Avenor

Planning Proposal 173-179 Walker Street North Sydney — Preliminary Aeronautical Impact Assessment

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strategic airspace

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Document Title: **Planning Proposal 173-179 Walker Street North Sydney — Preliminary Aeronautical Impact Assessment**

Purpose / Abstract:

This report is part of a Planning Proposal submitted to the Department of Planning and Environment (DP&E) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Avenor is seeking planning approval to amend the current height and FSR controls to allow for the development of a high density residential tower on Walker Street in North Sydney. The residential tower will be built on a site where there are currently 4 three-storey residential buildings.

This report assesses the current and forecast regulated airspace height constraints over the site to inform the planning process. The airspace constraints are examined in relation to the maximum building envelope proposed and the additional airspace that would be required for cranes necessary to enable the development.

The study concludes that the high density residential tower on 173-179 Walker Street, as proposed, would be considered approvable under the Airports (Protection of Airspace) Regulations.

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SACL	Sydney Airport Corporation Ltd		
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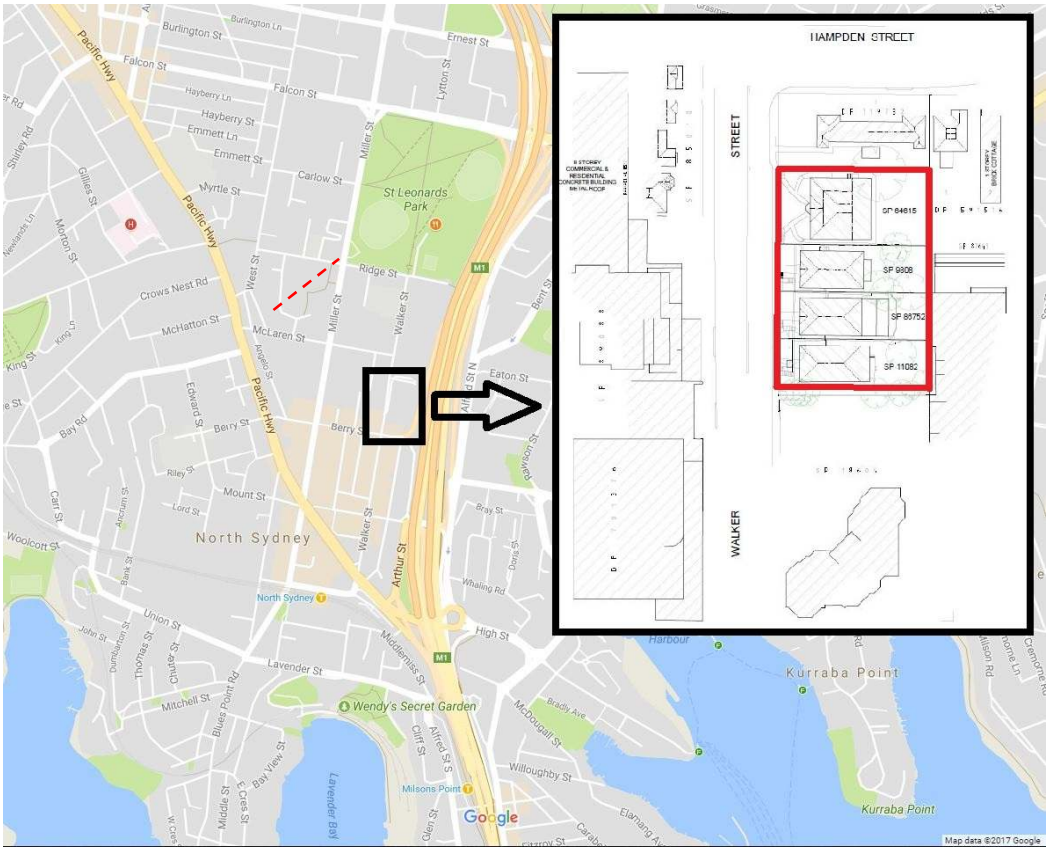
1. Executive Summary

This report is part of a Planning Proposal submitted to the Department of Planning and Environment (DP&E) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Avenor is seeking planning approval for the development of high density residential tower on Walker Street in North Sydney. The residential tower will be built on a site where there are currently 4 three-storey residential buildings. These are accessible from Walker Street to the West. Avenor is seeking to lodge a Planning Proposal on those properties to enable the change of planning controls to allow for the construction of a high density residential tower.



Source: Google Maps

Figure 1 — Site Location

From the aviation perspective, the key element of the proposed development that is relevant is the height of the proposed residential tower in metres Australian Height Datum (AHD):

- **210m AHD**

The airspace constraints are examined in relation to the maximum building height proposed and the additional airspace that would be required for cranes necessary to enable the development.

This report has been prepared having regard to Prescribed Airspace for Sydney Airport. **It examines the current and forecast regulated airspace height limits constraints overhead the site that are related to aviation airspace protection requirements** and which would:

a) Trigger the requirement to apply for an airspace height approval;
b) Constrain the maximum permissible building envelope heights; and
c) Constrain the maximum permissible heights for cranes that would be required to enable construction of the proposed development.

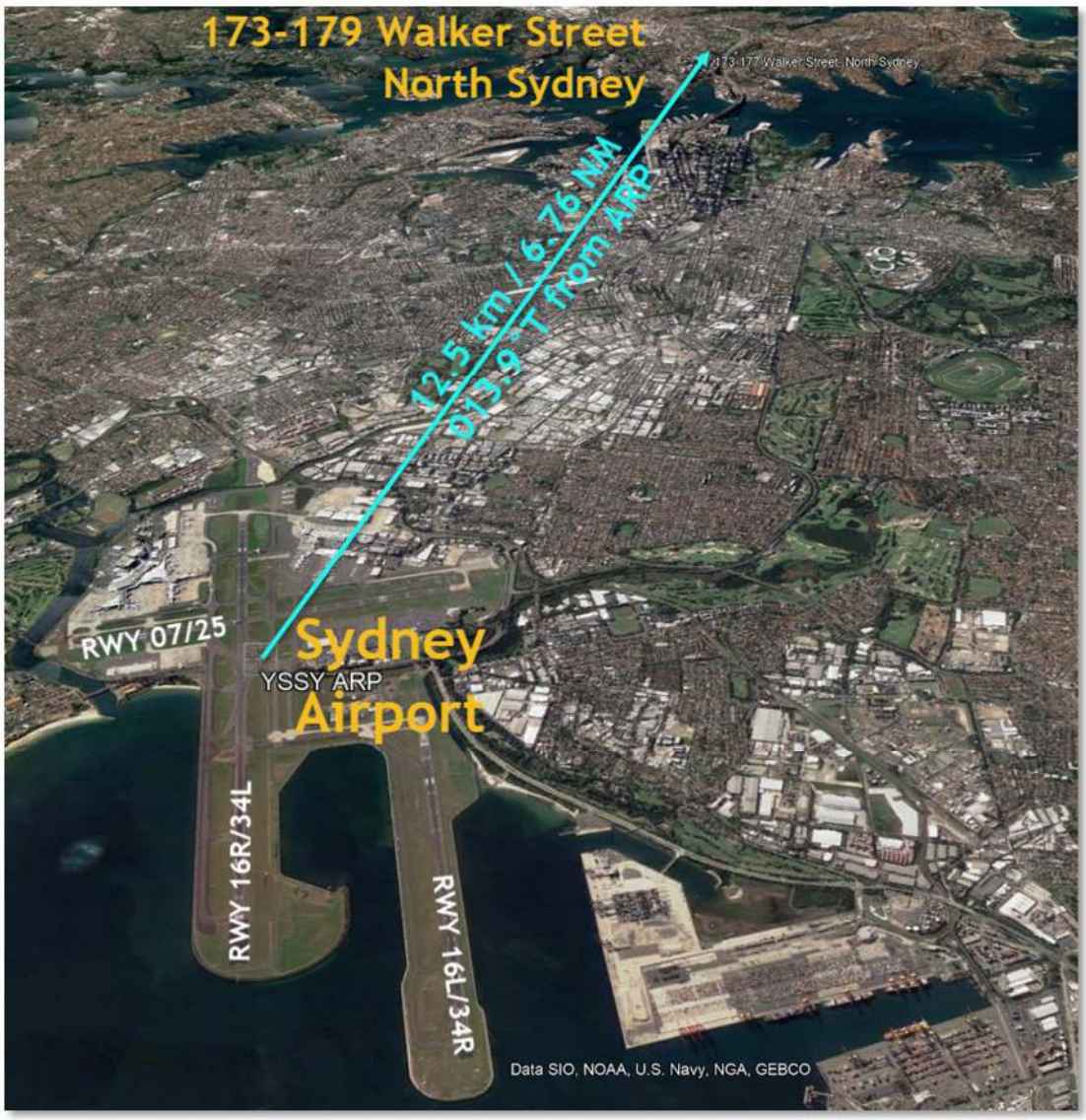


Figure 2 — Project site in relation to Sydney Airport

The study area is located in approximately 12.5 km (6.76 Nautical Miles, NM) north-north-east of the aerodrome reference point of Sydney Airport. In this location, the site is:

- Subject to Obstacle Limitation Surface (OLS) height limit, across the entire site, of 156m Australian Height Datum (AHD).

  OLS heights can be considered threshold heights; any building or crane which would exceed the relevant height would need to gain airspace height approvals from the Commonwealth Department of Infrastructure and Regional Development (DIRD), under the Airports (Protection of Airspace) Regulations (APAR) prior to construction or erection.

- Constrained by the Radar Terrain Clearance surface, which protects aircraft being vectored by Air Traffic Control at a minimum altitude of

2,000ft. The corresponding height constraint imposes a fixed height limit of 304.8m AHD across the site. (Note that the line representing the change between the 304.8m and 335.3m (2100ft) passes through the site; so the more conservative height limitation of 304.8m is assumed.)

RTCC surface heights are based on the heights related to the protection requirements of aircraft being vectored in Sydney Airport's airspace. These define the maximum permissible heights for buildings (including all overruns) under the APAR, except where another aviation safety-related airspace constraint is lower.

The relevant airspace constraints overhead the study area are summarised as follows:

Table 1 — Summary — Airspace Height Constraints

Height Limits (AHD)	*Height Limit Detail*	*Comment*
156m	OLS Outer Horizontal Surface (OHS)	THRESHOLD HEIGHT limits (depicted in Figure 6, p12) Any development that would exceed the relevant limiting heights across the site would require a prior 'airspace height' approval from the Department of Infrastructure and Regional Development under the Airports (Protection of Airspace) Regulations (or APAR).
304.8m	**Radar Terrain Clearance Chart (RTCC)** / Minimum Vector Altitude (MVA)	**This constraint is the maximum permissible building height (including crane heights) that would be approved by the aviation authorities in the relevant areas** (see Figure 9, p17) The vertical space available between the maximum proposed building height and the applicable airspace height constraint leaves ample room for cranes.
>304.8m	PANS-OPS 10NM Minimum Sector Altitude (MSA)	Though the building site falls within the lateral limits of the 10NM Minimum Sector Altitude protection area, the limiting height is higher than that of the RTCC MVA constraints.
N/A or >304.8m	PANS-OPS Approaches & Departures Surfaces	The study area is outside the extent of the protection areas of most of the PANS-OPS Approach Surfaces for Sydney Airport. Where PANS-OPS Missed Approach and Departure Procedure Surfaces do overlay the study area, the limiting heights are higher than that of the PANS-OPS 10NM MSA and RTCC MVA constraints.
NA	Other Surfaces	The study area is outside any airspace protection requirements related to Sydney Airport's Navigation and Airport Lighting and Visual Guidance facilities, as well as those related to Airline Engine Inoperative contingency take-off procedures.

The following table summarises the maximum proposed heights of the building in relation to the threshold OLS and constraining PANS-OPS surface heights.

Table 2 — Summary — Tower Buildings, Airspace Impact & Approvability Implications

Max Height (m AHD)	*Penetration of OLS **156**m AHD*	***CLEAR** of RTCC MVA **304.8**m AHD*	*Approvability Comment*
210	54	94.8	**Approvable under APAR**, with obstacle lighting conditions

The proposed tower would infringe the OLS, it would require prior airspace approvals under the APAR. Any approval for this project would most likely include conditions for the installation and operation of obstacle lighting on the tower, in accordance with the Civil Aviation Safety Regulations Manual of Standards (CASR MOS) Part 139.

Based on the proposed maximum tower heights, the tower is well clear of (below) the maximum permissible height prescribed for the RTCC MVA. The same height would be considered the cap height for cranes. However, given the clearance margins between that height constraint and the building roof top, there is ample room for cranes that would be required for construction without adversely affecting protected airspace.

Other buildings and building footprints where the maximum building height (including overruns) is below the OLS height would not need prior airspace approval.

Taking these factors into consideration, as well as the location of the site in relation to the airport, **there is no technical impediment to approval of the development of the site at 173-179 Walker Street in North Sydney** providing the maximum heights of buildings and cranes ultimately proposed do not exceed the RTCC/MVA Height Constraints documented herein, **and we consider that an application under the Airports (Protection of Airspace) Regulations, supported by a full aeronautical assessment and safety case would be approved by the Department of Infrastructure and Regional Development**.

Thus from an aviation perspective we anticipate no barrier to approval of the Planning Proposal for the development of 173-179 Walker Street North Sydney.

2. Introduction

This report is part of a Planning Proposal submitted to the Department of Planning and Environment (DP&E) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Avenor is seeking planning approval for the development of a high density residential tower on Walker Street in North Sydney. The residential tower will be built on a site where there are currently 4 three-storey residential buildings. Avenor is seeking to lodge a Planning Proposal on those properties to enable the change of planning controls to allow for the construction of a high density residential tower. This proposal follows on to the recent "Planning Proposal to Implement the North Sydney CBD Capacity and Land use strategy" by North Sydney Council, which was approved at Gateway and is now with the RPA for implementation since 20 Jul 2017. The North Sydney CBD Capacity and Land Use Strategy will result in a substantial increase in the building heights in the North Sydney CBD to heights higher than the proposed tower.

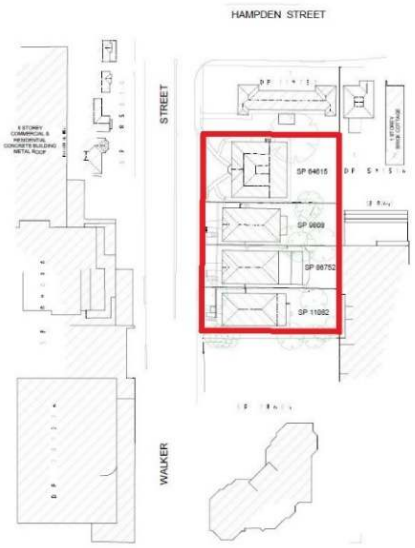
The airspace constraints are examined in relation to the maximum building height proposed and the additional airspace that would be required for cranes necessary to enable the development.

This report has been prepared having regard to Prescribed Airspace for Sydney Airport. **It examines the current and forecast regulated airspace height limits constraints overhead the site that are related to aviation airspace protection requirements** and which would

a) Trigger the requirement to apply for an airspace height approval;
b) Constrain the maximum permissible building envelope heights; and
c) Constrain the maximum permissible heights for cranes that would be required to enable construction of the proposed development.

2.1 Site Description

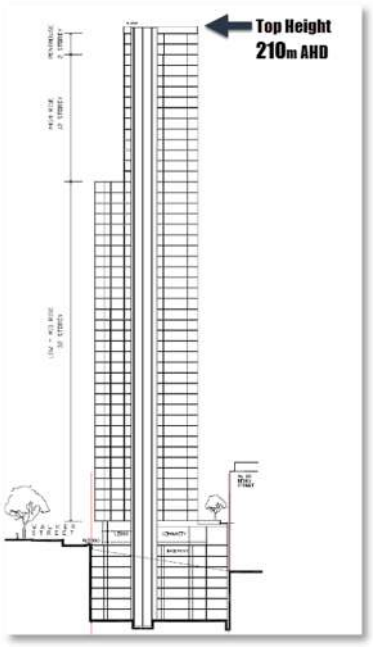
The site currently consists of 4 different lots which will be redeveloped to serve as the location for a new high density residential tower. Many tall towers can already be found in close proximity of the proposed site. Though none are currently as tall as the newly proposed tower, recently proposed amendments to the planning controls for the locality will enable buildings to be developed to a similar height as this proposed development.



Source: Avenor

Figure 3 — 173-179 Walker Street North Sydney Site Plan (as per Figure 1)

2.2 The Proposed Development from the Aviation Perspective



Source: Avenor & Strategic Airspace

Figure 4 — Profile view of proposed development with indication of maximum intended height for the tower.

From the aviation perspective, the key element of the proposed development that is relevant is the height of the proposed residential tower in metres Australian Height Datum (AHD):

- **210m AHD**

The airspace constraints are examined in relation to the maximum building height proposed and the additional airspace that would be required for cranes necessary to enable the development.

3. Aeronautical Impact Context

3.1 Location of the Proposed Development

The site, located on the western side of the Bradfield Highway in North Sydney is located approximately 12.5 km (6.76 Nautical Miles, NM) North-North-East of the aerodrome reference point of Sydney Airport, as indicated in Figure 6 below.

The measurement point used for this preliminary aeronautical assessment is at the southern-eastern corner of the proposed site, the approximate coordinates* being:

Latitude:	33° 50' 11.5" S	Longitude:	151° 12' 34.3" E	
Easting:	334,327.38	Northing:	6,254,527.57	Zone 56

** NB: These are not survey coordinates. They have been digitised from GoogleEarth™, having registered the roof plan in situ.*

Figure 5 — Location of Aeronautical Assessment Coordinate

The other airports in the Sydney Basin are too distant from the study area to have any impact on the airspace overhead it.

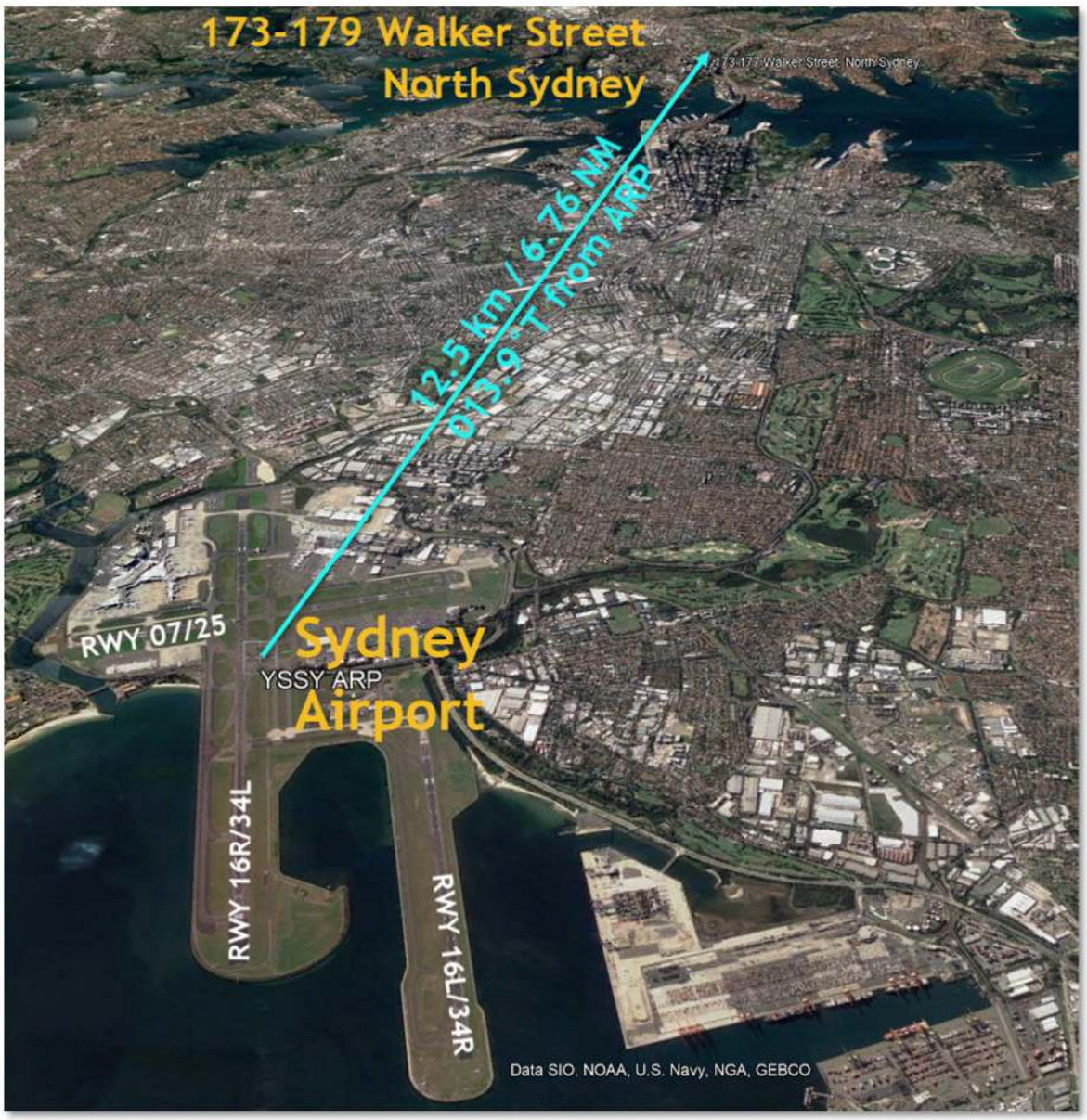


Figure 6 — Project site in relation to Sydney Airport (Large Format)

3.2 Methodology

The methodology used to determine the maximum building height (or minimum airspace height limitation) above the development site takes into consideration each of the following.

3.2.1 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.

3.2.2 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 and Regional Development (DIRD) — 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 development does not penetrate or adversely affect surfaces protecting: 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 either permanent or temporary buildings or structures. However, for a variety of reasons, PANS-OPS surfaces can and do change over time.
  - 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 Altitudes (MVAs) 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; and
    - Navaid and radar evaluation / protection surface plans.
  - **Other Factors**
    - Protection for other Instrument Flight Procedure surfaces, where the procedures are not classified as PANS-OPS and/or have been omitted from Sydney Airport's declared PANS-OPS surfaces charts. These may include a variety of Required Navigation Procedures (RNP).
    - 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.
    - 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 the Department of Infrastructure and Regional Development as Declared Airspace is considered part of an airport's Prescribed Airspace.

3.2.3 Note about Heights: Australian Height Datum (AHD) vs Above Ground Level (AGL)

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 airspace height limits, any building height approval under the Airports (Protection of Airspace) Regulations is regarded as inclusive of the building itself, plus all rooftop furniture and overruns (plant buildings, lift risers, antennae, etc).

3.2.4 Making an Application for an Aviation-related Airspace Height Approval

All applications under APAR must be submitted to DIRD, at the appropriate time, through the closest relevant airport — in this case, Sydney Airport. Applications should include aeronautical impact assessment reports — such as this, but which are based on the most current plans for the proposed development available at the time. For major developments, such reports should include consideration of cranes that will be required for construction: this information will be used for assessment of the feasibility of constructing the buildings if approved at the maximum heights sought. Safety impact assessments and mitigation strategies may need to be included in the aeronautical study, depending on the nature and location of the development in relation to the airspace restrictions and other aeronautical impact factors.

Separate applications for cranes will also be required at the appropriate times during the construction period, prior to their installation and operation.

4. Analysis

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

Table 3 — Summary — Airspace Height Constraints

Height Limits (AHD)	*Height Limit Detail*	*Comment*
156m	OLS Outer Horizontal Surface (OHS)	THRESHOLD HEIGHT limits (depicted in Figure 6, p12) Any development that would exceed the relevant limiting heights across the site would require a prior 'airspace height' approval from the Department of Infrastructure and Regional Development under the Airports (Protection of Airspace) Regulations (or APAR).
304.8m	**Radar Terrain Clearance Chart (RTCC)** / Minimum Vector Altitude (MVA)	**This constraint is the maximum permissible building height (including crane heights) that would be approved by the aviation authorities in the relevant areas** (see Figure 9, p17) The vertical space available between the maximum proposed building height and the applicable airspace height constraint leaves ample room for cranes.
>304.8m	PANS-OPS 10NM Minimum Sector Altitude (MSA)	Though the building falls within the lateral limits of the 10NM Minimum Sector Altitude protection area, the limiting height is higher than that of the RTCC MVA constraints.
N/A or >304.8m	PANS-OPS Approaches & Departures Surfaces	The study area is outside the extent of the protection areas of most of the PANS-OPS Approach Surfaces for Sydney Airport. Where PANS-OPS Missed Approach and Departure Procedure Surfaces do overlay the study area, the limiting heights are higher than that of the PANS-OPS 10NM MSA and RTCC MVA constraints.
NA	Other Surfaces	The study area is outside any airspace protection requirements related to Sydney Airport's Navigation and Airport Lighting and Visual Guidance facilities, as well as those related to Airline Engine Inoperative contingency take-off procedures.

4.1 OLS Analysis

The height limit of Sydney Airport's OLS overhead the precinct is defined by the Outer Horizontal Surface, which is 156m AHD, as depicted in Figure 6 below.

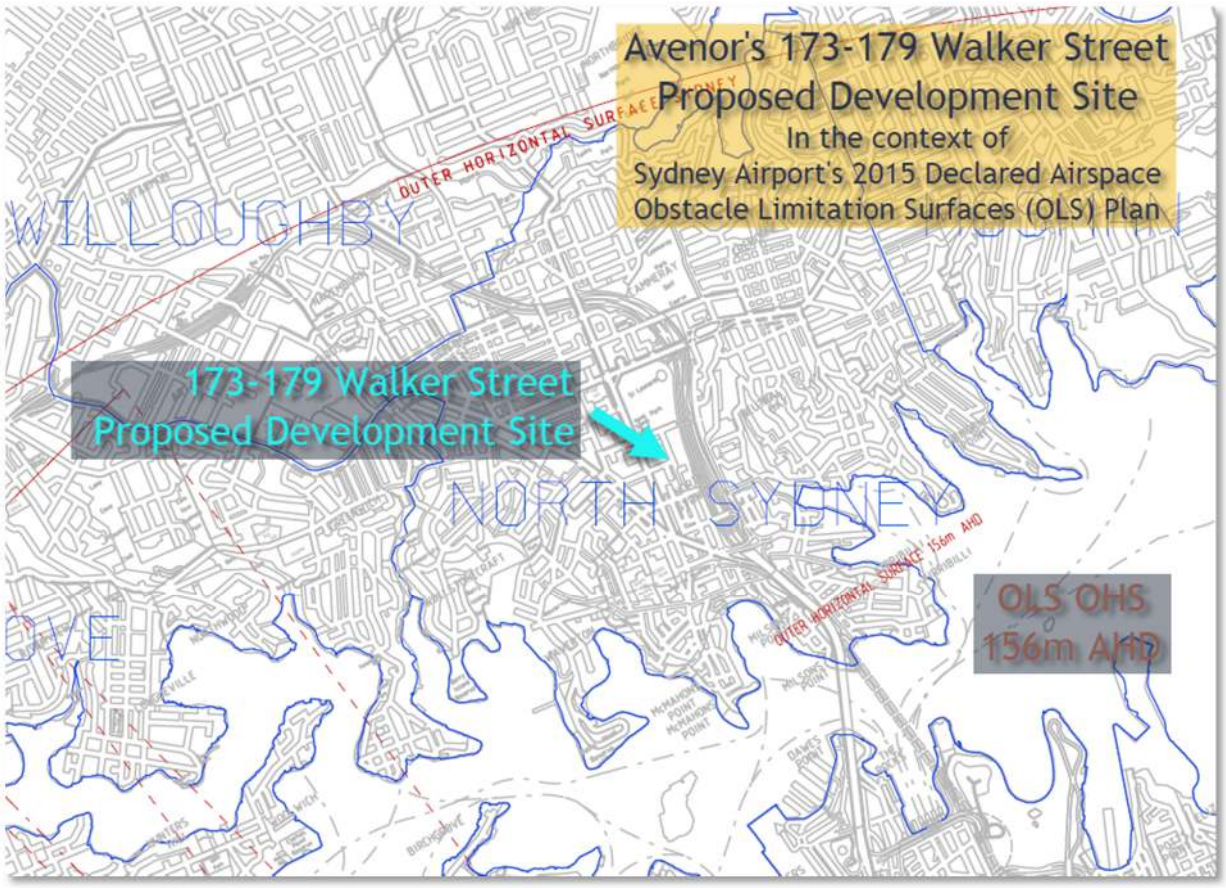


Figure 7 — Site in relation to Sydney Airport's OLS

The building and cranes may exceed the OLS height limits but an application for the aviation-related airspace approval for the proposed development must be submitted to Commonwealth Department of Infrastructure and Regional Development (DIRD) via Sydney Airport. Failure to obtain such approval before construction commences can result in significant penalties under the Airports Act (1996).

Conversely, airspace height approvals are not required for any buildings or cranes that would not exceed the OLS height limits.

The Sydney Airport Master Plan to 2033 does not forecast any changes to the aerodrome that would occasion a change to the OLS. Thus, the current OLS is anticipated to remain in force for the planning horizon of the project.

Table 4 — OLS Height Impact & APAR Approval Implications

Max Height (m AHD)	*Penetration of OLS **156**m AHD*	*Approvability Comment*
210	54	Requires prior APAR approval
>210	>54	Cranes for the construction of the building will require separate APAR approval prior to their erection

Under the Civil Aviation Safety Regulations Manual of Standards (CASR MOS) Part 139, any building or crane that penetrates an OLS is subject to obstacle lighting conditions. The recommendations as to the conditions that should be imposed as part of an approval would be made by the Civil Aviation Safety Authority (CASA) to the DIRD. It is highly likely that the tower would be required to have obstacle lights installed and operational.

4.2 PANS-OPS Analysis

In addition to reviewing the PANS-OPS Surfaces chart of Sydney Airport's Prescribed Airspace (as declared and approved by DIRD in 2015), assessment was conducted of the following instrument (non-visual) procedure types for Sydney Airport, as published by Airservices Australia in the Australian Aeronautical Information Publication (AIP) Departure and Approach Procedures (DAP), up to the pending Amendment 152 (effective 17-Aug-2017 to 08-Nov-2017).

- The Circling Minima and Minimum Sector Altitudes (MSAs) for existing PANS-OPS procedures
  "Area" procedures, which provide protection for aircraft manoeuvring or circling within defined areas above the airport and surrounds
- The discrete minima for the Instrument Approach Procedures.
- Missed Approaches — as part of the evaluation of Approach Procedures
- The existing Standard Instrument Departure Procedures (SIDs)
- Minimum Sector Altitude – 10 NM Sector

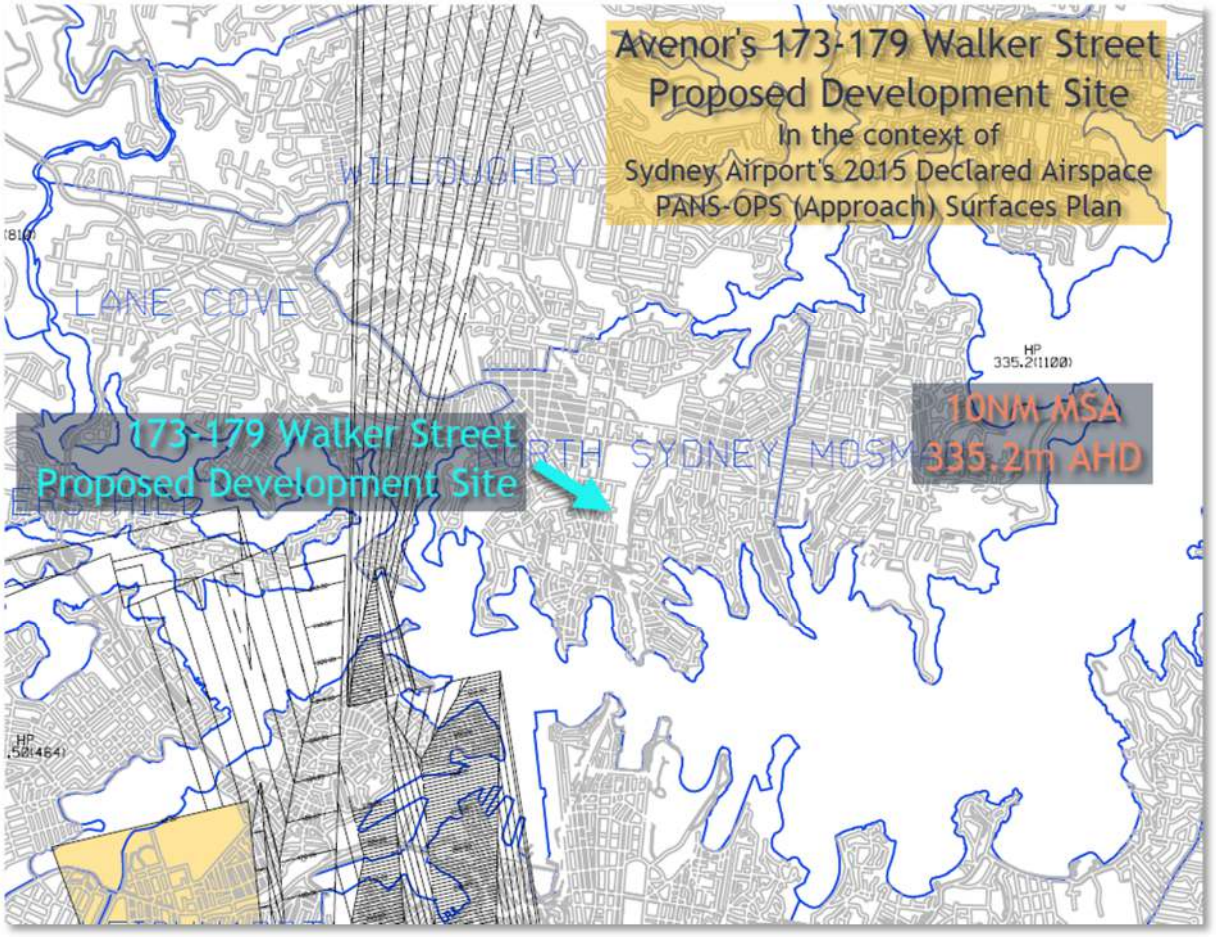


Figure 8 — PANS-OPS Approach Procedure Height Constraints across the Site

Of the approach and departure procedures, only procedures that are relevant to the project site are included in this report. These relevant procedures are procedures for the eastern North-South runway, RWY 16L/34R, departures from RWY 07, and "area" procedures.

The Sydney Airport Master Plan to 2033 was also reviewed for potential future impact. The Master Plan does not forecast any changes to procedures that would, to our best

knowledge, make the airspace above the project site any more constraining than that resulting from analysis of the current PANS-OPS procedures.

Analysis determined that the precinct is not constrained by protection surfaces related to approach flight procedures to runways at Sydney Airport, and although the precinct is under the protection surfaces for some missed approach and departure procedures, the effective height limit imposed on the site is that of the surface related to the 10 NM Minimum Sector Altitude (MSA). See the following sections for more details.

Table 5 — PANS-OPS Height Limit Summary

Procedure	*Height Limit (m AHD)*	*Description*
Minimum Sector Altitude (MSA)	**335.2**	**The 10 NM Minimum Sector Altitude of 2100 ft results in this surface height constraint.** This limit applies across the entire site area.
Circling Areas	N/A	This site is outside the extent of the Circling Areas.
Approaches and Missed Approaches to all Runways	N/A or >335.2	Outside the lateral protection areas of many procedures. Where protection surfaces overlay the study area, the lowest limit is higher than that of the maximum permissible obstacle constraint imposed by the 10NM MSA (see below).
Departures	N/A or >335.2	Where protection surfaces overlay the study area, the lowest limit is higher than that of the maximum permissible obstacle constraint imposed by the 10NM MSA (see below).

Table 6 — PANS-OPS Height Impact & APAR Approval Implications

Max Height (m AHD)	***CLEAR** of PANS-OPS **335**m AHD*	*Approvability Comment*
210	125.2	Approvable under APAR

Further details are provided in the following sections.

4.2.1 "Area" Procedures

A Minimum Sector Altitudes (MSAs)

The MSA protects area manoeuvring by aircraft within defined sectors. The relevant sector is a circular area of 10 NM in radius (plus a 5NM buffer) around the airport. The height restriction imposed by 10NM MSA is lower than the limits imposed by other procedures (eg, departure procedures) which also overlay the site.

Procedure	*Feature and / or Restriction*	*Description*
10NM MSA	Horizontal Surface: • **335.2m**	See Figure 7 above. Covers the entire site0.

B Circling Minima

The site is outside the extent of the circling procedures.

4.2.2 Instrument Approaches & Missed Approaches

The impact of each of the relevant PANS-OPS protection surfaces for current approach and departure procedures for Sydney Airport are summarised

below. The lateral extent of restrictions is shown in the diagrams (where appropriate).

A Approach Procedures to RWY 16L

The site is laterally clear of the protection surfaces of the following procedures:

- RWY 16L RNAV(GNSS) Approach
- RWY 16L ILS and GLS Approaches

Approaches to other runways are too far from the North Sydney site to warrant consideration in this study.

B Missed Approach Segments of Approach Procedures for RWY 07 and RWY 34R

The precinct is unconstrained by the following procedures, either because the limiting heights are so high (higher than other more restrictive surfaces) or the site is laterally outside the protection surfaces.

- RWY 34R RNAV(GNSS) Missed Approach
- RWY 34R ILS and GLS Missed Approaches

- Missed Approaches from other runways are too far from the North Sydney site to warrant consideration in this study.

4.2.3 Departures

Height limitations may be imposed by departure procedures from both RWY34R and RWY07, but the limiting heights overhead the project site are significantly higher than the limit imposed by the 10NM MSA. For example, the most restrictive of the height limits from any departure, as shown on Sydney Airport's 2015 Declared Airspace chart for Omnidirectional Radar Departures, is above 380m AHD. However, this particular chart is not entirely correct and is also obsolete due to changes to procedures since the time it was drafted and approved, and also because of a change in the PANS-OPS departure criteria at the end of 2016. StratAir's independent calculations of the PANS-OPS omnidirectional departure procedures indicate that the height constraints from the current procedures (from RWY34R and RWY07) are of the order of ~460m AHD.

4.3 Other Assessment Considerations

The following table provides a brief assessment of other considerations.

Table 7 — Other Assessable Height Limitations — including the RTCC MVA Limit

Procedure	*Height Limit (m AHD)*	*Description*
Radar Terrain Clearance Chart (RTCC) / Minimum Vector Altitude (MVA)	**304.8**	This height constraint is applicable over the building site. This is the limit related to the Minimum Vectoring Altitude (MVA), which is used by air traffic controllers. This information is sourced from the RTCC published as part of Sydney Airport's Prescribed Airspace Plans.

Procedure	*Height Limit (m AHD)*	*Description*
Navigation Infrastructure	N/A	The proposed development is too far from the airport to affect any navigation infrastructure.
Airlines Engine Out Procedures	N/A	Engine Out procedures (from RWY 34R, the most relevant take-off runway end for these procedures) 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, which is closer to the airport and taller than the proposed development. As such this proposal will not adversely affect any contingency procedures.

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

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

The surface depicted in Sydney Airport's 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.

The RTCC / MVA height limit overhead the entire study area is 304.9m AHD. This surface constraint becomes the effective limit as it is lower than surface heights related to PANS-OPS approach and departure procedures. The relevant RTCC surface boundary is depicted in relation to the site in Figure 9 below.

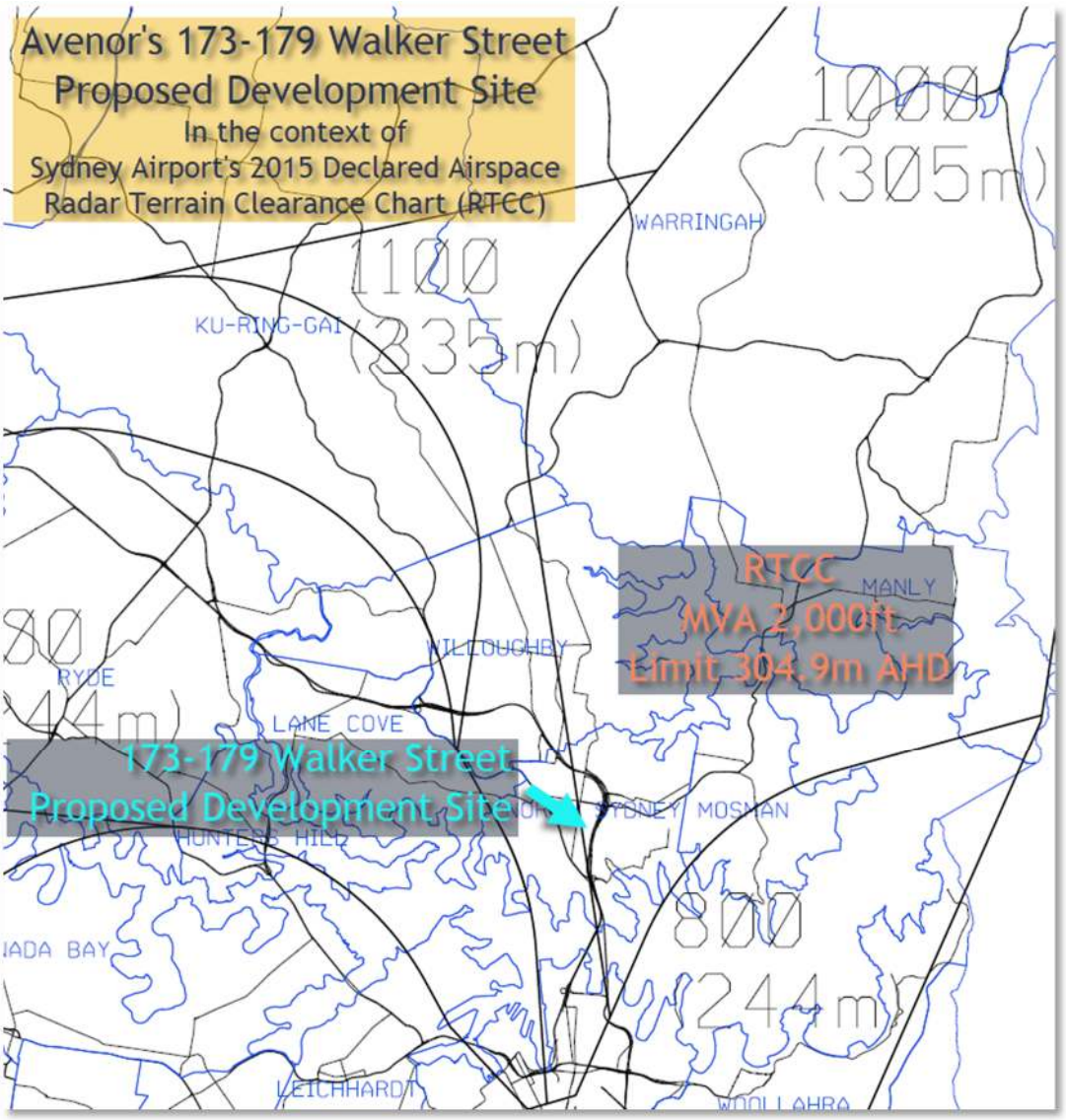


Figure 9 — Radar Terrain Clearance Chart (RTCC) Height Constraints across the Site

5. Conclusion

From an aeronautical impact point of view, the 173-179 Walker Street site benefits from its location in relation to the airport and the two nearest runways — RWY 07/25 and RWY 16L/34R — which means that in practice it is unaffected by height constraints related to the approach, missed approach and departure procedures to/from those runways.

The OLS height overhead the site is related to the Outer Horizontal Surface, which at 156m AHD means that the proposed tower on the site will be subject to the Airports (Protection of Airspace) Regulations.

The overall degree of penetration of the OLS and the amount of clearance between the maximum proposed tower height and the constraining PANS-OPS surface height are summarised in Table 8 below.

Table 8 — Summary —Airspace Impact & Approvability Implications

Max Height (m AHD)	*Penetration of OLS **156**m AHD*	***CLEAR** of RTCC MVA **304.8**m AHD*	*Approvability Comment*
210	54	94.8	**Approvable under APAR**, with obstacle lighting conditions

Further, given the location of the site in relation to Sydney Airport, and the amount of clearance between the maximum building height of the proposed tower and the constraining 'maximum permissible heights' defined by the PANS-OPS and RTCC/MVA surfaces, there is ample room for cranes of all types to be used for construction — and so the development can also be considered feasible because its construction would not cause any adverse impacts on the protected airspace. Thus, Sydney Airport and other aviation stakeholders would not have cause to object to the approval of the building on this basis.

Taking these factors into consideration, as well as the location of the site in relation to the airport, **there is no technical impediment to approval of the proposed development of a high density residential tower on the 173-179 Walker Street site in North Sydney** providing the maximum height of building and cranes ultimately proposed do not exceed the PANS-OPS and RTCC/MVA Height Constraints documented herein**, and we consider that an application under the Airports (Protection of Airspace) Regulations, supported by a full aeronautical assessment and safety case would be approved by the Department of Infrastructure and Regional Development**.

Thus from an aviation perspective we anticipate no barrier to approval of the development of a high density residential tower on the 173-179 Walker Street site in North Sydney.

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
APACL	Australia Pacific Airports Corporation Limited, owner of Melbourne and Launceston Airports
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)
BAC	Brisbane Airport Corporation
BCC	Brisbane City Council
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
CNS/ATM	Communications, Navigation, Surveillance / Air Traffic Management
CPA	Cairns Port Authority, Operators Of Cairns Airport
DA (Aviation)	Decision Altitude (Aviation)
DA (Planning)	Development Application or Development Approval (Planning)
DAH	Designated Airspace Handbook
DAP	Departure and Approach Procedures (published by AsA)
DEP	Departure
DER	Departure End (of the) Runway
DEVELMT	Development
DH	Decision Height
DIRD	Department of Infrastructure and Regional Development (sometimes also abbreviated as Infrastructure)
DME	Distance Measuring Equipment
Doc nn	ICAO Document Number nn
DoD	Department of Defence
DODPROPS	Dependent Opposite Direction Parallel Runway OPerations
EIS	Environmental Impact Study
ELEV	Elevation (above mean sea level)

Abbreviation	*Meaning*
ENE	East North East
ERSA	EnRoute Supplement Australia
ESE	East South East
FAF	Final Approach Fix
FAP	Final Approach Point
Ft	Feet
GBAS	Ground-Based Augmentation System, a GNSS augmentation system to provide vertical guidance and additional precision to non-precision approaches — permits GLS Approaches
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
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
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
NPR	New Parallel Runway (Project, Brisbane Airport)
OAR	Office of Airspace Regulation
OCA	Obstacle Clearance Altitude (in this case, in AMSL)
OCH	Obstacle Clearance Height

Abbreviation	*Meaning*
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
RPA	Rules and Practices for Aerodromes — replaced by the MOS Part 139 — Aerodromes
RPT	Regular Public Transport
RTCC	Radar Terrain Clearance Chart (refer also MVA)
RWY	Runway
SACL	Sydney Airport Corporation Limited
SID	Standard Instrument Departure
SODPROPS	(Independent) Simultaneous Opposite Direction Parallel Runway OPerations
SPP	State Planning Policy, Queensland (specifically SPP 1/02: Development in the Vicinity of Certain Airports and Aviation Facilities)
SSDA	State Significant Development Application
SSP	State Significant Precinct
SSR	Secondary Surveillance Radar
STAR	STandard Arrival
TAR	Terminal Approach Radar
TAS	True Airspeed
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
VOR	Very high frequency Omni-directional Range
VSS	Visual Segment Surface
WAC	Westralia Airports Corporation, operators of Perth Airport
WAM	Wide-Area Multilateration
WNW	West North West
WSW	West South West
WGS84	World Geodetic System 1984
WSA	Western Sydney Airport – the proposed second international airport for the Sydney Basin

APPENDIX 2 — PANS-OPS PROCEDURES

The latest versions of the IFPs consulted were from the current AIP Amendment 152, effective from 17-Aug-2017 to 08-Nov-2017 — as indicated in Table 5 below.

Table 9 — Appendix: PANS OPS Instrument Flight Procedure Charts for Sydney Airport (AIP Amendment 152 – Effective 17-Aug-2017 to 08-Nov-2017)

SYDNEY (YSSY)

Name of Chart	*Effective Date (Amendment No)*
AERODROME CHART PAGE 1	2-Mar-2017 (Am 150)
AERODROME CHART PAGE 2	10-Nov-2016 (Am 149)
APRON CHART - INTERNATIONAL PAGE 1	13-Nov-2014 (Am 141)
APRON CHART - INTERNATIONAL PAGE 2	25-May-2017 (Am 151)
APRON CHART - DOMESTIC PAGE 1	26-May-2016 (Am 147)
APRON CHART - DOMESTIC PAGE 2	26-May-2016 (Am 147)
APRON CHART - DOMESTIC PAGE 3	26-May-2016 (Am 147)
STANDARD DOMESTIC TAXI ROUTES - ARRIVALS	21-Aug-2014 (Am 140)
STANDARD DOMESTIC TAXI ROUTES - DEPARTURES	6-Mar-2014 (Am 138)
NOISE ABATEMENT PROCEDURE PAGE 1	17-Nov-2011 (Am 129)
NOISE ABATEMENT PROCEDURE PAGE 2	17-Aug-2017 (Am 152)
NOISE ABATEMENT PROCEDURE PAGE 3	3-Mar-2016 (Am 146)
NOISE ABATEMENT PROCEDURE PAGE 4	3-Mar-2016 (Am 146)
NOISE ABATEMENT PROCEDURE PAGE 5	2-Mar-2017 (Am 150)
NOISE ABATEMENT PROCEDURE PAGE 6	3-Mar-2016 (Am 146)
NOISE ABATEMENT PROCEDURE PAGE 7	3-Mar-2016 (Am 146)
NOISE ABATEMENT PROCEDURE PAGE 8	3-Mar-2016 (Am 146)
NOISE ABATEMENT PROCEDURE PAGE 9	3-Mar-2016 (Am 146)
NOISE ABATEMENT PROCEDURE PAGE 10	3-Mar-2016 (Am 146)
AIRPORT EFFICIENCY PROCEDURES	18-Aug-2016 (Am 148)
IVA USER GUIDE PAGE 1	10-Nov-2016 (Am 149)
IVA USER GUIDE PAGE 2	6-Mar-2014 (Am 138)
SID SYDNEY ONE DEP (RADAR) - ALL RWYS	17-Aug-2017 (Am 152)
SID RWY 34L SOUTH WEST DEP (JET)	10-Nov-2016 (Am 149)
SID RWY 16R & 34L SOUTH DEP (NON-JET) (RNAV)	10-Nov-2016 (Am 149)
SID RWY 16R DEENA SEVEN (JET) (RNAV)	17-Aug-2017 (Am 152)
SID RWY 34R ENTRA FIVE (JET) (RNAV)	10-Nov-2016 (Am 149)
SID RWY 07 FISHA EIGHT (JET) (RNAV)	17-Aug-2017 (Am 152)
SID KAMBA DEP RWYS 07 & 16L (NON-JET) (RNAV)	10-Nov-2016 (Am 149)
SID RWY 16R KAMPI FOUR (JET) (RNAV)	17-Aug-2017 (Am 152)
SID RWY 16L KEVIN FIVE (JET) (RNAV)	10-Nov-2016 (Am 149)
SID RWY 16L ABBEY THREE (JET) (RNAV)	10-Nov-2016 (Am 149)
SID RWY 34R MARUB SIX (JET) (RNAV)	17-Aug-2017 (Am 152)
SID RWY 34L RICHMOND FIVE DEP (JET)	17-Aug-2017 (Am 152)
SID RWY 16L BOTANY BAY EIGHT (VISUAL) (RNAV)	10-Nov-2016 (Am 149)
SID RWY 16R CURFEW FIVE (RNAV)	10-Nov-2016 (Am 149)
STAR BOREE SIX ARRIVAL (RNAV)	10-Nov-2016 (Am 149)
STAR MEPIL ONE ARRIVAL (RNAV)	10-Nov-2016 (Am 149)
STAR MARLN TWO ARRIVAL (RNAV)	10-Nov-2016 (Am 149)
STAR ODALE SIX ARRIVAL (RNAV)	17-Aug-2017 (Am 152)
STAR RIVET TWO ARRIVAL (RNAV)	10-Nov-2016 (Am 149)
ILS-Z OR LOC-Z RWY 07	10-Nov-2016 (Am 149)

Name of Chart	*Effective Date (Amendment No)*
ILS-Y OR LOC-Y RWY 07	10-Nov-2016 (Am 149)
ILS-Z OR LOC-Z RWY 16L	10-Nov-2016 (Am 149)
ILS-Y OR LOC-Y RWY 16L	10-Nov-2016 (Am 149)
ILS-Z OR LOC-Z RWY 16R PAGE 1	17-Aug-2017 (Am 152)
ILS-Z RWY 16R PAGE 2	17-Aug-2017 (Am 152)
ILS-Y OR LOC-Y RWY 16R	2-Mar-2017 (Am 150)
ILS OR LOC RWY 25	10-Nov-2016 (Am 149)
ILS-Z OR LOC-Z RWY 34L PAGE 1	17-Aug-2017 (Am 152)
ILS-Z RWY 34L PAGE 2	17-Aug-2017 (Am 152)
ILS-Y OR LOC-Y RWY 34L	25-May-2017 (Am 151)
ILS-Z OR LOC-Z RWY 34R	10-Nov-2016 (Am 149)
ILS-Y OR LOC-Y RWY 34R	10-Nov-2016 (Am 149)
RNAV-Z (GNSS) RWY 07	17-Aug-2017 (Am 152)
RNAV-Z (GNSS) RWY 16L	17-Aug-2017 (Am 152)
RNAV-Z (GNSS) RWY 16R	17-Aug-2017 (Am 152)
RNAV-Z (GNSS) RWY 25	17-Aug-2017 (Am 152)
RNAV-Z (GNSS) RWY 34L	17-Aug-2017 (Am 152)
RNAV-Z (GNSS) RWY 34R	17-Aug-2017 (Am 152)
GLS RWY 07	10-Nov-2016 (Am 149)
GLS RWY 16L	10-Nov-2016 (Am 149)
GLS RWY 16R	2-Mar-2017 (Am 150)
GLS RWY 25	10-Nov-2016 (Am 149)
GLS RWY 34L	25-May-2017 (Am 151)
GLS RWY 34R	10-Nov-2016 (Am 149)
ILS PRM USER INSTRUCTIONS PAGE 1	10-Nov-2016 (Am 149)
ILS PRM USER INSTRUCTIONS PAGE 2	20-Aug-2015 (Am 144)
ILS-Z RWY 16L PRM	10-Nov-2016 (Am 149)
ILS-Y RWY 16L PRM	10-Nov-2016 (Am 149)
ILS-Z (CAT I & II) RWY 16R PRM	2-Mar-2017 (Am 150)
ILS-Y RWY 16R PRM	2-Mar-2017 (Am 150)
ILS-Z (CAT I & II) RWY 34L PRM	10-Nov-2016 (Am 149)
ILS-Y RWY 34L PRM	10-Nov-2016 (Am 149)
ILS-Z RWY 34R PRM	10-Nov-2016 (Am 149)
ILS-Y RWY 34R PRM	10-Nov-2016 (Am 149)

Source: AIP Book (17-Aug-2017) via http://www.airservicesaustralia.com/aip/aip.asp?pg=10