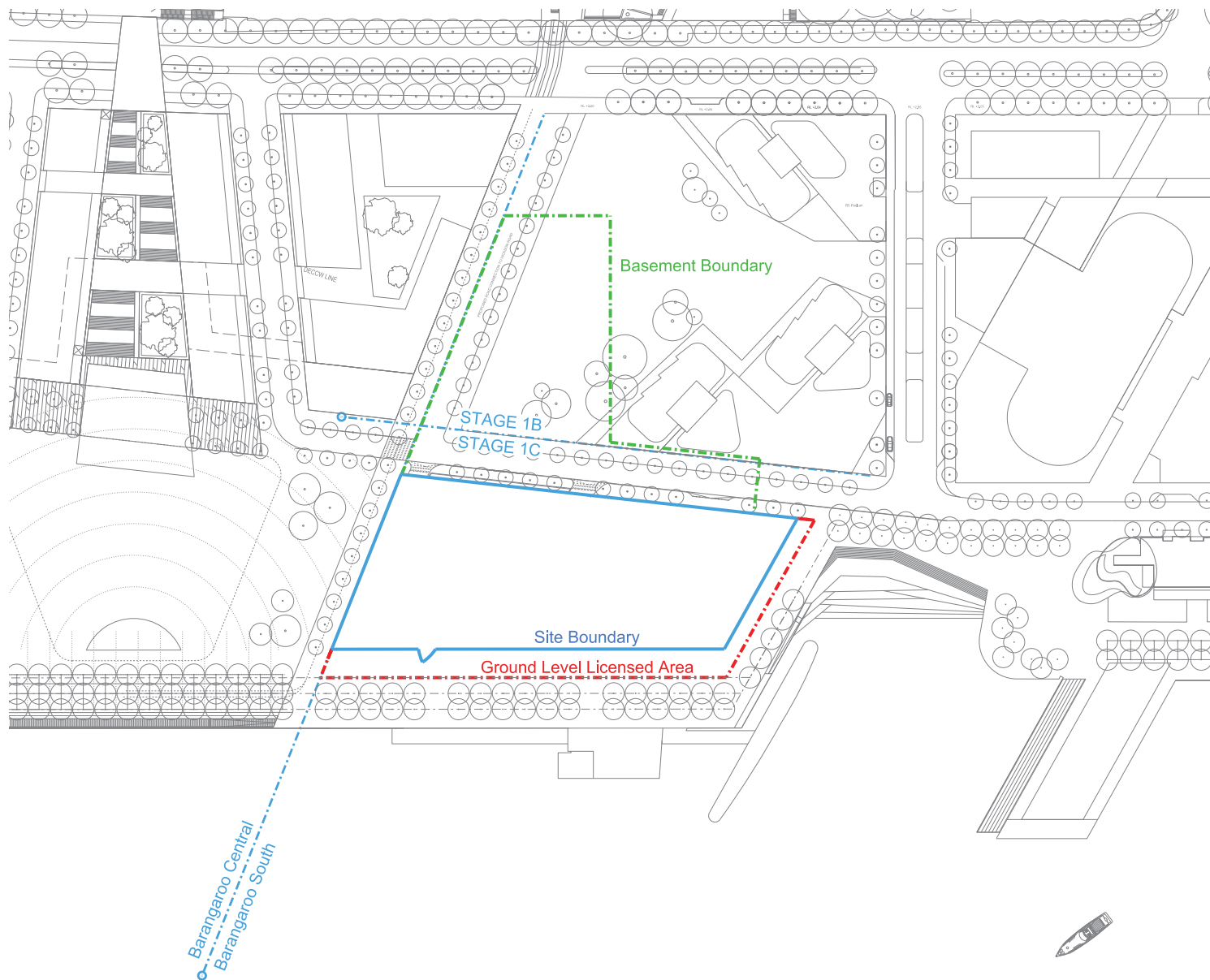
### 5.2 PHYSICAL FEATURES

The immediate Crown Sydney Hotel Resort site exists on a former shipping container storage site. The existing site comprises a concrete apron deck built over a protective seawall caisson, which in itself was built over old industrial wharf facilities that date back almost 200 years. As such, a significant amount back fill and historical industrial detritus is present behind the seawall.

The site is predominantly flat, rising slightly from south to north. The southern half of the site extends southwards over the caisson line and consequently part of the excavations and piling structures of the new scheme will extend into partial sea water. The northern half of the site sits wholly within the caisson line.

There is a bedrock level beneath the site that generally falls from east to west, consequently the excavation and piling structures will be installed to varying levels and depths from the resultant finished ground level.





### 5.3 SITE EXTENTS

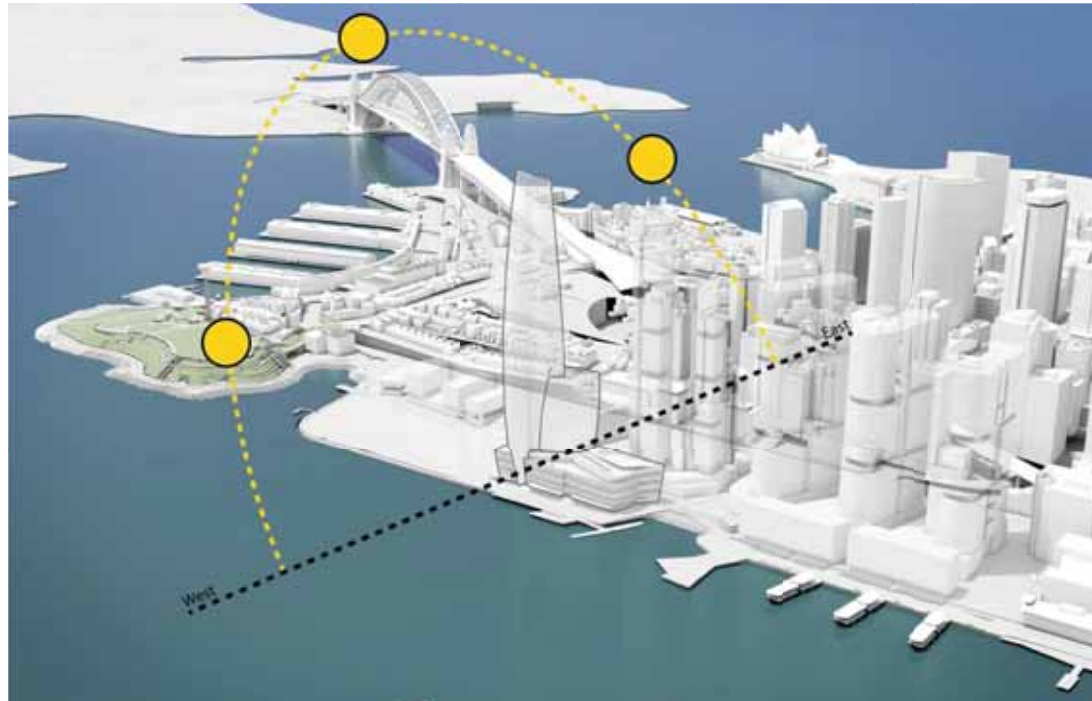
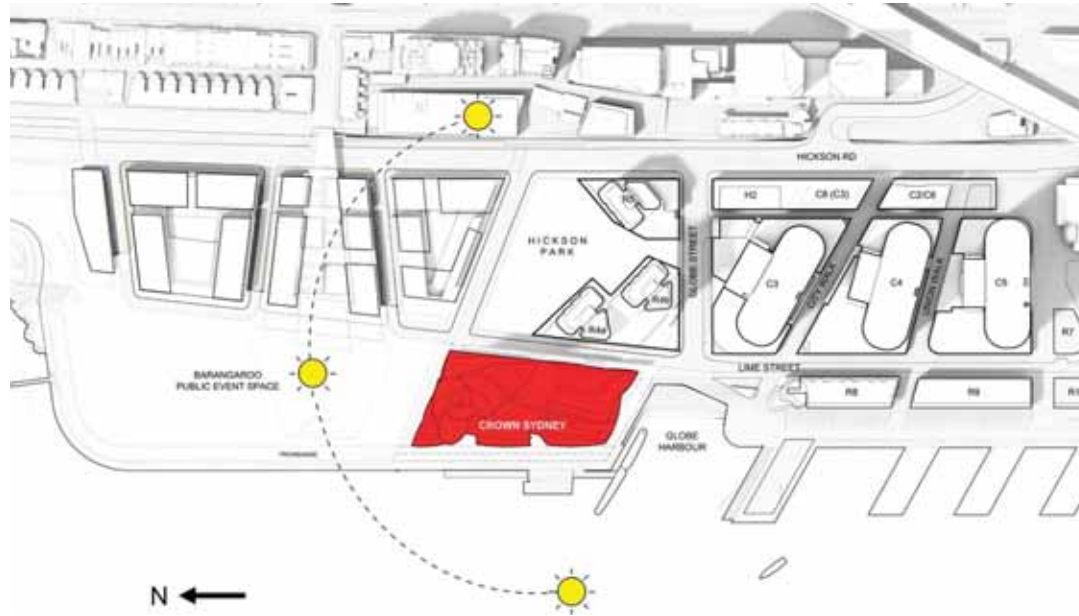
The extent of the site comprises of three main zones: the above ground site extents of the Crown Sydney Hotel Resort scheme, the Ground Level Licensed Area; and the below ground shared basement extents, where the Crown Sydney Hotel and the adjacent residential development will share one basement.

The Crown Sydney Hotel Resort Eastern Site Boundary is, located along the west of Lime Street, aligned on its axis. The Crown Sydney Hotel Resort shared basement extends below ground to the east of this boundary, underneath Lime Street and extends beneath Hickson Park. The Ground Level Licensed Area exist to the west and south of the Crown Sydney Hotel Resort Site Boundary, which will accommodate restaurants and cafe terraces.

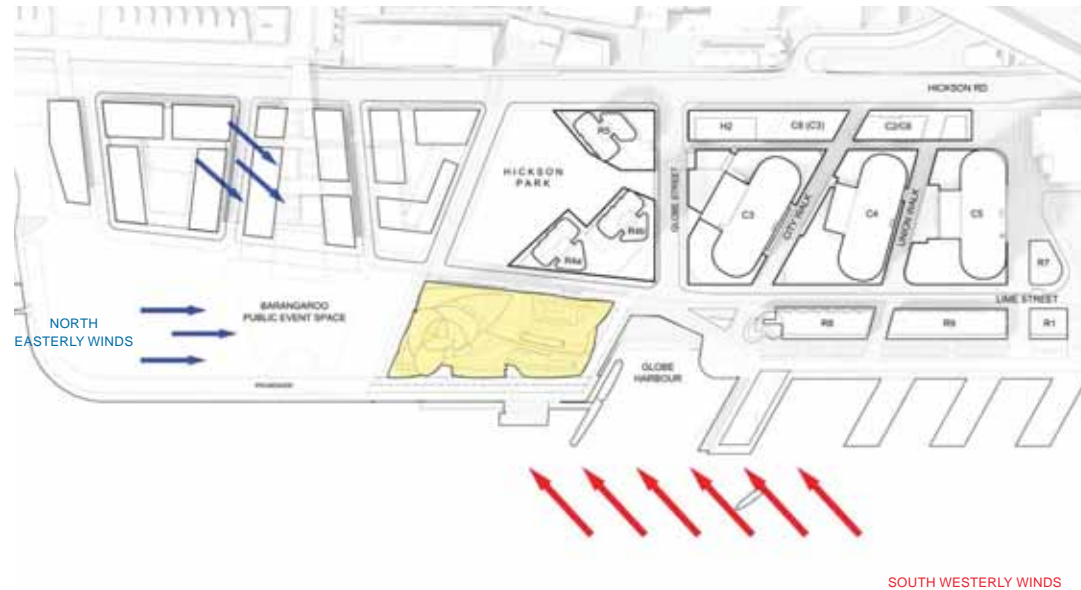
## 5.4 SUNPATHS AND OVERSHADOWING

Being located on the north-west corner of the new Barangaroo development, and of the Sydney CBD in general, the Crown Sydney Hotel Resort site will benefit from good exposure to sunlight throughout the day, in both the winter and summer conditions. There is little existing urban structure that overshadows the site; the future adjacent residential towers will provide a little early morning overshadowing once completed.

Sun path analysis has been prepared and tested for all times of the year, and has been implemented to refine and tune the architectural form. Shadow casting has been plotted to ascertain self-shading, which has informed various aspects of the design philosophy. This has been most important in the design of the level 3 and 4 pool terraces. A more technical analysis is available within Appendix C.







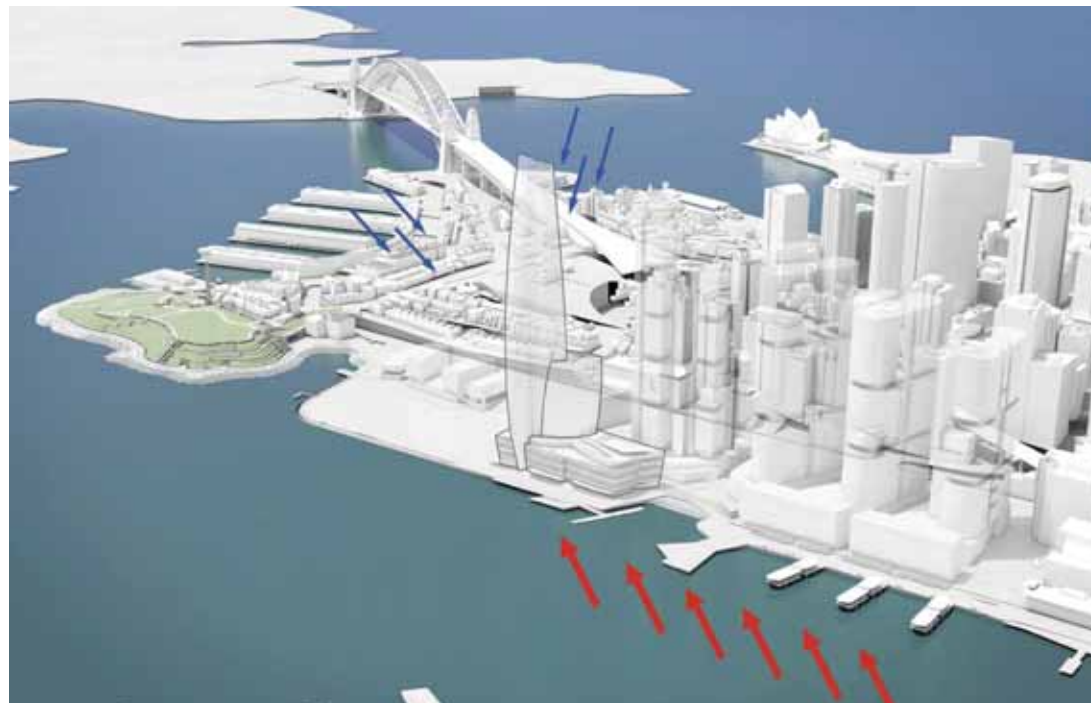
## 5.5 WIND

The Crown Sydney Hotel Resort site is in a relatively exposed area with regards to prevailing winds. The predominant wind directions are from the south-west and from the north-east. The scheme has been modelled and has been tested in a wind tunnel to help analyse the particular conditions, and to inform and develop appropriate mitigation measures for the main elements of the scheme.

A characteristic of particular consideration, as highlighted in the site wide wind analysis and modelling, relates to the cumulative effect of wind as it builds up when passing the extended 'wall' of buildings, comprising the existing CBD, the three new commercial buildings in Barangaroo South, the proposed residential buildings, and finally the Crown Sydney Hotel Resort scheme on the north-western corner of Barangaroo South.

Particular consideration is given to ground level condition around the podium to provide adequate shelter and protection for the public areas and for the spill out restaurants and cafés. The landscaped podium roofscapes are being developed with canopies where required for the high level outdoor restaurants and pool areas.

In addition, considerations are being given to downdraft created by the building, both in terms of protecting the terraces and external spaces and the effects at ground level in the public realm.

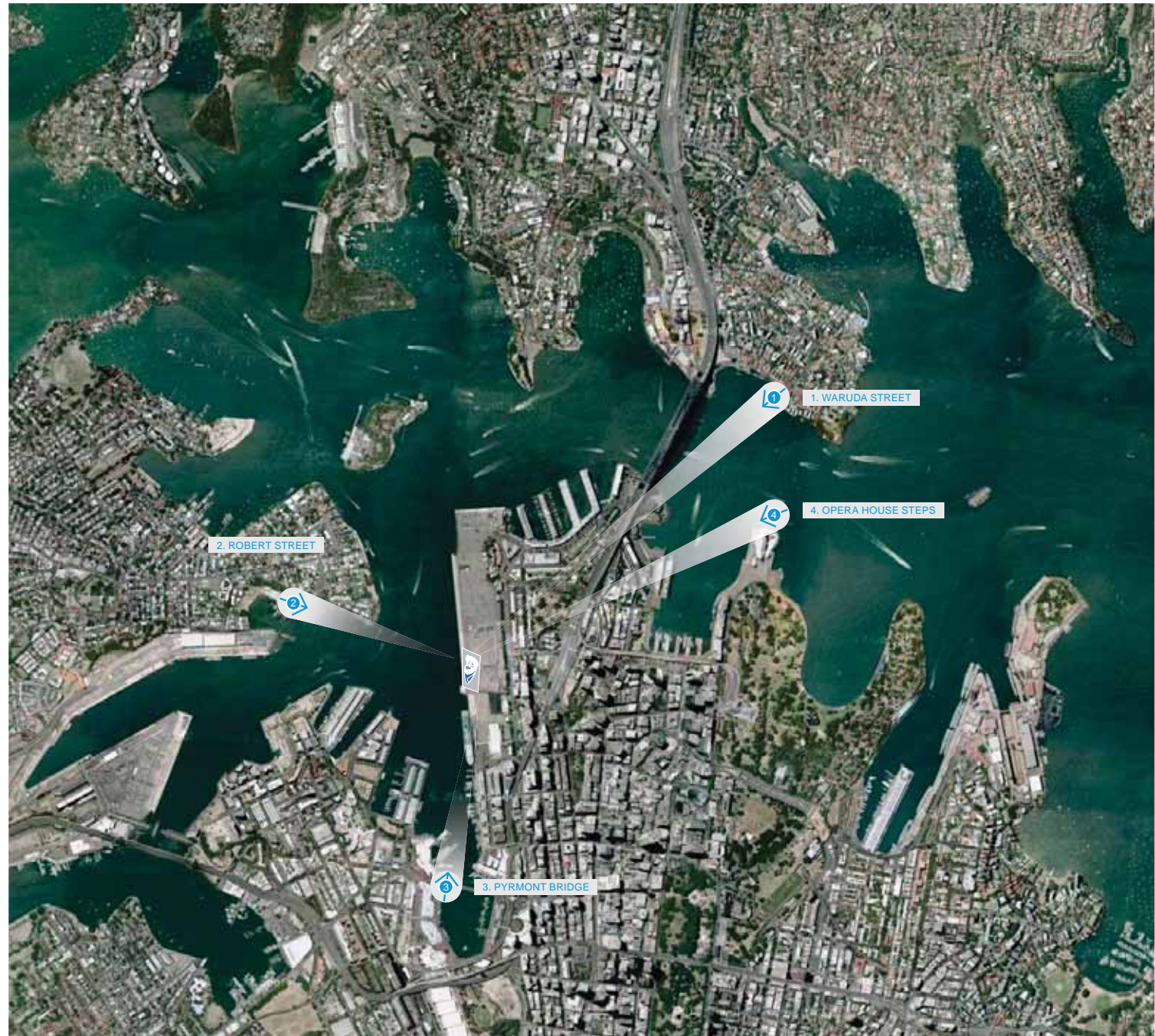


## 5.6 VIEWS

The Crown Sydney Hotel Resort scheme is in a highly visible position on the Sydney skyline, located on the north-west corner of the Sydney CBD. Consequently, it is imperative that the scheme attains an outstanding architectural quality and finish.

The massing and sculptural composition of the building has been considered and tested throughout the design process by generating views from a wide range of vantage points at local, medium and long proximities. These views have been plotted to incorporate the future developments of the commercial and proposed residential buildings, so as to allow the scheme to be read in terms of the resultant masterplan massing.

Additionally, a more comprehensive photomontage analysis has been undertaken as part of the masterplan analysis and in response to the Director General's Requirements. This analysis can be found in the Appendix of this document.







#### VIEW 1

From the north-east, the scheme can be seen across the Sydney Harbour Bridge, as part of the a line of buildings comprising the existing CBD, the new commercial buildings and proposed residential buildings.



#### VIEW 2

Viewed from the west across the water in the foreground of Sydney Harbour, Crown Sydney Hotel Resort forms the highest point of a progressing increase in height of the western edge in the context of the CBD.



#### VIEW 3

From Pyrmont Bridge



#### VIEW 4

When viewed from the steps of the Sydney Opera House, Crown Sydney can be seen as the defining corner element of the Sydney CBD, reflected in Circular Quay in the foreground.



## 5.7 PLANNING ENVELOPES

The planning development envelope comprises three distinct elements that broadly correspond with the three elements of the building, thereby defining the parameters within which the scheme has been designed and articulated.

The podium block extends across the entire site footprint, with a height development cap set at +40M RL. A permissible projection of the tower element has been described within the parameters. The podium envelope extends beyond the site boundary on the west and south by up to 6m.

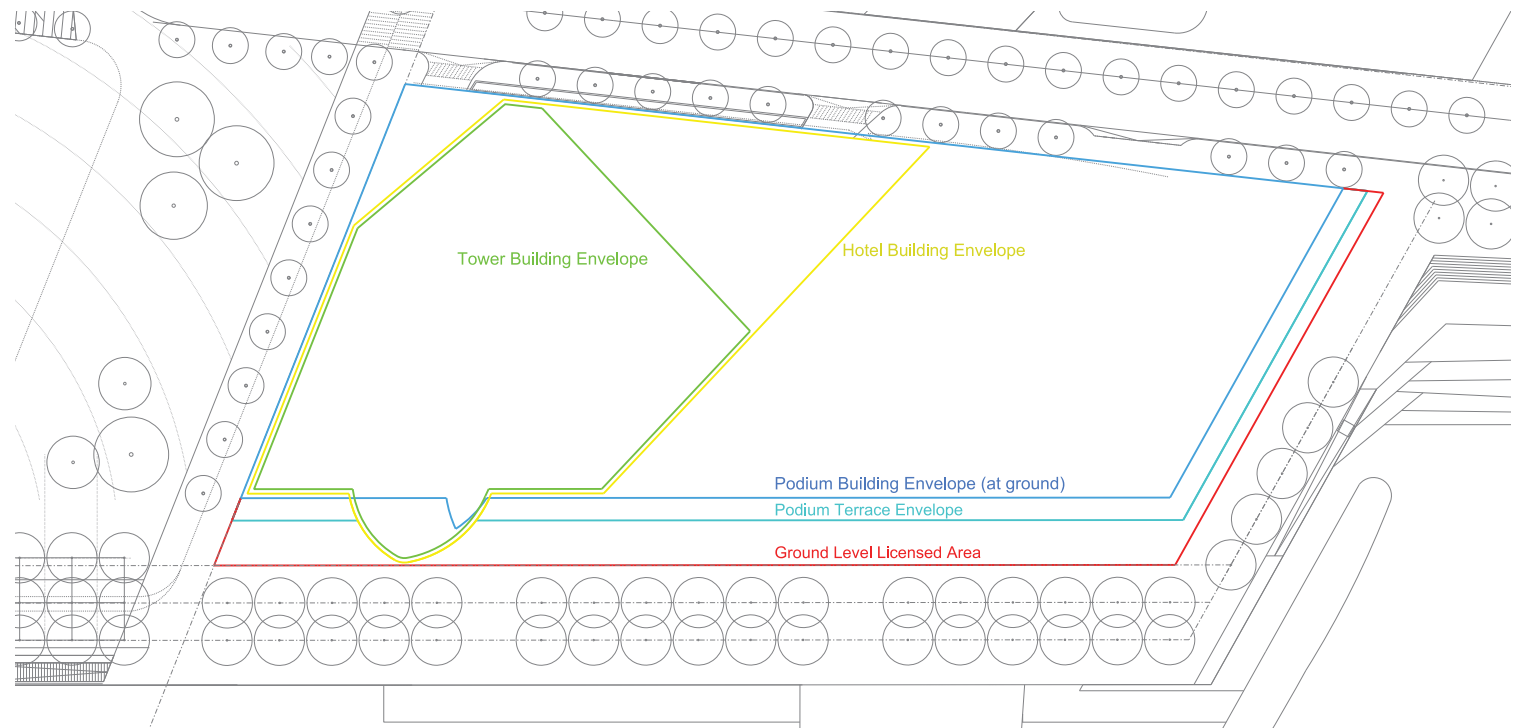
The hotel envelope is defined as a block that extends out of the podium roof, up to a level of +110M RL, and encompasses part of the tower form itself. The tower envelope is capped at level +275M RL. Both the tower and hotel envelopes are shaped in plan partly in response to key relationships of the masterplan 'fan' principles that define Barangaroo South.



Planning envelope axonometric by type



Planning envelope axonometric: overall volume



Plan: Planning envelope by type