

AVIATION IMPACT ASSESSMENT REPORT



AIRSPACE IMPLICATIONS DUE TO THE CONSTRUCTION OF THE LANG WALKER AO MEDICAL RESEARCH BUILDING - MACARTHUR

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This Report on the airspace implications, both during and following construction of the development is prepared for BVN by Resolution Response Pty. Ltd. ABN: 94 154 052 883, trading as 'AviPro'.

The Report relates to the coordination aspects associated with prescribed/protected airspace at Camden Aerodrome and the Helicopter Landing Site (HLS) at the Campbelltown Hospital due to the establishment and site design of the Macarthur Medical Research Centre. It is intended to inform design and planning.

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1. BACKGROUND

1.1. Project Establishment and Context

The Macarthur Medical Research Centre (MMRC) will facilitate world-class health research outcomes specifically targeted at the needs of the local Campbelltown/Macarthur population. Within a total building area of approximately 5,000m², the MMRC will include Clinical Research facilities, associated Dry Research and Collaboration spaces, a Community Engagement zone, and Back of House/Support spaces as required across four levels. The site identified is the existing Helicopter Landing Sites (HLS) located between Building D and the Macarthur Clinical School (MCS) on the Campbelltown Hospital Campus.

AviPro has been engaged to provide advice regarding the aviation specific impacts that the MMRC development will have on the prescribed/protected airspace at Camden Aerodrome and the new HLS on the rooftop of the new Campbelltown Hospital (which has yet to be commissioned) once it has transitioned from the existing HLS location. This includes an assessment of the impacts caused by the construction crane, and also the building itself once complete.

1.2. Background Material

Reference material drawn and provided by BVN in support of the report include early planning designs and concept drawings.

1.3. Methodology

Criteria from all relevant references were assessed, with the Guidelines used as the primary tool.

1.4. Explanation of Terms

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

Approach and Departure Path (IFR). The flight track helicopters follow when landing at or departing from the FATO of an HLS under the Instrument Flight Rules. The IFR approach and departure path extends upwards and outwards from the edge of the FATO safety area with an obstacle free gradient of 2.6⁰/4.5%/ 1:22.2 (22.2 units horizontal in 1 unit vertical), to a height of 152m above the FATO at a distance of ~3,386 m. The approach and departure path commences at the forward edge of the FATO safety area at a width of 34m, and increases in width uniformly to 152m m above the elevation of FATO surface at a distance of ~3,386 m.

Approach/Departure Path (VFR). The flight track helicopters follow when landing at or departing from the FATO of an HLS. Updated standards to align with ICAO requirements now has the VFR (day and) night approach and departure path extending upwards from the forward edge of the FATO safety area with an obstacle free gradient of 2.6⁰/4.5%/ 1:22.2 (22.2 units horizontal in 1 unit vertical), to a height of 152m above the FATO at a distance of ~3,386 m. The approach and departure path commences at the forward edge of the FATO safety area at a width of 34m, and expands uniformly, laterally at an angle of 8.7⁰/15%/1:12.8 to a total width of 140 m, then remains parallel to a distance of ~3,386m, where the height is 152 m above the elevation of FATO surface.

Design Helicopter. The Agusta AW139 contracted to the NSW Ambulance. The type reflects the latest generation Performance Class 1 capable helicopters used in HEMS and reflects the maximum weight and maximum contact load/minimum contact area. The design helicopter has a maximum all up mass of 7 tonnes, however for HLS design purposes it is assumed the helicopter will never exceed 6.8 tonnes on the HLS.

D Value (Overall Length). The distance from the tip of the main rotor tip plane path to the tip of the tail rotor tip plane path or the fin if further aft, of the Design Helicopter.

Elevated Helicopter Landing Site. An HLS located on a roof top or some other elevated structure where the Ground Effect Area/Touchdown and Lift-off Area (TLOF) is at least 2.5m above ground level.

Final Approach. The reduction of height and airspeed to arrive over a predetermined point above the FATO of an 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 specification of 1.5 x D Value or Overall Length of the Design Helicopter is used and equates to 25m. diameter. Area to be load bearing.

Ground Taxi. The surface movement of a wheeled helicopter under its own power with wheels touching the ground.

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 an HLS without a precision approach, the HLS elevation is the highest point of the FATO expressed as the distance above mean sea level.

Helicopter Landing Site PC1 Survey Reference Point. A position at the forward edge of the FATO safety area in the centre of the approach and departure path, from which the PC1 survey at 2.6° (4.5%) is initiated.

Helicopter Landing Site Reference Point (HRP). The geographic position of the HLS expressed as the latitude and longitude at the centre of the FATO.

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

Note:

*A designated HLS located at a hospital or medical facility is an emergency services HLS and **not** a medical emergency site.*

Heliport. Two or more co-existing helicopter landing sites (HLS). There are no implications for operating a heliport as opposed to an HLS, other than having a “Heliport Operations Manual” rather than an “HLS Operations Manual” which would address the various interactions and interoperability (aviation, clinical etc) at the dual sites.

Hover Taxi. The movement of a helicopter above the surface, generally at a wheel/skid height of approximately one metre. For facility design purposes, a skid-equipped helicopter is assumed to hover-taxi.

Landing and Lift Off Area (LLA). A load-bearing, nominally paved area, normally located in the centre of the TLOF, on which helicopters land and lift off. Minimum dimensions are based upon a 1 x metre clearance around the undercarriage contact points of the Design Helicopter.

Lift Off. To raise the helicopter into the air.

Movement. A landing or a lift off of a helicopter.

Object Identification Surface. The OIS are a set of imaginary surfaces associated with a heliport. They define the volume of airspace that should ideally be kept free from obstacles in order to minimise the danger to a helicopter during an entirely visual approach.

Obstacle Limitation Surface. The OLS are a set of imaginary surfaces associated with an aerodrome. They define the volume of airspace that should ideally be kept free from obstacles in order to minimise the danger to aircraft during an entirely visual approach.

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

Parking Pad. The paved centre portion of a parking position, normally adjacent to an HLS.

Performance Class 1 (PC1). 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. For an elevated HLS, the reject area is that area within the FATO (25 m. diameter) and therefore this area is to be load bearing. PC1 also requires CASA approved flight path surveys to/from the HLS.

Performance Class 2 (PC2). 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 safely continue the flight, except when the failure occurs early during the take-off manoeuvres, in which case a forced landing may be required. PC2 also requires CASA approved flight path surveys to/from the HLS.

Performance Class 2 With Exposure (PC2WE). PC2WE is very similar to PC2 as mentioned above. The primary difference is that there need not be any provision for a suitable forced landing area during the take-off and landing phases of flight, within the designated exposure period for the rotorcraft. PC2WE offers operators alternative mitigation strategies based on: a defined exposure time limit, demonstrated engine reliability, engine maintenance standards, pilot procedures and training, and operator risk assessments. Specific approval to operate with exposure is required from CASA and will require a number of mitigation strategies from the operator to gain that approval.

Performance Class 3 (PC3). 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:

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

Pilot Activated Lighting (PAL). A PAL system utilises a hospital-based VHF radio and timed switching device, activated by the pilot via a radio transmission on a pre-set frequency, to turn on the associated HLS lighting.

Prior Permission Required (PPR) HLS. An HLS developed for exclusive use of the owner and persons authorized by the owner, i.e. a hospital-based emergency services HLS.

Note:

The HLS owner and the HEMS 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.). This is addressed as part of the HLS commissioning process.

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 an HLS surrounding the FATO intended to reduce the risk of damage to helicopters accidentally diverging from the FATO. This area should be free of objects, other than those frangible mounted objects required for air navigation purposes. The Safety Area for the Design Helicopter extends 4.5 m. beyond the FATO perimeter forming a 34 m. X 34 m. square or a 34m. diameter circle.

Safety Net. Surrounds the outer edge of a rooftop HLS. It is to be a minimum of 1.5 m. wide and have a load carrying capacity of not less than 122 kg/m². The outer edge is not to project above the HLS deck, and slope back and down to the deck edge at approximately 10 degrees, and not more than 20 degrees. Both the inside and outside edges of the safety net are to be secured to a solid structure.

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.

Take off Position. A load bearing, generally paved area, normally located on the centreline and at the edge of the TLOF, from which the helicopter takes off. Typically, there are two such positions at the edge of the TLOF, one for each of two takeoff or arrival directions.

Touchdown and Lift-off Area (TLOF). A load bearing, generally paved area, normally centred 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, and is 14m diameter.

Transitional Surfaces. Starts from the side edges of the FATO safety area parallel to the approach and departure path centre line, and extends upwards and outwards (to the sides) at a slope of 2:1 (two-units horizontal in one-unit vertical or 26.6°) to a height of 45m above the elevation of the FATO surface. Further, from the forward edge of the side transitional surfaces, the transitional surface joins the outer edges of the approach and departure surface, and proceeds upwards and outwards until the outer edges are 152m wide at ~3386m which corresponds with the end of the approach and departure surface.

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 lit obstruction whose highest point is at the same or higher elevation.

1.5. Applicable Abbreviations

Acronym	Meaning
AC	US FAA Advisory Circular
ACC	Aeromedical Control Centre (HQ Eveleigh). Responsible for control and tasking of HEMS
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
DDO	Design and Development Overlay
FAA	Federal Aviation Administration, USA
FATO	Final approach and Take-Off Area (1.5 x helicopter length)
FARA	Final Approach Reference Area
GPS	Global Positioning System
HEMS	Helicopter Emergency Medical Service

Acronym	Meaning
HLS	Helicopter Landing Site
HLSRO	HLS Reporting Officer (Airservices requirement)
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions - requiring flight under IFR
L	Length (also referred to as Overall Length), 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 meeting dynamic loading requirements, with undercarriage contact points + 1 metre in all directions
MoH	Ministry of Health NSW
MMRC	Macarthur Medical Research Centre
MRI	Magnetic Resonance Imagers
MTOW	Maximum Take Off Weight
NOTAM	Notice to Airmen. Issued by Airservices in relation to airspace and navigation warnings
NVG	Night Vision Goggle(s)
OIS	Object Identification Surface(s) (Heliport/HLS)
OLS	Obstacle Limitation Surface(s) (Aerodrome)
PC1	Performance Class 1
PC2	Performance Class 2
PC3	Performance Class 3
RD	Main Rotor Diameter
RTCC	Radar Terrain Clearance Chart
SACL	Sydney Airports Corporation Limited
SARPS	Standards and Recommended Practices developed by ICAO and promulgated in the Annexes to the Convention of International Civil Aviation
TDP	Takeoff Decision Point (Category A/Performance Class 1 operations)
TLOF	Touch Down and Lift Off Area. Load bearing min. 1 x main rotor diameter.
VFR	Visual Flight Rules
VHF	Very High Frequency radio
VMC	Visual Meteorological Conditions - allowing flight under VFR
V _{TOSS}	Take off Safety Speed

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2. EXECUTIVE SUMMARY

The aim of this report is to provide insights into the impacts of constructing the Macarthur Medical Research Centre on the aviation operations into and out of Camden Aerodrome and of the Campbelltown Hospital HLS. The report analyses the likely impact of the completed building and any associated construction cranes on aviation activities.

The following key outcomes arose from the analysis:

- The MMRC, once constructed, will not protrude into the Camden Aerodrome PANS-OPS surfaces.
- The MMRC, once constructed, will not protrude into the Camden Aerodrome OLS.
- The MMRC, once constructed, will not protrude into the Sydney RTCC.
- The MMRC, once constructed, will not impact the Campbelltown Hospital HLS approach and departure paths.
- The MMRC construction crane(s) will not protrude into the Camden Aerodrome PANS-OPS surfaces.
- The MMRC construction crane(s) will not protrude into the Camden Aerodrome OLS.
- The MMRC construction crane(s) will not protrude into the Sydney RTCC.
- The MMRC construction crane(s) will not protrude into the Campbelltown Hospital HLS approach and departure paths.
- The MMRC construction crane(s) will require aviation-standard obstacle lighting.

There is insufficient detail known about the crane(s) to be used to construct the MMRC however the difference in elevation between the MMRC and the Campbelltown Hospital is approximately 35.5m and this is sufficient to accommodate any type of crane without impacting aviation safety.

Approval will not be required to erect a construction crane(s), noting that any construction crane must be fitted with aviation standard obstacle lighting as required by the Guidelines.

3. GENERAL AIRSPACE REQUIREMENTS AND CONSIDERATIONS

3.1. Purpose of this Section

It is important that the reader has a good understanding of the fundamentals of airspace protection for aerodromes and heliports/HLS in order to be able to understand the analysis later in this report. Section 3 provides this general overview.

3.2. Airspace Regulation in Australia - Aerodromes

Approvals will be required if primary prescribed airspace could be impinged. The normal contact for this process is through Sydney Metro Airports (owner of Camden Airport and Bankstown Airport).

Primary prescribed airspace includes an airport's Obstacle Limitation Surfaces (OLS) involving a set of imaginary surfaces associated with an aerodrome that should be kept free of obstacles. Additionally, the Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) surfaces that takes account of the airspace associated with aircraft instrument procedures, must be considered.

3.3. Airspace Management in Australia – Heliports and Helicopter Landing Sites

Currently within Australia, there are no set rules or regulations applicable to the design, construction or placement of HLS'. The appropriate national regulatory guidance at present for the use of HLS' is Civil Aviation Regulation (CAR) 92 which places the onus on the helicopter pilot to determine the suitability of a landing site. The Civil Aviation Safety Authority (CASA) as the regulator of aviation in Australia divested itself of direct responsibility for regulating HLS' in the early 1990s and currently provides only basic operating guidelines via Civil Aviation Advisory Publication (CAAP) 92-2 (2) Guidelines for the Establishment and Operation of Onshore Helicopter Landing Sites.

Because no Federal or State (NSW) legislation is in place to protect VFR approach and departure paths and the transitional surfaces associated with hospital HLS', in May 2018, the Commonwealth Department of Infrastructure, Transport, Regional Development and Communications issued Guideline H: Protecting Strategically Important Helicopter Landing Sites under the National Airports Safeguarding Framework (NASF). Whilst this publication has no legal effect in NSW as yet, its content is gradually being aligned within the NSW MoH Guidelines for Hospital Helicopter Landing Sites in NSW.

3.4. State Government Requirements

The various legislative/regulatory requirements relating to HLS' in NSW are complex. Current regulation excludes emergency service landing sites from the definition of "designated development" in the Environmental Planning and Assessment Regulation (which otherwise includes most HLS'). Generally, hospital HLS' are considered "ancillary-uses" to hospital purposes and are thus not separate "development". The same cannot necessarily be said about off-site emergency medical HLS, e.g. local sports fields.

To ensure that all requirements are met, close consultation with a NSW Ambulance approved Aviation Consultant should be maintained throughout the design and construction phases.

3.5. Local Government Requirements

Requirements emanate from the Airports Act 1996 and the Airports (Protection of Airspace) Regulations 1996.

There are no requirements to address airspace considerations in the Campbelltown Local Environment Plan 2015.

Clause 7.2 of the Camden Local Environment Plan 2010 contains paragraphs which state that:

“(3) The consent authority may grant development consent for development referred to in subclause (1) (a) if:

(a) the relevant Commonwealth body is satisfied the proposed development will not penetrate the obstacle limitation surface as shown on the Obstacle Limitation Surface Map, or

(b) the relevant Commonwealth body is satisfied the proposed development will penetrate the obstacle limitation surface as shown on the Obstacle Limitation Surface Map but:

(i) does not object to the consent authority granting development consent, or

(ii) does not object to the consent authority granting development consent subject to stated conditions.

(4) However, if the consent authority grants development consent for an application to which subclause (3)(b)(ii) applies, the consent authority must grant the development consent subject to the conditions stated by the relevant Commonwealth body as far as practicable.

(5) The consent authority must not grant development consent for development referred to in subclause (1)(a) if the relevant Commonwealth body:

(a) is satisfied the development will penetrate the obstacle limitation surface as shown on the Obstacle Limitation Surface Map, and

(b) objects to development consent being granted.

(6) The consent authority must not grant development consent for development referred to in subclause (1)(b) if the relevant Commonwealth body:

(a) is satisfied the development will penetrate the PANS-OPS surface as shown on the Procedures for Air Navigation Services-Aircraft Operations Map, and

(b) objects to development consent being granted.”

The Airports (Protection of Airspace) Regulations 1996 differentiate between short-term (less than 3 months) and long-term controlled activities. The Regulations provide for the airport operator to approve short-term controlled activities that penetrate the OLS, and for the Commonwealth Department of Infrastructure, Transport, Regional Development and Communications for approval of long-term controlled activities and those short-term controlled activities referred to it by the airport operator. However, the airport operator must refer short-term PANS-OPS infringements to the Department for approval. Long term intrusions of the PANS-OPS surface are prohibited.

3.6. Obstacle Limitation Surfaces

The objective of the OLS is to define a volume of airspace in proximity to the airport which should be kept free of obstacles that may endanger aircraft in visual operations, or during the visual stages of an instrument approach.

The intention is not to restrict or prohibit all obstacles, but to ensure that either existing or potential obstacles are examined for their impact on aircraft operations and that their presence is properly taken into account. Since they are relevant to visual operations, it may sometimes be sufficient to ensure that the obstacle is conspicuous to pilots, and this may require that the obstacle be marked or lit.

In reality, there is little issue with breaching the OLS as pilots will be visual with the obstruction and can work on “see and avoid” principles. OLS at a multi-runway aerodrome look akin to [Figure 1](#) below:

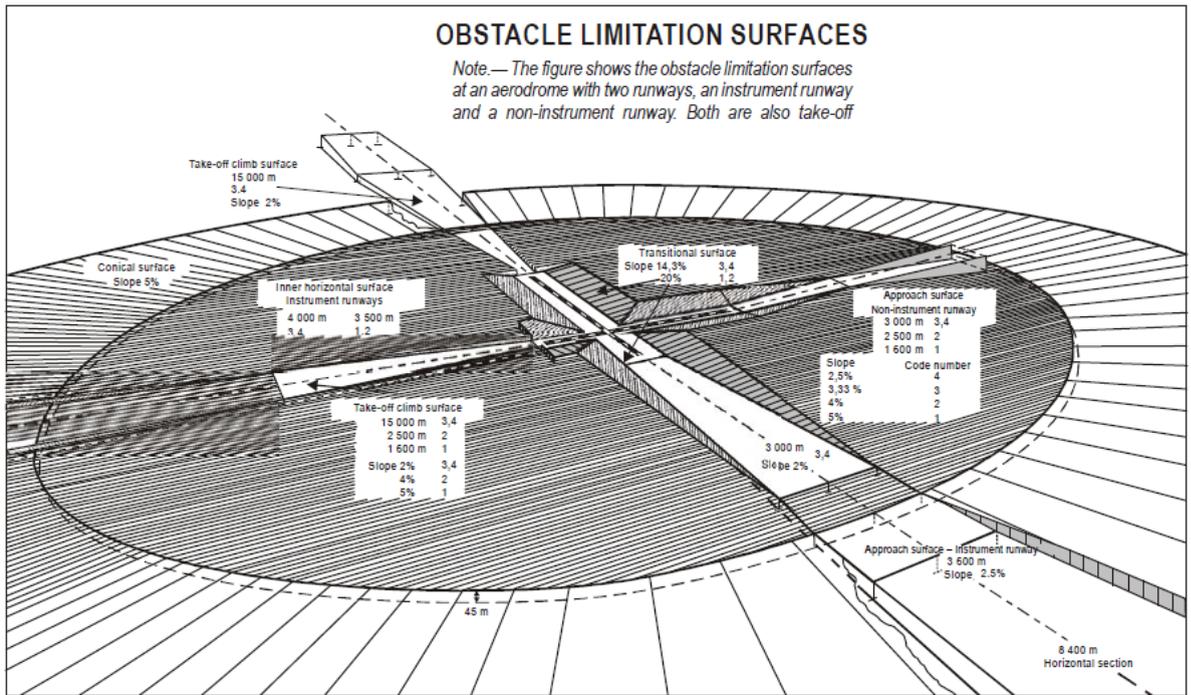


Figure 1: Example of Obstacle Limitation Surfaces

3.7. Procedures for Air Navigation – Aircraft Operations (PANS-OPS) Surfaces

PANS-OPS surfaces detail essential areas and obstacle clearance requirements for the achievement of safe, regular instrument flight operations.

The instrument flight procedures enable pilots to either descend from the high enroute environment of cruise type flight to establish visual contact with the landing runway, or climb from the runway to the enroute environment, with a prescribed safe margin above terrain and obstacles, by use of aircraft instruments and radio navigation aids or GPS in conditions where the pilot cannot maintain visual contact with the terrain and obstacles due to inclement weather conditions.

Pilots must be protected against protrusions into the PANS-OPS surfaces as they have no way of avoiding obstructions if they get off track and they cannot see such obstructions.

PANS-OPS surfaces are constructed differently to OLS however they serve a similar purpose. An example of PANS-OPS surfaces is in [Figure 2](#) below:

3.9. Approach and Departure Paths

The purpose of approach and departure path is to provide a portion of airspace sufficiently clear of hazards to allow safe approaches to, and departures from, the HLS. Approach and departure paths can be designed for both visual (VFR) use by day and by night using different criteria; and for instrument (IFR) flight (also by day and night, albeit there are no differences in design requirements).

VFR approach and departure paths should be such that there are no downwind operations and crosswind operations are kept to a minimum. To accomplish this, an HLS must have more than one path which provides an additional safety margin and operational flexibility.

The preferred flight approach and departure path should where possible, be aligned with the predominant, prevailing wind when taking account of potential obstacles. Other approach and departure paths should also be based on an assessment of the average, prevailing winds and potential obstacles. The separation between approach and departure paths should not be less than 135°, and should preferably be 180°.

3.10. VFR Approach and Departure (Take-off Climb) Surface

VFR approach and departure surfaces can be designed for both day and night operations. Because all NSW hospital HLS' are required to be capable of both day and night use, the night tolerances are always used. A (day and) night approach and departure surface starts at the forward edge of the FATO safety area and slopes upward at 2.6°/4.5%/1:22.2 (22.2 units horizontal in 1 unit vertical) for a distance of ~3,386 m. The approach and departure path commences at a width of 34 m and expands uniformly, laterally at an angle of 8.7°/15%/1:12.8 to a width of 140 m, then remains parallel to a distance of 3,386 m, where the height is 152 m above the elevation of FATO surface. The VFR approach and departure paths are to be obstacle free. It is important to achieve the 2.6°/4.5%/1:22.2 obstacle free slope to account for the performance requirements of one engine inoperative (OEI) flight following an emergency. See Figures 4 and 5 below.

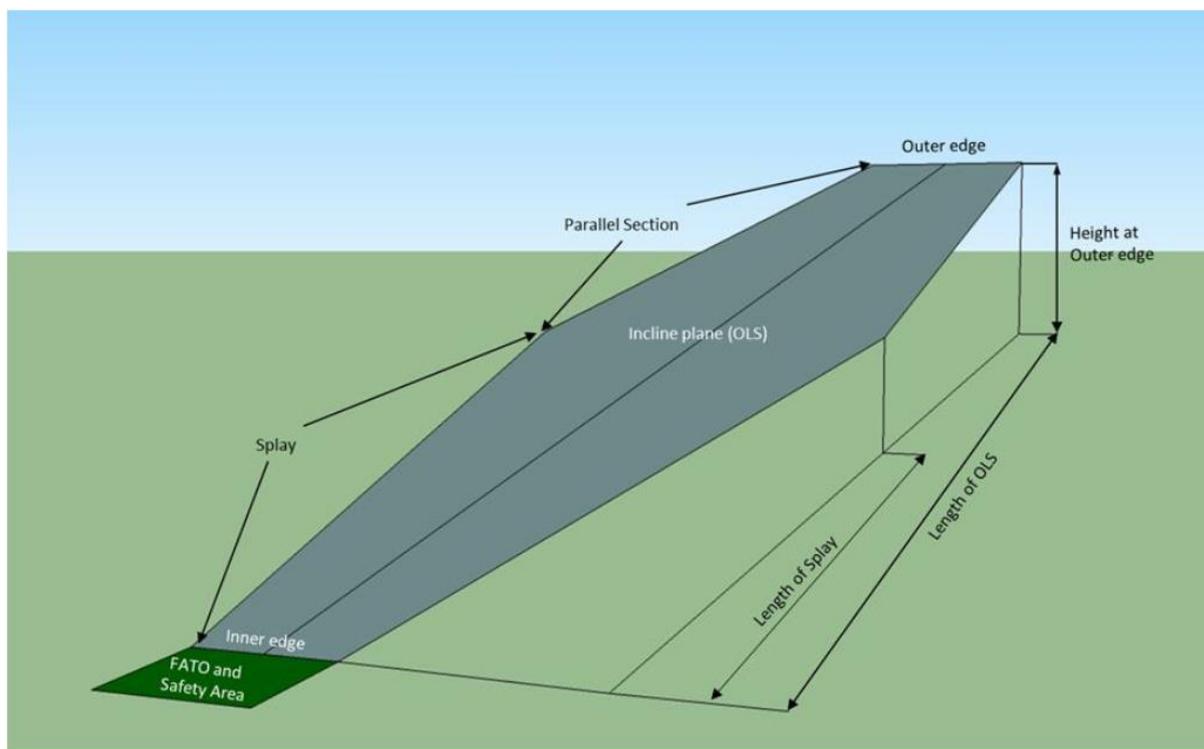


Figure 4: HLS VFR Approach and Departure Surfaces (1)

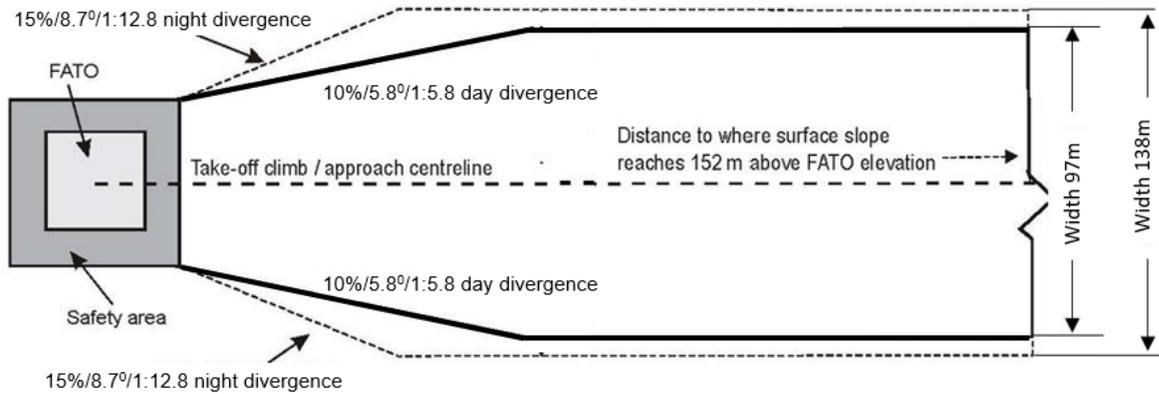


Figure 5: HLS VFR Approach and Departure Surfaces (2)

There are no transitional surfaces for VFR approach and departure paths.

3.11. Protected Side Slope

A VFR-only HLS is to be provided with at least one, and preferably two, protected side slopes, rising at 45° from the edge of the safety area and extending to a distance of 10m. See Figure 65 below. Due to the proximity of lift lobbies and other infrastructure, it is often difficult to provide the second protected side slope.

The surface of a protected side slope must not be penetrated by obstacles.

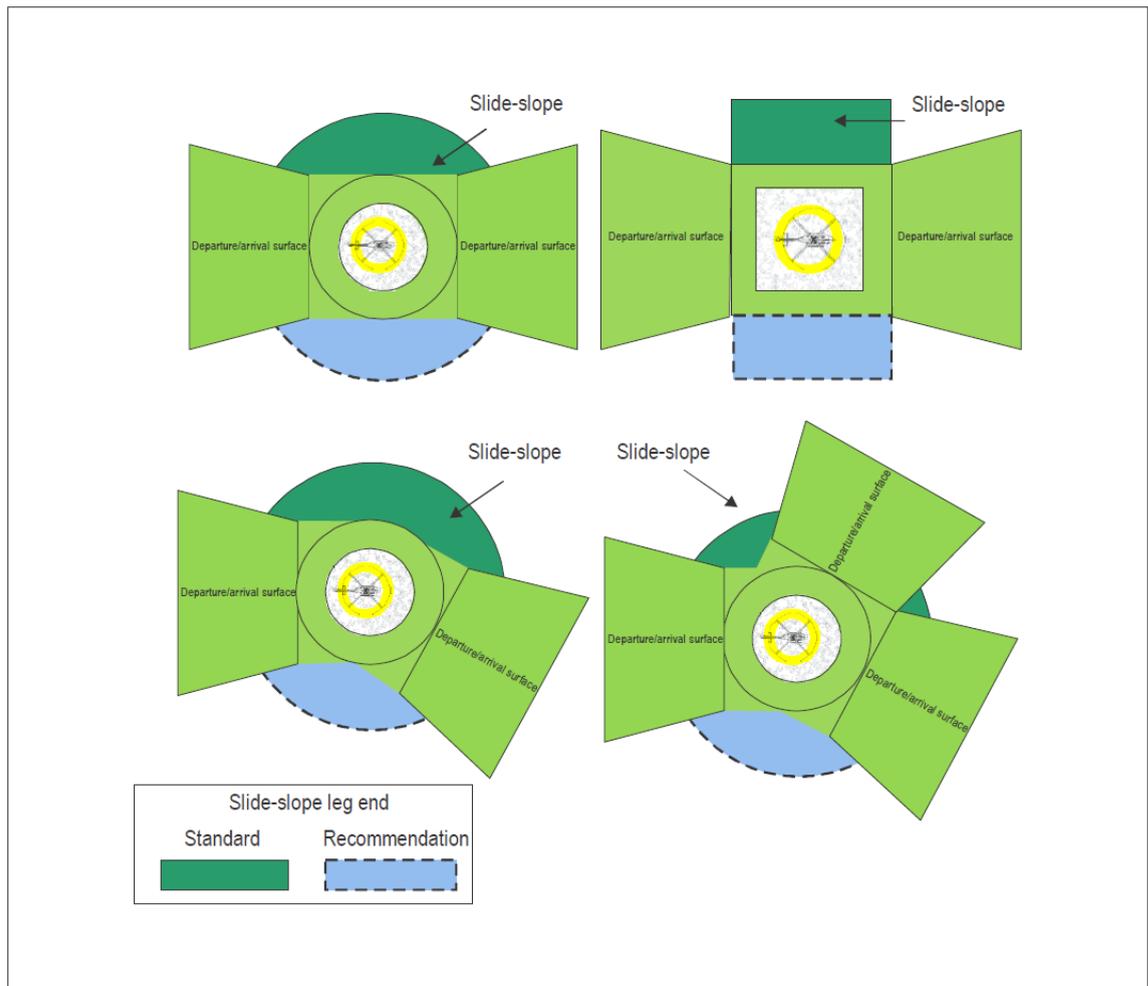


Figure 6: Protected Side Slopes

3.12. IFR Approach and Departure Paths

NSW has very few hospital HLS' with instrument approaches, however this can change at any time depending on needs and priorities. To that end, all NSW hospital HLS' should be surveyed so as to permit IFR operations, whether immediately or at some time in the future.

The IFR approach and departure surface, like the VFR approach and departure surface, commences at the safety area edge. They diverge uniformly to a width of 152m at 3,386m from the safety area edge (approximately 1:45).

The FATO transitional surfaces start from the edges of the FATO and safety area, parallel to the approach and departure path centre line, and extend outwards (from the sides of the FATO and safety area) at a slope of 1:2 (2 units horizontal in 1 unit vertical or 26.6°). They provide very similar protection at an IFR-capable HLS as the protected side slope does at a VFR-only HLS; but extend 45m above FATO level (rather than 10m). The approach and departure transitional surfaces commence at the forward edge of the safety area, overlaid over the approach and departure surface; and from the outer edges of the approach and departure surface. The outer sides are 76m from the centreline, i.e. the outer edges are 152m wide. The approach and departure transitional surfaces extend to the end of the approach and departure surface at 3,386m.

Note:

The transitional surface is not applied on the safety area edge opposite the Approach/Departure surface.

The approach and departure surface is to be free of penetrations. Any penetration of the transitional surface is to be considered a hazard.

Figure 7 illustrates the IFR Approach/Departure and Transitional surfaces.

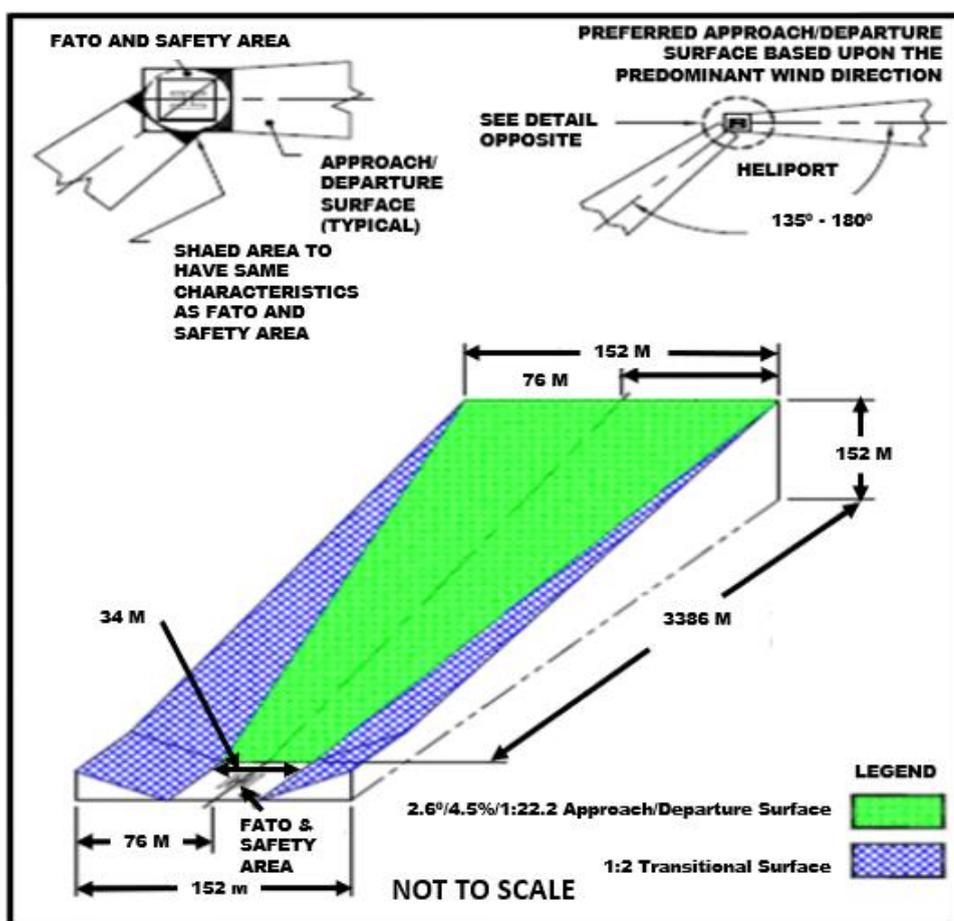


Figure 7: HLS IFR Approach/Departure and Transitional Surfaces

3.13. Visual Segment of a Point-in-Space Approach/Departure Procedure

ICAO Doc 9261 Heliport Manual, Part 2, Chapter 4, Section 4.2 addresses this highly specialised requirement. It will not apply at the majority of NSW hospitals.

3.14. Object Identification Surfaces (OIS)

Where possible, the Object Identification Surfaces (OIS) are to remain free of obstructions. However, at most hospital HLS, particularly at ground level, existing obstacles and infrastructure do not allow this. Clear OIS can normally only be accommodated at a “new” rural hospital “green field” location or on a roof top HLS which is high above the surroundings.

The object identification surfaces can be described as:

- Under the IFR approach and departure surface, the object identification surface starts from the outside edge of the FATO safety area and extends horizontally out for a distance of ~700m. From this point, the OIS extends out for an additional distance ~2,686m while rising on a 2.6° or 1:22.2 slope (22.2 units horizontal in 1 unit vertical). From the point ~700m from the FATO safety area perimeter, the OIS is ~30 m beneath the approach and departure surface.
- In all directions from the safety area, except under the approach/ departure paths, the OIS starts at the safety area perimeter and extends out horizontally for a distance of ~30m.
- The width of the OIS extends outwards as a function of distance from the edge of the safety area. From the safety area perimeter, the OIS diverges from each side of the IFR approach and departure path. At the outer end of the surface, the OIS extends laterally ~60 m from each side of the IFR approach and departure path. See [Figure 8](#).

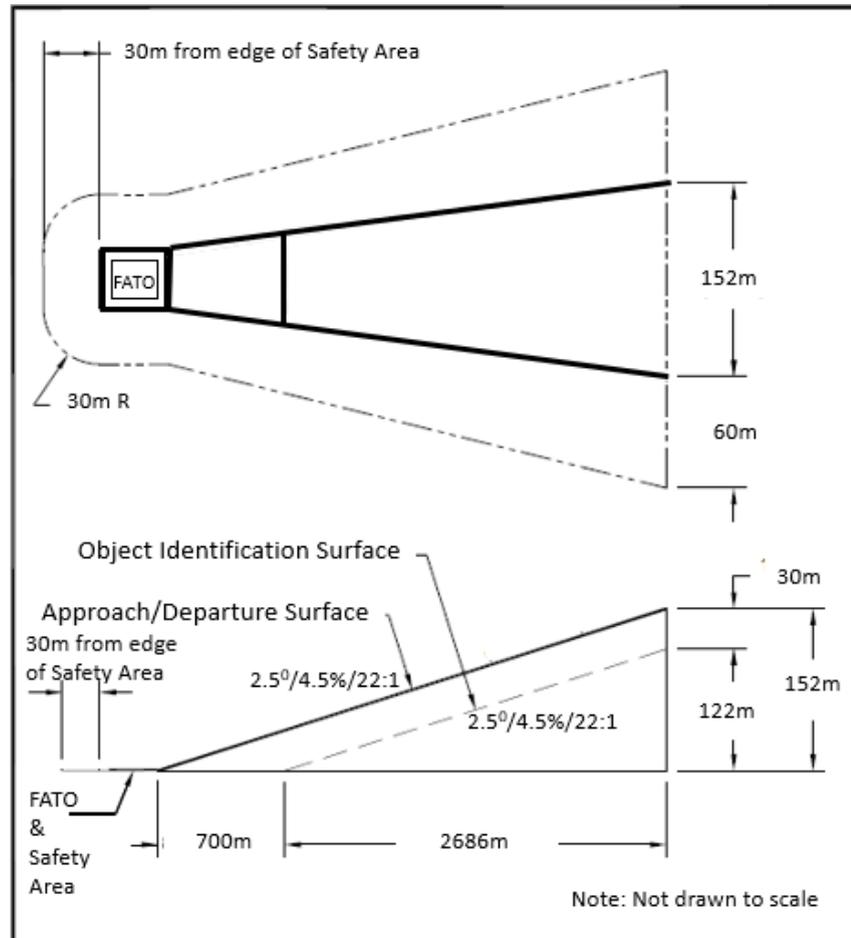


Figure 8: Object Identification Surfaces

3.15. Category A Backup Procedure

A Category A back-up procedure, i.e. without a lateral component, is one of the PC1 HLS profiles provided in RFMs along with the dimensions of the backup area. Category A The backup procedure is depicted in Figure 9 below.

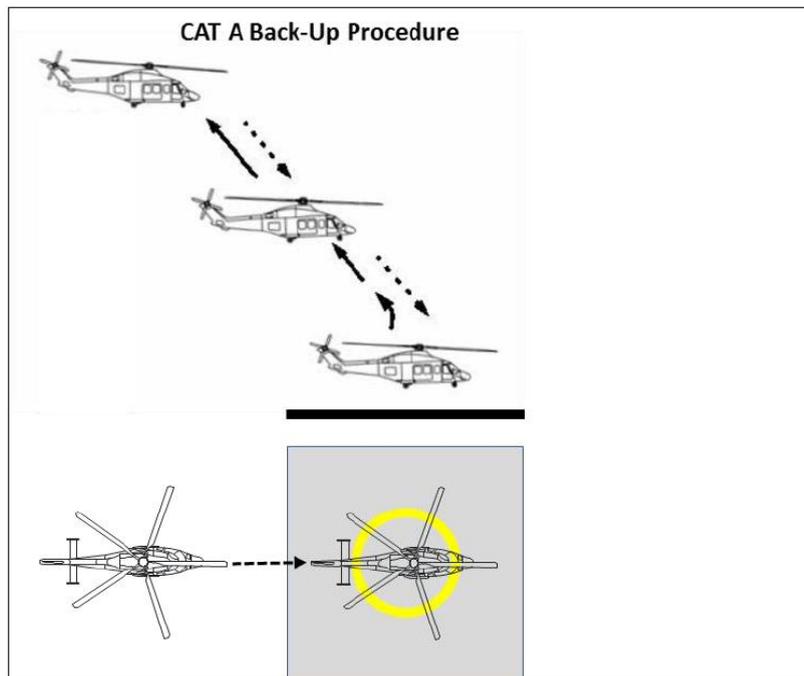


Figure 9: Category A Backup Procedure Profile

The back-up area should consist of two elements: an ascent/descent path/surface and an obstacle limitation surface. The dimensions of these are normally contained in tabular form in the Category A supplement of the RFM. For NSW hospitals which are to be both day and night capable, the splay is to be 15%. Where the backup area is coincident with a reciprocal VFR approach and departure surface, no additional airspace protection measures will be required. Where the back-up area does not overlay the VFR approach and departure surface, a specific ascent/descent path/surface and obstacle limitation surface will need to be surveyed. See Figure 10 below.

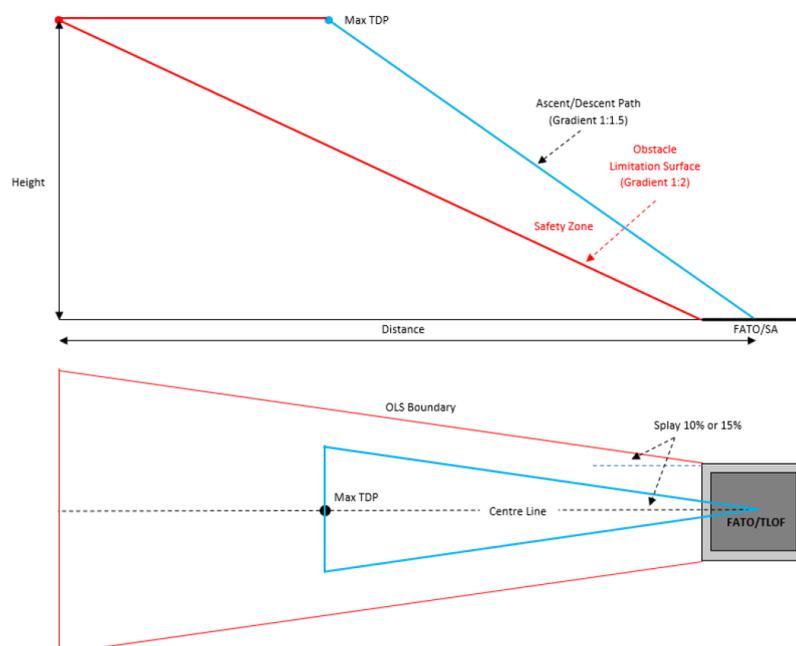


Figure 10: Category A Backup Procedure Surfaces

3.16. 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:

- Removing the object.
- Altering the object, e.g. reducing its height.
- 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 deck may include radio aeriels or exhaust stacks etc. attached to the main building, other buildings in the vicinity such as a lift lobby, or stand alone. All such obstacles are required to have red obstacle lights fitted.

3.17. Obstructions in close Proximity but Outside/Below the Approach/Departure Surface

Unmarked wires, antennas, poles, mobile phone 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 enroute operations by flying well above them, approaches and departures require operations near the ground where obstacles may be in close proximity. Where possible obstructions are to be moved, however if this is impractical, markings and/or obstruction lighting is to be placed upon them.

4. SPECIFIC MACARTHUR MEDICAL RESEARCH CENTRE CONSIDERATIONS

4.1. The Macarthur Medical Research Centre (MMRC) Location

The location of the lot of the proposed MMRC footprint is shown in [Figure 11](#) below. It is approximately 200m from the new Campbelltown Hospital HLS.

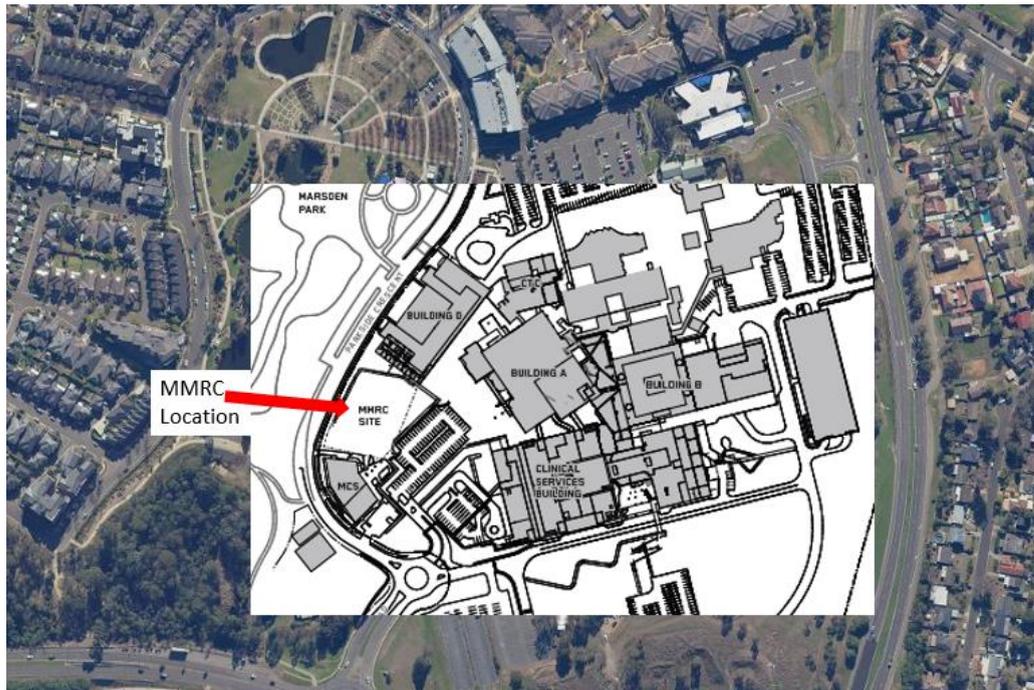


Figure 11: Location of the Proposed MMRC Building

4.2. The MMRC Elevation

The MMRC is planned to be built to 96.33 metres above sea level (RL 96.33) with additional elevation to a maximum of RL 99.03 for rooftop fixtures e.g. lift overrun and fire stairs; See [Figure 12](#) below:



Figure 12: Elevation of the MMRC

4.3. The Camden Aerodrome OLS Overlay

The Camden Aerodrome OLS is depicted in [Figure 13](#) below. The approximate location of the Campbelltown Hospital campus is also indicated.



Figure 13: Camden Aerodrome Obstacle Limitation Surfaces

4.4. The MMRC within the Camden Aerodrome OLS

The Campbelltown Hospital campus is not within the Camden Aerodrome OLS.

4.5. The Camden Aerodrome PANS-OPS Overlay

The Camden Aerodrome PANS-OPS is depicted in [Figure 14](#) below. The approximate location of the Campbelltown Hospital campus is also indicated.

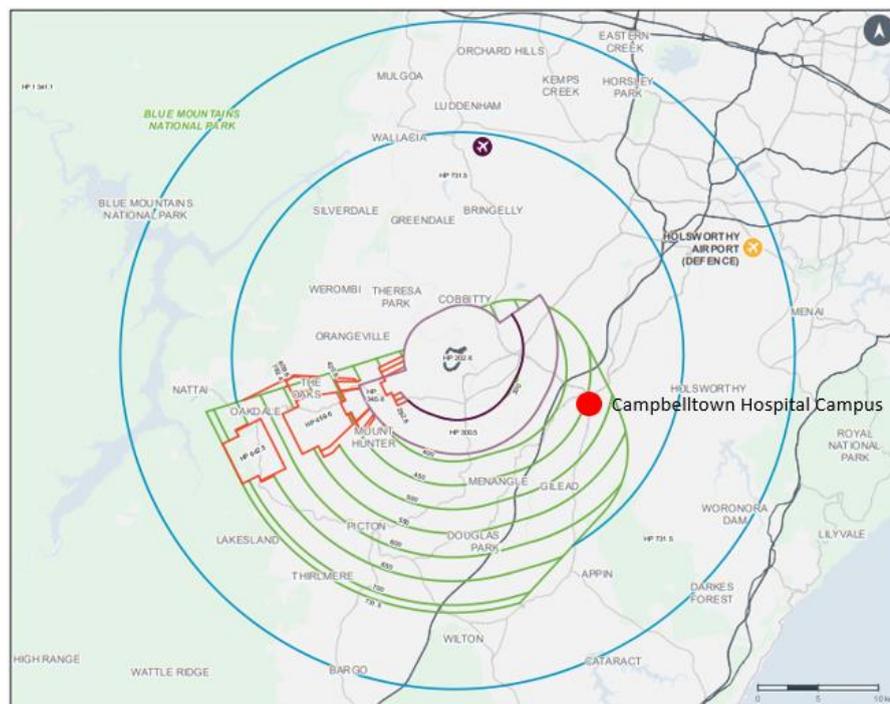


Figure 14: Camden Aerodrome PANS-OPS Surfaces

4.6. The MMRC within the Camden Aerodrome PANS-OPS Surfaces

Above the Campbelltown Hospital campus, the Camden Aerodrome PANS-OPS surface lower limit is over 450m above mean sea level (RL450 or 450 AHD). There will be no protrusion (including construction cranes).

4.7. The Sydney Aerodrome Radar Terrain Clearance Chart (RTCC) Overlay

The Sydney Aerodrome RTCC overlay is depicted in [Figure 15](#) below. The approximate location of the Campbelltown Hospital campus is also indicated.

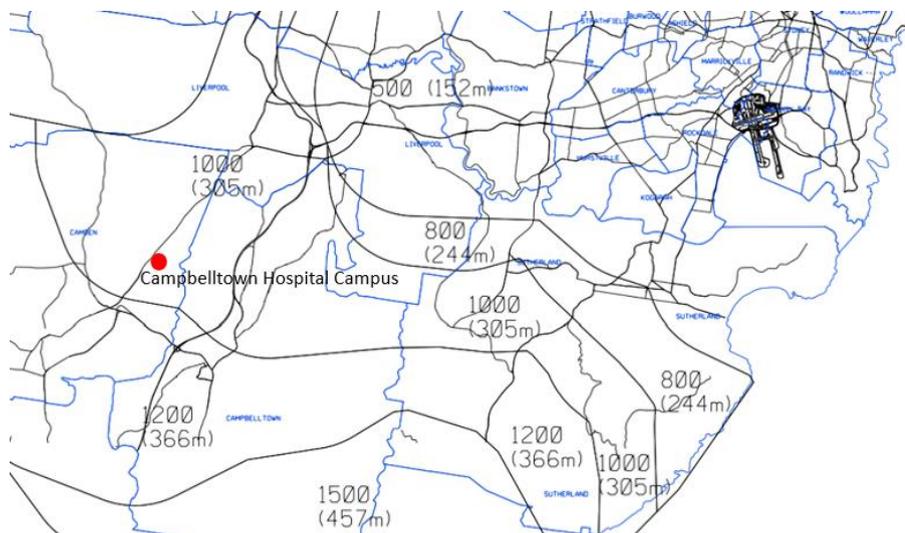


Figure 15: The MMRC within the Sydney RTCC

4.8. The MMRC within the Sydney Aerodrome RTCC

At its current height, the development (including construction cranes) will be well below the RTCC lower level for the area of 305m AHD.

4.9. MMRC Impacts on Camden Aerodrome OLS and PANS-OPS and Sydney Aerodrome RTCC

The development (and any associated construction cranes), will not protrude into the relevant OLS, PANS-OPS or RTCC surfaces.

4.10. Location of the MMRC in Relation to the Campbelltown Hospital HLS

The location of the MMRC in relation to the Campbelltown Hospital HLS is shown in [Figure 16](#) below:

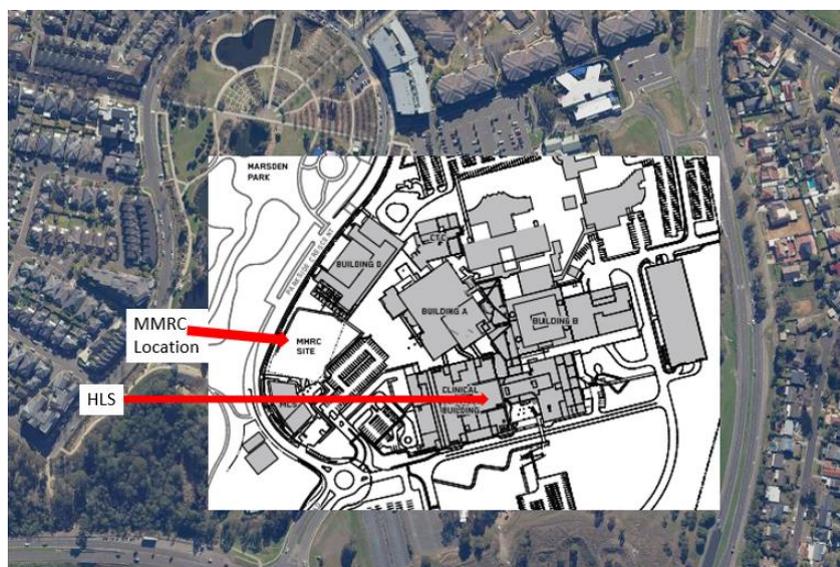


Figure 16: The MMRC in relation to the Campbelltown Hospital HLS

4.11. Elevation of the Campbelltown Hospital HLS

The elevation of the Campbelltown Hospital HLS is 135.5 metres AHD as shown in Figure 17 below. The proposed elevation of the MMRC at RL99.03 will be approximately 36.5 metres lower than the Campbelltown Hospital HLS.

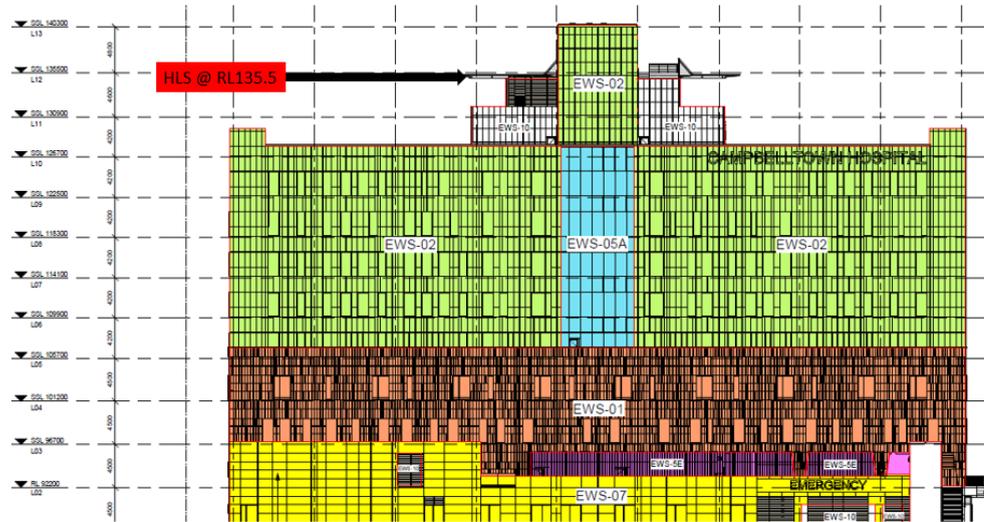


Figure 17: Elevation of the Campbelltown Hospital HLS

4.12. Campbelltown Hospital HLS Approach and Departure paths

The Campbelltown Hospital HLS approach and departure paths are shown in Figure 18 below.

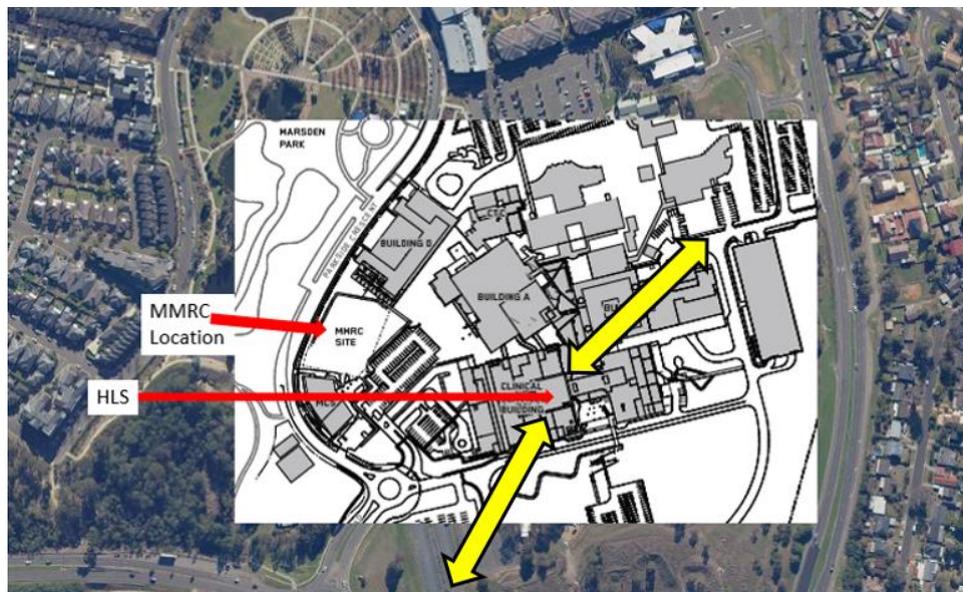


Figure 18: Campbelltown Hospital HLS Approach and Departure Paths

4.13. Impact of the MMRC on the Campbelltown Hospital HLS Approach and Departure paths

The approach and departure paths for the new Campbelltown Hospital HLS will not be impacted by the position of the MMRC. There is approximately 36.5m difference in elevation between the HLS and the MMRC. This will comfortably accommodate any type of tower crane (hammerhead or luffing) without going above HLS elevation and potentially impacting aviation safety.

4.14. Construction Crane Considerations

Although any construction crane(s) will be below the elevation of the HLS, the Guidelines require such cranes to be lit when “in the vicinity” of a Hospital HLS. The illumination requirements for cranes in the vicinity of a Hospital HLS are detailed below.

As a minimum for all tower cranes:

- top of crane A frame or cabin: medium intensity flashing red obstruction light.
- both ends of Jib: medium intensity flashing red obstruction light
- along Jib: line of white LED fluoro on a PE cell along the full length of the jib, and
- tower section: stairway lights or spot lights attached to the top of the tower pointing down and onto the tower (not up into pilot eyes).

As a minimum for all luffing cranes:

- top of crane A-frame or cabin: medium intensity red obstruction light
- end of Jib: medium intensity red obstruction light
- along Jib: line of white LED fluoro on a PE cell along the full length of the jib
- tower section: stairway lights or spot lights attached to the top of the tower pointing down and onto the tower (not up into pilot eyes)

The LED jib fluoro lights are to be LED weather proof emergency fluoros controlled via a PE cell with a minimum 90 minute battery back-up.

4.15. Deductions: Airspace, Cranes, Obstructions and HLS

The following key deductions can be made:

- The MMRC, once constructed, will not protrude into the Camden Aerodrome PANS-OPS surfaces.
- The MMRC, once constructed, will not protrude into the Camden Aerodrome OLS.
- The MMRC, once constructed, will not protrude into the Sydney RTCC.
- The MMRC, once constructed, will not impact the Campbelltown Hospital HLS approach and departure paths.
- The MMRC construction crane(s) will not protrude into the Camden Aerodrome PANS-OPS surfaces.
- The MMRC construction crane(s) will not protrude into the Camden Aerodrome OLS.
- The MMRC construction crane(s) will not protrude into the Sydney RTCC.
- The MMRC construction crane(s) will not protrude into the Campbelltown Hospital HLS approach and departure paths.
- The MMRC construction crane(s) will require aviation-standard obstacle lighting.

4.16. Conclusion

The MMRC, including its construction cranes, will not impact aviation safety in relation to either Camden Aerodrome or the new Campbelltown Hospital HLS.

No specific approvals will be required, however appropriate aviation standard lighting will be necessary on construction cranes.