

Aviation Safeguarding Assessment

33-37 Herbert St, St Leonards
Mixed Use Development

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Aviation Safeguarding Assessment: 33-37 Herbert St, St Leonards Mixed Use Development

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1

Executive Summary

Executive Summary

This Aviation Safeguarding Assessment has been prepared by Avlaw Aviation Consulting Pty Ltd (Avlaw) on behalf of Aqualand St Leonards Development Pty Ltd (Aqualand). It is submitted to the Department of Planning, Housing and Infrastructure (DPHI) to supplement a State Significant Development Application (SSDA) (SSD-88511459), in support of the redevelopment of land at 33-37 Herbert St in St Leonards (the site).

The scope of Avlaw's engagement has been defined by guidelines which are applicable to a proposed development at the site that are contained in the National Airports Safeguarding Framework (NASF) and all associated aviation legislation and regulations. This by default addresses the site-specific Secretary's Environmental Assessment Requirements (SEARs), which includes an item (#4) titled "Engagement", stating the following:

- Consult with Royal North Shore Hospital about potential interference with helicopter flight paths.

The proposed redevelopment at the site will consist of the demolition of the existing buildings (apart from the existing basements) and the construction of two buildings over a common podium, reaching heights of 127.30m AHD and 209.30m AHD, which includes all ancillary plant equipment, such as lift shaft overruns, vents, handrails, and communications antennas. The final Construction Management Plan (CMP), including tower crane locations and key lift dates, will be developed when detailed design has been finalised. However, preliminary advice in relation to the construction methodology indicates that two luffing tower cranes will be used during development, reaching a maximum height of 204.841m AHD (TC1) and 295.711m AHD (TC2), when at minimum radii.

Avlaw's assessment has found that the critical (i.e. lowest) airspace protection surface covering the site is the Outer Horizontal Surface of the Obstacle Limitation Surfaces (OLS) for Sydney (Kingsford Smith) Airport (SYD). Of the two buildings proposed, only the taller of the two will intrude the OLS. Both TC1 and TC2 will also intrude the OLS, meaning the taller building and both TC1 and TC2 will be considered controlled activities from an aviation perspective. Avlaw expects approval for all to be issued.

Above the SYD OLS, other airspace protection surfaces calculated by Avlaw are as follows:

- Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS):
 - 293.5m AHD at the southern edge of the site and rising to 296.5m AHD at the northern edge of the site, when applying International Civil Aviation Organisation (ICAO) PANS-OPS Doc 6168 criteria
 - This surface relates specifically to a Standard Instrument Departure (SID) for aircraft departing from RWY 34L and climbing straight ahead
 - 340.15m AHD, when applying Airservices Australia (Airservices) criteria
- Radar Terrain Clearance Chart (RTCC) protection surface is a horizontal plane across the site at 335.28m AHD

At 209.30m AHD, the taller of the two proposed buildings at the site will remain below all PANS-OPS or RTCC protection surfaces, irrespective of which criteria are applied. TC1 will also remain below the PANS-OPS and RTCC surfaces, however TC2 is assessed to intrude by nominally 1.711m when at minimum radius, specifically when ICAO PANS-OPS Doc 6168 criteria is applied. Such intrusions are possible in some circumstances, however, they must be limited to a total of three contiguous months. Avoiding such intrusions minimises the complexity of applications seeking controlled activity approval, and should be avoided whenever possible. Airservices will be tasked with assessing the proposed permanent and temporary structures at the site once controlled activity applications are lodged, and will advise Aqualand if the proposed crane activity does or does not impact Instrument Flight Procedures (IFPs) or PANS-OPS surfaces.

The site is also located approximately 240m NE of the rooftop helipad at the RNSH. Avlaw has assessed that all the buildings and crane swing arcs are clear of the operational airspace boundary associated with the established flight paths to and from the helipad (039T/219T), which includes contingency for the use of larger helicopters in the future. The airspace design criteria applied by Avlaw is that which is supported by CASA and considered industry best practice. Consultation with NSW Air Ambulance, Westpac Helicopter Rescue Service and Toll, facilitated by NSW Health's aviation advisors AviPro, has been positive, with all these stakeholders confirming that the built form and cranes will not impact the operational airspace boundaries for the established and preferred approach and departure paths.

No other aviation compliance issues or hazards to aircraft operations have been identified by Avlaw. The rationale for reaching this conclusion is detailed throughout this report.

2

Introduction

Introduction

This report has been prepared to support a State Significant Development Application (**SSDA**) SSD-88511459 for the site at 33 – 37 Herbert Street, St Leonards.

The Minister for Planning, or delegate, is the consent authority for the SSDA and this application is lodged with the NSW Department of Planning, Housing and Infrastructure (**DPHI**) for assessment.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (**SEARs**) dated 21 August 2025 (SSD- 88511459). Specifically, this report has been prepared to respond to the following SEARs:

Item	SEARS Requirement	Relevant Section of Report
4	Consult with Royal North Shore Hospital about potential interference with helicopter flight paths	7

Table 1: Aviation-related site-specific SEARs

Avlaw notes that the SEARS do not make reference to applicable aviation regulations (Airports (Protection of Airspace) Regulations 1996) and legislation (Airports Act 1996) or guidelines (NASF), which must be taken into consideration before built or temporary structures are erected around airports. The scope of Avlaw's assessment in this report has been expanded to take into account said requirements, which will satisfy the expectations of aviation stakeholders that will be invited to review the proposal and ensure a comprehensive aeronautical assessment is completed.

2.1 Description

The site is located at 33-37 Herbert Street, St Leonards on Cammeraygal Country and is legally described as Lot 1 & 2 in DP 744175, Lot 3 in DP 772072 at 33 Herbert St, and Lot 1 in DP 115615 at 37 Herbert St, St Leonards. The site has an irregular shape with a total area of approximately 5,919 m², comprising two street frontages: a primary western frontage to Herbert Street of approximately 135m and a secondary northern frontage to Ella Street of approximately 65m.

The site is located in the Willoughby local government area (**LGA**), positioned 4.5km north of the Sydney CBD and 3km from the North Sydney CBD, with proximity to the centres of St Leonards and Chatswood. No. 33 Herbert Street is currently occupied by a three-storey commercial building comprising retail and commercial office tenancies with basement parking, while No. 37 Herbert Street contains a single level retail showroom/warehouse building.

The site is in a highly accessible area, located approximately 400m walking distance from St Leonards train station and approximately 1km walking distance from the Crows Nest Metro station. The site benefits from its proximity to established commercial centres and excellent public transport connections, open space and critical health infrastructure.

The location of the site is illustrated in **Figure 1**.



Figure 1: Aerial photo showing the site boundary

2.2 Project Description

The SSDA seeks development consent for the following:

- Demolition of the existing buildings on site apart from the two-level, basement structure which is to be retained, adapted and reused for car parking;
- Site excavation, and other preparatory site works;
- Construction and operation of a part 13 storey and part 39 storey mixed use development comprising:
 - Approximately 413 dwellings including 46 affordable housing dwellings located on Levels 2 to 37 (excluding Level 4);
 - Shared amenities and landscaped communal open space on Level 4;
 - Approximately 5,918m² of non-residential (commercial/ retail) GFA located on Ground and Level 1;
 - Car parking spaces within the basement and podium; and
 - Ground floor loading and servicing;
- Associated landscaping work; and
- Augmentation of utilities and infrastructure
- Site excavation, remediation and other preparatory works.

Amend the Willoughby Local Environmental Plan (WLEP 2012) as follows:

- Rezone the subject site from E4 General Industrial to MU1 Mixed Use;
- Establish maximum height of RL 209.3m AHD;
- Amend maximum FSR from 1:1 to 7.15:1; and
- Establish non-residential FSR of 1:1.

3

Aviation Regulatory Framework

Aviation Regulatory Framework

3.1 Airspace Height Controls

Protection of the 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. As a signatory to the *Chicago Convention 1944*, Australia adopts International Civil Aviation Organisation (ICAO) Standards and Recommended Practices (SARPs) with respect to airspace, which define sets of invisible surfaces above the ground around an airport. The airspace above these surfaces forms the airport's prescribed airspace.

The airspace associated with Sydney and Bankstown Airports comprises two (2) types:

- airspace associated with visual flight rules (VFR); and
- airspace associated with instrument flight rules (IFR).

With regards to Sydney and Bankstown Airports, both the OLS associated with VFR operations and the PANS-OPS surfaces associated with IFR operations will require assessment and any penetration, permanent or temporary, will require a referral to the Department, as both Sydney and Bankstown Airports are federally leased airports. Federally leased airports are regulated by Chapter 12 of the Airports Act 1996 (the Act), and the Airports (Protection of Airspace) Regulations 1996 (Regulations) establish a framework for the protection of airspace at and around airports. The Act defines any activity resulting in an intrusion into the airport's prescribed airspace to be a "controlled activity" and requires that controlled activities cannot be carried out without approval. As such, controlled activities through the Department are referred to the Civil Aviation Safety Authority (CASA) for their technical assessment. If the PANS-OPS surfaces are penetrated temporarily, noting permanent penetrations are not allowed at federally leased airports, the department/CASA will refer to Airservices Australia, the Instrument Flight Procedure (IFP) designer, who will need to assess any operational impact on the IFPs.

Avlaw has completed an airspace assessment based on Sydney Airport's OLS as per CASR MOS Part 139 (aerodromes), ICAO PANS-OPS design requirements outlined in Doc 6168 and ICAO RNP-AR outlined in Doc 9905, which are explained later in this report.

Development that infringes on an airport's prescribed airspace is called a "controlled activity" and can include, but is not limited to:

- permanent structures such as buildings and communications towers intruding into protected airspace;
- temporary structures such as cranes intruding into protected airspace;
- or 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.

Of those listed above, the final built form and the temporary construction cranes proposed to intrude into the prescribed airspace of Sydney and Bankstown Airports will require a referral to the Department.

3.2 Airspace Approval Process

The aviation approval processes for penetrations of Sydney Airport and those which apply to helicopter operations at hospital helipads are covered by different regulations and legislation, and are also subject to separate administrative processes. Each has been described below separately.

Sydney Airport

Sydney Airport is a Federal government-leased airport and, as such, is subject to the Commonwealth's *Airport Act 1996* and the *Airports (Protection of Airspace) Regulations 1996*. It therefore also needs to comply with the Civil Aviation Safety Authority (CASA) Manual of Standards Part 139 – Aerodromes (MOS 139) in relation to obstacles and obstacle assessments.

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 prescribed airspace to be a "controlled activity" that cannot be carried out without approval from aviation stakeholders. Controlled activities include the following:

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

The *Airports (Protection of Airspace) Regulations 1996* differentiate between short-term (not expected to continue longer than 3 months) and long-term controlled activities (expected to continue for more than 3 months). With respect to long-term penetrations (i.e. a crane intruding the OLS for longer than 3 months), the airport operator is required to invite the following stakeholders to assess or comment on an application if there is an intrusion into prescribed airspace:

- **CASA** for an assessment of the OLS and any impact(s) on aviation safety;
- **Airservices Australia** for assessments of proposals against PANS-OPS, Radar Terrain Clearance Charts (RTCC) and/or Communications, Surveillance & Navigation (CNS) facilities to ensure that there are no adverse impacts.
- **Department of Infrastructure, Transport, Regional Development Communications and the Arts (Department)** for approval of any controlled activities.
- **The local council or planning authority** responsible for building approvals; and
- **The Department of Defence** in the case of joint-user airports (not relevant in this instance).

The final approving authority for all short-term penetrations of the PANS-OPS and long-term penetrations of the OLS is the Department, as specified in the *Airports Act 1996* and the *Airports (Protection of Airspace) Regulations 1996*. In making its determination, the Department is required to assess the respective assessments of the airport operator, Airservices Australia and CASA. The Department cannot approve short-term penetrations of the PANS-OPS without the support of Airservices (or other applicable MOS Part 173 certified provider) or the airport operator (in this instance, Sydney Airport) and also cannot approve long-term penetrations of the OLS in the event

CASA's assessment is not supportive of the application. It should be noted that long term intrusions of the PANS-OPS surfaces are prohibited, however that is not expected to be proposed at the site.

It is also worth noting that during recent discussions with Sydney Airport with respect to another development (specifically applications relating to cranes), a proposed installation date in 2027 led Sydney Airport to withhold progressing the controlled activity approval process, citing two main reasons:

- The *Airports (Protection of Airspace) Regulations 1996* are sunseting in 2026 and will be replaced with new regulations; and
- The rolling out of the modernisation of the OLS was announced by the ICAO earlier this year, which at some point in the years to come will impact airspace design around Sydney Airport.

Avlaw has reviewed the draft *Regulations 2026* and does not expect any of the changes above to introduce any additional risk to the likelihood of controlled activity approvals being issued at the site or for more restrictive criteria to be adopted by Sydney Airport or Bankstown Airport that would impact the conclusions in this report. However, this will need to be reassessed as and when sufficient details about the changes described above become available, along with the final CMP.

Approvals for intrusions into prescribed airspace are issued with specific conditions, which may include marking and lighting requirements, as well as dates for activity. This will need to be considered as the project progresses toward the commencement of construction, as the staging of lifts and associated dates must be included in the application forms and submitted with sufficient lead time (nominally 3-4 months) for approvals to be issued before the installation of cranes.

Carrying out a controlled activity without approval is an offence under Section 183 of the 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.

Hospital Helipads

The triggers for assessment of proposed development activities with respect to airspace surrounding hospital HLSs are not captured within the regulations and legislation described above for Sydney Airport. Applications for aviation approval for developments in close proximity to hospital HLSs are instead lodged with the asset owner (i.e. RNSH in this instance) who in turn refer the application to their aviation advisors and Helicopter Emergency Medical Services (HEMS) operators that fly to/from the HLS in question for assessment.

In order to assess if there will be any adverse impact on hospital helipads by the proposed development at the site, Avlaw has applied the operational airspace dimensions defined by ICAO as relevant to the activities at RNSH i.e. HEMS operations operating in Performance Class 1. This aligns with advice contained in CASA AC139.R-01 v3.0, which serves to inform such assessments within Australia. Avlaw's findings based on this criteria can be found in Section 5.7.

4

Proposed Development

Proposed Development

4.1 Site description

Figure 2 below is a plan view of the site and includes the MGA 94 coordinates for each of the corners. Also included are the MGA 94 coordinates for the centre of the tower sections of each crane (indicative), which are assessed in more detail later in this report.

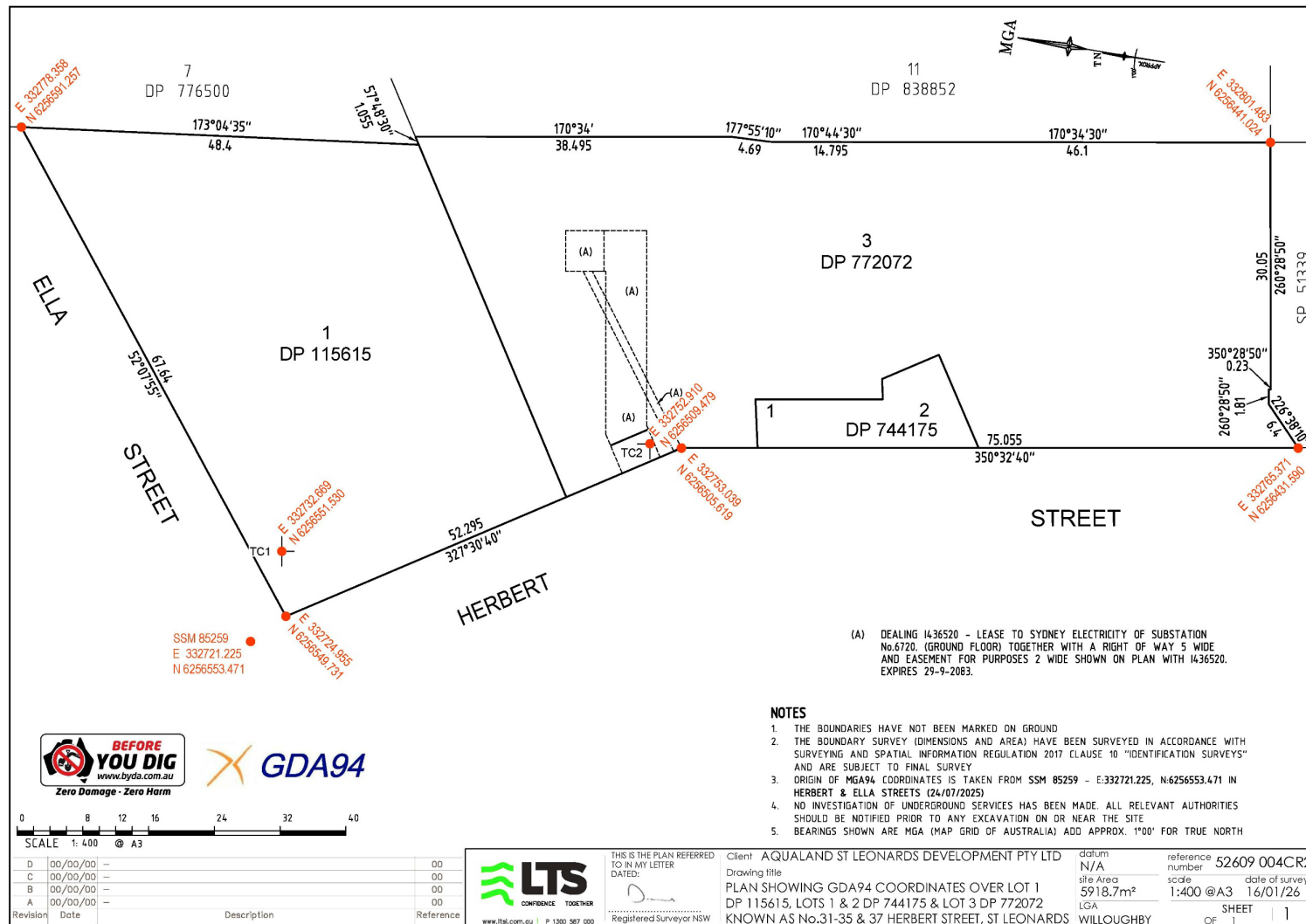


Figure 2: Site Plan showing the boundary of the site including MGA 94 coordinates of each corner/extremity

Note: MGA 94 coordinates within the boundary indicate positions of TC1 and TC2 (discussed later in this report)

4.2 Location

The site (marked in red) is approximately 14.23 km north of Sydney Airport's ARP on a bearing of 354.57 degrees magnetic (7.57 degrees true), which is illustrated in Figure 3 below.

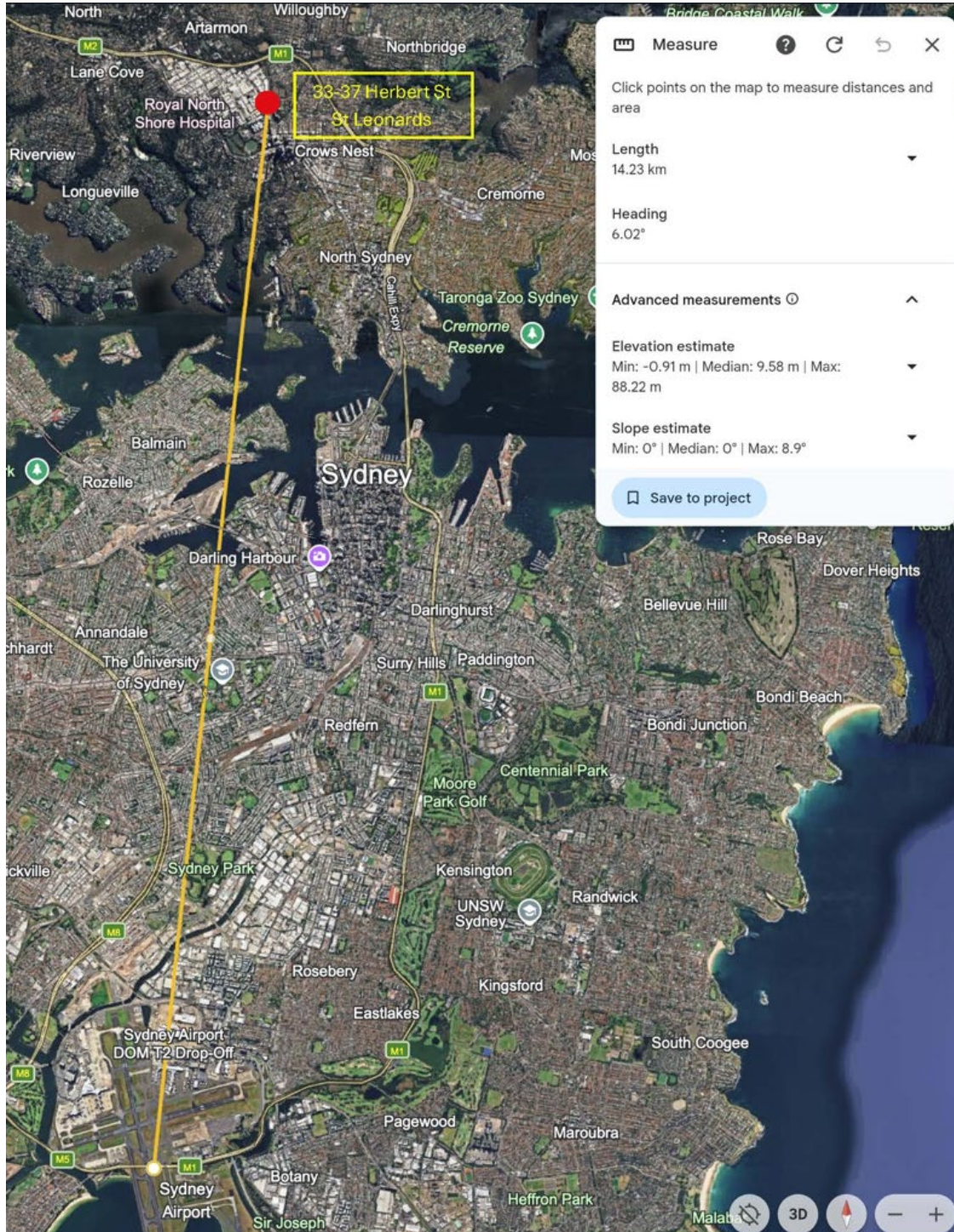
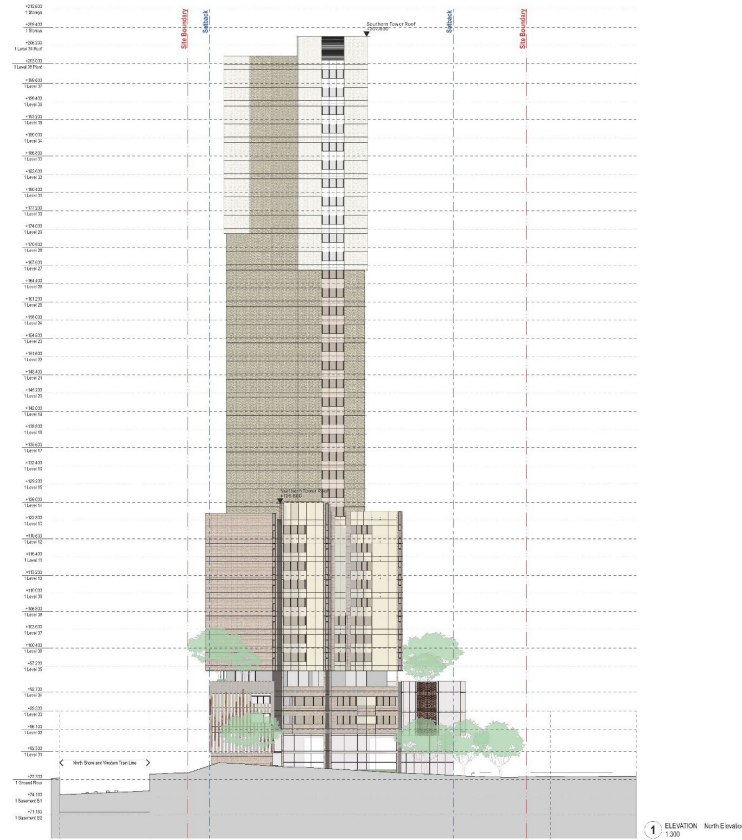


Figure 3: Site indicated in red in relation to Sydney Airport's ARP

4.3 Permanent structures

The permanent structures proposed at the site will comprise of two buildings, reaching heights of 127.30m AHD and 209.30m AHD respectively, inclusive of all ancillary features such as plant and equipment, handrails, lift overruns, ventilation shafts and communications antennas within this envelope.

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General notes:
 - All dimensions and notes are in millimeters and are shown in the drawing and not in the model.
 - All notes are in the drawing and not in the model.
 - All notes are in the drawing and not in the model.
 - All notes are in the drawing and not in the model.

Legend

Rev	Date	Description	By	CHK
1	10/10/2020	Issue for construction	JCS	
2	10/10/2020	Issue for construction	JCS	

33 Herbert St, St. Leonards	Scale
Construction	1:200 (A1)
Project Code	First Issue
10/10/2020	10/10/2020
Sheet No.	Rev
10/10/2020	01

Figure 4: North elevation drawing showing the proposed built structures at their finished heights

4.4 Crane Activity

A detailed Construction Management Plan (CMP), which includes finalised crane heights, locations and specific dates of activity, is not available at the time of writing and will be produced at a later stage of the project.

However, for the purposes of this assessment, Avlaw has been provided with indicative information which assumes the use of two (2) tower luffing cranes (TC1 and TC2) across the development, which is summarised in the table below.

Crane	Maximum Height (M AHD)	Crane Type
TC1	204.841 (refer to Figure 5)	Luffing
TC2	295.711 (refer to Figure 5)	Luffing

Table 2: Summary of indicative crane activity at the site

The figures on the following pages show each crane in reference to the proposed built form at the various operating radii, as well as a plan view image showing the swing arc and lateral extremities of each jib.

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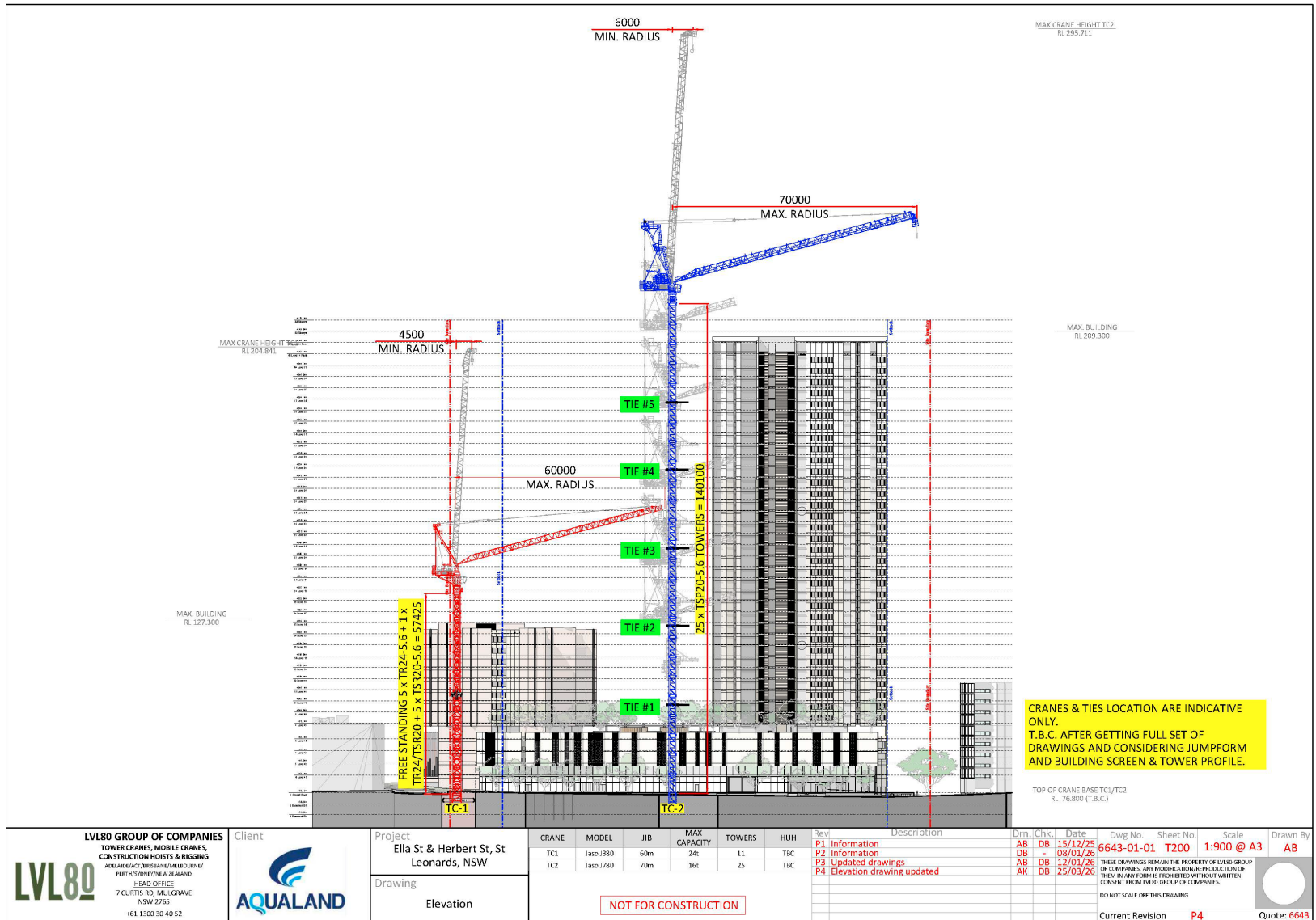


Figure 5: Elevation drawing indicatively showing operating heights of TC1 and TC2 at min and max radii

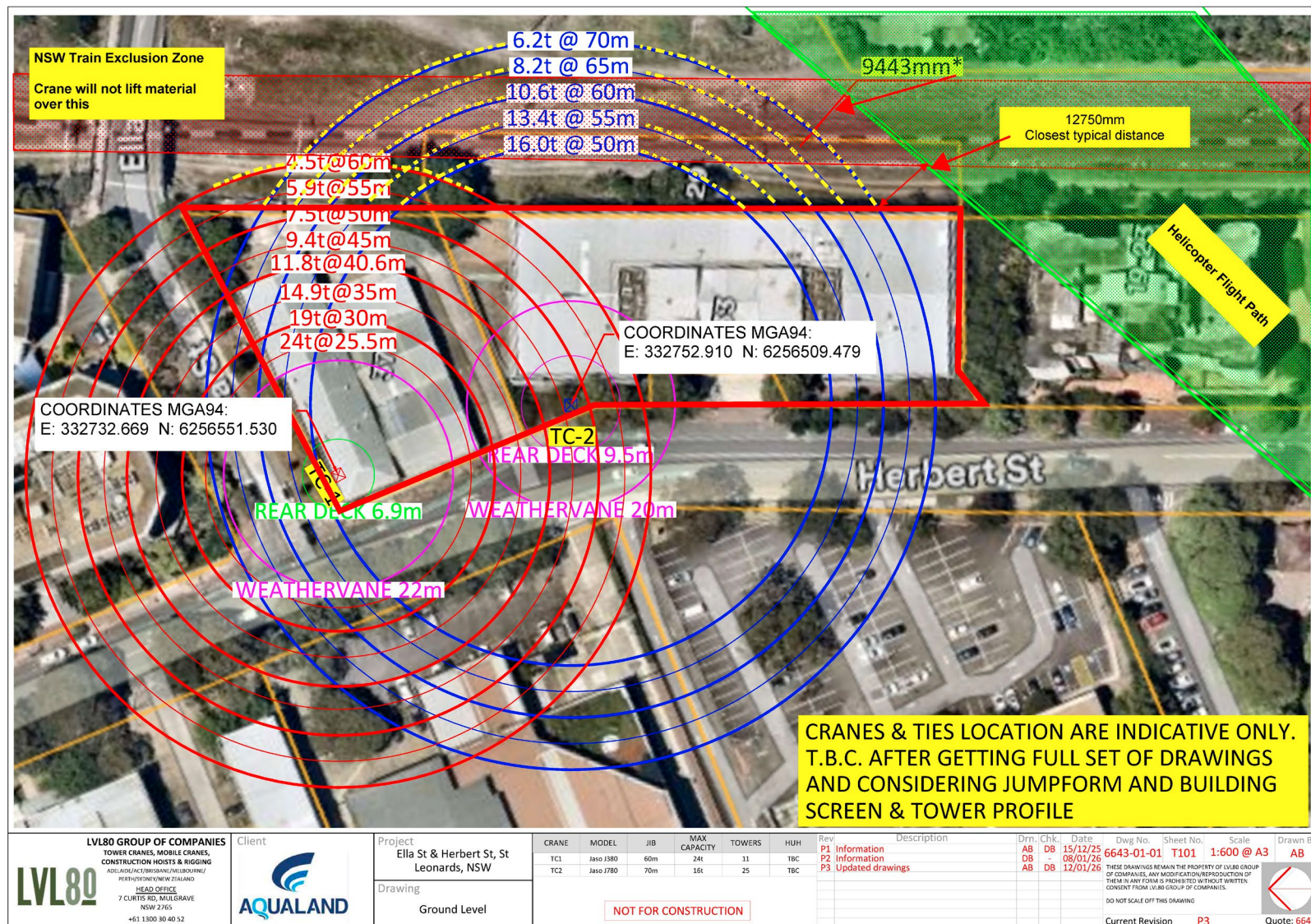


Figure 6: MGA 94 coordinates (indicative) for the centre of each tower section of TC1 and TC2

4.5 Non-structural elements

In addition to permanent and temporary obstacles which require assessment and approval in the event they intrude prescribed airspace, non-structural elements which introduce hazards to aircraft safety in the form of turbulence (e.g. discharge from vents, exhausts) must, when applicable, also be considered carefully and risk mitigated as required.

Such features must be considered in the context of applicable aviation regulations to ensure they will not introduce any unacceptable hazards to aircraft operations. Civil Aviation Safety Regulations (CASR) Part 139.180 states that *"CASA may determine a gaseous efflux having a velocity in excess of 4.3m/s will be a hazard to aircraft operations because of the velocity or location of the efflux"*. As mentioned Section 3.2, the *Airports (Protection of Airspace) Regulations 1996* will be updated as of 1 April 2026. The draft regulations have been reviewed by Avlaw, which includes a provision for the 4.3m/s limit to be increased to 6.1m/s.

Exhaust and lobby relief fans are proposed on the roof, which is standard for buildings of this height. The velocity of the discharge from these fans will be determined through the detailed design phase.

Therefore, further assessment of the proposed development at the site against this criterion is not considered necessary or appropriate at the time of writing, and is therefore excluded from the rest of this report.

5

NASF Guidelines

NASF Guidelines

The proposed development at the site needs to be assessed against a range of guidelines and principles contained within the NASF to satisfy the expectations of local planning authorities and aviation stakeholders. This ensures that any unacceptable risks associated with property development in the context of aircraft operations are not approved unless important aviation stakeholders have had an opportunity to assess the proposed activities on various aspects of aviation safety and, if necessary, propose appropriate mitigations that will ensure the safety, efficiency and regularity of aircraft operations are preserved.

All the NASF Guidelines are assessed in this section of this report, with the exception of an assessment of the Proposal against Guideline D of the NASF. This has been omitted as it relates specifically to wind turbine farms, which is irrelevant in the given type of development being proposed.

5.1 Aircraft Noise

Sydney Airport continues to grow each year, and more recently Sydney Airport has had its Airport Master Plan 2039 approved by the Minister as a requirement under the Airports Act.

To help quantify aircraft noise around airports and their surrounds to establish parameters for appropriate land-use planning based on aircraft noise, an Australian Noise Exposure Forecast (ANEF) has been developed to assist planners, developers, and regulators. ANEF modelling is endorsed by Airservices Australia and, in turn, has been approved as part of the airport master plan process. Figure 8 shows the N70 noise contour chart provided in the Sydney Airport 2039 Master Plan and has been adopted in this assessment, noting that the N70 lines extend out to the west of the site.

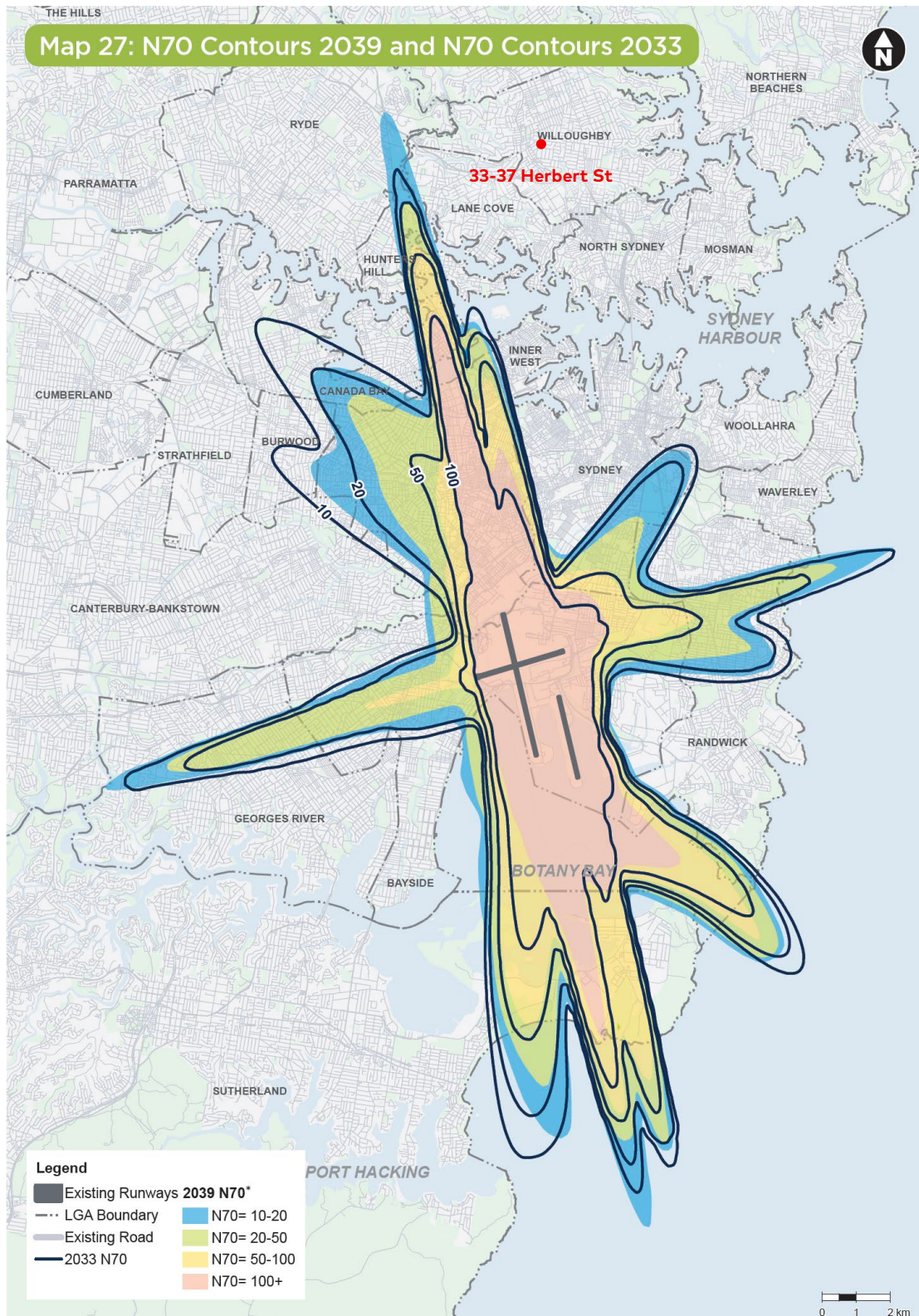


Figure 7: Sydney Airport 2039 Noise Exposure Contour Map.

Source: Sydney Airport Master Plan

It is clear that the entire site falls outside the contours within which restrictions for development of specific land uses would apply. Therefore, Avlaw's assessment is that the development at the site is compliant with noise restrictions as they relate to SYD.

5.2 Windshear and Turbulence

The Department has published [Guideline B](#) to provide advice to States and Territories, as well as local government decision makers and airport operators, to manage the risk of building-generated windshear and building-generated turbulence at airports. The assessment area that triggers additional assessment is illustrated in the figures below.

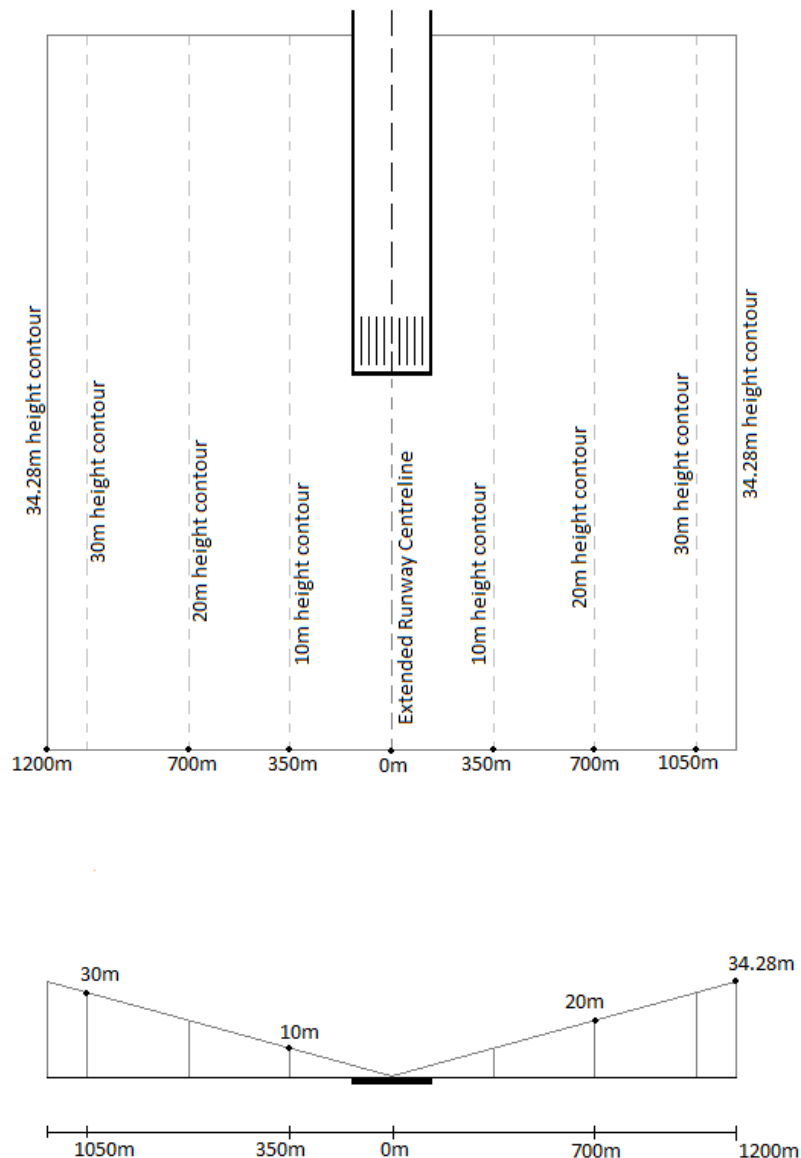


Figure 8: Plan view (top) and elevation view (bottom) of the 1:35 surface

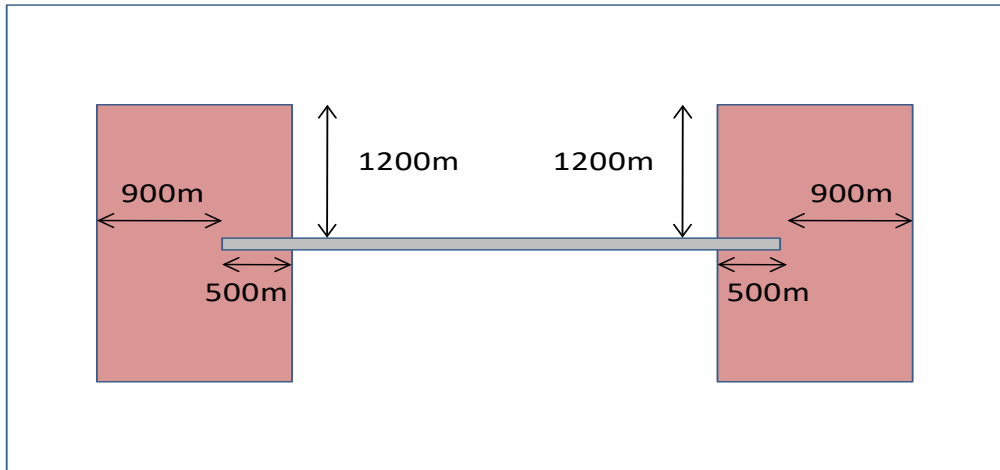


Figure 9: Area within which buildings that penetrate the 1:35 surface should be assessed

Since the site is located 12.45 km from the nearest runway threshold at Sydney Airport, the proposed development is outside the assessment area and therefore does not need to be assessed further to ensure compliance with windshear and turbulence criteria.

5.3 Wildlife Hazards

Within a certain proximity to an airport, aviation stakeholders require an assessment to be conducted on proposed developments to identify the risks of wildlife that may be present or attracted to a location as a means of understanding the impacts of said development on airport operations. Once identified, certain land uses are either deemed to be acceptable, unacceptable or conditionally approved based on specific monitoring and mitigation measures being developed and implemented. The site is located 14.23 km radius from the Sydney Airport's ARP and therefore falls outside the 13 km assessment criteria and does not need to be assessed further to ensure compliance with wildlife hazard criteria.

5.4 Lighting

The Department has published [NASF Guideline E on Managing Risk of Distractions to Pilots from Lighting in the Vicinity of Airports](#). The guideline advises on situations where lights are to be installed within a radius of 6km from an airport.

Attachment 1 to the guideline illustrates what is referred to as a "primary area" which is further divided into four segments which is illustrated below.

The site is located 12.45 km from the northern threshold of RWY 16R for Sydney Airport. Therefore, the site falls outside the maximum intensity of the light source measured at 3 degrees above the horizontal.

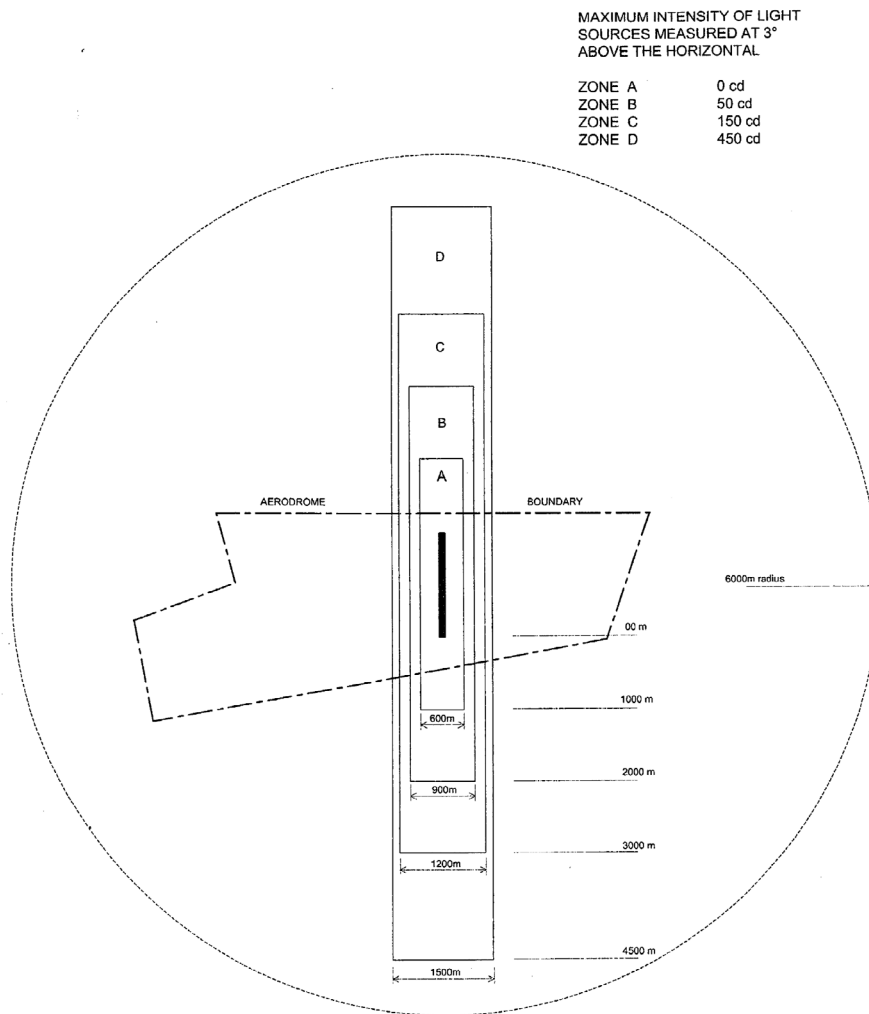


Figure 10: NASF lighting zones

As described above, the entire site falls outside the primary area indicated by Zones A, B, C and D and the overall assessment area for Sydney Airport and therefore, does not need to be assessed further to ensure compliance with NASF lighting zone guideline criteria.

5.5 Protected Airspace

The airspace design process for any airport is highly technical and lengthy. This is especially true with airports that have control towers and published IFPs, like Sydney Airport, which must be carefully considered before construction of any buildings or structures commences that may penetrate the prescribed airspace, on either a permanent or temporary basis. Sydney Airport has published an OLS drawing, and Airservices Australia has published IFPs that Avlaw has used to undertake the airspace assessment.

Avlaw has completed a thorough prescribed airspace assessment, which is based on modelling from first principles, which is based on CASA, Airservices and ICAO standards, the findings for which are explained below.

It is important to note that Avlaw also reviewed the current IFPs published for Sydney Airport and the current 2039 Airport Master Plan. Although the prescribed airspace charts shown on the airport's website are inserted for reference, given they are outdated and difficult to interpret to a granular level of detail, any conclusions in this report are based on the results of Avlaw's own modelling of the airspace protection surfaces for SYD.

OLS

The site is located within the Outer Horizontal Surface of the OLS, which is common to all runways at Sydney Airport. The Sydney Airport outer horizontal surface is set at 156.00 m AHD.

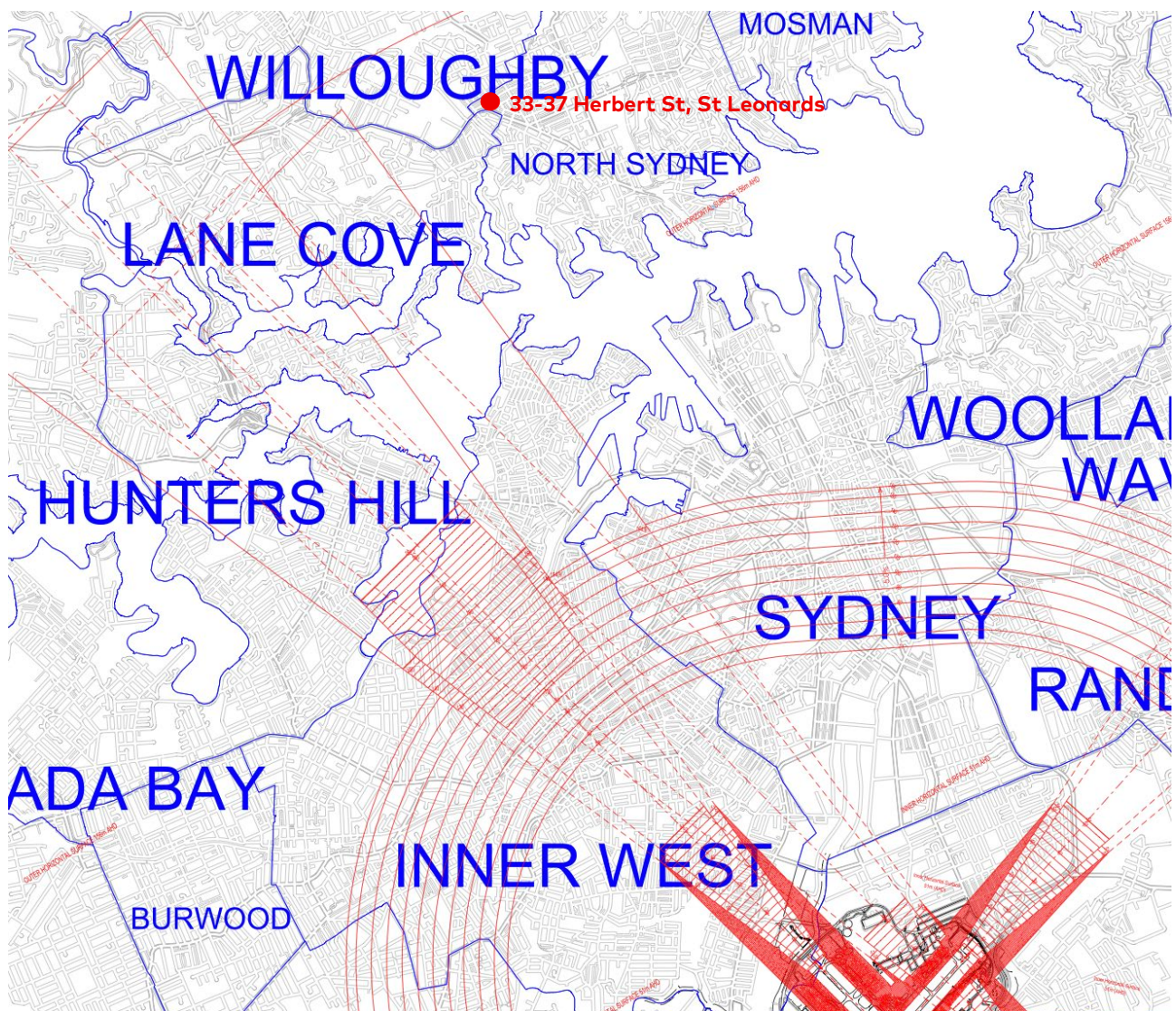


Figure 11: Extract from the SYD OLS chart showing the location of the site in the Outer Horizontal Section

Avlaw has modelled the proposed buildings (127.30m AHD and 209.30m AHD) along with the indicative operating envelope for both TC1 (204.841m AHD) and TC2 (295.711m AHD) to identify if there are any intrusions of the OLS for SYD. Avlaw's modelling has confirmed that the taller of the two building and both TC1 and TC2 will intrude, all of which are illustrated in the figures below.

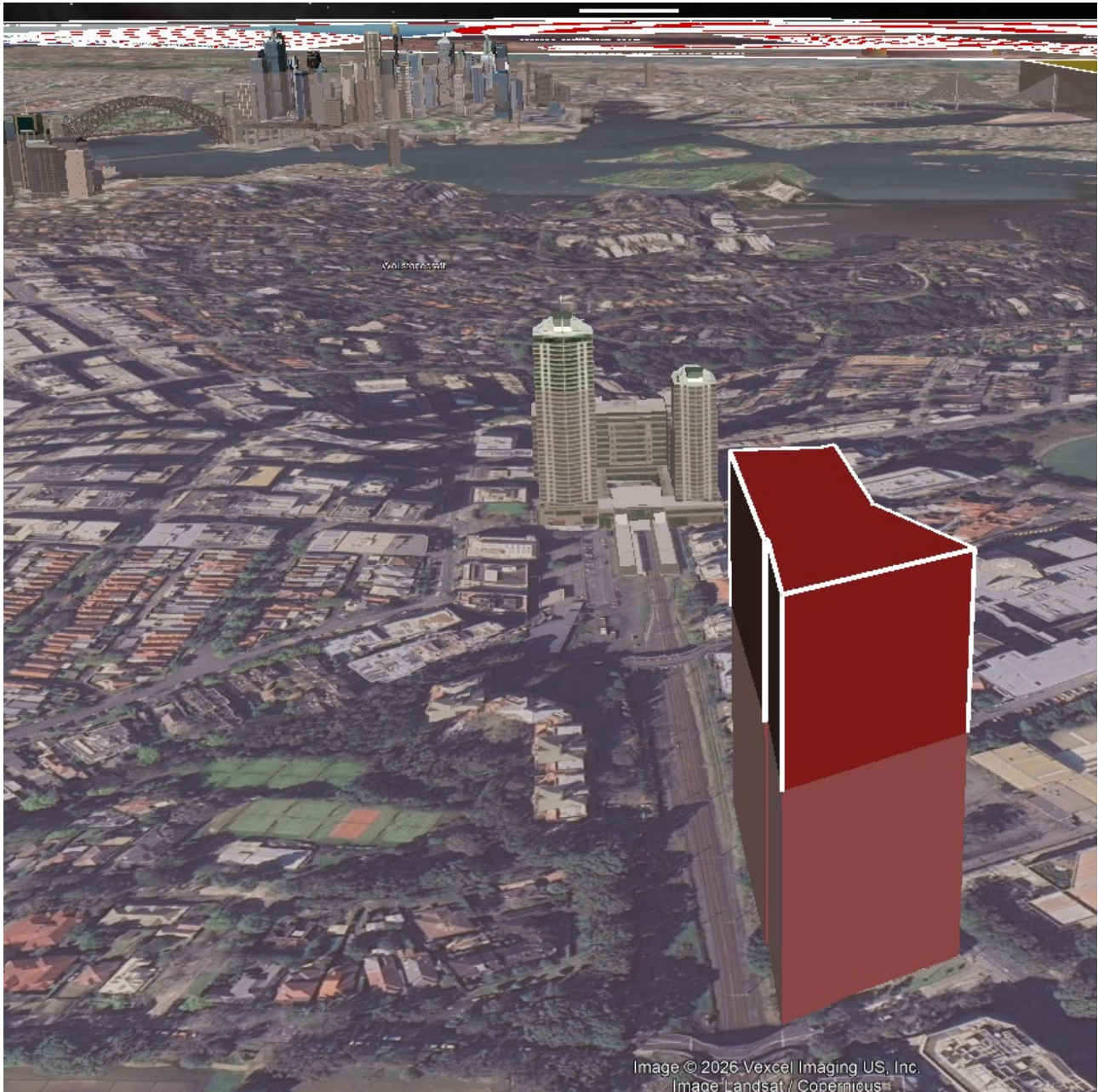


Figure 12: Avlaw's model of the proposed taller building at the site intruding the SYD OLS

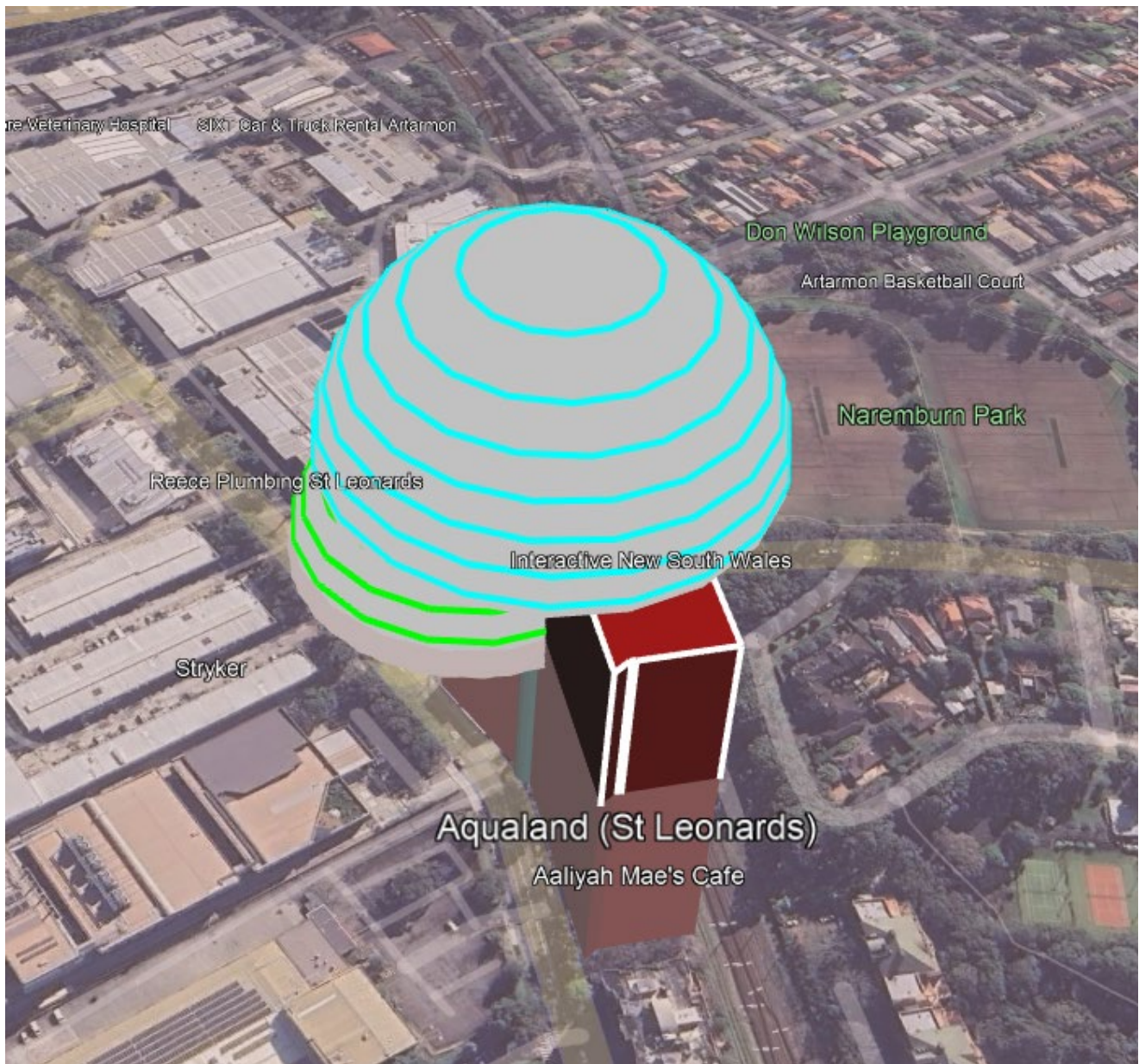


Figure 13: Avlaw's model of TC1 and TC2 both intruding the SYD OLS

Avlaw's assessment of the proposed buildings and cranes at the site against the Sydney Airport OLS finds the following:

- The shorter of the two buildings will not intrude;
- The taller of the two building will intrude the Outer Horizontal Surface of the OLS by 53.3m;
- TC1 will intrude the Outer Horizontal Surface of the OLS by 48.841m; and
- TC2 will intrude the Outer Horizontal Surface of the OLS by 139.711m.

The taller building, TC1 and TC2 will therefore be considered obstacles from an aviation perspective and require controlled activity approval, prior to being erected. Avlaw believes all will be issued, with further rationale provided in Section 6.

PANS-OPS

Sydney Airport has well-established and published IFPs for all runways, which are also enhanced by air traffic control along with primary and secondary radar. Using the Avlaw model of the proposed building and crane envelope, designing the protection surfaces associated with critical PANS-OPS procedures have been calculated from first principles, which has produced the following results:

- When applying ICAO PANS-OPS Doc 6168 criteria, the lowest PANS-OPS surface over the site relates to a SID for aircraft departing Runway 34L and climbing straight ahead.
- The surface ranges from 294.5m AHD to 296.5m AHD, rising across the site to the north.
- When applying Airservices' criteria, the lowest PANS-OPS surface is a horizontal plane at 340.15m AHD.

Avlaw's advice is to take a conservative approach and assume the more restrictive of the two criteria described above will be applied when assessing the heights of buildings and cranes at the site. The images below illustrate the results of Avlaw's modelling results when applying ICAO PANS-OPS Doc 6168 criteria.

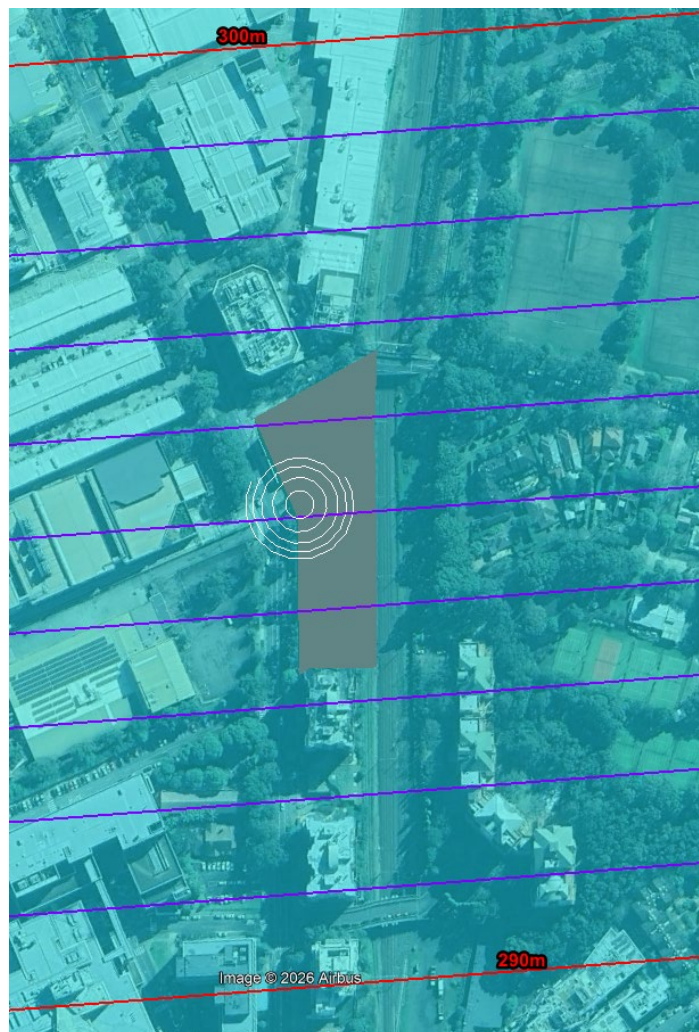


Figure 14: Avlaw's model of the PANS-OPS (ICAO criteria) showing TC2 intruding

Avlaw's assessment of the proposed buildings and cranes at the site against the Sydney Airport PANS-OPS finds the following:

- Neither building will intrude the PANS-OPS;
- TC1 will remain below the PANS-OPS at all times; and
- TC2 will intrude the PANS-OPS by 1.711m, but only when operating at minimum radius.

Intrusions of PANS-OPS surfaces are limited to a period of three contiguous months, and therefore any proposed intrusions need to be carefully planned to ensure that the upper floors of the development can be completed within this time restriction.

It is worth noting that this conclusion regarding the PANS-OPS is found when applying ICAO PANS-OPS Doc 6168 criteria. When the alternative Airservices assessment methodology is applied, the PANS-OPS restriction increased to 340.1m AHD, meaning TC2 will not intrude.

Airservices will be tasked with assessing the proposed permanent and temporary structures at the site against PANS-OPS restrictions once controlled activity applications are lodged and will advise the Aqualand if the proposed crane activity does or does not impact IFP or PANS-OPS surfaces.

RTCC

The site is located under the 335.28m AHD sector of the RTCC, which cannot be penetrated by buildings or cranes. The image below shows the results of Avlaw's modelling of the site.



Figure 15: Avlaw's model of the proposed building and two (2) tower luffing cranes below the RTCC

Avlaw's assessment of the proposed buildings and cranes at the site against the RTCC finds the following:

- Neither building will intrude; and
- Neither TC1 or TC2 will intrude.

Therefore, the proposed development at the site will not have any adverse impacts on the safe vectoring of aircraft by Air Traffic Controllers, in reference to the RTCC height restrictions.

5.6 Aviation Facilities - Communications, Navigation and Surveillance (CNS)

The Department has published [Guideline G](#) of the NASF to provide advice to States and Territories, Local Government decision makers and others on planning protection within Building Restricted Areas (BRAs) to ensure no developments are approved that can adversely impact the Communication, Navigation and Surveillance (CNS) facilities related to air transport operations.

Sydney Airport uses both ground-based and GPS satellite navigation aids to assist in instrument approach and departure procedures and overhead en-route navigation. The location of the site in relation to the ground-based navigational aids at Sydney Airport is well outside the assessment areas and therefore, the proposed development at the site does not need to be assessed further.

5.7 Strategically Important Helicopter Landing Sites

The triggers for assessment of proposed development activities with respect to airspace surrounding Helicopter Landing Sites (HLSs) are not captured within those that are in place to establish the prescribed airspace for an airport (e.g. OLS, PANS-OPS). [NASF](#) Guideline H has been developed to offer some form of protection to what are being termed Strategically Important Helicopter Landing Sites (SHLSs). Under the guideline, hospital helipads would be considered as SHLSs and therefore protected from obstacles being erected in close proximity to it.

The guideline defines 140m wide rectangular steps in the direction of the approach/take-off area in 500m long increments until reaching 125m above the SHLS. The steps, rising in 15m increments, are shown below in a figure that has been sourced from Guideline H that illustrates the area which is protected and the heights above which further assessment is triggered.

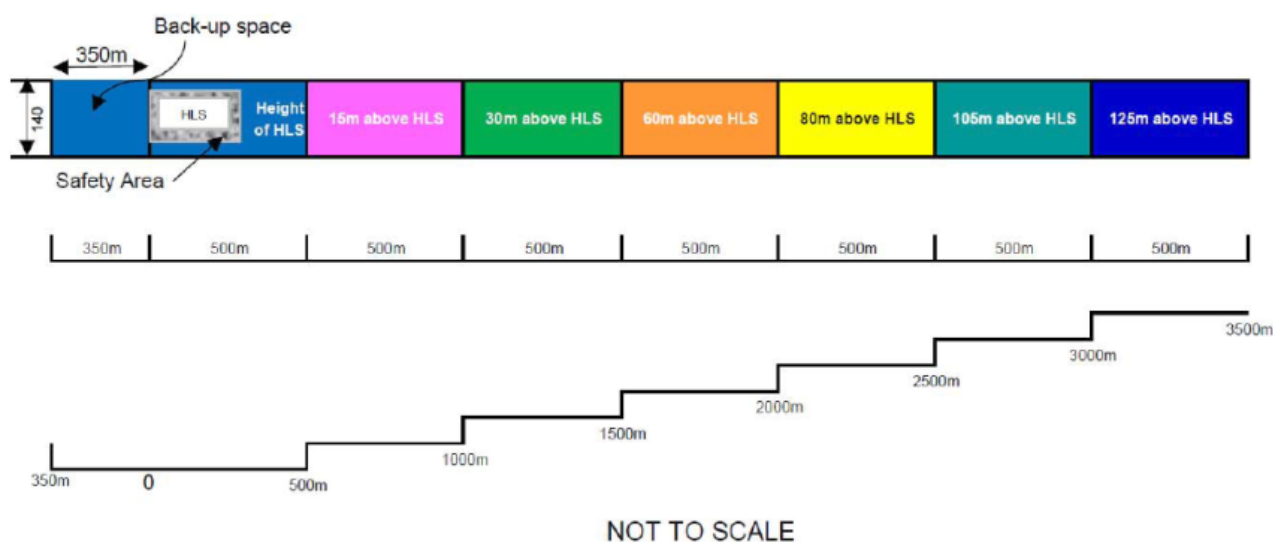


Figure 16: Referral trigger for SHLS

Applications for airspace approval for developments in close proximity to HLSs are lodged with the asset owner who in turn refers the application to their aviation advisors (if applicable) and Helicopter Emergency Medical Services (HEMS) operators that fly to/from the HLS in question for assessment. The closest existing hospital to the site with a helipad is the RNSH, which is located approximately 240m NE from the site and therefore, within the first step of the

assessment area as shown in the referral trigger for SHLS above. Therefore, if the site was in the direction of the approach/departure tracks for the RNSH HLS, any permanent or temporary structure at or above the height of the HLS would require additional assessment.

The RNSH HLS is at a height of 128.6m AHD, meaning the taller building and TC1 and TC2 all meet the criteria for additional assessment to identify the potential impacts on helicopter activities.

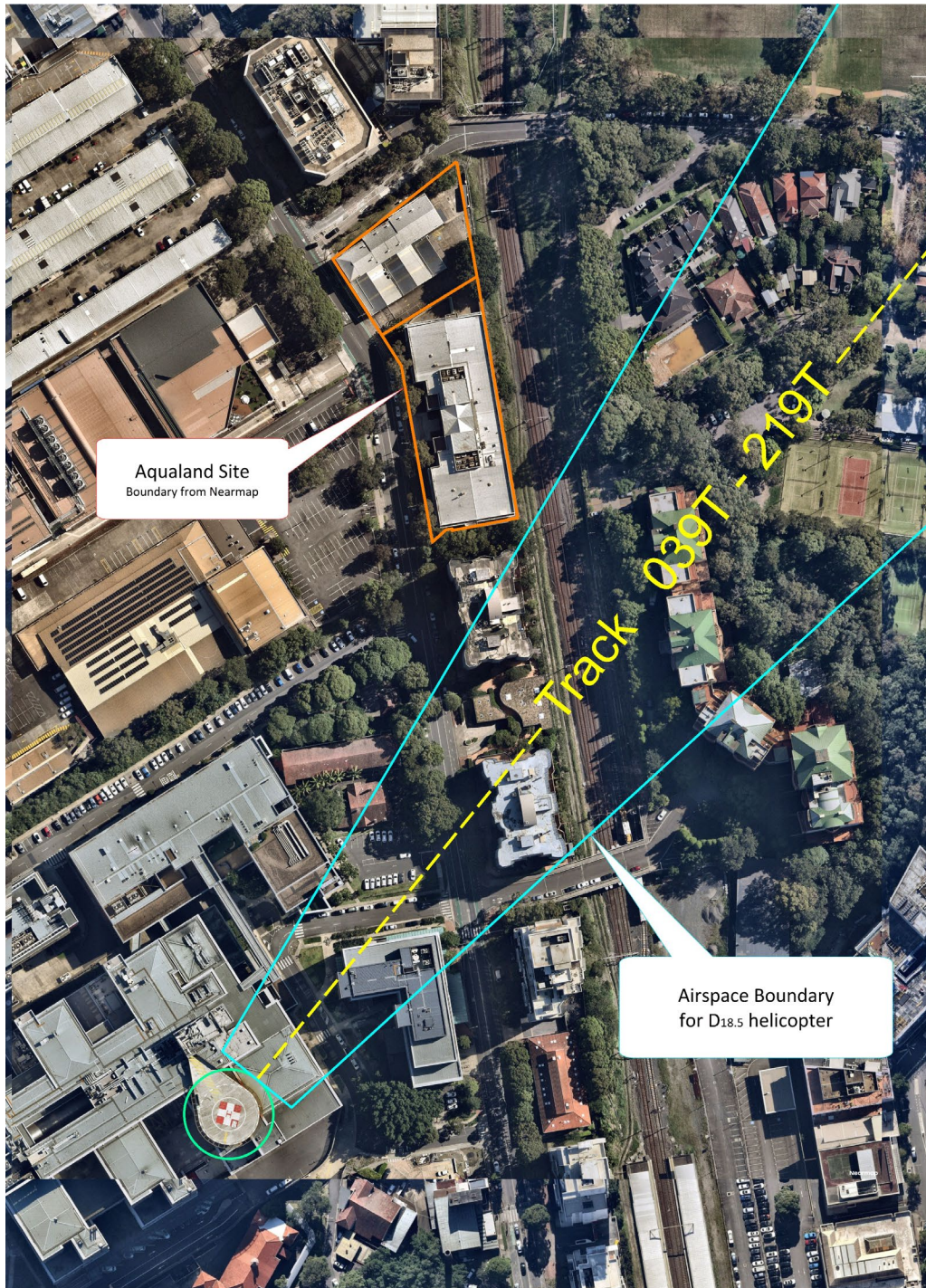


Figure 17: Operational airspace boundary for NE flight path at the RNSH HLS in relation to site boundary

Note: boundary shown in aqua is based on a $D_{18.5}$ helicopter, which protects future aircraft types

The proposed site, buildings and crane activity are all clear of the lateral limits of the operational airspace boundary for the 039T flight path at the RNSH HLS. At the most critical point, there is a 4.7 m distance between the outer edge boundary for the airspace (based on 18.5D) and the site.

Therefore, the proposed development at the site will have no impact on the hospital helipad at RNSH. Consultation has been completed with a number of relevant stakeholders to inform this conclusion, details for which are provided in Section 7.

5.8 Public Safety Areas

An important aspect of compatible land uses that the site must be assessed against is the Public Safety Area (PSA) for Sydney Airport. [NASF](#) Guideline I has been developed to offer protection from incompatible land use development within a defined area at the end of airport runways.

These are designated areas of land at the end of runways within which development may be restricted in order to control the number of people on the ground. This is to reduce the risk of injury or death in the event an aircraft accident occurs during take-off or landing.

The Sydney Airport Master Plan 2039, while not adopting a PSA area, provides guidance on two (2) acceptable Australian PSA models and notes that the International Civil Aviation Organization (ICAO) data indicates that if an accident occurs, it will likely occur within 1,000 metres before the runway on approach or within 500 metres beyond the runway end on departure. PSA zones are designed to protect public safety, limiting land uses, on- and off-airport, that increase the number of people living, working or congregating in the zone, and the storage of hazardous materials in the zone.

Avlaw has assessed that the site is located 12.45 km from the nearest runway threshold (RWY 16R), and is outside any PSA trigger area for assessment; therefore, Avlaw has assessed that no action is required.

6

Proposed Obstacle Analysis

Proposed Obstacle Analysis

6.1 Sydney Airport

Penetration of the OLS is a consideration for practically every major international airport in Australia, and SYD is no exception. The potential for more tall structures to be approved close to SYD than what may ordinarily have been the case in decades past at other international airports will be closely associated with whether a revised concept for the OLS is adopted in Australia, following further development by ICAO. As mentioned in Section 3.2, there are indications that this will be rolled out in the coming years, but for the time being, Avlaw's assessment is based on the currently endorsed OLS, which is expected to be more restrictive.

As outlined in the earlier part of the report, the proposed development at the site will result in both permanent and temporary intrusions of the Sydney Airport OLS by the final built form structure and two temporary construction cranes. The final built form at a height of 209.30 m AHD will penetrate the Sydney Airport's OHS by 53.30 m, and during construction, two (2) onsite luffing cranes with an operating height of 204.841 m (TC1) and 295.711 m (TC2) AHD will penetrate the Sydney Airport's OHS by 48.841 m and 139.711 m respectively. As such, each will need to be assessed by SYD, CSA, AsA and ultimately approved by the Department. Avlaw believes that with mitigations in the form of markings, obstacle lighting and NOTAM, the risks associated with these proposed obstacles will be appropriately mitigated.

With respect to crane activity, depending on the criteria used by AsA, a slight reduction in height may be required. When applying ICAO criteria, the lowest calculated PANS-OPS surface across the site varies from 294.50 m (966 ft) to 296.50 m (973 ft), which increases to 340.15 m (1,116 ft) AHD when using Airservices' methodology (both related to the RWY 34L SID). Indicative construction timelines provided by Aqualand also suggest that TC2 could be at its maximum height for 8-9 months, resulting in an intrusion through the PANS-OPS (based on ICAO criteria) for more than the three months permitted.

6.2 RNSH Helipad

The operational airspace boundary for the RNSH Hospital HLS has been modelled by Avlaw in reference to the built and temporary structures at the site. No intrusions have been identified, even when future potential use of the HLS by larger helicopters (not currently operating) is applied.

7

Stakeholder Engagement

Stakeholder Engagement

Given the site's close proximity to the RNSH HLS, Avlaw's stakeholder engagement has concentrated on all those who have a responsibility or interest in the safety, efficiency and regularity of helicopter operations to and from this rooftop helipad. The primary contact for the HEMS operators in NSW is AviPro (NSW Health aviation advisors), who disseminate and coordinates information and responses related to proposed development activities near helipads with front-line HEMS operators. In addition, direct consultation with Westpac and NSW Air Ambulance has also been undertaken to sure all additional information.

Company	Contact Person	Contacted via
AviPro	Jeff Stark	Email
NSW Air Ambulance	Steven Lobley	Telephone Email
Westpac Rescue Helicopter Service	Michael O'Grady	Telephone Email
Toll Helicopters	Andrew Gordon	Email (via Steven Lobley)
Toll Helicopters	Gerard Longley	Telephone Email

Table 3: Summary of stakeholders who have been invited to comment on the proposed building and cranes

Following contact with the HEMS stakeholders as tabulated above, their comments are summarised as follows:

- Jeff Stark (AviPro) did not identify any issues with the proposed buildings or cranes, but pointed out that he was not a relevant stakeholder in this instance and that he would forward the information provided to others (see below);
- Steven Lobley (NSW Air Ambulance) did not offer any personal views, but did forward the information provided by Avlaw (via Jeff) to other relevant stakeholders (see below);
- Michael O'Grady (Westpac Rescue Helicopter) specifically mentioned no issue with the crane activity, and has been reminded that comments on the built form are requested;
- Andrew Gordon (Toll Helicopters) agreed with the Westpac Rescue Helicopter Service assessment regarding cranes, and added a request for further verification that the built form is clear of the lateral splays of the airspace boundary. This was re-sent (i.e. Figure 18) and Avlaw received subsequent feedback from Andrew's colleague at Toll Helicopters, Gerard Longley (see below); and
- Gerard Longley (Toll Helicopters) confirmed he had reviewed all emails referred to above along with supporting documentation produced by Avlaw and confirmed that neither the finished built form nor crane activity would infringe the established flight paths to/from the RNSH helipad.

In summary, a thorough stakeholder engagement process spanning three months has been completed and all have confirmed that they agree with Avlaw's assessment of the built form and

cranes against the established 039T/219T flight tracks for the RNSH helipad. Therefore, Avlaw concludes that it is satisfied that the proposed development at the site as detailed in this report will not introduce any hazards to helicopter operations, including those related to the RNSH helipad. For completeness, Avlaw will re-engage with these stakeholders later in the project when the detailed design is complete and CMP is frozen.

8

Conclusions

Conclusions

The findings from Avlaw's Aviation Safeguarding Assessment of the proposed built and temporary structures at the site are summarised below:

- The proposed development is not impacted by any land use restrictions in the context of aircraft noise.
- The site is outside the assessment trigger area which is impacted by potential windshear and turbulence considerations.
- The site is outside the assessment trigger area for wildlife management.
- The site falls outside the assessment area for off-airport lighting impacts on airport operations.
- The taller of the two buildings at the site will intrude the Outer Horizontal Surface of the OLS for Sydney Airport and will require controlled activity approval, which Avlaw believes will be given, with any specific conditions such as lighting determined by CASA.
- TC1 and TC2 will both intrude the Outer Horizontal Surface of the OLS for Sydney Airport and will each require controlled activity approval. TC1 should be approved such to conditions determined by CASA, where TC2 will require further input from AsA (see below re PANS-OPS).
- AsA will need to confirm the heights of the PANS-OPS surfaces over the site:
 - ICAO criteria results in an intrusion by TC2
 - If this criteria is applied, the PANS-OPS intrusion must be limited to three contiguous months (currently estimated to be 8-9 months)
 - AsA criteria does not result in any intrusions by cranes.
- The site is well clear and outside the assessment area for the ground-based navigation aids located at Sydney Airport.
- The site is within the NASF assessment area of an established HLS located at the RNSH. Avlaw has assessed the buildings and crane activity at the site to all be clear of the operational airspace boundary for the 039T flight track to the NE and therefore should not adversely impact helicopter operations.
- Consultation with numerous stakeholders relevant to the RNSH HLS has been positive, with all confirming that they do not object to the built form or cranes proposed to be erected at the site.
- The site is clear of any future PSA's, should they be adopted at Sydney Airport.



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