

WHANGAREI AIRPORT 2012 - Biannual Noise Compliance Contours Rp 001 2014001A 140114

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1.0 INTRODUCTION

Marshall Day Acoustics has been engaged to undertake aircraft noise predictions for Whangarei District Airport for the purposes of assessing compliance with the Whangarei District Plan noise controls.

Noise predictions have been undertaken based on actual operations that have occurred at Whangarei Airport (period 1 July 2012 – 30 June 2013). This information has been provided by the Whangarei District Airport.

A glossary of terminology is provided in Appendix A.

2.0 NOISE PERFORMANCE STANDARDS

The New Zealand Standard NZS 6805:1992 "Airport Noise Management and Land Use *Planning*" provides a recommended approach for territorial authorities dealing with airports and land affected by airport noise. The process aims to manage the adverse effects of airport noise by controlling the use of land around airports, and by ensuring the airport does not exceed the future noise contours used for the planning process.

The Standard recommends two boundaries, the Airnoise Boundary (ANB) and the Outer Control Boundary (OCB). At Whangarei, the provisions of NZS 6805 have been implemented through the District Plan (refer Appendix B). Planning Map 46R indicates the location of the ANB and OCB. Noise rules in the plan specify that noise from aircraft operations shall not exceed 65 dB L_{dn} outside the ANB

Further, the Airport Noise Management Plan (ANMP) for Whangarei District Airport (March 2005) sets out the procedure to be followed for compliance monitoring. In summary, the ANMP requires noise contours be produced to assess compliance with the relevant noise rules, and that this be undertaken on a biannual basis.

3.0 INTEGRATED NOISE MODEL

Several computer based models have been developed to predict aircraft noise in the vicinity of an airport. The most widely used of the models (and the model recommended in NZS 6805) is the Integrated Noise Model (INM) developed by the US Federal Aviation Authority. The INM calculation procedures use an energy averaging technique to calculate the noise exposure in terms of L_{dn} .

The INM calculates the noise level at a large number of grid points by summing the 'noise energy' from each aircraft movement during a 'typical' day's operation. The 'noise energy' is calculated using the hourly L_{Aeq} value, night-weighted by +10 dB and then averaged over 24 hours to give the daily L_{dn} value at each grid point. The grid points with equal noise level are then joined graphically to give a plot of L_{dn} noise contours. The INM predicts the noise level from aircraft operations in take-off and landing and excludes engine testing and taxi-ing.

The original airport noise contours used to develop the existing airport noise boundaries were generated in 2002 using INM version 6.1. Since this time there have been several updates to the INM program which produces slightly different results.



3.1 Terrain

INM v6.1 has the ability to include terrain effects. This is particularly helpful for airports such as Whangarei where there are significant topographical features in close proximity. In summary, the effects of terrain are the change in distance between aircraft noise sources and receivers on the ground.

However, no account of the screening effects of topographical features is included in the calculation algorithms. Therefore the same methodology as used previously (including in the District Plan noise contours) has been implemented to account for this effect.

Terrain data for Whangarei has been derived from NASA topographical data.

3.2 Aircraft Activity

Aircraft activity has been noted for 12 months (1 July 2012 – 30 June 2013) by Whangarei District Airport and supplied to MDA. The data has been provided in the form of landings data and an equal number of departures are assumed to give the annual movements.

The average number of daily movements has been determined by averaging the flight statistics over the 12 month period, and applying a peak load weighting to account for the busiest 3 month period. General assumptions relating to runway and track usage are based on the previous work undertaken when the District Plan noise boundaries were developed. This is considered appropriate for compliance monitoring. An equal

The effects of helicopter training have also been included in the noise model.

4.0 PREDICTED NOISE CONTOURS

The predicted 55 and 65 dB L_{dn} contours are shown in Figure 1, Appendix C. Also shown are the Outer Control Boundary (OCB) and Airnoise Boundary (ANB), as published in the current District Plan.

From Figure 1, it can be seen that the predicted 55 dB L_{dn} contour is within the OCB and that the predicted 65 dB L_{dn} contour is within the ANB. Therefore, it can be stated that the predicted current noise levels comply with the District Plan noise controls.

It is noted that these 2012 noise contours are generally smaller in extent than the 2008 noise compliance contours on centreline. This is largely due to a reduction in aircraft activity at the airport.

5.0 CONCLUSION

Marshall Day Acoustics has prepared aircraft noise contours for Whangarei District Airport, to assess compliance with the Whangarei District Plan.

Based on actual recorded aircraft activity (provided by Whangarei District Airport), noise contours have been predicted using the Integrated Noise Model. The predicted noise contours demonstrate that noise from aircraft operations (for 1 July 2012 until 30 June 2013) complies with the District Plan noise controls.



APPENDIX A GLOSSARY OF TERMINOLOGY

dB	<u>Decibel</u> The unit of sound level.		
	Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of Pr=20 μPa i.e. dB = 20 x log(P/Pr)		
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.		
L _{Aeq (t)}	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.		
	The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.		
L _{dn}	The day night noise level which is calculated from the 24 hour L _{Aeq} with a 10 dB penalty applied to the night-time (2200-0700 hours) L _{Aeq} .		
SEL or L _{AE}	<u>Sound Exposure Level</u> The sound level of one second duration which has the same amount of energy as the actual noise event measured. Usually used to measure the sound energy of a particular event, such as a train pass-by or an aircraft flyoyer		
Noise	A sound that is unwanted by, or distracting to, the receiver.		
Ambient	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.		
NZS 6801:2008	New Zealand Standard NZS 6801:2008 "Acoustics – Measurement of environmental sound"		
NZS 6802:2008	New Zealand Standard NZS 6802:2008 "Acoustics – Environmental Noise"		
NZS 6805:1992	New Zealand Standard NZS 6805:1992 "Airport Noise Management and Land Use Planning"		
NZS 6807:1994	New Zealand Standard NZS 6807:1994 <i>"Noise Management and Land Use</i> Planning for Helicopter Landing Areas"		



APPENDIX B WHANGAREI DISTRICT PLAN NOISE RULES

62.3 Noise from Aircraft Operations

- a) Noise from aircraft operations shall be so managed that the rolling 3-month average 24-hour night weighted sound exposure does not exceed 65dBA Ldn at, or at any point outside, the Air Noise Boundary; and
- b) Helicopter hovering (other than hovering included in normal take off landing) is restricted to the area identified as "Helicopter Hovering Area" on Planning Map 46; and
- c) Noise from aircraft operations, measured as the rolling 3-month average 24hour night weighted sound exposure may exceed the noise limits in Rule 62.3 a) in the event of:
 - i. Aircraft landing in an emergency; and
 - The operation of emergency flights required to rescue persons from life-threatening situations or to transport patients, human vital organs or medical personnel in a medical emergency; and
 - The operation of unscheduled flights required to meet the needs of a national or civil defence emergency declared under the Civil Defence Act 1983; and

(source: Whangarei District Plan Chapter 62)

2. DW 124 (Whangarei Airport)

Designation DW124 shall be subject to the following conditions:

- 1. The activities authorised by Designation DW124 shall be subject to the Airport noise limits imposed by the District Plan of the Whangarei District Council and in particular (but without limiting the application of this condition) Rule 44.3.6 relating to aircraft engine testing and Rule 62.5 relating to noise from aircraft operations.
- Within 6 months of the date of commencement of these amended conditions of Designation DW 124, the Whangarei Airport Authority shall submit to the Whangarei District Council as consent authority for approval an Airport Noise Management Plan (ANMP). The ANMP shall include:



- a) The manner in which the Airport Authority will comply with the District Plan rules relating to Airport noise. That section of the ANMP shall be prepared by a suitably qualified and experienced acoustical engineer.
- b) Provision for an Airport Noise Management Consultative Committee, the membership of which committee should include representatives of interested parties.
- c) The manner in which the Airport Authority will deal with the following:
 - helicopter flight paths;
 - helicopter hovering activity;
 - engine testing;
 - education of airport users and operators;
 - complaints; and
 - monitoring;
 - any other relevant matters.

(source: Whangarei District Plan Chapter 85)



APPENDIX C FIGURES

