BARANGAROO SOUTH MOD 8 SUBMISSION

REPORT TO IDENTIFY ANY IMPACTS OF THE BARANGAROO SOUTH PROPOSAL ON THE PRESCRIBED AIRSPACE FOR SYDNEY AIRPORT

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1. Executive Summary

This report supports a modification to Concept Plan (MP06_0162). Concept Plan (Mod 8) relates to Barangaroo South only.

Lend Lease has engaged AvLaw Pty Ltd ("AvLaw") to assess and report against Director General's Requirement No 19 "Prescribed Airspace for Sydney Airport and Sydney Observatory impacts" specifically "Identify any impacts of the proposal on the prescribed airspace for Sydney Airport".

AvLaw's analysis on two previous occasions for the Hotel and Commercial Tower C3, together with and the current assessment conducted in the preparation of this report, concludes that there is no impediment to the safety of flight operations into and out of Sydney Airport, or to the airspace associated with scenic tourism aviation activities, by the proposed development at Barangaroo South to a maximum height of 335 metres. The application for the Hotel with the temporary construction crane as the highest of all structures at Barangaroo South is to a maximum height of 333 metres.

AvLaw considers that the only requirements associated with construction of Barangaroo South proposed buildings are the promulgation of a Notice to Airmen (NOTAM) depicting the position and maximum operating height of any cranes and any specific features such as lighting and markings.

Most published tracks and tolerances with the prescribed lateral separation buffer were deemed to be clear of the Barangaroo site. Others are addressed by Air Traffic Control (ATC) procedures similar to that required for the height of the Centrepoint Tower.

AvLaw has determined that providing no buildings or cranes are located further west than that currently indicated and providing the maximum height does not exceed 335 metres, the documented Safety Case(s) assessment of the instrument flight procedures that supported requests for aviation acceptance for Stage 1A Commercial and Stage 1B Hotel may be applied to submissions for the entire Barangaroo South site.

AvLaw has identified that there are no new hazards introduced by the construction development to a maximum height of 333 metres as proposed, or ongoing utilisation to the lower maximum height of 275 metres (277 metres when the BMU is deployed) at Barangaroo South.

2. Acronyms

Acronym	Definition
AIP	Aeronautical Information Publication
AMSL	Above Mean Sea Level
ATC	Air Traffic Control
ATS	Air Traffic Services
BMU	Building Maintenance Unit
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulations
CTA	Control Area
CTR	Control Zone
DAP	Departure and Approach Procedures
DER	Departure end of runway
DME	Distance Measuring Equipment
GNSS	Global Navigation Satellite System
IAP	Instrument Approach and Departure Procedures
ICAO	International Civil Aviation Safety Authority
IFR	Instrument Flight Rules
ILS	Instrument Landing System
LOC	Locator
LSALT	Lowest Safe Altitude
MATS	Manual of Air Traffic Services
MOS	Manual of Standards
NAP	Noise Abatement Procedures
NOTAM	Notice to Airmen
NM	Nautical Miles
OLS	Obstacle Limitation Surface
PANS-OPS	Procedures for Air Navigation Services - Aircraft Operations
R07	Runway 07 Sydney Airport
R16L	Runway 16 Left Sydney Airport
R16R	Runway 16 Right Sydney Airport
R25	Runway 25 Sydney Airport
R34L	Runway 34 Left Sydney Airport
R34R	Runway 34 Right Sydney Airport
RNAV	Radio Navigation
RWY	Runway
SARPs	Standards and Recommended Practices
SID	Standard Instrument Departures
STAR	Standard Terminal Arrival Route
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

3. Introduction

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).

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 consequential and related changes to the urban design guidelines that are required to the built form and public domain outcome for the Barangaroo South site.

4. Overview of Proposed Modification

The proposed modification to the Concept Plan (Mod 8) seeks to:

- relocate the landmark building (Block Y) from the harbour onto 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.

5. 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 bounded to the south by a range of new development dominated by large CBD commercial tenants to the south.

The Barangaroo site has been divided into three distinct redevelopment areas (from north to south) – the Headland Park, Barangaroo Central and Barangaroo South. Concept Plan (Mod 8) relates to Barangaroo South only as shown in Figure 1.

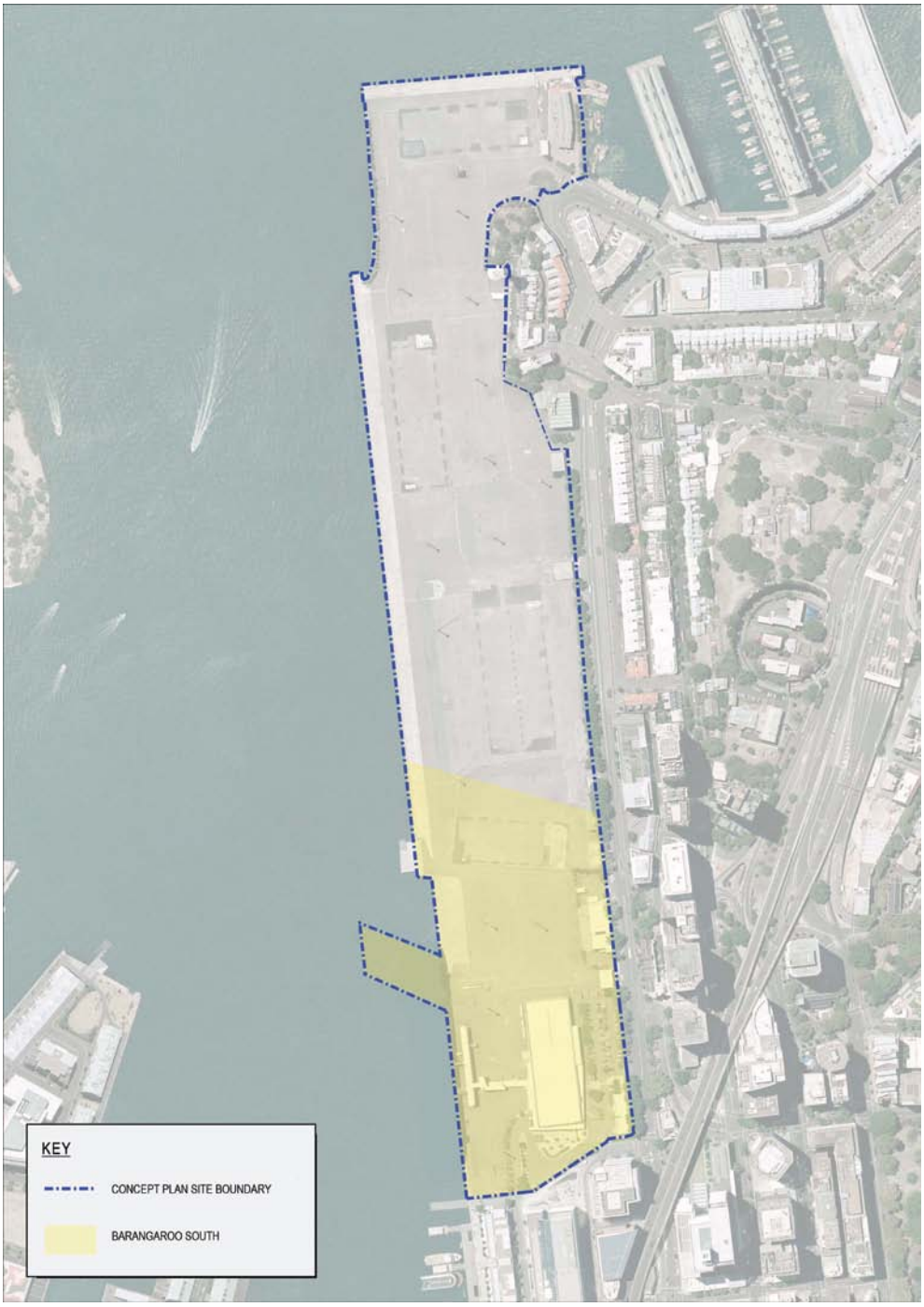


Figure 1: Indicative Site Boundary for Barangaroo South

6. Impacts on Prescribed Airspace for Sydney Airport

Lend Lease has engaged AvLaw Pty Ltd ("AvLaw") to assess and report against dot point one of the Director General's Requirement No 19 "Prescribed Airspace for Sydney Airport and Sydney Observatory impacts" specifically "Identify any impacts of the proposal on the prescribed airspace for Sydney Airport".

AvLaw has previously undertaken detailed assessment of building and crane heights at Barangaroo South for both Lend Lease in respect to Tower 1 Commercial Building 3 for temporary crane construction heights up to a maximum height of 286 metres, and Crown in respect to the Hotel up to a temporary crane construction height of 333metres, and has submitted building and crane details on behalf of both Lend Lease and Crown for initial aviation acceptance by CASA, Airservices, SACL and the Department of Infrastructure and Regional Development. The details were supported by Safety Cases and AvLaw was advised by Airservices Australia on 28 August 2014 of their acceptance of the buildings and cranes at the proposed heights as part of the process. Advice from the Department of Infrastructure and Regional Development to finalise initial aviation acceptance is pending.

AvLaw has now conducted a reassessment of the Barangaroo South development to include other buildings including R4A, R4B, R5, C3, C4 and C5.

AvLaw's previous analysis supported by two safety cases, and the current assessment concludes that there is no impediment to the safety of flight operations into and out of Sydney Airport, or to the airspace associated with scenic tourism aviation activities, by the proposed development at Barangaroo South that is complemented by Concept Plan (Mod 8) to a maximum height of 335 metres.

This conclusion is based on the detailed analyses of all published aircraft instrument flight procedures, analysis of the Sydney Air Traffic Control (ATC) procedures in the safe conduct of day to day air traffic management operations at Sydney, and assessment of local visual flight rules (VFR) operations.

The detailed analyses conducted by AvLaw revealed that the proposed construction activities at Barangaroo for temporary crane construction height up 333 metres would result in a potential penetration into the airspace of 2093 feet when the mandatory basic vertical separation standard of 1000 feet is added to the maximum proposed height of construction activity and the maximum height of existing buildings in the Sydney CBD.

The separation standards and tolerances applied to this assessment are as described in:

- CASA Manual of Standards (MOS) PART 172 and;
- International Civil Aviation Organisation (ICAO) Procedures for Air Navigation Services (PANSOPS).

AvLaw review of the Barangaroo Mod 8 Concept Plan concluded that no construction will exceed the 1100 feet height. The AvLaw analysis has revealed that aspects of "shielding" will be applicable to some buildings within the Barangaroo precinct where those buildings are shielded by higher adjacent penetrations of the applicable airspace.

The "shielding" principles are as those described in the CASA Manual of Standards Part 139 Section 7.4.

AvLaw considers that the only requirements associated with construction of Barangaroo South proposed buildings are the promulgation of a Notice to Airmen (NOTAM) depicting the position and maximum operating height of any cranes and any specific features such as lighting and markings, provision of updated

plans to Sydney Airports Corporation Ltd (SACL), and application for building and crane heights approval to SACL for the residential buildings not already notified to SACL. Refer to Appendix 3.

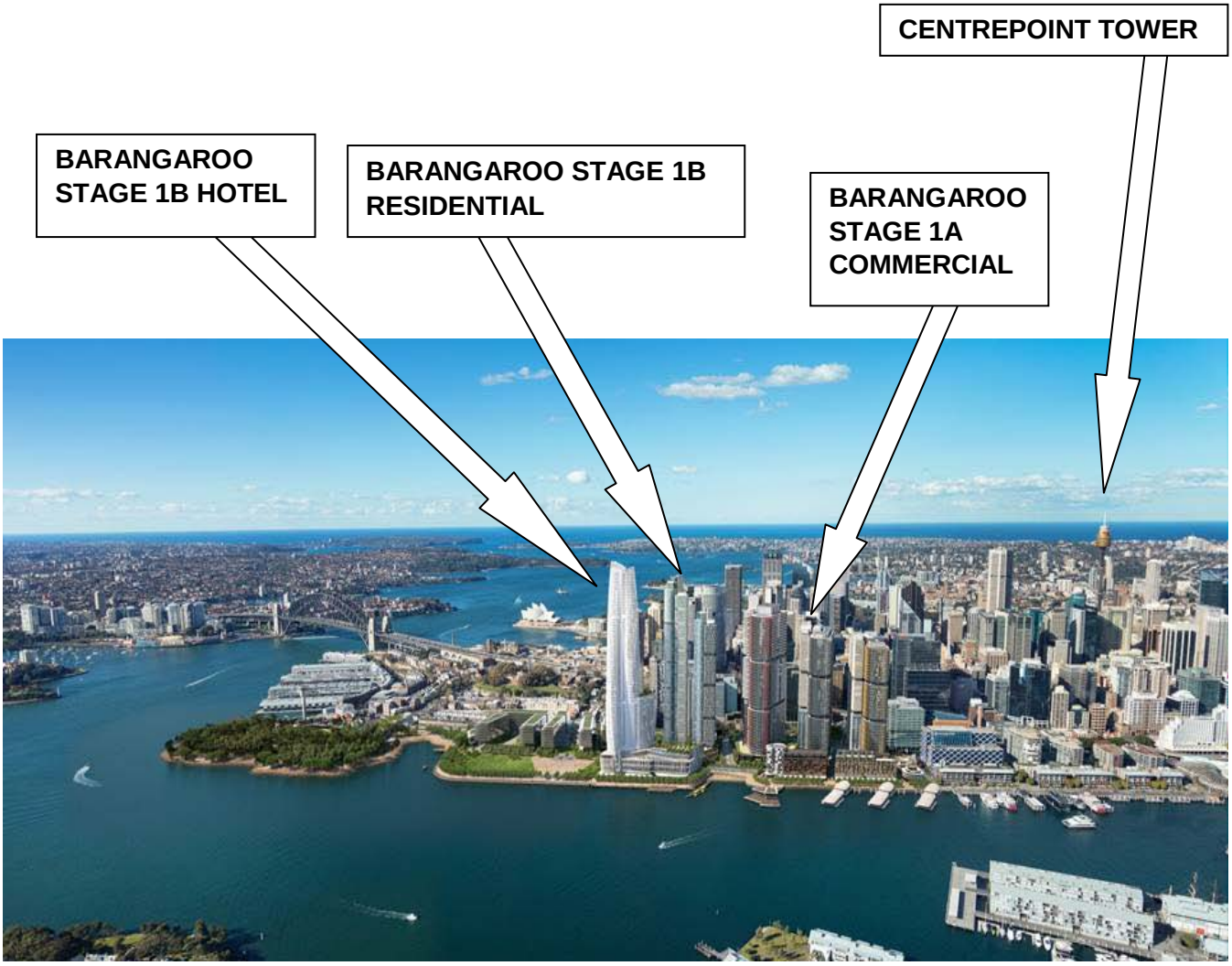


Figure 2: Pictorial layout depicting the location of Barangaroo South

7. Description of Sydney Airport Airspace Envelope Requirements

The protection of the immediate airspace around Sydney Airport is essential to ensuring a safe aircraft operating environment and to provide for controlled growth within safety regulatory constraints. These constraints are necessary to restrict some types of development and land uses in the vicinity of the airport such that some designated segments of the airspace surrounding Sydney Airport remain obstacle-free to ensure safety and the efficiency of aircraft operations.

The regulatory constraints controlling the airspace protection are contained within the *Airports (Protection of Airspace) Regulations 1996*, and *Civil Aviation Safety Regulations (CASR) Part 139 Aerodromes*, *Civil Aviation Safety Regulations Part 172 Air Traffic Service Providers*, *Civil Aviation Safety Regulations Part 173 Instrument Flight Procedure Design*, and *Manual of Standards (MOS) 173*. Under these regulations a system has been established whereby airspace around Sydney Airport (and other airports as applicable) is defined and includes the airspace above any part of either an obstacle limitation surface (OLS) or procedure for air navigation services-aircraft operations surfaces (PANS-OPS).

The regulations stipulate that for controlled activities specific approval is required from the Commonwealth Department of Infrastructure and Regional Development. Such controlled activities include construction or alterations to a building or structure that cause that activity to intrude into the designated airspace. This includes any cranes or temporary structures.

The requirements are that the proponent of such activities is to provide Sydney Airport Corporation Limited (SACL) with all the details of the proposal. SACL will then assess the details against the OLS and PANS-OPS criteria to identify any impact on safety of operations at Sydney Airport. SACL is the co-ordinating authority and will refer the details and their assessment as appropriate to the Civil Aviation Safety Authority (CASA), Airservices, and the Department of Infrastructure and Regional Development for their respective assessments of the impact of the proposal if the proposal penetrates the OLS and PANS-OPS criteria.

The OLS and PANS-OPS criteria are established and published in accordance with International Civil Aviation Organisation (ICAO) requirements and these requirements have been adopted by CASA and Airservices under the terms of Australia being a “contracting state” to the international convention. The details of the calculations of these criteria and the methodology used as are described in MOS Part 139.

The OLS depiction for Sydney Airport is shown in Figure 4 below indicating that the outer horizontal surface of the OLS is at 156 metres AHD over the Barangaroo site.

A PANS-OPS surface is calculated for each instrument procedure based on the respective clearance required between the designed flight path and an obstacle as defined in MOS, and ICAO Document 8168. SACL currently has a consultant finalising updated PANS-OPS drawings for Sydney Airport as those currently available are partly outdated and were produced 10 years ago. Notwithstanding, Airservices conduct their own calculations of applicable PANS-OPS requirements when undertaking their assessment of obstacles referred to them. SACL have advised AvLaw that their final consultants/SACL meeting prior to publishing revised PANS-OPS drawings is being held in the week commencing 1 September 2014. Specific updated drawings showing the PANS-OPS surfaces for all instrument flight procedures in the vicinity of Barangaroo South is not currently available, however indicative PANS-OPS are shown in Figure 3 marked on the Visual Terminal Chart (VTC) with indicative lateral clearances from the extended centreline of runway 34R, and in Figures 5 to 8 showing various existing PANS-OPS surfaces which has been extracted from the Sydney Airport Master Plan 2033.

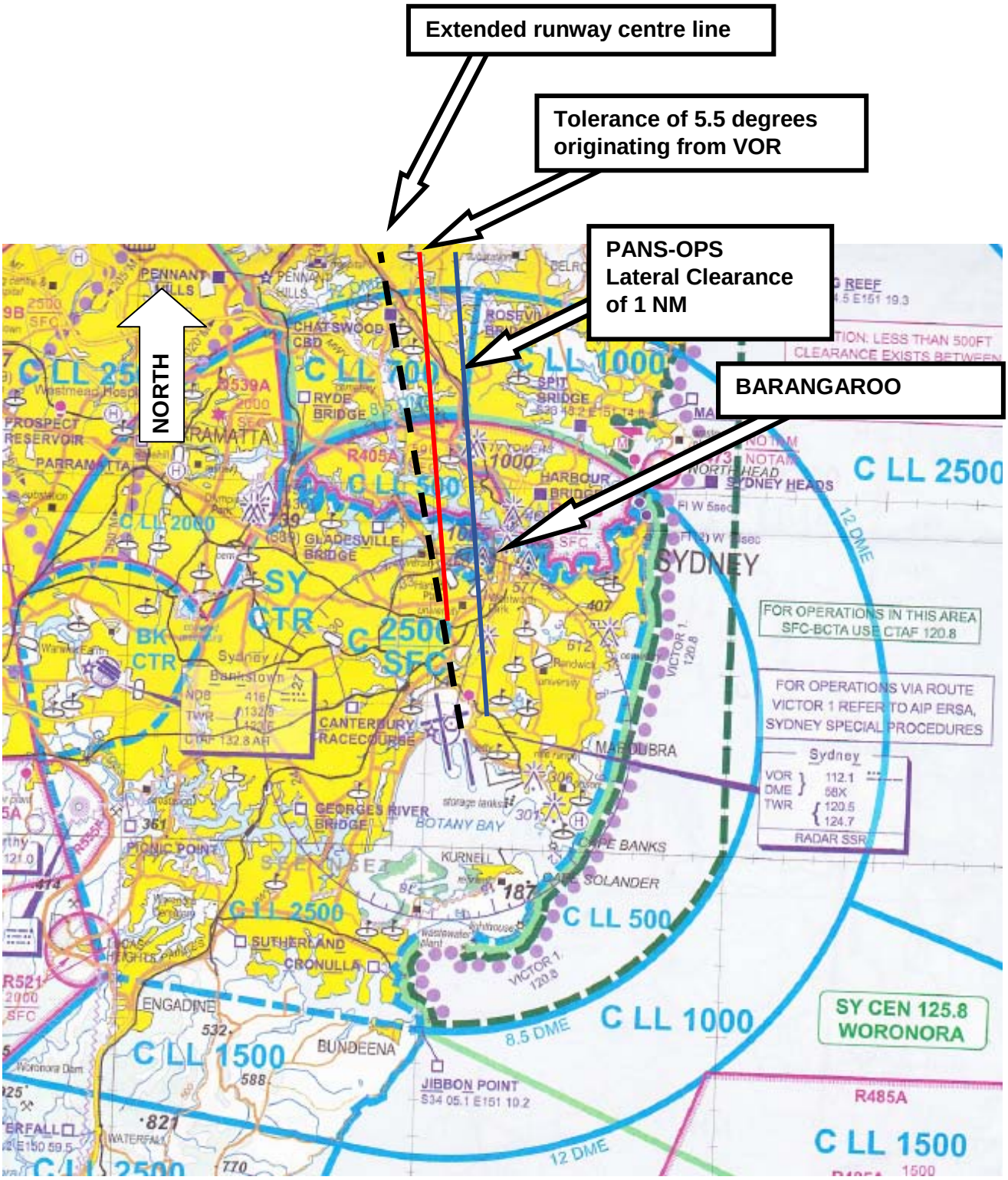


Figure 3: Sydney VTC Chart indicating PANS-OPS Clearance from Extended Centreline of Runway 34R

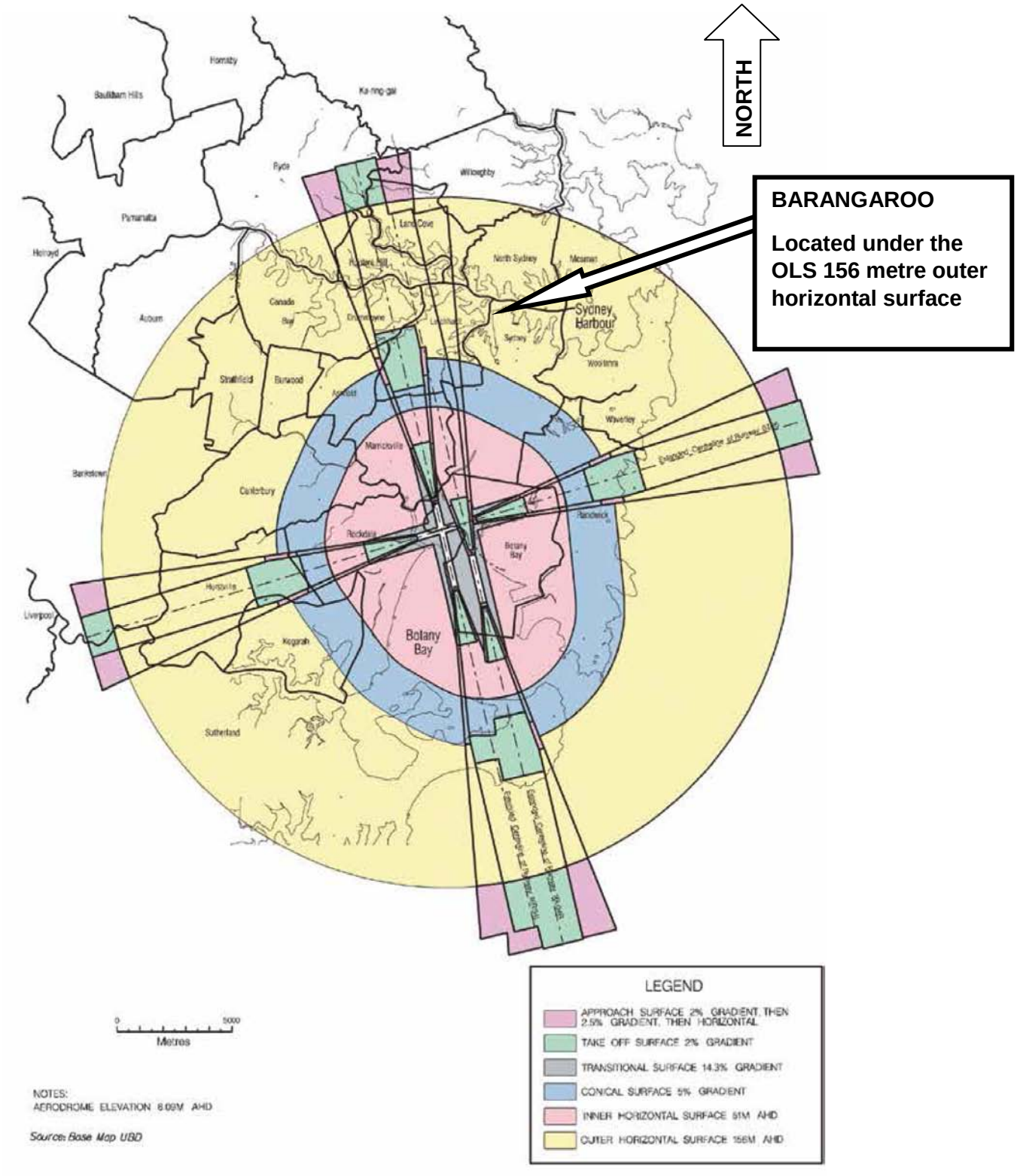


Figure 4: OLS [1]

[1] Source: Sydney Airport Master Plan 2033

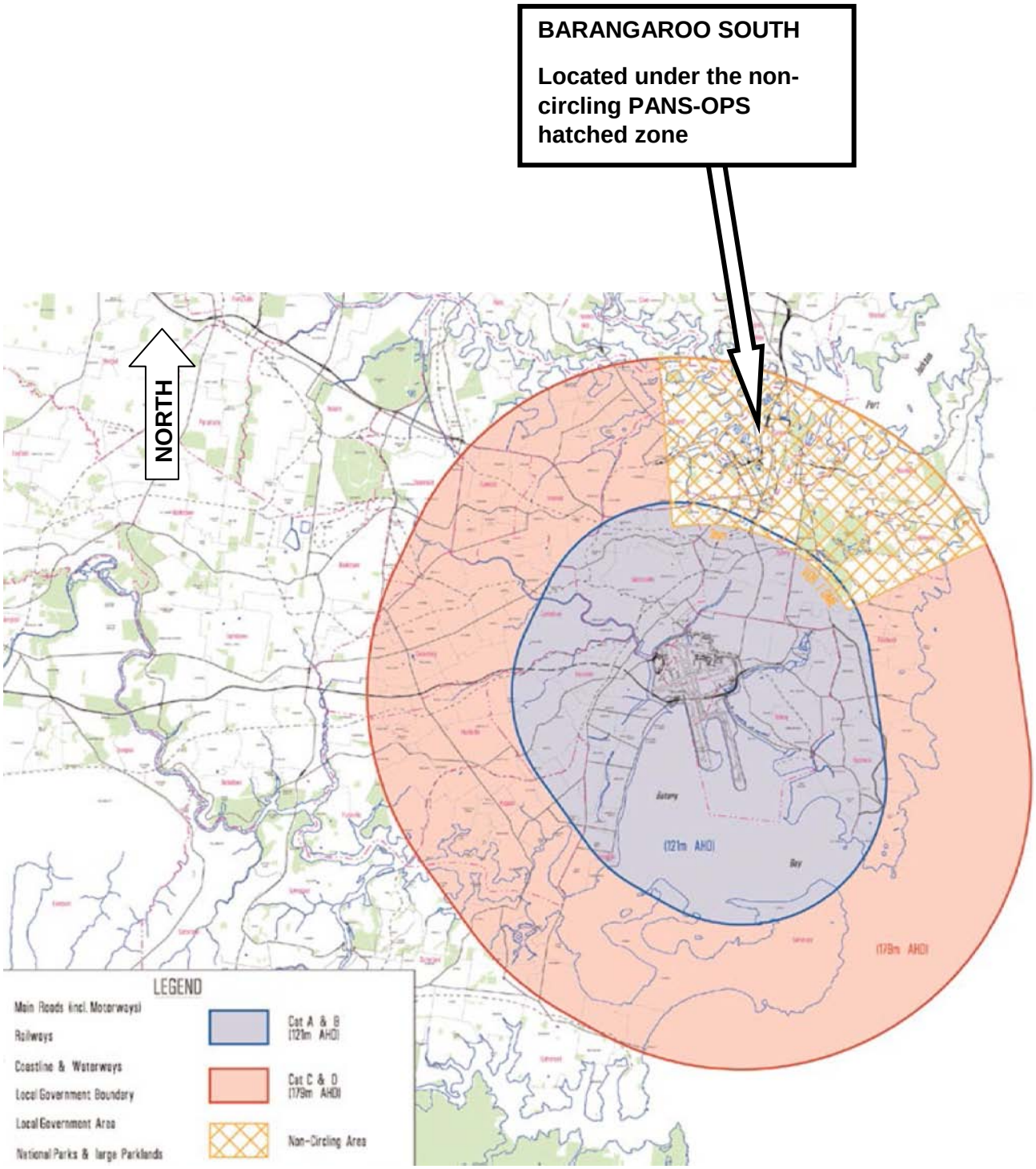


Figure 5: PANS-OPS Circling [2]

[2] Source: Sydney Airport Master Plan 2033

Figure 6: Current and Future PANS-OPS Surface Basic ILS [3]

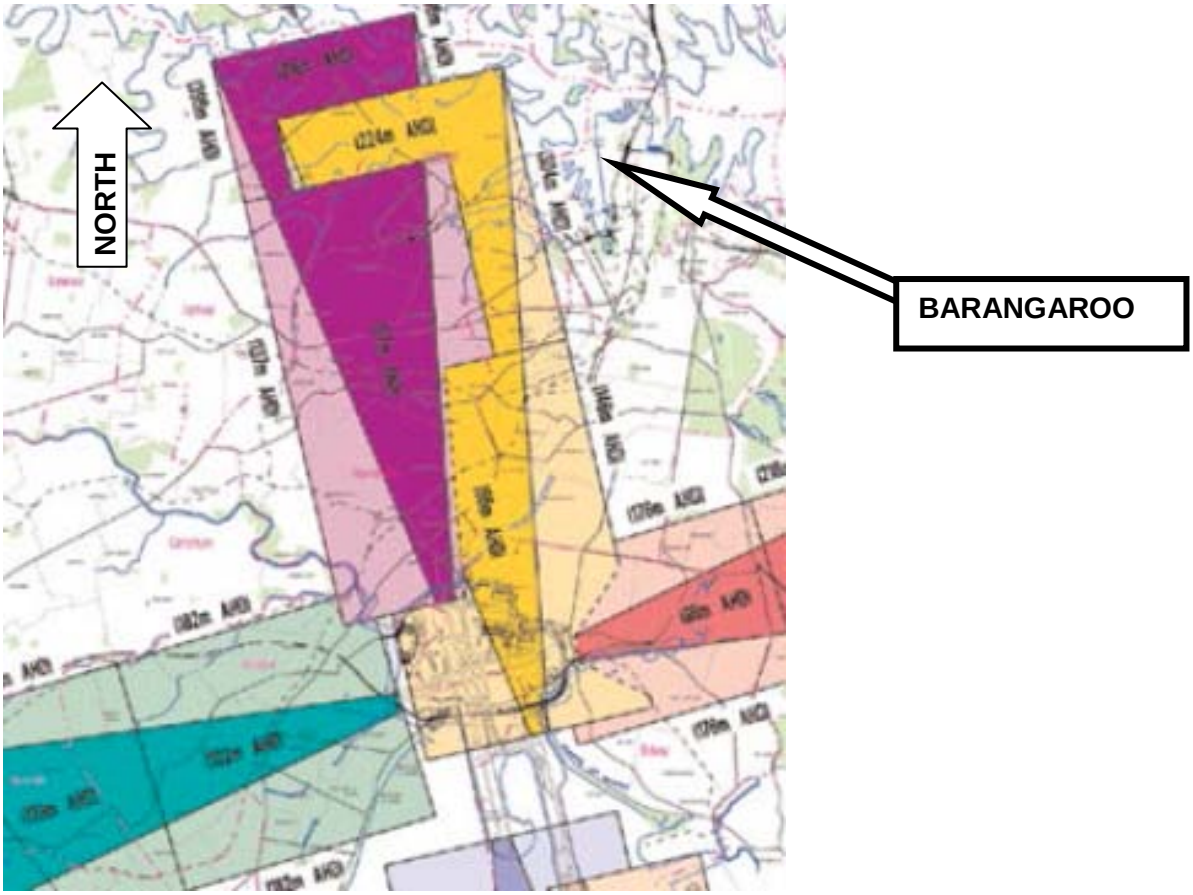


Figure 7: Current and Future PANS-OPS Surface LLZ/DME Final Approach segment

[3] Source: Sydney Airport Master Plan 2033

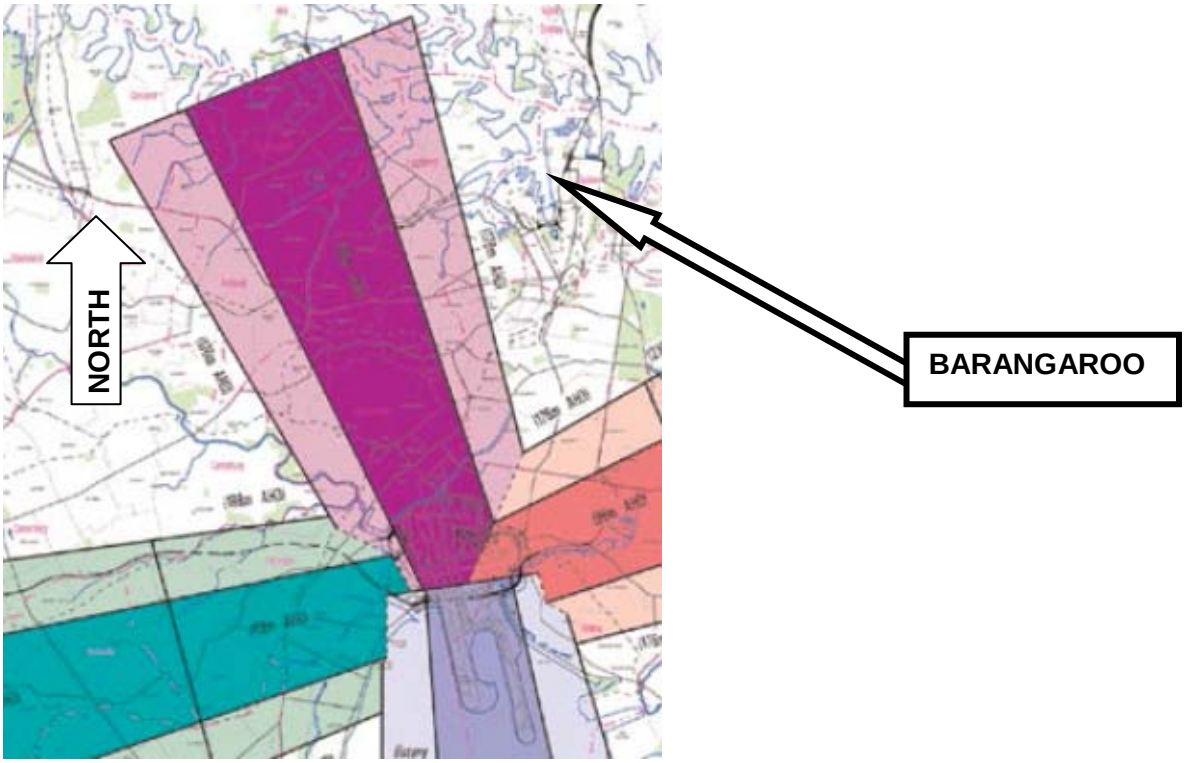


Figure 8: Current and Future PANS-OPS Surface VOR/DME Final Approach segment[4]

The Barangaroo development site lies under airspace that is administered by Airservices and is deemed controlled airspace defined as the Sydney Control Zone (CTR). The CTR can be described as a cone of airspace to a height of 2500 feet (A025) approximating a circle of 8.5nm radius centred on the Sydney aerodrome reference point (ARP). The airspace above the CTR is designated Control Area (CTA) and extends above the CTR from A025 to 60000 feet. The airspace outside the CTR is stepped up beneath the CTA such that controlled airspace does not extend down to the surface or ground level beyond the CTR.

The promulgated instrument approach and departures procedures for Sydney airport are described in the Aeronautical Information Publication (AIP) Departure and Approach Procedures (DAP). These procedures prescribe the tracks and heights that aircraft must maintain in the conduct of instrument operations and all manoeuvres are contained within CTA or CTR. It is the prescribed tracks within the CTR that are the more critical with respect to obstructions and terrain given that the aircraft can be operating in very low visibility.

There are some 43 prescribed instrument flight procedures published for Sydney Airport and covering all 6 runways (07/25, 16L/34R and 16R/34L). The tracks that are of most concern to the Barangaroo site are those associated with approaches to Runway 16L and departures from Runway 34R. Refer to Figure 9.

When assessing possible obstructions to aircraft prescribed tracks, navigational tolerances have to be applied to the track to cover instrument and pilot errors. Once the tolerance limit has been established a statutory 1nm basic lateral separation buffer must be applied. The tolerances to be applied and the 1nm buffer are described and promulgated in MOS Part 172.

During the AvLaw analyses of the H1 and C3 data for preparation of safety cases, most published tracks and tolerances with the prescribed lateral separation buffer were deemed to be clear of the Barangaroo site. Those deemed not clear are discussed below.

[4] *(Source: Sydney Airport Master Plan 2033)*

8. Assessment of Instrument Flight Procedures

Airservices provides the air traffic control services at Sydney Airport. In providing these services Airservices operates a number of radio navigation and radar surveillance systems to provide for safe and efficient aircraft operations. To meet safety aspects of traffic handling, Airservices has designed specific published instrument flight procedures for the processing of air traffic into and out of Sydney Airport. These procedures are documented within the Aeronautical Information Publication (AIP) and contain specific tracks and procedures to be followed for the safe conduct of flight operations. To meet the necessary performance requirements, airspace restrictions are established for each piece of navigational equipment and associated procedures. OLS and PANS OPS are prescriptive surfaces, however, Airservices can permit infringements of the protective airspace providing specific modelling and analysis of the proposal causes no degradation of safety in the conduct of the AIP published procedures. The protection of the navigation aid and procedures and radar restricted surfaces are mandated in CASR 139 and 171.

To support Airservices assessment and acceptance of intrusions on equivalent safety grounds by buildings and cranes to the OLS and potentially PANS OPS for Sydney Airport, AvLaw was retained by Lend Lease and by Crown Resorts to undertake detailed safety analyses and production of safety cases specific for two buildings contained within the Barangaroo Development site. These buildings are depicted within the site plan as H1 and C3. It is noted that that R4a and R4b are between C3 and the Hotel in height but are "shielded" by the Hotel. Refer to Appendix 1.

The Crown package including a safety case only covered the Hotel and was submitted to SACL on 6 June 2014 to seek initial aviation acceptance at the proposed heights. Advice is currently pending for a building height of 275 metres (277 metres when the BMU is deployed) and a final operating crane maximum height of 333 metres. Airservices advised AvLaw on 28 August 2014 of their favourable consideration at the proposed heights as their part of the process.

The Lend Lease package including a safety case was submitted to SACL on 14 May 2014 specific to C3 cranes, however, it contained updated details and a request for an updated approval to that previously given by the Department of Infrastructure and Regional Development for cranes on all commercial buildings. Advice is also pending with no change requested to building heights already approved by the Department of Infrastructure and Regional Development, but with the final operating maximum crane height increased from 256 metres to 286 metres. Airservices has also advised AvLaw on 28 August of their favourable consideration of the proposed heights as their part of the process.

The safety cases provide analyses and hazard identification processes, and identified no degradation in safety or new hazards to aviation created during and post construction at Barangaroo. All published air routes/instrument flight procedures have been assessed for safety against the proposed buildings and cranes at Barangaroo.

The evidence that these safety cases presented was that both buildings constructed to the planned heights would be contained within the designated safe operation area for air traffic control.

With respect to the published instrument procedures for Sydney Airport as depicted in AIP, the AvLaw Safety Cases revealed through detailed analyses and hazard identification workshops, that the safety of some published arrivals and departures tracks were potentially affected. One instrument approach (sector A DME Arrival procedure) may require a revision of the descent step, however, the hazard workshop panel believes that this arrival procedure would only be affected to the same extent as now because of the Sydney Centrepoint Tower, so the Barangaroo heights proposed was not considered a new hazard. This particular arrival procedure would be very rarely, if ever utilised by ATC due to the deleterious effect that the

procedure can have on traffic flows at Sydney Airport. The other procedures that are potentially affected are:- Standard Instrument Departures, SYDNEY FIVE DEPARTURE (RADAR) Runway 34R, Runway 34R ENTRA THREE, Runway 34R MARUB FOUR: Standards Terminal Arrival Routes, ILS-Z or LOC-Z RWY 34R missed approach, RNAV-Z RWY 34R missed approach, ILS-Z RWY 34R (PRM) missed approach, ILS-Y RWY 34R (PRM) missed approach. Again these procedures are only affected by the Barangaroo proposed heights to the same extent as exist now with current operating procedures catering for the Centrepoint Tower and are not considered new hazards.

Airservices responded on 28 August 2014 to the AvLaw submission and safety cases in respect to the crane operating heights for H1 and C3 with the following statement:

> *"Airspace Procedures*
>
> *With respect to procedures promulgated by Airservices in accordance with ICAO PANS-OPS and Document 9905, at the maximum heights mentioned above, the tower crane operations will not affect any sector or circling altitude, nor any instrument approach or departure procedure at Sydney Airport."*

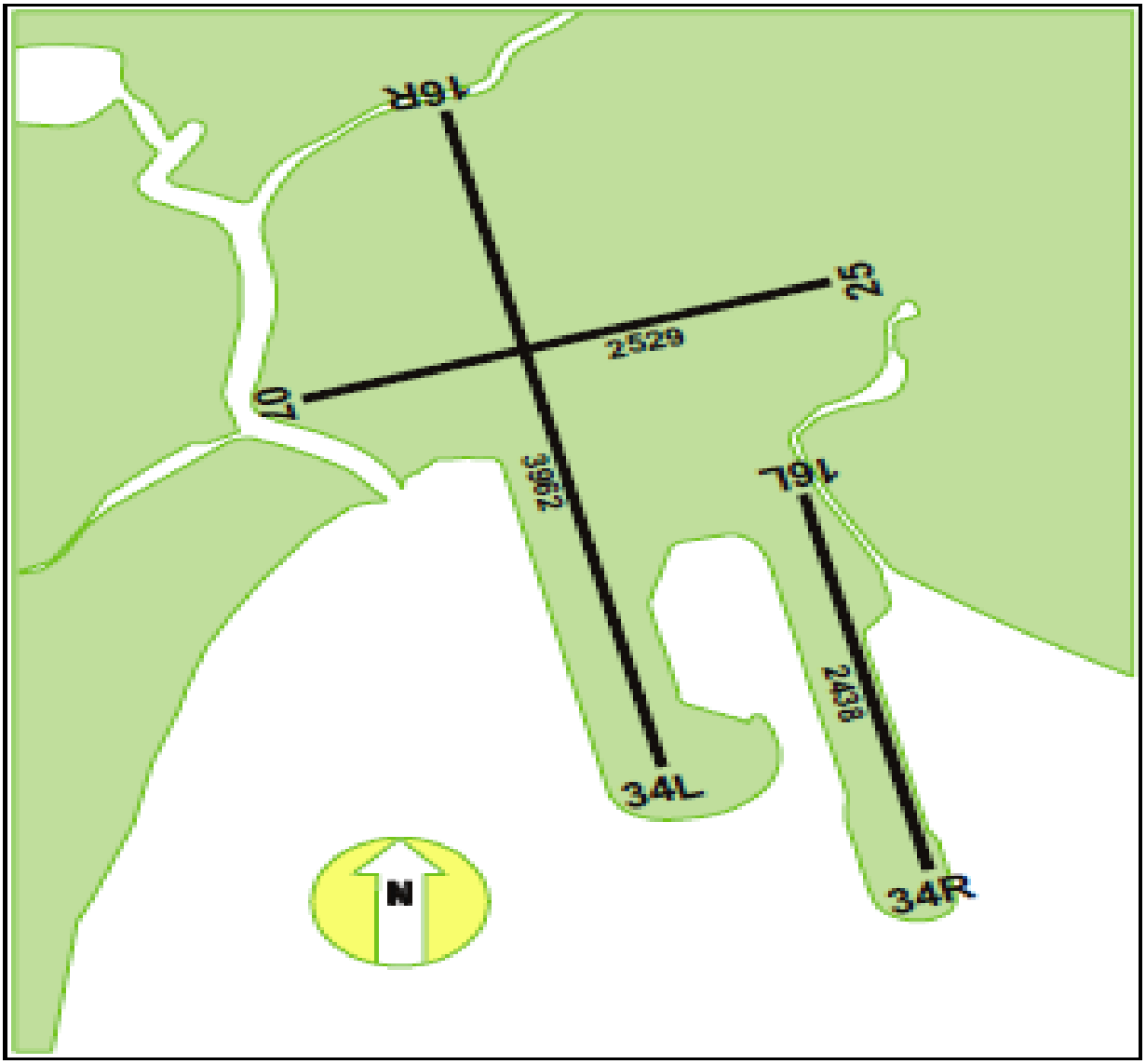


Figure 9: Disposition of Runway Alignment at Sydney Airport

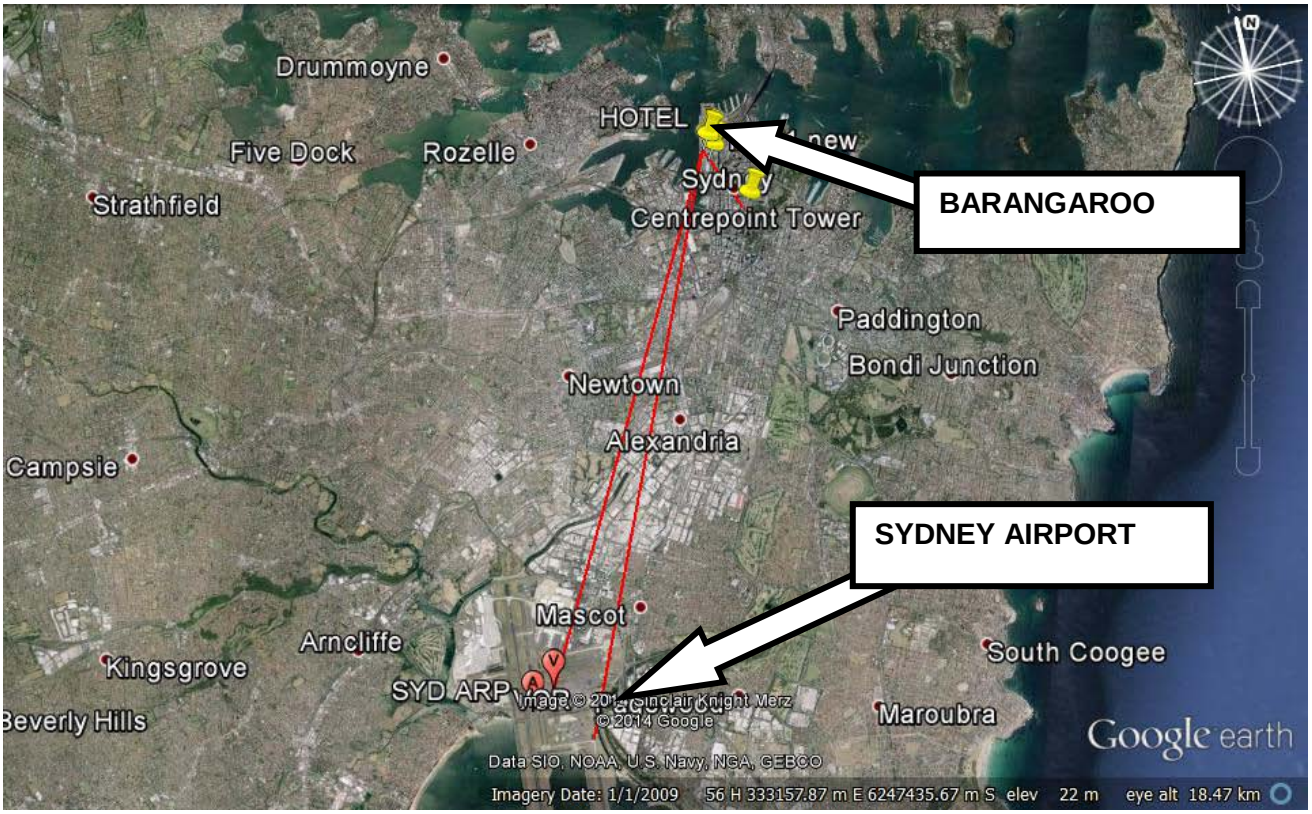


Figure 10: Location of Barangaroo with respect to Sydney Airport

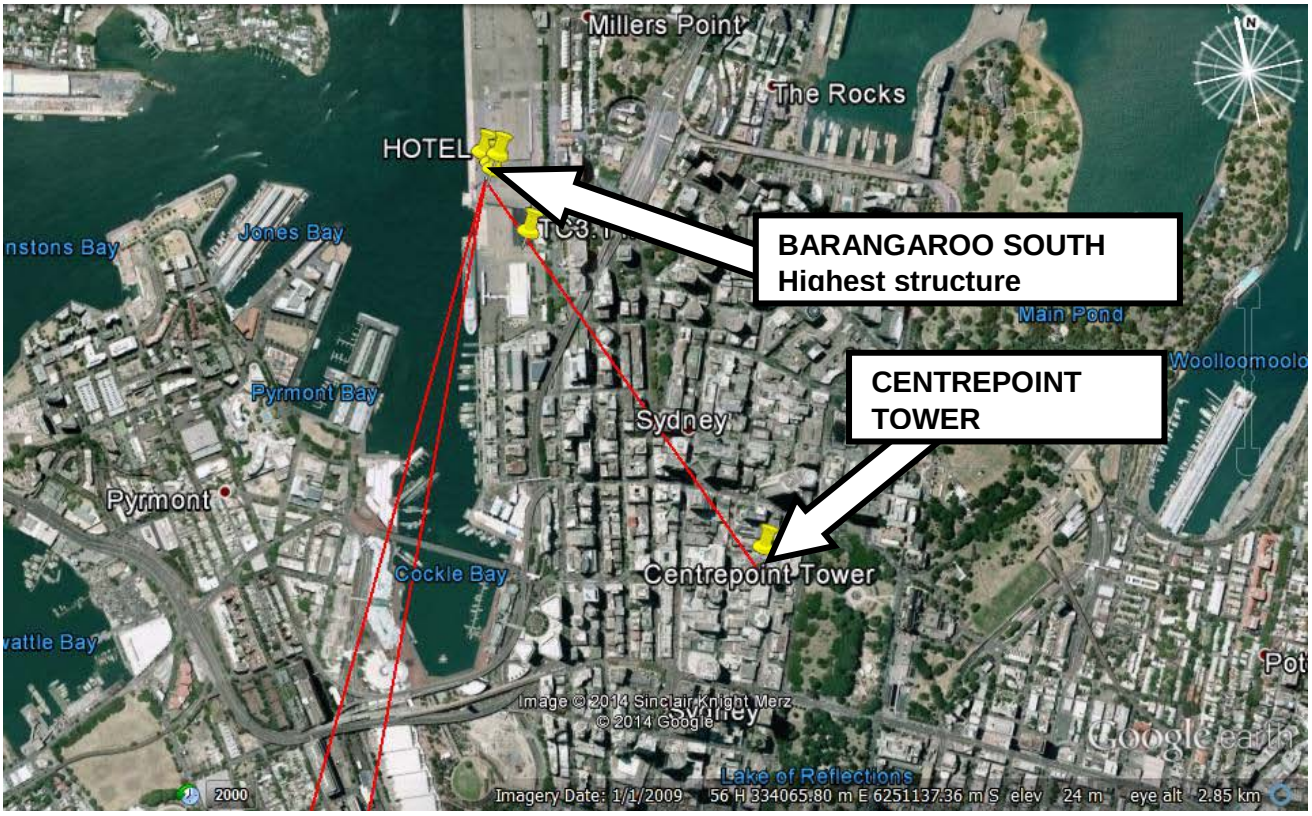


Figure 11: Location with respect to Centrepoint Tower

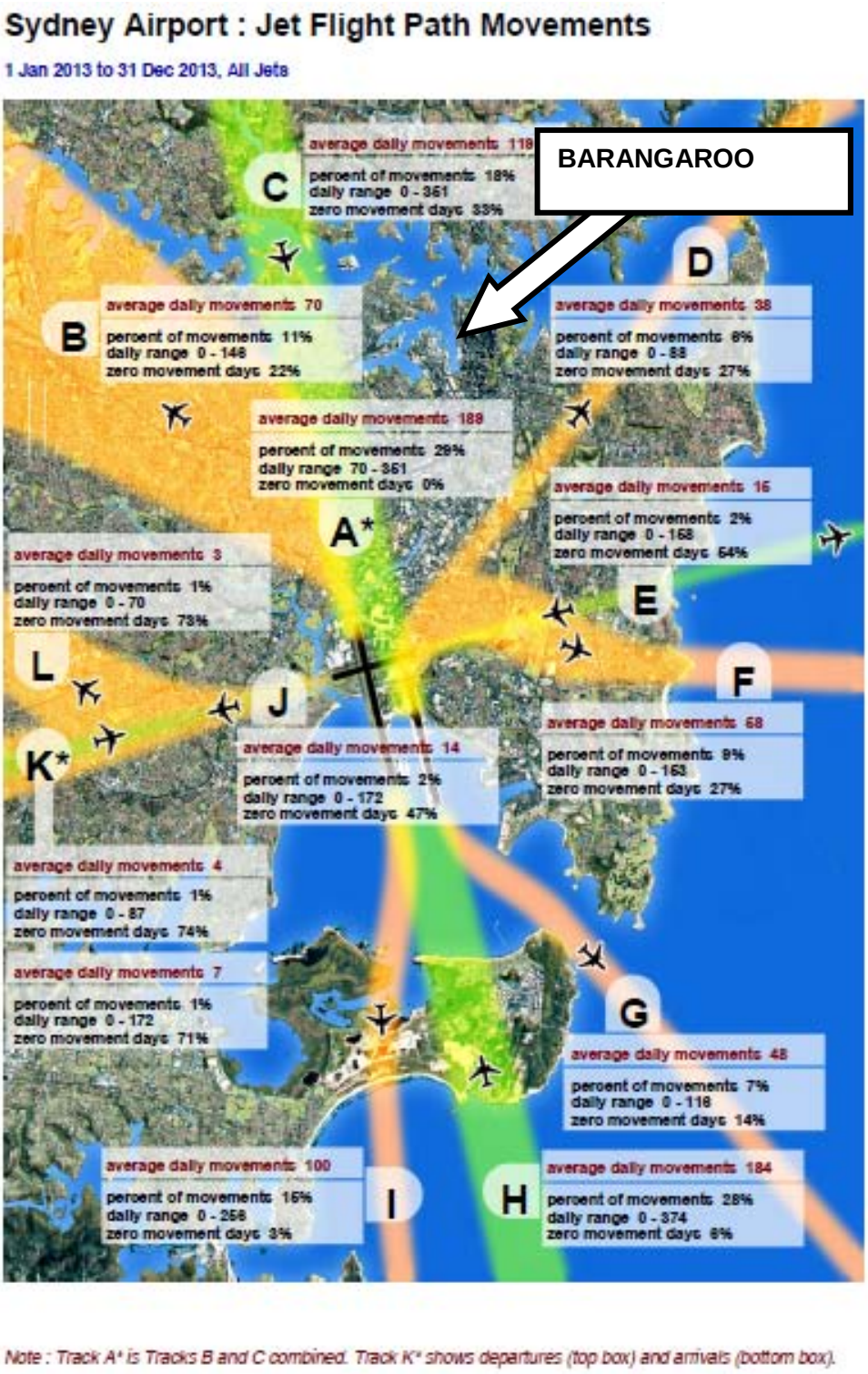


Figure 12: Disposition of all Sydney Jet Traffic 1 January to 31 December 2013[5]

[5] Source: Airservices Australia - March 2014

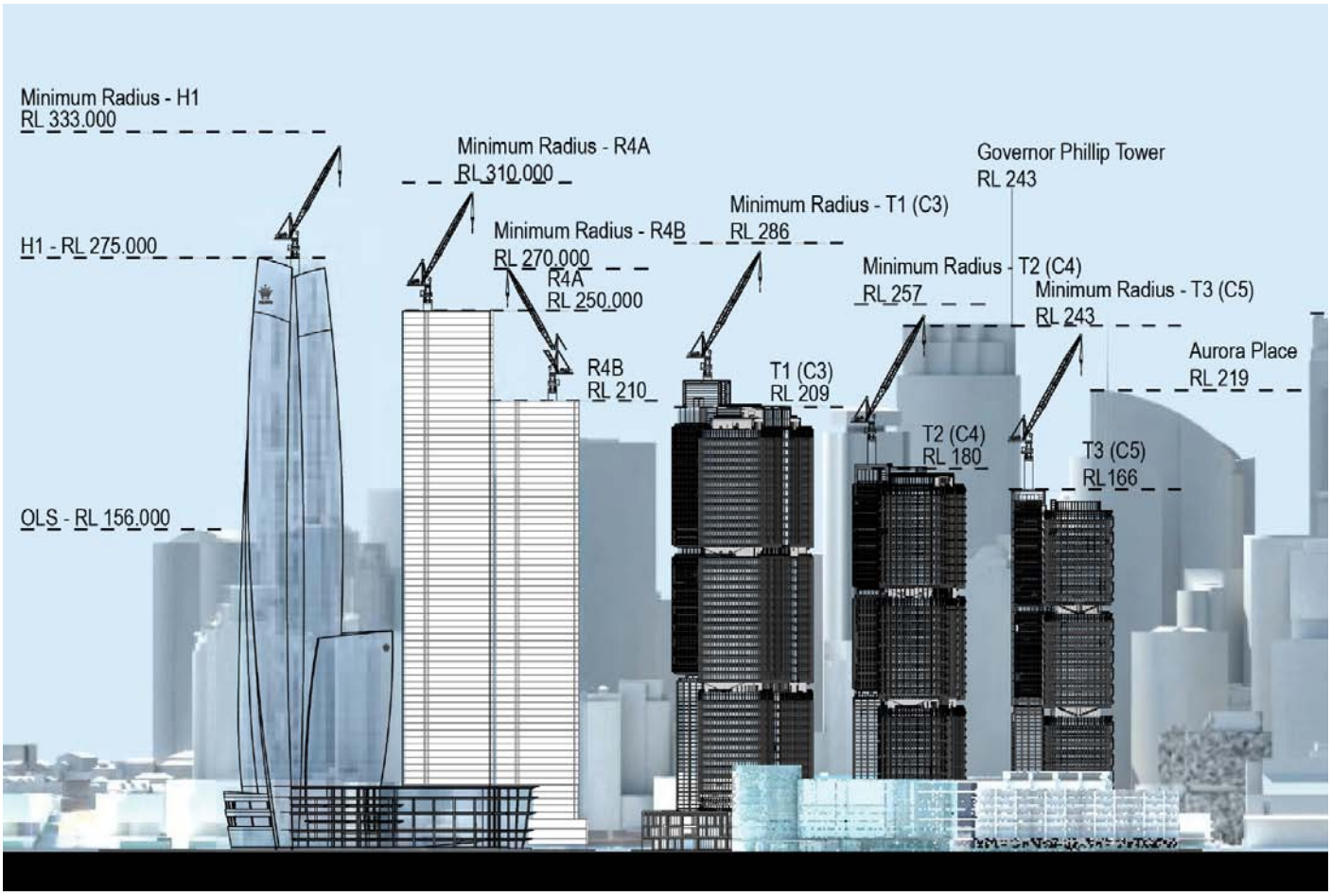


Figure 13: Building and crane heights

9. Description of the Breaches or Impacts for Stage 1B of Barangaroo South

The safety cases prepared by AvLaw for H1 and C3 contained detailed assessment of the published instrument flight procedures for Sydney Airport. In undertaking review of the Mod 8 documentation, AvLaw has determined that providing no buildings or cranes are located further west than that currently indicated, and providing the maximum height does not exceed 335 metres, that the documented Safety Case(s) assessment of the instrument flight procedures may be applied to the entire Barangaroo South site.

Stage 1B Residential, as does Stage 1A Commercial and Stage 1B Hotel, will penetrate the OLS for Sydney Airport. However, the current proposed timing of construction for Stage 1B Residential is after Stage 1B Hotel commencement which is in turn after Stage 1A.

The principle of "shielding" applies to obstacles that are in close proximity to other obstacles. The requirement as it would apply at Barangaroo is that if the Residential development did not penetrate a conical downward slope of 10% from the top of the Hotel, it would not be considered an obstacle for air navigation purposes as it would be "shielded" by the Hotel.

Providing initial aviation acceptance is given for the proposed heights of the Hotel and its construction crane, Stage 1B will be shielded by the crane on the Hotel while it is in place. The timing of the respective Stage 1B Hotel and Stage 1B Residential will have to be more closely addressed with respect to shielding. Notwithstanding, the Residential towers are not as high and are further east of the harbour than the Hotel, and are therefore considered likely to be given similar consideration to the Hotel for which AvLaw was advised on 28 August 2014 has received favourable assessment from Airservices.

10. Hazard Identification and Assessment During and Post Construction

The scope of this task required a qualitative and, where applicable, a quantitative safety assessment of hazards and subsequent risks identified to assist with application for conduct of a controlled activity at the Barangaroo Development site.

Any identified hazards to the safe operation of aviation activities associated with the building height(s) and crane operations were to be identified and recorded. In turn, any risk mitigation strategies developed and promulgated were to be documented and reviewed.

The hazard identification and risk assessment activities were conducted using the following methodology:

A detailed analysis of all prescribed departure and arrival procedures for Sydney Airport and Sydney Harbour aerial tourism activities was required to consider safety or operational impact of the building height and crane operation. The analysis included the assessment of climb gradients for departures and missed approaches for arrivals.

Independent modelling analysis of all the prescribed Departure and Approach Procedures (DAP) for Sydney was conducted by airspace and operations specialists.

Subsequently, a hazard identification workshop was conducted to refine the independent analyses and to seek further technical input to Mod 8 revised proposal to building and crane siting and activity height.

No hazards were identified that affect the operations of Sydney Airport or Sydney Harbour aerial tourism activities.

Promulgation of a NOTAM detailing the crane activity and any necessary lighting on the building or crane is a routine practice and therefore not prescribed in this document.

Requirements for the protection of airspace in the vicinity of aerodromes are specified in *Civil Aviation Safety Regulations* (CASR):

- Part 139 Aerodromes
    - Specifies the requirements for and dimensions of the Obstacle Limitation Surface (OLS) for the aerodrome. The impact on this airspace by the proposed development has been examined in this assessment.
- Part 172 Air Traffic Service Providers
    - Specifies the requirements for obstacle clearance for vectoring of aircraft under air traffic control (ATC) direction.
- Part 173 Instrument Flight Procedure Design
    - Specifies the design standards, including obstacle clearance, for instrument approach and departure procedures (IAP).

The Manual of Standards (MOS) 173 states:

> *1.1.1.2 The design standards are contained in:*
>
> *(a) international Civil Aviation Organisation (ICAO) Publication Doc 8168-OPS/611 Volumes 1 and 11, hereafter referred to as PANS-OPS: and*
>
> *(b) those included in this Manual of Standards (MOS), which are additional design standards not included in PANS-OPS, differences adopted by Australia, and new or developing standards.*
>
> *1.1.2. Differences between PANS-OPS Standards and those in the MOS*
>
> *1.1.2.1 Notwithstanding the above, where there is a difference between a standard prescribed in ICAO documents and the MOS,* ***the MOS standard shall prevail****."*

Similar statements regarding precedence of Regulations and MOS over ICAO Standards and Recommended Practices (SARPs) are made in MOS 172. This precedence has, in part, resulted in mixed application of imperial and metric units of measurement, and inaccurate conversion of 300m dimensions.

The use of *Section 1.1.2* of the MOS 173 is significant as international documentation and CASA use have interchanged an ICAO clearance of 300 metres with a "rounded" clearance of 1000 feet. That is not an accurate reflection of the ICAO requirement of 300 metres which converts to 984.28 feet, and 1000 feet converts accurately to 304.8 metres.

Discussions between AvLaw and CASA in January 2013 saw CASA indicate an inclination to accept the accurate conversion of 300 metres. CASA proposes to amend regulations to reflect this position. No particular issue arose during this assessment with respect to this conversion however the potential for disputes to arise with revised crane height activity could emerge and must be taken into consideration.

AvLaw further determined the European Organisation for the Safety of Air Navigation (Eurocontrol), in its document *Guidance Material for the Design of Terminal Procedures for Area Navigation (DME/DME B-GNSS, Bravo-VNAV & RNP-RNAV0)*[6], has fully adopted the ICAO PANS OPS requirement that specifies 300m or 984 feet.

The Hazard identification workshop conducted on 23 August 2014 considered the independent findings from analysis of all the SID, STAR and Instrument Approach published procedures. Particular attention was paid to any identified missed approach issues related to runway 34R.

Further analysis revealed that the proposed Hotel site was approximately 0.65NM from the existing Centrepoint Tower in the Sydney central business district. The Centrepoint structure has a published height of 327 metres or 1073 feet.

The panel assessed that the ATC procedures had been amended to incorporate the Centrepoint Tower which is the highest obstruction in the Sydney CBD area and 0.65 NM from the proposed Hotel Building H1. The height is rounded up to the nearest 100 feet delivering an obstruction height of 1100 feet. When the 1000 feet separation buffer is added it determines a maximum obstruction height of 2100 feet for aircraft separation aspects.

[6] *Edition 3.0 March 2003*

The highest structure proposed at Barangaroo is the Hotel Building with its temporary construction crane to a maximum height of 333 metres or 1092 feet. This height is also rounded up to the nearest 100 feet delivering the same obstruction height of 1100 feet. When the 1000 feet separation buffer is added it also determines a maximum obstruction height of 2100 feet for aircraft separation aspects. The height of 2100 feet is the lowest useable safe level for aircraft operations over the CBD area.

AvLaw has identified that there are no new hazards introduced by the construction development with temporary construction cranes to a maximum height of 333 metres as proposed, or ongoing utilisation to the lower maximum proposed building height of 275 metres (277 metres when the BMU is deployed) at Barangaroo South.

11. Lend Lease Post Planning Approval Process

Aviation approval is required in respect to all three stages of development at Barangaroo South. Such approval is required for objects that penetrate the OLS of 156 metres and/or PANS-OPS surfaces. Each of the three stages (1A - Commercial, 1B - Residential, and 1B - Hotel) at Barangaroo South has development that will penetrate the OLS.

Aviation acceptance has been sought by Lend Lease on two occasions for building and crane heights associated with Stage 1A - Commercial at Barangaroo South. Acceptance was advised to Lend Lease in respect to the first request to a maximum height of 259 metres, and is currently pending in respect to the second request to 286 metres which contained a safety case prepared by AvLaw. The Airservices element of the second request was given on 28 August 2014. Lend Lease need to follow-up on final all inclusive advice from the Department of Infrastructure and Regional Development and provide any updated plans to SACL for their information.

Initial aviation acceptance has also been sought by Crown for building and temporary crane heights associated with the Hotel at Barangaroo South. Advice is currently pending for a temporary crane maximum height of 333 metres. The Airservices element of the process was given on 28 August 2014. Again, the all inclusive advice from the Department of Infrastructure and Regional Development needs to be followed-up.

Detail of the residential buildings and cranes for Stage 1B Residential have not yet been provided for aviation acceptance.

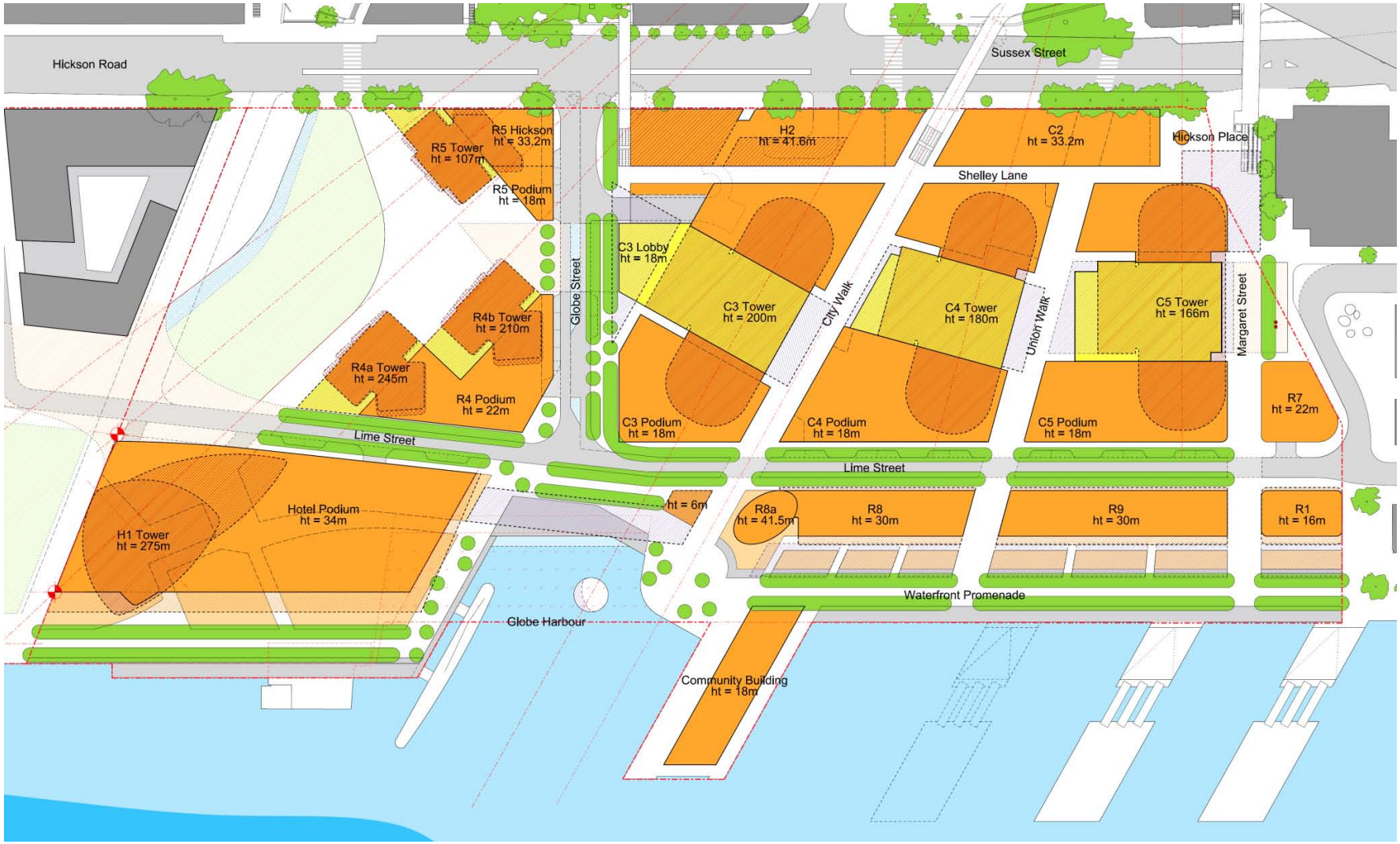
The maximum heights of the highest residential tower and construction crane are 250 metres and 310 metres respectively. The Hotel Building is currently scheduled for construction prior to the Residential Towers and the principles of "shielding" will result in the Residential Towers not being deemed an obstacle, however, depending on the actual timing of construction some controls will likely be imposed in the aviation approval. Lend Lease need to seek initial aviation acceptance for these Stage 1B Residential buildings and construction cranes through SACL.

The process for gaining initial aviation acceptance is to make written submission to SACL at CADDServices@syd.com.au The submission must contain details of building and crane heights that are proposed to penetrate the 156 metre OLS for Sydney Airport including coordinates, heights and proposed timing. Layout plan(s) showing the relativity to other buildings in the area should also be provided with the application.

AvLaw experience with recent submissions is that sufficient lead time will be required to permit SACL, Airservices, CASA, and the Department of Infrastructure and Regional Development to conduct their respective assessment. Indicative timing to receive all inclusive advice for past approvals is 7 months from the date of application. SACL is the coordinating authority for all submissions in the vicinity of Sydney Airport.

Appendix 3 contains a schedule for aviation submissions in respect to Barangaroo South.

12. APPENDIX 1 – Barangaroo South Indicative Master Plan (Mod 8)



Barangaroo South Concept Plan


RL 107
RL 33.2
RL 22
RL 210
RL 250
RL 22
RL 22
RL 40
RL 250
RL 110
RL 275
RL 40
RL 40
RL 40
RL 33.2
RL 33.2
RL 8
RL 209
RL 180
RL 180
PODIUM
RL 22
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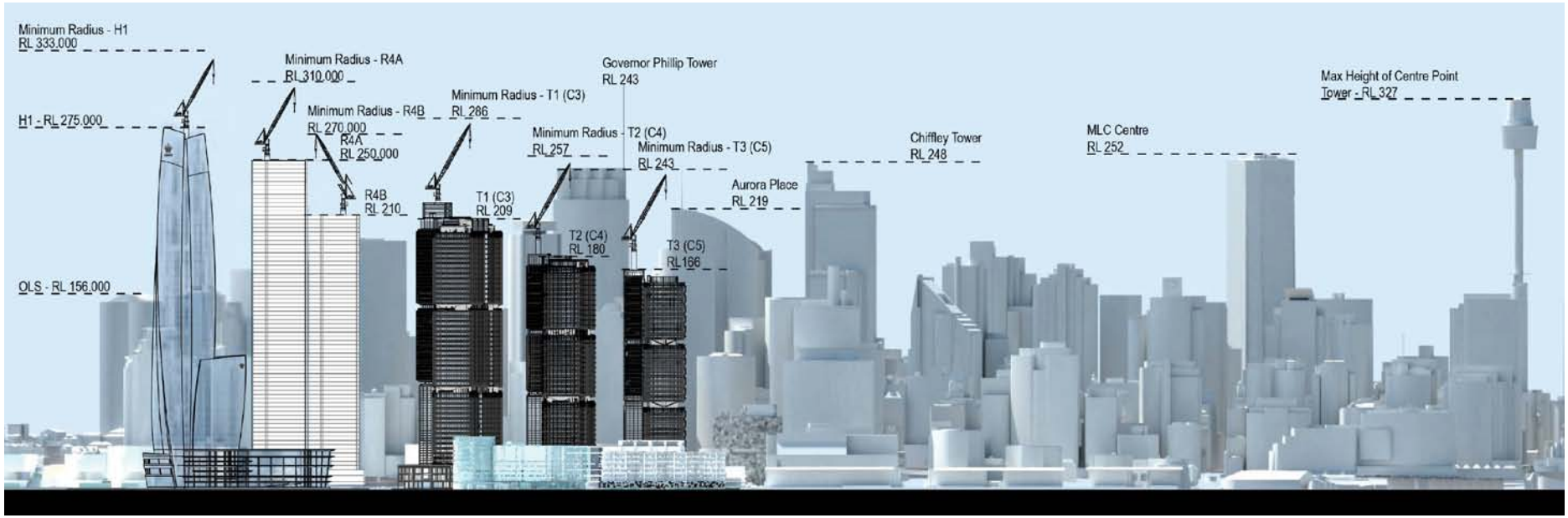
RL 22
PODIUM
RL 22
RL 25
RL 41.5
RL 33.3
RL 33.3
RL 21
Lend Lease
GRAHAM W JONES
Principal Architect
FRAIA NSW ARB 4005
BARANGAROO SOUTH
STAGE 1
MOD 8 MASTERPLAN
REVISED BUILDING ENVELOPES
Scale 1:500 @ B1 1:1250 @ A3
0
25
50M
Dwg. No. B10_AMP_08_0071
Date 10 Sep 2014 Revision 07

13. APPENDIX 2 – Barangaroo South Elevation Drawings



Elevation indicating maximum building and crane heights

14. APPENDIX 3 – Schedule for Aviation Submissions

STATUS OF SUBMISSIONS AS AT 28 AUGUST 2014						
	Submission to SACL	**Assessment by**			**Advice letter received from the Department**	**Comment**
		SACL	**CASA**	**Airservices**		
Stage 1A – Commercial						
Initial submission	YES	YES	YES	YES	YES	Acceptance up to 259 metres requested
Second submission	YES	YES	Pending	YES	Pending	Acceptance up to 286 metres requested
Stage 1B - Residential	NO	-	-	-	-	Acceptance up to 310 metres required
Stage 1B - Hotel	YES	YES	Pending	YES	Pending	Acceptance up to 333 metres requested