WILKINSON MURRAY

1 May 2019

WM Project Number: 14168
Our Ref: DIRDC010519 RB
Email: phil.hambly@infrastructure.gov.au

Mr Phil Hambly
Environmental Conditions & Approvals | Western Sydney Unit
Department of Infrastructure, Regional Development and Cities
111 Alinga Street
CANBERRA ACT 2600

Dear Mr Hambly

Re: Comments on Report by Eric Ancich

This letter sets out comments on the report *"Assessment Of Measured Aircraft Noise Levels Under The Existing Flight Paths of Sydney Kingsford Smith Airport With Reference To Western Sydney Airport"* by Eric J. Ancich ("the Ancich report").

The Ancich report includes measured noise levels from aircraft approaching and departing Sydney Airport at three locations and compares these with previously predicted levels from aircraft using Western Sydney Airport (now Nancy-Bird Walton Airport). The previously predicted levels are taken from the Environmental Impact Statement for Western Sydney Airport ("the EIS").

There are four separate issues with regard to the measurements presented in the Ancich report, each of which tends to increase the reported noise levels compared with those in the EIS.

1. Measurement instrumentation was set to "Fast" time-constant. All standard references for aircraft noise measurement, including Australian Standard 2021, indicate that maximum noise levels should be measured using "Slow" time-constant. The fast setting tends to increase the measurement result.

2. Maximum noise levels quoted in summary discussion in the Ancich report represent the highest levels measured during any overflight. Standard procedures for reporting maximum aircraft noise levels are that the reported level should be the mean of maximum noise levels for overflights for that aircraft type.

Points 1 and 2 are explicitly covered in Australian Standard 2021, which represents the most authoritative reference for aircraft noise measurement in Australia. Section 1.5.2 of AS 2021:2015, headed "Aircraft Noise Level" reads:

> *"The arithmetic average of the maximum sound levels occurring during a series of flyovers by a specific aircraft type and load conditions measured in A-weighted decibels [dB(A)] using the S time-weighting of a sound level meter."*

Note 2 to that section reads:

> *"Internationally, aircraft noise is measured using slow (S) time-weighting, and the extensive databases and programming algorithms used in determining aircraft noise exposure levels use data based on S time-weighted measurements. Consistent with these practices, aircraft noise measurements and assessments in Australia use S time-weighting and an average of the maximum noise levels."*

In combination, points 1 and 2 could easily result in an overestimation of 5-10 dB in reported noise levels.

3. Noise levels from aircraft on approach as reported in the Ancich report were recorded at two locations approximately 23 km north of the airport. At this point, aircraft approaching Sydney Airport will typically be at a stable height, or else be in the process of commencing their final descent. The process of maintaining stable height, and of transitioning to final descent, involves additional noise due to required thrust and flap settings.

At Western Sydney Airport, the EIS proposed that all aircraft would adopt "continuous descent approach" procedures which eliminate this additional noise. This proposal is incorporated in all predicted noise levels.

The Ancich report states (Section 4.4.1) with reference to the EIS document:

> *"Figure 10-7 of Volume -2a Chapter 10 Noise Aircraft "Concept Diagram of Continuous Descent Approach Zone of Noise Benefit" shows there is no benefit within approximately 20 km of the end of the runway. On this basis the noise level data recorded at Pymble Ladies College and Avondale Golf Course at 23 km from KSA equivalent to 19.28 km from WSA to Blacktown can be adopted as is."*

The figure referred to is reproduced below.

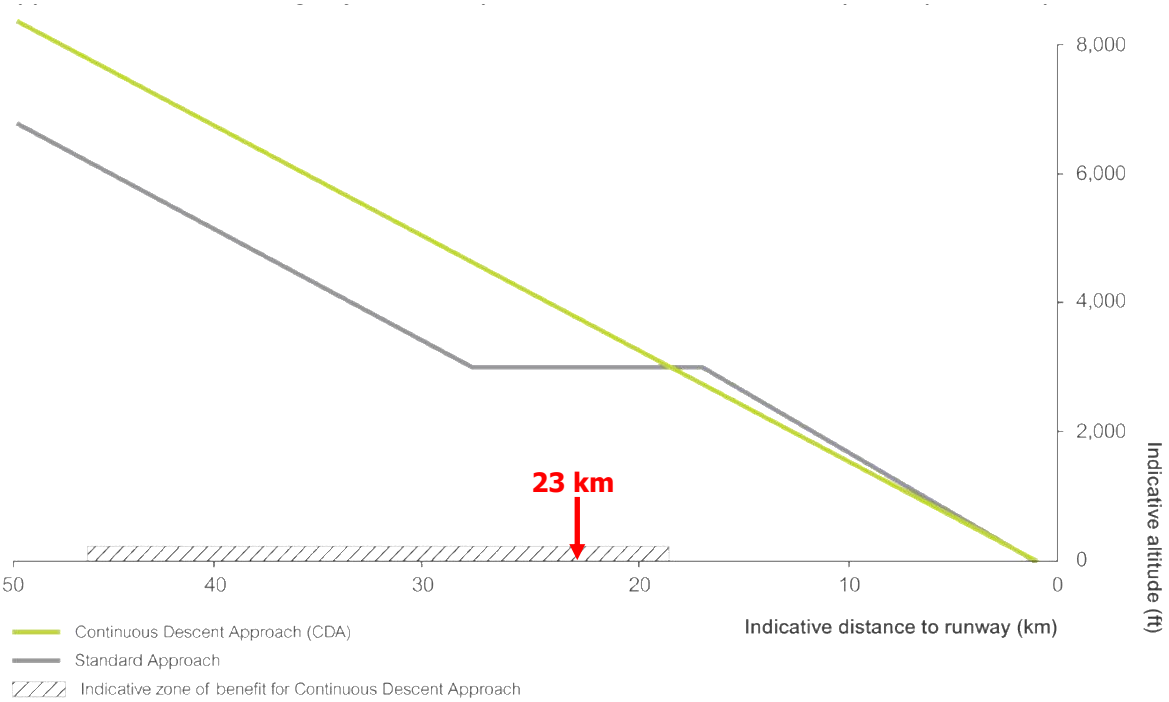


Figure 10–7 Concept diagram of continuous descent approach showing zone of noise benefit

At 23 km from the runway threshold, the figure clearly indicates a benefit from continuous descent approach, and hence that noise levels measured for Sydney Airport will be overestimates of those at Western Sydney Airport. In fact, in this area, the benefit is likely to be greatest because aircraft at Sydney are commencing the transition to final descent.

4. The Ancich report does not specifically indicate whether noise measurements were attended or unattended, nor does it provide a map or other indication of the exact measurement locations. The use of a "Sentinel On Demand" system at the two Pymble locations indicates that they were unattended. At the Mays Hill location it is not clear, although describing the measurement system as a "Brüel & Kjær Model 2250 based noise logger" suggests they were unattended.

At distances from the airport similar to those adopted in the Ancich report, the influence of extraneous noise may be very significant, and this would be exacerbated when Fast speed time constant is used. Simply aligning a recorded maximum noise level in time with an aircraft overflight does not guarantee that the recorded noise was due to the aircraft. Airservices Australia operates a sophisticated network of unattended noise monitors, using Slow speed time constant and incorporating pattern-matching algorithms to further sort aircraft from non-aircraft noise, but this group has found its system to be unreliable at distances greater than about 10 km from the airport (largely due to extraneous noise).

Figures in the Appendix to this report show noise levels, taken from the Ancich report, for two common aircraft types recorded at all three measurement locations. The range of recorded noise levels from the same aircraft type at the same location is very large – up to 15 dBA – and the difference between the highest level and the mean level is 4 – 8 dB. In addition, contrary to the statement in the conclusion of the Ancich report that "*measurement of noise generated by aircraft in flight has demonstrated that variability in the height of aircraft will result in a wide range of receiver noise levels*", there is no discernible correlation between recorded noise level and aircraft height.

These results strongly suggest the influence of extraneous noise in the higher readings recorded.

Finally, it is interesting to compare the results in the Ancich report with those from Airservices noise monitors located much closer to the airport. (Data are for the most recently-available period, October-December 2018.) Results are shown in Table 1 and Table 2. In the case of data from the Ancich report, the mean maximum levels are shown, which removes the influence of factor 2 above and reduces levels by 4-8 dBA compared with those quoted in the report.

For arrivals, even after removing the effect of factor 2, reported noise levels at 23 km are similar to or higher than those reported from the Airservices monitor at 10 km. This indicates significant additional overestimation in values in the Ancich report, presumably due to factors 1, 3 and 4 above.

For departures (for which factor 3 above is not relevant), the remaining discrepancy is less obvious, which may mean that factors 1 and 4 are less important in these results.

Table 1 Mean Maximum Aircraft Noise Levels from Arrivals

Location	Approximate distance from runway, km	L_{Amax} noise level, dBA and number of recorded operations	
		A320-232	737-838
Pymble Ladies College	23	69(1) (38)	69(1) (19)
Avondale Golf Course	23	71(1) (11)	68(1) (13)
Arirservices Hunters Hill monitor	10	68(2) (2684)	68(2) (5772)

Note (1): Fast speed
Note (2): Slow speed

Table 2 Mean Maximum Aircraft Noise Levels from Departures

Location	Approximate distance from runway, km	L_{Amax} noise level, dBA and number of operations	
		A320-232	737-838
Mays Hill	21	63(1) (9)	65(1) (16)
Arirservices Croydon monitor	8	69(2) (304)	72(2) (749)

Note (1): Fast speed
Note (2): Slow speed

Results from the Airservices monitors are consistent with the statements quoted from the EIS that:

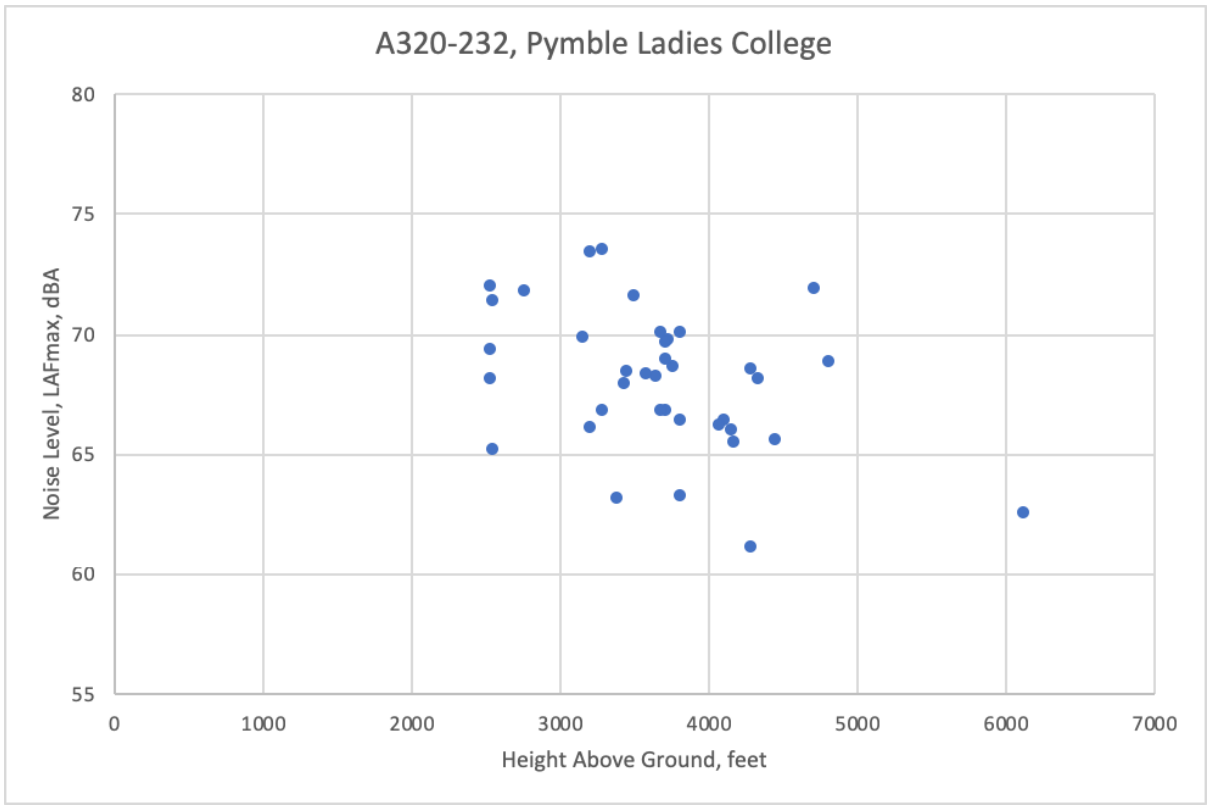
- for arrivals, the 70 dBA contour for an A320 extends 8-10 km from the runway end; and
- for departures, the 70 dBA contour for an A320 extends 5 km from the runway end.

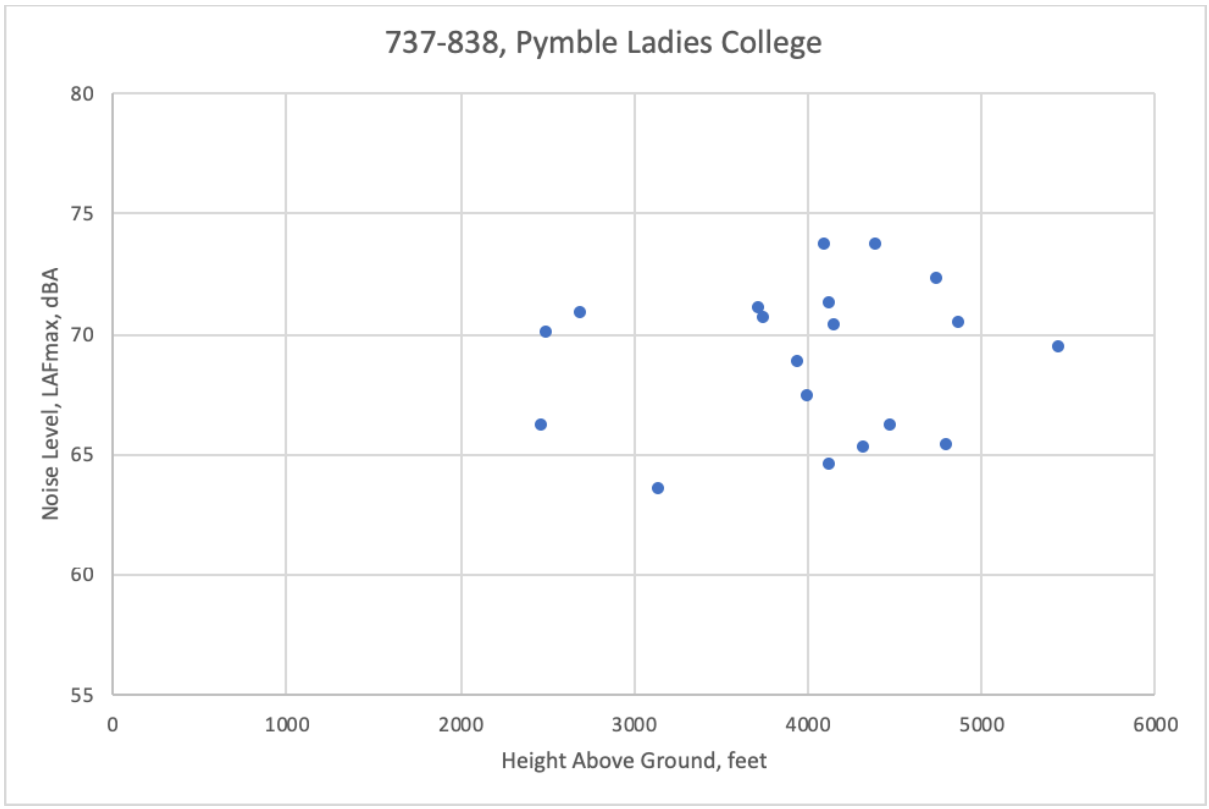
In conclusion, the effect of the four factors listed above is that noise levels quoted in the Ancich report are not comparable with predictions in the EIS for Western Sydney Airport. Noise levels in the Ancich report were not measured or reported in the standard way, ignore proposed procedural changes at Western Sydney Airport, and are likely to be affected by extraneous noise. The report offers no reason to question the validity of noise level predictions in the EIS.

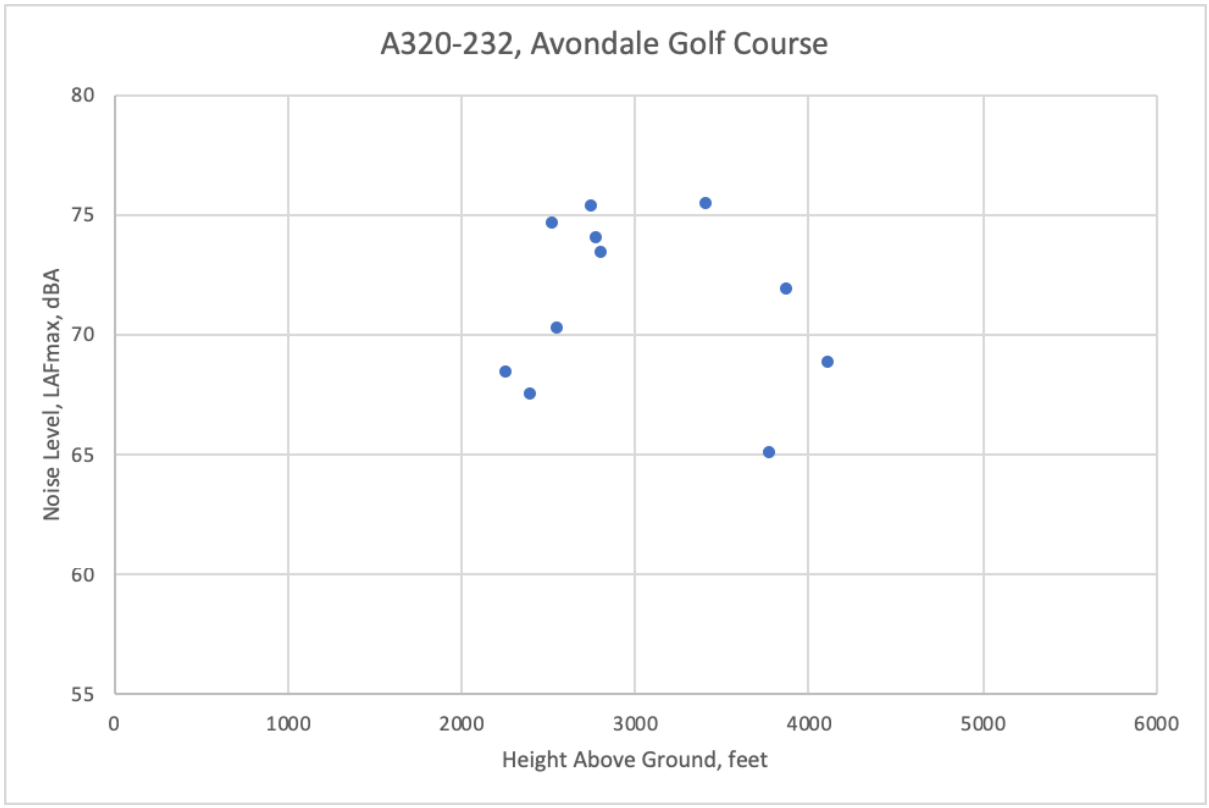
Yours sincerely
WILKINSON MURRAY PTY LIMITED

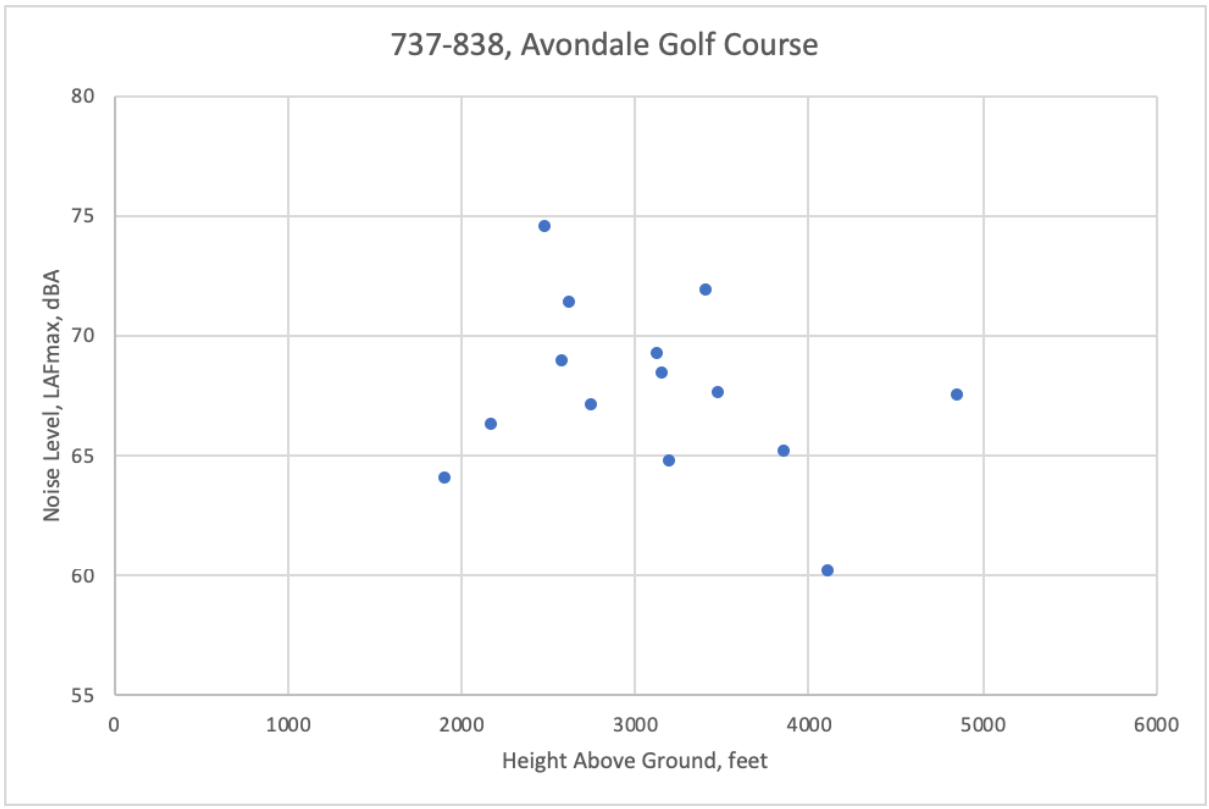
Rob Bullen
Principal

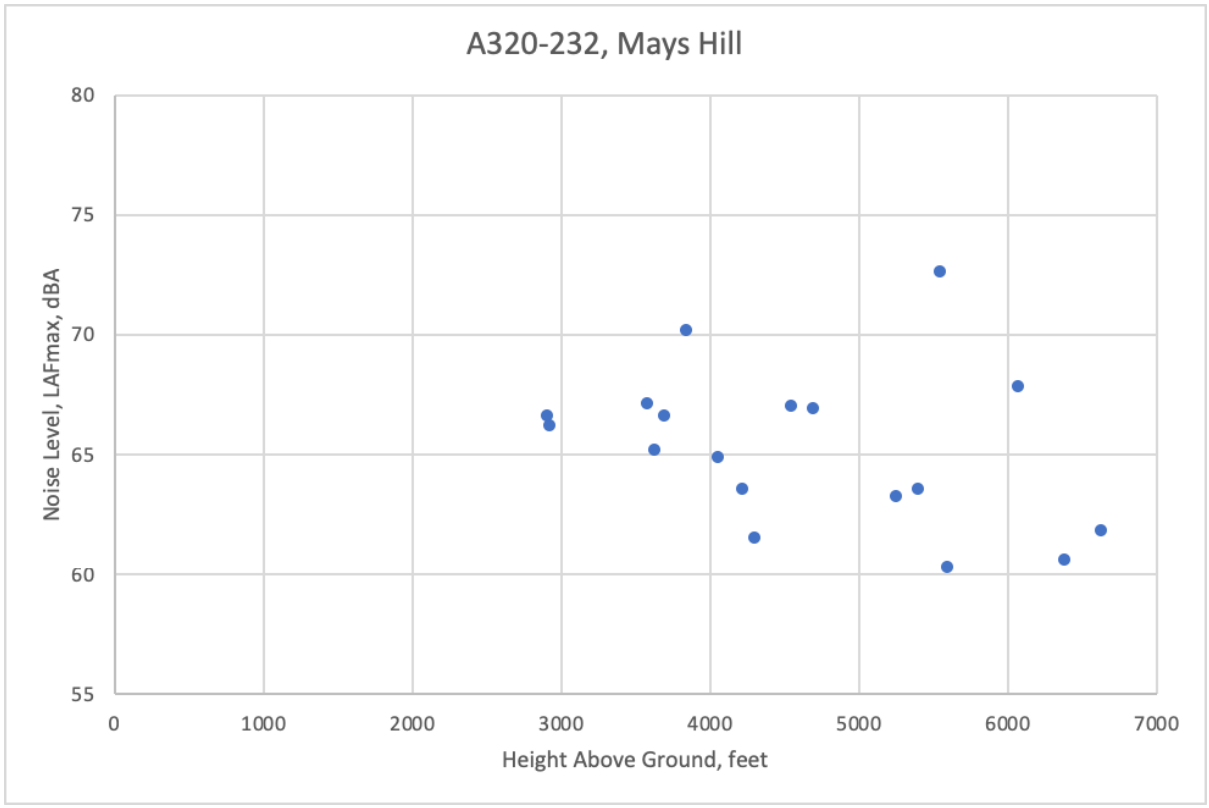
APPENDIX A

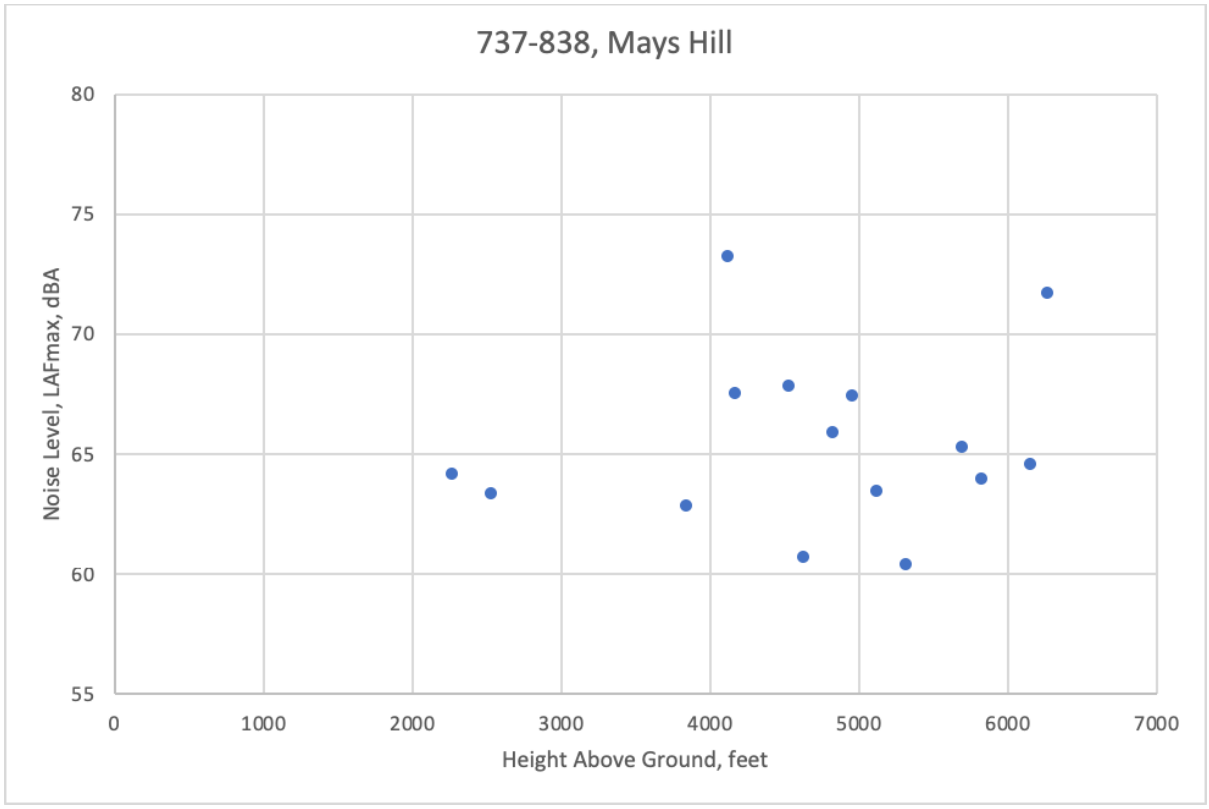

A320-232, Pymble Ladies College
Noise Level, LAFmax, dBA
80
75
70
65
60
55
0
1000
2000
3000
4000
5000
6000
7000
Height Above Ground, feet


737-838, Pymble Ladies College
Noise Level, LAFmax, dBA
80
75
70
65
60
55
0
1000
2000
3000
4000
5000
6000
Height Above Ground, feet


A320-232, Avondale Golf Course
Noise Level, LAFmax, dBA
80
75
70
65
60
55
0
1000
2000
3000
4000
5000
6000
Height Above Ground, feet


737-838, Avondale Golf Course
Noise Level, LAFmax, dBA
80
75
70
65
60
55
0
1000
2000
3000
4000
5000
6000
Height Above Ground, feet


A320-232, Mays Hill
Noise Level, LAFmax, dBA
80
75
70
65
60
55
0
1000
2000
3000
4000
5000
6000
7000
Height Above Ground, feet


737-838, Mays Hill
Noise Level, LAFmax, dBA
80
75
70
65
60
55
0
1000
2000
3000
4000
5000
6000
7000
Height Above Ground, feet