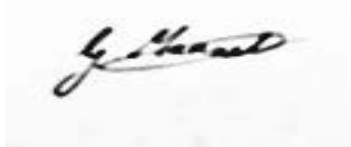


USAL-SoNA1: Technical Review of Phase 1 of the Survey of Noise Attitudes (SoNA) studies.

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Executive Summary

Scope

- This report includes the technical review of the analysis carried out by the Civil Aviation Authority (CAA) for the Survey of Noise Attitudes (SoNA) studies.
- The CAA Environmental Research and Consultancy Department (ERCD) has analysed social survey data in conjunction with noise modelling to draw conclusions on attitudes to aircraft noise
- The Department for Transport (DfT), the client, intend to use these conclusions to help their management of noise at the designated airports, and for developing policies relating to aircraft noise.
- This technical review covers the **Phase 1: SoNA1 Annoyance 2nd Edition and Sleep studies**.
- This report presents the findings of the technical peer review of the calculations which underpin the analysis presented in SoNA1 Annoyance 2nd Edition and Sleep studies.

Objectives

- Assure DfT, the client, that the analysis has been undertaken accurately and meet relevant standards.
- Assure the studies' audience, which comprises academics, community, industry and other government stakeholders, that the conclusions drawn are reliable and based on robust analysis.

Conclusions

- These reviewers have reviewed the noise dose analysis and the master dataset (including both social survey output data and noise modelling results).
- These reviewers have gone through all the calculations and datasets used in the Phase 1: SoNA1 Annoyance 2nd Edition and Sleep studies.
- **These reviewers are confident that the analyses undertaken are accurate, reliable and robust**, and meet standard practice in the field.
- Some recommendations are included to improve the noise validation of prediction model (ANCON) for new aircraft entering into service, and to quantify the uncertainty of noise dose calculations based on logarithmically averaged noise metrics.

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1. Review of noise dose analysis

1.1 Underlying noise validation process

Appendix A in the SoNA Peer Review scope document (attached) details the methodology for noise validation.

- Extraction of radar data and noise events: Radar data and noise events are extracted from the Airport Noise and Flight Track Monitoring System (ANOMS). Noise events are extracted for the summer period (16 June to 15 September inclusive) and processed separately for Arrival and Departure operations. The data in each noise event dataset include operation number (opnum), monitor ID, arrival/destination airport, noise levels (in terms of SEL(A) and L_{Amax} metrics) and runway. Full process covered in detail in peer review meetings with CAA.
- Generation of aircraft vertical profiles:
 - (1) The closest point between the aircraft and noise monitor (noise receptor) is calculated for each radar track and for each noise monitor. This calculation is made using CAA's proprietary software.
 - (2) The noise events extracted and the geometry between the aircraft and noise monitor are linked by the unique operation number and noise monitor ID.
 - (3) Noise events that do not meet the acceptance criteria (see attached SoNA Peer Review scope document for full details) are discarded. For instance, noise events are discarded if the angle formed between receptor on the ground and aircraft source (elevation angle) is less than 60 degrees. This is done to avoid noise events with small elevation angles, and therefore, highly affected by the effects of the ground in the sound propagation.
 - (4) SEL(A) and L_{Amax} levels of each event are corrected to an "under the flight path" position using standard lateral attenuation rules (if the noise monitor is not beneath the flight path).
 - (5) Using the dataset containing all noise events extracted, a logarithmically averaged SEL(A) and L_{Amax} is calculated for each aircraft model type, monitor and runway combination.
 - (6) The logarithmically averaged SEL(A) and L_{Amax} are corrected to account for the height of the monitor (measurements are assumed to take place in a flat surface, as ANCON accounts for terrain in noise contour calculations). After this correction, the logarithmically averaged SEL(A) and L_{Amax} are linked to the appropriate distance from SOR (start of roll, for departure operations) or distance to Threshold (for arrival operations).