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OUR REF: 6658/22 YOUR REF: AMcD DATE: 8th February 2022.

Ms. Adrienne McDonnell,
Kilreesk Lane,
St Margarets,
Co Dublin.

adriennemacaroo@gmail.com

Re: North Runway: Up-to-date acoustic assessment.

Dear Ms McDonnell,

There are two aspects to the distance of the moving (taking-off) aircraft to your home. It's easiest to consider a notional stationary point when the aircraft is "closest" to you. Call this point X.

Point X has two aspects in relation to your home. The first is the vertical height of the aircraft over ground. The second is the offset distance to your home, this being the horizontal aspect

We are interested in the distance of the aircraft to your home at that instant. Using Pythagorus (!) we compute the square root of the sum of the square of these distances. This will yield the distance of the "line of sight" from your home to the aircraft at the point X.

I have taken the existing flight path and that of the new runway. I have taken 4 scenarios for the vertical height (altitude) of the aircraft at X and computed the distance to your home on:

a) the existing runway, and
b) the new runway.

These take into account the offset distance of the runways to your home which, in the case of the existing runway I estimate to be 1,200m and, in the case of the new runway, I estimate to be 520m.

The 4 scenarios are set out below:

	DISTANCE TO HOME (M)	
Height (M)	New Runway	Existing Runway
800	954	1,442
1,000	1,130	1,560
1,500	1,590	1,920
1,800	1,870	2,160

As the heights increase the difference between the “old” and ”new” become smaller. This is significant. In acoustics there are criteria for point sources (a fixed item such as a rockbreaker) and a line source (constant motorway traffic). The normal method of calculating the increase or decrease is to look at

the results for a doubling or halving of the distance. For a point source the variation is *about* 6 dB and a line sources is *about* 3 dB.

Matters are a little more complicated for an aircraft taking off. The frequency content (the spectrum) of the "roar" of same and the differing reduction in air of these elements are important factors insofar as the arrival level of such noise a good distance (1 – 2 kms) away is concerned.

I have reviewed the spectral content of event 11 – as measured in-bedroom. A low frequency element – best correlated with 63 Hz third octave - peaks up to some 2 to 7 seconds ***after*** the $\mathbf{L_{AFmax}}$ is achieved. The reasons behind same probably include the relative positioning of the venturi (rear) of the engines relative to your home whereas the whine (which is more closely related to the frequencies of relevance on $\mathbf{L_{AFmax}}$) occurs from the front (intake) of the engines.

Event 11 was chosen as one of the "worst" of the measured take-offs, pre-07:00; I am attaching a snip view of the time profile, the 1 second $\mathbf{L_{Aeq}}$, the $\mathbf{L_{AFmax}}$ and the 63 Hz third-octave levels.

My best estimate – allowing for the greatest proportional increase (consequent on an unusually low altitude) on the new runway and a take-off comparable to event 11 is for an increase in the envelope of 1 to 2 dB.

I have deliberately omitted any reference to bedroom windows which do not face the new flight path; while they may well enjoy some shelter from a direct line of sight to the new path this is something the DAA should have investigated.

The results of my testing to date indicate that in respect of all WHO guidance for appropriate and good in-bedroom levels, at night, with fresh air admission, the operation of the new runway, for homes such as yours or those in proximity to you, that unacceptably high levels of noise, expressed as:

- 1-hour $\mathbf{L_{Aeq}}$'s,
- 15-minute $\mathbf{L_{Aeq}}$'s,
- $\mathbf{L_{AFmax}}$, or
- $\mathbf{L_{ASmax}}$,

will all be excessively high and contra-indicated for restful and restorative sleep.

Yours sincerely,

Karl Searson
Chartered Engineer.