



AERONAUTICAL IMPACT ASSESSMENT

Victoria Cross Over Station Development



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Aeronautical Impact Assessment - Victoria Cross Over Station Development

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ABOUT **AVLAW PTY LTD**

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The AvLaw team of consultants and auditors are comprised of senior airline executives, airport directors, engineers, planning and operations specialists and safety regulators.

Our subject matter experts each have extensive operational experience across a wide range of disciplines including airport and flight operations, maintenance, engineering, air traffic management, aviation law and regulations, aviation security, aviation economics and drones/RPA.



1

Background

Background

Introduction

This report has been prepared to accompany a detailed State Significant Development (SSD) development application (DA) for a commercial mixed-use Over Station Development (OSD) above the new Sydney Metro Victoria Cross Station. The detailed SSD DA is consistent with the Concept Approval (SSD 17_8874) granted for the maximum building envelope on the site, as proposed to be modified.

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, Industry and Environment (NSW DPIE) for assessment.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 6 May 2019. Specifically, this report has been prepared to respond to the following SEARs:

14) Prescribed Airspace for Sydney Airport

The EIS shall identify any impacts of the proposal on the prescribed airspace for Sydney Airport

This report has also been prepared in response to the following condition of consent for the State Significant Development Concept (SSD 8874) for the OSD:

AIRSPACE PROTECTION

A20. For the purposes of controlled activities within the prescribed airspace for Sydney Airport, the building must not exceed a maximum height of RL 230 metres Australian Height Datum, inclusive of all lift over-runs, vents, chimneys, aerials, antennas, lightning rods, any roof top garden plantings, exhaust flues, etc

A21. The building must be obstacle lit by medium intensity steady red lighting during the hours of darkness at the highest point of the building. Obstacle lights are to be arranged to ensure the building can be observed in a 360 degree radius as per subsection 9.4.3 of the Manual of Standards Part 139 - Aerodromes (MOS Part 139). Characteristics for medium intensity lights are stated in subsection 9.4.7 of MOS Part 139.

A22. The proponent must ensure obstacle lighting arrangements have a remote monitoring capability, in lieu of observations every 24 hours, to alert SACL reporting staff of any outage. For detailed requirements for obstacle lighting monitoring within the OLS of an aerodrome, refer to subsection 9.4.10 of the MOS Part 139.

A23. The proponent must advise Airservices Australia at least 3 business days prior to the controlled activity commencing by emailing ifp@airservicesaustralia.com and quoting SY-CA-562.

A24. Separate approval must be sought under the Airports (Protection of Airspace) Regulations 1996 for any construction equipment (i.e. cranes) required to construct the building. Construction cranes may be required to operate at a height significantly higher than that of the proposed controlled activity and consequently, may not be approved

under the Regulations. Therefore, it is advisable that approval to operate construction equipment (i.e. cranes) be obtained prior to any commitment to construct.

A25. At the completion of the construction of the building, a certified surveyor is to notify (in writing) SACL of the finished height of the building.

The detailed SSD DA seeks development consent for:

- » Construction of a new commercial office tower with a maximum building height of RL 230 or 168 metres (approximately 42 storeys).
- » The commercial tower includes a maximum GFA of approximately 61,500sqm, excluding floor space approved in the CSSI
- » Integration with the approved CSSI proposal including though not limited to:
 - Structures, mechanical and electronic systems, and services; and
 - Vertical transfers;
- » Use of spaces within the CSSI 'metro box' building envelope for the purposes of:
 - Retail tenancies;
 - Commercial office lobbies and space;
 - 161 car parking spaces within the basement for the purposes of the commercial office and retail use;
 - End of trip facilities; and
 - Loading and services access.
 - Utilities and services provision.
 - Signage locations (building identification signs).
 - Stratum subdivision (staged).

The Site

The site is generally described as 155-167 Miller Street, 181 Miller Street, 187-189 Miller Street, and part of 65 Berry Street, North Sydney (the site). The site occupies various addresses/allotments and is legally described as follows:

- » 155-167 Miller Street (SP 35644) (which incorporates lots 40 and 41 of Strata Plan 81092 and lots 37, 38 and 39 of Strata Plan 79612)
- » 181 Miller Street (Lot 15/DP 69345, Lot 1 & 2/DP 123056, Lot 10/DP 70667)
- » 187 Miller Street (Lot A/DP 160018)
- » 189 Miller Street (Lot 1/DP 633088)
- » Formerly part 65 Berry Street (Lot 1/DP 1230458)



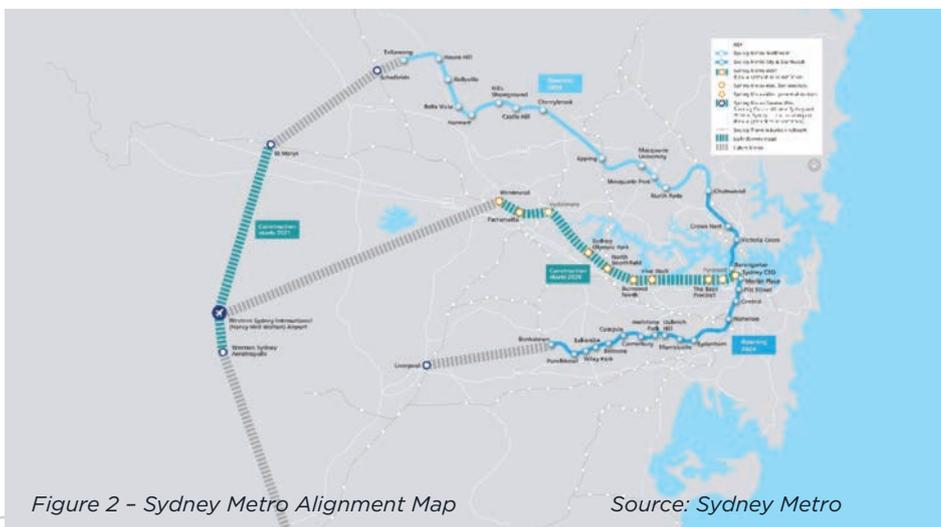
Sydney Metro Description

Sydney Metro is Australia’s biggest public transport project. Services started in May 2019 in the city’s North West with a train every four minutes in the peak. Metro rail will be extended into the CBD and beyond to Bankstown in 2024. There will be new metro railway stations underground at Crows Nest, Victoria Cross, Barangaroo, Martin Place, Pitt Street, Waterloo and new metro platforms under Central.

In 2024, Sydney will have 31 metro railway stations and a 66km standalone metro railway system – the biggest urban rail project in Australian history. There will be ultimate capacity for a metro train every two minutes in each direction under the Sydney city centre. The Sydney Metro Project is illustrated in the Figure below.

On 9 January 2017, the Minister for Planning approved the Sydney Metro City & Southwest - Chatswood to Sydenham project as a Critical State Significant Infrastructure project (reference SSI 15_7400) (CSSI Approval). The terms of the CSSI Approval includes all works required to construct the Sydney Metro Victoria Cross Station, including the demolition of existing buildings and structures on both sites. The CSSI Approval also includes construction of below and above ground works within the metro station structure for appropriate integration with the OSD.

With regards to CSSI related works, any component of the detailed design that is contained within the “metro box envelope” and public domain will be pursued in satisfaction of the CSSI conditions of approval and do not form part of the scope of the detailed SSD DA for the OSD.





2

**Executive
Summary**

Executive Summary

2. Executive Summary

Lendlease (Victoria Cross) Pty Limited (Lendlease) requested Avlaw Pty Ltd (Avlaw) in May 2019 to assist with the provision of an Aeronautical Impact Assessment (AIA) to supplement an application for controlled activity approvals with respect to their proposed commercial mixed-used development above the Victoria Cross Sydney Metro Station. The address is generally described as 155-167 Miller Street, 181 Miller Street, 187-189 Miller Street, & part of 65 Berry Street, North Sydney in North Sydney LGA i.e. the site.

The proposed maximum building height is 230m AHD (top of roof), with all plant and ancillary features captured within this envelope while temporary crane activity is to a maximum height of 305m AHD.

As explained in this AIA, Avlaw has determined that no aeronautical surfaces relative to Sydney (Kingsford Smith) Airport (Sydney Airport) will be adversely affected by the proposed development, nor will helicopter operations at the Royal North Shore Hospital helipad be adversely impacted.

Avlaw's assessment is that the Outer Horizontal Surface of the Obstacle Limitation Surfaces (OLS) across the site is 156m AHD and will be penetrated permanently by the building structure and temporarily by construction cranes meaning both will require controlled activity approval. Penetration of the OLS requires aeronautical assessment to show whether there is likely to be any adverse impact on the safety, efficiency or regularity of aircraft operations. The current Procedures for Air Navigation Surfaces - Aircraft Operations (PANS-OPS) height across the site is 340m AHD and the Radar Lowest Sector Altitude (RLSALT) or Radar Terrain Clearance Chart Height (RTCC) is 335.28m. The proposed development and temporary crane activity is below and clear of these surfaces i.e. only the OLS is penetrated by the building and cranes.

This AIA by Avlaw concludes that the proposed development is clear of all aircraft operational surfaces and the controlled activities will not adversely affect safety, efficiency or regularity of operations of aircraft at Sydney Airport or helicopter operations at Royal North Shore Hospital (RNSH).



3

**Regulatory
Framework**

Regulatory Framework

3. Regulatory Framework

3.1 International Civil Aviation Organisation

Protection of airspace surrounding an airport is a critical component of maintaining requisite safety standards that facilitate the efficient use of runways, whilst also managing the associated impacts of their use on other critical infrastructure (e.g. taxiways), the environment and the general public. Australia, as a member state of the International Civil Aviation Organisation (ICAO), is bound by its commitment to adopt the Standards and Recommended Practices (SARPs) found in the 19 Annexes to the Chicago Convention to which it is a signatory. In the context of erecting permanent or temporary structures, a number of these Annexes define the operational requirements that must be adhered to with respect to ensuring safe and efficient aircraft operations are maintained by establishing parameters for a number of invisible surfaces surrounding airports which ensure requisite separation between aircraft and obstacles are in place.

3.2 Relevant Legislation and Regulations

Part 12 of the *Airports Act 1996* and the *Airports (Protection of Airspace) Regulations 1996* establish a framework for the protection of airspace at and around airports. The *Airports Act 1996* defines any activity resulting in an intrusion into an airport's protected airspace to be a "controlled activity", and requires that controlled activities cannot be carried out without approval. The Regulations provide for the Department of Infrastructure and Regional Development or the airport operator to approve applications to carry out controlled activities, and to impose conditions on an approval.

Certain development and structures in the vicinity of an airport have the potential to limit the scope the airport's existing or future operations. Terrain, buildings and temporary structures (e.g. cranes) are examples of what may constitute a controlled activity, each of which must be assessed individually to determine the potential limitations their existence may have on safe and efficient aircraft operations, including adverse weather conditions.

With respect to Sydney Airport, PANS-OPS surfaces, OLS, Combined Radar Departure Protection Surfaces, and RTCC clearances have been "declared" by the Commonwealth Department of Infrastructure and Regional Development on 20 March 2015 and are therefore enshrined in legislation as the prescribed airspace. To assist define the height of the PANS-OPS surfaces covering the site, Avlaw has been provided an extract of the updated chart by SACL (Figure 7).



4

**Controlled
Activity Approval
Process**

Controlled Activity Approval Process

4. Controlled Activity Approval Process

Any activity that infringes an airport's protected airspace is called a controlled activity, and requires approval before it can be carried out. Controlled activities include the following:

- » permanent structures, such as buildings, intruding into the protected airspace
- » temporary structures such as cranes intruding into the protected airspace
- » any activities causing intrusions into the protected airspace through glare from artificial light or reflected sunlight, air turbulence from stacks or vents, smoke, dust, steam or other gases or particulate matter.

Carrying out a controlled activity without approval is an offence under Section 183 of the Airports Act 1996, and is punishable by a fine of up to 250 penalty units. It is an offence under Section 185 of the Act to contravene any conditions imposed on an approval. Under Section 186 of the Act it is an offence not to give information to the airport operator that is relevant to a proposed controlled activity.

International standards have been adopted which define two sets of invisible surfaces above the ground around an airport. The airspace above these surfaces forms the airport's protected airspace. These two surfaces are the:

- » OLS; and
- » PANS-OPS

The Regulations differentiate between short-term (not expected to continue longer than 3 months) and long-term controlled activities. The Regulations provide for the airport operator to approve short-term controlled activities, excluding PANS-OPS infringements, and for the Department of Infrastructure and Regional Development to approve long-term controlled activities, or short-term controlled activities referred to it by the airport operator, including short-term infringements of the PANS-OPS surface. However, long term intrusions of the PANS-OPS surface are prohibited.

The heights advised in the application for approval must include all towers, masts, BMU, construction crane(s), and ancillary features. An application will be considered in two elements, one being for the building itself (inclusive of all features) and one for construction crane(s).

Each penetration of the PANS-OPS and OLS has to be assessed against the effect on published Departure and Approach procedures and other matters, including published survey data and Air Traffic Control procedures and practices including compatibility with the promulgated ATC Radar Terrain Clearance Chart (RTCC) used for safe vectoring of aircraft in instrument meteorological conditions (non-visual). Each proposal has to be checked for proximity to published procedures with statutory tolerances and safety buffers applied. The tolerances vary according to the type of navigation or aid being utilised and cover vertical, lateral and longitudinal aspects.



5

**Proposed
Controlled
Activity**

Proposed Controlled Activity

5. Proposed Controlled Activity

5.1 Location

The development site for a mixed-use retail, commercial, and residential high-rise building is 155-167 Miller Street, 181 Miller Street, 187-189 Miller Street, & part of 65 Berry Street, North Sydney as shown in Figure 1 and Figure 1a. The coordinates of the southern corner of the site are 334183.94m E, 625468.68m S which is north of Sydney Harbour and 12,400 metres from Sydney Airport ARP.



Figure 3: Site boundary indicated in red



Figure 4: Site location in relation to Sydney Airport

5.2 Height of permanent structures

The proposed maximum building height is 230m AHD (top of roof), with all plant and ancillary features captured within this envelope. Refer to Figure 2 below.

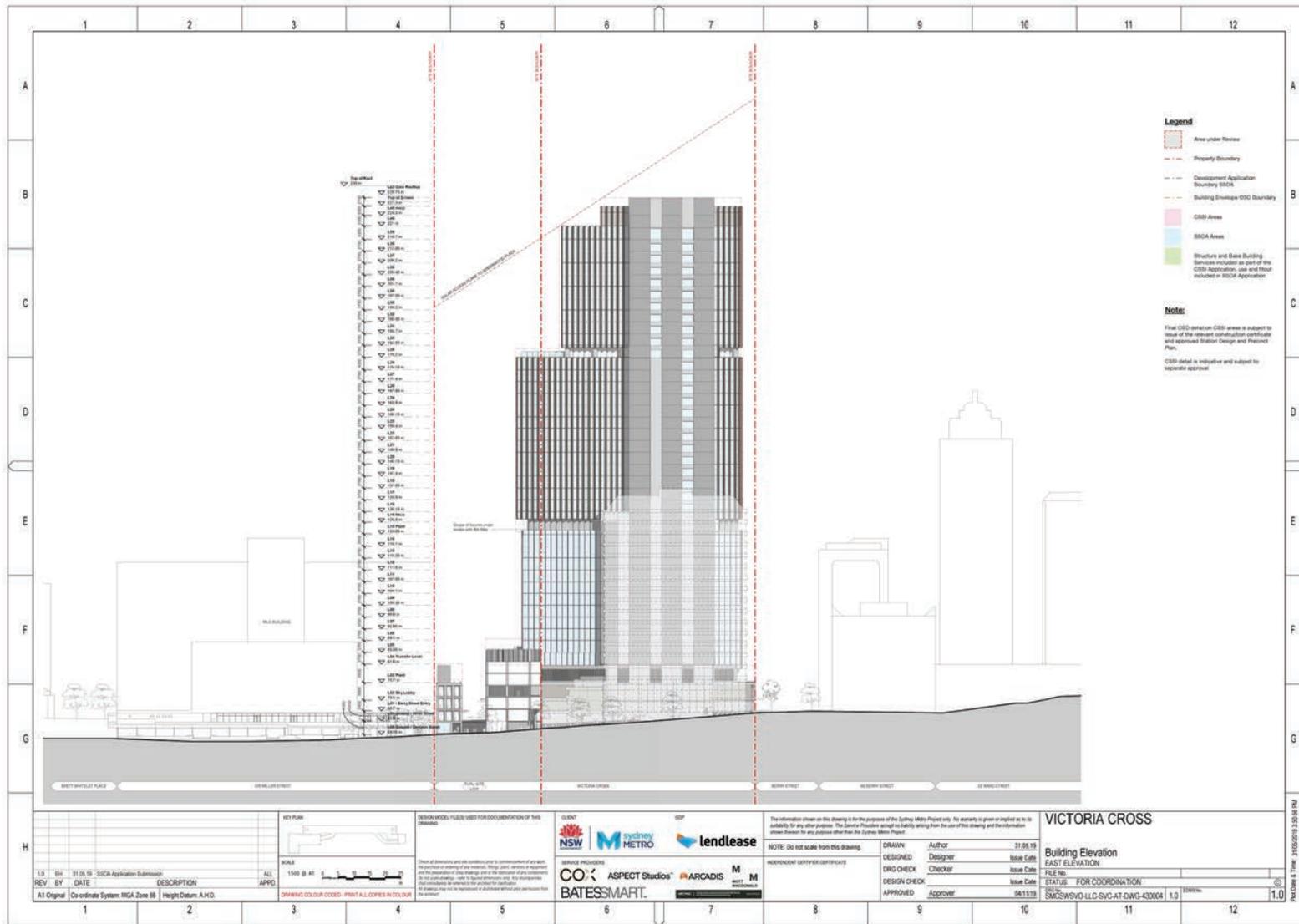


Figure 5: Building height indicating the highest point of the permanent structure as the top of roof at 230m AHD

5.3 Height of temporary structures

The proposed maximum height of temporary crane activity is 316.65m AHD. Refer to Figure 6.

VICTORIA CROSS OVER STATION DEVELOPMENT - CRANE ACTIVITY				
Crane reference	Maximum height (AHD)	Penetrate OLS	Estimated penetration date	Period of penetration
TC-01	316.65m	Yes	Sep-20	31 months
TC-02	312m	Yes	May-22 (TBC)	15 months (TBC)
TC-03	204.48m	Yes	Oct-20 (TBC)	20 months (TBC)



Figure 6: Tower Crane (TC1)

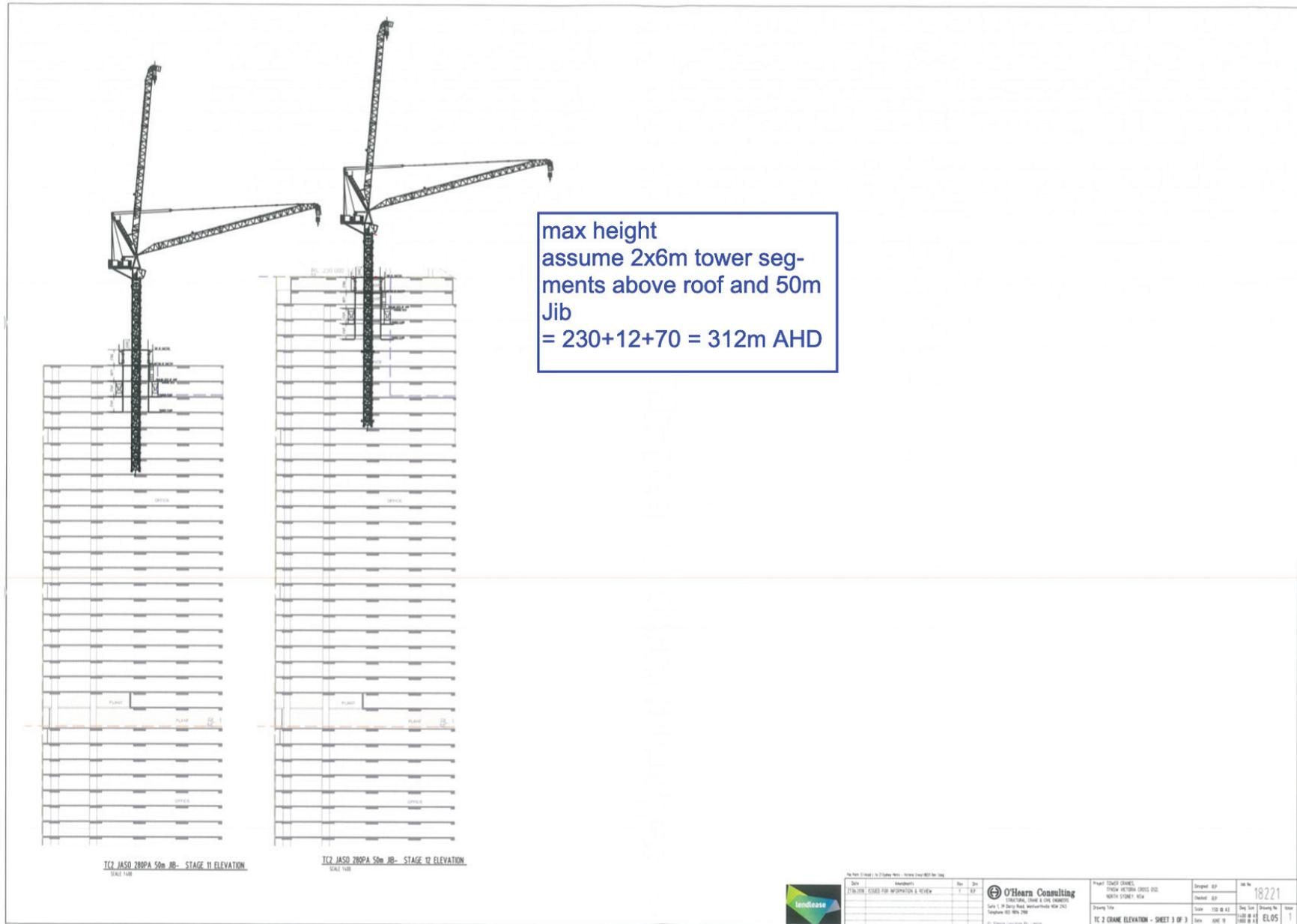


Figure 7: Tower Crane (TC2) shown at its maximum height

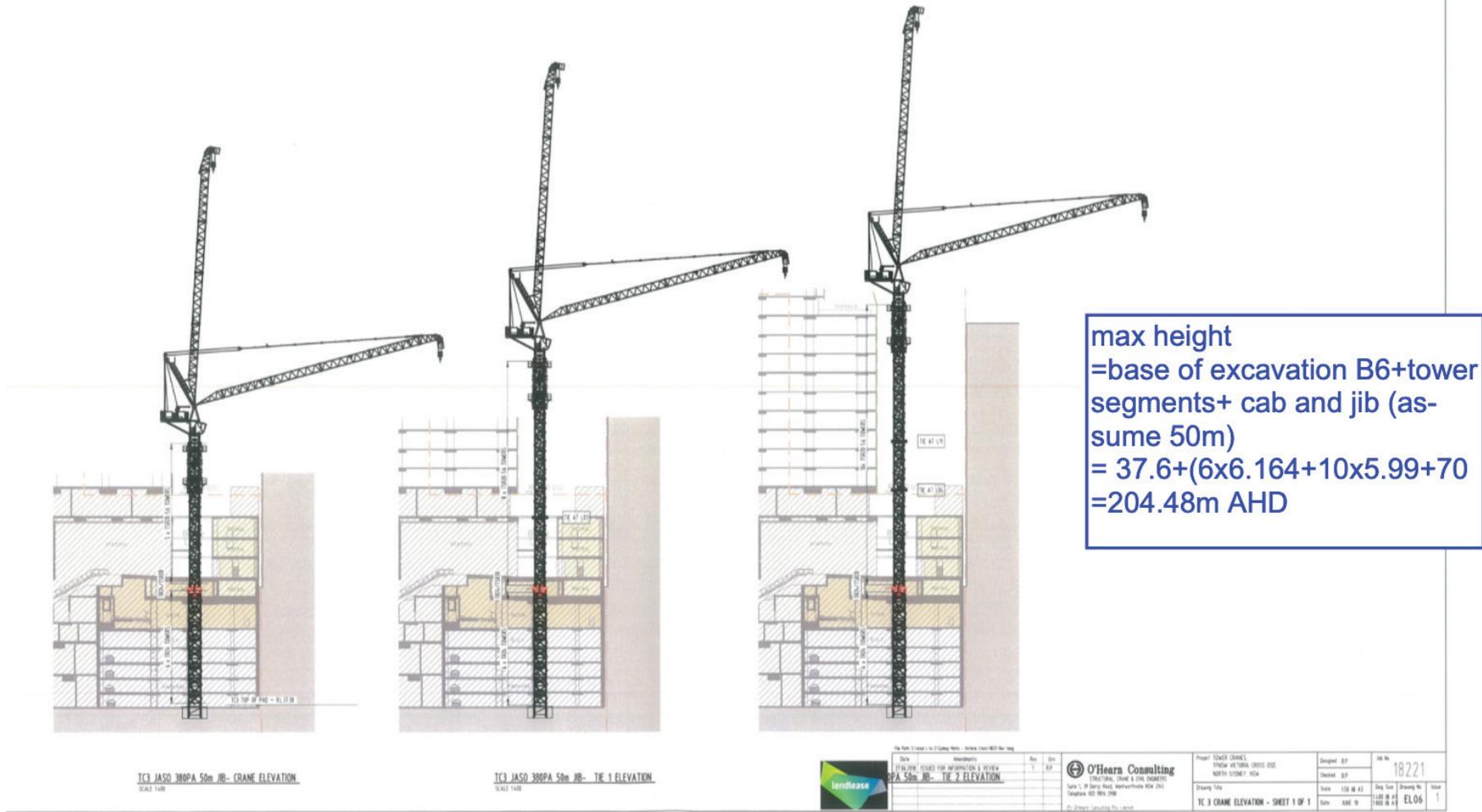


Figure 8: Tower Crane (TC3) shown at its maximum height



6

**Prescribed
Airspace
Assessment**

Prescribed Airspace Assessment

6. Prescribed Airspace Assessment

A review of the airspace charts made available by Sydney Airport through their website provides the basis upon which the aeronautical impact of any proposed controlled activity will have on the safety, efficiency and regulatory of aircraft operations. With respect to the proposed development by Lendlease at the site, Avlaw has determined that Charts 3 (Navigation Aids Protected Surfaces), 4 (High Intensity Light Protected Surfaces), and 7 (Precision Approach Path Indicator (PAPI) system protection surfaces) are not relevant because the development site is 12.4 kilometres from Sydney Airport and well clear of the horizontal limits of these surfaces. Avlaw has identified the OLS, PANS-OPS, Combined Radar Departure Assessment Surface and RTCC as the most critical volumes of airspace for which further analysis would be required to achieve requisite approvals. These are explained in more detail in section 6.1-6.4 below. The charts are currently being updated by SACL and Avlaw has obtained the relevant updates for this assessment.

6.1 Obstacle Limitation Surfaces (OLS)

The site lies under the 156m AHD Outer Horizontal Surface of the OLS for Sydney Airport and is indicated by the red marker on Figure 3. The proposed building height will penetrate the OLS by 74 metres. Since the building and temporary crane activity will penetrate the prescribed airspace for Sydney Airport, both will be considered controlled activities and require aeronautical assessment. That assessment is covered in the following sections.



Figure 9: Location with respect to the Sydney Airport OLS (2018)
(Note: This latest update from SACL is unchanged from the 2015 published chart)

6.2 Procedures for Air Navigation services – Aircraft Operations Surfaces (PANS-OPS)

The site is under the 340m AHD horizontal plane of the PANS-OPS as indicated by the red marker on Figure 4. The proposed building and temporary crane(s) at 305m AHD do not penetrate the PANS-OPS surface. Figure 4 shows the combined PANS-OPS surfaces applicable in the vicinity of the proposed development.

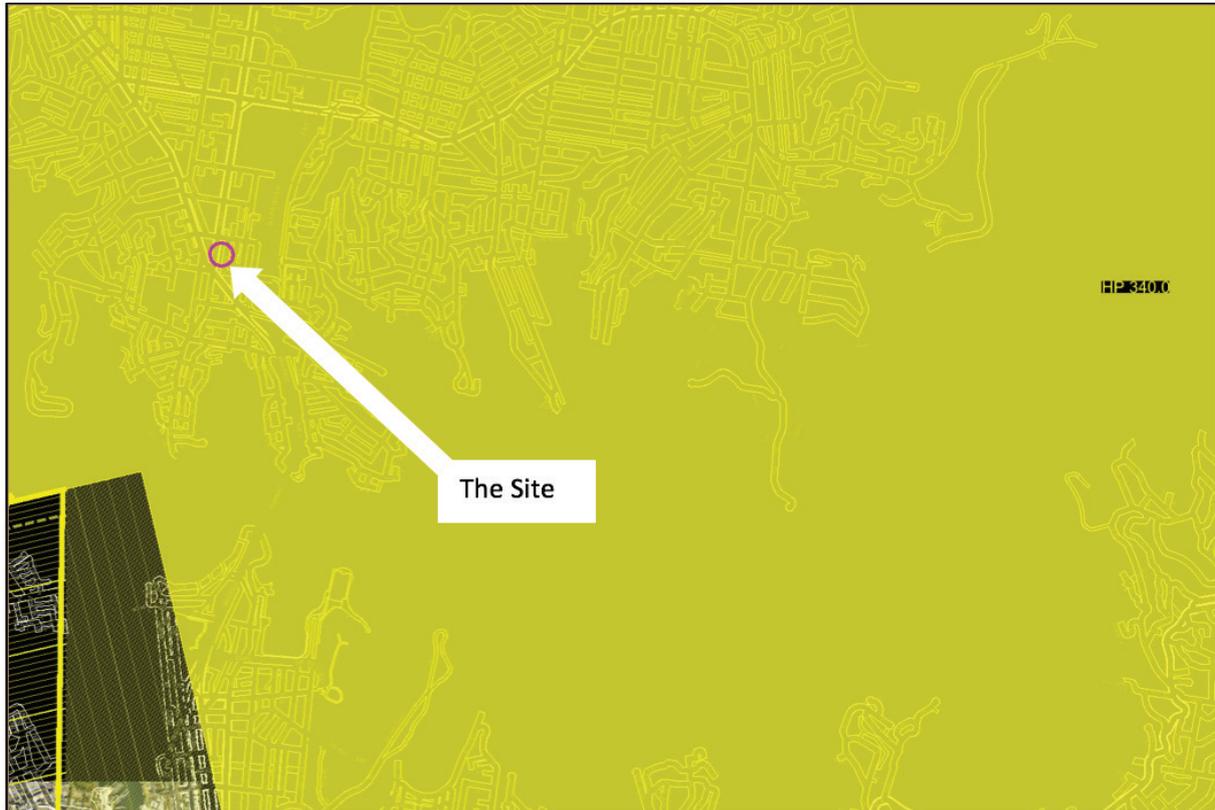


Figure 10: The site plotted on the Sydney Airport PANS-OPS Chart (2018)

(Note: The PANS-OPS surfaces covering the site has increased to 340m AHD from 335m AHD that was indicated on the 2015 published chart)

6.3 Combined Radar Departure Assessment Surface (Omni)

The site is under the 390m AHD contour of the Combined Radar Departure Assessment Surface. The proposed building and temporary crane(s) at 305m AHD do not penetrate the Combined Radar Departure Assessment Surface.

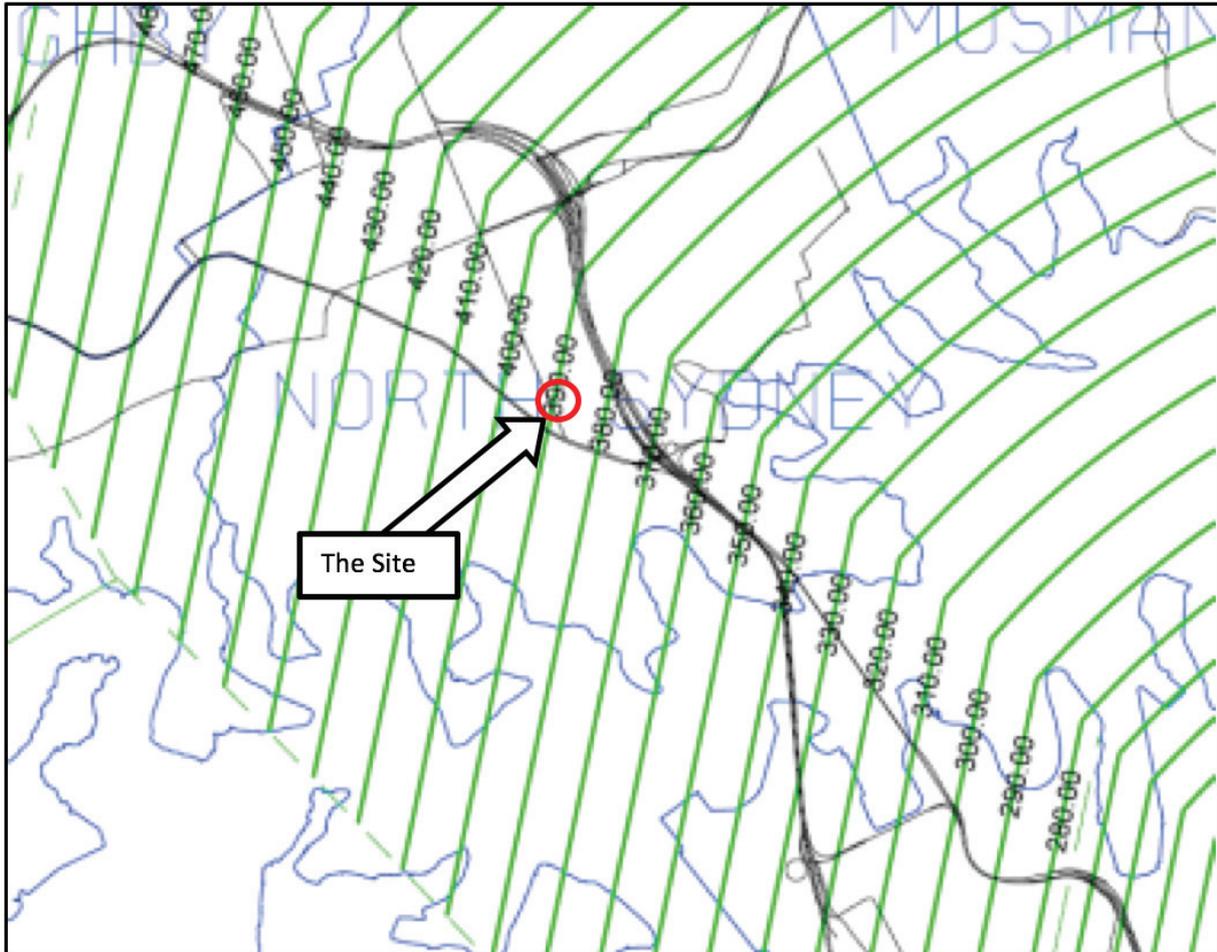


Figure 11: The site plotted on the Combined Radar Departure Assessment Surface Chart (2015)
(Source: Prescribed Airspace Drawing FSS 6934 8 20/3/15)

6.4 Radar Terrain Clearance Chart (RTCC)

The RTCC depictions are contained in the Radar Lowest Safe Altitude (RLSALT) Drawing. The proposed maximum building height is 230m AHD (top of roof), with all plant and ancillary features captured within this envelope. Temporary crane activity is to a maximum height of 305m AHD. Therefore, neither permanent or temporary obstacles will penetrate the 335m height as depicted on an extract of the RLSALT Drawing at Figure 5. The development location is indicated by the red dot.

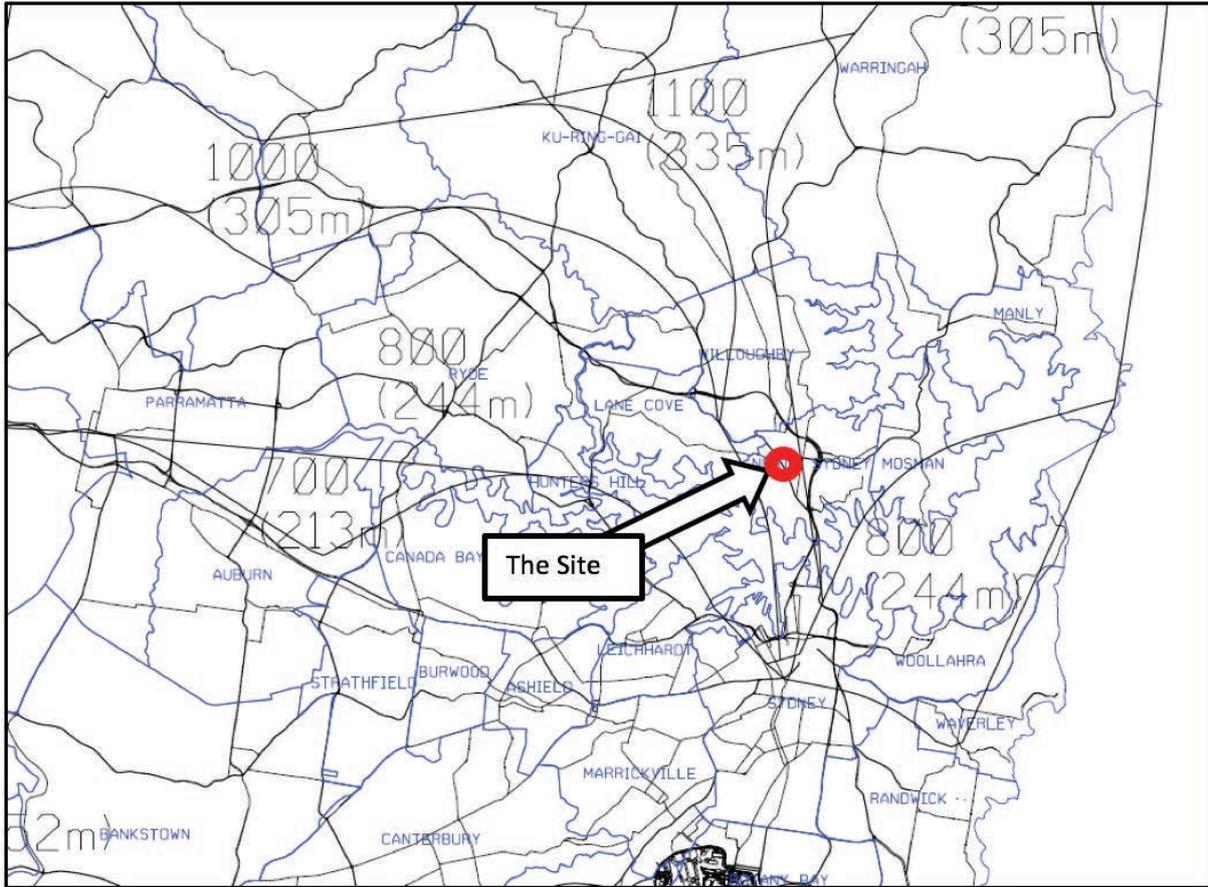


Figure 12: The site plotted on the RTCC (2015)

(Source: Prescribed Airspace Drawing FSS 6934 7A 20/3/15)

(Note: The latest updated extract in April 2019 from SACL is unchanged over the site at 335m AHD from this 2015 published chart)

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7

**Assessment of
Instrument Flight
Procedures**

Assessment of Instrument Flight Procedures

7. Assessment of Instrument Flight Procedures

A close assessment by Avlaw of all published approach and departure procedures as described in AIP/DAP for Sydney Airport has been undertaken and the proposed building height of 230m AHD (top of roof), with all plant and ancillary features captured within this envelope, is procedurally clear. The PANS-OPS chart extract at Figure 4 shows the obstacle clearance heights for all instrument flight procedures over the site also indicating that the proposed building and crane heights at 230m AHD and 305m AHD will have no adverse effect on instrument flight operations.



8

**Radar Navigation,
Communications
Performance Impact**

Radar Navigation, Communications Performance Impact

8. Radar Navigation, Communications Performance Impact

A thorough assessment by Avlaw has identified no potential performance issues from the proposed building development.

The proposed development is 12.4 kilometres or 6.7 nautical miles from the Sydney Airport ARP beyond the Sydney CBD and there are no facilities well to the north of the proposed development for their performance to be compromised.



9

**Sydney Airport
Master Plan**

Sydney Airport Master Plan

9. Sydney Airport Master Plan

The Sydney Airport Master Plan 2033 identifies future planning including assessment of aircraft traffic, passenger movements and instrument flight procedures in use.

Avlaw has noted that passenger and aircraft movements at Sydney are predicted to increase and that there are no identified changes to instrument flight procedures. In assessing the master plan predictions of increased movements, Avlaw is cognisant of the fact that aircraft movements that are predicted to increase should be insignificant. Sydney Airport has regulated caps on the number of movements per hour that are permitted and already operating at near capacity during peak periods.



10

**Helicopter
Operations**

Helicopter Operations

10. Helicopter Operations

The NW corner of the site is located approximately 2,255 metres SE of Royal North Shore Hospital (RNSH) Helipad in St Leonards and clear of preferred helicopter flight paths. Avlaw has reviewed currently published instrument procedures in the DAP/AIP and confirms that at the time of writing, instrument approaches are not conducted at RNSH.

Legislation requires the pilot of a helicopter to determine the safe take-off and landing approach taking into account all factors including aircraft performance, wind direction, obstacles, and emergency landing in the event of engine failure and “fly neighbourly” procedures. Guidance to pilots for operations at helicopter landing sites is provided in CASA publication CAAP 92-2(2).

While individual flight paths are up to the helicopter pilot to determine, there are factors he will take into account specific to the RNSH Hospital Helipad operations:

- » online helipad information at helipads.org provided by Careflight in association with other rescue helicopter operators advises approach to be in the SW sector over Gore Hill Oval or alternate approach in the NE sector, and departure to be in the SW sector over Gore Hill Oval or alternative NE sector.
- » AIP-ERSA entry for Sydney Airport of 23/5/19 at note 15 identifies a helicopter access lane to Royal North Shore Hospital at 1000ft from the harbour via St Leonards and Cammeray Parks

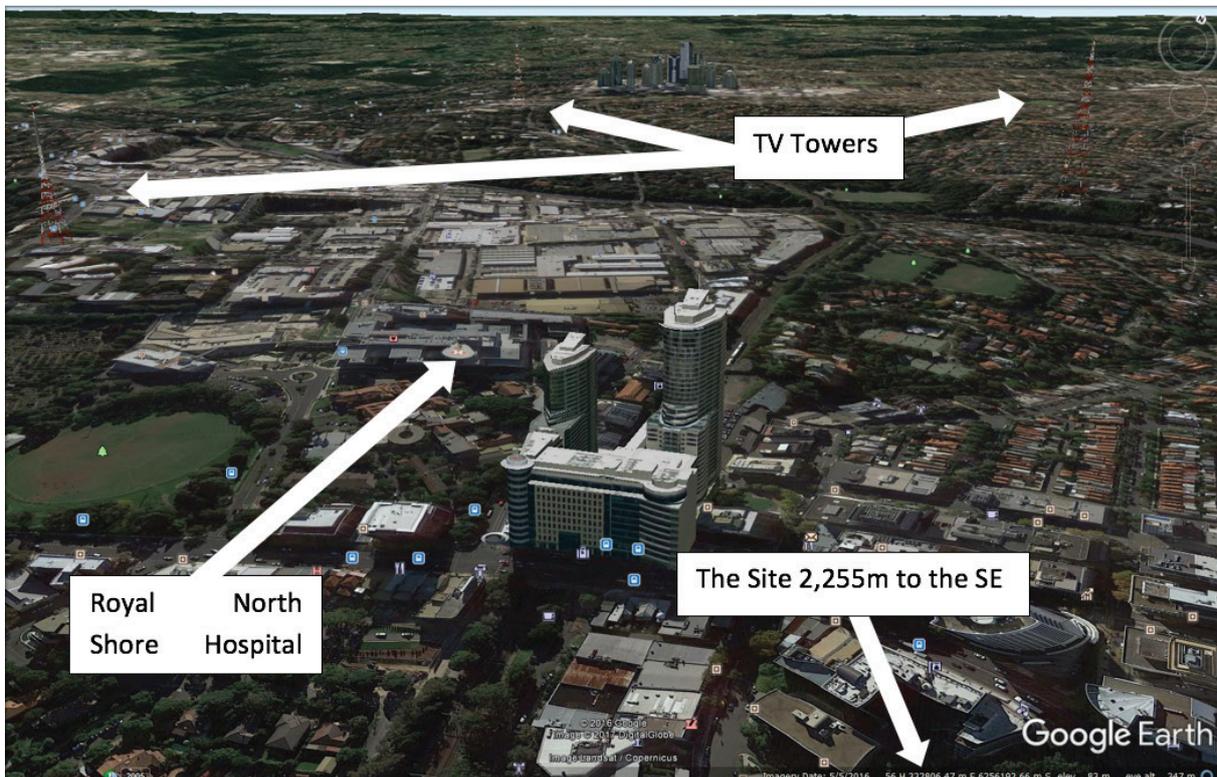


Figure 13: RNSH Helipad in relation the site and other existing obstacles

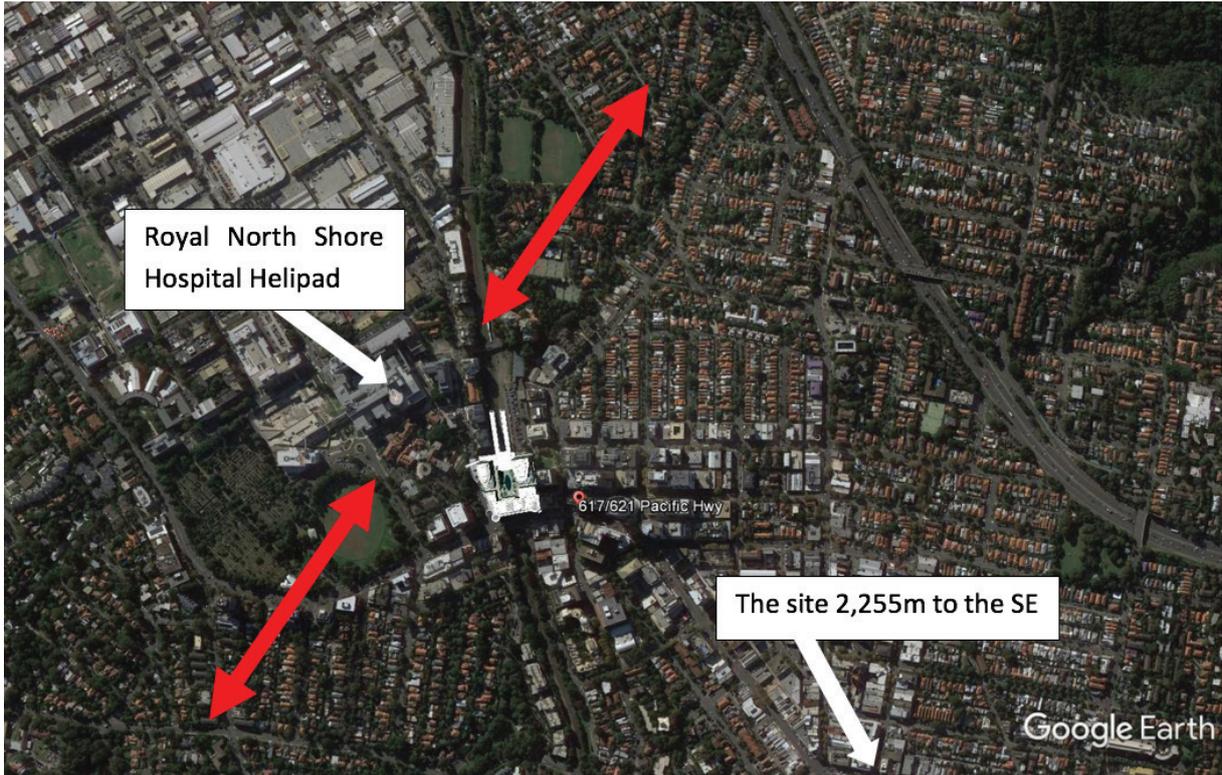


Figure 14: RNSH Helipad preferred flight paths shown in red



Figure 15a: RNSH Helipad helicopter access lane shown in purple

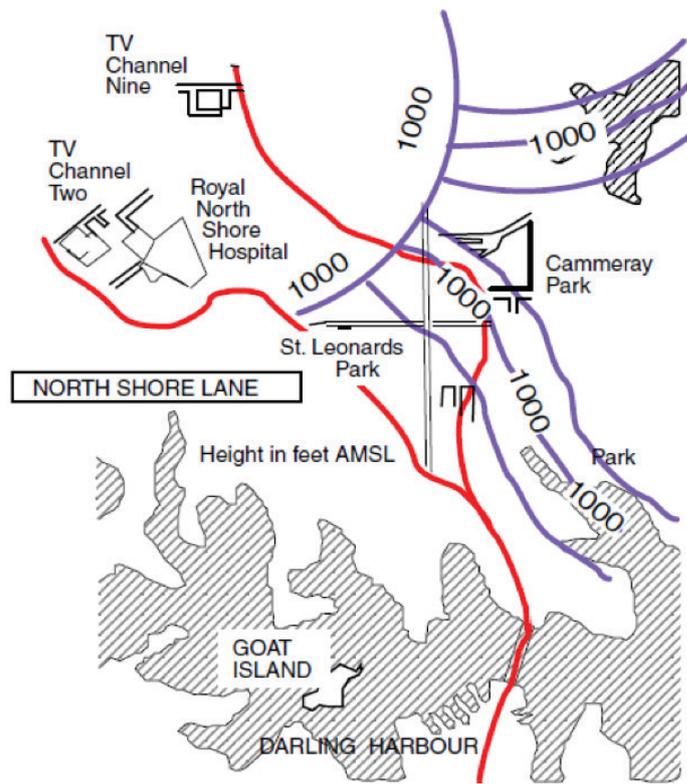


Figure 15b: RNSH Helipad helicopter access lane shown in purple

The development proposal has been assessed against impact on published helicopter operations in the area surrounding the site. There are helicopter transit lanes published in AIP/ERSA which are to the E of the site. These lanes are for use by helicopters flying by day in visual meteorological conditions (VMC) which require the use of visual navigation procedures to avoid obstacles. The site is not in close proximity of the RNSH. There are three television transmission towers in the vicinity of the development depicted on Figure 7. There are no published helicopter arrival/departure procedures into the Royal North Shore Hospital except as provided by emergency helicopter operators and made available at helipads.org. TV masts are depicted on aviation charts and are illuminated at night by prescribed obstruction lighting requirements.

A National Airport Safeguarding Framework (NASF) Guideline H has been issued regarding protection of what are being termed Strategic Helicopter Landing Sites (SHLS). Under the guideline, hospital helipads would be considered as SHLS and therefore protected from obstacles being erected in close proximity to it. The guideline provides for 140m wide rectangular steps in the direction of approach/take-off in 500m increments until reaching 125m above the SHLS which would be protected from obstacles such as buildings and cranes. The figure on the following page has been sourced from the guideline and illustrates this proposed protection of SHLS and the heights above which it is triggered.



Figure 16: Referral trigger for SHLS

While the site is within the 3,500m provided for in the NASF guideline, the approach and take-off at Royal North Shore Hospital Helipad is not in the direction of the site, and therefore the guideline has no effect on the site.

Avlaw's assessment is that because published procedures and preferred helicopter flight paths to and from the hospital helipad are clear of site, and that the helicopter access lane depicted in AIP is for VFR operations and is approximately 500m to the E of the site, and that the NASF guideline has no effect on the site, the proposed building and cranes will not adversely affect the safety of helicopter operations.

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11

Conclusions

Conclusions

11. Conclusions

The proposed maximum building height is 230m AHD (top of roof), with all plant and ancillary features captured within this envelope while temporary crane activity is to a maximum height of 305m AHD.

Both the permanent structure and temporary cranes penetrate the Outer Horizontal Surface of Sydney Airport's OLS of 156m AHD and will therefore be considered controlled activities and trigger aeronautical assessment.

The proposed maximum building height of 230m AHD (top of roof), with all plant and ancillary features captured within this envelope and temporary crane activity to a maximum height of 305m AHD do not penetrate the PANS-OPS surfaces for instrument flight procedures of 340m AHD, nor do they penetrate the applicable published RTCC/ RLSALT surface of 335m AHD, or the Combined Radar Departure Assessment Surface with respect to Sydney Airport.

Helicopter operations at the St Leonards RNSH helipad are covered by standard procedures which require helicopter flights paths to the SE and NW which is clear of the site. The site is clear of the helicopter access lane to the RNSH helipad described as "North Shore Lane" in AIP.

This AIA concludes that the proposed development heights of 230m AHD (top of roof), with all plant and ancillary features captured within this envelope and temporary crane activity to a maximum height of 305m AHD is clear of all aircraft operational surfaces, and the controlled activities will not adversely affect safety, efficiency or regularity of operations of aircraft (aeroplanes and helicopters) at Sydney Airport.



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