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NEPEAN HOSPITAL REDEVELOPMENT (NHR) STAGE 2 STATE SIGNIFICANT DEVELOPMENT (SSD) REPORT (AVIATION IMPACT STATEMENT)

15 August 2021	**AVIATION IMPACT STATEMENT**
Prepared for	NSW Health Infrastructure

Version 1.3

AviPro

Document Verification
Page 1 of 1

Job title: Nepean Hospital Redevelopment

Document title: Aviation State Significant Development Report – NHR Stage 2

Document ref: NHR Stage 2 SSD V1.3

Revision	Date	File name			
V1.0 DRAFT	15.08.21	Description	Initial DRAFT Aviation SSD Report – NHR Stage 2		
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V1.1 Draft	30.08.21	Description	Amended acoustic text (para 5.4), ANEF information.		
			Prepared by	**Checked by**	**Approved by**
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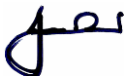
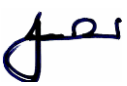
		Signature			
V1.2 Draft	31.08.21	Description	ANEF information (paras 3.1.4 and 5.5)		
			Prepared by	**Checked by**	**Approved by**
		Name			
		Signature			
V1.3	02.09.21	Description	Final.		
			Prepared by	**Checked by**	**Approved by**
		Name	S. Graham	J. Murray	S. Graham
		Signature			

This Report is prepared for NSW Health Infrastructure through CBRE for the Nepean Hospital Redevelopment Stage 2 by Resolution Response Pty. Ltd. ABN: 94 154 052 883, trading as 'AviPro'.

The Report relates to the aviation aspects associated with the site design of the proposed hospital and impact on the new rooftop heliport to inform consideration a Development Application.

Contents

1. DESCRIPTION OF THE PROPOSAL

1.1. Overview

The NSW Government provided pre-planning funds for a number of Hospital redevelopments across the state in the NSW Budget 2018/19, the Nepean Hospital Redevelopment NHR Stage 2 Project was one of these.

The NHR Stage 2 will deliver updated and enhanced facilities providing additional capacity to meet the demand of the Greater Western Sydney, Blue Mountains and Western Plains Regions. The NHR Stage 2 program provides significant enhanced acute services, as well as a new Campus Main Entry and drop-off spaces in a total transformation of the current Nepean Hospital Campus.

1.2. Subject Site

The Nepean Hospital Campus is located south east of the intersection of the Great Western Highway and Parker Street, Kingswood.

1.3. Functional Design Brief documentation for Stage 2

Functional Design Brief documentation for Stage 2 has been developed in a number of Tranches as outlined below.

Tranche 1 (September – December 2019:

- Front of House;
- Transit Lounge;
- Education and Training Services;
- Interventional Radiology;
- Cardiac Catheter Laboratories and Coronary Care Unit;
- Combined Echocardiography; and
- Intensive Care Unit.

Tranche 2 (April – July 2020):

- Paediatric Inpatient Unit and Ambulatory Care;
- Renal Inpatient Unit and Incentre Haemodialysis; and
- Intensive Care Unit Addendum (updated to reflect Ministry of Health recommendation).

Tranche 3 (June – August 2020):

- Pathology;
- Pharmacy; and
- Medical Imaging.

2. TERMS AND ABBREVIATIONS

2.1. Explanation of Terms

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

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 recommendations now has the VFR approach/departure path extending outwards from the edge of the FATO with an obstacle free gradient of 2.5º or 4.5% or 1:22 vertical to horizontal, measured from the edge of the forward edge of the FATO, to a height initially of 500 feet above the FATO at a distance of ~3,500 m. The flight path commences at the forward edge of the FATO at a width of 25 m., and increases in width uniformly to 150 m. at a distance of 3,500 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.

Design Helicopter. The Agusta AW139 contracted to the NSW Ambulance. The type reflects the new generation Performance Class 1 capable helicopters used in HEMS and reflects the maximum weight and maximum contact load/minimum contact area.

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 2.5 m. 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 Length Overall of the Design Helicopter is used and equates to 25 m. diameter. Area to be load bearing.

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.

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 multiple 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.

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.

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.

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.

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

Transitional Surfaces. Starts from the edges of the FATO parallel to the flight path centre line, and extends outwards (to the sides) at a slope of 2:1 (two-units horizontal in one-unit vertical or 26.6°) from the outer edges of approach/departure surface. The outer sides are 75 m. from the centreline, i.e. the outer edges are 150 m. wide. The transitional surfaces start at the forward edge of the FATO, overlaid over the approach/departure path (surfaces) and extend to the end of the approach/departure surface at 3,500 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 lit obstruction whose highest point is at the same or higher elevation.

2.2. Applicable Abbreviations

Acronym	Meaning
AC	Advisory Circular (US FAA)
ACC	Aeromedical Control Centre (HQ Eveleigh). Responsible for control and tasking of HEMS
ACMA	Australian Communication and Media Authority
ADF	Australian Defence Force
ADS-B	Automated Dependent Surveillance - Broadcast
AsA	Airservices Australia
ASB	Acute Services Building
A-SMGCS	Advanced Surface Movement Guidance & Control System
ATC	Air Traffic Control
BVN	Bligh Voller Nield (Architects)
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
DA	Development Application
DDO	Design and Development Overlay
DPIE	Department of Planning, Industry and Environment (NSW)
FAA	Federal Aviation Administration, USA
FATO	Final Approach and Take-Off Area (1.5 x helicopter length)
HEMS	Helicopter Emergency Medical Service
HI	Health Infrastructure
HLS	Helicopter Landing Site
HLSRO	HLS Reporting Officer (Airservices Australia requirement)
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions – requiring IFR flight
LGA	Local Government Area
LLA	Landing and Lift Off Area. Solid surface meeting dynamic loading requirements, with undercarriage contact points + I metre in all directions
MoH	Ministry of Health NSW
NOTAM	Notice to Airmen. Issued by Airservices Australia in relation to airspace and navigation warnings
NHR	Nepean Hospital Redevelopment
NVG	Night Vision Goggle(s)
OIS	Object Identification Surface(s) (Heliport/HLS)
OLS	Obstacle Limitation Surface(s) (Aerodrome)

Acronym	Meaning
PRM	Precision Runway Monitoring
RAAF	Royal Australian Air Force
RTCC	Radar Terrain Clearance Chart
SARPS	Standards and Recommended Practices developed by ICAO and promulgated in the Annexes to the Convention of International Civil Aviation
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
SSDA	State Significant Development Application
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

3. SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

3.1. Aviation and Airspace Requirements (Aviation Impact Statement)

This Section provides a list of SEARs requirements specific to the NHR Stage 2 work.

Item	Requirement or Key aviation airspace issue	Relevant Report Section
Aviation		
Provide a report prepared by a suitably qualified Aviation expert:		
1.	Providing details of any flight paths that may be impacted by the proposed development	See Sections 5.1 and Figure 2.
2.	Providing details of impact of the proposed development on Aviation and Airspace protection considering the Obstacle Limitation Surface (OLS) for nearby airports.	See Section 5 and Figures 4 and 5
3.	Identifying and assessing the potential impacts of the future development on the aviation operations of any nearby airports and affected flight paths of any existing onshore Helicopter Landing Site (HLS) in accordance with the relevant sections of the National Airports Safeguarding Framework (NASF).	See Sections 5.3 and Figure 6
4.	Identifying whether the proposal is located within any of the following Australian Noise Exposure Forecast (ANEF) contours as specified in Table 2.1 of Australian Standard 2021:2015 Acoustics - Aircraft noise intrusion - Building siting and construction (AS 2021:2015): <20, Between 20-25, or >25.	See section 5.5 and Figures 7 and 8.
	Relevant Policies and Guidelines: National Airports Safeguarding Framework and associated guidelines	

Table 1: Secretary's Environmental Assessment Requirements - Aviation

4. SSD GENERAL REQUIREMENTS – AVIATION REGULATION

4.1. Regulatory Review

The NHR Stage 2 project is located outside all major airport airspace areas. It is therefore not considered to be within "prescribed airspace" as defined in the Airports (Protection of Airspace) Regulations 1996. Further, there is no specific requirement in the Penrith Local Environment Plan 2010 (version 23 July 2021) to consider airspace protection. Specifically, Part 7 Additional Local Provisions referencing 'development of land in the flight paths of the proposed Second Sydney Airport'. The NHR Stage 2 site is outside and below any planned flight path airspace for this Airport and also RAAF Richmond.

The positioning and proposed development will not incur any negative air traffic or protected airspace factors or considerations. There are no constraints imposed by prescribed airspace associated with airports or airport instrument approach and standard departure profiles. As a consequence, the development of the Stage 2 building, and in particular vertical obstructions such as cranes, can be addressed from a "safety to flight" requirement for helicopters operating into/from the NHR Stage 1 Tower Acute Services Building (ASB) and aircraft transiting in the vicinity.

4.2. Civil Aviation Safety Authority (CASA)

CASA has not yet been engaged by the Department of Planning, Industry and Environment (DPIE) in relation to the NHR Stage 2 development nor is it expected that they would, given the Stage 2 building is shielded by the Stage 1 (ASB).

4.3. AirServices Australia (AsA)/Western Sydney Aerotropolis/RAAF Richmond

AsA, Western Sydney Aerotropolis and RAAF Richmond will not need to be consulted in relation to the NHR Stage 2 development.

4.4. Standards applied to HLS development for NSW Health

The following documents provide excellent advisory material, guidelines and best practice standards and led to the development of the NSW Ministry of Health (MoH) policy document GL2020_014 Guidelines for NSW Hospital HLS of 1 July 2020.

Key current reference documents are as follows:

- ICAO Annex 14, Vol II, Heliports;
- US FAA Advisory Circular AC 150/5390-2C, Heliport Design, (covers both operational and design criteria, particularly for hospital-based HLS' in Chapter 4, Hospital Heliports);
- Australian Civil Aviation Safety Authority (CASA) Civil Aviation Advisory Publication (CAAP) 92-2 (2) Guidelines for the Establishment and Operation of Onshore Helicopter Landing Sites. (covers essentially operational specifications only and is produced around European commercial helicopter airport-based operations);
- National Airports Safeguarding Framework Guideline H – Protecting Strategically Important Helicopter Landing Sites, and
- NSW Health GL2020_014 Guidelines for NSW Hospital HLS of 1 July 2020.

The Guidelines GL2020_014 document was prepared primarily around the ICAO and FAA guidelines and standards, utilising the most appropriate recommendations and practical HEMS operating procedures. The Guidelines are the standards used by NSW Health and are therefore used as primary source material in this report when considering flight path obstructions and other considerations concerning the continued operations to/from the Nepean ASB HLS.

5. SSD GENERAL REQUIREMENTS – HLS IMPACTS AND OPERATIONS

5.1. HLS Approach and Departure Path Considerations

Primary considerations in selection of HLS approach and departure paths include:

- Direction of prevailing winds,
- Location of established Nepean ASB HLS flight paths,
- Airspace restrictions and limitations,
- Avoidance of areas sensitive to noise and vibration, and

5.1.1. Wind

The Bureau of Meteorology has a weather station approximately 10 km North-West of the NHR Stage 2 site at Penrith Lakes. Annualised average wind readings taken since 1942 show that average annual predominant winds in the area are from the South/South-West in the mornings and West/North-West in the afternoons. Refer to Figure 1 below. This data was a primary driver for the design of the ASB HLS flight paths. This information is relevant during planning to account for any obstructions along the paths.

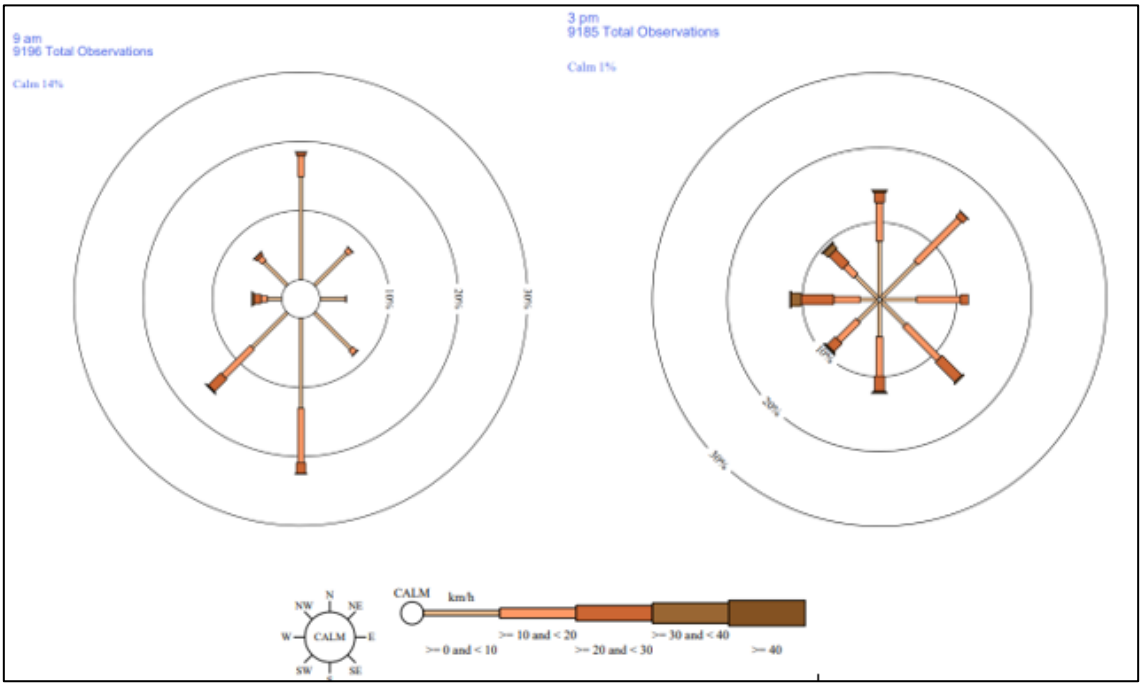


Figure 1: Penrith Lakes Wind Rose – Annual Average (Image BOM)

5.1.2. Details of Nepean ASB Preferred Approach and Departure Path Directions

The wind assessment from the Wind Roses at Figure 1 together with the layout of major roadways informed the development of the flight path directions.

Figure 2 illustrates the established approach and departure paths to the NHR Stage 1 (ASB) HLS.

The ASB HLS surveyed approach/departure path directions are illustrated in yellow (Figure 2). These directions are:

North: 167°41'03"/347°41'03" respectively

South: 347°41'03"/167°41'03" respectively

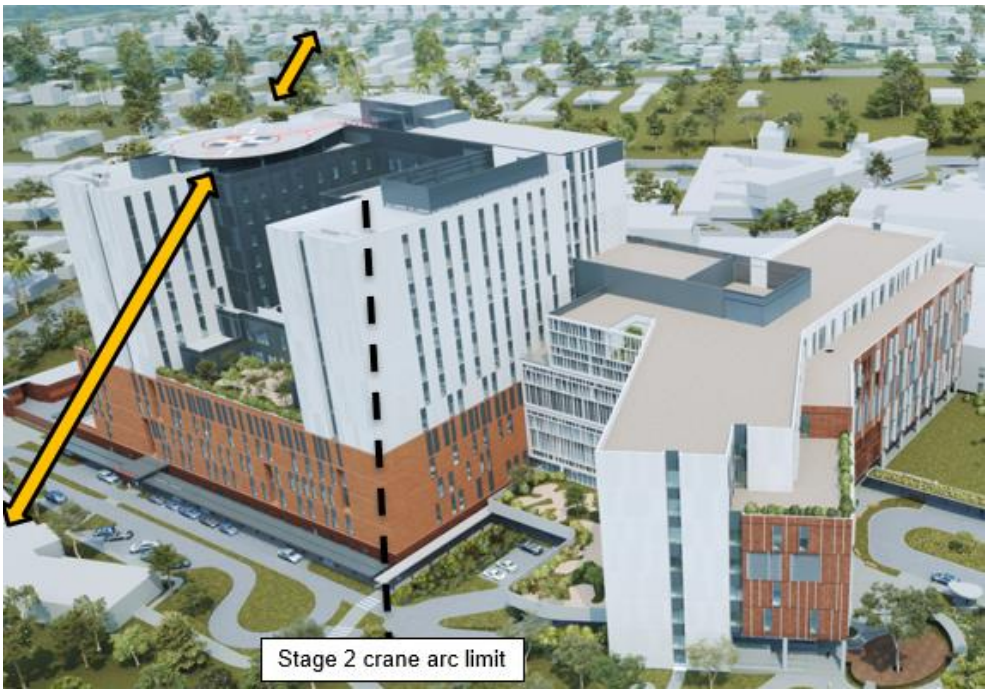


Figure 2: Approach and Departure Path Illustration at the NHR Stage 1 ASB HLS (Image BVN)

The planned flight path direction is clear of the proposed Stage 2 development and as can be seen, the Stage 2 development is well below the actual HLS height. The Stage 2 development, when built, will not impact access to/from the Stage 1 ASB HLS. Cranes associated with the Stage 2 development will still allow the access to the ASB HLS as long as the arc does not cross the dashed line illustrated in Figure 2.

5.2. Aviation and Airspace Protection

The airspace over the site has been reviewed for compliance with obstacle limitation surfaces (OLS) and Procedures for Air Navigation Services – Aircraft Operations (PANS OPS). Relevant authorities are almost certain to advise, in relation to the development, that site structures and cranes WILL NOT penetrate the OLS or the PANS OPS lower limit for the Nancy Bird Walton Western Sydney Aerotropolis or RAAF Base Richmond.

The development of the Western Sydney Aerotropolis is well advanced. Figure 3 provides an indication of the flight path studies currently being conducted. The runway directions are 050/230 degrees magnetic and oriented in a way that will not be impacted by the development of NHR Stage 2.

The exact details of this and any associated flight paths are far from being completed. Recent contact with Air Services operations management supports the following extract from the Department of Infrastructure, Cities and Regional Development website on the Western Sydney Aerotropolis.

> The flight paths for Western Sydney Airport are currently being developed.
>
> Airspace design in Australia generally starts with developing proof-of-concept flight paths. This first step was completed for Western Sydney Airport through developing indicative flight paths for the Environmental Impact Statement. These flight paths showed that Western Sydney Airport could operate safely and efficiently in the Sydney basin.
>
> Detailed work to begin planning for the flight paths design started in 2017 and will be finalised in 2024. Before flight paths are finalised, the proposed design will be open for public consultation as part of the environmental assessment. This is expected to take place around 2021.

Figure 3: Flight path status extract from DIRD Sydney Airport site

The proximity of the NHR Stage 2 site to the Aerotropolis and RAAF Richmond for flight operations consideration is best illustrated in Figure 4. There will be no impact on the development and operations of the Aerotropolis or RAAF Richmond caused by the building of the NHR Stage 2.

Figure 4: Nepean Campus and the Aerotropolis and RAAF Richmond Airport sites (Image Aust Govt Plan)

Due to the predominantly south-west/north-east orientation of the Aerotropolis runway alignment, the Obstacle Limitation Surfaces (OLS) associated with the Airport at RL 230.5, will not be impacted by the NHR Stage 2 development or any cranes associated with the construction. Figure 5 below.

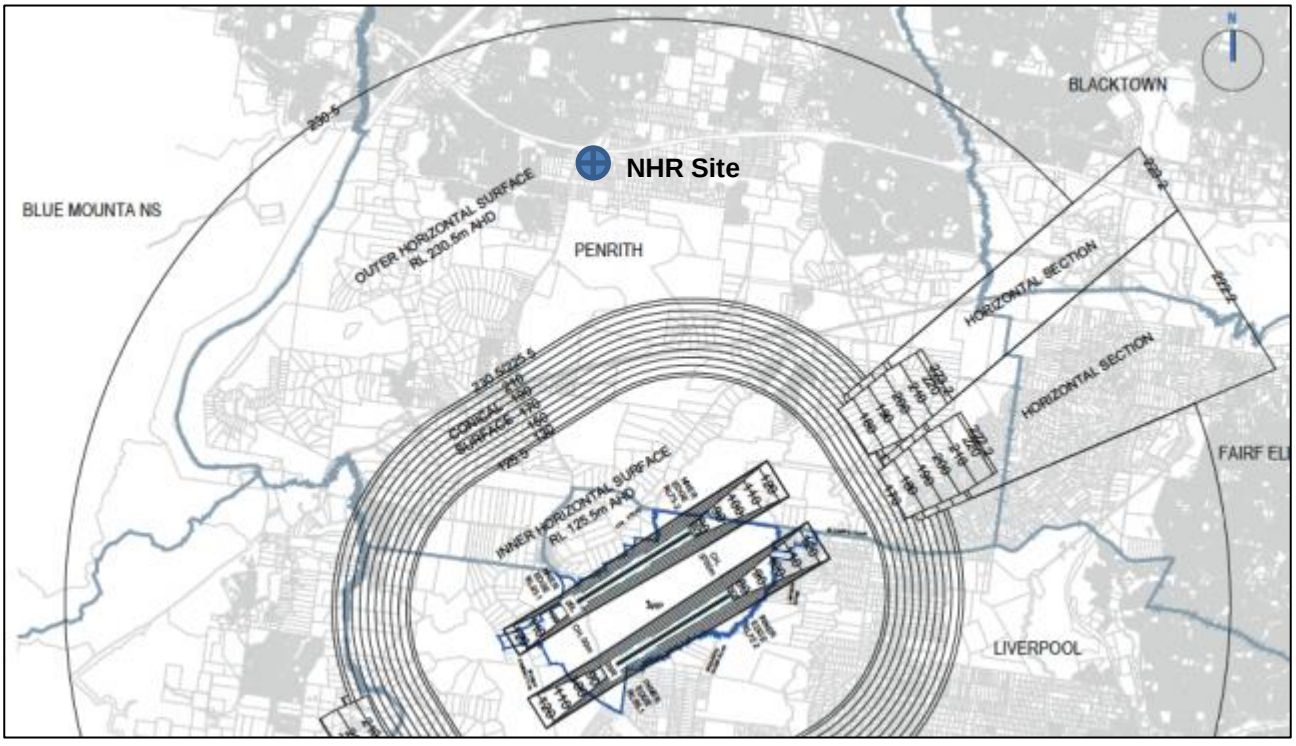


Figure 5: Nepean Campus and the Aerotropolis and RAAF Richmond Airport sites (Image Aust Govt Plan)

As stated, flight paths, including instrument approach procedures, are far from complete.

Until further detail is presented in the form of any restrictions that the Aerotropolis may have on airspace, it is reasonable to conclude that the highest level of air traffic control, as it exists in and around Sydney Mascot Airport, may apply to the Nepean site however this will not impact the construction of operation of NHR Stage 2.

5.3. Impact of Stage 2 development on Nepean ASB HLS Operations

The likely impact on the new Stage 1 ASB heliport, caused by tower cranes associated with the Stage 2 developments on the campus, is minimal to nil.

The Stage 2 structure is shielded below the ASB and as such the building will not impact the operations to/from the Nepean Campus ASB HLS.

Cranes associated with the Stage 2 development would need to remain clear of the approved flight path of the ASB HLS as illustrated below in Figure 6.

Figure 6: Crane arc limits for continued HLS operations (Image BVN)

As there is an existing HLS in immediate proximity to the Stage 2 development, there is a need to manage crane-helicopter interfaces during construction. It is important that any cranes be appropriately illuminated, even though it does not infringe the helicopter flight paths.

The requirements of the National Airports Safeguarding Framework Guideline H – Protecting Strategically Important Helicopter Landing Sites are applicable in this regard.

Certainty over this point cannot be established because the exact locations of any future additional developments; and the exact location(s), height(s) and jib length(s) of any associated crane(s) are not known.

5.4. Noise and Vibration

Noise and vibration impact on Stage 2 of the Nepean Hospital Redevelopment from the use of the HLS is outside the scope of this report and is addressed in the *EMM 2021, Nepean Hospital Stage 2 – Noise and Vibration Impact Assessment.*

5.5. Acoustic

The ANEF footprint for the two nearest airports (RAAF Richmond and the Western Sydney Aerotropolis) are depicted below. Figure 7 (RAAF Richmond) illustrates the 20 shows the ANEF 20 contour as the dashed blue line. This contour is 18.4km north of the NHR Stage 2 Development and the development is not within an ANEF noise contour.

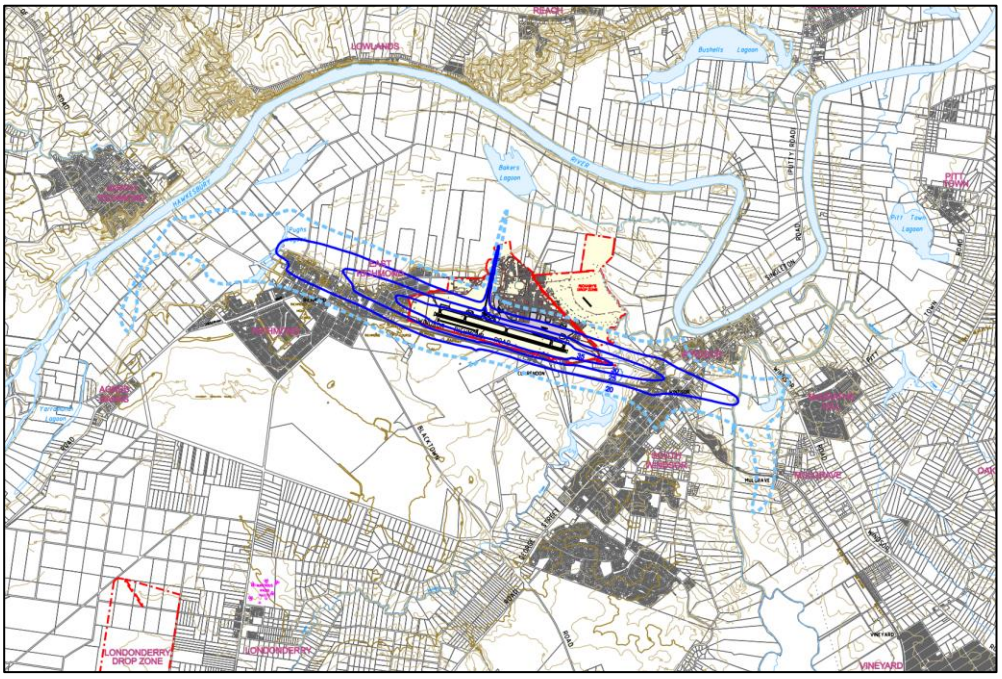


Figure 7: ANEF Contours – RAAF Richmond Runway

Figure 8 (Western Sydney Aerotropolis) represents the Australian Noise Exposure Concept (ANEC) Anticipated forecasts of future noise exposure patterns based on indicative flight paths around an airport that constitute the contours. The ANEF cannot be fully concluded given the early development stage of the Aerotropolis. The Aerotropolis is approximately 10km south of the NHR project and the grey shading represents ANEC of 20-25. The NHR development is not within any noise contours.

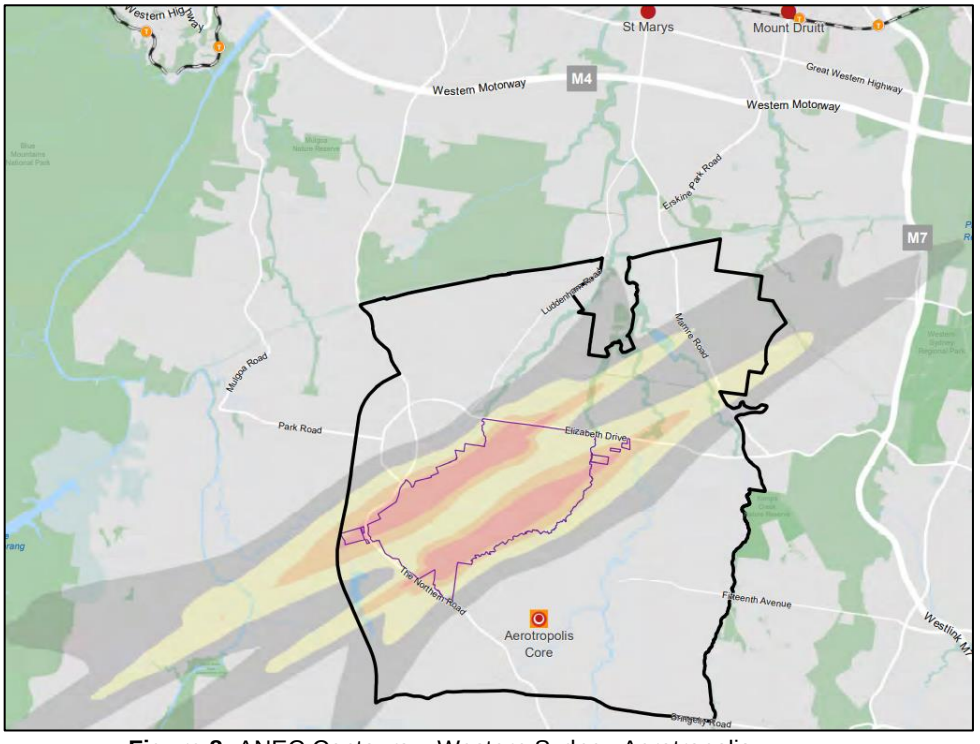


Figure 8: ANEC Contours – Western Sydney Aerotropolis

6. SSD RELEVANT CONSIDERATIONS

6.1. Consideration: Statutory and Strategic Context

Permissibility. No impediments to approval are anticipated.

HLS Development Standards. As the Stage 2 does not have an HLS, Development Standards from an aviation perspective do not apply.

6.2. Consideration: Policies

NSW Health Policy. The heliport will meet the compliance requirements of NSW Health GL2020_014 Guidelines for NSW Hospital HLS. Whilst the Guidelines do not restrict flight over adjacent buildings, it is common practice in approach and departure path design to avoid such situations. This is the case for the Nepean Campus.

6.3. Consideration: Environmental Amenity

Ecological Impacts. There are no known areas of environmental or ecological significance for this site from an aviation perspective.

6.4. Consideration: Noise and Vibration

Noise. Noise and vibration impact on Stage 2 of the Nepean Hospital Redevelopment from the use of the HLS is outside the scope of this report and is addressed in the EMM 2021, Nepean Hospital Stage 2 – Noise and Vibration Impact Assessment.

The typical helicopter “noise” event includes the following components:

Helicopter arrival:

- 1-minute approach and land, and
- 2 minutes engine idle (then shutdown).

Helicopter departure:

- 1-minute start-up,
- 1-minute hover and backup, and
- 1-minute departure.

Total elapsed noise event is approximately 6 minutes.

6.5. Consideration: Management of Cranage during construction

As there is an existing HLS in immediate proximity to the Stage 2 development, there is a need to manage crane-helicopter interfaces during construction. It is important that a crane be lit, even though it does not infringe the helicopter flight paths. The requirements of the National Airports Safeguarding Framework Guideline H – Protecting Strategically Important Helicopter Landing Sites are applicable in this regard.

7. CONCLUSION AND SUMMARY

7.1. Conclusion

The Stage 2 building as currently designed, will not impact the access to/from the Nepean ASB HLS. The building and cranes will not impact the prescribed airspace OLS and will be shielded by the Stage 1 tower.

Aviation safety will not be compromised by the NHR Stage 2 project.

7.2. Summary

From an SSD perspective, in summary:

- The established approach and departure paths will not be impacted by the Stage 2 building or the crane strategy associated with the development.
- The Stage 2 structure and associated cranes used for construction will not infringe prescribed airspace OLS of the Western Sydney Aerotropolis or RAAF Base Richmond; will not impact on any aviation communications, navigation and surveillance infrastructure; and will not impinge upon helicopter operations to and from the existing ASB HLS.
- The Stage 2 structure and associated cranes used for construction will not impact aviation operations of any nearby airports (Aerotropolis and RAAF Richmond) and affected flight paths of the existing ASB HLS in accordance with the relevant sections of the National Airports Safeguarding Framework (NASF).
- The NHR Stage 2 development is not located within the ANEF/C noise contours of the nearby airports (Aerotropolis and RAAF Richmond).