TOGA Central, 2 & 8A Lee St, Haymarket — Aeronautical Impact Assessment

STRA-AV-REP-00000001[A] (v1.2)

15-Jul-2022

strategic airspace

Prepared by Consultants:

Strategic Airspace Pty Limited
ABN: 60 097 857 415
PO Box 253, Bondi Junction NSW 1355
Australia
Tel: +61 2 **8957 2278**

Email - Attn: Cathy.PakPoy@StrategicAirspace.com

Client:

TOGA Pty Ltd
ABN: 27 000 926 947
Level 5, 45 Jones St
Ultimo NSW 2007
Australia

Document Control

Report: **STRA-AV-REP-00000001[A] (v1.2)** *StratAir Doc:* 22.004-01-001

Document Title: **TOGA Central, 2 & 8A Lee St, Haymarket — Aeronautical Impact Assessment**

Purpose / Abstract: *This aeronautical impact assessment (AIA) study has been prepared for TOGA Group, to accompany a detailed State Significant Development (SSD) Development Application (DA) for the mixed-use redevelopment proposal at TOGA Central, located at 2 & 8A Lee Street, Haymarket (the site). The site is also known as 'Site C' within the Western Gateway sub-precinct of the Central Precinct.*

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the SSD DA (SSD 33258337). It also assesses the Prescribed Airspace height constraints over the site, which takes into account existing operations and forecast changes referenced in the Sydney Airport Master Plan 2039, the Obstacle Limitation Surfaces and the PANS-OPS procedures published by Airservices Australia. These airspace constraints are as defined in the Airports (Protection of Airspace) Regulations 1996 (APAR).

In response to the specific issues raised in the SEARs:

- *No Helicopter Landing Site (HLS) is included as part of the development proposal and there is no nearby HLS that would be adversely affected by the development.*
- *The development would not adversely affect visual helicopter routes that track over Central Station.*

Further, based on the development plans, overall airspace impact findings are as follows:

- *The development would infringe Sydney Airport's Obstacle Limitation Surfaces (OLS) — triggering a requirement under the APAR to seek approval of the development as a Controlled Activity from the Commonwealth Department of Infrastructure, Transport, Regional Development and Communications (DITRDC).*
- *As the maximum development height would not infringe the constraining surface height (in this case, the RTCC surface which is lower than the PANS-OPS procedure surfaces), an application is technically approvable under the APAR.*
- *Any approval for the development under the APAR is highly likely to include a condition for obstacle lighting as a standard safety mitigation.*
- *Separate approvals will be required in the future for the cranes to be used for construction. However, because of The maximum height of the development, the potential future impact of cranes required for construction may be considered as a factor by DITRDC when evaluating the feasibility of constructing the proposed building prior to approving an APAR application for the building itself.*

In summary, the proposed tower building would not adversely affect the safety, regularity or efficiency of current and future air transport operations to and from Sydney Airport. The report concludes that the proposed mixed-use redevelopment is suitable and warrants approval subject to an airspace height approval under the APAR.

Change History

Version	*Versn Date*	*Version By*	*QA By*	*Version / Change Description*
1.0 DRAFT	14-Jun-2022	C. Pak-Poy	P. Haubourdin / J.A. McCarthy	Initial draft for client review
[A] (v1.1)	28-Jun-2022	P. Haubourdin	C. Pak-Poy	Update of plans (including final heights) & amendment of standard planning text.
[A] (v1.2)	15-Jul-2022	P. Haubourdin	C. Pak-Poy	Final roof heights & change of Development Boundary above RL21.

Distribution Control

Legend:			
Uncont	Uncontrolled Document	*StratAir*	Strategic Airspace
Client	TOGA Group	*Airservices*	Airservices Australia
APT,	Sydney Airport	*DITRDC*	Department of Infrastructure, Transport, Regional Development & Communications
SACL	Sydney Airport Corporation Ltd		
CASA	Civil Aviation Safety Authority		

Issue Version	*Issue Date*	*Issue Purpose / Description*	*Copy No*	*Copy Recipient*
1.0 Draft	14-Jun-2022	Distribution to the client for review	Uncont	StratAir Intranet, Client
[A] (v1.1)	28-Jun-2022	Final for Client Use	Uncont	StratAir Intranet, Client
[A] (v1.2)	15-Jul-2022	Release for SSDA	Uncont	StratAir Intranet, Client

Report Authors

Author	*Credentials*
Cathy Pak-Poy *Lead Consultant*	The Certifying Author of this report, Cathy Pak-Poy, has 30 years' experience as a specialist airspace consultant, including 9 years' experience as a Technical Advisor for Australia to the International Civil Aviation Organisation's Instrument Flight Procedures Panel, which was responsible for the international OLS, PANS-OPS and PBN standards. She has also consulted to Airservices, CASA and the Royal Australian Air Force (and trained some of their personnel), and has consulted to and trained civil and military aviation agencies, airports and airlines overseas. She held a Delegation for the Civil Aviation Safety Authority of PNG for two years and is the designated Chief Procedure Designer for the Part 173 design and validation approvals held by Strategic Airspace in the Republic of South Africa
John McCarthy *Senior Consultant*	A director of Strategic Airspace, with a background in mathematics, architecture, computer-aided design and IT. John has over 30 years' experience as a specialist airspace consultant, with deep technical expertise in OLS, PANS-OPS and PBN standards and application. Previously consulted to Airservices Australia, CASA, the RAAF, airports and private clients in Australia, as well as to EUROCONTROL and other international civil and military aviation agencies.
Paul Haubourdin *Senior Consultant*	Paul has conducted PANS-OPS instrument flight procedure design projects and many aeronautical impact assessments for StratAir. Previous experience includes the roles of Principle IFP Designer and Safety Investigator for Airways Corporation and Group EAD in NZ, and Manager Obstacle Assessments for the Belgian Air Force. He also has experience as an Air Traffic Controller and is a qualified pilot (CPL Helicopters, and ATPL Fixed Wing Belgium)

Contents

Document Control ..... **iii**
Change History iv
Distribution Control iv
Report Authors iv

1. Executive Summary **1**

2. Introduction **4**

3. The Site **7**

4. Methodology **9**
4.1 Airspace Regulations 9
4.2 Prescribed Airspace 9
4.3 About Airspace Heights 10

5. Assessment and Findings **11**
5.1 Aeronautical Impact Context 11
5.1.1 Reference Points used for Analysis 12
5.1.2 Site in relation to Sydney Airport 13
5.2 Analysis 15
5.2.1 OLS Analysis 15
5.2.2 PANS-OPS Analysis 16
A "Area" Procedures 18
B Instrument Approaches & Missed Approaches 18
C Departures 19
5.2.3 Other Assessment Considerations 19
A Radar Terrain Clearance Chart (RTCC) / Minimum Vector Altitude (MVA) Surface 20
B HLS Status & Helicopter Impact (SEARs Study Requirement) 21
5.2.4 Airspace Analysis Summary 23
5.3 Crane Considerations 24

6. Cumulative Impacts **26**

7. Mitigation Measures **26**

8. Conclusion **27**

Tables

Table 1-1 — Summary — Airspace Height Constraints 2
Table 2-1 — SEARs Cross-Reference Index 5
Table 2-2 — Other Non-SEARs Airspace Study Requirements Cross-Reference Index 5
Table 5-1 — Assessment Reference Locations & Coordinates 12
Table 5-2 — Site Reference Point (Pt.Ref) – Location in Relation to Sydney Airport 14
Table 5-3 — OLS Height Impact & APAR Application Implications 16
Table 5-4 — Sydney (YSSY) PANS-OPS Height Limit Summary 17
Table 5-5 — Summary of Limiting PANS-OPS Approach & Missed Approach Height and Envelope Height Clearances 19
Table 5-6 — Summary of Limiting PANS-OPS Departure Surface Heights & Envelope Height Clearances 19
Table 5-7 — Other Assessable Height Limitations (including the RTCC & SHLS Impact) 19
Table 5-8 — Proposed Envelope in relation to the RTCC Surface Height 20
Table 5-9 — Analysis Summary — Airspace Height Constraints 23
Table 5-10 — Airspace Surfaces & Potential Crane Impact 24
Table 6-1 — Cumulative Impact Assessment 26
Table 8-1 — Appendix: PANS OPS Instrument Flight Procedure Charts for Sydney Airport (AIP Amendment 171 – Effective 16-Jun-2022 to 07-Sep-2022) 2
Table 8-2 — OLS Height Constraints for All Reference Points 2
Table 8-3 — Maximum Surface Heights & Clearances for All Reference Points 3

Figures

Figure 1-1 — Site Location in relation to Sydney Airport (Small Format) 1
Figure 3-1 — Site Identification Plan 7
Figure 5-1 — West and Southern Elevations 11
Figure 5-2 — Roof Plan 12
Figure 5-3 — Key Reference Points for the Aeronautical Assessment 13
Figure 5-4 — Proposed Development Site in relation to Sydney Airport (Large Format) 14
Figure 5-5 — Site in relation to Sydney Airport's OLS 15
Figure 5-6 — Site in relation to Sydney Airport's PANS-OPS (Approach) Surfaces 17
Figure 5-7 — Radar Terrain Clearance Chart (RTCC) Height Constraint 21
Figure 5-8— Overhead view of the Proposed Development in relation to the Harbour Bridge Five Helicopter Route 22
Figure 5-9— 3D view of the Harbour Bridge Five Helicopter Route 22

Appendices

Appendix 1 — Abbreviations

Appendix 2 — PANS-OPS Procedures

Appendix 3 — Analysis Summary for All Reference Points

1. Executive Summary

This Aeronautical Impact Assessment (AIA) report has been prepared by Strategic Airspace (StratAir) to accompany a detailed State Significant Development (SSD) Development Application (DA) for the mixed-use redevelopment proposal at TOGA Central, located at 2 & 8A Lee Street, Haymarket (the site). The site is legally described as Lot 30 in Deposited Plan 880518 and Lot 13 in Deposited Plan 1062447. The site is also described as 'Site C' within the Western Gateway sub-precinct of the Central Precinct.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the SSD DA (SSD 33258337). The SEARs and other standard Aeronautical Impact Assessment requirements are referenced in Table 2-1 (p5) and Table 2-2.

Located at the southern end of the Sydney CBD, the site is only affected by the prescribed airspace of Sydney Airport; other airports are too remote to have any impact. The report examines the current airspace height constraints overhead the site as defined by the *Airports (Protection of Airspace) Regulations 1996* (APAR) and which would:

a) Trigger the requirement to apply for an airspace height approval.
b) Constrain the maximum permissible building envelope height(s) and future crane height(s).
c) Potentially influence airspace height application evaluation and approval conditions, including possible mitigations that may be required.

The site is located approximately 7.32 km (3.95 Nautical Miles (NM)) north-north-east of the Aerodrome Reference Point (ARP) of Sydney Airport, as shown in Figure 1-1 below.

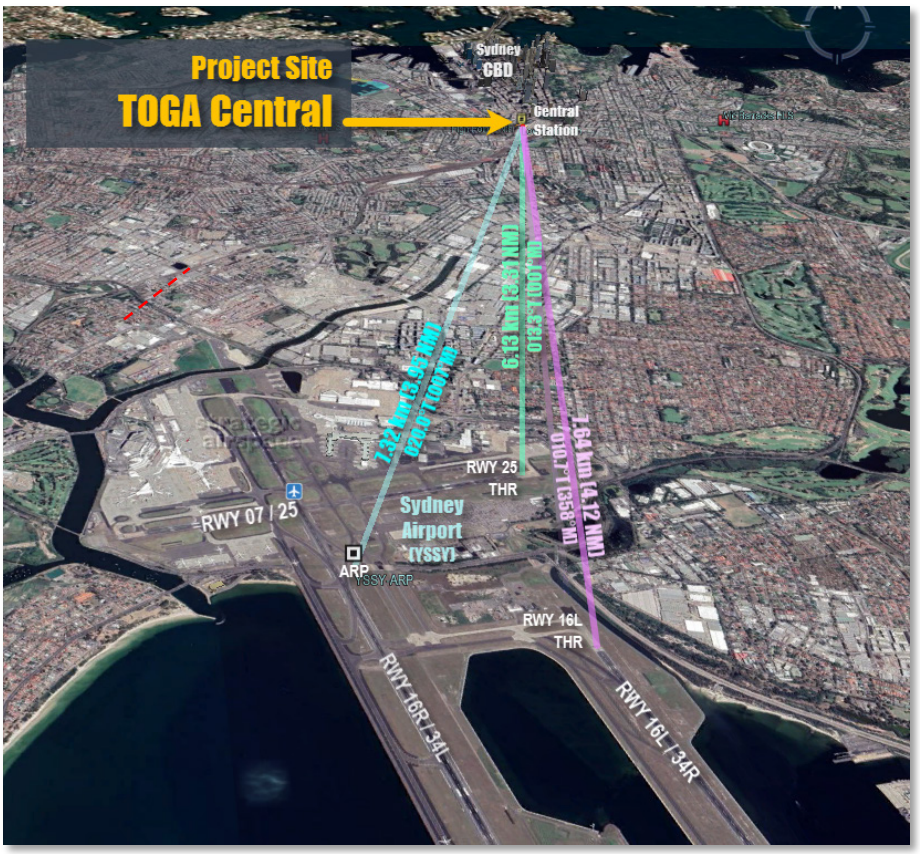


Figure 1-1 — Site Location in relation to Sydney Airport (Small Format)

The critical airspace constraints overhead the site are summarised in the table below.

Table 1-1 — Summary — Airspace Height Constraints

Height Limits (m AHD)	*Height Limit Detail*	*Comment*
206.280	**Max Assessment Height**	This is the maximum operating height of the Building Maintenance Unit (BMU) which is mounted on the roof of the building. As the BMU operating zone covers the full extent of the tower building, it is used as the maximum assessment height.
~143.79 to ~146.37	**OLS CONICAL Surface**	As **the proposed envelope** would infringe the OLS, it **would require a height application under the Airports (Protection of Airspace) Regulations 1996 (APAR) to be approved by the Department of Infrastructure, Transport, Regional Development & Communications (DITRDC) prior to construction**. Infringement of the OLS in this case is not considered a barrier to approval of an application under the APAR.
243.84	**Radar Terrain Clearance Chart (RTCC)** Minimum Vector Altitude (MVA) 1800ft Sector	**The site lies within the lateral limits of an RTCC surface which has an effective height limit of 243.84m AHD.** See Table 5-8 (p20) for details. This surface protects the 1800ft MVA sector which is used by Air Traffic Controllers (ATCs) to vector aircraft. For this reason, **this is considered the most limiting height for the proposed development at the project site.**
> 272	PANS-OPS Surfaces (Approach & Departures)	The Missed Approach for the ILS SA CAT I procedure to RWY 34R is the most constraining over the reference point, sloping up towards the NE. See Table 5-10 (p24) for details. The relevant PANS-OPS surface heights would most likely be considered the absolute maximum height for crane operations used for construction of the building, subject to approval of Sydney Airport, the aviation stakeholders and DITRDC. Separate applications under APAR for crane operations would need to be submitted and approved prior to operations of cranes but are not required to secure an approval under APAR for the proposed building development itself.
Higher or N/A	Other Surfaces & Helicopter Route	The site is outside the extent of other protection surfaces or the height limits are higher, and so considered Not Applicable.

In response to the specific issues raised in the SEARs:

- No Helicopter Landing Site (HLS) is included as part of the development proposal and there is no nearby HLS that would be adversely affected by the development.
- The development would not adversely affect visual helicopter routes that track over Central Station.

Other key findings are:

- Because the proposed envelope would exceed the OLS, an "*airspace application*" for the approval of the development as a *Controlled Activity* under the Airports (Protection of Airspace) Regulations 1996 would need to be submitted to DITRDC. Such applications must be submitted via Sydney Airport. Under the APAR an approval is required prior to the start of construction, but under most local planning regulations approval is likely to be required prior to (or as a consent condition of) approval of a Development Application.
- As the maximum development height would not infringe the constraining surface height (in this case, the RTCC surface), the application is technically approvable under the APAR.

- The cumulative effect of this development in relation to other Western Gateway and Central Precinct buildings will not have any measurable adverse impact on aviation safety or the approvability under the APAR.
- Any approval for the development under the APAR is highly likely to include a condition for obstacle lighting as a standard safety mitigation.

Given the above, we certify that the development as proposed would not have an adverse impact on the safety, regularity or efficiency of current or future air transport operations to and from Sydney Airport. We anticipate no barrier to approval under the APAR of an application for the proposed building envelope at the maximum planned height, subject to the implementation of any mitigation measures that may be recommended by the Civil Aviation Safety Authority (CASA) — such as the installation and maintenance of obstacle warning lights — for the purposes of an airspace height approval of an application under the Airports (Protection of Airspace) Regulations 1996 (APAR).

The report concludes that the proposed mixed-use redevelopment is suitable and warrants approval subject to an airspace height approval under the APAR.

2. Introduction

This report has been prepared to accompany a SSD DA for the for the mixed-use redevelopment proposal at TOGA Central, located at 2 & 8A Lee Street, Haymarket.

The Minister for Planning, or their delegate, is the consent authority for the SSD DA and this application is lodged with the NSW Department of Planning and Environment (DPE) for assessment.

The purpose of the SSD DA is to complete the restoration of the heritage-listed building on the site, delivery of new commercial floorspace and public realm improvements that will contribute to the realisation of the Government's vision for an iconic technology precinct and transport gateway. The application seeks consent for the conservation, refurbishment and adaptive re-use of the Adina Hotel building (also referred to as the former Parcel Post building (fPPb)), construction of a 45-storey tower above and adjacent to the existing building and delivery of significant public domain improvements at street level, lower ground level and within Henry Deane Plaza. Specifically, the SSD DA seeks development consent for:

- Site establishment and removal of landscaping within Henry Deane Plaza.
- Demolition of contemporary additions to the fPPb and public domain elements within Henry Deane Plaza.
- Conservation work and alterations to the fPPb for retail premises, commercial premises, and hotel and motel accommodation. The adaptive reuse of the building will seek to accommodate:
  - Commercial lobby and hotel concierge facilities,
  - Retail tenancies including food and drink tenancies and convenience retail with back of house areas,
  - 4 levels of co-working space,
  - Function and conference area with access to level 6 outdoor rooftop space, and
  - Reinstatement of the original fPPb roof pitch form in a contemporary terracotta materiality.
- Provision of retail floor space including a supermarket tenancy, smaller retail tenancies, and back of house areas below Henry Deane Plaza (at basement level 1 (RL12.10) and lower ground (RL 16)).
- Construction of a 45-storey hotel and commercial office tower above and adjacent to the fPPb. The tower will have a maximum building height of RL 202.28m, and comprise:
  - 10 levels of hotel facilities between level 10 – level 19 of the tower including 204 hotel keys and 2 levels of amenities including a pool, gymnasium and day spa to operate ancillary to the hotel premises. A glazed atrium and hotel arrival is accommodated adjacent to the fPPb, accessible from Lee Street.
  - 22 levels of commercial office space between level 23 – level 44 of the tower accommodated within a connected floor plate with a consolidated side core.
  - Rooftop plant, lift overrun, servicing and BMU.
- Provision of vehicular access into the site via a shared basement, with connection points provided to both Block A (at RL 5) and Block B (at RL5.5) basements. Primary access will be accommodated from the adjacent Atlassian site at 8-10 Lee Street, Haymarket, into 4 basement levels in a split-level arrangement. The basement will accommodate:
  - Car parking for 106 vehicles, 4 car share spaces and 5 loading bays.
  - Hotel, commercial and retail and waste storage areas.
  - Plant, utilities and servicing.

- Provision of end of trip facilities and 165 employee bicycle spaces within the fPPb basement, and an additional 71 visitor bicycle spaces within the public realm.
- Delivery of a revitalised public realm across the site that is coordinated with adjacent development, including an improved public plaza linking Railway Square (Lee Street), and Block B (known as 'Central Place Sydney'). The proposal includes the delivery of a significant area of new publicly accessible open space at street level, lower ground level, and at Henry Deane Plaza, including the following proposed elements:
  - Provision of equitable access within Henry Deane Plaza including stairways, ramp access and a publicly accessible lift.
  - Construction of an elevated pavilion within Henry Deane Plaza at RL21.
  - Landscaping works within Henry Deane Plaza and along Lee Street.
- Utilities and service provision.
- Realignment of lot boundaries.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 17 December 2021 and issued for the SSD DA. Specifically, this report has been prepared to respond to the SEARs requirement issued below.

Table 2-1 — SEARs Cross-Reference Index

Item	*Description of Requirement*	*Section Reference (This Report)*
25 Aviation	• If the development proposes a helicopter landing site (HLS), assess its potential impacts on the flight paths of any nearby airport, airfield or HLS. • If the site contains or is adjacent to an HLS, assess the impacts of the development on that HLS.	Section 5.2.3B HLS Status & Helicopter Impact (SEARs Study Requirement), p21 Figure 5-8, p22 and Figure 5-9, p22

Additional factors that are often specified as Study Requirements for AIAs that accompany DAs, together with a cross-reference index to where these requirements are attended to in the report, are noted below in Table 2-2 — Other Non-SEARs Airspace Study Requirements Cross-Reference Index.

Table 2-2 — Other Non-SEARs Airspace Study Requirements Cross-Reference Index

Item	*Description of Requirement*	*Section Reference (This Report)*
Scope & Requirement	Advise on measures, if necessary, to ensure the development does not have an adverse impact on the operations of Sydney Airport	Section 7 Mitigation Measures, p26
	Certify that, subject to any recommended measures, the development will not have an adverse impact on the operations of Sydney Airport	Section 1 Executive Summary, p1 Section 8 Conclusion, p27

Item	*Description of Requirement*	*Section Reference (This Report)*
Considerations	Demonstrate consideration of:	
	• The Sydney Airport Master Plan	Section 4.2 Prescribed Airspace, p9
	• Appropriate mapping to demonstrate the OLS, PANS-OPS and other relevant height limitations related to Sydney Airport and flight operations over the site	Section 5 Assessment and Findings: Section 5.2 Analysis, p15
	• Pathways required to secure airspace-related height approval	Section 4.1 Airspace Regulations, p9

3. The Site

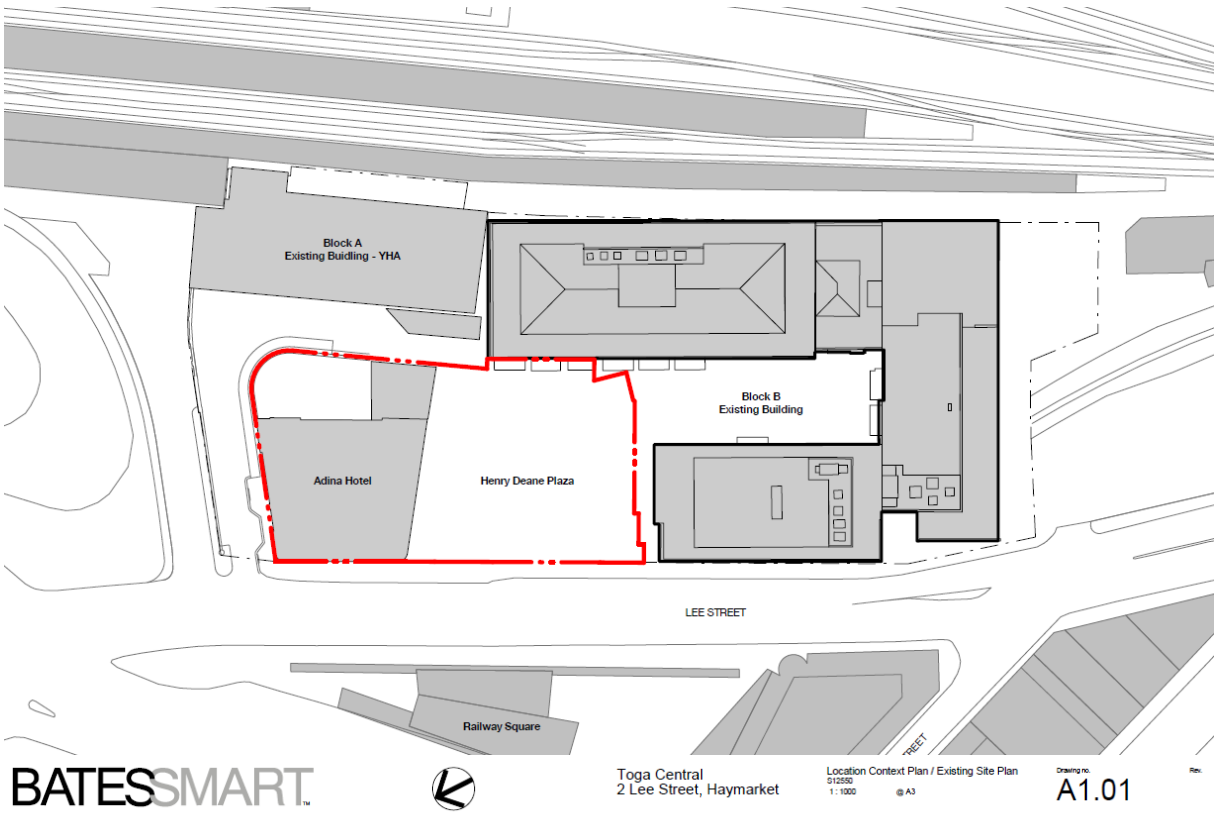
The site is located within the City of Sydney Local Government Area (LGA). The site is situated 1.5km south of the Sydney CBD and 6.9km north-east of the Sydney International Airport within the suburb of Haymarket.

The site is located within the Western Gateway sub-precinct, an area of approximately 1.65ha that is located immediately west of Central Station within Haymarket on the southern fringe of the Sydney CBD. Immediately north of Central Station is Belmore Park, to the west is Haymarket (including the University of Technology, Sydney and Chinatown), to the south and east is rail lines and services and Prince Alfred Park and to the east is Elizabeth Street and Surry Hills.

Central Station is a public landmark, heritage building, and the largest transport interchange in NSW. With regional and suburban train services, connections to light rail, bus networks and to Sydney Airport, the area around Central Station is one of the most-connected destinations in Australia.

The site is located at 2 & 8A Lee Street, Haymarket and is legally described as Lot 30 in Deposited Plan 880518 and Lot 13 in Deposited Plan 1062447. The land that comprises the site under the Proponent's control (either wholly or limited in either height or depth) comprises a total area of approximately 5,450sqm.

The location of the TOGA Central site is illustrated in Figure 3-1.



Source: Bates Smart

Figure 3-1 — Site Identification Plan

The site currently comprises the following existing development:

- Lot 30 in Deposited Plan 880518 (Adina Hotel building): the north-western lot within the Western Gateway sub-precinct accommodates a heritage-listed building which was originally developed as the Parcels Post Office building. The building has been adaptively re-used and is currently occupied by the Adina Hotel Sydney Central. The eight-storey building provides 98 short-stay visitor apartments and studio rooms with ancillary facilities including a swimming pool and outdoor seating at the rear of the site.
- Lot 13 in Deposited Plan 1062447 (Henry Deane Plaza): the central lot within the Western Gateway sub-precinct adjoins Lot 30 to the south. It accommodates 22 specialty food and beverage, convenience retail and commercial service tenancies. The lot also includes publicly accessible space which is used for pop-up events and a pedestrian thoroughfare from Central Station via the Devonshire Street Tunnel. At the entrance to Devonshire Street Tunnel is a large public sculpture and a glazed structure covers the walkway leading into Railway Square. This area forms part of the busy pedestrian connection from Central Station to Railway Square and on to George and Pitt Streets, and pedestrian subways.

The site is listed as an item of local significance under Schedule 5 of the *Sydney Local Environmental Plan 2012* 'Former Parcels Post Office including retaining wall, early lamp post and building interior', Item 855.

The site is also included within the Central Railway Station State heritage listing. This is listed on the State Heritage Register 'Sydney Terminal and Central Railway Station Group', Item SHR 01255, and in Schedule 5 of the *Sydney Local Environmental Plan 2012* 'Central Railway Station group including buildings, station yard, viaducts and building interiors' Item 824.

The site is not however listed independently on the State Heritage Register. There is an array of built forms that constitute Central Station, however the Main Terminal Building (particularly the western frontage) and associated clocktower constitute key components in the visual setting of the Parcel Post building.

4. Methodology

This report examines the current and forecast regulated airspace height constraints overhead the site which are related to aviation airspace protection requirements under the *Airports (Protection of Airspace) Regulations 1996* (APAR) and which would:

a) Trigger the requirement to apply for an airspace height approval.
b) Constrain the maximum permissible building envelope heights.
c) Potentially influence airspace height application evaluations and approval conditions, including possible mitigations that may be required.

4.1 Airspace Regulations

The proposed development site is subject to the Airports (Protection of Airspace) Regulations (APAR), under the Commonwealth's Airports Act, 1996), because of its proximity to Sydney Airport and because of its proposed height. These regulations define both: how building height limitations due to airspace safety can be determined; and the process for gaining approval of the proposed development under the regulations.

The Prescribed Airspace Regulations, and their impact upon building height limitations, are described below.

Where a proposed development would infringe the Prescribed Airspace, a height approval must be obtained from DITRDC prior to the intrusion into the airspace. A permanent intrusion, such as a building, is termed a *controlled activity*, and temporary intrusions that are not expected to continue longer than 3 months, such as cranes, are termed *short-term controlled activities*.

Applications are usually submitted via the nearest relevant airport (in this case, Sydney Airport), which then contacts relevant stakeholders and ultimately forwards the application to DITRDC for the final determination.

Height approvals under APAR are not required for rezoning applications. They are however usually required by local planning authorities prior to, or as consent conditions of, approval of Development Applications (DAs).

4.2 Prescribed Airspace

Prescribed airspace, under these regulations, includes at minimum:

- **Obstacle Limitation Surfaces (OLS)**
  - The OLS surfaces are used to identify buildings and other structures that may have an impact upon the safety or regularity of aircraft operations at an airport. This impact depends upon both the type of operations at the aerodrome and which OLS surfaces are penetrated by a (proposed) building or structure.
  - The OLS are flat and rising (invisible) surfaces around the airport. They are based on the geometry of the airport and its runways and therefore they rarely change.
  - If a permanent building development (or temporary crane) that is proposed at a height that will penetrate (exceed) the height limit of an OLS surface, then an application must be made to the Commonwealth Department of Infrastructure, Transport, Regional Development and Communications — via the closest airport, and with copies to any other potentially affected airport — for an airspace height approval prior to construction of the permanent development &/or erection of the temporary crane obstacle. Such applications should demonstrate the proposed building does not penetrate or adversely affect surfaces protecting the instrument flight procedures (PANS-OPS surfaces); radar vectoring; navigation infrastructure; or anything else that might affect the safety or regularity of operations at the airport.

- **PANS-OPS Surfaces**
  - PANS-OPS surfaces represent the protection surfaces for published instrument flight procedures to and from the airport. These surfaces comprise flat, sloping and complex surface components.
  - PANS-OPS surfaces must not be penetrated by permanent buildings or structures. However, for a variety of reasons, PANS-OPS surfaces can and do change over time. Approval may be granted, under certain conditions, for temporary obstacles (such as cranes) which at their maximum height would infringe the limiting PANS-OPS surface, and in such cases operation at such heights would most likely be capped by the RTCC surface constraint (see below) and limited to 3 months duration.
  - As flight procedures are changed from time to time (usually by Airservices), the PANS-OPS Surface Plan published by an airport may not reflect the current situation — which is why we not only reference the airport's plans but also review the published charts for current (or pending) instrument flight procedures and evaluate the associated PANS-OPS height limits. The regulations also make a provision for any factor which may be deemed to adversely affect the safety, regularity or efficiency of aircraft operations at an airport. In light of this, it is necessary to consider the following factors.

- **Other Considerations**
  - **Sydney Airport's Declared Airspace Plans** additionally include:
    - Radar Terrain Clearance Charts (RTCC), which depict the areas and height limits related to the Minimum Vector Altitude (MVA) sectors used by Air Traffic Controllers when vectoring aircraft.
    - Lighting and visual guidance protection plans — used for approach guidance by aircraft, especially at night and in times of poor visibility.
    - Navaid and radar evaluation / protection surface plans.
  - **Sydney Airport's 2039 Master Plan**
  - **Other Factors**
    - Airline Engine-Out (Contingency) Take-Off Splays
      (as per Civil Aviation Order 20.7 1b)
      These are generally assessed independently by the airlines as part of their own evaluations of any given airspace height application, but it is prudent to evaluate any potential impact in advance.
    - Proximity to the critical parts of flight paths to/from Strategic Helicopter Landing Sites (SHLS), which are usually limited to the helipads used by Helicopter Emergency Management Services (HEMS) at major trauma hospitals.
    - Other miscellaneous factors that may be considered as potential safety issues by any of the key stakeholders, and the Civil Aviation Safety Authority (CASA) in particular.
  - Note: Airspace that is approved by DITRDC as Declared Airspace is considered part of an airport's Prescribed Airspace.

4.3 About Airspace Heights

All "heights" provided in this document are elevations expressed in metres in the Australian Height Datum (AHD) — and thus they are true elevations, and NOT heights above ground level (AGL).

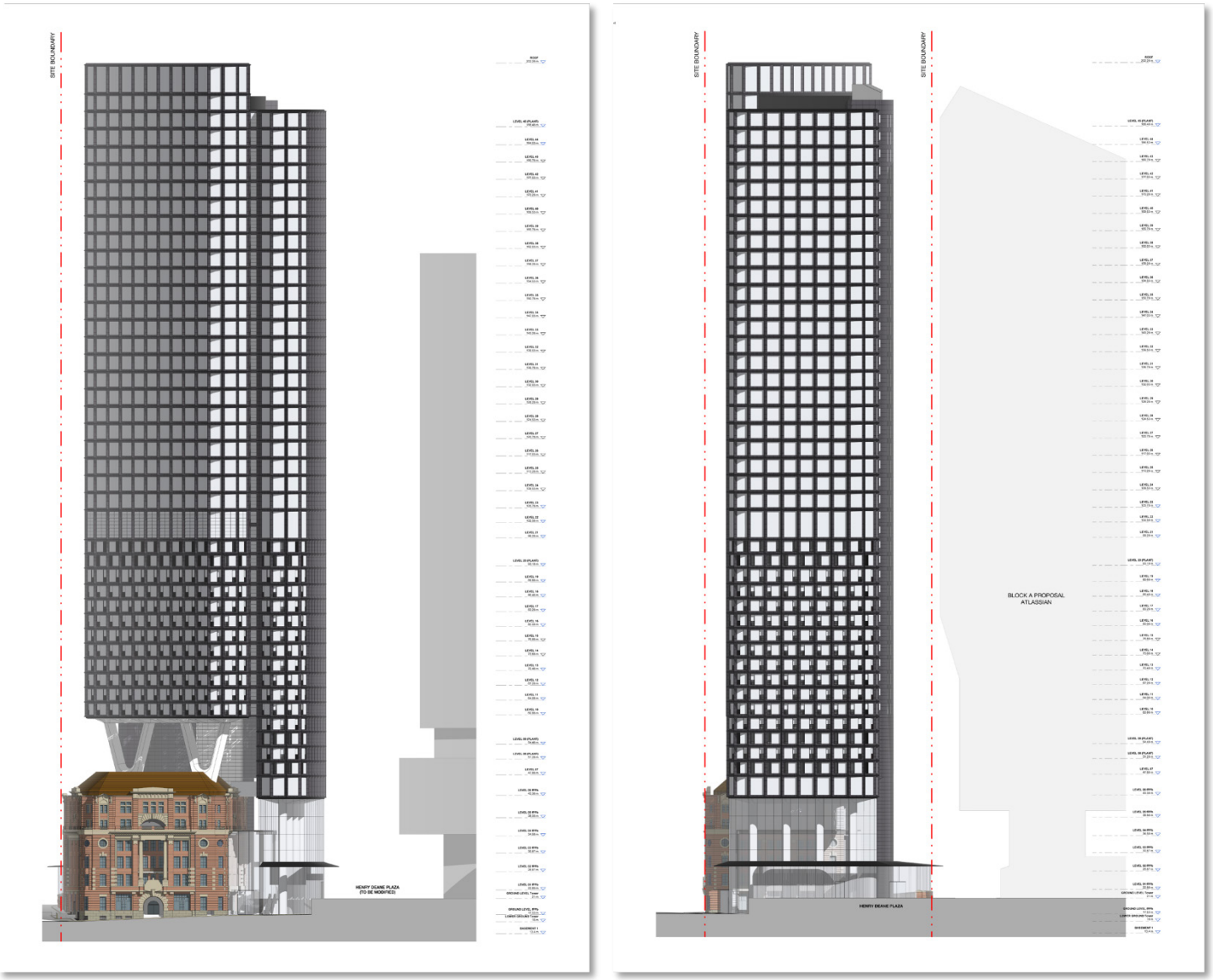
For estimating maximum development heights AGL, the ground elevation^{AHD} should be subtracted from the airspace height limits^{AHD}.

Note also — for aviation-related building airspace height approval under the Airports (Protection of Airspace) Regulations, approved heights are inclusive of the building itself, all rooftop furniture and overruns (eg, plant, lift risers, antennae, signage, building maintenance units (BMUs), etc) and any significant rooftop vegetation (eg, trees).

5. Assessment and Findings

5.1 Aeronautical Impact Context

The assessment is made on the building massing plans submitted for the SSD DA, as depicted in the plan extracts in the figures below.



Source: Bates Smart

Figure 5-1 — West and Southern Elevations

Source: Bates Smart

Figure 5-2 — Roof Plan

5.1.1 Reference Points used for Analysis

For the purposes of assessment, reference points were established at key points across the building footprint. The reference point coordinates were determined from the architectural floor plans, which were geo-referenced against CAD-based cadastral data. These reference points are shown in Table 5-1 and illustrated in Figure 5-3 below.

Whilst analysis against airspace heights has been conducted for all reference points, a single point — **Pt.Ref** — is referred to throughout the body of this report for the purpose of reporting the outcome of the analysis. This is because all other points are less restrictive in terms of airspace impact (a summary of airspace impact on the additional reference points is included in Appendix 3 — Analysis Summary for All Reference Points).

Table 5-1 — Assessment Reference Locations & Coordinates

Point	*Assessment Heights (m AHD*)*	*Location*	*WGS84 Geographic Coordinates*	*GDA94 Coordinates (Zone 56)*
Pt.Ref	**206.280**	**General Site Reference Point** Furthest reach of the Building Maintenance Unit (BMU) on the south-eastern corner of the building.	33° 53' 02.39" S 151° 12' 14.93" E	333921.532 E 6249254.612 N
Pt.B	206.280	The centre point of the BMU at its southernmost resting position — used in combination with a known jib radius of 18m to establish Pt.Ref.	33° 53' 01.82" S 151° 12' 14.82" E	333918.266 E 6249272.314 N
Pt.T	202.280	The southern edge of the tallest tower section.	33° 53' 01.56" S 151° 12' 14.35" E	333906.071 E 6249280.016 N
Pt.N	202.280	The northern most edge of the building, the point furthest away from Sydney Airport.	33° 53' 00.79" S 151° 12' 15.59" E	333937.515 E 6249304.292 N

Point	*Assessment Heights (m AHD*)*	*Location*	*WGS84 Geographic Coordinates*	*GDA94 Coordinates (Zone 56)*
Pt.L	197.580	The southern edge of the lift overrun.	33° 53' 01.89" S 151° 12' 15.37" E	333932.398 E 6249270.253 N
Pt.C	195.005	Central rooftop on which BMU track is installed	33° 53' 01.64" S 151° 12' 15.06" E	333924.267 E 6249277.774 N
Pt.S	192.205	The southern edge of the lower part of the roof.	33° 53' 02.35" S 151° 12' 14.82" E	333918.617 E 6249255.910 N

* *Assessment Heights — Indicative Max RLs for of the Proposed Tower Envelope*
m AHD = RL Heights expressed in Metres Australian Height Datum (AHD)

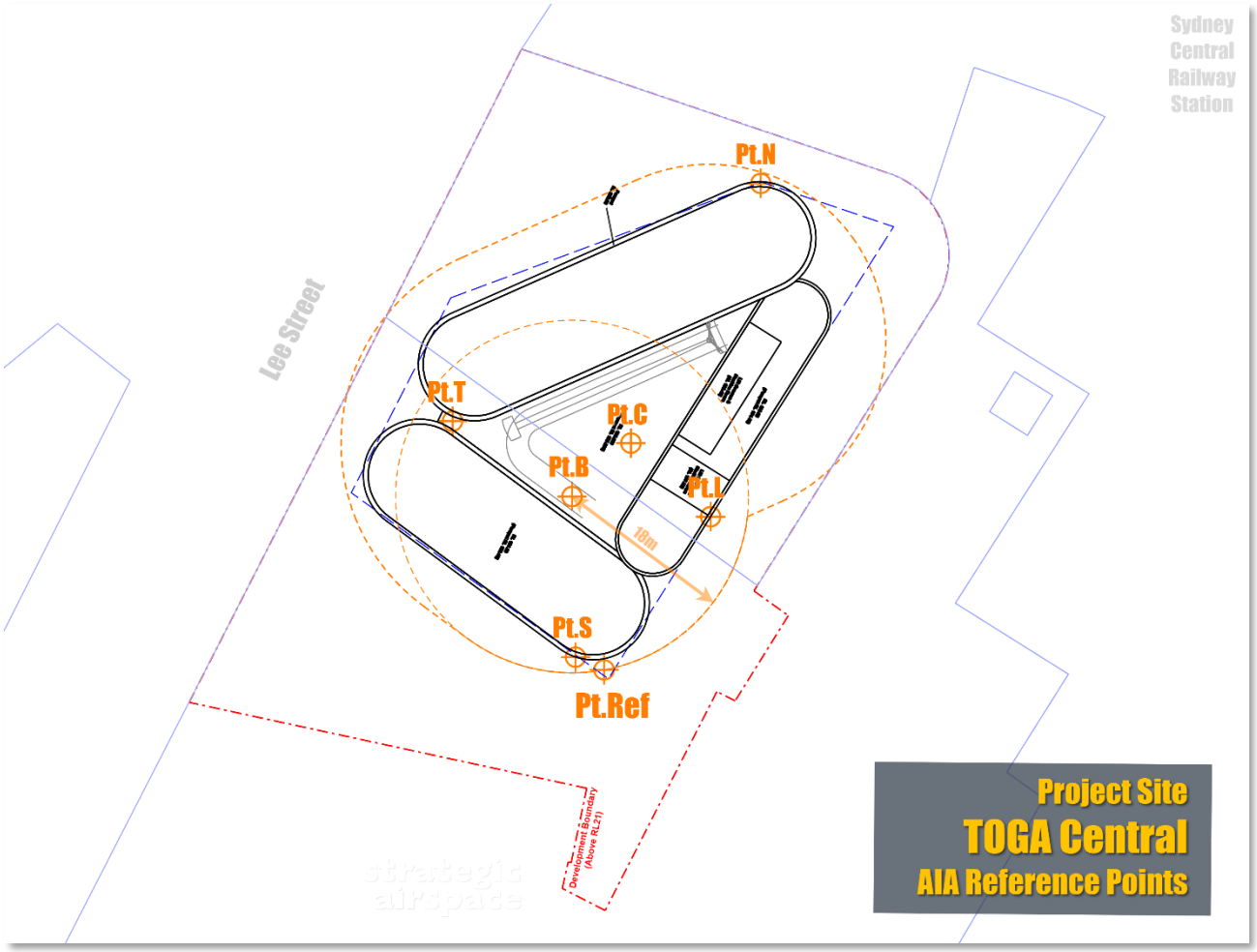


Figure 5-3 — Key Reference Points for the Aeronautical Assessment

5.1.2 Site in relation to Sydney Airport

The site reference point (Pt.Ref) is located approximately **7.32** km (**3.95** Nautical Miles (NM)) north-north-east of the Aerodrome Reference Point (ARP) of Sydney Airport, as shown in Figure 5-4 below.

The distance and bearing to the ARP and the northern ends of Runways 07/25 and 16L/34R are detailed in Table 5-2 below. Procedures to/from the western parallel runway, RWY 16R/34L, are considered irrelevant because those procedures must stay safely to the west of those for the eastern parallel runway – and therefor remain clear of the precinct.

Table 5-2 — Site Reference Point (Pt.Ref) – Location in Relation to Sydney Airport

Airport Feature	*Distance (Km)*	*Distance (NM)*	*Bearing (°T)*	*Bearing (°M)*
Aerodrome Reference Point (ARP)	**7.32**	**3.95**	**020.0**	**007**
RWY16L Threshold	7.34	4.12	010.7	358
RWY 25 Threshold	6.13	3.31	013.3	001

Figure 5-4 — Proposed Development Site in relation to Sydney Airport (Large Format)

5.2 Analysis

5.2.1 OLS Analysis

The location of the proposed re-development, with respect to the OLS of Sydney Airport, is shown in Figure 5-5 below.

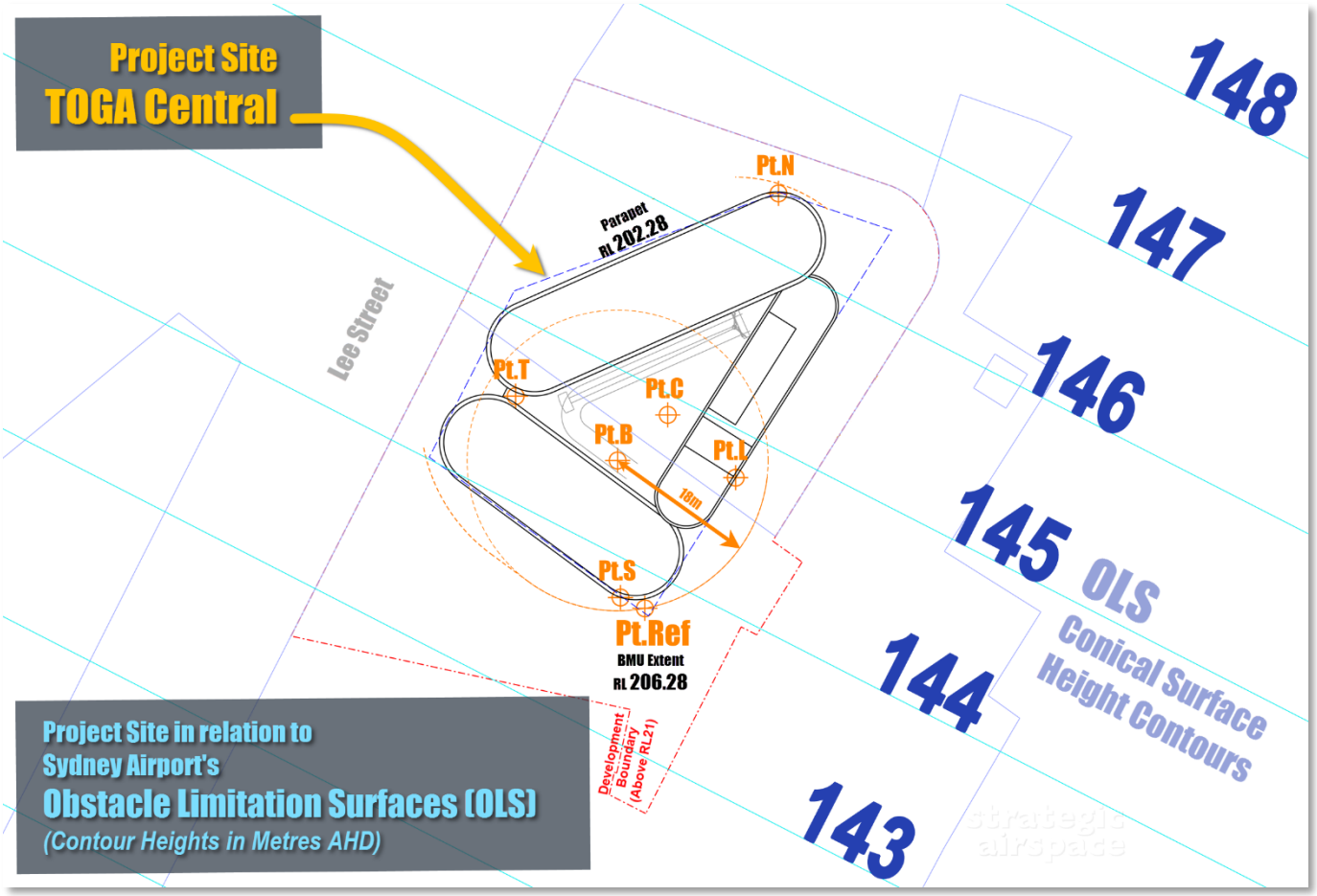


Figure 5-5 — Site in relation to Sydney Airport's OLS

Table 5-3 — OLS Height Impact & APAR Application Implications

		OLS Height		
Location	*Assessment Height (m AHD)*	*Surface Height*	*Clearance / Infringement*	*Approvability Comment*
Pt.Ref	**206.280**	**143.79**	**-62.49**	The building requires prior approval under APAR because it infringes the OLS. Approval is subject to the maximum height being below the most limiting PANS-OPS or RTCC surface height.
Pt.N	**202.280**	146.37	-55.91	

5.2.2 PANS-OPS Analysis

In addition to reviewing the PANS-OPS (Approach) Surfaces chart of Sydney Airport's Prescribed Airspace (current at 2017, but published by the airport in 2019), assessment was conducted of the following instrument procedure types for Sydney Airport, as published in the Australian Aeronautical Information Publication (AIP) Departure and Approach Procedures (DAP), up to Amendment 171 (effective 16-Jun-2022 to 07-Sep-2022).

- The Circling Minima and Minimum Sector Altitudes (MSAs) for existing PANS-OPS procedures
- The discrete minima for the Instrument Approach Procedures.
- Missed Approaches — as part of the evaluation of Approach Procedures
- Standard Instrument Departure Procedures (SIDs)
- The Minimum Sector Altitude — 10 NM Sector

The site in relation to the PANS-OPS surfaces shown on Sydney Airport's 2017 chart — as depicted in Figure 5-6 below — is shown for information only, as it is known to not fully reflect the currently published PANS-OPS procedures and it does not include PANS-OPS departure procedures. The limiting surface, at the time the chart was drawn, was that related to the parallel runway obstacle assessment surfaces (PAOAS) in the missed approach of the precision approach (ILS/GLS) approach procedures to RWY34R. Due to the coarseness of the street boundary data shown on the chart, it is not possible to determine the height limit according to that chart precisely — but it indicates that the constraining height at the Pt.Ref site assessment point would be over 292m AHD.

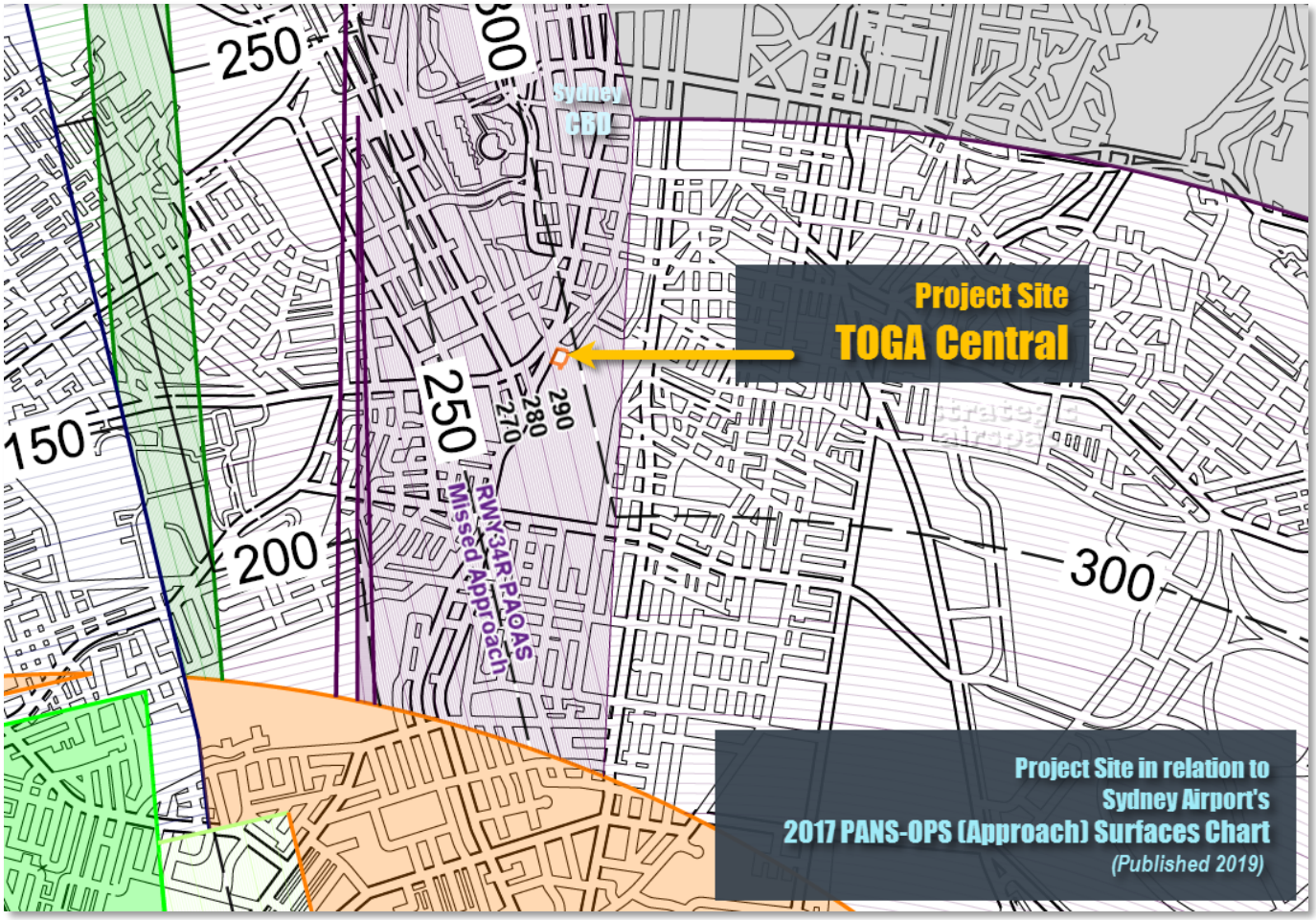


Figure 5-6 — Site in relation to Sydney Airport's PANS-OPS (Approach) Surfaces

The StratAir analysis of the Instrument Flight Procedures (IFPs) currently published by Airservices Australia (refer also to Appendix 2 — PANS-OPS Procedures) determined that the site is laterally outside the protection surfaces related to the northern approaches to the right parallel runway (ie, to RWY16L), to all procedures related to the left parallel runway (RWY 16R/34L) and those of the short cross runway (RWY 07/25). It is below the protection surfaces for the departure procedure from RWY34R and some of the missed approach procedures for approaches to RWY34R. The key details of the assessment of the current IFPs are in the following sections and summarised in Table 5-4 below.

Table 5-4 — Sydney (YSSY) PANS-OPS Height Limit Summary

Procedure	*Height Limit (m AHD)*	*Description*
Approaches and Missed Approaches to all Runways	≥ 272.07	Outside the lateral protection areas of many procedures. Where protection surfaces overlay the site, StratAir analysis indicates that the lowest limit is related to the Missed Approach of the RWY34R SA Cat I ILS procedure (based on the lowest published minima with the 3.4% minimum climb gradient) — which is lower than that indicated in Sydney Airport's PANS-OPS critical surfaces chart.
Circling Area	N/A	Outside the extent of the circling procedures.
Departures	≥ 279.15	Analysis indicates that most limiting surface constraint for the Omnidirectional Radar departure from RWY3R is applicable.

Procedure	*Height Limit (m AHD)*	*Description*
Minimum Sector Altitude (MSA)	340.08	The 10 NM Minimum Sector Altitude of 2100 ft imposes this surface height constraint across the entire site.
STARs	≥ 340.08	Outside the lateral protection areas or too high overhead to have any impact on the proposed development.

A "Area" Procedures

A.1 Minimum Sector Altitudes (MSAs)

The relevant sector is the inner 10 NM sector around the airport which has a 2,100ft minimum flight altitude.

Procedure	*Feature and / or Restriction*	*Description*
10NM MSA	Horizontal Surface: • 340.08m	Covers the entire site. This surface height is based on a conservative minimum obstacle clearance of 1000ft instead of the ICAO value of 300m.

A.2 Circling Minima

Not applicable: the site is outside the extent of the circling procedures.

A.3 STARs

The minimum segment altitude of any of the STARs over the site is 2,100ft, which is covered by the same protection as the MSA at 2100ft. A detailed study of the extent of impact by STARs is not included.

B Instrument Approaches & Missed Approaches

The impact of each of the relevant PANS-OPS protection surfaces for current approach and departure procedures for Sydney Airport were evaluated.

B.1 Approach Procedures to RWY 16L & RWY 25

The site is laterally clear of the protection surfaces of all approaches.

B.2 Missed Approaches

The missed approaches related to the RWY 07 and RWY 34R approach procedures were analysed. The most limiting of the missed approach surfaces overhead the site is associated with the ILS SA Cat I approach to RWY 34R. The limiting height and the impact in relation to the Tower are summarised in Table 5-5 below.

Table 5-5 — Summary of Limiting PANS-OPS Approach & Missed Approach Height and Envelope Height Clearances

		Limiting PANS-OPS Approach & Missed Approach Procedure Surfaces	
Location	*Assessment Height (m AHD)*	***RWY 34R ILS SA CAT I (MA)***	***Clearance / Infringement***
Pt.Ref	206.280	272.077	65.797

C Departures

The departure procedures from RWY 07 and RWY 34R were evaluated for potential impact. Based on the data published in the Omnidirectional Radar Departures All Runways chart, the RWY 34R departure procedure was determined to be the most limiting of all PANS-OPS procedures. The limiting heights and the impact in relation to the Tower and the cranes are summarised in Table 5-6 below.

Note that there is a substantial clearance between the limiting heights and the maximum probable development heights at each end of the building envelope.

Table 5-6 — Summary of Limiting PANS-OPS Departure Surface Heights & Envelope Height Clearances

		PANS-OPS Departure Surfaces	
Location	*Assessment Height (m AHD)*	*RWY 34R Omnidirectional Radar Departure*	*Clearance / Infringement*
Pt.Ref	206.280	279.158	72.878

5.2.3 Other Assessment Considerations

The following table provides a brief assessment of other considerations.

Table 5-7 — Other Assessable Height Limitations (including the RTCC & SHLS Impact)

Procedure	*Height Limit (m AHD)*	*Description*
Radar Terrain Clearance Chart (RTCC) / Minimum Vector Altitude (MVA)	**243.84**	This height constraint is applicable over the entire site. This is the limit related to the 1800ft Minimum Vectoring Altitude (MVA) sector, which is used by air traffic controllers. This information is sourced from the RTCC published as part of Sydney Airport's Prescribed Airspace Plans.
Navigation Infrastructure Surfaces	N/A	The proposed development is too far from the airport to affect any ground-based navigation infrastructure.
Approach Lighting & VGSI Surfaces	N/A	The site is outside the lateral extent of published approach lighting surfaces.

Procedure	*Height Limit (m AHD)*	*Description*
Airlines Engine Out Procedures	N/A	The Engine Out procedures from RWY 34R (the most relevant take-off runway end), are designed and maintained by each of the passenger transport aircraft operators in accordance with the relevant regulations. All such procedures necessarily take into account Sydney Tower Eye in the Sydney CBD, which given its relevant proximity and taller height, will take precedence. As such this proposal will not adversely affect any contingency procedures.
Helicopter Procedures related to the Nearest HLS or Strategic Helicopter Landing Site (SHLS) [1]	N/A	There are no nearby existing or proposed HLS or SHLS that would be adversely impacted. Any other helicopter traffic that traverses the CBD must maintain visual clearance from any obstacles, including existing tall buildings. It is also noted that the HARBOUR BRIDGE 5 and ERSKINEVILLE 5 visual helicopter routes have a transition point above Central Railway. The specified flight altitude of these routes at that point is 1000 ft (304.8m AHD), which is ~99m above the tallest point of the proposed envelope. See also section 5.2.3B below.

There are no other considerations that might limit the building height at the project site.

A Radar Terrain Clearance Chart (RTCC) / Minimum Vector Altitude (MVA) Surface

The Radar Terrain Clearance Chart (RTCC) overhead the site protects the airspace used by air traffic controllers as the lowest Minimum Vector Altitude (MVA) they can use for vectoring aircraft. With an MVA of 1800ft over the entire site, the RTCC surface height limit is defined as being 1000ft below that, at a height of 243.84m AHD*.

* *On Sydney Airport's RTCC chart they show the value rounded up to the nearest metre, 244m AHD. The value used in this report is a more conservative unrounded value.*

Table 5-8 — Proposed Envelope in relation to the RTCC Surface Height

		RTCC (1800ft MVA Sector)		
Location	*Assessment Height (m AHD)*	*Surface Height (800 ft)*	*Clearance / Infringement*	*Comment*
Pt.Ref	206.280	243.84	37.560	Refer also to Section 5.3 Crane Considerations (p24)

Note that because the RTCC surface constraint is lower than the lowest PANS-OPS surface, it becomes relevant as a cap on the building height.

1 A Strategic Helicopter Landing Site is defined in the National Airports Safety Framework (Guideline H) as an HLS associated with a hospital; an elevated HLS located within a populated area, an HLS subject to instrument flight procedures, or any other facility identified as strategic by State/Territory or Commonwealth government/authorities.

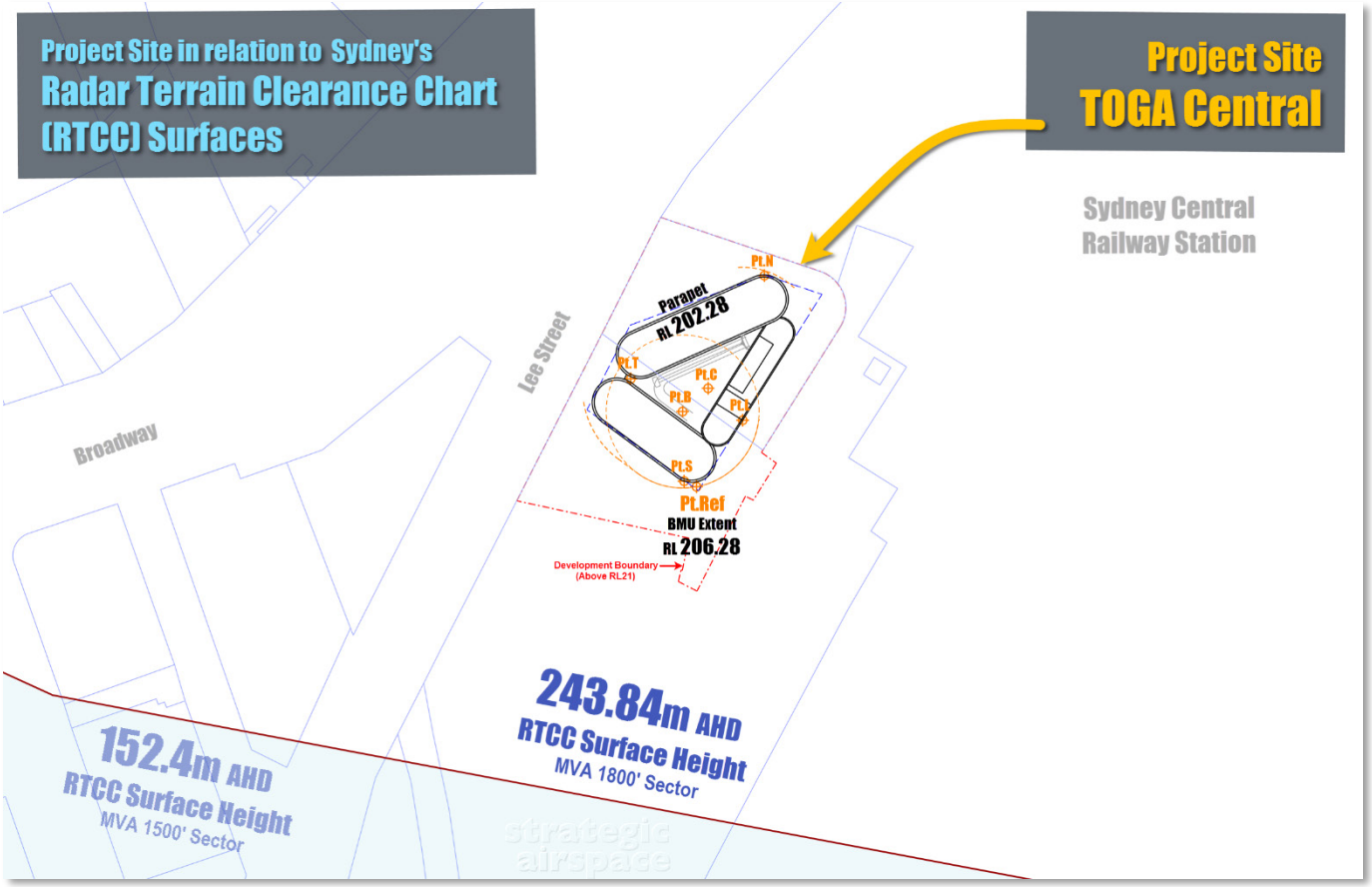


Figure 5-7 — Radar Terrain Clearance Chart (RTCC) Height Constraint

B HLS Status & Helicopter Impact (SEARs Study Requirement)

The development proposal does not include any plans for a Helicopter Landing Site (HLS), and thus there will be no helicopter flight path activity to/from the development.

The site is not adjacent to any other strategic or non-strategic HLSs, and so will not have any adverse impact on the flight paths to/from such sites.

In addition to the specific items raised in the SEARs, we also note that there are two coded helicopter routes which fly above Central Station, which require clearances from Air Traffic Control. The first, “HARBOUR BRIDGE 5”, is for helicopters to transit between Sydney Airport and Sydney Harbour (where the route start/end waypoint is above the southern pylon of Sydney Harbour Bridge). A key turning point in this route, a visual waypoint, is Central Station. The route is depicted in plan view in Figure 5-8 and in 3D (a view from the south-south-west) in Figure 5-9 below. The second, “ERSKINEVILLE 5”, is a subset of the HARBOUR BRIDGE 5 route, covering the leg between Erskineville Oval and Central Station, over Redfern Station.

Use of these routes requires helicopters to fly at an altitude of 1000ft (equivalent to ~305m Australian Height Datum) over Central Station, in visual meteorological conditions, and to remain clear of all buildings. As the proposed development’s maximum height is ~99m (324ft) below the flight altitude, and because it is the pilot’s licensing rules and legal responsibility to remain clear of buildings, the proposed development would not cause any adverse impact on this helicopter route.

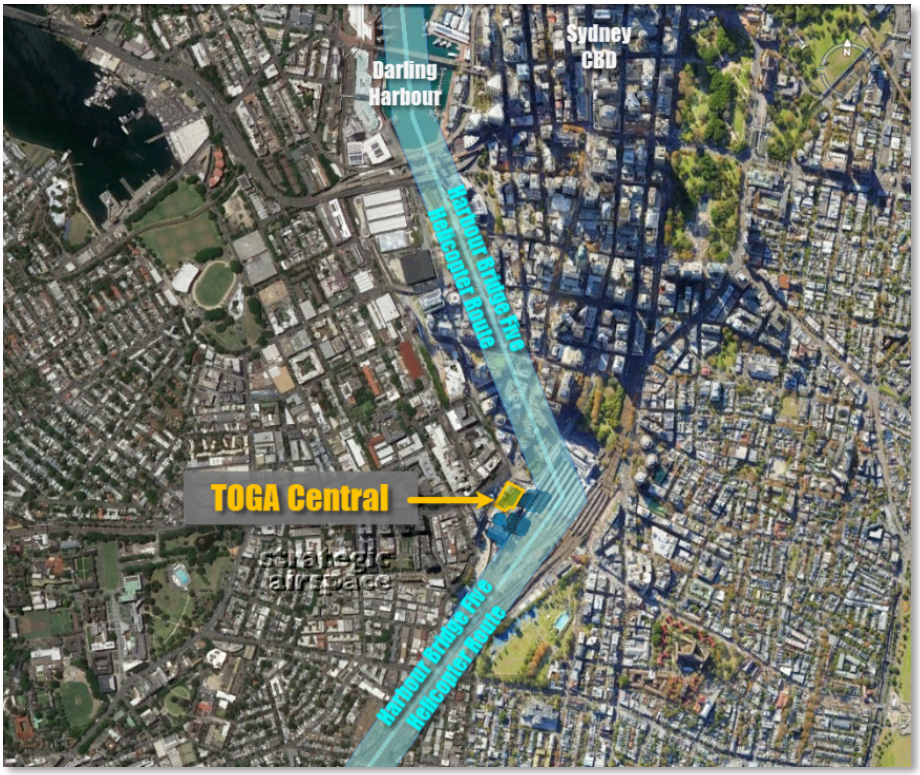


Figure 5-8— Overhead view of the Proposed Development in relation to the Harbour Bridge Five Helicopter Route

Figure 5-9— 3D view of the Harbour Bridge Five Helicopter Route

In summary, the development does not contain a proposal for an HLS, and it will not cause any adverse impact to flight paths to/from existing HLSs nor to the Harbour Bridge Five or Erskineville Five routes overhead.

5.2.4 Airspace Analysis Summary

The impact of the various building height limitations, from lowest to highest, is summarised in the following table.

Table 5-9 — Analysis Summary — Airspace Height Constraints

Height Limits (m AHD)	*Height Limit Detail*	*Comment*
Max Pt.Ref **206.280** Min Pt.S 192.205 Max Pt.N 202.280	**Max Height** **Top Building Heights**	This is the maximum operating height of the BMU. As the BMU operating zone covers the full extent of the tower building, it is used as the maximum assessment height. This is the range of the separate tower roof heights. Refer also Figure 5-1 (p11), Figure 5-2 (p12) Figure 5-3 (p13) & Appendix 3 — Analysis Summary for All Reference Points
~143.79 to ~146.37	**OLS CONICAL Surface**	The site is under the OLS CONICAL Approach Surface, which slopes up at 5% across the site from the south-south-west to the north-north-east. The height limits of this surface vary across the site and the tower envelope. See Figure 5-5 (p15) and Table 5-3 (p16). As **the proposed envelope** would infringe the OLS, it **would require a height application under the Airports (Protection of Airspace) Regulations 1996 (APAR) to be approved by DITRDC prior to construction**. Infringement of the OLS in this case is not considered a barrier to approval of an application under the APAR.
243.84	**Radar Terrain Clearance Chart (RTCC)** Minimum Vector Altitude (MVA) 1800ft Sector	**The site lies within the lateral limits of an RTCC surface which has an effective limit 243.84m AHD** — although this is published as 244m AHD on Sydney Airport's RTCC chart as part of their Declared Airspace. See Table 5-8 (p20) for details. At the equivalent of 800ft altitude, this surface protects the 1800ft MVA sector which is used by Air Traffic Controllers (ATCs) to vector aircraft. This surface typically cannot be breached by any obstacle, permanent or temporary, at night or during times of low visibility. For this reason, **this is considered the most limiting height for the proposed development at the project site.**
> 272	PANS-OPS Surfaces (Approach & Departures)	The Missed Approach for the ILS SA CAT I procedure to RWY 34R is the most constraining over the reference point, sloping up towards the NE. See Table 5-10 (p24) for details. Normally the PANS-OPS procedure surfaces are the most constraining on development heights, but since in this case the RTCC surface height is lower, the RTCC is considered the maximum permissible development height at the project site. The relevant PANS-OPS surface heights would most likely be considered the absolute maximum height for crane operations used for construction of the building, subject to approval of Sydney Airport, the aviation stakeholders and DITRDC. Separate applications under APAR for crane operations would need to be submitted and approved prior to operations of cranes but are not required to secure an approval under APAR for a proposed building development itself.

Height Limits (m AHD)	*Height Limit Detail*	*Comment*
Higher or N/A	Other Surfaces & Helicopter Route	The site is outside the extent of other protection surfaces or the height limits are higher, and so considered Not Applicable.

5.3 Crane Considerations

This section is provided for advance information only. It is not required for DA consent. However, an assessment of the feasibility of constructing a tower as tall as proposed in relation to the potential airspace impact cranes required for construction may be conducted by the aviation agencies when evaluating their responses to an airspace height application for the building under the APAR — even though airspace height applications for cranes are usually submitted separately, after DA consent but prior to construction.

Any crane which would exceed the OLS relevant height will require prior approval under the APAR.

Cranes which would not exceed the RTCC surface height (where it is lower than the limiting PANS-OPS surface height) are likely to be given an APAR approval for operating for an unlimited duration, subject to the agreement of Sydney Airport.

Under the APAR, cranes which would exceed the most limiting of the PANS-OPS and RTCC surface limits could only be considered approvable as Short-Term Controlled Activities (ie, temporary obstacles), and in such cases the approval would contain a number of specific conditions. The key regulatory implications are that applications for cranes must be acceptable to Sydney Airport, and the operating period during which a crane height may exceed the PANS-OPS height limit would be limited to a period not exceeding 3 months.

Table 5-10 — Airspace Surfaces & Potential Crane Impact

Building ID & Assessment Location		*Height m AHD*	***Crane Impact*** *Potential Crane Impact**	***Lowest PANS-OPS*** *PANS-OPS Surface Hgt Clearance*	***RTCC Surface*** *RTCC Surface Hgt Clearance*
Site Reference Point	**Pt.Ref**	**206.280**	**YES**	65.79	**37.5**
BMU	Pt.B	206.280	**YES**	65.79	**37.5**
North Edge of Site	Pt.N	202.280	Probably limited	71.44	**41.5**
Tall Tower (Southern Pt)	Pt.T	202.280	Probably limited	70.69	**41.5**
Lift Overrun	Pt.L	197.580	Probably limited	75.00	**46.2**
Central Rooftop	Pt.C	195.005	Probably limited	77.85	**48.8**
South Tower	Pt.S	192.205	Probably limited	79.92	**51.6**

** Cranes which exceed the PANS-OPS &/or RTCC would be subject to a 3-month time limit & other operating conditions*

For buildings, the estimated Crane impact is determined by the available clearance over the building:

- clearance more than 60m - no impact
- clearance 50m - 60m - potentially limited
- clearance 40m - 50m - probably limited
- clearance 40m or less - assumed impact on crane feasibility

For TCs, the Crane impact is determined based on any penetration of the PANS-OPS or RTCC surfaces

In addition to standard requirements such as hazard warning lights, other approval conditions that could be reasonably anticipated would include operating procedures and requirements such as:

- A defined communications system between the Site Manager or Crane Supervisor and the Sydney Air Traffic Management (ATM) Unit at Sydney Airport; and
- The potential need to lower cranes during periods of low visibility (and that this may need to be put into place at short notice) and at night — subject to such a requirement being stated by Airservices in response to an APAR application for the crane(s).

As shown in Table 5-10 above, the available clearance heights for cranes above the rooftops, the top of the lift overrun and the top of the BMU range from 37.5.m to 51.6m, which may be insufficient for cranes (assuming luffing cranes, with appropriate jib lengths) that would be required to construct the upper levels. However, that clearance margin would be sufficient for cranes to operate at heights which would not infringe the RTCC surface height for construction of a substantial number (and perhaps even the majority) of floors.

This implies that staging of crane heights would be required, where for example Stage 1 cranes could operate below the limiting RTCC surface height (for as long as required) and Stage 2 cranes would be limited to the 3-month time limit and other operational conditions.

Any future height applications for cranes will require a detailed airspace assessment, current at the time of the application, inclusion of the then current Construction Management Plan (CMP), crane plans and operations programme and, subject to the final height impact, demonstration that the cranes could be operated within the anticipated time and operational constraints without any adverse impact on the safety, regularity or efficiency to air transport operations. Separate applications would be required for each crane and for different stage heights.

6. Cumulative Impacts

The development of the proposed tower will increase the concentration of tall buildings in the Western Gateway sub-precinct, and the massing effect will be further increased with the ultimate development of tall buildings proposed as part of the planning proposal for the Central Precinct SSD. Increased concentration of tall buildings can sometimes be regarded as an increase in the statistical risk to aircraft safety if relevant to particular procedures and their constraining heights. Fortunately, in its location at the southern end of the CBD, the airspace overhead the site is already sufficiently high so as to not constrain the proposed development (because of existing taller buildings in the CBD).

Further, the addition of the TOGA Central building between the Block A (Atlassian) and Block B (Dexus / Frasers Central Place) will not add any measurable risk to the safety aircraft operations to and from Sydney Airport, and the internationally accepted Target Level of Safety (TLS) would not be adversely affected.

Table 6-1 — Cumulative Impact Assessment

Relevant Projects	*Status*	*Cumulative Impact on Nearby Major Developments*
Western Gateway — Block A: Atlassian	Approved	• No cumulative adverse impact on aircraft safety is anticipated.
Western Gateway — Block B: Dexus / Frasers Central Place	Approved	• No cumulative adverse impact on aircraft safety is anticipated.
Central Precinct Renewal Program (CPRP)	SSD Under Assessment	• The 2022 planning proposal for the Central Precinct Renewal Program, sponsored by Transport for NSW, assumes the development of Blocks A, B and C (this proposal) of the Western Gateway sub-precinct. • No cumulative adverse impact on aircraft safety is anticipated.

7. Mitigation Measures

Under the CASA MOS Part 139 (Chapter 9, Division 4), obstacle lighting would need to be installed as a warning to aircraft (helicopters included) at night and times of low visibility because the height of the building will exceed a height of 100m above ground level, and it will infringe the OLS Conical Surface.

Given the proximity to other buildings in the Western Gateway sub-precinct (which may be constructed before the TOGA Central development), it is likely that CASA will make a recommendation for a minimum of one obstacle light on the tallest section of the building.

The requirement for this and the number and type of obstacle lights — to be recommended by CASA upon evaluation of any airspace height application — and the obstacle monitoring and maintenance procedures will be specified as a condition of any airspace height approval under the APAR.

8. Conclusion

The proposed development would infringe the OLS — and therefore requires prior approval as a Controlled Activity under the APAR.

Given the location of the tower in the Sydney CBD, its proximity to existing tower buildings in the CBD which are taller than that proposed for this development, and the fact that the maximum height of the planning envelope is well clear of the constraining RTCC surface height, the proposed building would not create any adverse impact on the safety, regularity or efficiency of current or future air transport operations to and from Sydney Airport, nor on any helicopter traffic overhead. It is therefore technically approvable under the APAR.

As a standard safety mitigation for a building of this height, and because it infringes the OLS Conical Surface, any approval for the development is likely to contain a condition for the installation and monitoring of obstacle lights.

Separate applications for cranes that would infringe the OLS would also be required in the future, although they are not required before DA consent.

In summary, based on this assessment, we certify that the proposed development would not have an adverse impact on the operations of Sydney Airport, and anticipate that a height application under APAR for the building envelope as proposed would be successful.

APPENDICES

APPENDIX 1 — ABBREVIATIONS

Abbreviations used in this report and/or associated reference documents, and the meanings assigned to them for the purposes of this report are detailed in the following table:

Abbreviation	*Meaning*
AC	Advisory Circular (document supporting CAR 1998)
ACFT	Aircraft
AD	Aerodrome
AGL	Above Ground Level (Height)
AHD	Australian Height Datum
AHT	Aircraft Height
AIP	Aeronautical Information Publication
Airports Act	Airports Act 1996, as amended
AIS	Aeronautical Information Services
ALARP	As Low As Reasonably Practicable
ALC	Airport Lease Company
Alt	Altitude
AMAC	Australian Mayoral Aviation Council
AMSL	Above Minimum Sea Level
ANEF	Australian Noise Exposure Forecast
ANSP	Airspace and Navigation Service Provider
APCH	Approach
APARs, or A(PofA)R	Airports (Protection of Airspace) Regulations, 1996 as amended
ARP	Aerodrome Reference Point
AsA	Airservices Australia
ASDA	Accelerated Stop Distance Available
ATC	Air Traffic Control(ler)
ATM	Air Traffic Management
BA (Planning)	Building Application or Building Approval (Planning)
BMU	Building Maintenance Unit
CAAP	Civil Aviation Advisory Publication
CAO	Civil Aviation Order
CAR	Civil Aviation Regulation
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulation
Cat	Category
CBD	Central Business District
CG	Climb Gradient
CMP	Construction Management Plan
CNS/ATM	Communications, Navigation, Surveillance / Air Traffic Management
CoS	City of Sydney (Council)
DA (Aviation)	Decision Altitude (Aviation)
DA (Planning)	Development Application (Planning)
DAH	Designated Airspace Handbook
DAP	Departure and Approach Procedures (published by AsA)
DEP	Departure
DER	Departure End of Runway
DEVELMT	Development
DH	Decision Height
DITRDC	Department of Infrastructure, Transport, Regional Development & Communications (Commonwealth) (former abbreviations include DIRD, DIRDC, DITRDC)
DME	Distance Measuring Equipment
Doc nn	ICAO Document Number nn
DoD	Department of Defence
DODPROPS	Dependent Opposite Direction Parallel Runway OPerations
DPIE	Department of Planning, Industry & Environment (NSW)
EIS	Environmental Impact Study

Abbreviation	*Meaning*
ELEV	Elevation (above mean sea level)
ENE	East North East
ERSA	EnRoute Supplement Australia
ESE	East South East
FAF	Final Approach Fix
FAP	Final Approach Point
Ft	Feet
GDA94	Geocentric Datum of Australia 1994
GDA2020	Geocentric Datum of Australia 2020
GLS	GNSS Landing System – a precision landing system like ILS but based on augmented GNSS using ground and satellite systems.
GNSS	Global Navigation Satellite System
GP	Glide Path
HIAL	High Intensity Approach Light
HLS	Helicopter Landing Site
IAS	Indicated Air Speed
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IHS	Inner Horizontal Surface, an Obstacle Limitation Surface
ILS	Instrument Landing System, a precision approach landing system
IMC	Instrument Meteorological Conditions
IPA	Integrated Planning Act 1997, Queensland State Government
ISA	International Standard Atmosphere
IVA	Independent Visual Approach
Km	Kilometres
Kt	Knot (one nautical mile per hour)
LAT	Latitude
LDA	Landing Distance Available
LEP	Local Environment Plan (Planning)
LLZ	Localizer
LNAV	Lateral Navigation
LONG	Longitude
LSALT	Lowest Safe ALTitude
M	Metres
MAPt	Missed Approach Point
MDA	Minimum Descent Altitude
MDH	Minimum Descent Height
MDP	Major Development Plan
MGA94	Map Grid Australia 1994
MGA2020	Map Grid Australia 2020
MOC	Minimum Obstacle Clearance
MOCA	Minimum Obstacle Clearance Altitude
MOS	Manual Of Standards, published by CASA
MP	Master Plan
MSA	Minimum Sector Altitude
MVA	Minimum Vector Altitude
NASF	National Airports Safeguarding Framework
NDB	Non-Directional Beacon
NE	North East
NM	Nautical Mile (= 1.852 km)
nnDME	Distance from the DME (in Nautical Miles)
NNE	North North East
NNW	North North West
NOTAM	NOTice to AirMen
OAR	Office of Airspace Regulation
OCA	Obstacle Clearance Altitude (in this case, in AMSL)

Abbreviation	*Meaning*
OCH	Obstacle Clearance Height
ODPROPS	Opposite Direction Parallel Runway OPerations
OHS	Outer Horizontal Surface, an Obstacle Limitation Surface
OLS	Obstacle Limitation Surface, defined by ICAO Annex 14; refer also CASA MOS Part 139
PANS-OPS	Procedures for Air Navigation – Operations, ICAO Doc 8168; refer also CASA MOS Part 173
PAPI	Precision Approach Path Indicator (a form of VGSI)
PBN	Performance Based Navigation
PRM	Precision Runway Monitor
RAAF	Royal Australian Air Force
RAPAC	Regional AirsPace users Advisory Committee
REF	Reference
RL	Relative Level
RNAV	aRea NAVigation
RNP	Required Navigation Performance
RNP AR	Required Navigation Performance – Authorisation Required
RPT	Regular Public Transport
RTCC	Radar Terrain Clearance Chart (refer also MVA)
RWY	Runway
SACL	Sydney Airport Corporation Limited
SHLS	Strategic Helicopter Landing Site
SID	Standard Instrument Departure
SODPROPS	(Independent) Simultaneous Opposite Direction Parallel Runway OPerations
SSDA	State Significant Development Application
SSP	State Significant Precinct
SSR	Secondary Surveillance Radar
STAR	STandard Arrival
TAR	Terminal Approach Radar
TAS	True Airspeed
TfNSW	Transport for NSW
THR	THReshold (of Runway)
TMA	TerMinal Area
TNA	Turn Altitude
TODA	Take-off Distance Available
TORA	Take-Off Runway Available
VFR	Visual Flight Rules
VIS	Visual
VMC	Visual Meteorological Conditions
V_n	Aircraft critical velocity reference
VNAV	Vertical Navigation
VNC	Visual Navigation Chart
VOR	Very high frequency Omni-directional Range
VSS	Visual Segment Surface
VTC	Visual Terminal Chart
WAM	Wide-Area Multilateration
WNW	West North West
WSW	West South West
WGS84	World Geodetic System 1984
WSA	Western Sydney Airport

APPENDIX 2 — PANS-OPS PROCEDURES

The versions of the IFPs consulted were from the AIP Amendment 171, effective from 16-Jun-2022 to 07-Sep-2022, current as of the date of this report — as indicated in Table 8-1 below.

Table 8-1 — Appendix: PANS OPS Instrument Flight Procedure Charts for Sydney Airport (AIP Amendment 171 – Effective 16-Jun-2022 to 07-Sep-2022)

SYDNEY (YSSY)

Name of Chart	*Effective Date*	*(Amdt No)*
AERODROME CHART PAGE 1	2-Dec-2021	(Am 169)
AERODROME CHART PAGE 2	16-Jun-2022	(Am 171)
AERODROME GROUND MOVEMENT CHART	16-Jun-2022	(Am 171)
APRON CHART - INTERNATIONAL PAGE 1	2-Dec-2021	(Am 169)
APRON CHART - INTERNATIONAL PAGE 2	2-Dec-2021	(Am 169)
APRON CHART - DOMESTIC PAGE 1	7-Nov-2019	(Am 161)
APRON CHART - DOMESTIC PAGE 2	16-Jun-2022	(Am 171)
APRON CHART - DOMESTIC PAGE 3	13-Aug-2020	(Am 164)
STANDARD DOMESTIC TAXI ROUTES - ARRIVALS	16-Jun-2022	(Am 171)
STANDARD DOMESTIC TAXI ROUTES - DEPARTURES	16-Jun-2022	(Am 171)
NOISE ABATEMENT PROCEDURE PAGE 1	7-Nov-2019	(Am 161)
NOISE ABATEMENT PROCEDURE PAGE 2	2-Dec-2021	(Am 169)
NOISE ABATEMENT PROCEDURE PAGE 3	7-Nov-2019	(Am 161)
NOISE ABATEMENT PROCEDURE PAGE 4	21-May-2020	(Am 163)
NOISE ABATEMENT PROCEDURE PAGE 5	21-May-2020	(Am 163)
NOISE ABATEMENT PROCEDURE PAGE 6	7-Nov-2019	(Am 161)
NOISE ABATEMENT PROCEDURE PAGE 7	7-Nov-2019	(Am 161)
NOISE ABATEMENT PROCEDURE PAGE 8	7-Nov-2019	(Am 161)
NOISE ABATEMENT PROCEDURE PAGE 9	7-Nov-2019	(Am 161)
NOISE ABATEMENT PROCEDURE PAGE 10	7-Nov-2019	(Am 161)
AIRPORT EFFICIENCY PROCEDURES	7-Nov-2019	(Am 161)
IVA USER GUIDE PAGE 1	7-Nov-2019	(Am 161)
IVA USER GUIDE PAGE 2	7-Nov-2019	(Am 161)
PRM USER INSTRUCTIONS	17-Jun-2021	(Am 167)
SID SYDNEY TWO DEPARTURE (RADAR)	24-Mar-2022	(Am 170)
SID RWY 34L SOUTH WEST DEP (JET)	24-Mar-2022	(Am 170)
SID RWY 16R DEENA SEVEN (JET) (RNAV)	24-Mar-2022	(Am 170)
SID RWY 34R ENTRA FIVE (JET) (RNAV)	24-Mar-2022	(Am 170)
SID RWY 07 FISHA EIGHT (JET) (RNAV)	24-Mar-2022	(Am 170)
SID RWY 16R KAMPI FIVE (RNAV)	24-Mar-2022	(Am 170)
SID RWY 16L KEVIN SIX (RNAV)	24-Mar-2022	(Am 170)
SID RWY 16L ABBEY THREE (JET) (RNAV)	16-Jun-2022	(Am 171)
SID RWY 34R MARUB SIX (JET) (RNAV)	24-Mar-2022	(Am 170)
SID RWY 34L RICHMOND FIVE DEP (JET)	24-Mar-2022	(Am 170)
STAR BOREE THREE A ARRIVAL (RNAV)	24-Mar-2022	(Am 170)
STAR BOREE THREE P ARRIVAL (RNAV)	24-Mar-2022	(Am 170)
STAR MEPIL THREE ARRIVAL (RNAV)	24-Mar-2022	(Am 170)
STAR MARLN FIVE ARRIVAL (RNAV)	24-Mar-2022	(Am 170)
STAR ODALE SEVEN ARRIVAL (RNAV)	24-Mar-2022	(Am 170)
STAR RIVET THREE ARRIVAL (RNAV)	24-Mar-2022	(Am 170)
ILS OR LOC RWY 07	7-Nov-2019	(Am 161)

Name of Chart	*Effective Date*	*(Amdt No)*
ILS OR LOC RWY 16L PAGE 1	9-Sep-2021	(Am 168)
ILS RWY 16L PAGE 2	9-Sep-2021	(Am 168)
ILS OR LOC RWY 16R PAGE 1	9-Sep-2021	(Am 168)
ILS RWY 16R PAGE 2	9-Sep-2021	(Am 168)
ILS OR LOC RWY 25	17-Jun-2021	(Am 167)
ILS OR LOC RWY 34L PAGE 1	9-Sep-2021	(Am 168)
ILS RWY 34L PAGE 2	9-Sep-2021	(Am 168)
ILS OR LOC RWY 34R PAGE 1	2-Dec-2021	(Am 169)
ILS RWY 34R PAGE 2	2-Dec-2021	(Am 169)
RNP RWY 07	9-Sep-2021	(Am 168)
RNP RWY 16L	9-Sep-2021	(Am 168)
RNP RWY 16R	9-Sep-2021	(Am 168)
RNP RWY 25	9-Sep-2021	(Am 168)
RNP RWY 34L	9-Sep-2021	(Am 168)
RNP RWY 34R	2-Dec-2021	(Am 169)
GLS RWY 07	7-Nov-2019	(Am 161)
GLS RWY 16L	9-Sep-2021	(Am 168)
GLS RWY 16R	9-Sep-2021	(Am 168)
GLS RWY 25	17-Jun-2021	(Am 167)
GLS RWY 34L	9-Sep-2021	(Am 168)
GLS RWY 34R	2-Dec-2021	(Am 169)

Source: AIP Book (16-Jun-2022 to 07-Sep-2022) via http://www.airservicesaustralia.com/aip/aip.asp?pg=10

APPENDIX 3 — ANALYSIS SUMMARY FOR ALL REFERENCE POINTS

This section contains the surface heights and clearances for all reference points. Infringements are shown as negative numbers in red.

Note also that for the BMU, the maximum BMU height is used, but the height clearances are based on the closest point of the BMU to the relevant surface based on the 18m jib radius.

Table 8-2 — OLS Height Constraints for All Reference Points

Building ID & Assessment Location		*Height m AHD*	*OLS Surface*	
			Hgt OLS SFC	*Hgt Clearance*
Site Reference Point	**Pt.Ref**	**206.280**	143.79	-62.49
BMU	Pt.B	206.280	143.61	-62.67
North Edge of Site	Pt.N	202.280	146.37	-55.91
Tall Tower (Southern Pt)	Pt.T	202.280	144.57	-57.71
Lift Overrun	Pt.L	197.580	144.74	-52.84
Central Rooftop	Pt.C	195.005	144.89	-50.12
South Tower	Pt.S	192.205	143.78	-48.42

Table 8-3 — Maximum Surface Heights & Clearances for All Reference Points

Building ID & Assessment Location		*Height m AHD*	*Min PANS-OPS HGT & Clearance (APCHs & DEPs)*			*PANS-OPS MSA Surface*		*RTCC Surface*		*Crane Impact*
			PANS-OPS Surface	*MIN SFC HGT*	*Hgt Clearance*	*MSA Surface Hgt*	*Hgt Clearance*	*RTCC Surface Hgt*	*Hgt Clearance*	*Potential Crane Impact**
Site Reference Point	**Pt.Ref**	**206.280**	ILS 34R MA SA CAT I (163)	272.077	65.79	340.08	133.8	243.84	37.5.	**YES**
BMU	Pt.B	206.280	ILS 34R MA SA CAT I (163)	272.073	65.79	340.08	133.8	243.84	37.5	**YES**
North Edge of Site	Pt.N	202.280	ILS 34R MA SA CAT I (163)	273.726	71.44	340.08	137.8	243.84	41.5	Probably limited
Tall Tower (Southern Pt)	Pt.T	202.280	ILS 34R MA SA CAT I (163)	272.975	70.69	340.08	137.8	243.84	41.5	Probably limited
Lift Overrun	Pt.L	197.580	ILS 34R MA SA CAT I (163)	272.582	75.00	340.08	142.5	243.84	46.2	Probably limited
Central Rooftop	PtC	195.005	ILS 34R MA SA CAT I (163)	272.856	77.85	340.08	145.0	243.84	48.8	Probably limited
South Tower	Pt.S	192.205	ILS 34R MA SA CAT I (163)	272.128	79.92	340.08	147.8	243.84	51.6	Probably limited

** Cranes which exceed the PANS-OPS &/or RTCC would be subject to a 3-month time limit & other operating conditions*

For buildings, the estimated Crane impact is determined by the available clearance over the building:

- clearance more than 60m - no impact
- clearance 50m - 60m - potentially limited
- clearance 40m - 50m - probably limited
- clearance 40m or less - assumed impact on crane feasibility

For TCs, the Crane impact is determined based on any penetration of the PANS-OPS or RTCC surfaces