

**OCCUPATIONAL AND ENVIRONMENTAL
MEDICINE WING**

NOISE AND VIBRATION DIVISION

Report: OEM/81/14 Dated December 2014

A REPORT ON AN ENVIRONMENTAL NOISE SURVEY
OF AIRCRAFT ACTIVITY AT RAF CONINGSBY

Approved for publication



Head of the
Noise and Vibration Division

Copy Number:

Date

CONDITIONS OF RELEASE

This information is Crown Copyright and the intellectual property rights for this publication belong exclusively to the Ministry of Defence (MOD). No material or information contained in this publication should be produced, stored in a retrieval system or transmitted in any form outside MOD establishments except as authorised by both the sponsor and the MOD where appropriate.

**OCCUPATIONAL AND ENVIRONMENTAL MEDICINE WING
NOISE AND VIBRATION DIVISION**

ROYAL AIR FORCE CENTRE OF AVIATION MEDICINE

Report No: OEM/81/14

**A REPORT ON AN ENVIRONMENTAL NOISE SURVEY OF AIRCRAFT ACTIVITY AT
RAF CONINGSBY**

EXECUTIVE SUMMARY

1. The Noise and Vibration Division was tasked by [REDACTED] to carry out a Noise Amelioration Scheme (Military) assessment of aircraft activity at RAF Coningsby.
2. RAF Coningsby is home to three Typhoon squadrons as well as 41(R) Test and Evaluation Squadron and the Battle of Britain Memorial Flight.
3. Average Daily Movement numbers were calculated from Air Traffic Control movement logs for the period Feb 11 to Jan 12.
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 Coningsby.

DISTRIBUTION LIST

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

*Electronic copy

CONTENTS

<u>SECTION</u>	<u>PAGES</u>
Introduction	1
Background	1
Relevant Legislation	1
Flight Data Collection	2
Movements Review	2
Analysis	3
Assumptions	4
Results	4
Recommendations	4
Acknowledgements	4
References	5
ANNEXES	
A. Unadjusted $L_{Aeq,16hr}$ Contours	A-1
B. Administrative Adjusted $L_{Aeq,16hr}$ Contours	B-1

OCCUPATIONAL AND ENVIRONMENTAL MEDICINE WING

NOISE AND VIBRATION DIVISION

ROYAL AIR FORCE CENTRE OF AVIATION MEDICINE

Report No: OEM/81/14

A REPORT ON AN ENVIRONMENTAL NOISE SURVEY OF AIRCRAFT ACTIVITY AT RAF CONINGSBY

Author: [REDACTED]

INTRODUCTION

1. The Noise and Vibration Division was tasked by [REDACTED] to carry out a Noise Amelioration Scheme (Military) (NAS(M)) assessment, in accordance with Reference A, of aircraft activity at RAF Coningsby.

BACKGROUND

2. RAF Coningsby is situated in the English county of Lincolnshire with the villages of Coningsby to the north and Tattershall to the north-west of the station.

3. RAF Coningsby has one main runway designated 25/07 which is 2744m long and 61m wide. The dominant aircraft movements take place on runway 25 with 74% of movements and 26% on runway 07.

4. RAF Coningsby is home to three Typhoon squadrons as well as 41(R) Test and Evaluation Squadron and the Battle of Britain Memorial Flight (BBMF).

5. The Typhoon aircraft is equipped with twin Eurojet EJ200 turbojet engines, capable of producing 20,000lbs of thrust.

6. In addition to Typhoon aircraft, RAF Coningsby also has Tornado GR4 aircraft which is flown by 41(R) Squadron and Lancaster, Spitfire, Hurricane, Chipmunk and Dakota aircraft which are operated by the BBMF. RAF Coningsby also hosts a number of visiting aircraft including fast jets such as Tornado GR4 and Hawk.

7. The last environmental noise survey of RAF Coningsby is detailed in Reference B.

RELEVANT LEGISLATION

8. 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.

9. Reference A 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.

10. Reference A 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

11. Information regarding aircraft performance, flight paths and flight variables were obtained from RAF Coningsby Military Flight Information Publication document (MilFLIP) at Reference E and discussions with the relevant aircrew.

12. Circuits flown by fast jet aircraft are to the south of station at a height of 1000ft. BBMF aircraft circuits are flown to the north of the station at a height of 500ft for Lancaster, Dakota, and Chipmunk aircraft and 800ft for Spitfire and Hurricane aircraft. All aircraft depart with a straight climb before turning to avoid overflying the local towns and villages (Reference F).

MOVEMENTS REVIEW

13. The average daily movement (ADM) numbers were calculated from Air Traffic Control (ATC) movement logs for the period Feb 11 to Jan 12. Manoeuvres recorded by the ATC movement logs are not divided into rollers or overshoots. Due to Typhoon deployment from Mar to Sep 11 a 6% adjustment has been made to the number of Typhoon aircraft movements within those months in order to get a more representative ADM. The adjustment was derived from the total number of fixed wing aircraft movements made from Jan 10 to Jan 11. Table 1 below shows the calculated ADM numbers which are based on a flying year of 220 days. Helicopter movements are not included in this review. This is due to the number of helicopter movements recorded by RAF Coningsby being insignificant and therefore having little impact on the contour. Table 2 contains the ADM figures for the period Nov 1988 to Jan 1989 from Reference B converted to the same format to allow a direct comparison. Table 3 shows the percentage change for each identifiable type.

Table 1 – Calculated Average Daily Movements for 12 Month Period Feb 11 to Jan 12

	Departure/ Approach	Roller/ Overshoot
Typhoon	20	50
Other Fast Jets	2	6
BBMF	2	2

Table 2 – Average Daily Movements for 12 Month Period Nov 1988 to Jan 1989

	Departure/ Approach	Roller	Overshoot
Tornado	29	17	13

Table 3 – Percentage Change in Average Daily Movement Figures

	Departure/ Approach	Roller/ Overshoot
Fast Jets	-24%	+87%

14. 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.

ANALYSIS

15. Noise contours for the station are produced using the Federal Aviation Administration's Integrated Noise Model (INM) which 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, ground heights and receiver. Aircraft noise models work by taking a core data set of aircraft Noise-Power-Distance (NPD) source noise levels and then predicting the noise impacts beneath the flight track using the flight profiles of the aircraft.

16. Typhoon aircraft were modelled from measured NPD source noise levels given in Reference G. The majority of fast jet movements at RAF Coningsby during the logging period were Tornado GR4 aircraft; therefore all visiting fast jets have been modelled using the Tornado flight variables built into INM.

17. No BBMF aircraft noise data exists within INM, therefore all BBMF aircraft have been modelled using noise levels and flight variables of GASEPV. GASEPV is one of three aircraft profiles used by the INM for the purpose of noise modelling; it represents a generic high performance single engine piston aircraft with a variable pitch propeller. This has been selected as a modelling substitute to categorise flights from the Spitfire, Hurricane and Chipmunk. Movements of Lancaster and Dakota aircraft are minimal [and would have no impact on the contour] over the logging period and have therefore not been modelled.

18. 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

19. All departing aircraft have been modelled as using standard instrument departures (SIDs) as published in Reference E. 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.
20. All overshoots and rollers are recorded as rollers. This is due to rollers being more consistent to model, as an overshoot can be performed at a range of altitudes.
21. 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.
22. Engine ground running of aircraft at RAF Coningsby has not been included in this assessment as the data was not available. This is due to the data not being collected by RAF Coningsby.

RESULTS

23. Annex A presents the 72, 66 and 63 dB $L_{Aeq,16hr}$ unadjusted noise contours as produced by INM. 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.
24. 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

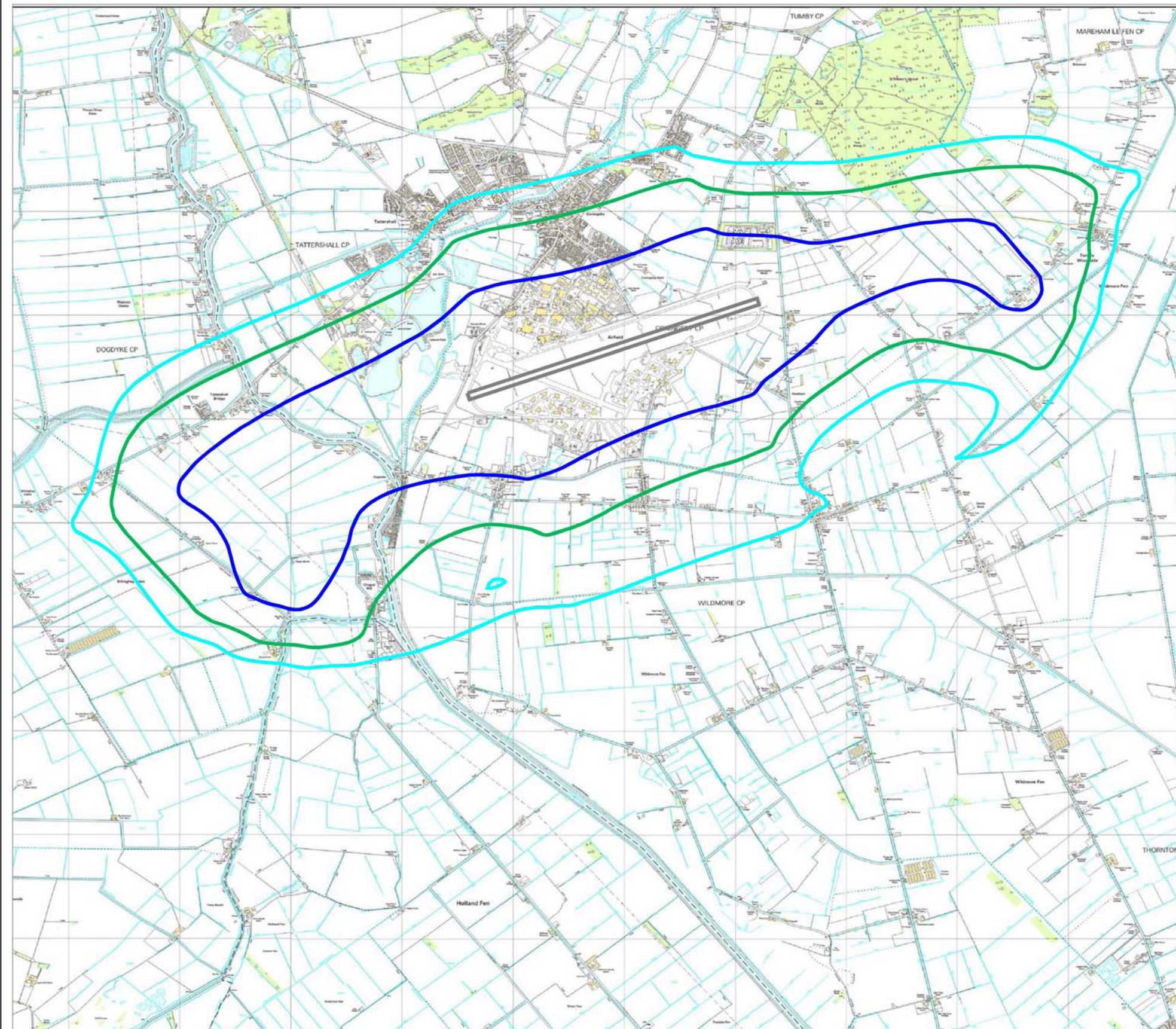
25. It is recommended that the 72, 66 and 63 dB $L_{Aeq,16hr}$ administrative adjusted noise contours detailed at Annex B, should be used as the basis for the NAS(M) at RAF Coningsby.

ACKNOWLEDGEMENTS

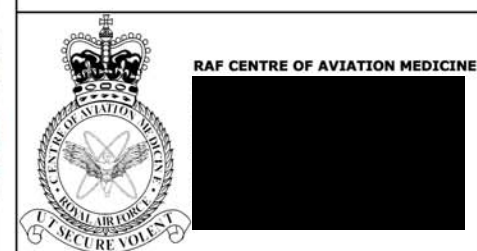
26. The Noise and Vibration Division would like to thank the personnel of RAF Coningsby who assisted with data collection that enabled the production of the contours.

REFERENCES

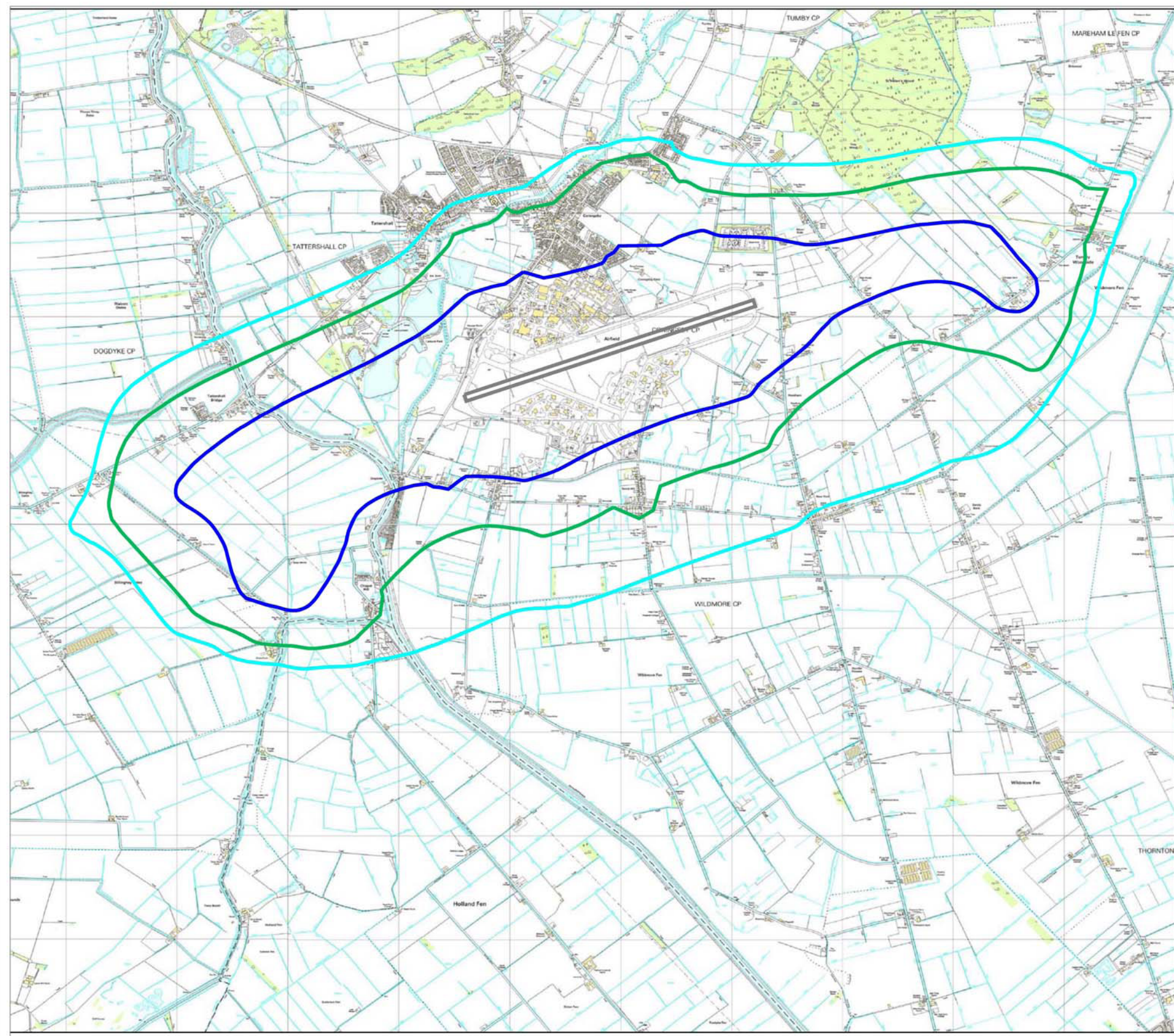
- A. JSP 418, Part 2, Leaflet 04-1. Dated June 2010.
- B. RAF Institute of Community and Occupational Medicine. Report No. ICOM/40/89. Dated August 1989.
- C. Planning Policy Guidance: Planning and Noise. PPG 24. Department of the Environment, dated Sep 94.
- D. Noise Policy Statement for England. Department of Environment, Food and Rural Affairs, dated 15 Mar 10.
- E. MilFLIP No AD 2 - EGXC.
- F. RAF Coningsby Flying Order Book. 2012
- G. 



- KEY**
- - 72dB LAeq,16hr Contour.
 - - 66dB LAeq,16hr Contour.
 - - 63dB LAeq,16hr Contour.

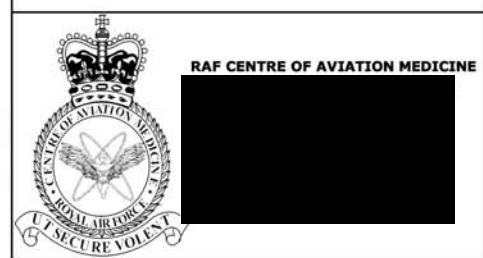




PROJECT RAF Coningsby	
TITLE Unadjusted LAeq,16hr Contours	
DRAWING NUMBER	DRAWN BY
DATE 15 Dec 14	REVISION
CAD FILE	
CAM FILE REFERENCE	
CLASSIFICATION	



KEY

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



PROJECT	
RAF Coningsby	
TITLE	
Administrative Adjusted L _{Aeq,16h} Contours	
DRAWING NUMBER	DRAWN BY
	
DATE	REVISION
15 Dec 14	
CAD FILE	
CAM FILE REFERENCE	
	
CLASSIFICATION	