March 2020

AVIATION IMPACT STATEMENT

GOSFORD ALIVE DEVELOPMENT

Prepared for Lederer Group Pty Ltd

AVIATION PROJECTS

AVIATION PROJECTS

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GLOSSARY

AGL	above ground level
AHD	Australian Height Datum
AIP	aeronautical information package (Airservices Australia)
AMSL	above mean sea level
ARP	aerodrome reference point
CAAP	Civil Aviation Advisory Publication
CAR	Civil Aviation Regulations (1988)
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulations (1998)
CNS	Communications, Navigation and Surveillance
DAH	Designated Airspace Handbook
ERSA	En Route Supplement Australia (Airservices Australia)
ICAO	International Civil Aviation Organisation
HLS	Helicopter Landing Site
LSALT	lowest safe altitude
MSA	minimum safe altitude
MOC	minimum obstacle clearance
MOS	Manual of Standards Part 139—Aerodromes
OLS	obstacle limitation surface(s)
RAAF	Royal Australian Air Force
SSR	secondary surveillance radar

UNITS OF MEASUREMENT

ft	feet	(1 ft = 0.3048 m)
km	kilometres	(1 km = 0.5399 nm)
m	metres	(1 m = 3.281 ft)
nm	nautical miles	(1 nm = 1.852 km)

1. INTRODUCTION

1.1. Situation

Lederer Group Pty Ltd (Lederer Group) is currently responding to submissions for the Planning Proposal regarding the development of the Gosford Alive precinct (the Project) which is located in proximity to the Gosford Hospital helicopter landing site (HLS).

The Project has been deemed a State Significant Development, and the New South Wales Department of Planning Industry and Environment (NSW DPIE) and New South Wales Department of Health has advised that a report is required from a qualified aviation expert to evaluate the proposal for potential impacts on aviation safety and to provide an Aviation Impact Statement.

The Project is to be located at 136-148 Donnison Street, Gosford NSW (Lot 6 DP598833 and Lot 1 DP540292) and is comprised of five towers ranging in height from 73.1 to 101 m Australian Height Datum (AHD) (approximately 17 to 27 storeys) with a mixed use of commercial, retail and residential.

In an email dated 14 February 2020, Mr Patrick Hall, Portfolio and Development Manager Lederer Group, requested Aviation Projects provide an Aviation Impact Statement for the proposed development, and to assess any impacts and mitigation measures for current operations at Gosford Hospital HLS.

1.2. Purpose and scope of task

The scope of this task included the following:

- Review the site against all associated regulatory and airspace authorities;
- Conduct an Aviation Impact Statement to assess the potential aviation impacts of the proposed development (during construction and operation), including helicopter flight paths servicing Gosford Hospital; and
- Propose any potential mitigation strategies.

1.3. Methodology

The task was performed according to the method outlined below:

1. Review client material;
2. Review relevant regulatory requirements and information sources including Aeronautical Information Package and Civil Aviation Safety Authority (CASA) *Manual of Standards Part 139 – Aerodromes*, and *Part 173 – Instrument Flight Procedures Design* to identify potential impacts to the obstacle limitation surface (OLS), procedures for air navigation services – aircraft operations (PANS-OPS) for Gosford Hospital HLS and *Airports (Protection of Airspace) Regulations 1996* (APAR);
3. Consider the National Airports Safeguarding Framework Guidelines, including Guideline H*: Protecting Strategically Important Helicopter Landing Sites*;
4. Consider the Civil Aviation Advisory Publications (CAAPs) guidelines, including CAAP 92-2(2): *Guidelines for the establishment and operation of onshore Helicopter Landing Sites*;

5. Provide advice on exhaust plumes that may originate at the top of the proposed building, which may impact OLS airspace, including the need for a Plume Rise Assessment (CASA Advisory Circular AC 139-05 version 3.0 date 03 January 2019);
6. Identify operational impacts and provide advice on Gosford Hospital HLS airspace, including construction cranes;
7. Prepare a draft letter report with preliminary aviation planning assessment and advice on safeguarding airspace and send to Lederer Group Pty Ltd for comment; and
8. Finalise the letter report for Client acceptance.

1.4. Client material

The following material was provided by Lederer Group for the purpose of this Aviation Impact Statement:

- Lederer Group Pty Ltd, Gosford Alive Architectural Design Report, project no 218155, revision D, dated August 2019;
- Mecone Pty Ltd, Gosford Alive Concept DA + Stage 1 works (demolition, clearing, site improvements) Environmental Impact Statement for State Significant Development, dated 27 September 2019;
- The Buchan Group Pty Ltd, Gosford Alive Masterplan, Proposed Building Envelope, project no 218155, drawing no. DA-02, revision B, dated 28 February 2020;
- The Buchan Group Pty Ltd, Gosford Alive Masterplan, Masterplan – Elevation Henry Parry Drive, project no 218155, drawing no. DA-20, dated 28 February 2020;
- The Buchan Group Pty Ltd, Gosford Alive Masterplan, Masterplan – Elevation William St, project no 218155, drawing no. DA-21, dated 28 February 2020;
- The Buchan Group Pty Ltd, Gosford Alive Masterplan, Masterplan – Elevation Donnison Street, project no 218155, drawing no. DA-22, dated 28 February 2020;
- The Buchan Group Pty Ltd, Gosford Alive Masterplan, Masterplan – Elevation Albany St, project no 218155, drawing no. DA-23, dated 28 February 2020;
- The Buchan Group Pty Ltd, Gosford Alive Masterplan, Masterplan Section A, project no 218155, drawing no. DA-24, dated 28 February 2020;
- The Buchan Group Pty Ltd, Gosford Alive Masterplan, Masterplan Section B, project no 218155, drawing no. DA-25, dated 28 February 2020; and
- The Buchan Group Pty Ltd, Gosford Alive Masterplan, Masterplan Section B, project no 218155, drawing no. DA-140, dated 17 August 2019.

1.5. References

References used or consulted in the preparation of this report include:

- Airservices Australia, *Aeronautical Information Package; including AIP Book, Departure and Approach Procedures and En Route Supplement Australia,* effective 27 February 2020;
- Airservices Australia, Designated Airspace Handbook (DAH), effective 07 November 2019;
- Civil Aviation Safety Authority, Civil Aviation Regulations 1998 (CAR);
- Civil Aviation Safety Authority, Civil Aviation Safety Regulations 1998 (CASR;
- Civil Aviation Safety Authority, *Manual of Standards Part 139 – Aerodromes*, version 1.14: dated January 2017;
- Civil Aviation Safety Authority, *Manual of Standards Part 139 – Aerodromes*, version 1.14: dated January 2017;
- Civil Aviation Safety Authority, Manual of Standards Part 173 – *Standards Applicable to Instrument Flight Procedure Design*, version 1.5, dated March 2016;
- Civil Aviation Safety Authority, *Advisory Circular (AC) 139-8(2): Reporting of Tall Structures,* dated March 2018;
- Civil Aviation Safety Authority, *Advisory Circular (AC) 139-05(3.1): Plume Rise Assessment*, dated 03 January 2019;
- Department of Infrastructure and Regional Development, Australian Government, National Airport Safeguarding Framework, *Guideline B Managing the Risk of Building Generated Windshear and Turbulence at Airports*, dated May 2018, and *Guideline H: Protecting Strategically Important Helicopter Landing Sites* dated May 2018;
- International Civil Aviation Organization, Aircraft Operations Volume II – *Construction of Visual and Instrument Flight Procedures*, 6th edition, 2014;
- NSW Department of Health, NSW Government, Guidelines for Hospital Helicopter Landing Sites in NSW, dated 2018;
- New South Wales Government, State Environmental Planning Policy (Gosford City Centre) 2018; and
- OzRunways, dated 26 February 2020.

2. BACKGROUND

2.1. Project description

The Project comprises of five towers for development. Figure 1 shows an aerial view of the Project site (source: The Buchan Group Pty Ltd, project no 218155, drawing no. DA-140, dated 17 August 2019).

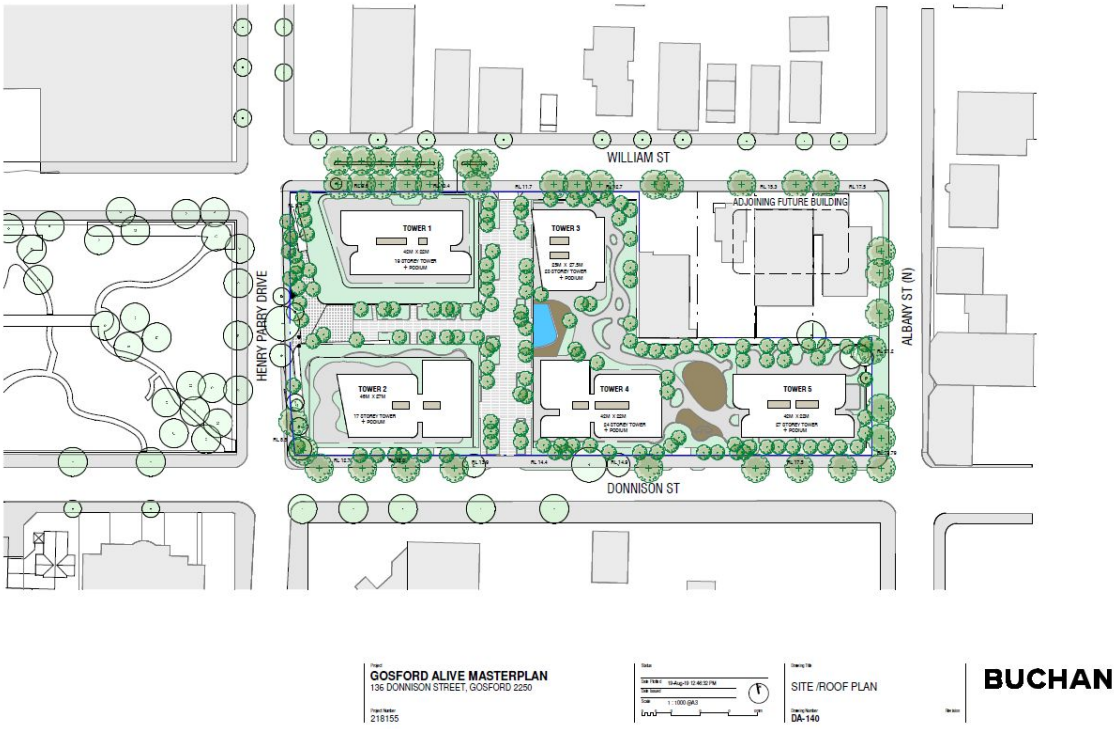

Figure 1 Aerial view of Project site

Figure 2 shows a side elevation view of towers 2, 4 and 5 (source: The Buchan Group Pty Ltd, Gosford Alive Masterplan, Masterplan – Elevation Donnison Street, project no 218155, drawing no. DA-22, dated 28 February 2020).

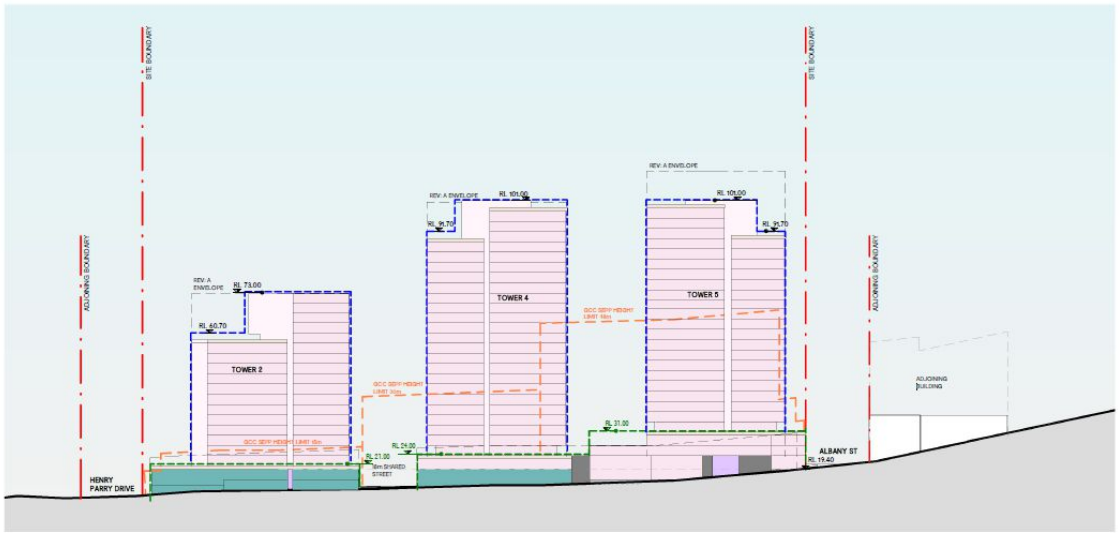

Figure 2 Side view towers 2, 4 and 5

Figure 3 shows a side elevation view of towers 1 and 3 (source: The Buchan Group Pty Ltd, Gosford Alive Masterplan, Masterplan – Elevation William St, project no 218155, drawing no. DA-21, dated 28 February 2020).

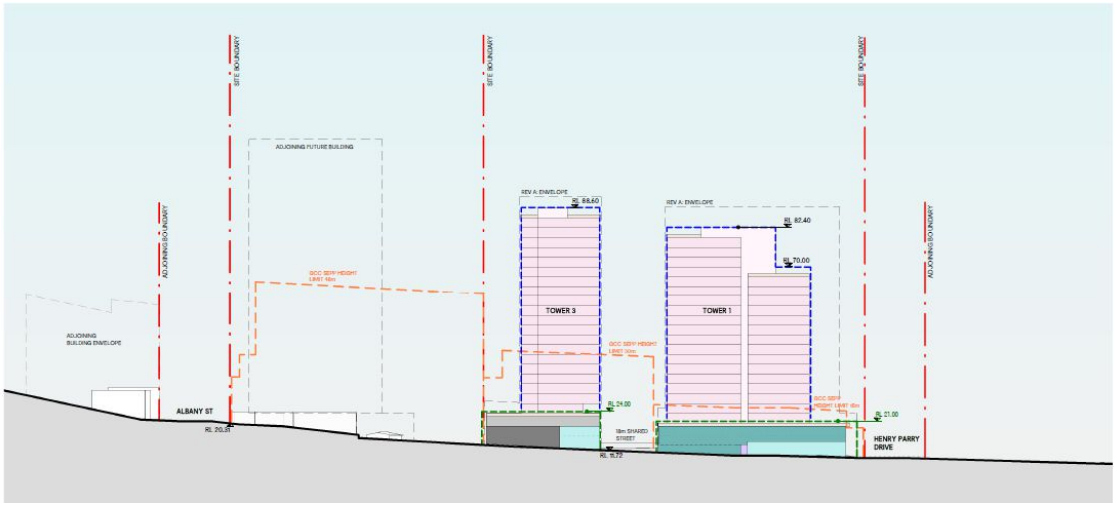

Figure 3 Side view towers 1 and 3

2.2. Site overview

An overview of the Project site located at Lot 6 DP598833 and Lot 1 DP540292 Donnison Street Gosford, is provided in Figure 4 (source: Google Earth).

Figure 4 Project site

Figure 5 shows the location of the Project site relative to Gosford Hospital HLS, which is located approximately 907 m to the north west (source: Google Earth).

Figure 5 Project site relative to Gosford Hospital HLS

A search was conducted to identify nearby registered, certified or military airports. The airport that is located closest to the Project site is the RAAF Base Richmond military airport. However, as the Project is located 56 km (30 nm) from RAAF Base Richmond, there will be no impacts on operations at the airport and has therefore not been assessed as part of this AIS.

Figure 6 identifies the project in proximity to RAAF Base Richmond.

Figure 6 Project proximity to RAAF Base Richmond

The Project site falls east to west, from 20.8 m AHD at Albany Street North to down to 9.15 m AHD at the corner of William Street and Henry Parry Drive.

For the purposes of this analysis, the following details for towers 4 and 5 are relevant to the assessment herein:

- natural ground level is 19.4 m (AHD);
- building height is 81.6 m above ground level (AGL); and
- maximum overall height is 101 m in AHD (331 ft above mean sea level (AMSL)).

Figure 7 illustrates tower 5, the tower has a maximum overall height of 101 m AHD (source: The Buchan Group Pty Ltd, Gosford Alive Masterplan, Masterplan – Elevation Albany St, project no 218155, drawing no. DA-23, dated 28 February 2020).

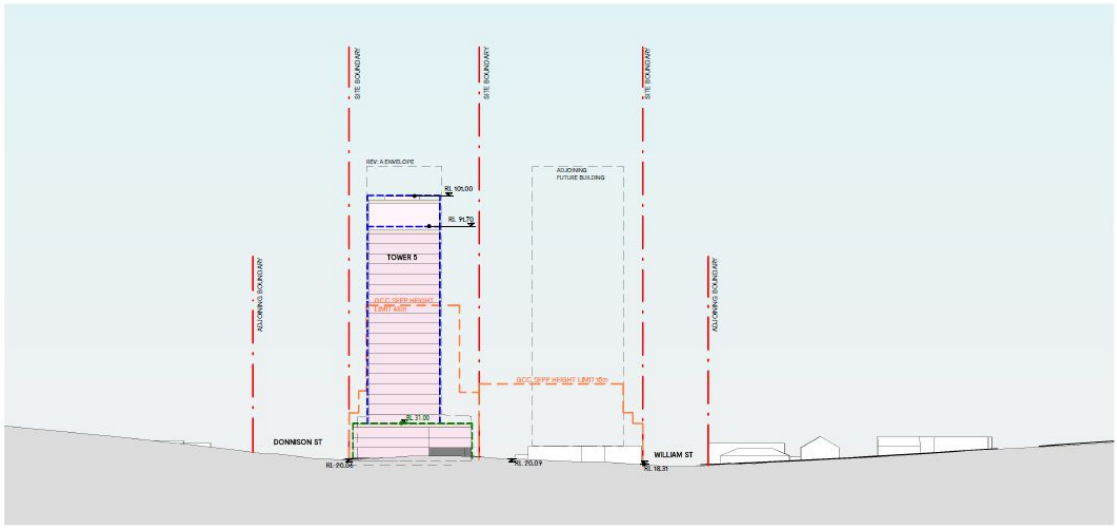

Figure 7 Tower 5 elevation

2.3. Temporary crane operations

Lederer Group will advise of temporary crane details prior to construction.

3. PLANNING CONTEXT

In the absence of formal Australian legislation for the protection of airspace and flight paths around HLS, the following planning documents, and guidelines have been used or referenced as a basis for the aviation impact statement.

3.1. State Environmental Planning Policy (Gosford City Centre) 2018

The Project is located within the Central Coast Council local government area (LGA). The Project is subject to the provisions of the State Environmental Planning Policy (Gosford City Centre) 2018.

The aim of the policy is:

> *(a) to promote the economic and social revitalisation of Gosford City Centre,*
>
> *(e) to encourage responsible management, development and conservation of natural and man-made resources and to ensure that Gosford City Centre achieves sustainable social, economic and environmental outcomes,*
>
> *(f) to protect and enhance the environmentally sensitive areas and natural and cultural heritage of Gosford City Centre for the benefit of present and future generations,*
>
> *(j) to ensure that development exhibits design excellence to deliver the highest standard of architectural and urban design in Gosford City Centre.*

The State Environmental Planning Policy (Gosford City Centre), does not contain any provisions for the Gosford Hospital HLS, nor does it contain any information relating to plume rise assessments, aviation impacts or protecting the airspace around the Gosford Hospital HLS.

The Project is located in a mixed-use zone B4, refer to Figure 8 (source: NSW ePlanning Spatial Viewer).

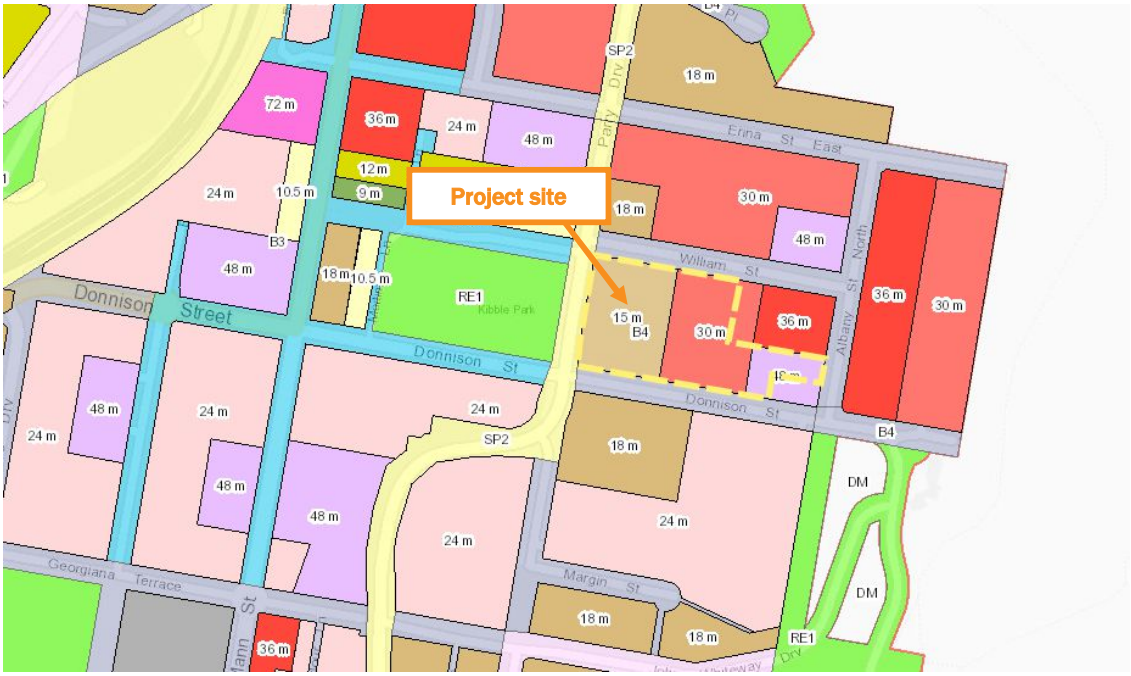

Figure 8 Location of site and land zoning

Due to Project being deemed a State Significant Development, the zoning criteria regarding the Project is subject to exceptions to height and floor space ratio as detailed in section 8.4:

> *(4) Development consent may be granted to development that results in a building with a height that exceeds the maximum height shown for the land on the Height of Buildings Map, or a floor space ratio that exceeds the floor space ratio shown for the land on the Floor Space Ratio Map, or both, by an amount to be determined by the consent authority, if—*
>
> *(a) the site area of the development is at least 5,600 square metres, and*
>
> *(b) a design review panel reviews the development, and*
>
> *(c) if required by the design review panel, an architectural design competition is held in relation to the development, and*
>
> *(d) the consent authority takes into account the findings of the design review panel and, if held, the results of the architectural design competition, and*
>
> *(e) the consent authority is satisfied with the amount of floor space that will be provided for the purposes of commercial premises, and*
>
> *(f) the consent authority is satisfied that the building meets or exceeds minimum building sustainability and environmental performance standards.*

3.2. Civil Aviation Safety Regulations (1998) Part 139-Aerodromes

The Civil Aviation Safety Authority (CASA) regulates aviation activities in Australia. Applicable requirements include the Civil Aviation Regulations 1988 (CAR), Civil Aviation Safety Regulations 1998 (CASR) and associated Manuals of Standards (MOS) Part 139—*Aerodromes* and other guidance material.

3.2.1. Civil Aviation Safety Regulations 1998, Part 139--*Aerodromes*

CASR 139.365 requires the owner of a structure (or proponents of a structure) that will be 110 m or more above ground level (AGL) to inform CASA. This is to allow CASA, under CASR 139.370, to assess the effect of the structure on aircraft operations and determine whether or not the structure will be a hazardous object because of its location, height, or lack of marking or lighting.

2.2.2. Manual of Standards 139–*Aerodromes*

Chapter 7 of MOS 139 sets out the standards applicable to Obstacle Restriction and Limitation. Section 7.1.5 deals with objects outside the obstacle limitation surfaces (OLS):

7.1.5 Objects Outside the OLS

7.1.5.1 Under CASR Part 139 any object which extends to a height of 110 m or more above local ground level must be notified to CASA.

7.1.5.2 Any object that extends to a height of 150 m or more above local ground level must be regarded as an obstacle unless it is assessed by CASA to be otherwise.

3.2.2. Civil Aviation Advisory Publications - CAAP 92-2(2)

Civil Aviation Advisory Publications (CAAPs) provide guidance, interpretation and explanation on complying with the Civil Aviation Regulations 1988 (CAR) or Civil Aviation Orders (CAO).

Section 7 of CAAP 92-2(2) provides guidance on the recommended criteria for a helicopter landing site including requirements to the obstacle limitation surfaces.

7.1.3 A Basic HLS should:

- *be determined, by way of the helicopter operator's risk assessment, to be large enough to accommodate the helicopter and have additional operator-defined safety areas (or buffers) to allow the crew to conduct the proposed operation safely at the location;*
- *have a TLOF with suitable surface characteristic for safe operations and strong enough to withstand the dynamic loads imposed by the helicopter.*
- *have sufficient obstacle free approach and departure gradients to provide for safe helicopter operations into and out of the site under all expected operational conditions.*
- *have approach and departure paths that minimise the exposure of the helicopter to meteorological phenomena which may endanger the aircraft and provide escape flight paths, if a non-normal situation arises, which maximise the potential for using suitable forced landing areas.*

Section 7 of CAAP 92-2(2) sets up recommendations for final approach and take-off area (FATO) which define dimensions of the FATO.

7.2.2 The FATO should, at minimum, be capable of enclosing a circle [2] with a diameter equal to one-and-a-half times the D-value (1.5 x D) of the largest helicopter intended to use the site and be free of obstacles likely to interfere with the manoeuvring of the helicopter.

7.2.3 It is recommended that a safety area extend a distance of at least 0.25 x D or 3 m around the FATO, whichever is the larger, or a greater distance if considered necessary for a particular HLS.

[2] A FATO may be any shape provided it meets this requirement. Orthogonal shapes may provide better visual cues.

CAAP 92-2(2) also provides guidelines for the establishment and operation of onshore Helicopter Landing Sites (HLS).

Approach and departure paths

7.2.18 The approach and departure paths should be in accordance with the Annex 14 recommendations as illustrated in Figures 3 to 8. The decision on which slope is appropriate for the HLS should be based on which is the most suitable for the performance class of the operations at the site.

7.2.19 CASA recommends application of these standards for RPT, Charter and future Air Transport operations, including emergency medical service (EMS) operations at metropolitan hospital sites. Some helicopters may however require even greater approach and departure path protection dependant on their performance capability.

A minimum of two approach and departure paths should be assigned. These should be separated by a minimum angle of 150° and may be curved left or right to avoid obstacles or to take advantage of a more advantageous flight paths. This does not preclude one-way HLSs, provided adequate provisions are made for turning, limitations are notified to aircraft operators and any operational risks are suitably mitigated. Any curvature should comply with recommendations contained in ICAO Annex 14 Volume II.

7.2.20 The slope design categories in Figure 3 may not be restricted to a specific performance class of operation and may be applicable to more than one performance class of operation. The slope design categories depicted in Figures 3 and 4 represent recommended minimum design slope angles and not operational slopes:

- *slope category "A" generally corresponds with helicopters operated in performance class 1*
- *slope category "B" generally corresponds with helicopters operated in performance class 3*
- *slope category "C" generally corresponds with helicopters operated in performance class 2*

A copy of Figure 3 of CAAP 92-2(2) which shows *Slope design categories* to three classes of performance class of operation is provided in Figure 9.

SURFACE and DIMENSIONS	SLOPE DESIGN CATEGORIES		
	A	B	C
APPROACH and TAKE-OFF CLIMB SURFACE:			
Length of inner edge	Width of safety area	Width of safety area	Width of safety area
Location of inner edge	Safety area boundary (Clearway boundary if provided)	Safety area boundary	Safety area boundary
Divergence: (1st and 2nd section)			
Day use only	10%	10%	10%
Night use	15%	15%	15%
First Section:			
Length	3 386 m	245 m	1 220 m
Slope	4.5% (1:22.2)	8% (1:12.5)	12.5% (1:8)
Outer Width	(b)	N/A	(b)
Second Section:			
Length	N/A	830 m	N/A
Slope	N/A	16% (1:6.25)	N/A
Outer Width	N/A	(b)	N/A
Total Length from inner edge (a)	3 386 m	1 075 m	1 220 m
Transitional Surface: (FATOs with a PinS approach procedure with a VSS)			
Slope	50% (1:2)	50% (1:2)	50% (1:2)
Height	45 m	45 m	45 m

Figure 9 Figure 3 CAAP 92-2(2)

AW139 is the primary helicopter type in use with Ambulance NSW. AW139 reflects the maximum weight, maximum contact load/minimum contact area, and has a similar overall length, rotor diameter, and footprint to the older Bell 412 models.

Under Category A, AW139 is certified for operations and can operate with a working load which meets Performance Class 1 operational requirements from all HLS types and when the gross weight is within Category A limits.

3.3. International Civil Aviation Organisation Annex 14 – Volume 2 Heliports

International Civil Aviation Organisation (ICAO) Annex 14 Aerodromes (Volume 2, Heliports) sets out the Standards and Recommended Practices (specifications) that prescribe the physical characteristics and obstacle limitation surfaces to be provided at heliports, and certain facilities and technical services normally provided at a heliport.

Chapter 3 Section 3.2 Elevated heliports

ICAO Annex 14 (Chapter 4) – *Obstacle limitation surfaces and sectors* – provides guidance with respect to obstacle environment.

Section 4.2 *Obstacle limitation requirements* provides the following guidance:

> *Note 1. — The requirements for obstacle limitation surfaces are specified on the basis of the intended use of a FATO, i.e. approach manoeuvre to hover or landing, or take-off manoeuvre and type of approach, and are intended to be applied when such use is made of the FATO. In cases where operations are conducted to or from both directions of a FATO, then the function of certain surfaces may be nullified because of more stringent requirements of another lower surface.*

3.4. National Airports Safeguarding Framework

The National Airports Safeguarding Advisory Group (NASAG) was established by Commonwealth Department of Infrastructure and Transport to develop a national land use planning framework called the National Airports Safeguarding Framework (NASF). The purpose of this framework is to enhance the current and future safety, viability and growth of aviation operations at Australian airports through:

- the implementation of best practice in relation to land use assessment and decision making in the vicinity of airports;
- assurance of community safety and amenity near airports;
- better understanding and recognition of aviation safety requirements and aircraft noise impacts in land use and related planning decisions;
- the provision of greater certainty and clarity for developers and land owners;
- improvements to regulatory certainty and efficiency; and
- the publication and dissemination of information on best practice in land use and related planning that supports the safe and efficient operation of airports.

NASF Guideline H: Protecting Strategically Important Helicopter Landing Sites provides guidance to State/Territory and local government decision makers as well as the owners/operators of identified strategically important helicopter landing site (SHLS) to ensure:

> *c) new development (and associated activities) do not present a hazard to helicopters arriving or departing from those SHLS …*

Additionally:

> *All development/activity applications in the vicinity of an identified SHLS should be reviewed to determine if there is any conflict in respect to:*
>
> *a) intrusions into the flight path (buildings, cranes, gaseous plumes);*
>
> *b) operational hazards (reflective glare, dust, smoke, electromagnetic interference);*
>
> *c) lighting that may cause distraction;*

d) lighting installed to illuminate obstructions that is not visible when using night vision goggles;

e) wildlife/bird strikes;

f) drone operations/strikes; and

g) building induced windshear/turbulence.

Cranes

36. Where development, including temporary structures ancillary to that development (for example, cranes) has the potential to impact upon the safe operation of SHLS, it is important that the relevant helipad owner is notified and has an opportunity to make a meaningful contribution to the outcome of the development proposal.

45. Any development proposal located within/beneath the flight path to a HLS must be required to indicate:

a) whether a crane is to be erected during the construction of that development;

b) the maximum height of the crane;

c) the height and swing radius of the crane with the jib stowed when not in operation; and

d) the period in which the crane is anticipated to remain on site.

46. Regardless of whether the proposed development extends into the flight path, if the crane to be used during construction is anticipated to extend into the flight path, CASA and the SHLS asset owner should be contacted for advice. Advice received during that referral must be taken into consideration in the assessment of the application.

Lighting

48. Where a SHLS is to be used in association with night time operations, all lighting is to comply with CAAP 92-2 (2) Guidelines for the Establishment and Operation of Onshore Helicopter Landing Sites, except where certified by a suitably qualified and experienced aviation professional.

49. Lighting erected onto any obstruction (building, crane, or telecommunication tower for example) within the flight path or above 110 metres in height (whether it is located within a flight path or not), must be able to be detected by Night Vision Goggles (or equivalent). It is understood that lighting that is red in colour and low intensity steady light is preferable. Additionally, any buildings, cranes, etc above 110 metres in height (regardless of their location) should be referred to CASA as part of the assessment process. helipad owner is notified and has an opportunity to make a meaningful contribution to the outcome of the development proposal.

Gosford Hospital HLS could be considered a SHLS, so NASF Guideline H has been considered as part of this assessment.

3.5. Guidelines for Hospital Helicopter Landing Sites in NSW

Within New South Wales, all HLS are guided by the document *Guidelines for Hospital Helicopter Landing Sites in NSW*. The guidelines, amended in 2018, are intended for hospital-based operations only. The guidelines

provide direction regarding the ongoing management of HLS, and incorporates international, national and state-wide regulations.

Section 3.12.2 provides guidance regarding the lighting of obstructions:

> *Marking and lighting of obstructions relates to those objects considered an obstruction on or in the vicinity of the HLS and within the approach/ departure airspace, and obstructions in close proximity but outside and below the approach/ departure surface. Obstruction lights are red. Low intensity steady red lights are suitable.*

Section 3.13 provides guidance regarding the Object Identification Surfaces (OIS):

- *in all directions from the safety area, except under the approach/departure paths, the object identification surface starts at the safety area perimeter and extends out horizontally for a distance of ~30m*
- *under the approach/departure surface, the object identification surface starts from the outside edge of the FATO and extends horizontally out for a distance of ~700m. From this point, the object identification surface extends out for an additional distance ~2,800 meters while rising on a 2.5° or 22:1 slope (22 units horizontal in one unit vertical). From the point ~700m from the FATO perimeter, the object identification surface is ~30m beneath the approach/ departure surface*
- *There should be no future development penetrating the OIS, which extends out to 3.5 km from the forward edge of the FATO.*

A copy of *Figure 10 Airspace Where Marking and Lighting are recommended for objects within the OIS* is provided in Figure 10 (Source: NSW Health).

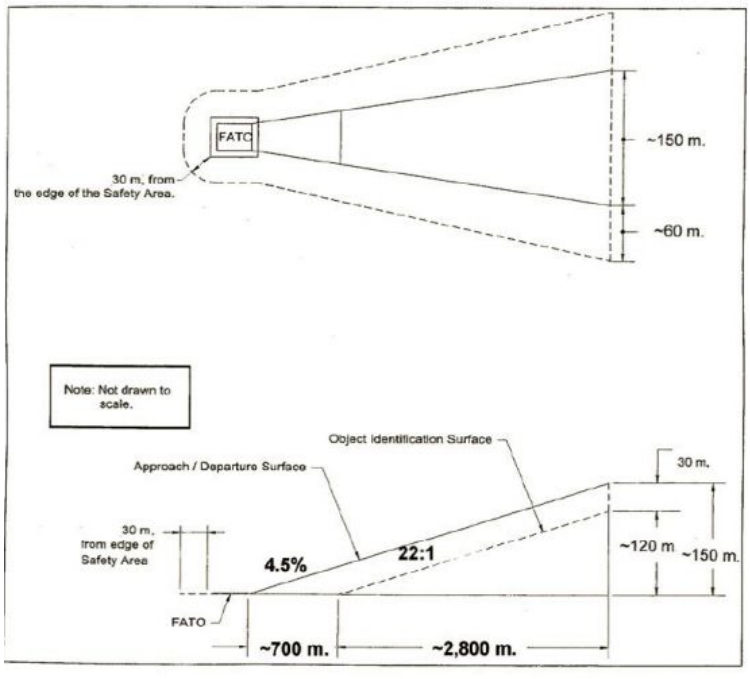

Figure 10 Airspace where marking and lighting are recommended

Section 3.14.1 provides guidance regarding visual flight rules approach and departure paths:

> *The approach/departure path starts at the forward edge of the FATO and slopes upward at 2.5°/ 4.5%/ 22:1 (22 units horizontal in 1 unit vertical) for a distance of ~3,500m where the width is ~150m at a height of 500 feet above the elevation of TLOF surface. For PC1 survey purposes, the survey commences from the forward edge of the FATO in the flight path direction, from a datum point 1.5 m above the FATO edge.*
>
> *The approach/ departure surface is to be free of penetrations. Any penetration of the transitional surface is considered a hazard.*
>
> A copy of *Figure 11 VFR HLS Approach/Departure Transitional Surfaces* within the OIS is provided in Figure 11 (Source: NSW Health).

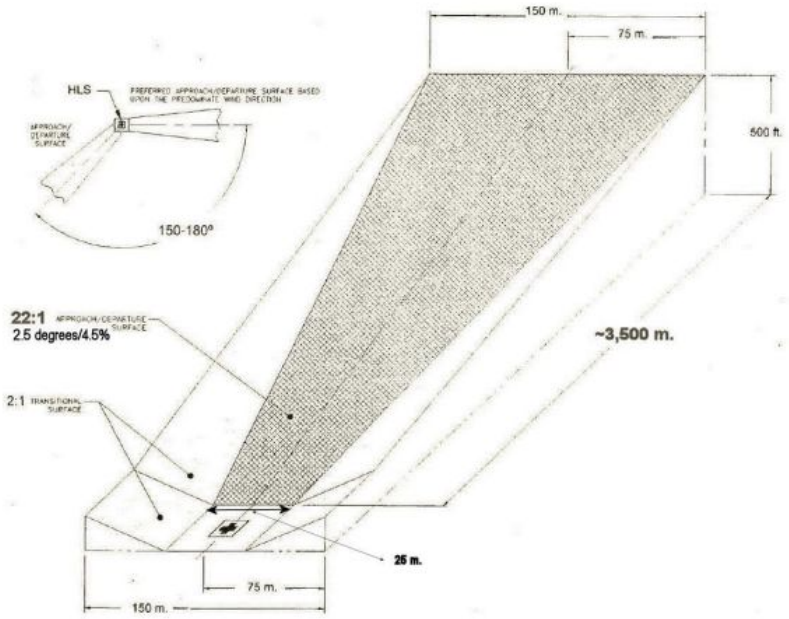

Figure 11 VFR HLS Approach/Departure Transitional Surfaces

5. CONSULTATION

Since mid-2018, Gosford Hospital has had two helicopter landing sites, refer to Figure 12 (source: NSW Government, Spatial Services, SIX Maps).

Figure 12 Gosford Hospital HLS sites

During data collection for this assessment, a discrepancy was identified between the information that is published on Airservices Australia website, and the information published on the OzRunways helipads page. The aeronautical data provided by OzRunways is approved under CASA CASR Part 175.

The instrument approach procedure XGSGN01-154 including associated latitude, longitude and elevation, has been designed to the decommissioned HLS at YXGS. However, the information and operating procedures published on the OzRunways Helipads page is for the new HLS.

Users of YXGS were consulted to determine the correct operating procedures, confirm flight paths and the correct coordinates of the HLS being used.

Refer to Table 1 for stakeholders who were consulted regarding procedures at YXGS.

Table 1 Stakeholder consultation

Stakeholder	*Contact*	*Comments*
Andrew Ryan **A/Zone Manager Helicopter Operations, Southern Zone**	Via email and phone 25 February 2020	In consultation Mr Ryan was contacted regarding operations at the Gosford Hospital HLS. During a phone conversation Mr Ryan advised that he was unsure about operating procedures at YXGS and to contact Gosford Hospital directly
Phillip Menge **Gosford Hospital Security Manager**	Via email and phone 26 February 2020	During consultation Mr Menge was nominated as a contact point for the Gosford Hospital. He was unable to provide advice regarding operating procedures at YXGS, however gave additional contact details regarding the HLS.
Paul Whitwell **Manager NSW Ambulance Aeromedical Control Centre**	Via phone 26 February 2020	Mr Whitwell did not respond to request for comment
Tim Frankel **Senior Contract Pilot – Helicopters** **Toll Group**	Via phone and email 27 February 2020	During consultation Mr Frankel was contacted for clarification on Toll Group's operating procedures at YXGS. Via phone, Mr Frankel advised Toll uses the details published on the OzRunways helipads page.
Jeff Stark **Senior Consultant AviPro**	Via email and phone 27 February 2020	During consultation Mr Stark was contacted for clarification on the discrepancy on published information and operating procedures at YXGS. Via email Mr Stark advised the following: *The chart has not been amended for the location of the new HLS. The old HLS is still there and can be used for parking or if the new (main) HLS is U/S so the chart is still valid for the old HLS. CASA has given the NSW HEMS operators approval to use the incorrect charts (also for Westmead and Liverpool among others) as long as they have mandatory supplemental procedures (which they do have).*
OzRunways	Via email 26 February 2020	Clarification was sought to confirm the accuracy of the data published on OzRunways. A reply from OzRunways advised: *We only host the data for the helipads - we don't publish or produce it.*

Stakeholder	*Contact*	*Comments*
		Best bet is to get in touch with the contact listed in the helipads entry, helipads.newcastle@rescuehelicopter.com Any action that is required will be passed through to us and amended from there.
Helipads Newcastle	Via email 2 March 2020	Clarification was sought to confirm operating procedures at YXGS. No reply was received.

After subsequent consultation, the discrepancy noticed between the coordinates of the published information, and the published database on OzRunways Helipads remained unresolved.

For the purposes of analysis, continuity and safety the elevation of the HLS assessed in the aviation impact statement is the location of the new HLS which has the coordinates of Latitude 33°25'11"24 S and Longitude 151°20'21"02 E and an elevation of 210 ft AMSL (64 m AHD).

The instrument approach procedure published by Airservices Australia (to the incorrect HLS location) has been adopted as current (albeit likely to be updated in the future).

6. AVIATION IMPACT STATEMENT

The proposed Project site is located within proximity to the Gosford Hospital HLS.

6.1. Gosford Hospital Helicopter Landing Site

Gosford Hospital HLS (YXGS) is the closest HLS to the Project site and is the only HLS that is of concern regarding the impact on aviation operations as a result of the Project development.

YXGS is operated by the New South Wales Central Coast Local Health District and is located approximately 900 m north west of the Project site.

6.2. Minimum Safe Altitudes

The minimum safe altitude (MSA) is applicable for the instrument approach procedures at YXGS from the hospital's ARP. A copy of the MSA published for the hospital in AIP DAP is shown in Figure 13.

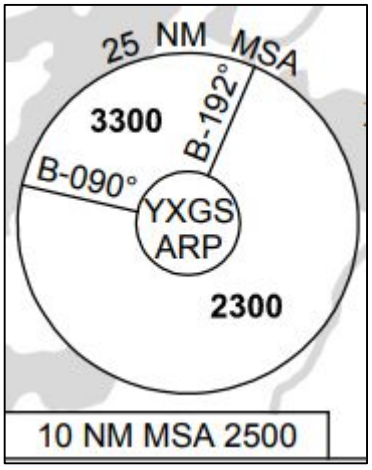

Figure 13 Gosford Hospital MSA

The Manual of Standards 173 Standards Applicable to Instrument Flight Procedure Design (MOS 173), requires that a minimum obstacle clearance (MOC) of 1000 ft below the published MSA is maintained.

Obstacles within 15 nm (10 nm MSA + 5 nm buffer) and within 30 nm (25 nm MSA + 5 nm buffer) of YXGS ARP define the height at which an aircraft can fly when within 10 nm and 25 nm.

The Project site is located within the 10 nm MSA of Gosford Hospitalt. The MOC of the 10 nm MSA is 1500 ft AMSL. The overall height of the tallest building of the Project (tower 5) is 101 m (331 ft) AHD. Therefore, the Project will not impact the MSA of YXGS.

6.3. Instrument procedures

A check of the AIP via the Airservices Australia website showed that YXGS is serviced by instrument non-precision flight procedures as per Table 2 (source: Airservices Australia).

Table 2 Gosford Hospital HLS procedure chart

Chart name (Procedure Designer)	*Effective date*
RNAV (GNSS) 340 (AsA)	1 March 2018 (XGSGN01-154)

The Project site is located outside the horizontal and vertical extent of the holding areas associated with waypoint XGSSB and will therefore not impact on the holding areas associated with YXGS.

Further the project does not penetrate the protection surfaces associated with the RNAV (GNSS) 340 procedure.

6.4. Visual approach and departure flight paths

As published on the Gosford Hospital HLS OzRunways Helipads page, approaches are oriented 220/090 and departures are oriented 040/270. Refer to Figure 14 (source: Google Earth, OzRunways).

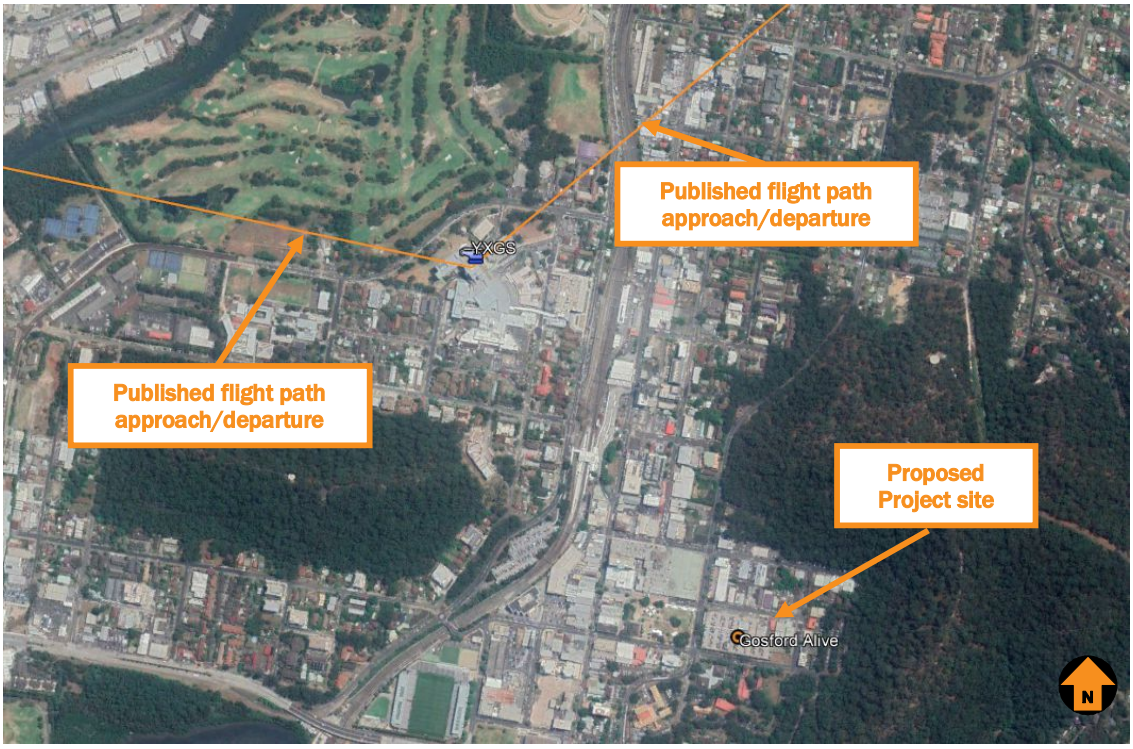

Figure 14 Published flight paths for YXGS HLS

The project site is located outside the flight paths to/from YXGS HLS as published on OzRunways, and will therefore not impact the approach or departure procedures for the HLS.

6.5. Object Identification Surface (OIS)

As per the NSW guidelines for HLS operations in NSW, under the approach/departure surface, the object identification surface (OIS) starts from the outside edge of the FATO and extends horizontally out for a distance of ~700m. From this point, the OIS extends out for an additional distance ~2,800 m.

Any object identified within this surface that penetrates the OIS is considered a hazard.

The elevation of the YXGS is 210 ft AMSL (64 m AHD).

The overall height of the tallest building of the Project (tower 5) is 331 ft AMSL (101 m AHD).

Figure 15 shows a close up of the Project site relative to the RNAV (GNSS) 340 procedure and the approach departure paths (source: Google Earth, Airservices Australia).

Figure 15 Obstacle Identification Surface YXGS

The Project is located outside of the OIS associated with the published approach and departure procedures.

6.6. Air routes and LSALT

MOS 173 requires that a minimum obstacle clearance of 1000 ft below the published lowest safe altitude (LSALT) is maintained along each air route.

The Project site is wholly located in the area with a grid lowest safe altitude of 1067 m AHD (3500 ft AMSL) with a MOC surface of 762 m AHD (2500 ft AMSL). With the proposed height of 101 m AHD (331 ft AMSL) for tower 5, the Project will not impact the grid LSALT.

Figure 16 shows the grid LSALT and the air routes in the vincinity of the Project site (source: AsA, AIP Charts, En Route Chart Low National, 30 January 2020).

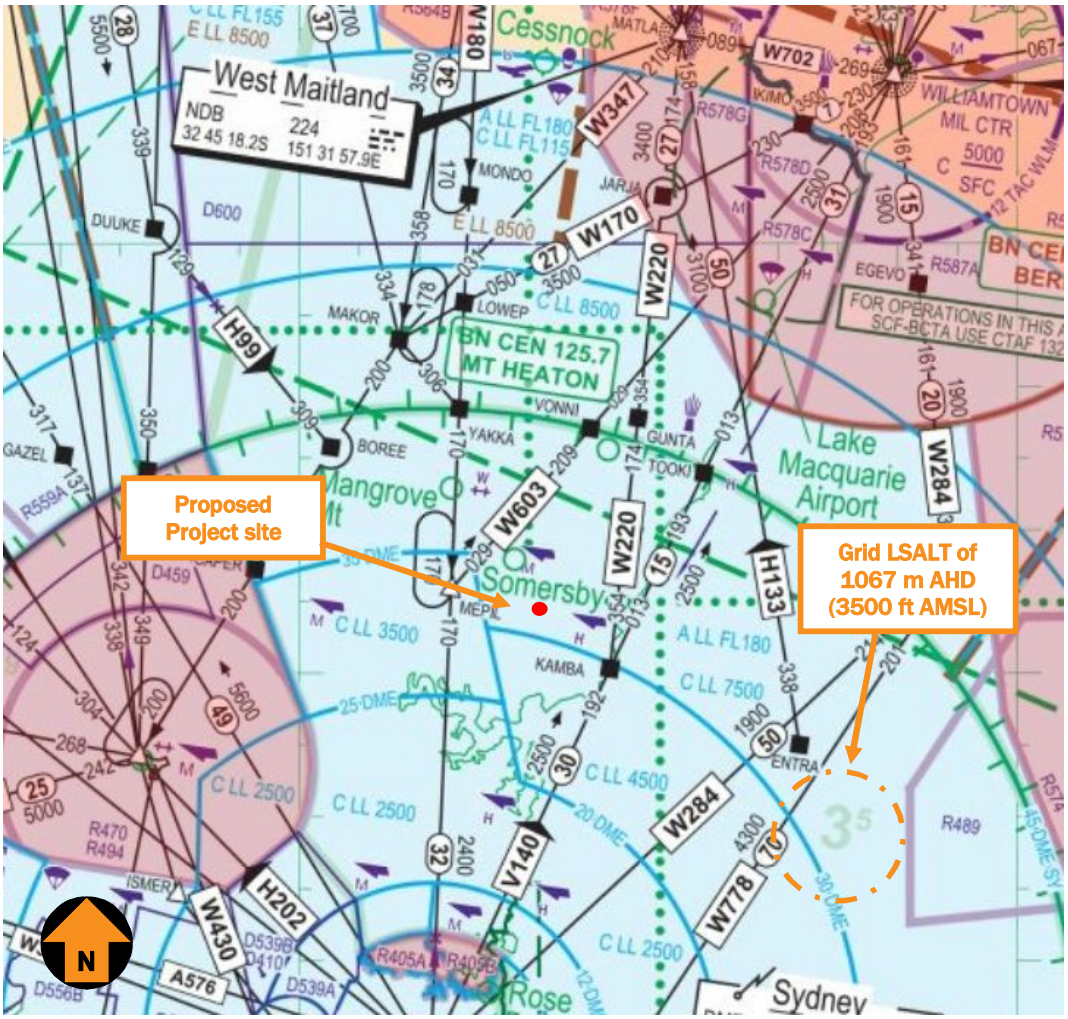

Figure 16 En Route Chart Low National in the vicinity of the Project site

An impact analysis of the surrounding air routes is provided at Table 3.

Table 3 Air route impact analysis

Air route	*Waypoint pair*	*Route LSALT*	*MOC*	*Impact on airspace design*	*Potential solution*	*Impact on aircraft ops*
W603	MEPIL and WILLIAMTOWN	2400 ft AMSL	427 m AHD 1400 ft AMSL	Nil	NA	NA
W220	KAMBA to MATLA	3400 ft AMSL	732 m AHD 2400 ft AMSL	Nil	NA	NA
V140	KAMBA to WILLIAMTOWN	2500 ft AMSL	457 m AHD 1500 ft AMSL	Nil	NA	NA

Note: MOC is the height above which obstacles would impact on LSALTS or air routes.

The Project will not impact LSALTs of the surrounding air routes.

6.7. Airspace

The Project site is located wholly within Class G airspace, and is not located in any Prohibited, Restricted and Danger areas. It is unlikely that there will be any impact to military aviation activity.

Therefore, the Project will not have an impact on controlled or designated airspace.

6.8. Aviation facilities

A search on OzRunways, which sources its data from Airservices Australia (AIP) and AOPA National Airfield Directory datasets, was conducted to identify any aviation facilities that may be affected by the project. The closest aviation facilities to the Project site are located at the Royal Australian Air Force (RAAF) Base Richmond (YSRI) (a non-directional (radio) beacon (NDB)).

According to National Airports Safeguarding Framework Guideline G *Protecting Aviation Facilities - Communications, Navigation and Surveillance (CNS),* the navigation facilities have areas restricted to developments.

The Project site is located approximately 56 km (30 nm) north east of RAAF Base Richmond and outside the areas restricted to developments for noted aviation facilities, and therefore will not interfere with these facilities.

6.9. Radar

With respect to aviation radar facilities, there are no aviation radars located close to the Project site. The closest radar is Sydney Primary Surveillance Radar (PSR) and Sydney Secondary Surveillance Radar (SSR) located approximately 60 km (32 nm) south from the Project site. Given there are much higher obstacles located south of the Project, especially those of the Sydney CBD, the Project will not impact Sydney PSR or SSR.

With respect to Bureau of Meteorology (BoM) radars, the closest weather radar is the Sydney (Terrey Hills) radar located at Terrey Hills (latitude 33.701°S, longitude 151.210°E). The Project is unlikely impact the Sydney (Terrey Hills) radar facility.

6.10. Reporting of tall structures and plume rise

CASA's Advisory Circular AC 139-08 version 2.0 dated March 2018 provides some guidance to those authorities and persons involved in the planning, approval, erection, extension or dismantling of tall structures or sources of hazardous plumes so that they may understand the vital nature of the information they provide.

Paragraph 2.4 sets requirement to reporting tall structures. In particular, paragraph 2.4.2 states:

> *The Royal Australian Air Force (RAAF) has an additional requirement to know about the existence of low-level structures. The trigger height of these structures is:*
>
> *– 30 m or more above ground level, within 30 km of an aerodrome*
>
> *– 45 m or more above ground level elsewhere*

The maximum development height is 101 m AGL. Therefore, the proponent should report details about this building to Airservices Australia, using the following email address: vod@airservicesaustralia.com

The Tall Structure/Vertical Obstacle Notification Form for reporting a building is available at AsA's website: http://www.airservicesaustralia.com/wp-content/uploads/ATS-FORM-0085_ObstacleNotificationForm.pdf

6.11. Plume rise

There are no provisions or requirements regarding the need of a plume rise assessment within the State Environmental Planning Policy (Gosford City Centre) 2018.

However, the applicant should seek advice on exhaust plumes that may originate at the top of the proposed towers, which may impact airspace and if required, may need a Plume Rise Assessment (CASA Advisory Circular AC 139-05 (v3.0) and is available at CASA's website:
https://www.casa.gov.au/sites/default/files/advisory-circular-ac-139-05-plume-rise-assessments.pdf

The Application for an Operational Assessment of a Proposed Plume Rise is available at CASA's website:
https://www.casa.gov.au/sites/default/files/_assets/main/manuals/regulate/casr139/form1247.pdf

8. HAZARD LIGHTING AND MARKING

8.1. Civil Aviation Safety Authority

In considering the need for aviation hazard lighting, a preliminary feasibility analysis of the regulatory context was undertaken.

CASA regulates aviation activities in Australia. Applicable requirements include the *Civil Aviation Act 1988* (CAA), *Civil Aviation Regulations 1988* (CAR), *Civil Aviation Safety Regulations 1998* (CASR), associated Manuals of Standards (MOS) and other guidance material including *Civil Aviation Advisory Publication* (CAAP) and Advisory Circular (AC). The applicable legislations are extracted below:

8.1.1. Manual of Standards 139--*Aerodromes*

Chapter 7 of MOS 139 sets out the standards applicable to Obstacle Restriction and Limitation.

7.1.1.2 An obstacle is defined as:

(b) any object that penetrates the obstacle limitation surfaces (OLS), a series of surfaces that set the height limits of objects, around an aerodrome.

7.1.1.3 Obstacle data requirements for the design of instrument procedures need to be determined in liaison with flight procedure designers.

7.1.1.4 Non compliance with standards may result in CASA issuing hazard notification notices as prescribed in CASR Part 139.

Chapter 8 of MOS 139 specifies the standards for markings, including standards applicable to Obstacle Marking.

8.10.1 General

8.10.1.1 Fixed objects, temporary and permanent, which extend above the obstacle limitation surfaces but are permitted to remain; or objects which are present on the movement area, are regarded as obstacles, and must be marked. The aerodrome operator must submit details of such obstacles to CASA, for hazard assessment and particular requirements for marking and lighting. This information must be included in the Aerodrome Manual.

8.10.1.2 CASA may permit obstacles to remain unmarked;

(a) when obstacles are sufficiently conspicuous by their shape, size or colour;

(b) when obstacles are shielded by other obstacles already marked; or

(c) when obstacles are lighted by high intensity obstacle lights by day.

Chapter 9 sets out the standards applicable to visual aids provided by aerodrome lighting. Section 9.4.1 provides some general guidance on obstacle lighting:

9.4.1.2 In general, an object in the following situations would require to be provided with obstacle lighting unless CASA, in an aeronautical study, assesses it as being shielded by another lit object or that it is of no operational significance:

9.4.1.3 Owners of tall buildings or structures below the obstacle limitation surfaces, or less than 110 m above ground level, may, of their own volition, provide obstacle lighting to indicate the presence of such buildings or structures at night. To ensure consistency and avoid any confusion to pilots, the obstacle lighting provided needs to conform with the standards specified in this Chapter.

9.4.1.4 In circumstances where the provision of obstacle marking is impracticable, obstacle lighting may be used during the day in lieu of obstacle marking.

Section 9.4.2 provides guidance on types of obstacle lighting and their use:

9.4.2.1 Three types of lights are used for lighting obstacles. These are low intensity, medium intensity and high intensity lights, or a combination of such lights.

9.4.2.2 Low intensity obstacle lights are steady red lights and are to be used on non-extensive objects whose height above the surrounding ground is less than 45 m.

9.4.2.3 Medium intensity obstacle lights are to be used either alone or in combination with low intensity lights, where:

(a) the object is an extensive one;

(b) the top of the object is 45 m or more above the surrounding ground;

(c) CASA determines that early warning to pilots of the presence of the object is desirable.

9.4.2.4 There are three types of medium intensity obstacle lights:

(a) Flashing white light. Likely to be unsuitable for use in environmentally sensitive locations, and near built-up areas. May be used in lieu of obstacle markings during the day to indicate temporary obstacles in the vicinity of an aerodrome, for example construction cranes, etc. and are not to be used in other applications without specific CASA agreement.

(b) Flashing red light, also known as a hazard beacon. Is suitable for all applications, and is extensively used to mark terrain obstacles such as high ground.

(c) Steady red light. May be used where there is opposition to the use of a flashing red light, for example in environmentally sensitive locations.

9.4.2.5 High intensity obstacle lights are flashing white lights used on obstacles that are in excess of 150 m in height. As high intensity obstacle lights have a significant environmental impact on people and animals, it is necessary to consult with interested parties about their use. High intensity obstacle lights may also be used during the day, in lieu of obstacle marking, on obstacles that are in excess of 150m in height, or are difficult to be seen from the air because of their skeletal nature, such as towers with overhead wires and cables spanning across roads, valleys or waterways.

Section 9.4.3 provides guidance on location of obstacle lights:

9.4.3.1 One or more obstacle lights are to be located as close as practicable to the top of the object. The top lights are to be arranged so as to at least indicate the points or edges of the object highest above the obstacle limitation surface

In accordance with Section 9.4.1.2 (iii), it is recommended that the rooftops of towers 4 and 5 should be lit with a low intensity red steady light at night (as per Section 9.4.2.2). The provision of marking is unreasonable as the building size and the rooftop colour (in white) will be noticeable during the day.

The use of a low intensity steady red light at night will satisfy aircraft safety and the requirements of MOS 139 and the NSW Government Health Department, *Guidelines For Hospital Helicopter Landing Sites In NSW.*

9. CONCLUSIONS

As a result of this aeronautical assessment, the following conclusions are made:

1. The proposed towers 4 and 5 have the following characteristics:
    a. nominal ground level is 19.4 m AHD;
    b. building height is 81.6 m AGL; and
    c. maximum overall height is 101 m AHD (331 ft AMSL).
2. The Project development and its highest towers:
    a. will not infringe the obstacle clearance heights applicable to any of the instrument procedures at Gosford Hospital HLS;
    b. will not penetrate the obstacle identification surfaces of Gosford Hospital HLS;
    c. will not impact air routes and is outside restricted areas;
    d. will not impact any aviation facilities; and
    e. will not impact any aviation radars and BoM radars.
3. In accordance with Section 9.4.1.2 (iii), the rooftops of towers 4 and 5 should be lit with a low intensity red steady light at night (as per Section 9.4.2.2 and Section 3.12.2). The provision of marking is not necessary as the building size and the rooftop colour (in white) will be noticeable during the day.
4. The use of a low intensity steady red light at night will satisfy aircraft safety and the requirements of the NSW Guidelines for Hospital Helicopter Landing Sites in NSW and MOS 139.

10. RECOMMENDATIONS

As a result of this aeronautical assessment, the following recommendations are made:

1. The proposed Project as proposed can be supported without adversely affecting aviation safety.
2. The rooftop of towers 4 and 5 should be lit with a low intensity steady red light at night (as per Section 9.4.2.2 and Section 3.12.2).
3. If approved, details of the Project should be reported to Airservices Australia via this email address: vod@airservicesaustralia.com, and published in En Route Supplement Australia (ERSA) and other relevant aeronautical chart products.
4. Any crane used during construction should be referred to NSW Health for approval, appropriately marked, operated during daylight hours only and notified to pilots via NOTAM.

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