

# TRIALING PERFORMANCE BASED NAVIGATION FLIGHT PATHS IN WELLINGTON



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BOARD OF AIRLINE REPRESENTATIVES NEW ZEALAND INC

# Trialing proposed improvements to flight paths in Wellington

## PERFORMANCE BASED NAVIGATION

The international aviation industry is progressively using satellite navigation technology to introduce Performance Based Navigation (PBN) into airports around the world. PBN allows aircraft to navigate accurately without relying on ground based navigation aids, providing greater network resilience. PBN flight paths can be optimised and this means aircraft use less fuel, emit less carbon dioxide, fly higher over built up areas and fly more quietly on approach.

Wellington Airport, Airways New Zealand, New Southern Sky, and the Board of Airline Representatives New Zealand (BARNZ) plan to trial PBN into Wellington in 2018.

This document explains more about the trial, the proposed flight paths and how you can provide feedback.

## HOW PERFORMANCE BASED NAVIGATION FLIGHT PATHS WORK

PBN flight paths use the accuracy of satellite-based navigation and Global Positioning Systems on the aircraft to follow optimised flight paths to a high degree of accuracy and, depending on the route, fly shorter curved descents into an airport.

## THE RULES FOR ESTABLISHING FLIGHT PATHS

The planning and operation of flight paths in Wellington is regulated through the Civil Aviation Act 1990 and by Civil Aviation Rules.

Aviation legislation and policy focuses on the safe and efficient operation of aircraft and airports.

Land use planning legislation and policy protects both the airport's function and the surrounding communities from the impacts of the airport, especially in relation to noise.

Civil Aviation Rules outline the requirements for flights operating in New Zealand airspace and provides aerodrome traffic rules and noise abatement procedures for airports. These rules include requirements for pilots to approach and depart runways under certain conditions to minimise noise impacts from landing and take-off.

## BENEFITS OF PBN FLIGHT PATHS

### 1. Safety

PBN delivers safety benefits through high precision navigation. It ensures aircraft fly consistently along an accurate path in the sky resulting in predictability for both pilots and air traffic controllers.

### 2. Environment

PBN offers significant environmental benefits, including the reduction of carbon emissions by reducing the amount of fuel used by aircraft. This is achieved by designing paths to the runway that allow aircraft to fly on low power settings during the approach.

### 3. Reliability

PBN can provide greater resilience than current ground based navigation aids, which are exposed to significant weather events.

Because of its effectiveness during periods of low cloud and bad weather, PBN creates potential for reduced arrival and departure delays for passengers, and fewer diversions of arriving flights to other airports.

### 4. Better noise outcomes

Aircraft arriving at an airport are able to fly higher over built up areas and on lower power settings on their approach to the runway, in a procedure known as a "continuous descent approach".

This almost eliminates the traditional step-down approach where aircraft descend in steps separated by intervals of level flight and increased engine thrust.

Aircraft using PBN generate less noise because aircraft engines are close to idle. Aircraft landing gear may also be deployed when they are closer to the runway which reduces noise levels even further.

## CONVENTIONAL STEP-DOWN APPROACH

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## PERFORMANCE BASED NAVIGATION – A JOINT INDUSTRY INITIATIVE

Airways New Zealand – manages New Zealand’s 30 million km² of airspace, providing air traffic control, surveillance, communication, flight inspections, mapping and airspace design services. Airways designs the PBN flight paths and procedures, and integrates the PBN trial aircraft into the overall air traffic flow approaching and departing Wellington Airport.

Wellington Airport – provides the infrastructure for aircraft to land and take off, and facilities for processing passengers as they arrive and leave. The airport manages aircraft noise in line with the Wellington City Council District Plan and coordinates feedback from public about local aircraft noise.

Board of Airline Representatives New Zealand (BARNZ) – an incorporated society comprising 29 member airlines which operate scheduled domestic and international services into and within New Zealand.

Civil Aviation Authority of New Zealand (CAA) - regulates civil aviation in New Zealand and implements any International Civil Aviation Organisation’s standards and regulations to the extent they are incorporated into relevant New Zealand legislation.

## WELLINGTON’S FLIGHT PATHS AND AIRCRAFT NOISE MITIGATION

The Wellington City Council District Plan strictly governs the total noise for aircraft movements at the airport, controls the hours of flight with a night curfew in place, controls engine testing and other land based activities and improvements to the airport layout and equipment to reduce ground noise.

The Wellington Air Noise Management Committee (ANMC) was formed in 1997, allowing community and industry representatives to advise on the airport’s Noise Management Plan. The Noise Management Plan is implemented by Wellington Airport and includes methods and processes for remedying and mitigating adverse effects of airport noise.

Wellington Airport operates well within the noise limits set by the Wellington City Council District Plan. Over the last 20 years, as airport activity has increased, the overall noise generated has significantly declined.

This is a direct result of substantial and ongoing investment in new technology by the airlines and the airport, which has meant that noise has been kept to levels considerably less than its historic peak in 1988.

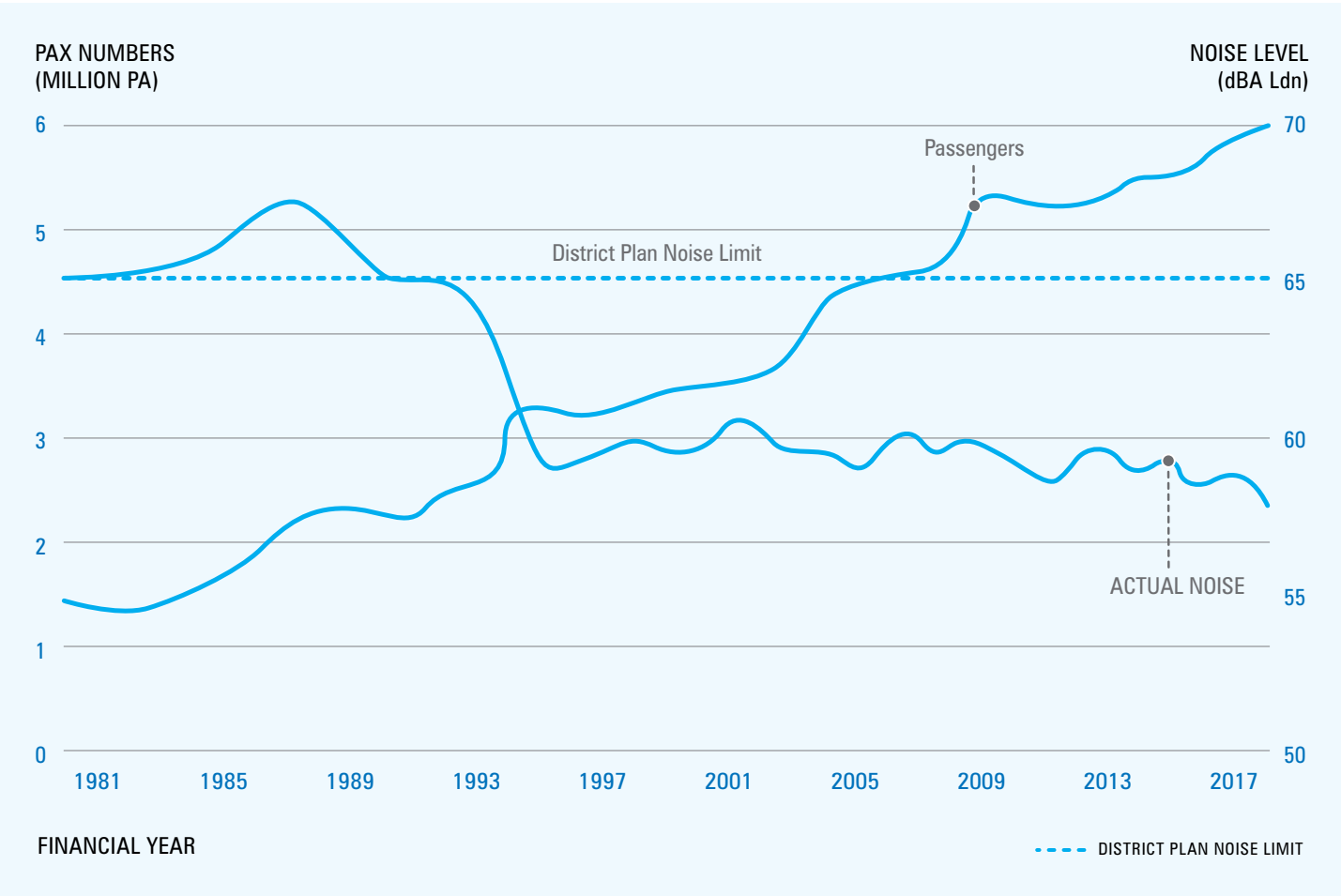
These include:

- Changes in aircraft technology have produced new generations of aircraft that are up to 30% quieter and this innovation is expected to continue.
- The implementation of the airport’s curfew that has significantly reduced airport noise between midnight and 6.00 a.m.
- Noise abatement procedures specific to Wellington Airport relating to flight paths set by the Civil Aviation Authority.
- Improvements to the airport layout to reduce ground noise.
- Investment in quieter ground service equipment and engine testing controls.

As part of the ongoing Noise Management Plan, the ANMC has supported implementing a range of noise mitigation measures for homes and early childhood centres located within the airport’s Air Noise Boundary. The Quieter Homes package offers almost 700 home owners inside the Air Noise Boundary a specifically tailored package of acoustic mitigation treatment designed to reduce aircraft noise.

## PASSENGER GROWTH VS NOISE LEVEL

Wellington Airport remains committed to complying with noise abatement procedures for flight routes set by the Civil Aviation Authority



Few cities in the world benefit from an airport as conveniently located as Wellington Airport. This accessibility and proximity to residential properties means that we carefully monitor and manage the effects of airport noise on our neighbours.

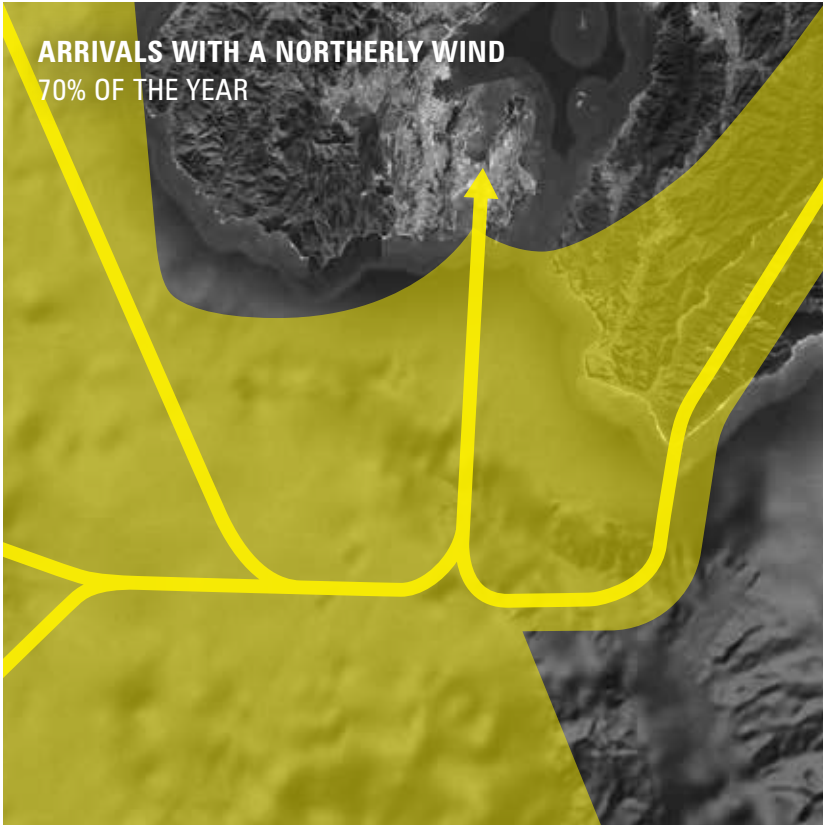
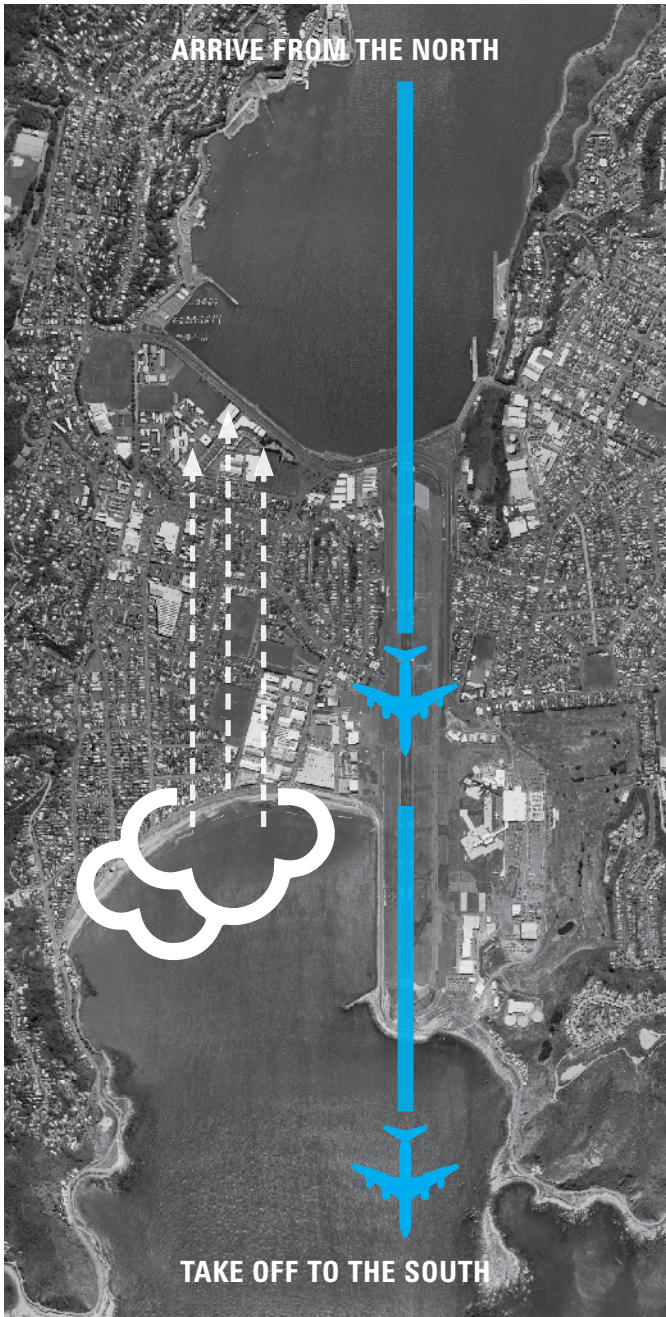
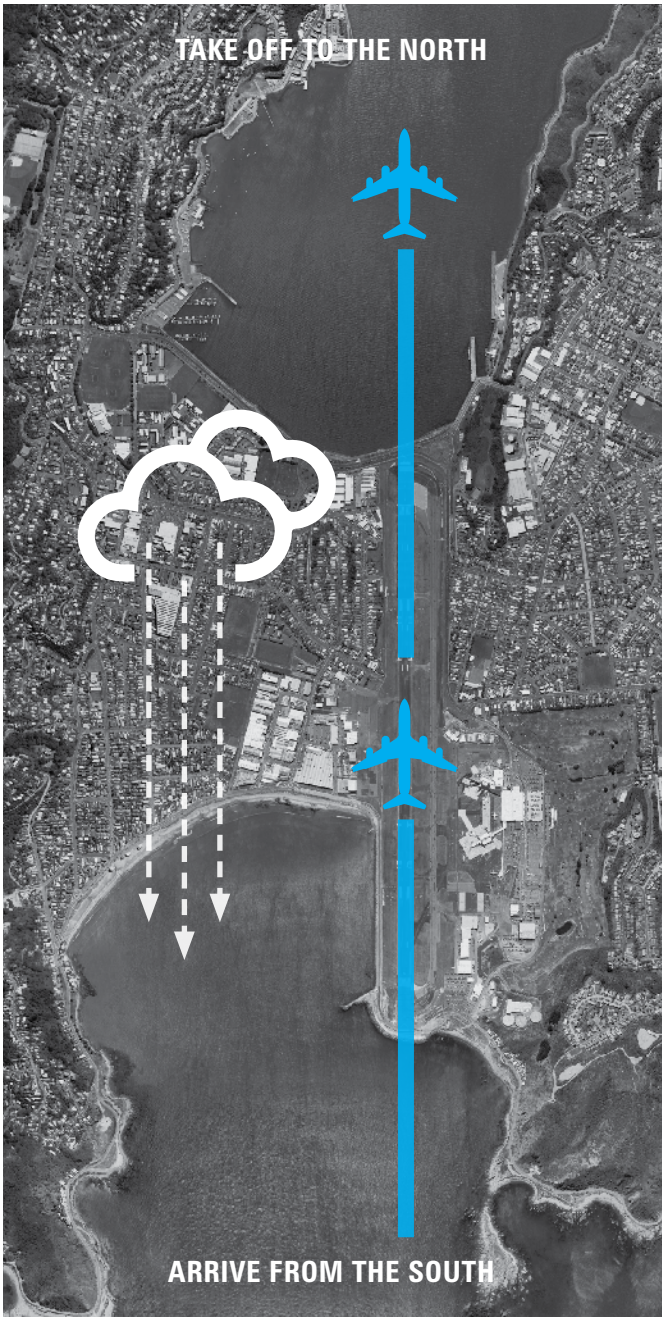


# How aircraft currently fly to and from Wellington

Around 250 flights land and take off at Wellington Airport every day. Aircraft must take off and land into the wind. The runway direction used by planes at Wellington Airport is oriented north and south.

The wind in Wellington is a northerly for around two thirds of the year. This means that two thirds of flights arrive from the south in order to land into the wind and take off to the north, into the wind. It is the opposite when there is southerly wind.

70% of arrivals into Wellington come from the south over the Cook Strait avoiding residential areas.



Aircraft flying to and from Wellington currently use ground based navigation aids including an Instrument Landing System (ILS).

The ILS provides aircraft with lateral and vertical guidance for the approach into Wellington.

The ILS however can be affected by obstructions, storms or flooding. PBN has a greater level of resilience given it uses satellite technology.

Here are images showing a current traditional day at Wellington for arrivals in a northerly wind, and in a southerly wind, with the flight paths being used.

Shaded yellow areas are where aircraft fly currently. They spread out over a wide area as aircraft fly visually (on fine and clear weather days) and under Air Traffic Control instruction.

Solid yellow lines indicate where specific flightpaths are already in place.



# Trialing the proposed PBN flight paths in Wellington

The trial of the proposed PBN flight arrival paths into Wellington will commence from September 2018.

Around 15% of flights into Wellington will use PBN routes during the trial.

Measurement and analysis of noise data is a major part of the trial. This information, combined with community feedback will assist in designing the most safe and efficient routes for aircraft. This is how the trial will work:

## MARCH – AUGUST 2018

- 1. **Establish existing baseline** - Noise monitors will be installed at locations along the proposed flight paths to establish the baseline level of noise – what is experienced today under normal conditions.

## SEPTEMBER 2018 – AUGUST 2019

- 2. **Trial and monitor proposed approach flight paths** - The PBN flight paths will then be trialed over a twelve month period. Noise and traffic levels will be monitored again.

## MARCH 2019

- 3. **Compare baseline and new paths** - Analysis will then be conducted and a six month interim report on the comparison will be prepared.

## OCTOBER 2019

- 4. **Issue draft report for feedback** - This report will be issued to the Air Noise Management Committee and community for comment and feedback.

## NOVEMBER 2019

- 5. **Review feedback and make any adjustments needed** - Feedback will be reviewed and considered and flight paths adjusted where feasible.

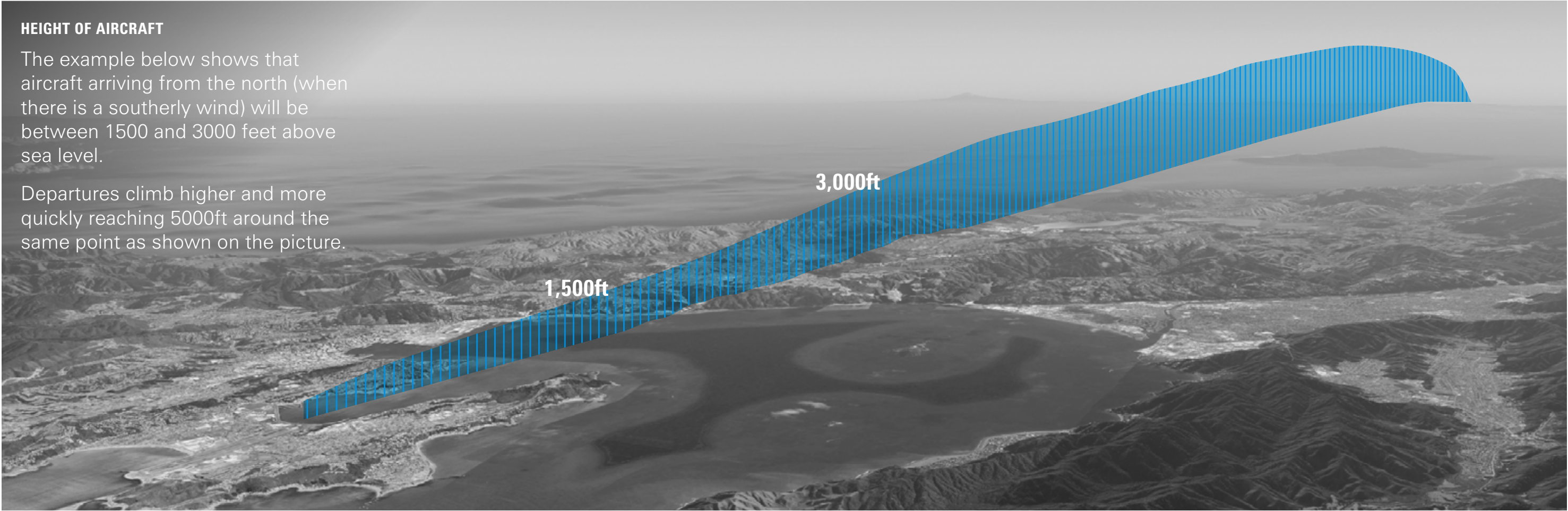
The PBN flight paths being trialed have already taken the following factors into account based on international and local best practice:

- 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.

## HEIGHT OF AIRCRAFT

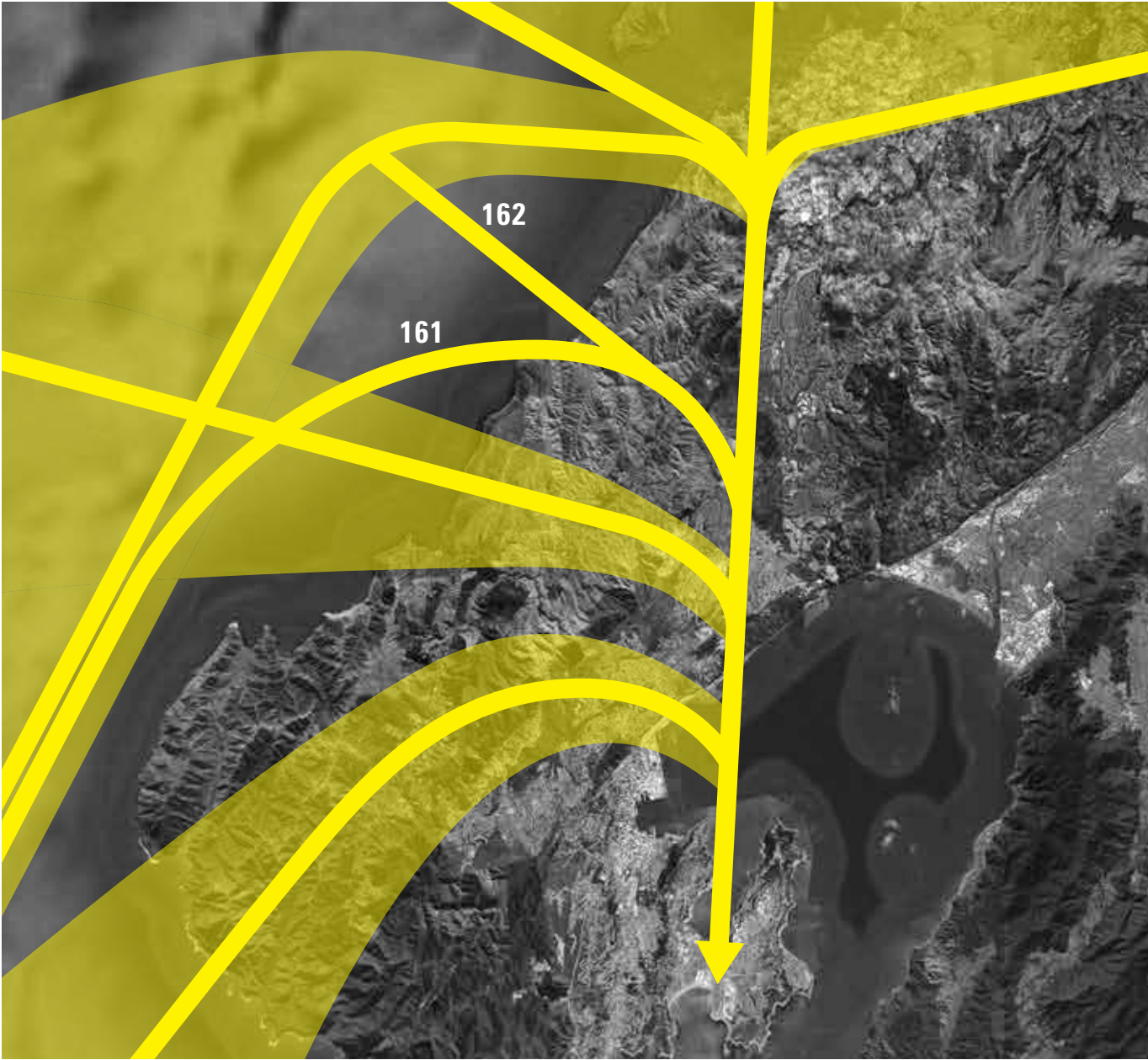
The example below shows that aircraft arriving from the north (when there is a southerly wind) will be between 1500 and 3000 feet above sea level.

Departures climb higher and more quickly reaching 5000ft around the same point as shown on the picture.





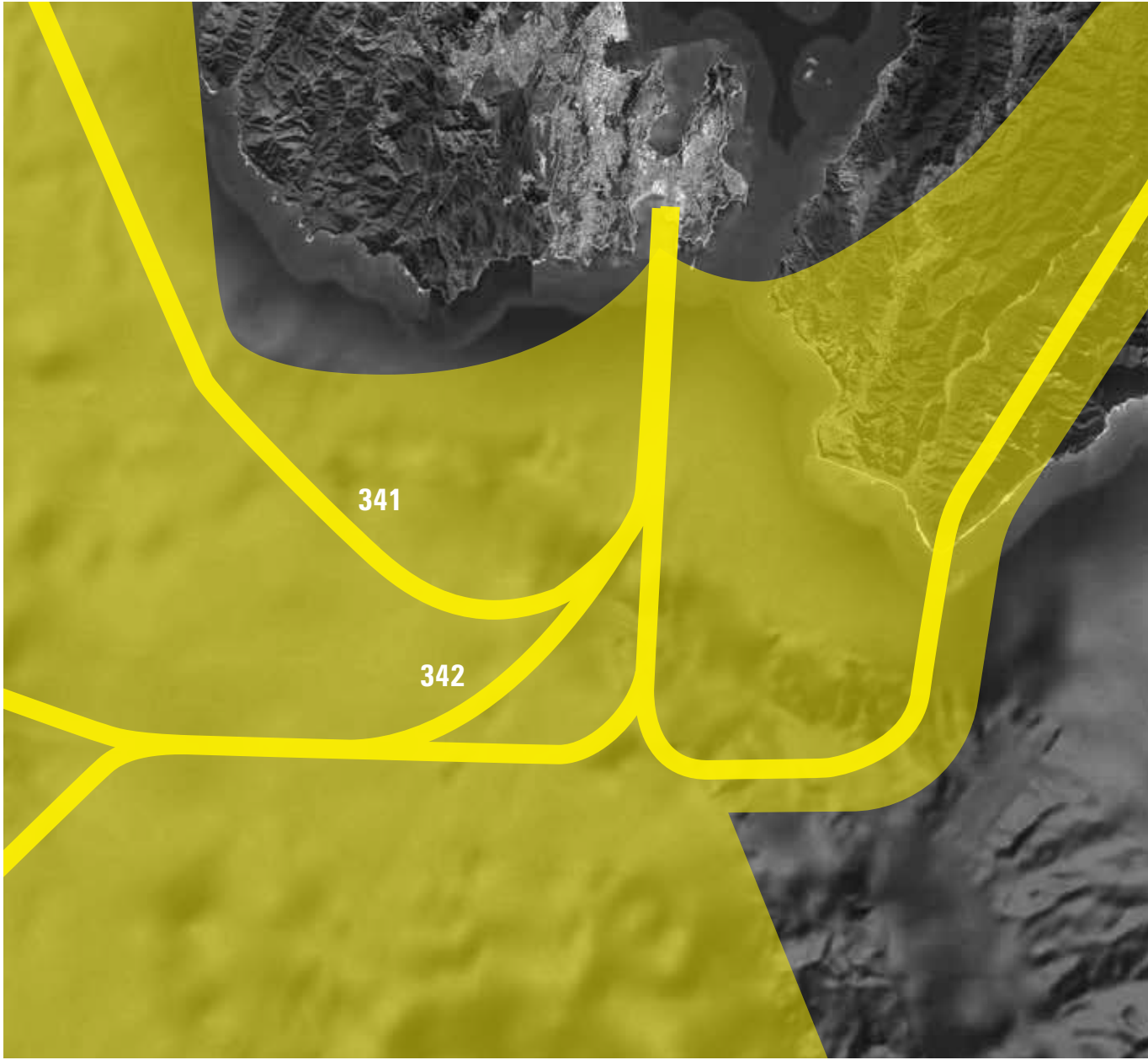
# The trial PBN routes



## ARRIVALS FROM THE NORTH

On average there are around 125 arrival flights per day. The lines 161 and 162 are the new PBN routes being trialled. Existing routes in yellow will continue. Arrivals from the north occur up to 30% of the year when there is a southerly wind.

At the completion of the trial it is expected that 20 flights would use the new PBN route 161 and 9 flights would use route 162. This will alleviate traffic on other routes and be more efficient in terms of noise and carbon emissions. The direct approach from the north already has a continuous descent since the 1970s using Instrument Landing Systems (as it is a straight line) and was further enhanced with GPS for additional resilience. There is no benefit in implementing further PBN technology on this approach as it does not require a curved descent.



## ARRIVALS FROM THE SOUTH

Arrivals from the south occur up to 70% of the year when there is a northerly wind. The trial of PBN routes 341 and 342 will provide more efficient approaches and fuel savings.



## NOT ALL AIRCRAFT WILL USE PBN FLIGHT PATHS DURING THE TRIALS AND AFTER THEY HAVE BEEN INTRODUCED

It is important to know that PBN routes are only used by aircraft that have the appropriate equipment and CAA approvals. Also on days where the weather is fine and clear, pilots in any aircraft may still choose to utilise different routes into Wellington with or without Performance Based Navigation.

The airlines and aircraft taking part in the Wellington PBN trial include:

### Jet aircraft

Air New Zealand and Jetstar (A320)  
Qantas and Virgin Australia (B737-800)

### Turbo-propeller aircraft

Mount Cook – ATR 72-600  
(introduction from approximately June 2018)

## WHERE TO GET INFORMATION AND PROVIDE FEEDBACK AS THE TRIAL PROGRESSES

All information and updates as the trial progresses, can be found at [www.wellingtonairport.co.nz/airnoise](http://www.wellingtonairport.co.nz/airnoise). At this web page you can also view and report on any flights either in real time or historically.

If you would like to receive email updates on the trial please send an email to [airnoise@wellingtonairport.co.nz](mailto:airnoise@wellingtonairport.co.nz) with *PBN trial info* in the subject line.

Or you can send a letter with your details to:

PBN Flight Paths  
Wellington Airport  
PO Box 14175  
Wellington 6241

Wellington Airport connects our region to the rest of New Zealand and the world through 250 flights per day. The aim of this trial is to help the travel, trade and tourism industries grow in a safe and environmentally friendly and socially responsible manner.

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