

CHRISTCHURCH INTERNATIONAL AIRPORT

NOISE MANAGEMENT PLAN

28 March 2014

V10

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Definitions

In this Management Plan, the following acronyms and definitions are used:

AANC	- Annual Aircraft Noise Contours (AANC)
CIA	- Christchurch International Airport
CIAL	- Christchurch International Airport Limited
CCC / the Council	- Christchurch City Council
District / City Plan	- Operative Christchurch City Plan
GA	- General Aviation
INM	- Integrated Noise Model
MDA	- Marshall Day Acoustics
NMP	- Noise Management Plan

1.0 Introduction

The Christchurch International Airport (CIA) Noise Management Plan (NMP) has been prepared by Christchurch International Airport Limited (CIAL) in conjunction with its noise consultants Marshall Day Acoustics (MDA).

This NMP should be regarded as an evolving document which can be amended and updated as information is available and changes occur.

The NMP was formed as part of the Environment Court decision C166/2005 (Refer to **Appendix A**).

The Christchurch City Plan stipulates that CIAL will have a NMP that includes the following provisions:-

- a) *Setting out procedures for monitoring and demonstrating compliance with the noise control rule in the City Plan and for mitigation and review of the noise control lines incorporated in the Plan once noise levels are approaching projected levels;*
- b) *A comprehensive noise complaints procedure for Christchurch International Airport;*
- c) *Procedures for amendment to the contents and implementation of the noise management plan; and*
- d) *Formalising the engine testing bylaw in the noise management plan.*

The 'Noise Control lines' (City Plan 11-1.5(a)) also referred to as the CIA Noise Contours have been produced in accordance with New Zealand Standard NZS6805 Airport Noise Management and Land Use Planning. (For the noise contour plan, refer to **Appendix B**).

The noise from Aircraft Operations is to be managed in accordance with Rules 11-1.3.6 and 11-1.2.4.2 in the City Plan. These are detailed in Section 2 below. In 2007 the noise contours were remodelled and updated. The updated contours are included in the Commissioners' decision on Plan Change 1 to the Regional Policy Statement, the Waimakariri District Plan and the Selwyn District Plan. They have not yet been included in the City Plan. Nevertheless CIAL will also report its compliance against these updated contours until such time as the City Plan is amended. The City Plan is currently (April 2014) being reviewed and the updated contours will be adopted. Further details on the updated contours can be found in the Expert Panel Report (**Appendix C**).

The noise associated with the testing of aircraft engines in situ (i.e. on wing) is controlled separately by a CIAL By-Law 1989 (**Appendix D**) and the Airside Operations Agreement (**Appendix E**). This source of noise is discussed separately in this NMP.

Notwithstanding other requirements, section 16(1) of the RMA requires that every occupier of land shall adopt the best practicable option to ensure that emissions of noise from that land do not exceed a reasonable level.

2.0 Aircraft Noise - Operations

2.1 City Plan Requirements

The Christchurch City Plan refers to airport noise in a number of locations. Rule 11-1.3.5 sets out the requirement that noise from aircraft operations shall not exceed 65 dB L_{dn} outside the 65 dB L_{dn} airport noise contours shown in the City Plan (Volume 3, Part 11, Appendix 3) as detailed below.

1.3.6 Aircraft Noise (updated 22 May 2006)

Critical Standard

CIAL shall manage the Christchurch International Airport so that the noise from aircraft operations does not exceed L_{dn} 65 dBA outside the L_{dn} 65 dBA airport noise contour shown in Appendix 3 of Part II.

Noise from aircraft operations shall be based on noise data from the Integrated Noise Model (INM) and records of actual aircraft operations at CIA. The noise level shall be calculated over the busiest three month period of the year.

Aircraft operations means:

- *the landing and take off of aircraft at CIA*
- *aircraft flying along any flight path associated with a landing or take off at CIA*

The following activities are excluded from the definition of Aircraft Operations:

- *aircraft operating in an emergency for medical or national/civil defence reasons*
- *air shows*
- *military operations not associated with the Antarctic programme*
- *aircraft using the airport as an alternative to a scheduled airport elsewhere*

- aircraft taxiing
- aircraft engine testing.

Exceedance by up to 1 dBA of the noise limit is permitted provided CIAL demonstrates at the request of, and to the satisfaction of, the Council that any such exceedance is due to atypical weather patterns.”

Rule 11–1.2.4.2. sets out the airport’s obligation to provide annual calculations of aircraft noise levels and the results of noise measurements.

1.2.4.2 Aircraft noise monitoring (updated 22 May 2006)

CIAL shall annually provide to the Council’s Environmental Services Manager the result of calculations based upon monitored aircraft movements for the preceding year and the known noise characteristics of those aircraft. These calculations will be performed by a person with appropriate qualifications and experience in airport noise modelling and acoustic assessments. The provided result shall be verified by noise measurements and shall be in the form of a 65 dBA L_{dn} contour representing the noise created by aircraft operations over that year (other than movements of a kind excluded in the Aircraft Noise Rule 1.3.6) superimposed upon a copy of the plan forming Appendix 3 to Part II of this Plan. The measurement of aircraft sound exposure and the resultant derivation of a 65 dBA L_{dn} shall be in accordance with NZS 6805:1992.”

In order to verify the calculated noise contours based on actual aircraft movement data provided by Airways NZ, site noise monitoring will be carried out on an irregular basis at a series of relevant sites, chosen in accordance with Appendix H. Noise monitoring is not undertaken in a continuous manner throughout the calendar year, nor is there reliance on one ‘indicator site’ to provide monitoring surveys.

2.2 Annual Aircraft Noise Contours (AANC)

CIAL are required by the above rule to provide annual calculations of the aircraft noise levels from the CIA. The noise levels are to be reported in the form of annual aircraft noise contours using the INM computer program and performed by a person suitably qualified in acoustics with experience in airport noise modelling and acoustic assessment.

It is recognised that the strict interpretation of rules 11-1.3.6 and 11-1.2.4.2 are conflicting with respect to the calculation of annual noise contours for monitoring compliance. Rule 11-1.3.6 specifies that noise shall be calculated over the busiest three month period whereas Rule 11-1.2.4.2 specifies that noise contours shall be based on aircraft movements for the preceding year. CIAL has been advised that the contours should be calculated based on the busiest three month period of the preceding year as being the worst case.

In addition, a further set of noise contours based on the busiest 3 months operation on RWY 29 should also be prepared, to adequately assess noise levels when the NW winds are prevalent and aircraft utilise RWY 29 more than usual.

To enable the calculations, CIAL will be responsible for arranging the observation, collection, recording and analysis of aircraft movement data on a continuous basis. To establish "*the busiest three month period of the year*", CIAL will use the total number of movements in each month with further consideration of the total number of jet movements. For that busiest three-

month period, the following data for each movement will be extracted from the detailed records, for inputting into the INM calculation procedure:

- aircraft type;
- destination/trip length;
- approach/departure track;
- landing/take-off profile (if non-standard);
- runway usage;
- time of operation.

The AANC shall be calculated using the version of the INM that was used for the preparation of the noise contours in the City Plan. If that version of the INM is no longer available or cannot be run on the current computer technology, the version closest to the original version shall be used for calculation purposes.

2.3 Noise Monitoring and Mitigation

The primary noise control rule in the Plan, Rule 11-1.3.6 requires the noise from aircraft operations to be monitored using calculations from the INM program and records of actual aircraft operations at CIA. However, Rule 11-1.2.4.2 requires noise measurements to be carried out for verification purposes. The extent of these noise measurements is not specified in the provision of Rule 11-1.2.4.2. MDA proposes that in-field monitoring for the purpose of verifying the INM calculations shall take place regularly on a three year cycle. Under this regime, in-field monitoring should be carried out in at least two locations on or near the 65 dB L_{dn} contour shown in the relevant Plan to obtain approximately three months of data at each location. Monitoring at the separate locations may take place either consecutively or

simultaneously and the monitoring cycle should include measurements in the vicinity of all runway centrelines. Methods of in-field monitoring and site selection are contained in **Appendix H**.

Where differences are found in the noise measurements and the calculated noise levels, these will be reported in the noise monitoring report discussed in s5. Possible outcomes from any such discrepancy include 'mitigation and review of the noise control lines' as suggested in the Decision.

As discussed above, the primary 'instrument' for noise monitoring is the INM calculation of the AANC. The AANC will enable a review of the noise produced by the airport and whether the 'current' noise levels are approaching the limits established in the City Plan noise contours. It will also enable a review of the effects of any changes to operational procedures such as unusual usage of the North-West runway, changes to schedules or simultaneous operation of both runways.

CIAL shall manage aircraft operations so as to comply with the noise limits as specified in 11-1.3.6 of the City Plan. However if the monitoring results indicate an unexpected non-compliance, CIAL shall undertake an investigation to establish the cause and extent of the non-compliance. This investigation may involve additional in-field noise measurements to verify any non-compliance. CIAL shall report the findings of the investigation to the Council within 20 working days following detection of the non-compliance including any proposed operational changes or mitigation measures. The

timeframe for CIAL to report to the Council upon the detection of the non-compliance can be extended, where:

CIAL formerly advises the City Council within 20 working days of the detection of the non-compliance, and outlines

A reasonable time frame to determine the nature and scope of the required investigation, and reporting timeframe back to the City Council.

A reasonable time frame to enable any additional in-field monitoring to be completed, of deemed necessary to the investigation.

3.0 Engine Testing Noise

CIA is the maintenance base for a range of aircraft. Aircraft operators are required to carry out maintenance procedures on aircraft and their engines. These procedures may require mandatory engine testing before the aircraft can fly again.

Ground testing of aircraft engines 'on the wing' is carried out on the runway and taxiway areas at the airport. This involves taxiing or towing the aircraft to the required test area (as directed by Air Traffic Control), and testing the engines at various power levels.

The duration and type of 'on the wing' testing varies widely. Testing may arise due to testing of replacement components, troubleshooting of a defect or routine systems testing. Generally on modern aircraft the majority of this testing is carried out at 'idle' thrust settings. Occasionally it is necessary to

increase the engine power to full thrust. If a full thrust test is required there would typically be 2 or 3 high power runs, each of about 3 minutes duration. The remainder of the time comprises lower power or idle running.

3.1 Relevant Statutory Requirements

Night testing (i.e. between the hours of 2300 and 0600) can only be performed on aircraft that are required to operate scheduled services in the morning.

This particular type of aircraft engine testing is managed under Section 52 Stationary Engine Testing in the Christchurch International Airport By Laws (attached as **Appendix D**), and the Airside Operations Agreement (attached as **Appendix E**). The City Plan contains land use controls relating to engine testing noise in the Rural Zone. The reason for the rule is described as follows:

13.2.9 Aircraft noise testing area (updated 30 April 2011)

A rule applies in the rural zones controlling dwellings within 800m of the aircraft noise testing area, identified at the western end of the airport cross runway within the Special Purpose (Airport) Zone (Map 23B). This location, while not ideal, offers the least potential disturbance to persons living near the airport, although some disturbance may still occur from time to time. In order to ensure that adverse noise from engine testing is at least minimised, the majority of engine testing activities will take place within 200m of the "cross" identifying the Aircraft Engine Testing Area shown on Planning Map 23B.

Under the By Laws and the Airside Operations Agreement details of each night time engine testing event are recorded by the aircraft operator and

forwarded to CIAL (a copy is attached in **Appendix F**). CIAL will record the details of each event in a purpose-made engine testing noise monitoring application, discussed in Section 3.3 below.

An agreement has been reached between CIAL, AirNZ and other operators regarding the recording of engine ground running testing events. This document, "*Engine Maintenance Ground Run Procedures*" contains policy guidelines on engine ground running testing at Christchurch Airport.

3.3 Engine Testing Monitoring Software

Engine Testing Monitoring Software (ETMS) is being developed by Marshall Day Acoustics for CIAL. It is similar in concept to the INM monitoring procedure in that it is based on the records of the actual ET that has been carried out. Aircraft maintenance staff input a detailed set of information (including of the type of engine testing activity, aircraft model, date and time, wind direction, and speed) into the software so that the noise exposure levels can be calculated in the nearby community (refer to **Appendix F: Fig. 1**). It is intended that this will be used as the basis for on-going monitoring and reporting.

3.4 Engine Testing Noise Assessment (ETNA)

An engine testing noise assessment (ETNA) will be carried out to compliment the controls on engine testing outlined in the preceding sections.

Initially calculations will include various noise metrics so that comparison can be made with other NZ engine testing operations and facilities. Once a suitable sample of such data is available (and validated by on ground noise

monitoring) an assessment of the most appropriate noise metric to use and its suitability for the Christchurch environment can be undertaken.

This monitoring procedure has been implemented and is currently being used at other airports such as Hamilton and Auckland.

3.5 ETNA Progress

MDA (on behalf of CIAL) will be analysing and assessing recent engine testing noise emissions in March/April 2014. An assessment report is then to be completed. The report will:

- Discuss predicted engine testing noise levels in the community
- Assess engine testing noise level measurements carried out in the community
- Consider engine testing controls at other airports
- Make recommendations for appropriate noise level controls for Christchurch
- Discuss the implications of adopting the assessment recommendations

The engine testing software that MDA has developed will also be provided to CIAL in March/April for direct data entry by Air New Zealand engineers of engine testing noise events, using the agreed procedure discussed in section 3.1. Procedures for ongoing engine testing noise management will be developed and details of these will be added to this Noise Management Plan.

Following the assessment of engine testing noise effects, consideration will be given to developing additional or alternative controls on engine testing and land use management should the outcome of the assessment signal that this is appropriate. The target completion date of the assessment of engine testing noise effects is mid-2014. It is possible that the recommended engine testing noise controls can be included in the City Plan review process.

4.0 Noise Complaints

The CIA Noise Complaints Procedure provides individuals with the ability to express, and have recorded, their concerns about aviation noise (activities) or to ask questions regarding noise at CIA.

Noise complaints may be made by calling the CIAL Integrated Operation Centre (IOC) which is manned 24 hours a day (on phone 353 7777). [Click here](#) for the noise complaint form. IOC staff document noise complaints by obtaining information from the caller about the nature of the complaint, time of the occurrence, location of callers residence and the activity that caused disturbance (a copy of the public complaint form is attached as **Appendix G**). This information is used to determine the probable activity that was responsible for the complaint.

A follow up phone call will be made followed by a written response / e-mail if requested by the caller detailing the complaint and details of the activity responsible, the meteorological conditions and the runway in use at the time of the disturbance. A notice of action taken by CIAL in respect of the

complaint will be included. Typically CIAL responds to the complaint via email or phone call and then investigates the complaint further to identify the cause of the noise. A written response of the investigation is then sent to the complainant.

5.0 Noise Monitoring Report (Aircraft Movements)

CIAL is required to prepare a Noise Monitoring Report (NMR) on an annual basis to the satisfaction of Christchurch City Council. The report is required to include;

- Annual Aircraft Noise Contours (as specified in **section 2.2**)
- Summary of aircraft movements and associated data.
- Measured noise levels (if applicable that year)
- Noise complaints received with appropriate associated data regarding aircraft operations
- Details of any proposed noise management mitigation initiatives

The Noise Monitoring Report is to be made available through the CIAL website (<http://www.christchurchairport.co.nz>).

In the 2014 NMR (and all subsequent NMR's), an Aircraft Maintenance Report which will summarise engine testing activities including night time engine tests and calculated engine testing noise levels is also expected to be included.

6.0 Amendment and Implementation of the NMP

This Noise Management Plan is a living document that will be reviewed and updated on an as required basis. The mechanism for amendment and

implementation of the NMP will involve the CIAL and CCC as the representative public body. The NMP will be reviewed annually at the time of the production of the annual noise monitoring report and on an as required basis which may occur due to changes in technology available, changes to operational procedures, or monitored noise levels that are approaching the specified limits.

CIAL, may at any time, make amendments to the Noise Management Plan, by submitting the amendments in writing to the City Council for certification that the amendments are consistent with those matters set out in Part 11-1.5 of the City Plan. Minor amendments to take into account unforeseen conditions, do not need to be submitted in advance of the work being undertaken.

A copy of the current version of the Noise Management Plan shall be kept on the CIAL Website (<http://www.christchurch-airport.co.nz>) at all times and all key personnel associated with matters to which the NMP applies shall be made aware of its contents.

APPENDICES

- **Appendix A:** Decision C 166/2005
- **Appendix B:** Plan of Noise Contours
- **Appendix C:** Expert Panel Report
- **Appendix D:** CIAL Bylaw (1989)
- **Appendix E :** Airside Operations Agreement
- **Appendix F:** Aircraft Engine Test Form
 - **Figure 1:** Engine Testing Noise Assessment Receiver Locations
- **Appendix G:** Public Complaint Form
- **Appendix H:** Infield Monitoring In-field Measurement Site Selection and Duration Site Selection (see pg. 18 below)
- **Appendix I:** Neighbourhood Friendly Practices
- NZS 6805 (CIAL cannot provide this)

Appendix H - Infield Monitoring– In-field Measurement Site

Selection and Duration Site Selection

Appropriate sites for undertaking infield monitoring shall be selected based on the following criteria:

- Proximity to 65 dBA L_{dn} contour;
- Relevance to the community i.e. select inhabited locations over uninhabited locations where possible;
- Quality of acoustic environment for monitoring aircraft noise i.e. low risk of contamination from other noise sources;
- Where multiple sites are selected ensure a representative distribution across various legs of the contours.

The selection of sites will depend on the availability of secure sites with a power supply and willing landowners. It is likely that not all of the criteria above can be satisfied completely however sites which satisfy the criteria to a greater extent should be given priority over others.

Monitoring Duration

The appropriate duration of infield monitoring will depend on a number of factors including the frequency of aircraft activity at the site and the extent of contamination during the monitoring period (e.g. adverse weather etc). A suitable monitoring period would be not less than one month. For locations where aircraft activity is infrequent (e.g. under Runway 29 approach) a monitoring period of 3 months is recommended.