TRIALING PERFORMANCE BASED NAVIGATION FLIGHT PATHS IN WELLINGTON

INTERIM REPORT September 2019







Wellington PBN Flight Paths Trial

INTERIM REPORT

Airways New Zealand, the Board of Airline Representatives New Zealand (BARNZ) and Wellington Airport have prepared the following summary outlining progress of the Performance Based Navigation flight paths trial.

A full report is to be issued on completion of the 12 month trial at the end of 2019.

INTERIM REVIEW OF 2018-2019 WELLINGTON PBN FLIGHT PATHS TRIAL

On 20 September 2018 the Performance Based Navigation (PBN) flight path trial commenced in Wellington. PBN flight paths use the accuracy of satellite-based navigation and Global Positioning Systems on the aircraft to follow optimised flight paths and is being introduced at Wellington in accordance with international guidance and New Zealand government policy.



Arrivals from the North (trial flight paths 161 and 162)

The 12-month flight paths trial is for arrivals into Wellington and is part of the New Southern Sky programme led by NZ Civil Aviation Authority to make air travel smarter, quicker, safer and more sustainable.

WELLINGTON PBN APPROACH FLIGHT PATHS

The PBN flight paths being trialled at Wellington take into account the following factors:

- The most efficient routes for ease of flight and reduction in fuel usage
- Emulate existing routes that are already being flown
- Minimise flight or increase the height of the flight path above residential areas where possible
- Aircraft safety when using these procedures is appropriately managed
- Local terrain such as Mt Victoria and Mt Kaukau are appropriately considered



Arrivals from the South (trial flight paths 341 and 342)

FLIGHT PATH TRIAL – INTERIM REPORT

The purpose of the 12 month PBN trial is to enable the collection of data (including noise monitoring, number of flights) and community feedback, to help inform the most safe and efficient routes for aircraft. Noise monitors were installed at four locations below the trial flight paths to establish the baseline level of noise before the trial started and enable comparison of aircraft noise of the new flight paths.

OPERATIONAL DATA

For the six month period 20 September 2018 to 20 March 2019, the Wellington PBN trial flight paths were utilised by 1400 jet aircraft operated by Air New Zealand and Jetstar (A320) and Qantas and Virgin Australia (B737-800).

Table 1: Flight path use for the first six months of the trial

	Arrivals from the north	Arrivals from the south
Total flights on PBN trial	1041	359
Maximum PBN trial flights/day	26	32
Maximum PBN trial traffic %/day	13%	21%

These aircraft flew 11,000 fewer kilometres when compared to the shortest alternative instrument approach - reducing fuel burn, CO2 emissions and shorter passenger travel time.

Table 2: Calculated benefits of PBN approaches at Wellington for the first six months of the trial

Distance Saved	6 066 NM / 11 235 km	
	0,000 NW/ 11,200 KM	
Flight time reduction	14.4 hours / 864 minutes	
Fuel saving (\$1/kg, NBJ 39kg/min)	33,800 kgs / \$33,800	
Aircraft direct operating cost (NBJ \$37/min, no fuel)	\$32,000	
CO2 emission reduction	107,000 kgs	
Passengers	203,000	
Passenger value of time saved (\$22/hr)	\$46,000	

NOISE DATA

Measurement and analysis of aircraft noise data is an important part of the PBN flight path trial at Wellington. Aircraft noise data was gathered from three portable noise measurement terminals installed along the trial flight paths both before the trial started and during the first six months of the trial. Noise data was measured for approaches from the north as those from the south are over the ocean. The location of the noise monitors is shown on Figure 1.

The noise levels measured and modelled by noise experts during the first six months of the trial are comparable with the baseline (pre-trial) noise levels for all flight paths. Table 3 below shows the measured noise levels for all days during the pre-trial and trial period to demonstrate the overall change in noise level at the monitor locations.

This includes days with northerly winds meaning the aircraft noise measured is from departures overflying the monitors rather than arrivals.

The results below show no change in overall noise levels. A measurement variation of 1-2 decibels is expected and can be due to a range of factors, including atmospheric and wind conditions which affect sound propagation, aircraft performance and non-aircraft noise being measured by the monitors. This variability in measurement conditions and noise sources is also reflected in the other general noise results.

Table 4 below shows the noise levels only for days with southerly winds when aircraft were arriving from the north. This provides a more direct comparison of aircraft noise levels with and without flight paths 161 and 162 in use. Flights arrived from the north 31% of the time during the pre-trial period and 46% of the time during the first six months of the trial. The longterm average shows that arrivals from the north occur 30% of the time.

These results show that during the first six months of the trial when aircraft arrive from the north, the average aircraft noise was 3 dB higher at Churton Park and 3 dB lower at Tawa compared with the pre-trial levels. This was partially due to fewer aircraft over Tawa and more aircraft over Churton Park on flight paths 161 and 162 during the trial. For most people, a 3 dB change in noise level is just perceptible and not considered significant. The aircraft noise level at Johnsonville was unchanged. There was no perceptible change in noise for individual aircraft flyovers between pre-trial and trial measurements. The measured single event noise levels were 1 - 2 dB different, which is within normal measurement variation. Further analysis of the noise data will be prepared by noise experts for inclusion in the final trial report.

Table 3: Measured Average Noise Levels at monitoring locations

	Aircraft Noise (dB Ldn)		Other General Noise (dB Ldn)	
Monitoring Location	Pre-Trial	During Trial	Pre-Trial	During Trial
Tawa	45	44	57	57
Churton Park	43	43	50	51
Johnsonville	53	54	52	55

Table 4: Measured Average Noise Levels at monitoring locations for days with southerly winds (arrivals from the north only)

	Aircraft Noise (dB Ldn)		Other General Noise (dB Ldn)	
Monitoring Location	Pre-Trial	During Trial	Pre-Trial	During Trial
Tawa	50	47	58	57
Churton Park	40	43	51	53
Johnsonville	55	55	52	54

COMMUNITY RESPONSE

The flight trial at Wellington was announced to the public in March 2018, including the distribution of a brochure explaining the trial to residents in the northern suburbs of Wellington and publication on the Wellington Airport website. Notification of commencement of the trial was communicated to interested parties in September 2018. In total, 21 members of the public have enquired about PBN-related flight paths and aircraft movements. The indicative location of these enquiries (where known) is shown on Figure 1. All enquiries were responded to by Wellington Airport, with input from the trial partners where required. We will continue to monitor feedback from our communities as the trial progresses.



Figure 1: Noise monitoring locations (
) and community enquiries (
)

INTERIM RECOMMENDATIONS

The following interim recommendations have been made by the trial partners as a result of the Wellington PBN flight paths trial interim review:

- Continue the one-year trial of PBN flight paths for arrivals to Wellington Airport as planned, because a range of benefits is being achieved, and valuable data and feedback is being gathered.
- Continue use of 161/162 approaches for arrivals from South Island and Australia, continuing to monitor flight path use (by aircraft) to inform end of trial aircraft noise modelling and public feedback.

Information about the Wellington flight paths trial will continue to be made available on the Wellington Airport website

(https://www.wellingtonairport.co.nz/noise/air-noise/).

Following completion of the year-long trial a final report will be prepared for community comment and feedback.

Aircraft noise measurements

- dB LdnThe day-night sound level which is calculated from the 24 hour LAeq with a 10dB
penalty applied to the night-time (2200-0700 hours) LAeq.
- Aeq The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.

Monitoring aircraft noise

The portable noise monitoring terminal (NMT) is connected to Wellington's Airport Noise and Operations Management System (ANOMS).

The NMT continuously measures the total noise environment and automatically transfers the noise data to ANOMS, which also records the aircraft flight track data from Airways NZ.

ANOMS then correlates aircraft operation with a noise event when the flight tracks of the aircraft operate in the vicinity of the NMT and there is a match between the recorded time of noise event and the flight track.



southern sky

WELLINGTON

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