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## COMMENTS ON THE MEASUREMENT OF AIRCRAFT NOISE IN RELATION TO MEASUREMENTS UNDERTAKEN BY DR ERIC ANCICH AND MR DOM CARTER

Dear [REDACTED]

Report 9173-R1 by Dr Eric Ancich describes aircraft noise measurements undertaken by Dr Ancich and Mr Don Carter. It claims that the measurements contradict results presented in the Environmental Impact Statement for Western Sydney Airport ("the EIS"). This letter provides comments on those results, taking account of subsequent discussion with Dr Ancich and Mr Carter.

Also included in this letter is a brief summary of documents relating to the assessment of aircraft noise in Australia.

### **Response to Report 9173-R1**

The Western Sydney Airport EIS showed predicted noise levels in terms of a number of descriptors including  $L_{Amax}$ , N70, N60 and ANEF. The emphasis in evaluation was on N70 and N60, for reasons described below. The comments in Dr Ancich's report relate only to the  $L_{Amax}$  descriptor.

Briefly, I believe discrepancies between the measurements and EIS results are due to three factors:

1. The measurements used the "Fast" speed setting on the measurement equipment whereas the EIS predictions are for "Slow" speed (as required in standard aircraft measurement procedures);
2. The measurements quote the absolute maximum noise level recorded whereas the EIS predictions are based on an average of maximum noise levels for a specific aircraft type and operation;
3. For approaches, measurements were made at a location where aircraft procedures are not equivalent to the "continuous descent approaches" proposed for Western Sydney Airport.

With respect to point 1, I believe there is agreement that “Slow” speed setting is the appropriate measurement procedure for aircraft noise, although there is disagreement about the difference between maximum noise levels that would be obtained using “Fast” and “Slow” speed. The size of the difference could be demonstrated relatively simply using existing or newly-obtained audio recordings of aircraft operations. My experience indicates that the difference would be 2 – 5 dBA.

With respect to point 3, I believe there is also agreement that noise levels from approaches at Western Sydney Airport should be measured or calculated using the operating procedures that will be used at WSA. Demonstrating the likely noise levels at WSA would require measurements from aircraft executing continuous descent approaches (while keeping in mind that differences occur between measurement sites). A recent well-documented study at Louisville Airport, U.S.A. indicates that introducing continuous descent approaches resulted in a reduction of 4-7 dBA in maximum noise levels.

This leaves point 2, which is related to the meaning of the maximum noise level descriptor identified as  $L_{Amax}$  in the EIS. I can confirm that in this EIS and others, maximum noise levels are described in terms of an average of maximum noise levels from a specific aircraft type performing a specific operation, and not by the highest maximum level that would be measured during any such operation. A remaining question is whether wording in the EIS made this sufficiently clear.

The EIS indicates (Section 10.5.3):

*Single-event noise contours depict the maximum ( $L_{Amax}$ ) noise levels resulting from a single operation of a specific aircraft type on all applicable arrival or departure flight paths.*

This is admittedly unclear – single operations by a specific aircraft type will result in a range of maximum noise levels, and exactly how this range is “depicted” is not stated. If the intention had been to describe only the highest of these maximum levels the wording would presumably have been “...the **highest** maximum ( $L_{Amax}$ ) noise **level** resulting from **any** single operation ...”. However it would certainly have been clearer if the process of averaging these maximum levels had been explicitly stated. Confusion could have been avoided by the insertion of two words –

*“Single-event noise contours depict the **average of** maximum ( $L_{Amax}$ ) noise levels ...”*

Nevertheless, the following paragraph and other text in the EIS indicates that the maximum levels presented result from use of the INM model, and as pointed out by Dr Ancich this model predicts average maximum noise levels. (Prediction of absolute maximum noise levels within reasonable error bonds would not be possible.)

This usage is also consistent with the description of maximum aircraft noise levels in AS 2021, as described below, and I believe it is consistent with generally-understood usage in cases where a series of different maxima are to be combined.

In summary, I do not believe there is any contradiction between Dr Ancich's results and those in the EIS when the three factors listed above are considered, although I concede that in future reports the definition of the  $L_{Amax}$  noise descriptor should be clarified.

## **Documents Describing the Assessment of Aircraft Noise in Australia**

### *Australian Standard 2021*

This Standard is concerned with land use planning – that is, with bringing new residents to existing aircraft noise – rather than with assessment of the impact of new aircraft noise, as required in the EIS. The acceptability of building sites is assessed using the ANEF descriptor. I regard the advice in this Standard as definitive for land use planning, but of only marginal significance in the assessment of proposed new or altered aircraft noise. (It is useful only insofar as it delineates which land areas would be available for new development in the future.)

AS 2021 also makes use of a descriptor called the “aircraft noise level”, for purposes unrelated to the description of noise impacts. The descriptor is defined as:

*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.*

The “aircraft noise level” is often identified with the  $L_{Amax}$  descriptor, although AS 2021 does not use that term.

### *Standards Australia Handbook : “Acoustics—Guidance on producing information on aircraft noise”*

This handbook provides a description of the information that should be provided to residents and potential residents to allow them to better understand aircraft noise impacts. The most important recommended descriptors are N60 and N70, and this is reflected in the prominence given to those units in the EIS. However, other units are also discussed, including a unit called  $L_{Amax}$ . This is described very similarly to the description in the EIS, and unfortunately the lack of clarity in its definition, as described above for the EIS, remains in this document.

### *Expanding ways to describe and assess aircraft noise*

This report, dating from 2000, represents the first attempt to document alternative noise descriptors to ANEF and similar units, for use in the assessment of new or changing aircraft noise. It describes the N70 and N60 descriptors, which still form the basis of assessments today, as well as other units which are not now in common use. It does not mention a descriptor of single-event aircraft noise levels.

### *National Airports Safeguarding Framework, Guideline A*

This more recent document describes land use planning guidelines that are intended to extend the range of areas covered under the guidelines in AS 2021. The metrics used are ANEF, N70, N65 and N60. While I strongly support the provision of information using those descriptors to potential residents over a wide area, I do not support the use of the criteria in this document as formal land use planning guidelines. The document makes no mention of  $L_{AMax}$  noise levels.

### *Environmental Impact Statements*

Since the release of the “Expanding ways ...” document, the practice of aircraft noise assessment in Australia has grown up through the production of Environmental Impact Statements for major projects. These include:

- runway extension at Gold Coast Airport;
- additional runway assessments for Brisbane, Perth and Melbourne airports;
- runway lengthening and re-configuration at Sunshine Coast Airport; and
- new Western Sydney Airport.

All these documents use (at least) N60 and N70 descriptors to investigate both overall noise impacts and differential impacts between various airport use options. Most also include single-event noise descriptors (always an average of maximum noise levels from similar events).

More recent documents also include increasingly sophisticated measures of noise exposure, including representations of daily and seasonal variation in numbers of movements, in response to public concerns. These concerns typically relate to numbers and times of operations rather than to absolute noise levels. Other recent innovations include on-line provision of information for specific locations, and I expect that further additions will also be made to the information available to residents in forthcoming assessments.

The EIS for Western Sydney Airport was produced using the best-available calculation tools, and uses noise descriptors and assessment methodology developed in Australia over a number of years on similar projects. The approach has been independently assessed, and accepted by stakeholders as providing useful and understandable information on aircraft noise impacts.

The methodology and presentation in this and other aircraft noise assessments is designed to provide objective information allowing informed decisions on the noise impacts of proposals, including alternative operating modes and procedures. Important decisions regarding such alternatives are still to be made at WSA, and will require similar detailed analysis to properly inform all stakeholders.

I trust that this information is helpful. If you require further information or clarification, please do not hesitate to contact me.

Yours sincerely,

**ROB BULLEN CONSULTING**

A handwritten signature in black ink, appearing to be 'Rob Bullen', with a stylized, cursive-like script.

**Rob Bullen**  
Principal