Christchurch PBN Flight Paths Trial

Full Report

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Full Report

PBN trial partners have prepared the following summary outlining findings of the now complete 12-month PBN flight paths trial. The report has been approved by Airways New Zealand, the Board of Airline Representatives New Zealand (BARNZ), Christchurch Airport and New Southern Sky (NSS).

Final Review of 2017-2018 Christchurch PBN Flight Paths Trial

On 9 November 2018, Airways New Zealand, BARNZ, Christchurch Airport and NSS completed a trial of Performance Based Navigation (PBN) flight paths in Christchurch. PBN is a global air navigation standard, being introduced in accordance with international guidance and New Zealand government policy. The 12-month flight paths trial was for arrivals to Christchurch only and is part of NSS, a 10-year programme led by NZ Civil Aviation Authority that is introducing major changes to New Zealand's aviation system in order to make air travel smarter, quicker, safer and more sustainable.

Christchurch PBN Approach Flight Paths

The PBN approach paths selected for the trial were the product of consultation between Airways New Zealand, BARNZ, Christchurch Airport and NSS. The philosophy adopted when selecting any flight path is to achieve a level of consensus by balancing the technical and operational needs of the trial, with an aim to moderate the overall noise effects on communities. The initial findings of the trial confirm aircraft are flying at a higher altitude over the city and densely populated areas, which results in reduced audible noise. There are also fewer flights over the suburbs of Kaiapoi, Wigram, Hornby, Prebbleton and Rolleston, and the trial flight paths avoid direct overflight of Templeton and West Melton settlements. The trial received valuable feedback from communities and individuals.

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Participating Aircraft

Most domestic and trans-Tasman jet aircraft are capable of flying the trial approaches and some propeller aircraft are also becoming capable. However many of these aircraft still flew a non-PBN trial approach in fine weather (including north-westerly conditions using Runway 29), or for training, or for air traffic control reasons.

Flight Paths Trial

The trial enabled the collection of data (such as noise monitoring, number of flights) and community feedback, and helped to inform and achieve a good balance of safety, airspace management and environmental benefits - such as noise reduction for communities, fuel and carbon emission savings.

Operational Data

For the period 9 November 2017 to 7 November 2018, Christchurch PBN trial flight paths were utilised by 4,395 aircraft.

These aircraft flew 32,000 fewer kilometres when compared to the shortest alternative instrument approach, and provided a number of additional benefits.

Christchurch Runway	Total trial flights 09 Nov 17-07 Nov 18	Maximum trial flights/day	Maximum trial traffic %/day
02	3641	30	26%
20	392	7	7%
29	362	31	27%

Calculated benefits for the twelve month trial:

Distance saved	32,250km
Flight time reduction	2,450 minutes
Fuel savings	97,200kg
CO2 emissions avoided *	307,000kg
Passengers receiving safety/time benefits **	630,000

*Reducing fuel burn by aircraft also provides environmental benefits through reductions in CO2 emissions.

**Number of passengers who received reduced flight times and other benefits from PBN vertically guided approaches.

Noise Data

Throughout the RNP/PBN trial the staff at Marshal Day Acoustics (MDA) were engaged to investigate and offer understanding of changes to the noise environment resulting from the flight paths trial. This work can largely be summed up as an assessment of noise effects resulting from the flight paths being tested, including:

Modelling noise - impacts from the updated flight paths prior to the trial starting, during and after.

Three different sets of contours were modelled through the trial:

1. Pre-trial Annual Aircraft Noise Contour (AANC), *modelling data included*: historical runway usage/ flight numbers with updated PBN flight paths.

2. Mid-trial AANC – *modelling data included*: actual runway usage/flight numbers on PBN flight paths during the first three months of the trial.

3. 2018 AANC - *modelling data included*: actual runway usage /flight numbers for the busiest three months in 2018 including number of flights on the PBN approach.

The modelled contours were compared against compliance contours in the Christchurch District Plan, to understand and monitor any effect PBN approaches would have on the airport company's compliance.

All three scenarios modelled demonstrated compliance with the contours in the District Plan, with no significant change to the 65dB Ldn compliance contour.

Community annoyance - using the pre-trial modelled contours described above, MDA undertook an assessment on the number of dwellings which would theoretically receive a change in noise as a result of the updated flight paths. This information was then used to assess relative changes in the 'community annoyance' levels. The Miedema & Oudshoorn Community Response to Aircraft Noise (2001)[1] was used to understand how any changes to noise environment would be received. The Community Annoyance study identified a reduction in 142 dwellings subject to a noise environment considered to be 'highly annoying'.

[1] Miedema & Oudshoorn (2001); 'Annoyance from Transportation Noise: Relationships with Exposure Metrics DNL and DENL and Their Confidence Intervals' Environmental Health Perspectives, Vol 109, 4, pp409-416.

Changes to the noise environment

In addition to the Community Annoyance study, MDA also looked into changes to the noise environment as a result of the PBN tracks using widely accepted typical change in noise levels:

- An increase in noise level of 10 dB sounds, subjectively about 'twice as loud'
- A change in noise level of 5 to 8 dB sounds, regarded as noticeable
- A change in noise level of 3 to 4 dB sounds, considered just detectable
- A change in noise level of 1 to 2 dB sounds, not discernible.

The assessment showed a total of 10,122 dwellings within the 50Ldn noise contour.

Noise modelling predicted the following changes to those dwellings:

- 10,052 dwellings would receive a 0-2dB **decrease** (not discernible) in noise levels.
- 39 dwellings would receive a **decrease** in noise within the 3-4 dB (just detectable) range.
- 31 dwellings would receive an **increase** in noise within the 3-4 dB (just detectable) range.
- There would be no increase in noise levels greater than 4 dB due to PBN tracks in the flight paths trial.

Summary

Of the 10, 122 dwellings within the 50 Ldn dBA noise contours:

- 10,091 dwellings were predicted to receive a decrease in noise
- 31 dwellings were predicted to receive an increase in noise.

Noise monitoring

Both before and during the trial, noise monitoring was undertaken at six representative locations. This occurred between March 2017 to August 2017 (pre-trial) and November 2017 to March 2018 (during the trial). The objective of the noise monitoring was to measure the difference in noise level due to PBN by comparing pre-trial and during trial noise levels.

Noise measurements during the trial show the overall noise level (Ldn) changes (up and down) by up to 2 dB, due to the introduction of PBN arrivals.

2 dB is within the margin of variation of such a trial and is regarded as subjective, not discernible.

Community Feedback

Feedback from the community was proactively and continuously sought throughout the 12-month trial. Several different channels were employed, including announcements in news media, a dedicated website (www.christchurchflightpathstrial.co.nz) which featured information about the trial, a feedback form and a phone number to call for personal response.

Any response to an inquiry included encouragement to keep sending feedback, and to share the information and website address with others who might also be able to offer feedback.

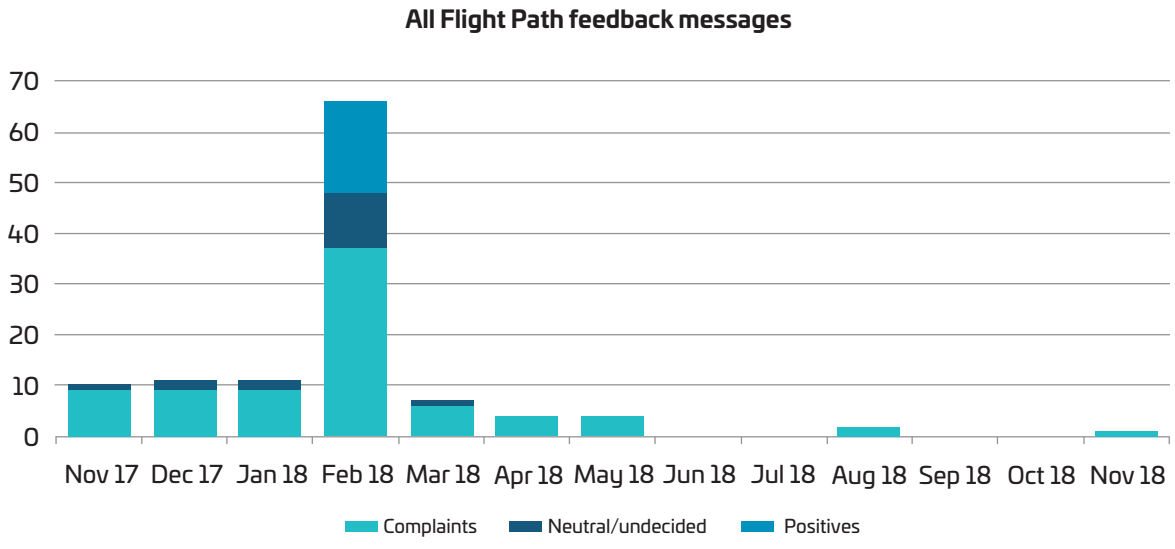
We committed throughout the trial to every piece of feedback getting a response and consideration when decisions were made after the trial ended.

In total, 134 flight path feedback messages were received from the community. Some were found not to be PBN related, however they provided a useful opportunity to engage with community members to address their comments.

This leaves 81 complaints from 46 separate complainants, as well as 17 neutral/undecided and 18 positive responses at the end of the trial.

Bespoke responses were provided through Christchurch Airport, using information gained from all trial partners, to every individual via email, phone and in person. Detailed and individualised information and maps were provided by the trial partners and appreciated by the recipients.

The feedback has been incorporated into the Full Report. It offered useful commentary, plus the direct response of a flight path being adjusted for the second half of the trial and confirmed as one of the ongoing flight paths.



Final Recommendations

Consideration of all the data gathered during the 12-month trial has led the trial partners to the following recommendations/conclusions:

- Because of the range of benefits being achieved, the PBN flight paths that were used in the trial be accepted.
- Continue to restrict the use of sensitive PBN flight paths prior to 9am on weekends (initiated 14 July 2018). This was a direct response to community feedback and is expected to provide a material reduction in the noise impact for some residents.
- Use the additional PBN flight path to approach Runway 02 from the northwest (east of West Melton), added at the end point of the trial as an alternative to the original PBN flight path. This responds to and addresses residential noise concerns and increased pilot participation. Noise sharing across these two flight paths may be considered as a future option.

These recommendations have been considered and agreed to by the four trial partners.

Information about the Christchurch flight paths trial will continue to be made available on this website (www.christchurchflightpathstrial.co.nz) until 31 December 2019, after which it will be available on www.christchurchairport.co.nz

Figure depicts Christchurch PBN trial flight paths including recommended new flight path, effective 8 November 2018.

christchurchflightpathstrial.co.nz

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