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On behalf of

AVIATION STATE SIGNIFICANT DEVELOPMENT REPORT: HORNSBY-KU-RING-GAI HOSPITAL (HKH)

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6 February 2020

AVIATION STATE SIGNIFICANT DEVELOPMENT REPORT:

HORNSBY KU-RING-GAI HOSPITAL SSD-8647

References:

A. Development Consent – SSD 8647 dated 30 May 2018
B. Consolidated consent – Schedule 1 SSD-8647-Mod 2 dated 25 Jul 2019
C. Airports (Protection of Airspace) Regulations 1996
D. https://www.sydneyairport.com.au/corporate/planning-and-projects/airspace-protection-tile
E. NSW Health Policy GL2018_010 Guidelines for NSW Hospital HLS
F. Cumberland Ecology Flora and Fauna Report No 19040RP1 dated 9 April 2019
G. National Airports Safeguarding Framework Guideline H – Protecting Strategically Important Helicopter Landing Sites

INTRODUCTION

Background

On 25 July 2019 the Department of Planning, Industry and Environment (DPIE) granted consent to a modification of Reference A to enable construction of a rooftop Helicopter Landing Site (HLS) above Stage 2 - New Clinical Services Building of the Hornsby Ku-Ring-Gai Hospital (HKH) (see Reference B). The modification did not seek approval for the use of the HLS. This report has been prepared in support of a subsequent modification seeking approval for minor works and the use of the HLS by Helicopter Emergency Medical Service (HEMS) operators.

Executive Summary

The siting of a rooftop HLS with its associated approach and departure path design at the HKH has resulted in an acceptable outcome. To the maximum extent, low overflight of built-up areas is avoided whilst conforming with the most likely wind directions expected in the area and providing the best available forced landing areas pertinent to prevailing wind directions. The rooftop HLS will negate the requirement for HEMS operators to continue using the existing on-grade HLS at James Park (other users, e.g. police will continue to operate to/from James Park). Approach and departure directions are consistent with the most favourable paths used by helicopters into and out of the James Park HLS (noting that James Park is unsurveyed and has no published approach and departure paths). The rooftop HLS provides a much safer facility than the James Park HLS which is encircled by power lines, contains four high light poles and has several high trees in the preferred approach and departure directions constituting operational hazards.

Primary considerations in HLS approach and departure path selection included:

- Direction of prevailing winds,
- Location of vertical structures and obstacles/hazards,
- Airspace restrictions and limitations,
- Avoidance of areas sensitive to noise and vibration,
- Avoidance of ecologically and environmentally sensitive areas, and
- Availability of emergency landing areas.

The selected approach and departure paths, dictated by prevailing winds, obstacle avoidance and availability of suitable forced landing areas for emergencies during late final approach or the early stages of take-off align approximately South-East to North-West.

Areas of overflight currently include suburban areas to the South-East and a mixture of suburban and industrial areas to the North-West. Whilst the HLS is sited outside the Sydney Air Traffic Control Zone and Control Areas (CTR/CTA), it is almost directly underneath a heavily utilised visual flight route. Aircraft in transit overhead HKH will be at approximately 1000 to 1500 feet above the HLS. They will not constitute any confliction, under normal circumstances, with HEMS helicopters arriving and departing the HLS.

This document addresses the aviation considerations as they apply to the HKH development. It includes the following:

- SSD General Requirements:
    - Regulatory Review,
    - Preferred Flight Path Directions,
- SSD Key Issues.

SSD GENERAL REQUIREMENTS – REGULATORY REVIEW

The HKH development is located outside the Sydney Airport Control Zone (CTR) and Control Areas (CTA). It is therefore not considered to be within "prescribed airspace" as defined in Reference C.

Reference D provides access to a range of overlays and guidance that pertain to the implications for development in relation to vertical constructions within prescribed airspace. These will not apply to HKH. Notwithstanding this non-applicability, advice will need to be sought from AirServices Australia (ASA) and the Civil Aviation Safety Authority (CASA) by the NSW Department of Planning, Industry and Environment to gain formal Commonwealth Government acknowledgement of this point.

The positioning and proposed development of an HLS at HKH will not incur any negative air traffic or protected airspace factors or considerations (notwithstanding approval must still be sought). 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 HLS, and in particular vertical obstructions such as cranes, can be addressed from a "safety to flight" requirement for helicopters operating near the HKH HLS and aircraft transiting overhead.

The HKH is sufficiently distant from Sydney such that arriving and departing aircraft will not realise any traffic confliction with helicopters operating to and from the HKH HLS.

CASA

CASA has not yet been engaged by the Social Infrastructure team from the Department of Planning, Industry and Environment (DPIE) in relation to the HKH HLS. Formal CASA advice will be required to confirm that HLS planning and design has considered the following relevant documentation listed in the Avipro 100% Schematic Design Report:

- International Civil Aviation Organization (ICAO) Annex 14, Vol II, Heliports,
- ICAO Heliport Manual Doc 9261 -AN/903,
- US Federal Aviation Administration Advisory Circular 50/5390-2C, Heliport Design,
- Australian CASA Civil Aviation Advisory Publication (CAAP) 92-2 (2) Guidelines for the Establishment and Operation of Onshore Helicopter Landing Sites, and
- NSW Health GL2018_010 Guidelines for NSW Hospital HLS of April 2018.

ASA

ASA has not yet been engaged by the Social Infrastructure team from the DPIE in relation to the HKH HLS. ASA advice will be required in relation to:

- the effect any sector or circling altitude, any instrument approach or departure procedure at Sydney (Kingsford-Smith) Airport;
- the effect on any Radar Terrain Clearance Chart (RTCC); and
- the impact on the performance of any ASA Precision/Non-Precision Navigation Aids, Anemometers, HF/VHF/UHF Communications, Advanced Surface Movement Guidance & Control System (A-SMGCS), Radar, Precision Runway Monitoring (PRM), Automated Dependent Surveillance - Broadcast (ADS-B), Wide Area Multilateration (WAM) systems or Satellite/Links.

HLS Compliance and Standards

Within Australia, there are no laws or regulations applicable to the design, construction or placement of HLS. The relevant current legislation 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.

CASA, as the regulator of aviation in Australia, divested itself of direct responsibility 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.

CASA does not provide design, structural information or advice beyond that provided in the CAAP.

CASA, as a component of a Regulatory Reform Program, intends to prepare rules for helicopter landing sites and currently has a panel established for this purpose. The new rules will form Civil Aviation Safety Regulation (CASR) Sub-Part 139R. It is currently anticipated that Sub-Part 139R will become applicable from late March 2021. If and when they are introduced, there will be an implementation phase and “grandfather” clauses. Standards set by NSW Ambulance were established to meet or exceed those requirements.

Considerable work internationally has been undertaken over many years in this area, particularly through the International Civil Aviation Organisation (ICAO) and the US Federal Aviation Administration (FAA). The resulting documents on the subject provide excellent advisory material, guidelines and best practice standards. These are contained in Reference E.

ICAO sets out international Standards and Recommended Practices (SARPS) for the safe conduct of civil aviation activities in the Annexes to the Convention on International Civil Aviation (Chicago, 1944), with the following Annexes applicable to helicopter operations:

- Annex 6: Operation of Aircraft - Part III: International,
- Operations - Helicopters 6th Edition July 2004, and
- Annex 14: Aerodromes - Volume II: Heliports 4th Edition 2013.

ICAO Annex 14 Volume II provides SARPS for the planning, design, operation and maintenance of HLS facilities for use by the providers of these facilities. CAAP 92-2(2) provides only limited guidance material on the minimum physical parameters required to assist helicopter pilots and operators in meeting their obligations under CAR 92.

As a signatory to the Convention on International Civil Aviation, Australia has undertaken to apply the ICAO SARPS, except where specific differences have been notified to ICAO.

The Supplement (Second Edition, Amendment No.1, 18 February 1999) to Annex 14 Volume II, lists seven CASA Australia recommended differences to the ICAO SARPS relating to heliports. This document is now out-of-date and the differences remain. Subject to differences, CASA supported the adoption of Annex 14, SARPS for heliports.

CASA has for some years been undertaking a Regulatory Reform Program in the rotary wing area and it is assumed that the ICAO SARPS with some of the differences removed, will form the basis of the proposed Civil Aviation Safety Regulations.

Proposed new CASRs include:

- Sub-Part 133 pertaining to Commercial Air Transport Operations;
- Sub-Part 138 pertaining to Aerial Work operations; and
- Sub-Part 139R pertaining to Helicopter Landing Sites.

Currently within Australia HEMS activities are defined as Aerial Work operations however it is proposed by CASA that helicopter aeromedical functions will be redefined as Air Transport operations (Medical Transport under CASR Part 133). Should this eventuate, the highest standards required of Air Transport (the carriage of passengers for hire and reward) will apply to Medical Transport.

Although CASA has not historically been active in the HLS field, many countries have, and in particular the US. Many years of experience operating large numbers of helicopters in a range of roles have resulted in the production of comprehensive helicopter landing site and heliport design and operating procedures. The US Federal Aviation Administration (FAA) has produced an Advisory Circular, the content of which is actually required in the US, detailing the necessary standards. Within the AC is a comprehensive section devoted to hospital based “helicopter landing sites”, and where more than one HLS is collocated, “heliports”.

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 HLS Policy GL2018_010 – Reference D.

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) 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); and
- NSW Health GL2018_010 Guidelines for NSW Hospital HLS of April 2018.

The Guidelines GL2018_010 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.

SSD GENERAL REQUIREMENTS - PREFERRED FLIGHT PATH DIRECTIONS

Image 1 illustrates the planned flight paths to the HKH HLS (large scale). This image attempts to portray that it is the low-speed early part of the departure and the low-speed final approach that require stability in direction (hence the approach and departure arrows painted onto the HLS and depicted on this image). While, or once, an aircraft has safe single-engine flying speed the pilot is at liberty to manoeuvre and turn to suit the prevailing wind conditions and comply with any relevant "fly neighbourly" procedures or to avoid known areas sensitive to aircraft noise and vibration. Increasing rates of climb and descent (increasing flight path steepness) can be utilised to attempt to insulate sensitive areas from noise and vibration. In reality, no two approaches or departures will ever be alike. The inherent flexibility of a helicopter allows it to accommodate various flight profile changes in response to changing circumstances and requirements.

Image 1: Flight path illustration at HKH HLS

Aircraft arriving and departing from HKH will not require an ATC clearance. ATC will not be required to separate HEMS helicopters from civil commercial air traffic. Because the lift overrun is positioned to the South-Western corner of the building, the approach and departure paths are forced to be oriented South–East to North–West. It will not always be possible to avoid overflight of the housing areas in the vicinity of the hospital. See Image 1 above. Taking into account prevailing winds, this arrangement is the only workable solution for this HLS if the two approach and departure paths are to be kept in the required range of 150^0-180^0 apart.

Figure 1 below illustrates the planned flight paths to the HKH HLS (small scale). The approach and departure paths do not overfly the STAR Building. The services on top of the STAR building are well clear of the selected approach and departure paths and will not be affected by HEMS operators.

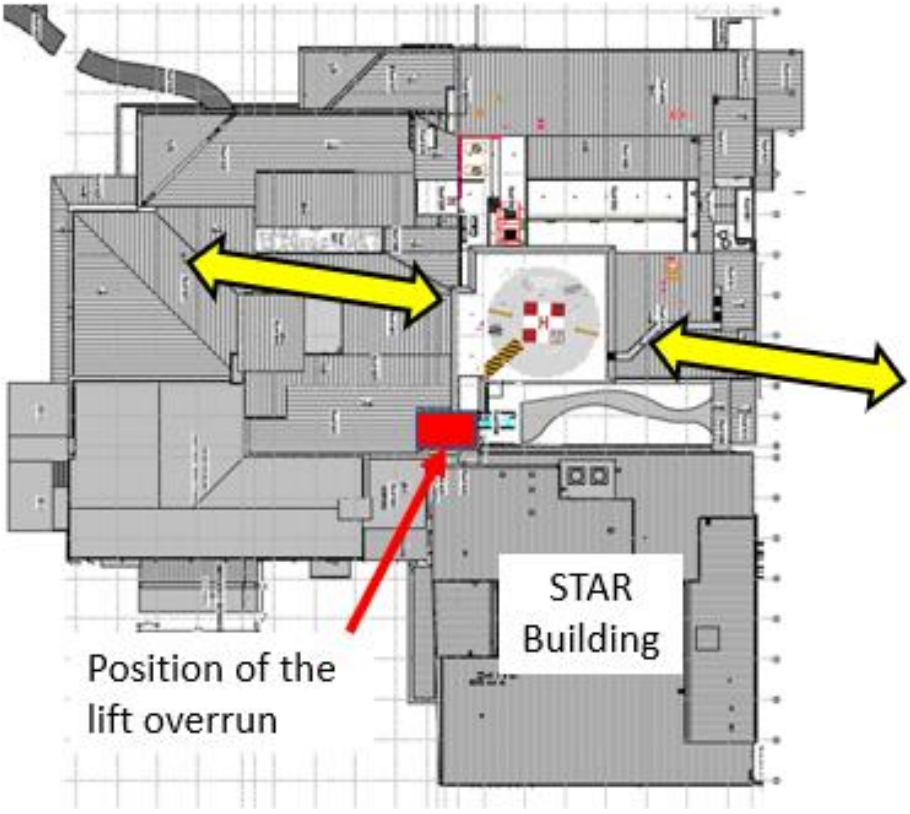

Figure 1: Flight path illustration at HKH HLS

The rooftop HLS at HKH provides an improved option over the existing James Park HLS in that noise will be more dispersed due to the greater elevation. The current HEMS usage of the James Park HLS is 7-8 movements per annum. It is expected that the usage of the new rooftop HLS will be similar. See Image 2 below:

Image 2: Comparison between existing and new HLS locations

The proposed visual flight rules approach and departure paths run South–East to North-West. These paths will need to be surveyed to achieve an obstacle free gradient of 2.5º (4.5% or 1:22 vertical to horizontal), measured from a point 1.5 m. above the forward edge of a 25 m diameter final approach and take-off area (FATO), to a height of 500 feet above the FATO at a distance of ~3,500 m.

Primary considerations in selection HLS approach and departure paths include:

- Direction of prevailing winds,
- Availability of emergency landing areas,
- Location of vertical structures and obstacles/hazards,
- Airspace restrictions and limitations,
- Avoidance of areas sensitive to noise and vibration, and
- Avoidance of ecologically and environmentally sensitive areas.

The arrival and departure paths avoid overflight of the national parks area to the North-East of the site. This will assist in avoiding any overflight of migratory or foraging animals that may be present in these areas. Overflight of the national parks area to the West of the Hornsby CBD will occur at such altitudes as to not present as a hazard to wildlife. See Image 3 below.

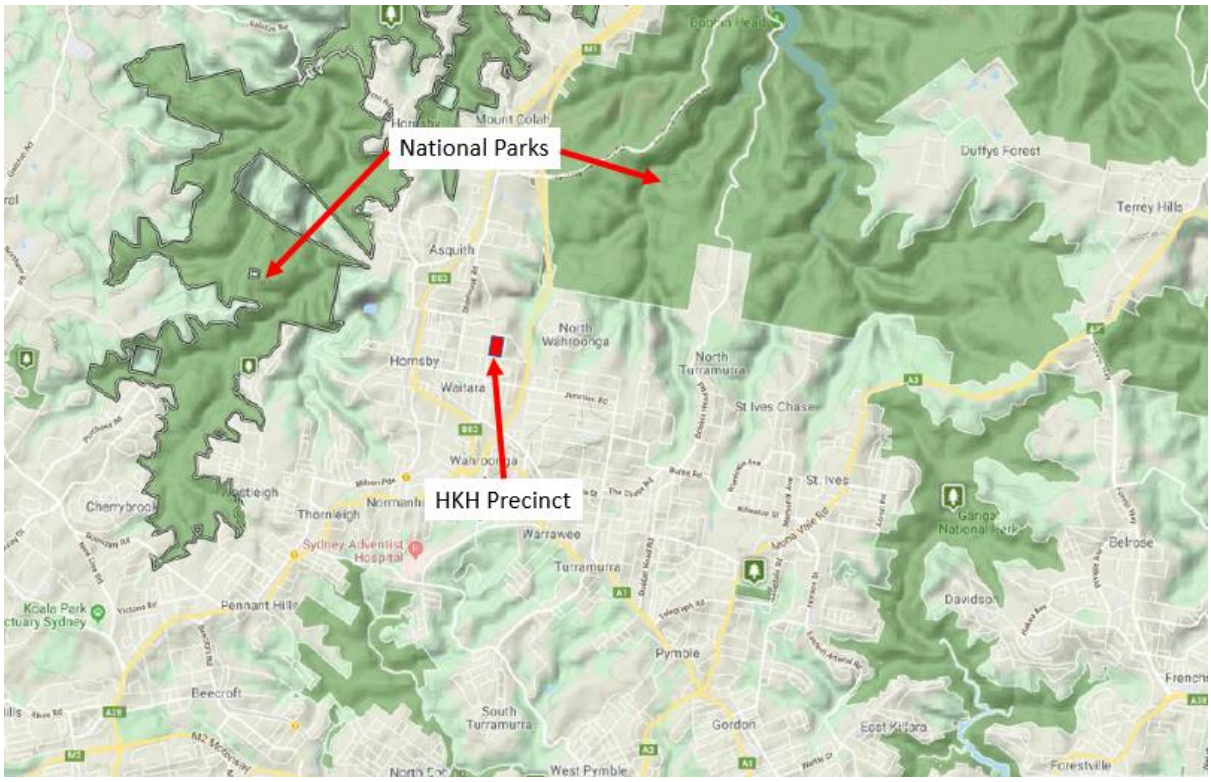

Image 3: HKH Precinct in relation to surrounding National Parks

Wind

The Bureau of Meteorology has a weather station approximately 12 km east of the HKH site at Terry Hills. Annualised five-year average wind readings show that average annual predominant winds in the area are from the west. This will be the primary driver for approach selection based upon wind. Secondary peaks occur from the north, south and north-east. Refer to Figure 2. This information is relevant during planning to account for any obstructions along the paths.

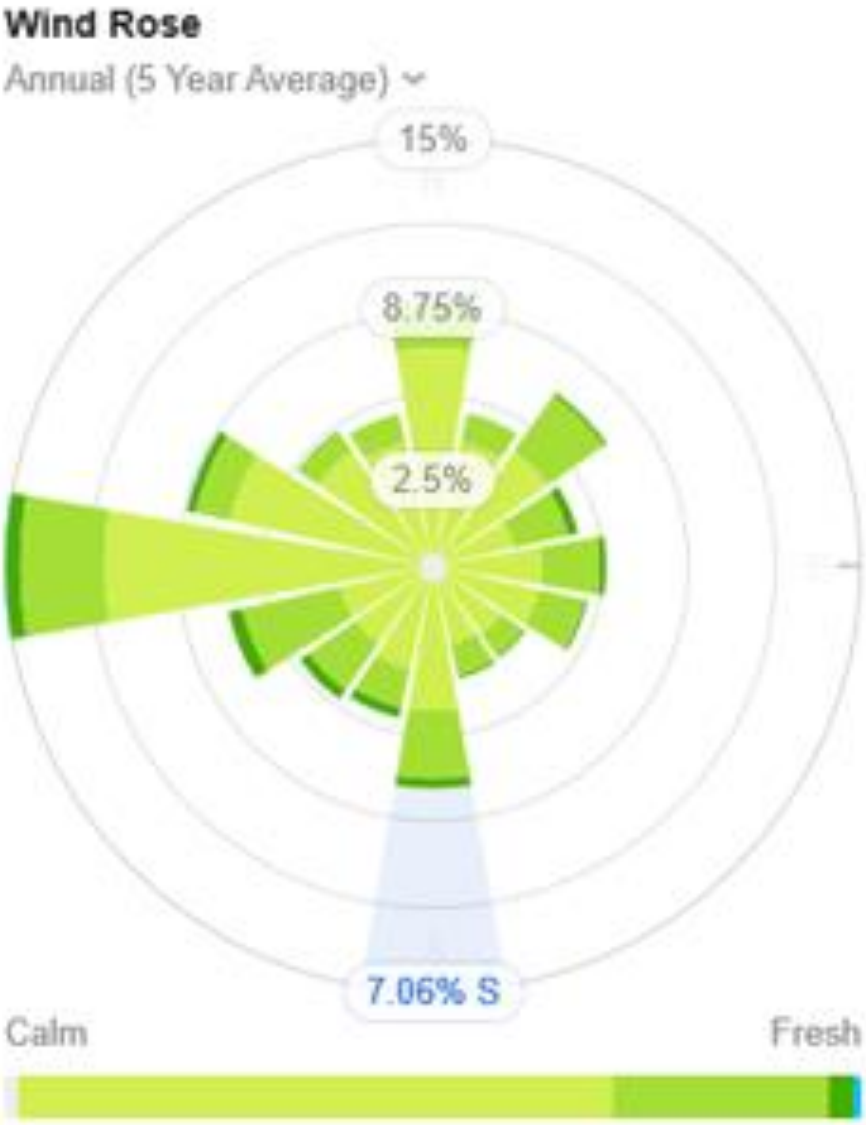

Figure 2: Terrey Hills Wind Rose – Annual Average

Important criteria for approach/departure paths is that there be a minimum of two that are at least 150° apart. In this scenario, the two selected paths are approximately 160° apart. These may change, subject to formal survey and dependent upon any significant changes made to services on the shared rooftop. The helicopters can accommodate quite strong quartering tail winds and therefore there would be few occasions when wind direction alone would lead to the HLS being unusable. The preference however, is to have some component of head wind when landing or departing. Strong wind conditions on the other hand may cause a temporary closure regardless of direction.

The two flight paths should allow for acceptable head wind components at almost all times.

The elevated HLS positioning on the rooftop provides for additional approach/departure paths whereby the pilot can land or take-off into wind from most directions where infrastructure permits.

Prior to acceptance by NSW Ambulance, a VFR approach and Departure Path and Transitional Surface survey combined with a Design Development Overlay survey will need to be completed.

SSD KEY ISSUES

Key Issue: Statutory and Strategic Context

Permissibility. Permissibility from an aviation perspective needs to be confirmed by ASA. Application is made on behalf of Health Infrastructure by the Social Infrastructure team of the Department of Planning, Infrastructure and Environment as part of the SSD process. No impediments to approval are anticipated.

Development Standards. The standards applying to this HLS are NSW Health Policy and represent best practice and exceed any standards required by current legislation. Development Standards from an aviation perspective do not apply.

Key Issue: Policies

NSW Health Policy. The HLS will meet the compliance requirements of NSW Health GL2018_010 Guidelines for NSW Hospital HLS. Whilst the Guidelines do not restrict flight of adjacent buildings, it is common practice in approach and departure path design to avoid such situations. It has been possible on this occasion to avoid overflight of the adjacent STAR building and also to avoid impacting its rooftop services e.g. cooling towers and vents, with rotor downwash.

Key Issue: Environmental Amenity

Acoustic Impacts. There will be acoustic impacts associated with the conduct of helicopter flight operations to/from the proposed rooftop HLS. This will require a degree of engineering to ensure noise is not transferred into the structure. Complete avoidance of acoustic impacts on local residential and communities is impractical and cannot be guaranteed.

Ecological Impacts. There are no known areas of environmental or ecological significance that require specific protection from the impacts of helicopter operations. Whilst the Project's ecology report (see Reference F) only addressed the immediate vicinity of the works, a search of data, reports and other sources did not reveal the existence of any noteworthy habitats, nesting areas, breeding grounds or roosting colonies that might be impacted by helicopters. Noting that James Park to the north of the hospital is currently an operational HLS for HKH, the HEMS operators will be well aware of any noise or vibration sensitive areas. The same operational procedures for noise abatement will probably apply for the new HLS. This will be confirmed with HEMS operators as part of the HLS commissioning process.

Key Issue: Noise and Vibration

Noise. 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.

It should be noted that at "city" hospitals where the pilot is subject to Air Traffic Control (ATC), it may take several minutes longer as clearance may not be immediately available for the route that the pilot wishes to take. In such circumstances, ATC may keep a HEMS helicopter waiting for a long period before approval to depart is gained. This issue will not arise at HKH.

Figure 3 below is sourced from Health Building Note 15-10: Hospital Helipads issued by the UK Department of Health. It indicates that an elevated (rooftop) HLS will have a positive effect on noise and vibration to the surrounding environment as compared to an on-grade site.

	Ground-level sites	Raised structures and mounds	Elevated (rooftop) sites
Aircraft and public security			
Freedom from obstructions at ground level			
Freedom from obstructions in the helicopter approach corridors			
Provision of into-wind approaches			
Preventing air turbulence affecting helicopters and patients			
Reducing the impact of noise and downwash			
Preservation of trees and shrubs			
Impact on future building plans			
Minimal building cost			
Minimal running costs		See paragraph 3.11	
Requirement for fire and rescue equipment	None mandated	Possibly required	Required
Requirement for trained manpower available for each landing	None mandated	Possibly fire and rescue	Fire and rescue

Figure 3: Comparison of ground level, raised (and mounded) and rooftop sites (note: The NSW Health Policy details fire equipment requirements)

Key Issue: Contamination

The main contamination from an HLS is that of fuel product spillage. In the case of HKH HLS, this risk is significantly mitigated by not conducting refuelling operations or maintenance on the HLS.

If there was a fuel leak of any sort from the helicopter, the installation of the fuel/water separator will mitigate the contamination risk.

Key Issue: Drainage

The HLS will have drainage to ensure standing water is drained from the deck. A slope of up to 2° will ensure water does not pool and helps maintain the integrity of the anti-slip surface.

Key Issue: Management of Cranage during construction

As there is an existing HLS in immediate proximity to the HKH development, there is a need to manage crane-helicopter interfaces during construction. It is important that a crane be lit (which it is), even though it does not infringe the Obstacle Identification Surfaces (IOS) associated with Sydney Airport. The requirements of Reference G are applicable in this regard.

Consultation

AviPro has consulted with the following organisations with no reportable feedback:

- NSW Ambulance Service (the helicopter retrieval capability Director),
- Toll Helicopters (contracted helicopter operator),
- NRMA Careflight (contracted helicopter operator),
- Westpac Rescue Helicopters (contracted helicopter operator).

Future Consultation

AviPro will commence engagement with the following organisations as appropriate:

- Sydney Airport (Manager, Operations and Standards),
- Health Infrastructure (Program Management),
- NSW Ambulance Service (the helicopter retrieval capability Director),
- Toll Helicopters (contracted helicopter operator),
- NRMA Careflight (contracted helicopter operator),
- Westpac Rescue Helicopters (contracted helicopter operator), and

AviPro may also engage with the following additional organisations:

- ASA – if issues arise from the ASA DA submitted by DPIE,
- CASA - if regulatory change occurs that materially impacts the program.

Conclusion

The rooftop layout, as currently designed, is suitable to host an HLS. The positioning of the lift overrun is the primary driver of the approach and departure paths, which in turn fit quite well with historical prevailing winds. The HLS will result in an average or normal level of overflight of populated areas for an HLS in a suburban CBD with surrounding residential areas. This overflight is unavoidable.

From an SSD perspective, in summary:

- The new HKH HLS structure and associated cranes used for construction will not infringe prescribed airspace surfaces limits.
- The HLS will be compliant with Reference D – NSW Health Policy and other Policies as they may apply.
- Planned approach and departure paths conform with the most likely wind directions and provide pilots with acceptable forced landing areas in the event of emergencies requiring immediate landing on final approach to land or immediately after take-off.

Sincerely,

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