60 Strathallen Avenue Northbridge NSW 2063

AVIATION REPORT:

- NSW HELICOPTER EMERGENCY MEDICAL SERVICE (HEMS) FLIGHT PATH ANALYSIS

WOLLONGONG PRIVATE HOSPITAL DEVELOPMENT PM-02

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1 ESTABLISHMENT

1.1 Background

Erilyan Pty. Ltd. on behalf of AA Crown Holdings, is proposing the construction of Wollongong Private Hospital for Ramsay Healthcare on land located at 360-364 Crown Street Wollongong.

The proposed site is located approximately 180m. to the south south west of the Wollongong Hospital emergency services Helicopter Landing Site (HLS).

Project Architect Health Projects International (HPI), has produced concept drawings for the project.

As the proposed development is in close vicinity to the Wollongong Hospital HLS, an assessment of any potential flight path conflicts between the development and the Wollongong Hospital HLS is required.

1.2 Scope

AviPro is to provide aviation associated advice to Erilyan relating to any potential conflict between existing HEMS VFR Approach and Departure paths associated with Wollongong Hospital HLS, and the proposed development.

Advice includes the following areas:

- Design Helicopter as it effects FATO size;
- FATO size as it effects VFR Approach and Departure path dimensions;
- Obstructions as a result of existing and proposed structures;
- Suitable VFR Approach/Departure paths, transitional surfaces and arcs; and
- Object Identification Surfaces.

1.3 HLS Terms of Reference and Applicability

Currently within Australia, there are no set rules or regulations applicable to the design, construction or placement of HLSs. There may however be local council planning, location and movement approvals required. The regulator of aviation in Australia, the Civil Aviation Safety Authority, effectively divested itself of responsibility in the early 1990s and now provides only basic operating guidelines via an out-of-date document [CAAP 92-2(1)], and as policy does not provide design or structural information or advice.

Considerable work has however been undertaken internationally in this area, particularly through the International Civil Aviation Organisation (ICAO) and the US Federal Aviation Administration

(FAA). Additionally, the NSW MoH via ASNSW has current HLS documentation based on international standards. CASA is also working on Civil Aviation Safety Regulations (CASR 1998) Parts 133 and 138 pertaining to helicopter operations. Parts 133 and 138 are yet to be promulgated.

The resulting documents on the subject provide excellent advisory material, guidelines and best practice standards. Key current documents are as follows:

- ICAO Annex 14, Vol II, Heliports.
- ICAO Heliport Manual Doc 9261-AN/903.
- US FAA Advisory Circular *AC 150/5390-2C, Heliport Design*, (covers both operational and design criteria, particularly for hospital based HLSs in Chapter 4, Hospital Heliports).
- Australian Civil Aviation Safety Authority (CASA) Civil Aviation Advisory Publication (CAAP), *CAAP 92-2 (1), Guidelines for the Establishment and Use of Helicopter Landing Sites. (*covers essentially operational specifications only and is scheduled for review).
- NSW Ministry of Health (MoH) Guidelines for Hospital Helicopter Landing Sites in NSW Rev 06a of October 2011.

The guidelines and standards drawn from current ICAO and FAA HLS recommendations were used to establish the NSW Ministry of Health (MoH) Guidelines for Hospital Helicopter Landing Sites, and form the basis of the standards used in this report.

Other guidelines/requirements of particular relevance include:

- Adherence to the performance requirements specified in the Rotorcraft Flight Manual (RFM) of the primary helicopter types used by ASNSW;
- Acknowledgement of the proposed requirements of CASA CASRs Parts 133 and 138;
- The noise effect as a result of approaching and departing helicopters over particular flight paths, and thus the use of "Fly Neighbourly" techniques;

1.4 Background Material

Relevant reference material provided by Donald Cant Watts Corke (DCWC) and Health Projects International (HPI) in support of the report include:

- Site drawing plan view WGPH-P-G Issue 9;
- Urunga Parade and West Elevations WGPH-E-2 Issue 2;
- Section view E-W WGPH-SE-1 Issue 8; and
- Section view N-S WGPH-SE-2 Issue 1.

1.5 Methodology

Following an initial desktop assessment of the background material, a site visit was completed.

Criteria from all relevant references were assessed, with the NSW MoH Guidelines for Hospital Helicopter Landing Sites in NSW Rev 06a used as the primary assessment tool.

1.6 Explanation of Terms

Aircraft. Refers to both aeroplanes (fixed wing) and helicopters (rotary wing.

Approach/Departure Path. The flight track helicopters follow when landing at or departing from the FATO of a HLS. Extends outwards from the edge of the FATO and has an obstacle free gradient of 7.5º (1:8 vertical to horizontal) measured from the edge of the FATO to a height initially of 500 feet above the FATO at a distance of ~1,250 m. The path may be curved left or right to avoid obstacles or to take advantage of a better approach or departure path. Changes in direction by day below 300 feet should be avoided and there should be no changes in direction below 500 feet at night.

Both the CASA CAAP and FAA AC describe the approach/departure path and both commence with the width of the FATO. As the AC is more prescriptive, these guidelines are used. The AC extends the width of the approach/departure path from the edge of the FATO out to a distance of ~150 m. at 500 feet above the level of the HLS, and then out to a distance of ~1,250 m.

It should be noted that where possible a lesser obstacle free gradient of 2½º, 4.5% or 1:23 is aimed for to accommodate the lesser performing Bell 412 series helicopters also providing HEMS in NSW.

Category A Performance. Similar to Performance Class 1 (PC1) requirements. For a rotorcraft, means the class of rotorcraft operations where, in the event of failure of the critical power unit, performance is available to enable the rotorcraft to land within the rejected take-off distance available, or safely continue the flight to an appropriate landing area, depending on when the failure occurs.

Category B Performance. Similar to Performance Class 2 requirements. For a rotorcraft, means the class of rotorcraft operations where, in the event of failure of the critical power unit, performance is available to enable the rotorcraft to safety continue the flight, except when the failure occurs early during the take-off manoeuvre, in which case a forced landing may be required.

Design Helicopter. The selection of design, construction and location of a HLS is dependent on the choice of a “Design Helicopter”. In NSW, the Agusta AW139 contracted to the ASNSW is the Design Helicopter. The type reflects the new generation helicopters used in HEMS and reflects the maximum weight, maximum contact load/minimum contact area, overall length and rotor diameter, etc. of HEMS expected to operate to NSW hospital HLSs.

Elevated Helicopter Landing Site (Heliport). A HLS located on a roof top or some other elevated structure where the Ground Effect Area/Touchdown and Lift-off Area (GEA/TLOF) is at least 76 cm. above ground level.

Final Approach. The reduction of height and airspeed to arrive over a predetermined point above the FATO of a HLS.

Final Approach and Takeoff Area (FATO). A defined area over which the final phase of the approach to a hover, or a landing is completed and from which the takeoff is initiated. For the purposes of these guidelines, the US FAA AC specification of 1.5 x Length Overall of the Design Helicopter is used. The FATO should be load bearing.

Ground Effect Area. (**GEA** - Australia) [also known as the **Touchdown and Lift-off Area** (**TLOF** – US). A load bearing, generally paved area, normally centered in the FATO, on which the helicopter lands or takes off, and that provides ground effect for a helicopter rotor system. Size is based on 1 x Main Rotor diameter of Design Helicopter.

Hazard to Air Navigation. Any object having a substantial adverse effect upon the safe and efficient use of the navigable airspace by aircraft, upon the operation of air navigation facilities, or upon existing or planned airport/heliport capacity.

Helicopter Landing Site (HLS). One or more may also be known as a **Heliport**. The area of land, water or a structure used or intended to be used for the landing and takeoff of helicopters, together with appurtenant buildings and facilities.

Helicopter Landing Site Elevation. At a HLS without a precision approach, the HLS elevation is the highest point of the FATO expressed as the distance above mean sea level.

Hospital Helicopter Landing Site. A HLS limited to serving helicopters engaged in air ambulance, or other hospital related functions.

> **NOTE:** *A designated helicopter landing site located at a hospital or medical facility is a HLS and **not** a medical emergency site.*

Object Identification Surfaces. The area below the approach/ departure and transitional surfaces where object separation is to be maintained and where objects should be marked if penetrating the surface, out to a horizontal distance of ~1,250 m.

Obstruction to Air Navigation. Any fixed or mobile object, including a parked helicopter, which impinges the approach/departure surface or the transitional surfaces.

Performance Class 1. Similar to Category A requirements. For a rotorcraft, means the class of rotorcraft operations where, in the event of failure of the critical power unit, performance is available to enable the rotorcraft to land within the rejected take-off distance available, or safely continue the flight to an appropriate landing area, depending on when the failure occurs. To operate PC1, the rotorcraft must be Category A certified for the category of HLS.

Performance Class 2. Similar to Category B requirements. For a rotorcraft, means the class of rotorcraft operations where, in the event of failure of the critical power unit, performance is available to enable the rotorcraft to safety continue the flight, except when the failure occurs early during the take-off manoeuvre, in which case a forced landing may be required.

Performance Class 3. For a rotorcraft, means the class of rotorcraft operations where, in the event of failure of the critical power unit at any time during the flight, a forced landing:

a) in the case of multi-engine rotorcraft – may be required; or
b) in the case of single-engine rotorcraft – will be required.

Prior Permission Required (PPR) HLS. A HLS developed for exclusive use of the owner and persons authorized by the owner.

> **NOTE:** *The HLS owner and operator are to ensure that all pilots are thoroughly knowledgeable with the HLS (including such features as approach/departure path characteristics, preferred heading, facility limitations, lighting, obstacles in the area, size of the facility, etc.).*

Rotor Downwash. The volume of air moved downward by the action of the rotating main rotor blades. When this air strikes the ground or some other surface, it causes a turbulent outflow of air from beneath the helicopter.

Safety Area. A defined area on a HLS surrounding the FATO intended to reduce the risk of damage to helicopters accidentally diverging from the FATO (0.3 x RD of the Design Helicopter). This area should be free of objects, other than those frangible mounted objects required for air navigation purposes. This translates to an outer diameter of 33 m. for the Design Helicopter.

Safety Net. Surrounds the outer edge of a rooftop or elevated HLS, nominally at the FATO boundary. Should be a minimum of 1.5 m. wide, not project more than 25 cm. above the HLS outer edge, have a load carrying capacity of not less than 122 kg/m^2., and be fastened to a solid structure.

Segment 1. Category A profile distance between TDP and V_{TOSS}. The distance is dependent upon the helicopter type, its weight, the altitude, temperature, wind speed and direction.

Shielded Obstruction. A proposed or existing obstruction that does **not** need to be marked or lit due to its close proximity to another obstruction whose highest point is at the same or higher elevation.

Standard HLS. A place that may be used as an aerodrome for helicopter operations by day and night.

Take off. To accelerate and commence climb at the relevant climb speed.

Touchdown and Lift-off Area (TLOF – US**)** [also known as the **Ground Effect Area** (**GEA** – Australia)]**.** A load bearing, generally paved area, normally centered in the FATO, on which the helicopter lands or takes off, and that provides ground effect for a helicopter rotor system. Size is based on 1 x main rotor diameter of Design Helicopter.

Transitional Surfaces. Starts from the edges of the FATO parallel to the flight path centre line, and from the outer edges of approach/ departure surface, and extends outwards at a slope of 2:1 (2 units horizontal in 1 unit vertical) for a distance of ~75 m. from the centreline. The transitional surfaces start at the edge of the FATO opposite the approach/departure surfaces and extend to the end of the approach/departure surface out to ~1,250 m.

Unshielded Obstruction. A proposed or existing obstruction that may need to be marked or lit since it is **not** in close proximity to another marked and lighted obstruction whose highest point is at the same or higher elevation.

1.7 Applicable Abbreviations

AC	US FAA Advisory Circular.
AWS	Automatic Weather Station (BoM).
ASNSW	Ambulance Service of New South Wales.
BoM	Bureau of Meteorology.
CAAP	Civil Aviation Advisory Publication (Australia).
CASA	Civil Aviation Safety Authority (Australia).
CAOs	Civil Aviation Orders (Australia).
CARs	Civil Aviation Regulations (1988) Australia.

CASRs	Civil Aviation Safety Regulations (1998) Australia.
CTAF	Common Traffic Advisory Frequency.
D	Diameter of the main rotor of the Design Helicopter (also RD).
DCWC	Donald Cant Watts Corke.
ED	Hospital Emergency Department.
FAA	Federal Aviation Administration, USA.
FATO	Final Approach and Take Off Area. (Australian CAAP = 2 x Length) (ICAO and US FAA AC = 1.5 x Length and is used)
FARA	Final Approach Reference Area.
FMS	Flight Manual Supplement.
GEA	Ground Effect Area (also TLOF) – min. 1 x main rotor diameter. Load bearing area.
GPS	Global Positioning System taking its data from orbiting satellites.
HAPI-PLASI	Pulse Light Approach Slope Indicator (see VGI).
HEMS	Helicopter Emergency Medical Service.
HLS	Helicopter Landing Site (also Heliport).
HPI	Health Projects International.
ICAO	International Civil Aviation Organisation.
IFR	Instrument Flight Rules.
IMC	Instrument Meteorological Conditions - requiring flight under IFR.
L	Length (overall), in relation to a helicopter, the total distance between the main rotor and tail rotor tip plane paths when rotating.
LDP	Landing Decision Point (Category A/ Performance Class 1 operations).
LLA	Landing and Lift Off Area. Solid surface with undercarriage contact points + I x metre in all directions.
MRI	Magnetic Resonance Imagers.
MRU	Medical Retrieval Unit (HQ Eveleigh). Responsible for control and tasking of HEMS.
MTOW	Maximum Take Off Weight.
NDB	Non Directional Beacon providing a radio signal to an aircraft ADF.
RD	Main Rotor Diameter (also D).
RMI	Remote Magnetic Indicator (magnetic compass with flux valve system).
TDP	Takeoff Decision Point (Category A/ Performance Class 1 operations).
TLOF	Touch Down and Lift Off Area (US FAA), also (Australia GEA) - min. 1 x main rotor diameter. Load bearing.
VFR	Visual Flight Rules.
VHF	Very High Frequency radio.
VGI	Visual glideslope indicator.

VMC	Visual Meteorological Conditions - allowing flight under VFR.
VOR	VHF Omni-directional Radio - a ground radio transmitter for aircraft navigation purposes.
V_{TOSS}	Takeoff Safety Speed.

1.8 List of Figures

2 EXECUTIVE SUMMARY

Wollongong Hospital Helicopter Landing Site presently has an obstacle free HEMS VFR Approach and Departure arc covering approximately 220º. This is located primarily on the western side of the HLS. The remaining arc on the eastern side is effectively blanked by the hospital buildings. Objects are deemed obstacles if they penetrate 7.5º elevation when measured out from the HLS FATO edge.

The proposed location of Wollongong Private Hospital on Crown Street falls within the southern section of the usable VFR Approach and Departure arc. The height of the proposed building in this location results in approximately 11º elevation measured from the HLS FATO. As such, the development would present a significant obstruction within the currently available VFR Approach and Departure arc.

An obstruction as a result of the proposed development would reduce the usable VFR Approach and Departure arc from approximately 220º to approximately 185º. As the remaining usable arc still exceeds the recommended minimum of 180º, the development would not present an issue for HEMS operations to and from the HLS. The positioning of appropriate obstruction lights on the top of the development would be required.

3 AVIATION REQUIREMENTS AND CONSIDERATIONS

3.1 Design Helicopter

The most common helicopter types to use the Wollongong Hospital HLS are the Agusta AW139, the Bell 412 series and the Eurocopter EC145. The AW 139 is the largest/heaviest of the types employed and is the "Design Helicopter" for planning purposes. The Design Helicopter is almost the same dimensions as the Bell 412 series but has a Maximum Take Off Weight (MTOW) of 6,400 kg, 1,000 kg. more than that of the Bell 412. See Figures 1-3.

Figure 1: ASNSW AW139 "Design Helicopter"

Figure 2: SouthCare Bell 412

Figure 3: ASNSW EC145

The dimensions of the AW139 are seen at Figure 4.

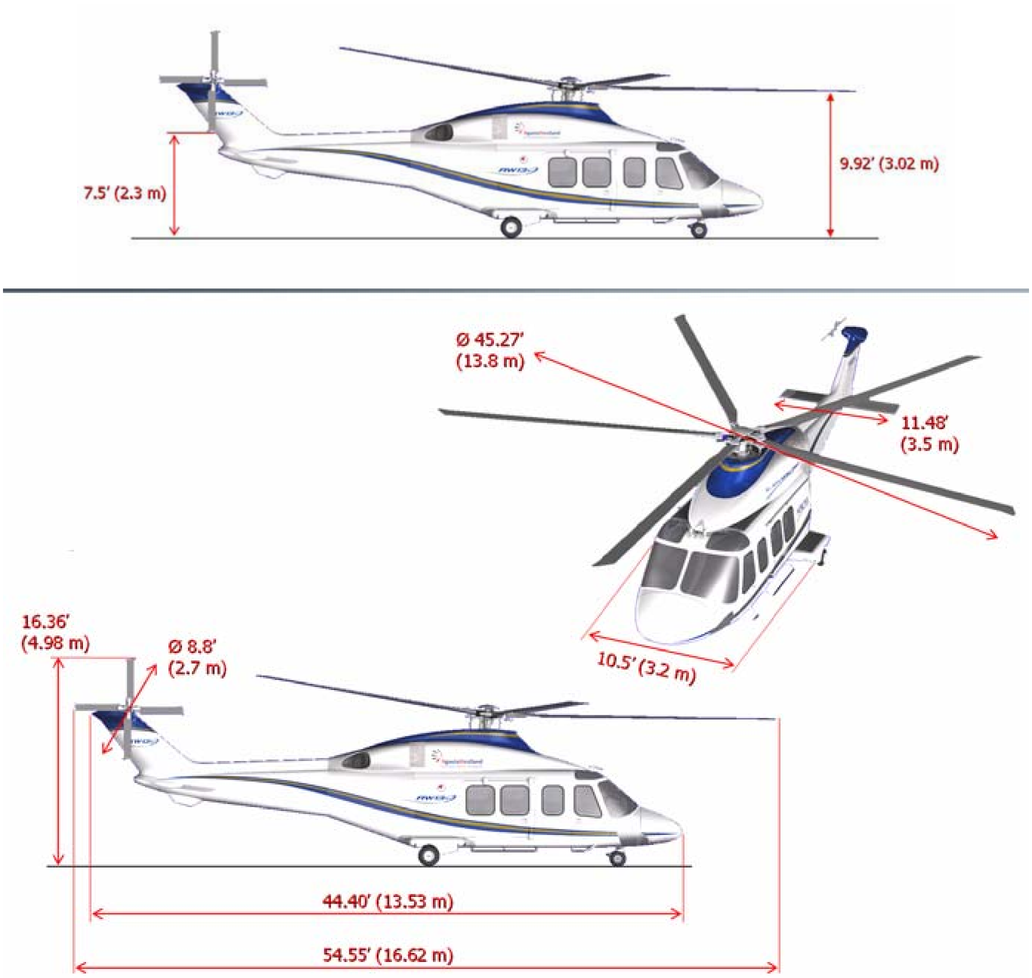

Figure 4: AW139 Dimensions

3.2 Helicopter Landing Site Dimensions

For the purposes of this study, it is only necessary to be aware of the width of the VFR Approach and Departure path at the HLS, and again abeam the proposed development.

The width of the flight path at the HLS is determined by the dimensions of a HLS, which are in turn determined by the Design Helicopter. In NSW the resulting HLS FATO has either a diameter of 25m., or if square 25 x 25m. Each HLS is surrounded by a Safety Area extending from the FATO by a further 4m.

3.3 Object Identification Surfaces (OIS)

Where possible, the object identification surfaces as specified in the Guidelines should be met. However at many NSW hospital HLSs the existing obstructions do not allow for this standard. It can often only be met at a “new” rural hospital “green field” location.

The OIS standard is as follows:

(1) 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 ~30 m.

(2) 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 ~250 m. From this point, the object identification surface extends out for an additional distance ~1,000 m. while rising on a 7.5º or 8:1 slope (8 units horizontal in 1 unit vertical). From the point ~200-250 m. from the FATO perimeter, the object identification surface is ~30 m. beneath and parallel to the approach/departure surface.

(3) The width of the safety surface increases as a function of distance from the Safety Area. From the Safety Area perimeter, the object identification surface extends laterally to a point ~30 m. outside the Safety Area perimeter. At the upper end of the surface, the object identification surface extends laterally ~60 m. on either side of the approach/departure path. See Figure 5.

In relation to the Wollongong Hospital HLS, the OIS recommendations cannot be met.

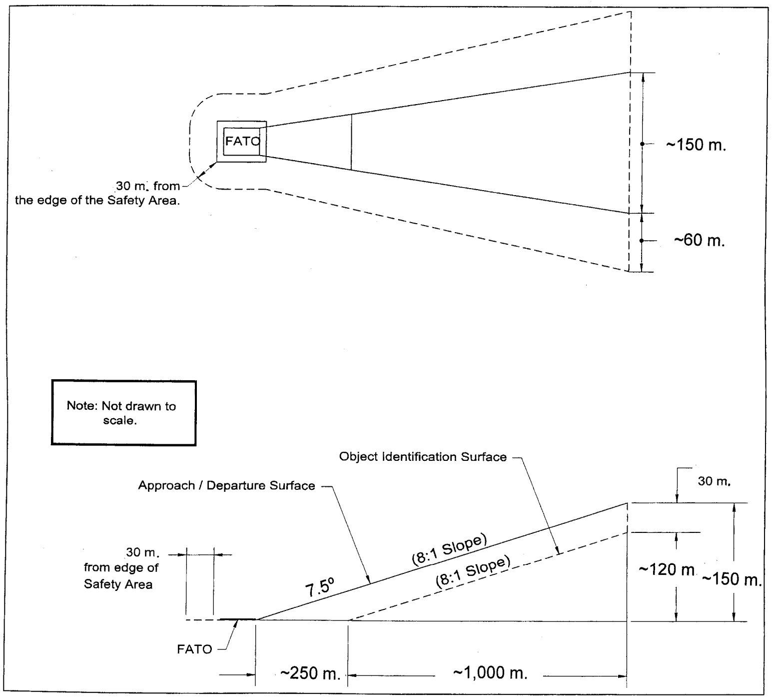

Figure 5: Approach/Departure and Object Identification Surface

3.4 VFR Approach and Departure Paths

The purpose of approach/departure airspace is to provide sufficient airspace clear of hazards to allow safe approaches to and departures from HLSs.

Approach/departure paths should be such that downwind operations are avoided and crosswind operations are kept to a minimum. To accomplish this, a HLS should have more than one approach/ departure path which provides an additional safety margin and operational flexibility. The preferred flight approach/departure path should where possible, be aligned with the predominate wind when taking account of potential obstacles. Other approach/departure paths should also be based on an assessment of the prevailing winds and potential obstacles. The separation between such flight paths should not be less than 150º, and aiming for 180º.

VFR approach/departure paths may curve in order to avoid objects or noise-sensitive areas. More than one curve in the path is not recommended. Changes in direction by day below 300 feet should be avoided, and there should be no changes in direction below 500 feet at night.

The VFR Approach and Departure path commences at the HLS, at the width of the FATO (25m.), and extends out splayed for a distance of ~1,250m., where it is 150m. wide and ~500 feet above the elevation of the HLS.

3.5 VFR Approach/Departure and Transitional Surfaces

An approach/departure surface is centred on each approach/ departure path. Under the current Guidelines, the approach/departure path starts at the edge of the FATO and slopes upward at 7.5º or 8:1 (8 units horizontal in 1 unit vertical) for a distance of ~1,250 m. where the width is ~150 m. at a height of 500 feet above the elevation of GEA/TLOF surface. Proposed changes in the CASA Regulations involve even more restrictive approach/departure angles down to 2.5º or 23:1. It they are incorporated within the new CASRs, they are most likely to be Guidelines as mandating them would preclude almost all existing NSW hospital HLSs other than a few roof top/elevated HLSs.

The transitional surfaces start from the edges of the FATO parallel to the flight path centre line, and from the outer edges of approach/ departure surface, and extend outwards at a slope of 2:1 (2 units horizontal in 1 unit vertical) for a distance of ~75 m. from the centreline. The transitional surfaces start at the edge of the FATO opposite the approach/departure surfaces and extend to the end of the approach/departure surface.

> <u>Note</u>: *The transitional surface is not applied on the FATO edge opposite the approach departure surface.*

The approach/departure surface should be free of penetrations. Any penetration of the transitional surface should be considered a hazard. Refer to Sub-section 3.6.

Figure 6 following illustrates the approach/departure (primary and transitional) surfaces.

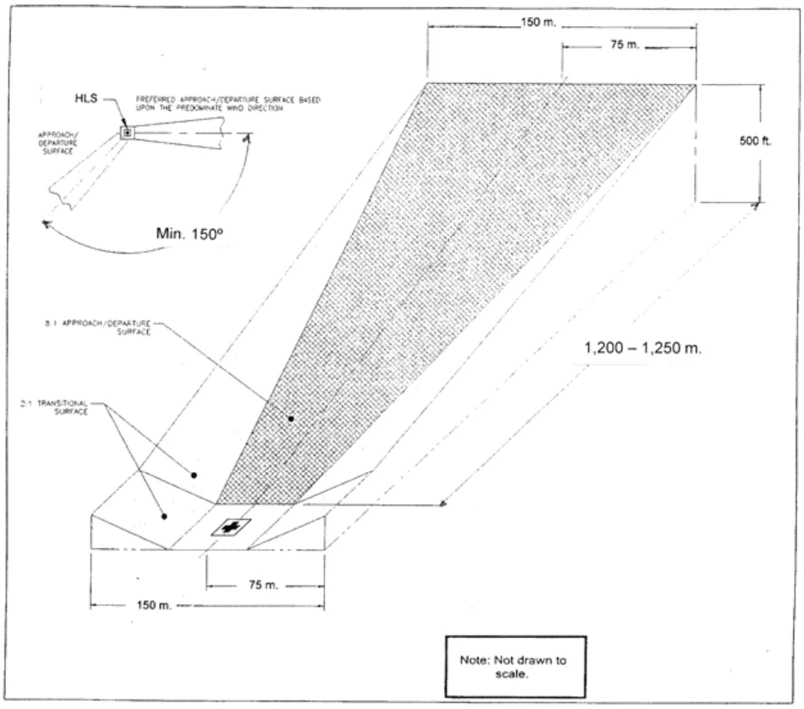

Figure 6: VFR Approach/Departure Transitional Surfaces

3.6 Obstructions on or in the Vicinity of the HLS

The adverse effect of an object presumed or determined to be a hazard to air navigation may be mitigated by:

(1) Removing the object.

(2) Altering the object, e.g. reducing its height.

(3) Marking and/or lighting the object, provided that the object would not be a hazard to air navigation if it were marked and lit.

An example of an obstruction light required close to the HLS would be that required to be positioned on the top of the windsock. Other obstacles in close proximity to the HLS may include radio aerials or exhaust stacks etc. attached to the main building or other buildings in the vicinity. All such obstacles are required to have red obstacle lights fitted.

3.6.1 Obstructions in close Proximity but Outside and Below the Approach/Departure Surface

The tops of high buildings, unmarked wires, antennas, poles, cell towers, and similar objects are often difficult to see even in the best daylight weather, and in time for a pilot to successfully take evasive action. While pilots can avoid such objects during en route operations by flying well above them, approaches and departures require operations near the ground where obstacles may be in close proximity. If difficult-to-see objects penetrate the OISs, these objects should be marked to make them more conspicuous.

3.7 Prevailing Winds

Helicopters require and use head wind to advantage during both takeoff and landing. A head wind component will provide its maximum benefit when coming from directly in front of a helicopter. It will improve performance by reducing the amount of power required and/or allow for increased payload and/or allow for an increased angle of climb during takeoff and will allow for a reduction in power required for landing. A headwind is effectively air flow through the rotor system (disk) which provides its first positive performance benefit during takeoff at approximately 15 kts. (translational lift) depending on the type of helicopter. The performance improves until best rate of climb speed is achieved at approximately 70 kts. depending on the helicopter type. The transition from hover to takeoff safety speed (V_{TOSS}) during takeoff is the most critical phase of flight. V_{TOSS} is dependent on the helicopter type and is generally between 40-50 kts.

It is therefore important to review the prevailing wind direction and speed when considering approach and departure paths to and from a HLS. It is however even more important to achieve two approach and departure paths which are at least 150º apart and preferably 180º apart. Achieving two approach/departure paths 180º apart is far more important than aligning a path or paths with the prevailing wind. As long as there is a head wind component there is advantage. Except for periods of extreme weather with excessively strong winds and turbulence, there is almost no time that a HLS would be unusable due to wind direction if two paths 180º apart are available.

The most common methods of securing local wind information is via the Bureau of Meteorology Automatic Weather Stations (BoM AWS). A less popular method is the use of the CSIRO's TAPM (The Air Pollution Model). This is however designed to estimate the spread of air pollution, is a simulation and purely a prognostic model which provides only a very rough idea. It does not take account of the local topographical situation. TAPM is invariably of little assistance due to its unreliability.

If a BoM weather station is within a reasonable distance of the location of interest, it is the most accurate and reliable source of information.

3.8 Airspace

Civil Aviation Safety Authority/Airservices Australia approval is not required for operations at the Wollongong HLS. The adjacent airspace is designated as Class "G" (uncontrolled) from ground level to 4,500 feet AMSL. Refer to the En Route Supplement Australia (ERSA).

4 WOLLONGONG HOSPITAL HLS VFR APPROACH AND DEPARTURE PATHS

4.1 Wollongong Hospital HLS

Wollongong Hospital HLS is positioned above a multistorey carpark located on the western side of New Dapto Street, to the west of and opposite the hospital. The coordinates of the HLS are S. 34º 25.413' E. 150º 52.950'. The HLS is elevated and is at 45.6 AHD. See Figure 7.

Figure 7: Wollongong Hospital HLS

4.2 Wollongong Area Prevailing Winds

The closest BoM AMS is located at Wollongong University which is within two kilometres of Wollongong Hospital HLS. It is acknowledged that the university is closer to the base of the western ridge line than the hospital, and therefore there will be some local variation between the two locations in wind direction and speed.

Readings taken between 1970 and 2008 have been reviewed. Consultation with the Senior Base Pilot at the Wollongong/Albion Park based ASNSW HEMS confirms that the winds at the University closely align with the winds in the HLS area. There will be some minor variations at low level due to the rolling terrain and structures in the city; however it is reported to be essentially accurate.

Following are the 0900 and 1500 BoM wind rose annual average observations taken between 1970 and 2008. See Figures 8 and 9.

Rose of Wind direction versus Wind speed in km/h (01 Nov 1970 to 05 Jun 2008)
Custom times selected, refer to attached note for details

WOLLONGONG UNIVERSITY
Site No: 068188 • Opened Jan 1970 • Closed Jun 2008 • Latitude: -34.403° • Longitude: 150.8795° • Elevation 25m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.

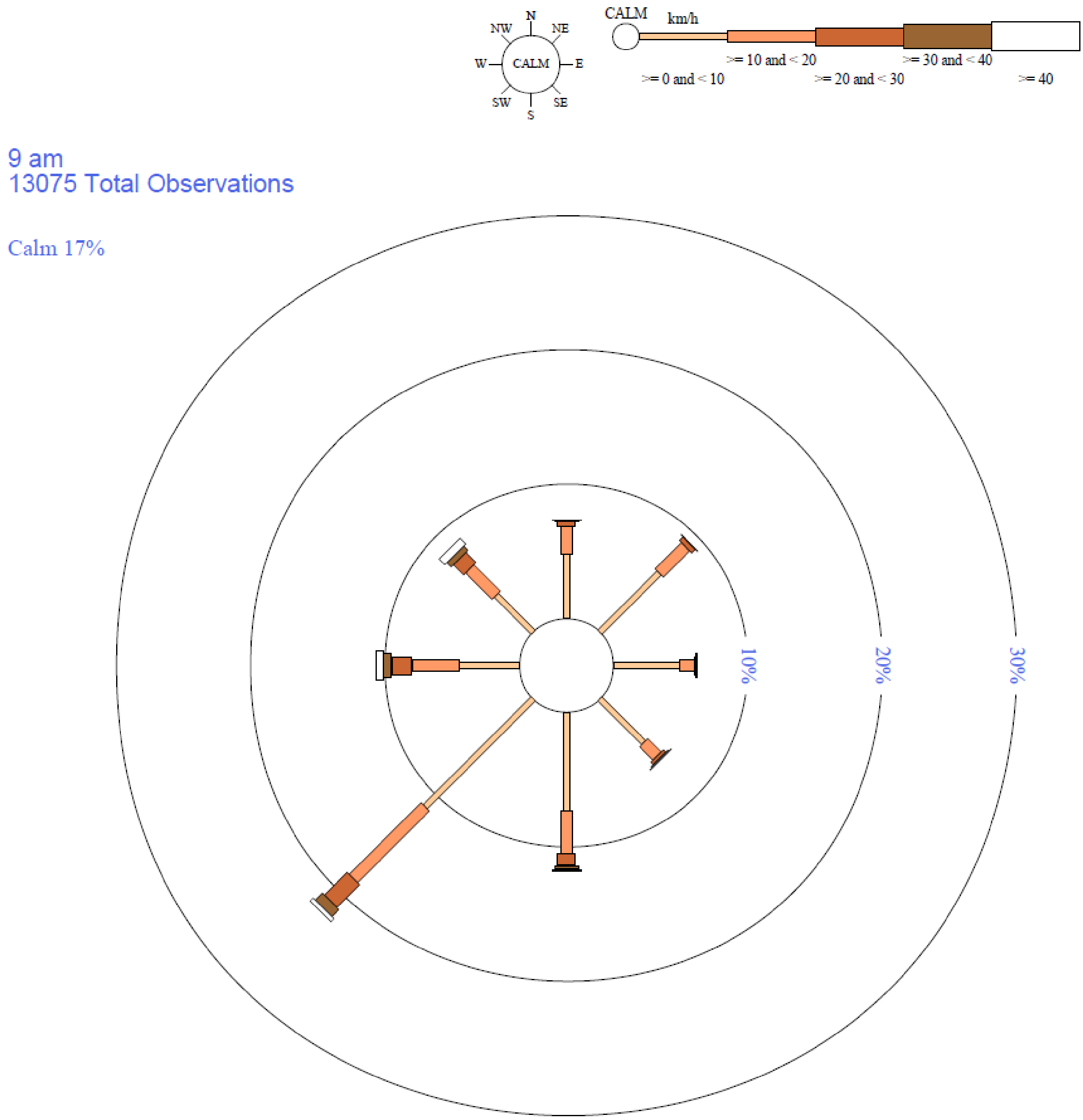

Figure 8: BoM Wind Rose Average 0900 Readings Wollongong University

Rose of Wind direction versus Wind speed in km/h (01 Nov 1970 to 05 Jun 2008)
Custom times selected, refer to attached note for details

WOLLONGONG UNIVERSITY
Site No: 068188 • Opened Jan 1970 • Closed Jun 2008 • Latitude: -34.403° • Longitude: 150.8795° • Elevation 25m

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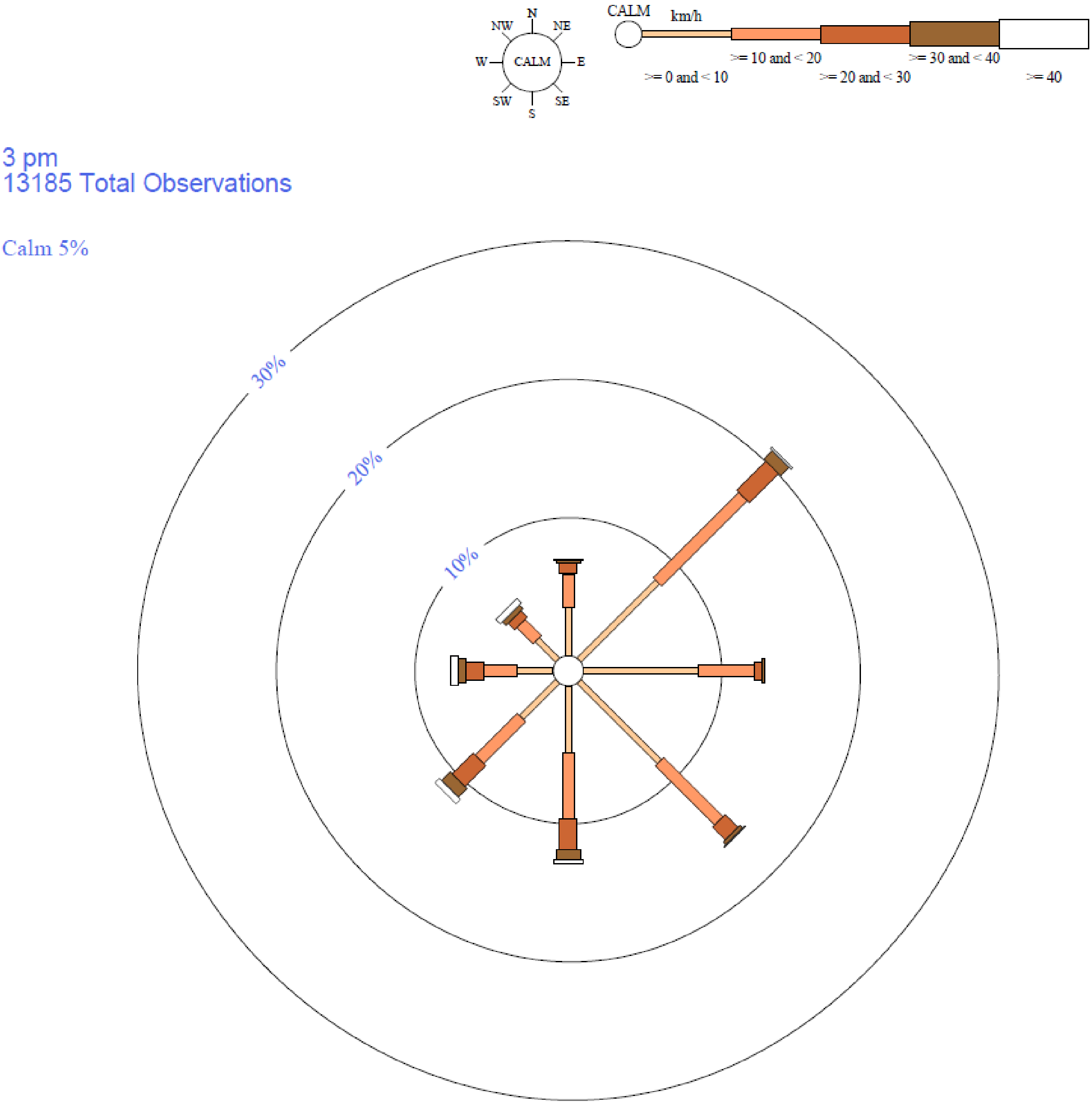

Figure 9: BoM Wind Rose Average 1500 Readings Wollongong University

From Figures 8 and 9 it may be seen that the predominant winds at 0900 are south westerly, and at 1500 they are in the eastern sector, and predominantly north easterly. The winds between 0900 and 1500 can be anywhere in between. The most important consideration is to aim for at least two approach and departure paths 180º apart.

4.3 Location of Proposed Wollongong Private Hospital in Relation to the Wollongong Hospital HLS

The northern face of the proposed development is approximately 180m. to the SSW of the HLS, and within the arc currently used for VFR approaches and departures. The area within the yellow lines shows the extent of the development and the red dot is approximately the highest point. See Figure 10.

Figure 10: Proposed Development Site with Reference to Wollongong Hospital HLS

4.4 Primary VFR Approach and Departure Paths at Wollongong Hospital HLS

VFR approaches and departures are subject to wind direction and to a lesser extent, strength. Currently approaches to the Wollongong HLS are to the south, to the east and to the north. Departures are conversely, to the north, to the west and to the south.

At present no specific preferred VFR Approach/Departure paths have been designated for the HLS, with approaches and departures anywhere within the acceptable western arc. It is however intended to set preferred paths, but this is to await a decision on a proposed new hospital development close to the HLS.

An arc extending clockwise from ~190º through ~050º T is currently available for VFR approaches and departures. At the time of review there were no obstacles penetrating the minimum acceptable 7.5º VFR Approach and Departure path within this arc. The arc extending clockwise from ~050º through ~190º T is effectively unusable due to permanent obstacles. See Figure 11.

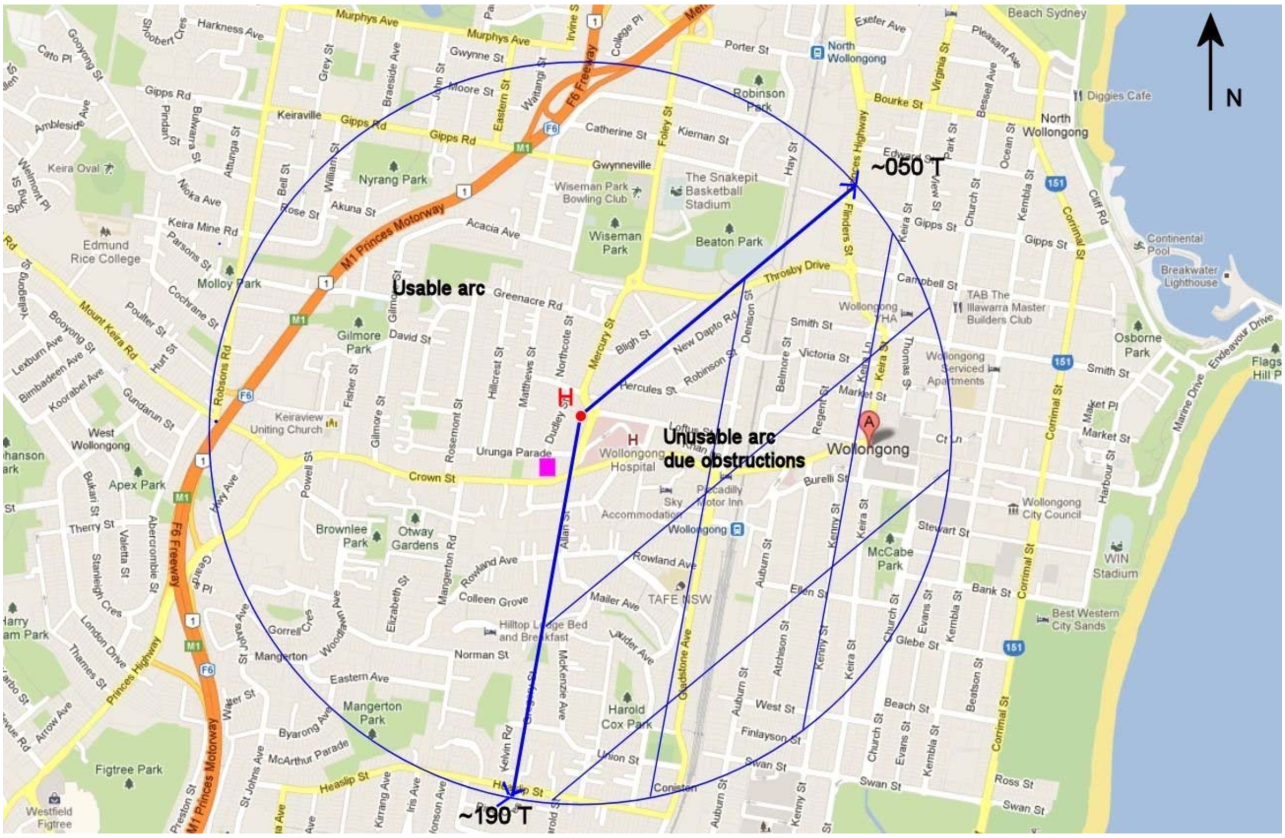

Figure 11: Current Usable VFR Approach and Departure Path Arc to the West with Unusable Arc to the East

4.5 Effect of Proposed Development on Existing VFR Approach and Departure Arc to Wollongong Hospital HLS

The proposed development of Wollongong Private Hospital is located between Urunga Parade and Crown Street, immediately to the west of the Wollongong Day Surgery. The distance between the edge of the HLS FATO and the northern face of the development is estimated to be approximately 180m. Refer to Figure 10.

The VFR Approach and Departure paths, or in this situation the VFR Approach and Departure arc, must be free of obstructions penetrating 7.5º above the horizontal when measured from the HLS FATO edge. The HLS elevation is 45.6 AHD and from advice provided by DCWC/HPI, the top of the proposed development is 79.5 AHD. Based on a distance of ~180m., the angle from the HLS FATO edge to the top of the proposed development is ~11º. Any figure above 7.5º represents a significant obstacle. See Figure 12.

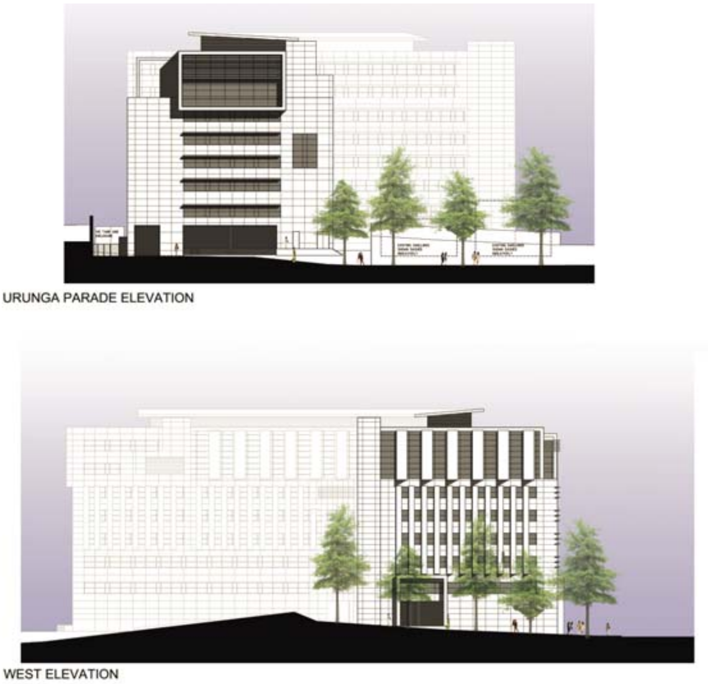

Figure 12: Elevation Drawings of the Proposed Wollongong Private Hospital

It follows therefore, that the construction of Wollongong Private Hospital at the location as marked in Figure 10, will present a significant obstacle and thus would preclude the arc within the green triangle noted in Figure 13, from being used for approach to and departure from the HLS.

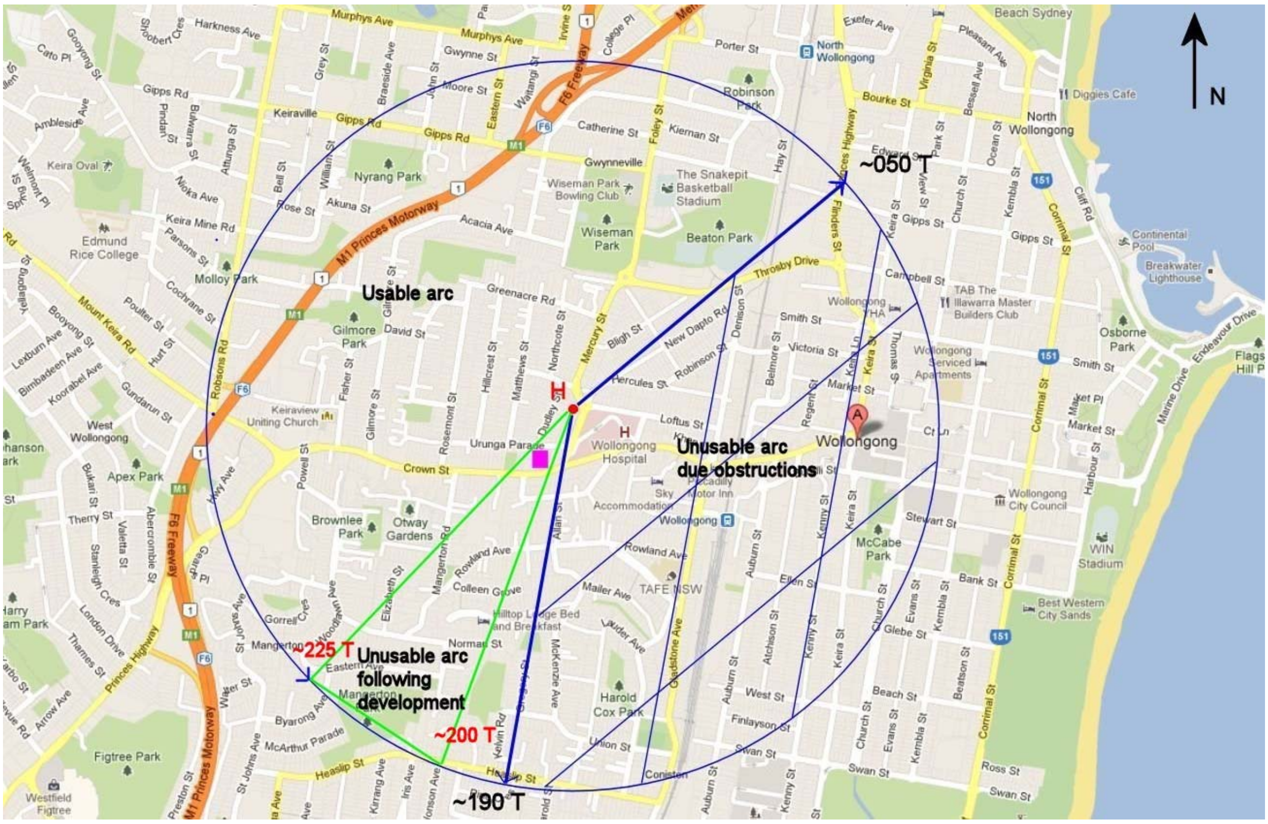

Figure 13: Unusable VFR Approach and Departure Path Arc Following Development, Marked within the Green Triangle

As the remaining available VFR Approach and Departure arc on the western side exceeds 180º, the reduction in available arc presents no concern. It will however be necessary to position red obstruction lights at the corners of the highest points of the construction.

It will also be necessary to advise ASNSW in advance of the positioning of any cranes used during construction. Such cranes will also require red obstruction lights placed at the extremities of the boom and at the highest point.

4.6 Airspace

Airspace in area surrounding Wollongong Hospital is uncontrolled Class G and not relevant to this analysis.

5 WOLLONGONG HOSPITAL REDEVELOPMENT

5.1 Potential Redevelopment at Wollongong Hospital

Health Infrastructure NSW has advised that there is potential for redevelopment in the area of the existing Wollongong Hospital HLS. This may involve the HLS and the area immediately adjacent and to its south between Dudley Street, New Dapto Street and Urunga Parade. Such a development may necessitate a relocation of the HLS to a position ~50m. west of the present location. Any new development is likely to exceed the present height of the HLS at 45.6 AHD.

Such a development would effect the currently available VFR Approach and Departure arc, and is likely to be between the HLS and the proposed Wollongong Private Hospital. In such a situation a new hospital development would effectively blank any obstruction posed by the proposed Wollongong Private Hospital. Therefore Wollongong Private Hospital would no longer be the primary obstacle south of the HLS.

At the time of report preparation, HI were unable to forecast a date for the potential hospital development.

6 CONCLUSION

Wollongong Hospital HLS was constructed prior to the introduction of the current NSW MoH Hospital HLS Guidelines. At that time there was no requirement to specify preferred VFR Approach and Departure paths. The arc on the eastern side of the HLS between approximately 050º and 190º T includes the hospital buildings and is unusable for approaches and departures due to these obstacles infringing the obstacle free gradient requirement of 7.5º. The arc clockwise between approximately 190º through 050º T meets the obstacle free requirements and is thus available for VFR approaches and departures throughout the arc. Helicopters may approach or depart in any direction within this arc, subject to wind direction and speed considerations.

The proposed construction of Wollongong Private Hospital on the nominated site presents a significant obstacle as the obstacle free gradient exceeds 7.5º. The highest point of the Private Hospital roof is at an angle of approximately 11º when measured from horizontal at the Wollongong Hospital HLS FATO edge. The result is that an arc between approximately 200º and 225º T would be unusable for approaches and departures.

However, as there remains a usable arc in excess of 180º on the western side of the HLS, the positioning of Wollongong Private Hospital on the proposed site and at the proposed dimensions, would not detrimentally effect HEMS operations to Wollongong Hospital HLS. The remaining usable arc is approximately 225º clockwise through 050º T, exceeding the desired 180º specification in the Guidelines. Appropriate red obstacle lights would be required at the extremities of the highest points of the structure.

Health Infrastructure NSW has advised that a hospital development is under consideration in the area of the existing HLS, and on its southern side. This may involve a slight repositioning of the HLS, and a construction on the southern side exceeding the height of the HLS deck at 45.6 AHD. Such a development would effectively mask the proposed Wollongong Private Hospital location and become the primary obstacle in the southern sector of the currently available western arc. Health Infrastructure has not yet provided a time frame for any development.

Attachment A

View: HLS Deck to Development Site

Attachment B

View: Development Site to HLS Deck