ILLAWARRA INTERNATIONAL HEALTH PRECINCT

HELIPAD
PRELIMINARY NOISE ASSESSMENT

ACOUSTICS AND AIR

REPORT NO. 09069
VERSION A

WILKINSON MURRAY

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MARCH 2009

PREPARED FOR

LA VIE DEVELOPMENTS
MARINERS COURT, MCELHONE STREET
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Wilkinson Murray Pty Limited
ABN 41 192 548 112 • Level 2, 123 Willoughby Road, Crows Nest NSW 2065, Australia • **Asian Office: Hong Kong**
t +61 2 9437 4611 • **f** +61 2 9437 4393 • **e** acoustics@wilkinsonmurray.com.au • **w** www.wilkinsonmurray.com.au

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1 INTRODUCTION

As requested, we have conducted a preliminary “desktop” acoustic assessment of the proposed roof top helipad to be located at the proposed Illawarra International Health Precinct at Huntley. The assessment has been conducted to determine the acoustic feasibility of the site for use by emergency helicopter services.

In considering potential impacts on acoustic amenity of surrounding residential properties the following information has been utilised:

- Ambient noise levels of the surrounding area based on AS1055.2 (1997) *Acoustics - Description and measurement of environmental noise - Application to specific situations*.
- In-flight helicopter noise data from the US FAA’s Integrated Noise Model (INM) Database;
- Take off noise measurements of Eurocopters; and
- Proposed flight routes as advised by Heli-Consultants Pty Ltd (reference letter attached in Appendix B.)

2 PROPOSED HELICOPTER FLIGHT ROUTES

The most critical consideration in selecting flight paths was the availability of obstacle-free approach and departure paths. Advice from Heli-Consultants Pty Ltd indicates that the flight paths are aligned approximately 345 degrees/165 degrees true (333 degrees/153 degrees magnetic) with respect to the rooftop helipad location.

Figure 2-1 illustrates the proposed flight paths.

Figure 2-1 Proposed Flight Path and Heliport

For the purposes of this study we have assessed the flight paths detailed above using a 9 degree approach gradient along each path. This gradient will be maintained until a height of 1000 ft (305 m) is achieved.

3 AMBIENT NOISE LEVELS AND SURROUNDING RECIEVERS

Indicative ambient noise levels have been established based on "typical" background noise levels in Appendix A of Australian Standard *AS1055.2 (1997) Acoustics - Description and measurement of environmental noise - Application to specific situations*.

The following background noise levels have been used based on a R2 category being " Areas with low density transportation. The following Table 3-1 details the background noise levels used for this assessment

Table 3-1 Indicative Background L_{A90} noise levels for "Areas with low density transportation" – dBA.

Period	Day 07:00-18:00	Evening 18:00-22:00	Night 22:00-07:00
Background Noise Levels	45	40	35

Nearby Surrounding receivers have been determined to be

- **East** Suburban Residences in Penrose the nearest of which are in Goolagong Street at a distance in the order of 340 m from the helipad.
- **South** East A single residence to the south of the site on Huntley Road at a distance of 250 m from the helipad.
- **West** A single residence to the south of the site on Huntley Road at a distance of 680 m from the helipad.

3.1 Helicopter Types

Advice from Heli-Consultants Pty Ltd indicated that the largest helicopter types to use the Helipad are medium size helicopters such as a Bell 412 or an August Westland AW139. These helicopters are shown below.

Bell 412

August Westland AW139

4 NOISE CRITERIA

The following sections present noise criteria applicable to noise emanating from the helicopter at the landing pad, and whilst in flight.

4.1 Ground-Based Noise

In assessing noise from the proposed helicopter operations, it is important to distinguish between noise generated while the helicopter is on the roof top and noise generated whilst it is in the air. When the helicopter is on the ground, its noise can be assessed under guidelines promulgated by the NSW Department of Environment and Climate Change (DECC) in their Industrial Noise Policy. In this case, the most stringent of these criteria would be the "intrusiveness" criterion, namely that the $L_{Aeq,15min}$ noise level emanating from the premises should not exceed the Rating Background Level (RBL) by more than 5dBA.

For the purposes of establishing applicable noise criteria for surrounding residences we have taken the typical background noise levels detailed in Table 3.1 as the RBL for each period of the day.

The site specific intrusive noise criteria are presented in Table 4-1:

Table 4-1: Site Specific Noise Criteria for Ground Based Noise dBA.

Monitoring Location	Day (7 am – 6 pm)	Evening (6 pm – 10 pm)	Night (10 pm – 7 am)
Rating Background Noise Level	45	40	35
Intrusive Noise Criterion*–$L_{Aeq(15\ minutes)}$	50	45	40

Accordingly a minimum noise criterion of 40 dBA is applicable based on helicopter operation any time of the day.

4.2 Noise Generated in the Air

Noise produced whilst a helicopter is in the air is not regulated by the DECC. In addition there are no specific noise criteria relating to helicopter movements.

However Air Services Australia has produced the document "*Environmental Principles and procedures for minimising the impact of aircraft noise*" (Revised 21 November 2002) which provides guidance on noise exposure of aircraft as follows;

"Upper and Lower Limits of Noise Exposure

Principle 5: *Noise is not considered significant when selecting noise preferred options if exposure amounts to less than 40 $L_{eq\ 24}$ and there are less than 50 overflights per day.*

Principle 6: *No residential area should receive more than 60 $L_{eq\ 24}$, i.e., no residential area should receive more noise exposure than that which is considered "unacceptable" for residential housing under Australian Standard AS2021."*

For the purposes of this review the impact of helicopter flyover noise has been assessed with respect to these noise goals.

4.3 Sleep Disturbance

No specific noise criteria applies to sleep disturbance associated with helicopters operating in the night period between 10 pm and 7 am. However the DECC's *Environmental Criteria for Road Traffic Noise (ECRTN)* provides the following guidance with respect to transportation noise and sleep disturbance.

- Maximum internal noise level below 50 – 55 dBA are unlikely to cause sleep awakening reactions.
- One or two noise events per night, with maximum internal noise levels of 65 – 70 dBA, are not likely to affect health and wellbeing significantly.

Assuming windows of residences are open the above values can be converted to external noise criteria by adding 10 dBA, that is;

- Maximum external noise levels below 60 – 65 dBA are unlikely to cause sleep awakening reactions.
- One or two noise events per night, with maximum external noise levels of 75 – 80 dBA, are not likely to affect health and wellbeing significantly.

5 NOISE ASSESSMENT

5.1 Impacts from Ground-Based Noise

Due to the nature of this assessment noise levels at the helipad, during take off and landing of the specific Helicopter types, have not been measured. Therefore we have used noise measurements of Eurocopter AS355 F1 and AS350 B3 helicopters conducted by Wilkinson Murray on previous assessments.

The following Table 5-1 summaries the results of these measurements.

Table 5-1 Measured Helicopter Noise Levels from a Helicopter on the Helipad – dBA.

Helicopter Type	Combined Takeoff and Landing SEL at 30 m	L_{Amax} at 30 m
AS 335 F1	105	93-95
AS 350 B3	103	92-93

The measured helicopter noise level and ground height contours for the area were entered into the Cadna A noise prediction software to determine likely noise levels at the identified surrounding residences. Table 5-2 shows calculated noise levels at the surrounding receiver locations where calculations assume that one take-off and landing may occur in any 15-minute period.

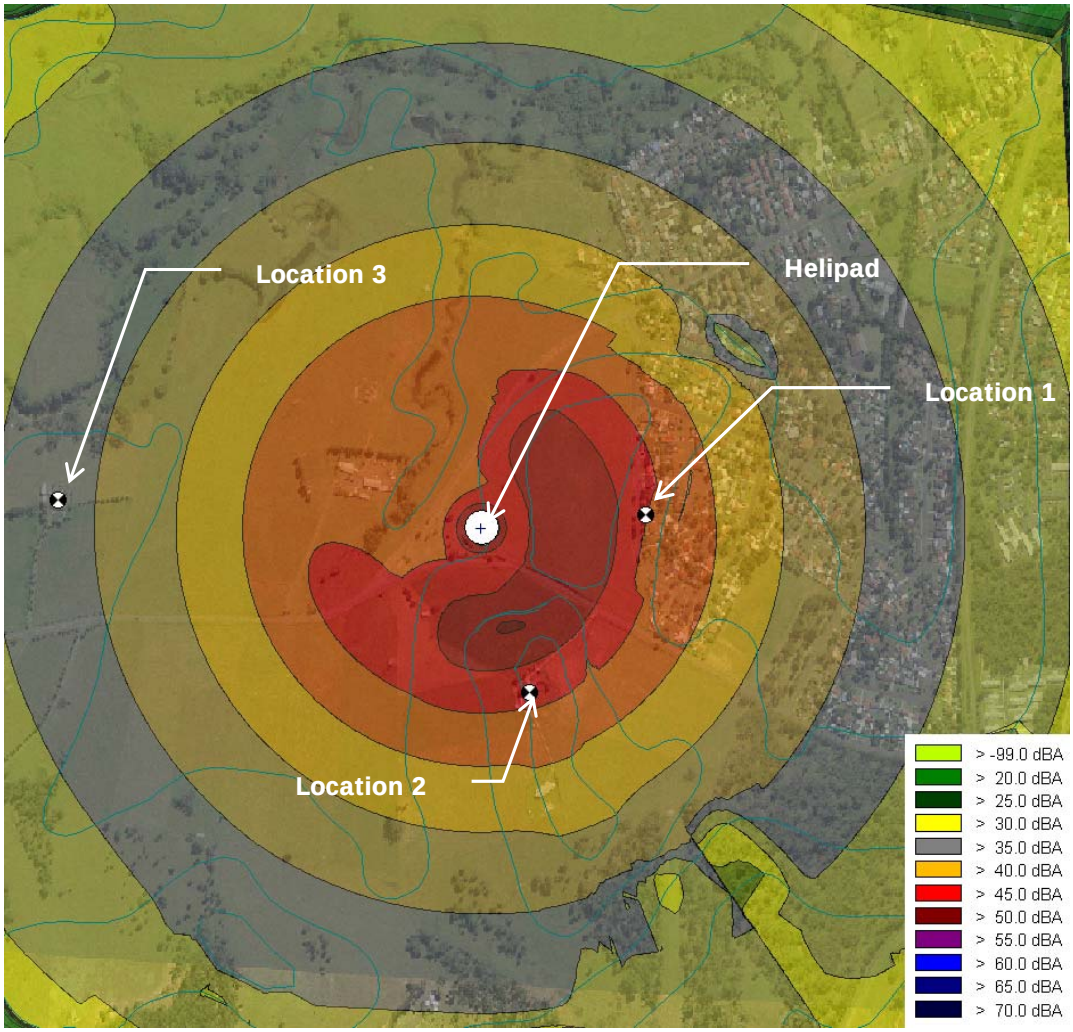
Table 5-2 $L_{Aeq, 15min}$ Noise Levels from a Helicopter on the Helipad

Receiver	Predicted Noise Level dBA	Night Noise Criterion dBA
Location 1 – Goolagong Street Residences	46	40
Location 2 – SE Residence	46	40
Location 3 – Western Residence	37	40

A review of predicted noise levels indicates likely compliance with day criteria. A marginal 1 dBA exceedance is predicted for the evening period whilst a greater exceedance of night noise criteria at surrounding residences to the south east and east is indicated. Such an exceedance during the night period is not unexpected considering the likely low ambient noise levels of this area.

Figure 5-1 presents the noise contours around the site based on this operational scenario.

Figure 5-1 Noise Contours from the operation of the Helicopter at the Helipad.



Maximum noise level at residences associated with operations of the Helipad as detailed in Table 5-3.

Table 5-3 L_{Amax} Noise Levels from a Helicopter on the Helipad

Receiver	Predicted Noise Level dBA	External Sleep Arousal Noise Criterion dBA
Location 1 – Goolagong Street Residences	67	75-80
Location 2 – SE Residence	67	75-80
Location 3 – Western Residence	57	75-80

A review of predicted maximum noise levels associated with the helipad indicate operations at the helipad are unlikely to cause sleep awakening reactions.

5.2 Noise Impacts from Helicopters in the Air

Flyover noise levels from the Bell 412 or an August Westland AW139 helicopters are not included in the US FAA's INM. The most similar medium helicopters in the data base are the Sikorsky S70 and S76 helicopters both of which are 4 blade helicopters with similar engine power to the Bell 412 and the AW 139 helicopters. Therefore the findings determined in this assessment are based on the INM noise data for these helicopters.

$L_{Aeq,24\ hour}$ helicopter noise levels have been predicted at residences based on a flight path as shown on Figure 2-1 and an approach height of 1000 ft (305 m). These are presented in Tables 5-2 and 5-3.

Table 5-2: Predicted Helicopter Flight Noise Levels at Residences for a S70 helicopter - dBA.

Receiver Area	Helicopter Sound Exposure Level (From INM) -			L_{Aeq} (24 hrs)	Maximum Permissible Operations - 24 hr criterion dBA	
	Arrival	Departure	Total		40 dBA	60 dBA
Location 1 – Goolagong Street Residences	85	81	87	37	2	181
Location 2 – SE Residence	98	90	99	49	0	12
Location 3 – W Residence	87	76	87	38	2	161

Table 5-3: Predicted Helicopter Flight Noise Levels at Residences for a S76 helicopter- dBA .

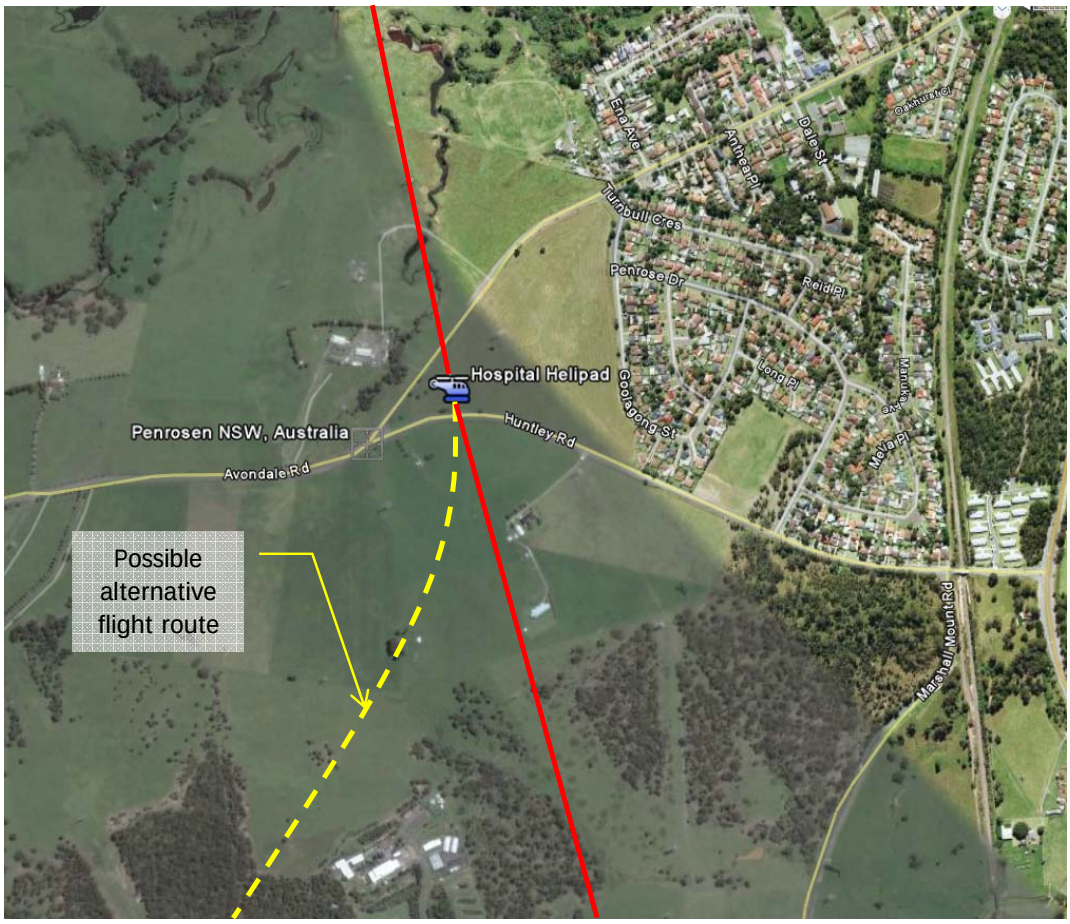
Receiver Area	Helicopter Sound Exposure Level (From INM) -			L_{Aeq} (24 hrs)	Maximum Permissible Operations - 24 hr criterion dBA	
	Arrival	Departure	Total		40 dBA	60 dBA
Location 1 – Goolagong Street Residences	83	84	87	37	2	193
Location 2 – SE Residence	95	93	97	48	0	17
Location 3 – W Residence	84	80	85	36	2	248

A review of the predicted in-flight noise levels at identified receivers indicates that the greatest exposure of noise from helicopters with be at the residence to the SE of the helipad. This is due the close proximity of this residence to the proposed southern flight path.

Therefore to minimise the noise impact at this residence consideration should be given to the following noise control measures.

- Minimise the use of the southern flight path.
- Change the southern flight route so that the approach is from the south west. This would require review by the helicopter consultant for feasibility both from a flight route and helipad design perspective. Figure 5-2 shows an alternative flight route option.

Figure 5-2 Possible alternative flight route.



Technically, predictions indicate that a much higher number of flights could be permitted before the 60 dBA limit is exceeded, however such a frequency would be likely to result in significant complaint from occupants of surrounding residences.

Discussions with Heli-Consultants Pty Ltd indicated that the current uses of private hospital helipads are typically low, whereby use 2-3 times a week would be considered well used. This being the case it is likely that the use of the helipad will comply with Air Services Principle 5 being; "*Noise is not considered significant"* at the bulk of the residences to the east and west of the site.

A greater potential for adverse noise impact is predicted at the residence to the south east of the helipad site. This potential impact may be mitigated by the measures that have been previously identified.

In addition maximum passby noise levels will occur when the helicopter flies over the SE residence. Maximum external noise levels of between 80 to 88 dBA are predicted from INM noise data. Therefore sleep disturbance is likely at this residence during a helicopter flyover during the night period.

This finding supports the earlier noise mitigation recommendations.

6 CONCLUSIONS

A preliminary assessment of potential noise emissions associated with the operation of a helipad at the proposed Illawarra International Health Precinct has been conducted. The assessment has been based on indicative background noise levels as recommended in Australian Standards, and noise levels from the INM along with our own noise measurements.

The following conclusions are drawn based on proposed flight paths and helicopter types.

- Noise associated with the Helipad ground operations is likely to generally comply with noise criteria based on NSW DECC requirements with the exception of a the night period where an exceedance of up to 6 dBA is predicted.
- The maximum number of flights per day has been established as 2 at all residences, with the exception of the one residence to the SE, in order to achieve a 24 hour noise objective of 40 dBA. In these cases noise associated with helicopters can be classified as not significant.
- The maximum number of return flights per day at the SE residence has been established as 12 in order to achieve a 24 hour noise objective of 60 dBA. However such a level is likely to result complaint. In addition sleep disturbance is indicated should a helicopter use the southern flight route during the night period.
- In order to minimise any noise impact at the identified residence, particularly at night, it is recommended consideration be given to minimising the use of the southern flight path and orientating this flight path to the South West.

Version	Status	Date	Prepared by	Checked by
A	Final	11 March 2009	Brian Clarke	Neil Gross

APPENDIX A

GLOSSARY OF TERMS

GLOSSARY

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph overleaf, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

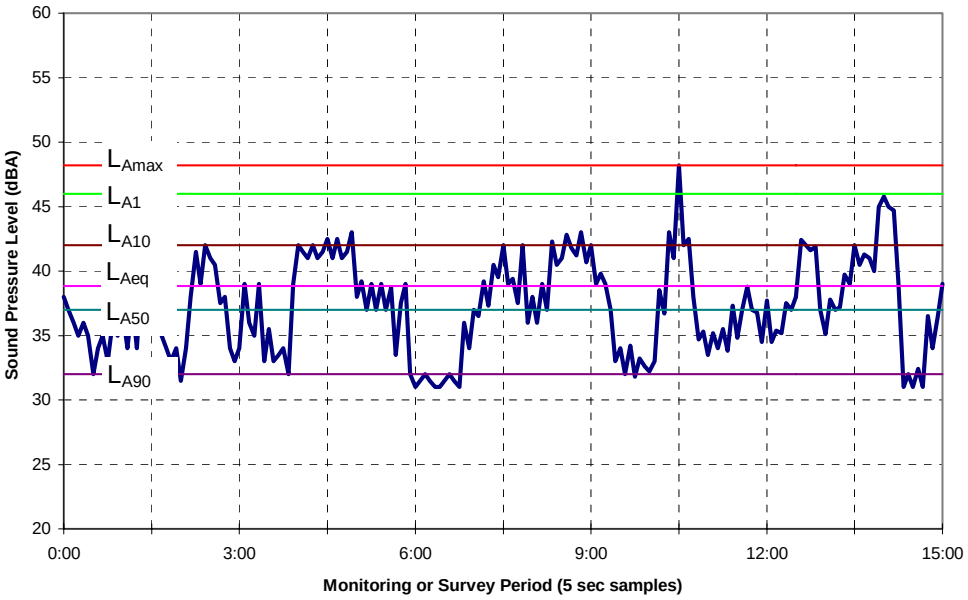
L_{A50} – The L_{A50} level is the noise level which is exceeded for 50% of the sample period. During the sample period, the noise level is below the L_{A50} level for 50% of the time.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10^{th} percentile (lowest 10^{th} percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period **–** daytime, evening and night time.

SEL – Sound exposure level abbreviated as SEL and L_{AE}, is the total noise energy produced from a single noise event. The Sound Exposure Level is a metric used to describe the amount of noise from an event such as an individual aircraft flyover. It is computed from measured dBA sound levels. The Sound Exposure Level is the integration of all the acoustic energy contained within the event.


60
55
50
45
40
35
30
25
20
Sound Pressure Level (dBA)
LAmax
LA1
LA10
LAeq
LA50
LA90
0:00
3:00
6:00
9:00
12:00
15:00
Monitoring or Survey Period (5 sec samples)

APPENDIX B

Advice from Heli-Consultants Pty Ltd

The Tyler Family Trust (ABN 30 411 320 406) trading as

HELI-CONSULTANTS PTY LTD

ACN 002 091 830 - ABN 69 002 091 830

83 Columbia Rd, SEVEN HILLS NSW 2147 AUSTRALIA
Ph. 61-419-493634, e-mail dan@tylerdigital.com

27th November, 2008

Mr Mike Wilkinson
Illawarra International Health Precinct
Mariner's Court, McElhone Street
Wooloomooloo. NSW

Dear Sir,

Environmental Assessment for Helicopter Landing Site (HLS)
Illawarra Health Precinct (Stage 5)

Having examined your Drawings SK02PL Site Plan and SK05PL Site Analysis (Issue 8) I concur with that the proposed siting of the helicopter landing site atop the Hospital is viable and appropriate. The three most important aspects of preliminary design for medical helipads are aviation safety, patient accessibility, and environmental acceptability.

The proposed location appears to provide two (2) obstacle-free flight paths located 180° apart and aligned approximately 345°/165° true. Preliminary analysis of the wind patterns for the area shows NE/SW and N/S winds predominate.

The alignment is also parallel to the main runway at Albion Park Airport. The powerlines that transect the site SE/NW drop down to the northwest so that it appears they will be below the desired 1:8 obstacle-free flight path gradient.

The rooftop location will give access to the critical care facilities in the subjacent structure via lift. The selection of flight paths aligned 345°T/165°T will avoid overflight of residents to the north east of the site.

For the purposes of acoustic assessment, you should model the flight paths thus aligned using a 9° approach gradient along each path. The largest helicopter types likely to use the site would be the Bell 412 and Agusta-Westland AW139 models. Frequency of use will depend upon the number of critical-care patients under treatment and should be calculated in consultation with the clinical supervisors.

Yours faithfully,

Daniel E Tyler

Daniel E Tyler, LL.M.
Managing Director
Encl