

**OCCUPATIONAL AND ENVIRONMENTAL
MEDICINE WING**

NOISE AND VIBRATION DIVISION

Report: OEM/27/14

Dated June 2014

A REPORT ON AN ENVIRONMENTAL NOISE SURVEY
OF AIRCRAFT ACTIVITY AT RAF VALLEY AND RAF
MONA

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NOISE AND VIBRATION DIVISION**

ROYAL AIR FORCE CENTRE OF AVIATION MEDICINE

Report No: OEM/27/14

**A REPORT ON AN ENVIRONMENTAL NOISE SURVEY OF AIRCRAFT ACTIVITY AT
RAF VALLEY AND RAF MONA**

EXECUTIVE SUMMARY

1. The Noise and Vibration Division was tasked by RAF Valley Station Environmental Health Technician [REDACTED] to carry out a Noise Amelioration Scheme (Military) assessment of aircraft activity at RAF Valley and RAF Mona.
2. Aircraft Movement numbers were collected for the period 01 Aug 11 to 01 Jul 12. Helicopter movements during this period are included for RAF Valley assessment but not for RAF Mona assessment, due to data being not available. Engine ground runs information was not provided and therefore are not included in this assessment. The assessment does not include movements from RAF Mona private flying school.
3. Information was gathered from Ascent flight training, Air Traffic Control and Operations Wing regarding aircraft movements, flight tracks and aircraft profile information. From this information Average Daily Movement figures for each aircraft type for each location were calculated.
4. Using the Federal Aviation Administration's Integrated Noise Model, 16-hour L_{Aeq} noise contours were produced. These contours were reviewed by the Defence Safety and Environment Authority and administrative adjustments made to extend the noise contour in specific areas.
5. It is recommended that the administrative adjusted 72, 66 and 63 dB $L_{Aeq,16hr}$ contours should be used as the basis for the Noise Amelioration Scheme (Military) at RAF Valley and RAF Mona.

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Author: [REDACTED]

INTRODUCTION

1. The Noise and Vibration Division was tasked by RAF Valley Station Environmental Health Technician (SEHT) [REDACTED] at Reference A, to carry out a Noise Amelioration Scheme (Military) (NAS(M)) assessment, as detailed at Reference B, of aircraft activity at RAF Valley and RAF Mona.

BACKGROUND

2. RAF Valley and RAF Mona are situated in the island of Anglesey, Wales.

3. RAF Valley has two designated runways. Runway 13/31 is 2290m long and 46m wide and runway 01/19 is 1571m long and 46m wide. Due to prevailing meteorological conditions, the dominant aircraft movements take place on runway 13/31 with an average 68% share of movements; runway 01/19 has an average 32% share of movements.

4. RAF Mona has one main designated runway 04/22, which is 1666m long and 46m wide and acts as a relief landing ground.

5. RAF Valley is home to the No. 4 Flying Training School which takes RAF and Royal Navy pilots from 1FTS at RAF Linton-on-Ouse and trains them to fly fast jets, prior to training on an Operational Conversion Unit. RAF Valley is also home to 'C' Flight of 22 Sqn with Sea King helicopters.

6. There is no previous Noise Amelioration Scheme (Military) assessment of aircraft activity at RAF Valley and RAF Mona.

RELEVANT LEGISLATION

7. The Secretary of State's policy statement on health, safety and environmental protection requires that adverse effects on the environment are minimised and where defence has exemptions derogations or disapplications from environmental protection legislation, departmental arrangements that produce outcomes that are so far as reasonably practicable, at least as good as those required by UK legislation. Defence is bound by the majority of environmental protection legislation applicable to environmental noise including those covering protected species and habitats. However, defence does have an exemption from elements of statutory nuisance in the Environmental Protection Act (1990); that exemption includes "noise emitted from premises so as to be prejudicial to health or nuisance". To meet Secretary of State's policy commitments to take

all reasonable steps to minimise adverse effects from environmental noise and put in place arrangements that produce outcomes that are, so far as is reasonably practicable, at least as good as those required by legislation to manage the environmental noise produced by defence activities.

8. Reference B was written to satisfy Planning Policy Guidance 24 (PPG24) at Reference C. PPG24 uses similar but not identical noise levels to the NAS(M). PPG 24 has now been withdrawn and Reference D has partially replaced it.

9. Reference B details MOD Environmental Policy. With regards to Environmental Noise, in particular aircraft operations, the MOD has a Noise Amelioration Scheme (Military) (NAS(M)) which is introduced on an airfield by airfield basis. Its aim is to compensate those people living in the immediate vicinity of military airfields in the United Kingdom and who are affected by noise from the activity. NAS(M) is based on the following criteria:

- a. Offer to purchase residential properties exposed to aircraft noise of 72 dB(A) $L_{Aeq,16hr}$ or more.
- b. Offer to install an acoustic insulation package:
 - i. For residential properties exposed to aircraft noise of 66 dB(A) $L_{Aeq,16hr}$
 - ii. For noise sensitive areas such as schools/colleges, hospitals and care homes exposed to aircraft noise of 63 dB(A) $L_{Aeq,16hr}$

FLIGHT DATA COLLECTION

10. Information regarding aircraft performance, flight paths and flight variables were obtained from RAF Valley Military Flight Information Publication document (MilFLIP) at Reference E and discussions with the relevant aircrew, Ascent flight training, Air Traffic Control and Operations Wing. Data collected for the period 01 Aug 11 to 01 Jul 12 has been used in this assessment. Helicopter movements during this period are included for the assessment of RAF Valley but not for the assessment of RAF Mona due to data on helicopter types and manoeuvres were not available. Engine ground runs information was not provided and therefore are not included in this assessment.

11. Due to noise data not being available for Hawk T2, all Hawk aircrafts have been modelled utilising Hawk T1 Noise Power Distance data in the Federal Aviation Administration's Integrated Noise Model 7.0 (INM). Separate flight profile information for the Hawk T1 and Hawk T2 have been inputted into the noise model.

12. The airfields visual circuit direction is varied whenever possible and is flown 1000 ft above ground level.

MOVEMENTS REVIEW

13. RAF Valley and RAF Mona is operational for 365 days per year. Across all RAF flying stations the average number of flying days is 220 per annum. This average takes into account annual leave, weekends and public holidays. It does not take into account extended periods of poor weather, extended periods of aircraft unserviceability or extended aircraft deployments away from the station. To be in line with other RAF stations, the total annual movement figures for each aircraft type are divided by 220 to produce the expected aircraft movements on an average flying day. This is known as the Average Daily Movements (ADM) figure.

14. Modelled aircraft comprises of 92% of the total movements at RAF Valley. Other aircraft comprises of 8% of total movements at RAF Valley. Aircraft circuit manoeuvres require an ADM figure of 1.00 or above to allow input into the INM 7.0, which was used to model noise contours. The 8% of visiting aircraft to RAF Valley are not included in the model because their individual manoeuvre frequencies are below this.

15. Modelled aircraft comprises of 66% of total movements at RAF Mona. These are modelled as Hawks T1 aircraft with profile data for Hawk T1 and Hawk T2 respectively. Helicopter movements comprise 34% of total movements at RAF Mona. However helicopter movements are not included in the assessment for RAF Mona due to data not being available.

16. The assessment does not include movements from RAF Mona private flying school.

17. No movements of Roller / Overshoot were recorded. However observations of fast jet approaches have shown that fast jet aircraft perform an overshoot then climb back into a circuit before making a landing. Therefore an additional overshoot has been included for every recorded approach by fast jets.

18. RAF Valley and RAF Mona Air Traffic Control (ATC) logs provided all station aircraft movement information. ATC logs also provided details of runway direction and usage. Table 1 shows the total calculated ADM numbers for the period 01 Aug 11 to 01 Jul 12.

Table 1 – Calculated Average Daily Movements for Aug 11 to 01 Jul 12 at RAF Valley

Aircraft Type	Take-Off/ Landing	Roller / Overshoot
SeaKing	5.23	No Data Available
Griffin	6.16	No Data Available
A139	5.10	No Data Available
D228	1.39	1.39
Hawk T1	22.54	22.54
Hawk T2	11.62	11.62

Table 2 – Calculated Average Daily Movements for Aug 11 to 01 Jul 12 at RAF Mona

Aircraft Type	Take-Off/ Landing	Roller / Overshoot
Helicopters	Data not provided	No Data Available
Fast jets (predominately Hawk T1 and T2)	25.87	25.87

19. When an aircraft is going to perform an overshoot or roller it approaches the airfield as if it is going to land. Overshoots are performed when an aircraft enters the landing pattern and continues straight down the line of the runway before climbing again into the circuit. A roller is similar however it involves the aircraft touching its wheels onto the ground and rolling down the runway before accelerating and climbing again into the circuit. Therefore all circuit manoeuvres are modelled as rollers as it is the worst case scenario for noise.

ANALYSIS

20. INM is an internationally recognised noise prediction package and is used extensively within the UK for civil/commercial aircraft operations. INM 7 is the latest version which allows a 3 dimensional geometric model to be constructed including the runway, flight tracks, flight profiles, ground heights and receiver(s). Aircraft noise models work by taking a core data set of aircraft Noise-Power-Distance source noise levels and then predicting the noise impacts beneath the flight track using the flight profiles of the aircraft.

21. Information regarding aircraft performance, flight paths and flight variables of aircraft based at RAF Valley and RAF Mona were obtained from Reference E and Reference F, supported by discussions with the aircrew of each aircraft type, Ascent flight training, Air Traffic Control and Operations Wing.

22. For modelled visiting aircraft the standard information regarding aircraft performance and flight variables built into INM were used.

23. Administrative adjustments are extensions of the noise contours intended to smooth regions of the contour where there are significant variations in noise levels in small areas. Where the noise contour passes through areas of housing or near to noise sensitive buildings (i.e. schools, nursing homes, hospitals etc.) then an administrative adjustment will be made to extend the noise contour to a natural break (such as a road, river or empty land etc.) An administrative adjustment always extends the area covered by the contour. Administrative adjustments are made by the Defence Safety and Environment Authority.

ASSUMPTIONS

24. All departing aircraft have been modelled as using standard instrument departures (SIDs) as published in Reference F. The percentage usage split of each SID is not recorded therefore it was assumed that each SID was used equally. All approaching aircraft are modelled as having taken either the published precision approach procedure or the category A/B Instrument Landing System approach with an equal split between the two.

RESULTS

25. Annex A presents the 72, 66 and 63 dB $L_{Aeq,16hr}$ unadjusted noise contours. This is the direct output from INM 7.0. The contours consider noise from aircraft only; it may be that in any particular area there may be other noise sources such as busy roads, railway lines etc that dominate the noise environment.

26. Annex B presents the 72, 66 and 63 dB $L_{Aeq,16hr}$ administrative adjusted noise contours. The contours consider noise from aircraft only; It may be that in any particular area there may be other noise sources such as busy roads, railway lines etc that dominate the noise environment.

RECOMMENDATIONS

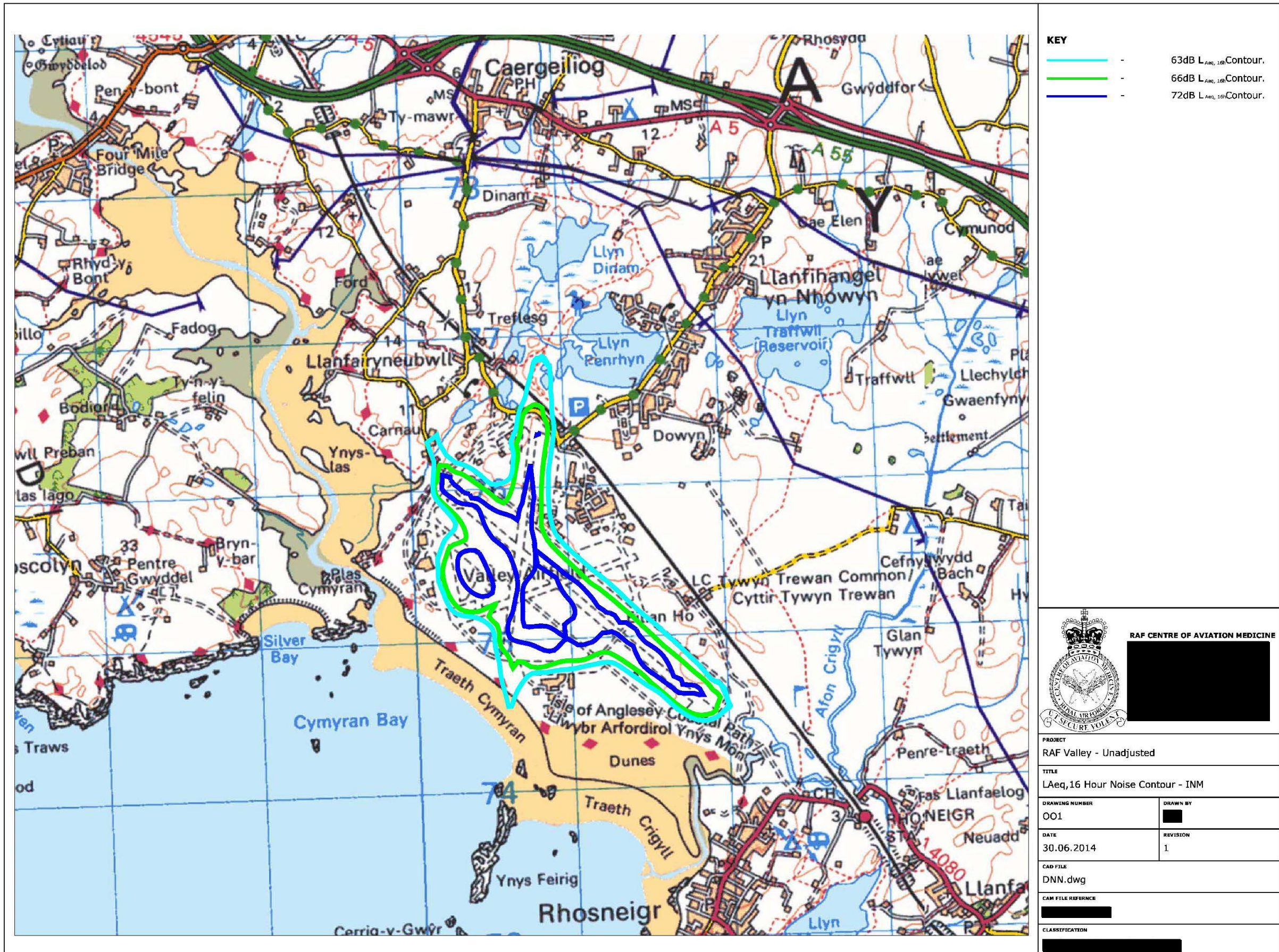
27. It is recommended that the 72, 66 and 63 dB $L_{Aeq,16hr}$ administrative adjusted noise contours detailed at Annex B, should be used as the basis for the NAS(M) at RAF Valley and RAF Mona.

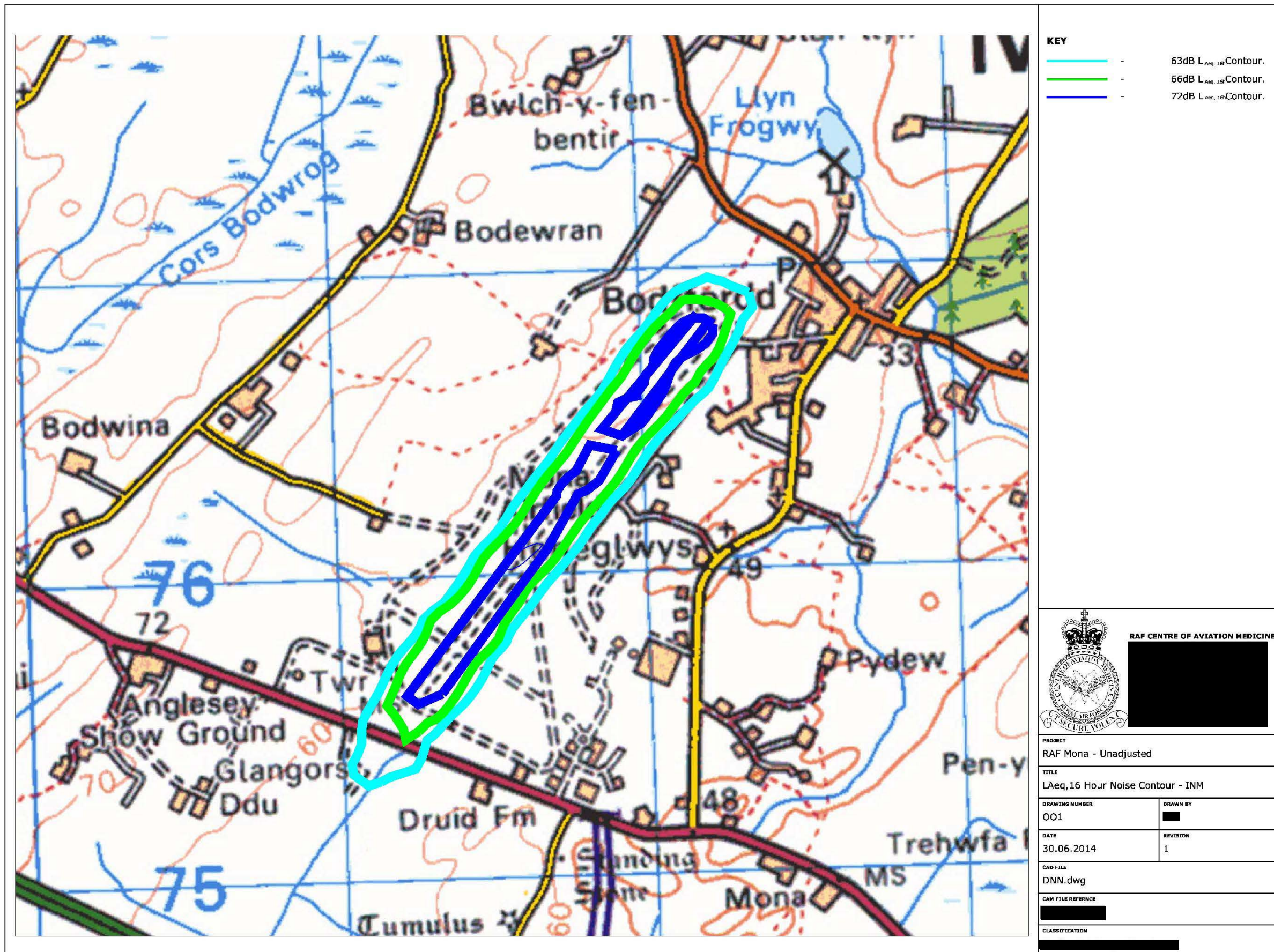
ACKNOWLEDGEMENTS

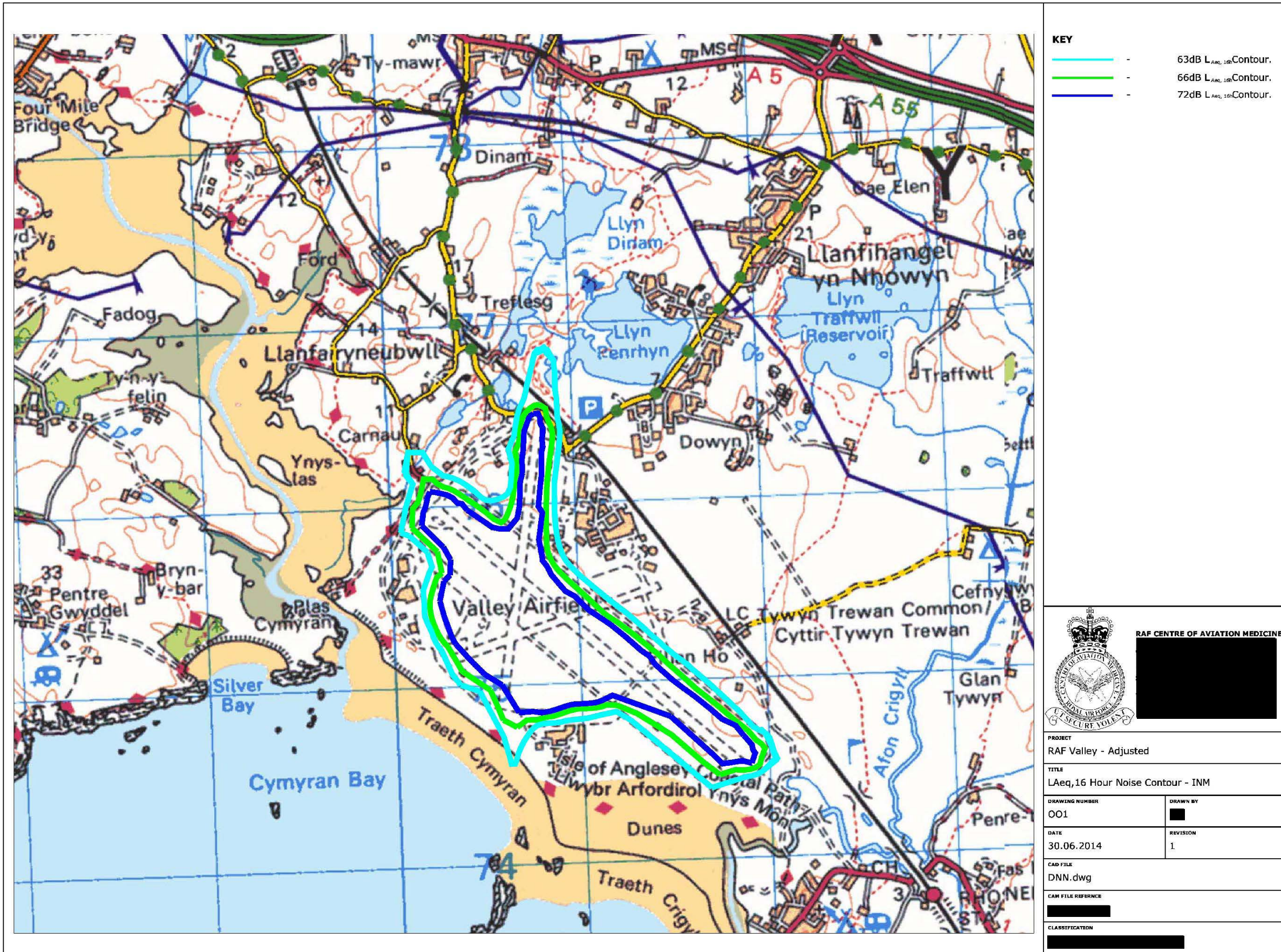
28. The Noise and Vibration Division would like to thank the personnel of RAF Valley who contributed information, in particular RAF Valley SEHT [REDACTED], who assisted with detailed local information that enabled the production of the contours.

REFERENCES

- A. [REDACTED]
- B. JSP 418, Volume 2, Leaflet 04.1. Dated June 2010.
- C. Planning Policy Guidance: Planning and Noise. PPG 24. Department of the Environment, dated Sep 94.
- D. Noise Policy Statement for England. Department of Environment, Food and Rural Affairs, dated 15 Mar 10.
- E. MilFLIP No AD 2- EGOV, 20 Sep 12
- F. RAF Valley Flying Order Book, Issue 6, 2012.

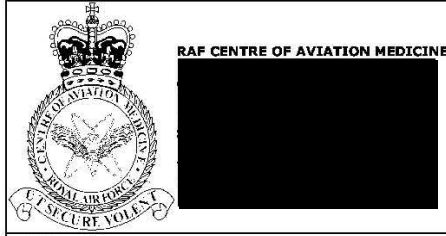






KEY

	-	63dB L _{Aeq,16h} Contour.
	-	66dB L _{Aeq,16h} Contour.
	-	72dB L _{Aeq,16h} Contour.



PROJECT RAF Valley - Adjusted	
TITLE L _{Aeq,16} Hour Noise Contour - INM	
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DATE 30.06.2014	REVISION 1
CAD FILE DNN.dwg	
CAM FILE REFERENCE [Redacted]	
CLASSIFICATION [Redacted]	

