July 2020

AVIATION IMPACT STATEMENT

NORTHSIDE PRIVATE HOSPITAL

Prepared for Erilyan Pty Ltd

AVIATION PROJECTS

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DOCUMENT CONTROL

Document Title: Northside Private Hospital - Aviation Impact Statement

Reference: 062902-01

Prepared by: G Holmes

Reviewed by: P Davidyuk

Released by: G Holmes

Revision History

Version	*Description*	*Transmitted*	*Reviewed by*	*Date*
0.1	First Draft	2 July 2020		
1.0	Final	15 July 2020		

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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

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

The proposed Project has been deemed a State Significant Development, and the New South Wales Department of Planning Industry and Environment (NSW DPIE) has advised that the client should have regard to the Department's guideline on Safeguarding Strategic Important Helicopter Landing Sites in NSW. 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 proposed Project is located at Lot 2 DP1226923 on the corner of Faunce Street West and Racecourse Road, Gosford NSW. The proposed Project is comprised of an 11-storey private hospital which includes eight floors comprising of medical suites, in-patient units, specialist clinics and associated support services, up to a maximum building height of 57.2 m (188 ft) Australian Height Datum (AHD).

In an email dated 17 June 2020, Mr Mike Ryan, Project Manager Erilyan, 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;
- Assess the potential impact of the proposed development;
- Propose any possible mitigation strategies; and
- Assess the flight paths to Gosford Hospital.

1.3. Methodology

The task was performed according to the method outlined below:

1. Reviewed client material;
2. Reviewed 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. Considered the National Airports Safeguarding Framework Guidelines, including Guideline H*: Protecting Strategically Important Helicopter Landing Sites*;

4. Considered the Civil Aviation Advisory Publications (CAAPs) guidelines, including CAAP 92-2(2): *Guidelines for the establishment and operation of onshore Helicopter Landing Sites*;
5. Considered the New South Wales Department of Health guidelines including: *Guidelines for Hospital Helicopter Landing Sites in NSW*;
6. Provided 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);
7. Identified operational impacts and provide advice on Gosford Hospital HLS airspace, including construction cranes;
8. Prepared a draft letter report with preliminary aviation planning assessment and advice on safeguarding airspace and sent to Erilyan Pty Ltd for comment; and
9. Finalised the letter report for Client acceptance.

1.4. Client material

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

- Health Projects International, *Northside Private Hospital - Presentation-2,* dated June 2020.

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 21 May 2020;
- Airservices Australia, Designated Airspace Handbook (DAH), effective 21 May 2020;
- 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 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 17 June 2020.

2. BACKGROUND

2.1. Project description

The proposed Project includes the construction of an 11-storey private hospital and associated infrastructure which includes ground floor parking, waste storage, loading docks and a basement level. Figure 1 shows a view of the hospital looking east towards the proposed Project site (source: SJB, June 2020).

Figure 1 View of Project corner of Racecourse Road and Faunce St West

Figure 2 shows a view looking south towards the proposed Project (source: SJB, June 2020).

Figure 2 Looking south towards the proposed Project

2.2. Site overview

An overview of the proposed Project site located at Lot 2 DP1226923 on the corner of Faunce Street West and Racecourse Road, Gosford, is provided in Figure 3 (source: Health Projects International, 2020).

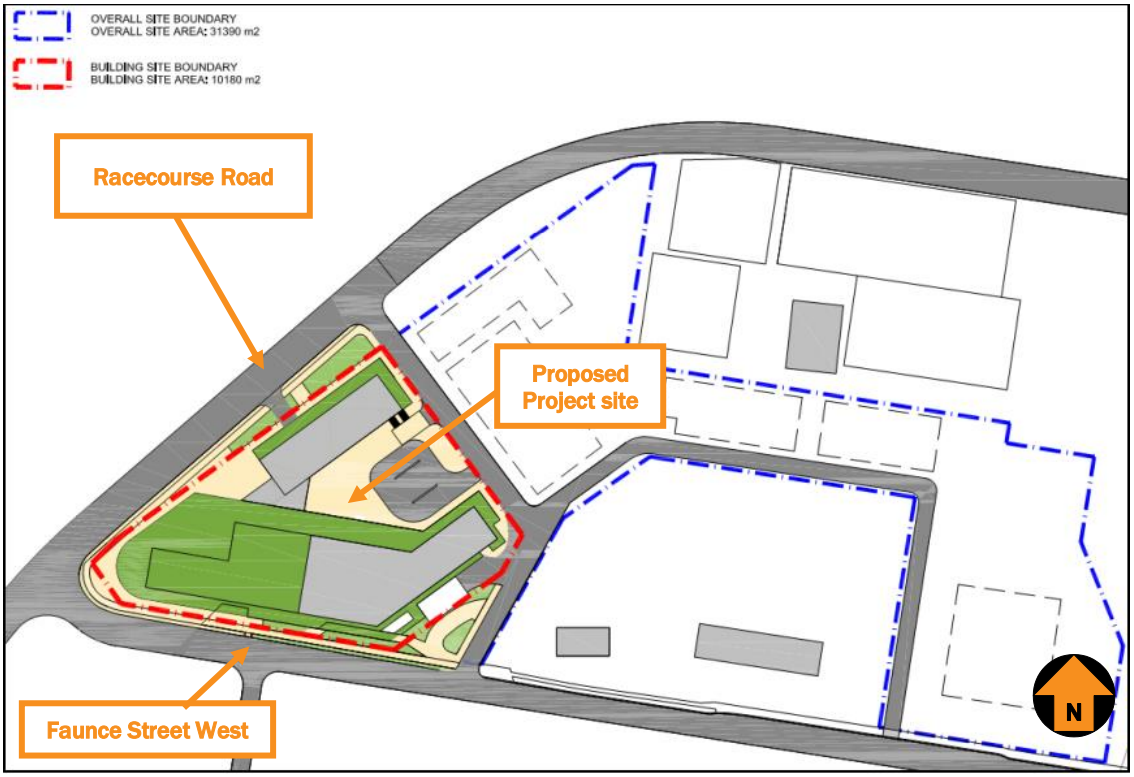

Figure 3 Proposed Project site

Figure 4 shows the location of the proposed Project site relative to Gosford Hospital HLS, which is located approximately 750 m to the east (source: Google Earth).

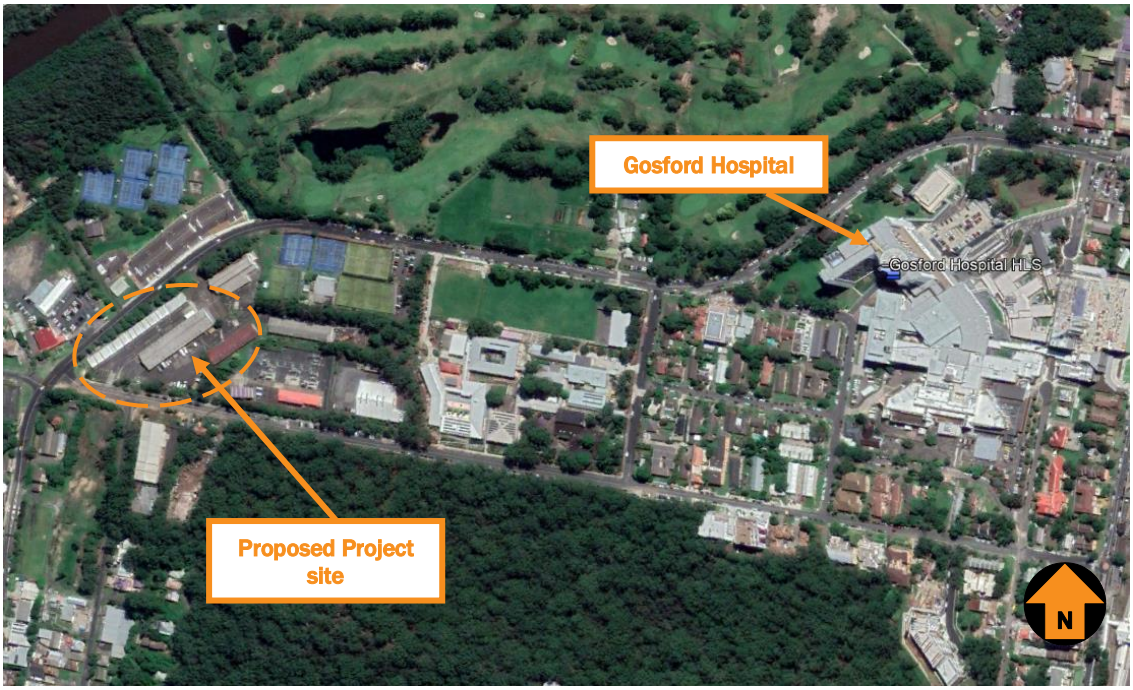

Figure 4 Proposed Project site relative to Gosford Hospital HLS

The proposed Project includes the construction of an 11-storey private hospital which includes eight floors comprising of medical suites, in-patient units, specialist clinics and associated support services.

The maximum building height for the proposed Project is approximately 57.2 m (188 ft) AHD.

2.3. Temporary crane operations

Erilyan 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 proposed Project is located within the Central Coast Council local government area (LGA). The proposed 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 proposed Project is located in a B6 Enterprise Corridor, refer to Figure 5 (source: NSW ePlanning Spatial Viewer, 2020).

Figure 5 Location of site and land zoning

As a State Significant Development, the zoning criteria regarding the proposed 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 6.

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 6 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 7 (source: NSW Health).

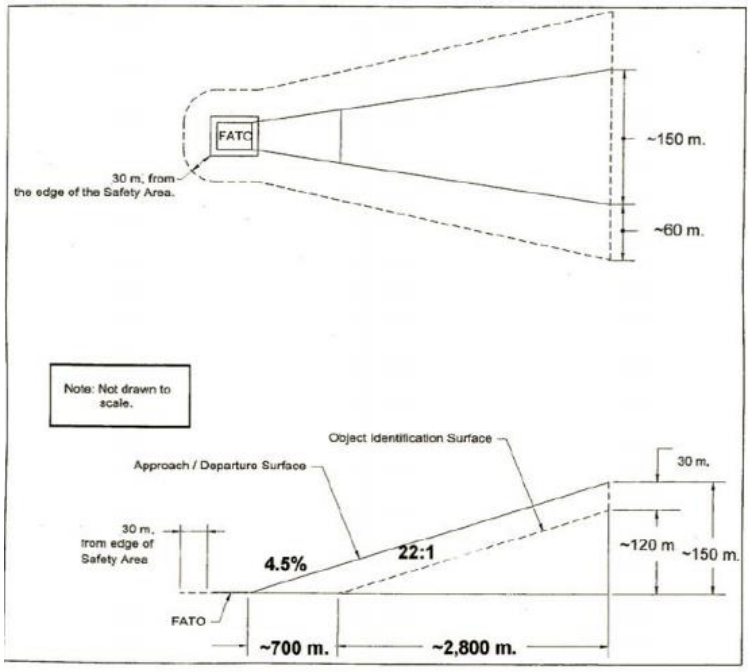

Figure 7 Airspace where marking and lighting are recommended

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 8 (Source: NSW Health).

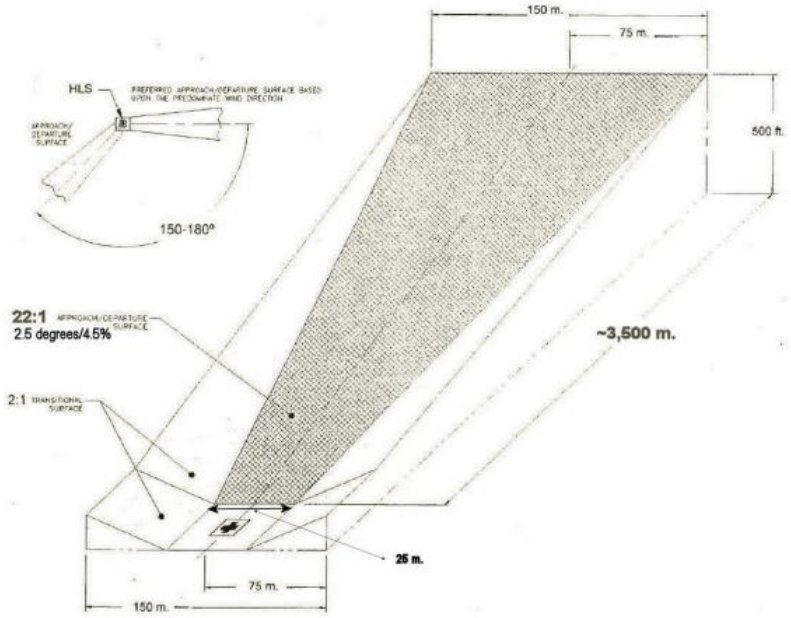

Figure 8 VFR HLS Approach/Departure Transitional Surfaces

In mid-2018 a new helicopter landing site opened at Gosford Hospital refer to Figure 9 (source: NSW Government, Spatial Services, SIX Maps).

Figure 9 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.

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).

5. AVIATION IMPACT STATEMENT

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

5.1. Gosford Hospital Helicopter Landing Site

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

YXGS is operated by the New South Wales Central Coast Local Health District and is located approximately 750 m east of the proposed Project site.

5.2. 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 10.

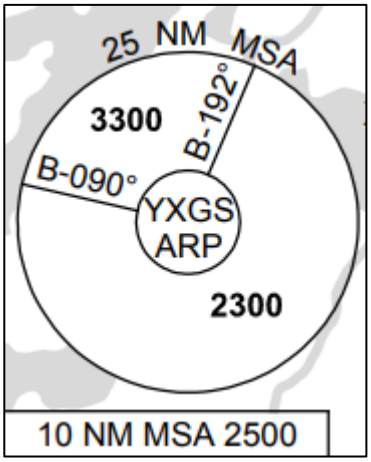

Figure 10 Gosford Hospital MSA

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 proposed Project site is located within the 10 nm MSA of Gosford Hospital. The MOC of the 10 nm MSA is 1500 ft AMSL. The overall height of the building of the proposed Project is 57.2 m (187 ft) AHD.

Therefore, the proposed Project will not impact the 10 nm MSA of YXGS.

5.3. 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 1 (source: Airservices Australia).

Table 1 Gosford Hospital HLS procedure chart

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

Figure 11 shows a close up of the proposed Project site relative to the RNAV (GNSS) 340 procedure and the missed approach path (source: Google Earth, Airservices Australia).

Figure 11 Published flight paths for YXGS HLS

The proposed 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.

The proposed Project does not penetrate the protection surfaces associated with the RNAV (GNSS) 340 procedure. Therefore, the proposed Project will have no impact on the instrument non-precision flight procedures of YXGS.

5.4. Visual approach and departure flight paths and Object Identification Surface

As published on the Gosford Hospital HLS OzRunways Helipads page, approaches are oriented 220/090 and departures are oriented 040/270. It is assumed that pilots operating under VFR conditions would be using the visual approach and departure flight paths.

Refer to Figure 12 and Figure 13 for the proposed Project in relation to the approach and departure flight path (in pumpkin colour) and the OIS (in shades of green and blue) (source: Google Earth, OzRunways).

Figure 12 VFR approach and departure path YXGS

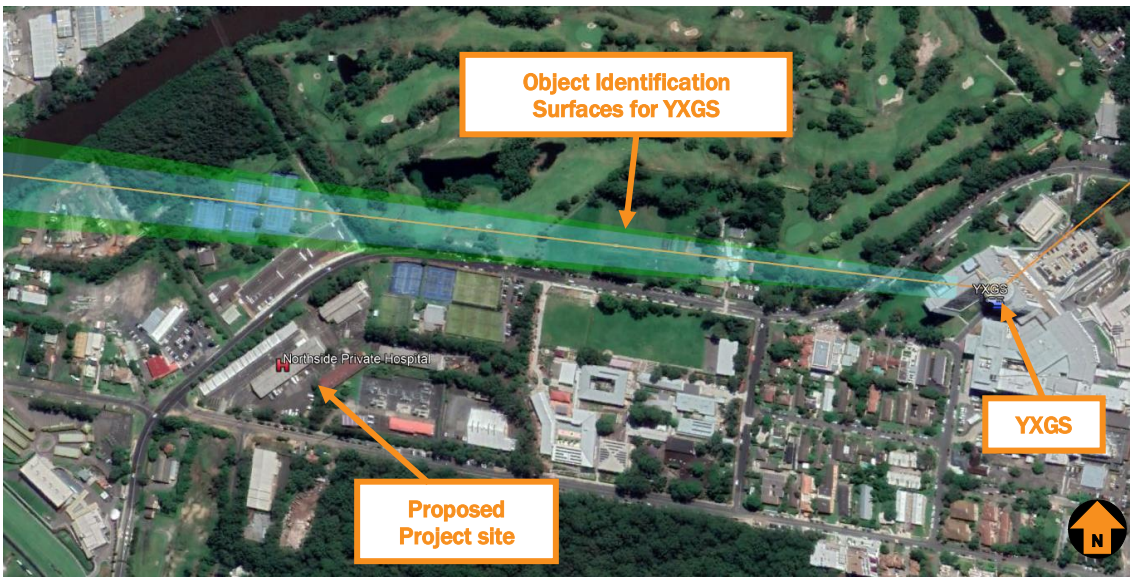

Figure 13 Obstacle Identification Surfaces YXGS

The maximum overall building height for the proposed Project is 57.2 m (188 ft) AHD.

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

The Obstacle identification surface (OIS) starts from the outside edge of the FATO and extends horizontally out for a distance of approximately 700 m. From this point, the OIS extends out for an additional distance of approximately 2800 m. Any object identified within this surface that penetrates the OIS is considered a hazard.

As per the NSW guidelines for HLS operations in NSW, the proposed 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.

The proposed Project is located within proximity of YXGS, however is outside of and below the OIS associated with the published approach and departure procedures.

Therefore, the proposed Project will not impact the OIS of YXGS.

5.5. 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 proposed 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).

Figure 14 shows the grid LSALT and the air routes in the vincinity of the proposed Project site (source: AsA, AIP Charts, En Route Chart Low National, 18 June 2020).

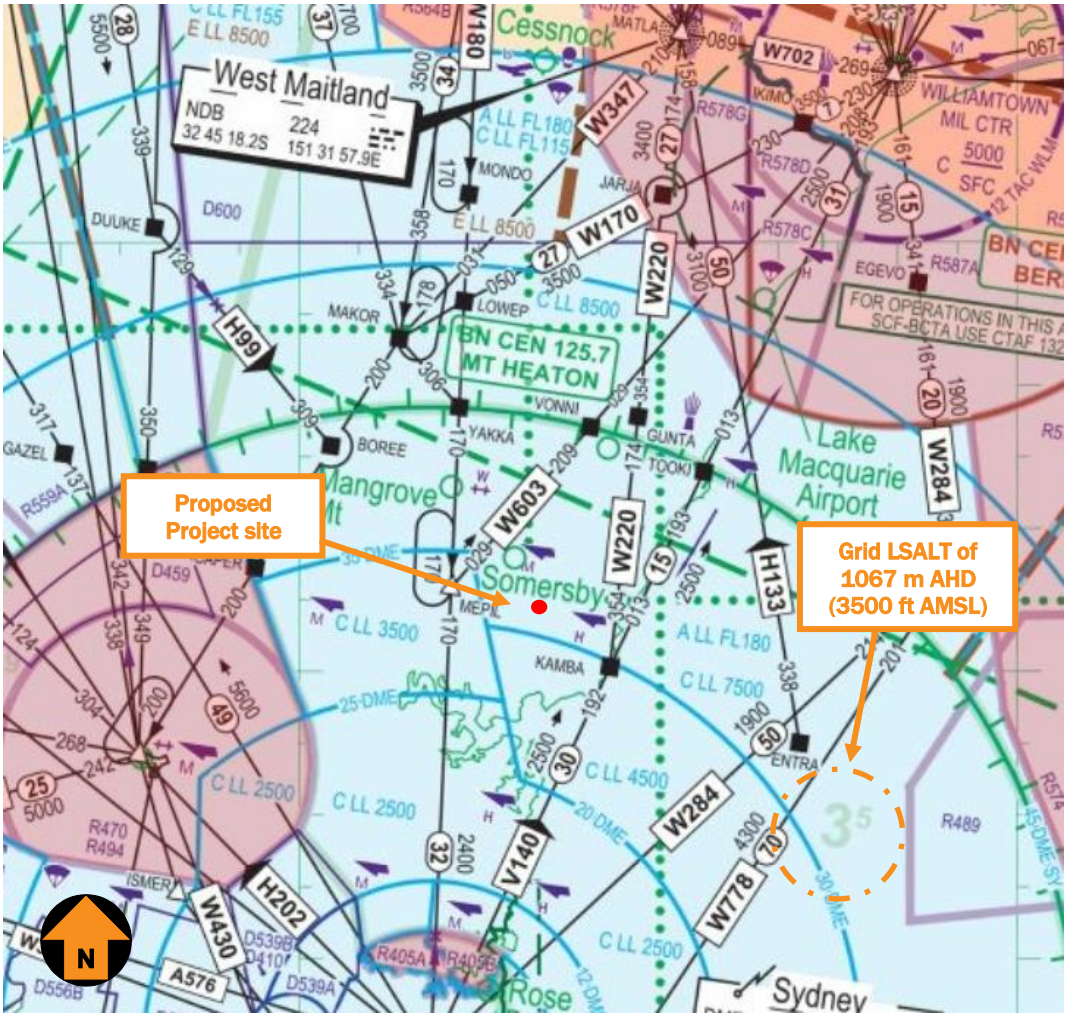

Figure 14 En Route Chart Low National in the vicinity of the Project site

With a proposed maximum building height of 57.2 m (188 ft) AHD, the proposed Project will not impact the grid LSALT.

An impact analysis of the surrounding air routes is provided at Table 2.

Table 2 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 GUNTA	3400 ft AMSL	732 m AHD 2400 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.

5.6. Airspace

A search was conducted to identify nearby registered, certified or military airports. The closest airport that is located to the proposed Project site is the Royal Australian Air Force (RAAF) Base Richmond military airport. However, the proposed Project is located beyond 55 km (30 nm) from RAAF Base Richmond, there will be no impacts on operations at the airport and therefore has not been assessed as part of this AIS.

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.

Figure 15 identifies the project in proximity to RAAF Base Richmond (source: OzRunways, 250k Topo Map).

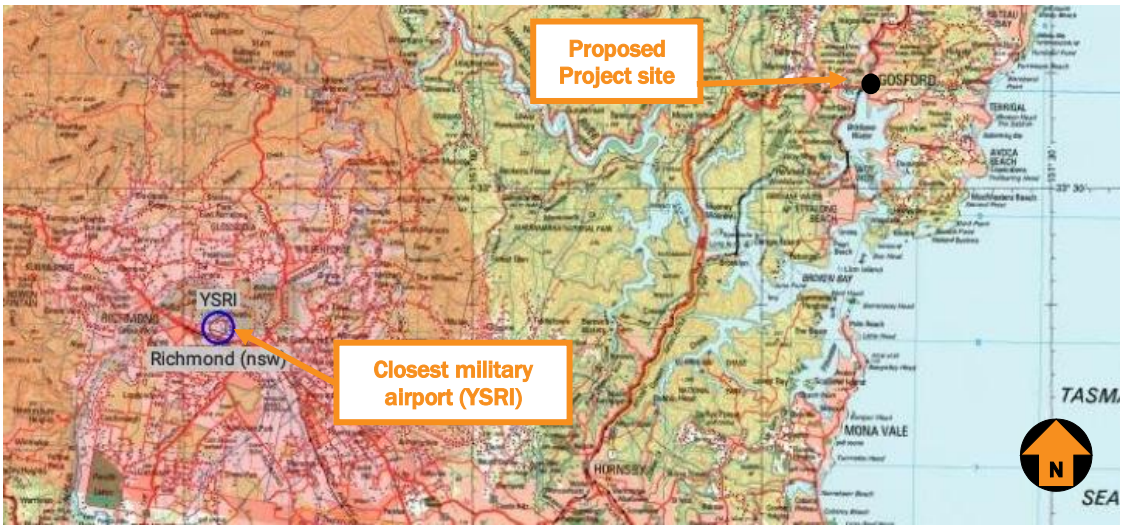

Figure 15 Proposed Project proximity to RAAF Base Richmond (YSRI)

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

5.7. 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 proposed project. The closest aviation facility to the proposed Project site is located at the RAAF Base Richmond (YSRI). which is 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 proposed Project site is located approximately 55 km (30 nm) north east of RAAF Base Richmond and outside the areas restricted to developments for noted aviation facility, and therefore will not interfere with this facility.

5.8. 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 proposed Project site. Given there are much higher obstacles located south, especially those of the Sydney CBD, the proposed 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 approximately 33 km (18 nm) away at Terrey Hills (latitude 33.701°S, longitude 151.210°E). The proposed Project is unlikely impact the Sydney (Terrey Hills) radar facility.

5.9. 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 57.2 m (188 ft) AHD. 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

5.10. 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

7. HAZARD LIGHTING AND MARKING

7.1. 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:

7.1.1. 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

8.10.1.2 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:

9.4.2.3 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.

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 rooftop of the proposed Project at a maximum overall height of 57.2 m (188 ft) AHD.AHD should be lit with a medium intensity red steady light at night (as per Section 9.4.2.4) and placed on the building as close as practicable to the top (as per Section 9.4.3.1). The provision of marking is unreasonable as the building size and the building colour will be noticeable during the day.

The use of a medium 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.*

8. CONCLUSIONS

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

1. The maximum overall building height for the proposed Project is 57.2 m (188 ft) AHD.
2. The proposed Project development:
    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 MOS 139 Section 9.4.1.2 (iii), it is recommended that the rooftop of the proposed Project at a maximum height of 57.2 m (188 ft) AHD be lit with a medium intensity red steady light at night (as per Section 9.4.2.4) and placed on the building as close as practicable to the top (as per Section 9.4.3.1). The provision of marking is unreasonable as the building size and the building colour will be noticeable during the day.
4. While the *NSW Guidelines for Hospital Helicopter Landing Sites in NSW* recommends the use of a low intensity steady red light at night, due to the proximity to Gosford Hospital HLS, the use of a medium intensity steady red light at night will satisfy aircraft safety and the requirements of MOS 139.

9. 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 the proposed building at a height of 57.2 m (188 ft) AHD should be lit with a medium intensity red steady light at night (as per MOS 139 Section 9.4.2.4 and Section 9.4.3.1).
3. If approved, details of the proposed 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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aviationprojects.com.au