GOLD COAST AIRPORT RUNWAY 14 ILS ARRIVAL PROCEDURES

Post Implementation Review

1 October 2020

CHANGE SUMMARY

Version	Date	Change Description
Draft 0.1	28 August 2020	Draft report for public release
1.0	1 October 2020	Final Report

CONTENTS

EXECUTIVE SUMMARY

The Gold Coast Airport Instrument Landing System (ILS), and associated arrival and noise abatement procedures (NAPs) for Runway 14 (RWY14), was implemented on 28 February 2019. In advice from the Commonwealth Minister of Environment in 2015, it was noted that Airservices should conduct a Post Implementation Review (PIR) of the Airservices 2014 Environmental Impact Assessment (EIA) within 18 months of implementation of the ILS. This advice specifically noted the need to conduct noise monitoring for a three month period to enable verification of predicted noise levels in the 2014 EIA. The requirement for the PIR was also noted in the approval from the Commonwealth Minister of Infrastructure for the Gold Coast Airport ILS Major Development Plan in 2015.

Prior to the implementation of the ILS, a 2017 Administrative Appeals Tribunal (AAT) ruling imposed a number of conditions limiting the use of the ILS. This required that Airservices develop NAPs that would allow use of the ILS only when poor weather affects visibility or for critical operational requirements, including emergencies. The introduction of the NAPs aimed to lower the use of the ILS below what was anticipated in the 2014 EIA, and as such, the effectiveness of these NAPs have also formed part of this PIR.

As part of Airservices PIR procedures, the effectiveness of community engagement activities and information in relation to forecast noise levels and new operating procedures was also assessed.

Key Findings

The key findings of the PIR were:

- ILS usage was found to be much less than originally assessed in the 2014 EIA, with 45 aircraft using the ILS on a busy day compared to 82 modelled in the 2014 EIA forecast. This was due to the introduction of new approach procedures in 2016 that are preferred by aircraft operators, and also the effectiveness of the NAPs in limiting use of the ILS.
- The noise impacts of the ILS implementation on communities north of the airport was found to be lower than modelled in the 2014 EIA. During the month of highest ILS usage, an average of one to two aircraft noise events at 60 dB(A) or above per day were recorded. This was well below the maximum forecast impact in the 2014 EIA of up to 74 dB(A), up to 82 times a day, over 10 (not necessarily consecutive) days a year.
- An approach using a navigation waypoint known as ‘KEGAN’ was included in the 2014 EIA. This was subsequently removed prior to ILS implementation, and resulted in aircraft being vectored (turned) onto the ILS approach by air traffic control at 2,500 feet, 18 kilometres from the airport. As such, aircraft join the ILS over the coast north of Broadbeach at a slightly lower attitude than modelled, however this resulted in an increase of less than 1.6 dB(A). Changes in noise levels of 3 dB(A) are unlikely to be perceptible.
- The 2014 EIA did not model use of the ILS procedure by piston aircraft (generally used for flight training purposes) due to their expected utilisation not being readily determined. It was found that 41% of ILS use was by these aircraft. This was due to the ability under the NAPs for these aircraft to fly this procedure in all weather conditions for training purposes between the hours of 9am and 5pm, and so is a compliant activity.
- The implementation of the NAPs met the requirement of the AAT ruling. Analysis found that 90% of operators constrained by the NAPs used the ILS in conditions of low visibility and cloud base, and approximately 10% used it for operational requirements. We have been active in requesting information from operators where the reason for use of the ILS was not clear (i.e. where weather conditions were not an obvious driver).
- Feedback from community indicated that reporting of ILS usage to the community was found to lack a consistent structure and the desired level of detail.
- Community engagement processes were noted in some cases to be cumbersome and requiring greater transparency and access to information.

Recommended actions

The following recommended actions have been identified in response to the PIR findings:

Recommended Action 1

We will provide updated information derived from this report in a succinct and accessible format to the community regarding the use of preferred approaches to RWY14, the distribution of arriving traffic across various procedures, and the associated noise exposure.

Recommended Action 2

We will review the arrival flight paths to the ILS for RWY14 to identify possible noise improvements for the community. This will include consultation with the Airport Noise Abatement Consultative Committee (ANACC) and Gold Coast Community Aviation Consultation Group (CACG) to identify safe, feasible and appropriate proposals. This will also include engagement with the Gold Coast community.

Recommended Action 3

a) *We will include a broader mix of aircraft types in all future noise modelling and flight path change considerations to ensure a representative assessment.*

b) *We will add piston aircraft utilisation of the ILS to future reporting.*

Recommended Action 4

a) *We will continue to work closely with airlines and operators to ensure correct application of the priorities as per NAPs.*

b) *We will provide information derived from this report in a succinct and accessible format to the community to explain how the NAPs are achieving the AAT conditions and intent.*

c) *While the NAPs are an aviation operational document for pilots, with language and instructions specific to this audience and constrained by the aviation rule set, we will review the specific community concerns raised prior to, and as part of, this PIR regarding the wording of the NAPs. We will consult with the ANACC regarding this review and provide briefings to the Gold Coast CACG. Findings will be made available on the Airservices website.*

Recommended Action 5

We will consult with the ANACC regarding the format of future reporting on the ILS usage to ensure information is transparent and available for the Gold Coast CACG and ANACC meetings. We will provide this information on the Airservices website.

Recommended Action 6

We will provide a briefing to the CACG and ANACC on our 'Community Engagement Framework'.

Recommended Action 7

When predicting noise levels from aircraft using specific instrument procedures designed to be used in adverse weather conditions, we will make specific allowance for increased ambient noise levels in future EIAs (due to the influence of high winds, rain and thunder on ambient noise levels). Information on these allowances will be included in community information. This will improve the accuracy of noise exposure forecast modelling.

1. PURPOSE

The purpose of this document is to present the findings of a Post Implementation Review (PIR) of the Airservices Environmental Impact Assessment (EIA) of the aircraft arrival procedures associated with the Instrument Landing System (ILS) for Runway 14 (RWY14) at Gold Coast Airport, Queensland.

It also includes a review of the effectiveness of the noise abatement procedures (NAPs) related to the use of the ILS and the community engagement activities and public information released in relation to ILS usage, forecast noise levels and the ILS NAPs.

2. BACKGROUND

The Gold Coast Airport ILS, and associated arrival procedures and NAPs[1], for RWY14 was implemented on 28 February 2019.

An ILS is a precision, radio navigation, ground based aid to allow aircraft to approach and land in weather conditions that would otherwise have resulted in a missed approach and possible diversion to another airport[2].

The ILS procedures were subject to an EIA, completed by Airservices on 19 May 2014, and were referred to the Commonwealth Minister of Environment in 2015, under the *Environment Protection and Biodiversity Act 1999* (EPBC Act) as they were likely to have a 'significant' environmental impact. Airservices received authorisation for the action and advice from the Minster in November 2015.

In January 2016, Gold Coast Airport Pty Ltd (GCAPL) received approval conditions for the ILS Major Development Plan (MDP) from the Minister for Infrastructure. This approval noted the advice from the Minister of Environment, and that the projected aircraft noise was not at levels deemed significant in Australia or elsewhere under the Australian Noise Exposure Forecast (ANEF) or similar noise contour systems.

The advice and approval conditions required that Airservices should: provide ongoing community engagement with support from GCAPL, including through the Gold Coast Airport Community Aviation Consultation Group (CACG); keep the Aircraft Noise Ombudsman (ANO) informed throughout the process; and undertake a PIR of the EIA within 18 months of implementation of the ILS.

In March 2017, an Administrative Appeals Tribunal (AAT) placed a number of conditions on the operational use of the ILS to reduce noise impacts on the community. This required that Airservices develop and publish NAPs for the preferred use of approaches to RWY14.

Details of the advice and conditions are provided in Section 3.

Airservices undertook community engagement in 2018 and 2019 to provide information on the ILS usage, forecast noise exposure, and NAPs. Since the ILS was implemented, Airservices has also provided reporting on the ILS usage through the CACG.

In response to the Ministerial advice, and to meet the requirements of the PIR, Airservices was required to conduct noise monitoring of the ILS for a minimum period of three months, to capture data to assist in the verification of forecast noise levels.

The location of the noise monitors was determined following Airservices-led community engagement in August 2019. Airservices deployed two temporary noise monitors, one at Miami and another at Broadbeach, to supplement readings from an existing permanent noise monitor already in place at Tugun.

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[1] Noise Abatement Procedures (NAPs) are designed to minimise the impact of aircraft noise on the community by reducing noise at the airport during ground operations and noise generated during the arrival and departure phases of flight. Airservices Australia (2020)

[2] Gold Coast Airport Pty Ltd Instrument Landing System Major Development Plan | January 2016 https://pdf.goldcoastairport.com.au/instrument-landing-system

Aircraft noise and flight path data was captured by the noise monitors between 1 November 2019 and 29 February 2020, as the summer period is a known period of inclement weather that results in increased usage of the ILS. There were a number of storm and low-visibility events recorded during this period, and the traffic movements were reflective of busy summer operations. The data sample was obtained prior to the impact of the COVID-19 pandemic on air traffic numbers, and the data set was determined to be an appropriate and representative sample for the PIR analysis.

As part of the PIR process, Airservices conducted community engagement with the Gold Coast community, including the Gold Coast Airport CACG and Airport Noise Abatement Consultative Committee (ANACC) between 23 July and 20 August 2020. Community members were invited to provide feedback and submissions regarding the noise associated with ILS operations, the effectiveness of the NAPs, and the community engagement information provided by Airservices throughout the process.

Airservices also engaged with the ANO and GCAPL regarding the PIR process.

This draft report meets the requirements of the Ministerial advice and approval conditions, and will be provided to the ANO, GCAPL, the Gold Coast Airport CACG, and the wider Gold Coast community.

The report will be finalised following a two-week public comment period, including presentation to the CACG. It will then be published on Airservices website.

More information on the Gold Coast Airport ILS project and the history of the changes is available at https://www.airservicesaustralia.com/projects/flight-path-changes/2019-changes/

3. ADVICE AND CONDITIONS

3.1. Commonwealth Environment Minister's Advice

Airservices 2014 EIA found that the proposed new ILS arrival procedures to RWY14 at Gold Coast Airport were likely to have a 'significant' environmental impact (particularly in relation to community noise impacts), within the meaning of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). As such, the matter was referred by Airservices to the Commonwealth Minister for the Environment for advice (under s161 of the EPBC Act), on 18 March 2015.

The Minister's advice was received by Airservices on 13 November 2015, which stated that Airservices should give due consideration to:

- "an ongoing Community Relations Strategy - to provide the opportunity for local community engagement on issues related to airport planning and operations, including airport noise, through the existing CACG which has a membership including Federal and State MPs, local councils, federal and state departments, local business groups and local community representatives.
- informing the ANO of all proposed actions in respect of the proposed ILS - the ANO conducts independent administrative reviews of Airservices management of aircraft noise-related activities, including, the handling of complaints or enquiries made to Airservices about aircraft noise, community consultation processes related to aircraft noise and the presentation and distribution of aircraft noise-related information.
- undertaking a Post Implementation Review of the Environmental Assessment of the flight paths, conducted by Airservices Australia, associated with the proposed ILS, not less than 12 months, and not more than 18 months following commissioning of the ILS. Noise monitoring of three months would be adequate to collect sufficient data to verify noise levels predicted through the Integrated Noise Model, identify non-compliance, inform corrective actions and provide the basis of a report to be made available to the CACG and ANO."

A copy of the Commonwealth Environment Minister's advice to Airservices in relation to the EIA of the ILS arrival procedures at Gold Coast Airport is included in **Appendix A**.

3.2. Commonwealth Infrastructure Minister's Approval Conditions

The ILS arrival procedures were assessed as part of the Gold Coast Airport ILS Major Development Plan (MDP), prepared by GCAPL in September 2015 (in accordance with the Commonwealth Airports Act 1995).

GCAPL's MDP was approved by the then Minister for Infrastructure on 19 January 2016, and included the conditions that GCAPL work with Airservices to undertake a PIR of Airservices' EIA of the ILS flight path within 12 to 18 months of the commissioning of the ILS, and for the PIR to include noise monitoring and reporting.

Under this condition, the PIR was required to be completed by the end of August 2020.

A copy of the Commonwealth Infrastructure Minister's approval of the MDP for the ILS at Gold Coast Airport is included in **Appendix B**.

3.3. Administrative Appeals Tribunal Conditions

The proposed ILS arrival procedures were the subject of a Commonwealth Administrative Appeals Tribunal (AAT) hearing, between two applicants (Gold Coast Lifestyle Association Incorporated and Tugun Cobaki Alliance Incorporated), and three respondents (the Minister for Infrastructure and Regional Development, GCAPL and Airservices).

The AAT reached a final decision on 21 March 2017, which imposed a number of conditions on the operational use of the ILS by Airservices and GCAPL.

Airservices developed the NAPs in accordance with the AAT conditions. The ILS and associated arrival procedures and NAPs were implemented on 28 February 2019.

A copy of the AAT final decision and conditions are included in **Appendix C**.

4. SCOPE

In compliance with its own internal national operating standard, *AA-ENV-NOS-2.100, Environmental management of aircraft operations*, Airservices conducts PIRs into airspace and flight path changes to verify assumptions made about potential environmental and community impacts, and to determine the effectiveness of the environmental impact assessment and community engagement process. The outcomes inform future changes and improve the overall change management process.

To ensure the Ministerial advice and approval conditions were met, the PIR consisted of a review of:

- Airservices 2014 EIA of the ILS flight path, including assumptions and forecast noise levels.

In addition, the PIR also assessed the effectiveness of:

- Noise Abatement Procedures (NAPs) for arrival procedures to the ILS
- community engagement activities and public information released in relation to forecast noise levels and ILS NAPs.

5. OBJECTIVES

The following objectives of the PIR were developed by Airservices, following consultation with GCAPL and the ANO:

1. Validate the assumptions and forecast noise levels associated with the ILS operations from the 2014 EIA through undertaking a minimum of three months of aircraft noise monitoring during the peak period of ILS usage.
2. Identify 'non-compliance' in relation to modelled noise levels compared to actual noise levels.
3. Identify corrective actions in relation to Airservices environmental assessment and noise modelling procedures.
4. Review the application of NAPs for the arrival procedures for the ILS, with respect to the AAT ruling and conditions.
5. Review the Airservices Community Engagement activities and information related to the NAPs, and identify any improvements in provision of ongoing information.
6. Publish a PIR report on Airservices website with findings and recommendations.

6. CURRENT OPERATIONS

6.1. Airport Description

Gold Coast Airport is located 3km northwest of the border towns of Coolangatta and Tweed Heads. The airport has two runways. The main runway (RWY14/32) is 2,492m long, with a 582m long crossing secondary runway (RWY17/35) (**Figure 1**).

Figure 1 shows a satellite image of Gold Coast Airport.

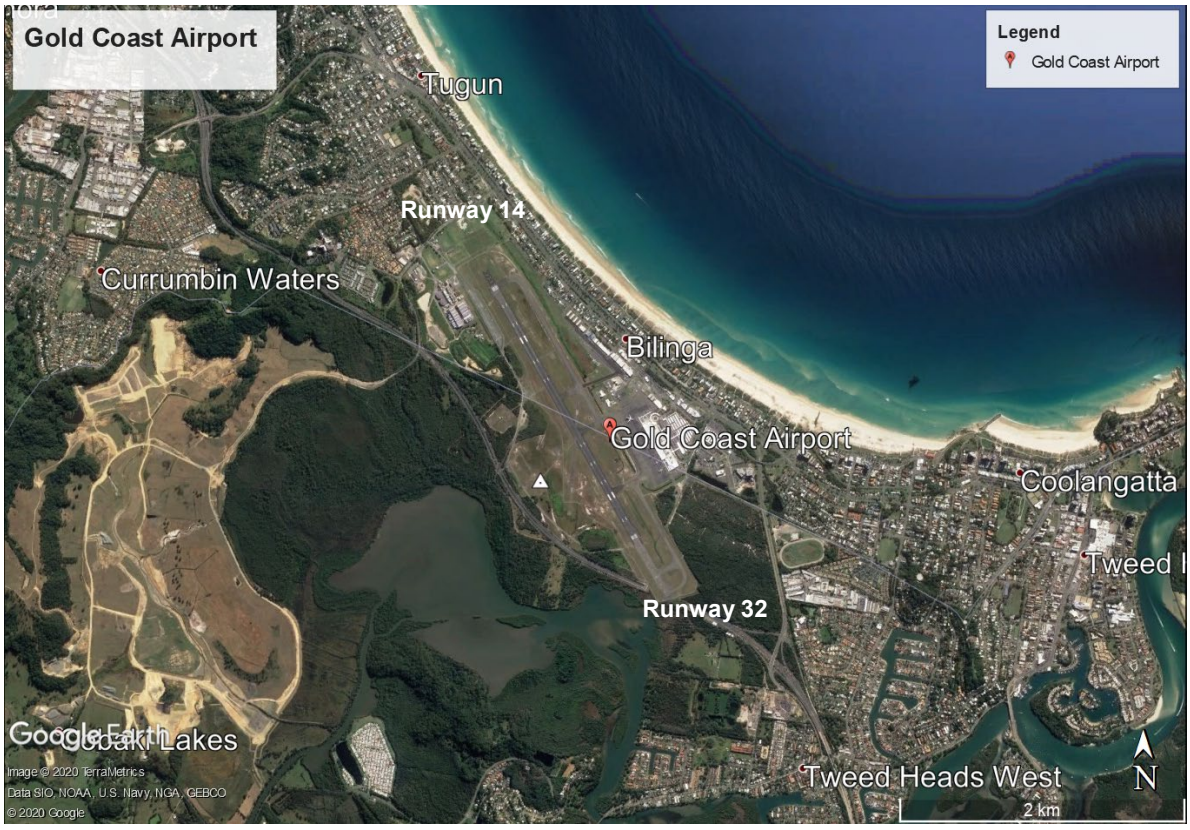


Figure 1: Satellite image of Gold Coast Airport showing RWY 14 and 32, *Source: Google Earth*

According to Gold Coast Airport Noise Abatement Procedures (NAPs)[3], RWY 14 is the preferred runway for all operations at the Gold Coast, including for arrivals and departures, when weather and operational conditions permit.

The majority of operations at Gold Coast Airport have historically been international and domestic scheduled passenger operations, however this has varied markedly as a result of the COVID-19 pandemic impacts on aviation operations.

General Aviation (GA) also operates from the airport, including both fixed wing and helicopter training, and scenic flights. There are a number of flying training schools based at Gold Coast Airport, and they undertake both circuit training and instrument flight training.

[3] Airservices Aeronautical Information Publication (AIP) DAP 164 AERODROME & PROCEDURE CHARTS https://www.airservicesaustralia.com/aip/current/dap/BCGNA01-159_13AUG2020.pdf

6.2. Arrival and Approach Procedures

The current arrival and approach procedures to RWY14 at Gold Coast Airport are presented in **Figure 2**.

In general, aircraft arriving to RWY14 are not to be below 5,000 feet (jet) or 3,000 feet (turbo prop) until the aircraft is established off the coast and over water, to join either the visual approach or an appropriate RWY14 instrument approach. The type of approach depends on the direction of the arrival, visibility conditions, and operational requirements at the time.

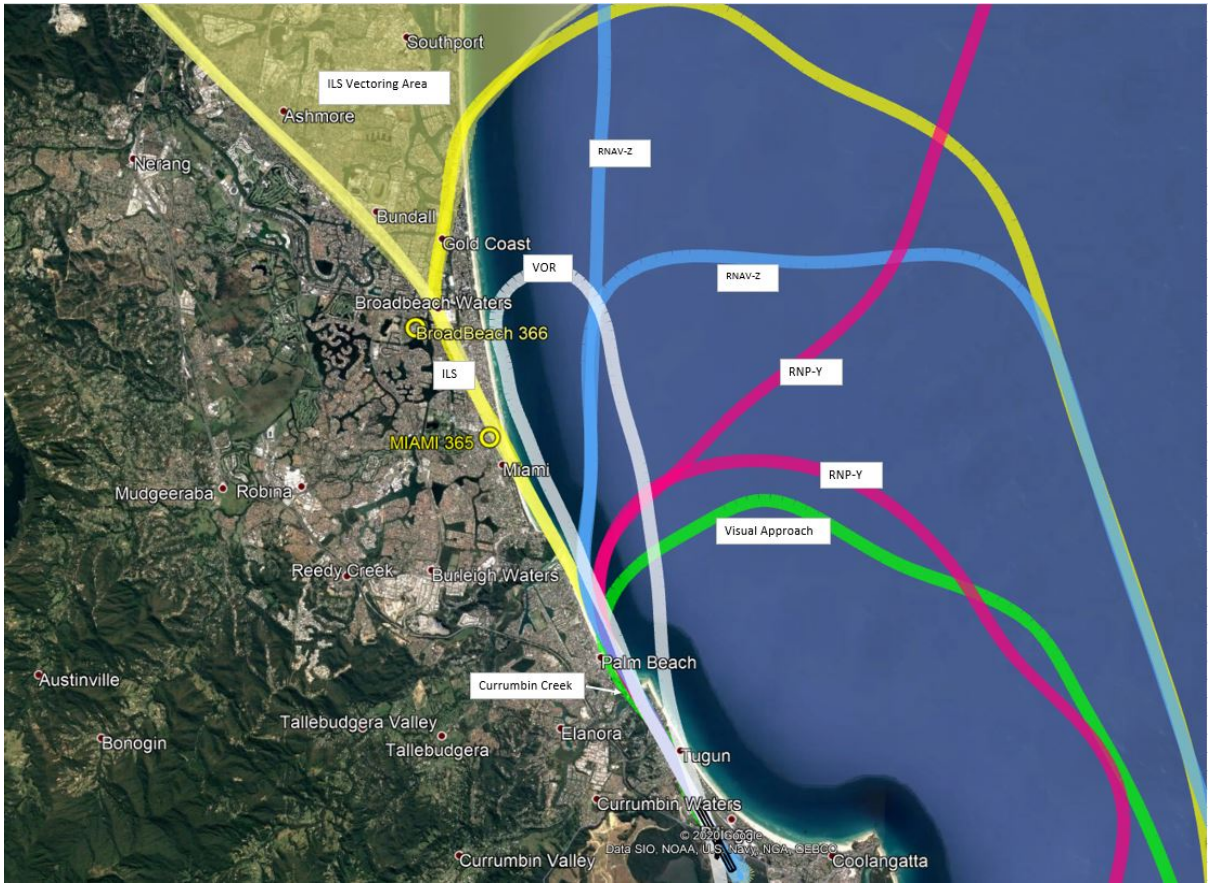


Figure 2: Depiction of current arrivals and approach procedures to RWY 14 at Gold Coast Airport, *Source: Airservices NFPMS*

A visual approach (green) is an approach to a runway conducted under instrument flight rules, but where the pilot proceeds by visual reference, and remains clear of cloud to the airport. The pilot must at all times have the airport or preceding aircraft in sight.

The visual approach remains over water until near Currumbin Creek.

There are several instrument approach procedures available to RWY14:

- **Required Navigation Performance – Authorisation Required (RNP-AR) approach (pink) -** these are also known as 'Smart Tracking' approaches and are preferred by suitably approved operators as they allow aircraft to fly with a higher degree of accuracy, and assist in providing safe and predictable landings in all weather conditions, particularly inclement weather and low-visibility.

  RNP-AR approaches can only be used by operators who have the necessary avionics equipment installed in their aircraft, whose pilots are trained, and who are approved by the Civil Aviation Safety Authority (CASA) to conduct such approaches.

  'Smart Tracking' technology makes air travel safer, more efficient and more dependable.

It also has the potential to improve noise outcomes for communities living close to airports as they facilitate Continuous Descent Operations (CDO), allowing aircraft to descend using less thrust, and by reducing the spread of aircraft on arrival paths.

The number of domestic airline operators approved to fly 'Smart Tracking' approaches continues to grow and it is the preferred approach for all approved operators.

The RNP-AR approaches to RWY14 are referred to as RNAV-W (RNP) and RNAV-Y (RNP).

The RNP-AR flight paths (RNAV-W & Y) ensure aircraft remain over water until Currumbin Creek, using the most advanced satellite navigation available to approved operators.

- **Area Navigation (RNAV) approach (blue) -** is a method of navigation that enables aircraft to fly on the desired flight path within the coverage of referenced ground-based navigational aids (NAVAIDs) or within the limits of the capability of self-contained systems and/or space-based systems (i.e. Global Navigation Satellite System (GNSS) and associated waypoints), or a combination of these capabilities. RNAV approaches can be classified as non-precision approaches with no vertical guidance, however some RNAV approaches also include vertical guidance.

  The RNAV approaches to RWY14 are referred to as RNAV-Z (GNSS).

  The RNAV flight path (RNAV-Z) ensures that, while aircraft are closer to the coast south of Tallebudgera Creek than those using Smart Tracking, aircraft will remain over water until Currumbin Creek using satellite navigation available to all airlines.

- **ILS approach (yellow) -** is defined as a precision runway approach aid based on two radio beams which together provide pilots with both vertical and horizontal guidance during an approach to land.

  The ILS approach to RWY14 is referred to as ILS-Z.

  When the ILS is required to be used, arriving aircraft are vectored (turned) by Air Traffic Control (ATC) to intercept the ILS approach procedure in a triangular zone approximately 18km (10 nautical miles) north of the airport (**Figure 2**).

  Once established on ('locked on') to the ILS, aircraft fly a 'straight-in' ILS approach path to the RWY14 threshold. This flight path overflies coastal areas between Surfers Paradise and Gold Coast Airport including the communities of Broadbeach, Miami, Palm Beach and Tugun (as shown in the **Figure 2**).

- **VHF Omni-Directional Range (VOR) approach (White) -** this approach uses ground based navigation equipment, and is known as a no-precision approach as there is no vertical guidance provided. Pilots manage descent and altitude manually and this approach is primarily used for general aviation training purposes at Gold Coast Airport.

  The VOR approach is referred to as VOR RWY 14.

6.3. Noise Abatement Procedures

Airservices has a number of different NAPs at Gold Coast Airport for aircraft operating under Instrument Flight Rules (IFR)[4]. These include instructions for the management of preferred runways and flight paths for operations, defined noise sensitive areas, jet departures, emergencies, and curfew dispensations. They also include instructions for the management of preferred approaches to RWY14.

These instructions are located in Airservices *Aeronautical Information Publication (AIP) DAP 164 Aerodrome & Procedure Charts*[5].

Instructions for aircraft operating under Visual Flight Rules (VFR) are located in Airservices *Aeronautical Information Publication (AIP) En Route Supplement Australia*[6], and contain information for aircraft conducting training, circuit operations and airwork.

This section provides an overview of the NAPs that relate to the use of the ILS, and an assessment of the effectiveness of the NAPs is presented in Section 10.

6.3.1. ILS Noise Abatement Procedures

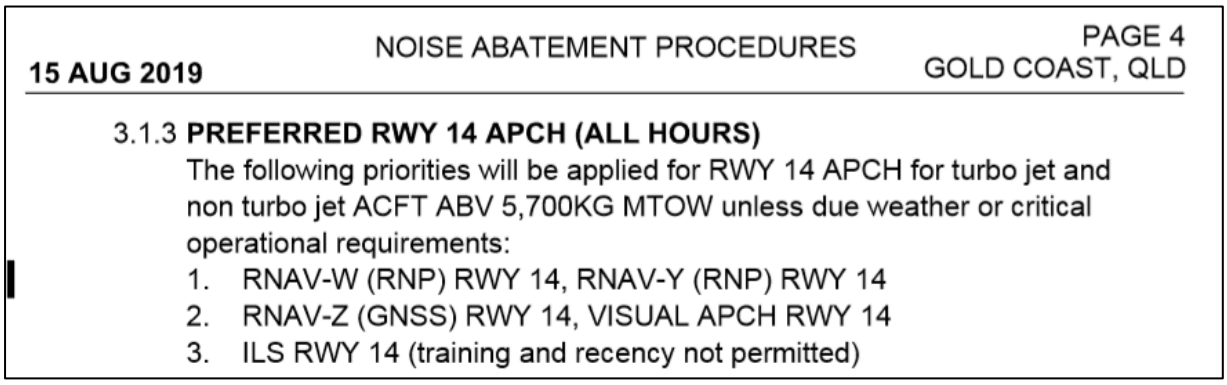
When a visual approach is not possible, the NAPs for approaches to RWY14[7] require jet and turbo prop aircraft to use the instrument approaches in a defined order of priority (**Figure 3**). This is to minimise noise impacts on the community.

The objective of the NAPs is to limit the use of the ILS, so that (as per the AAT conditions) it is only used when poor weather affects visibility, and for critical operational requirements, including emergencies.

The weather conditions for use of the ILS are when:

a. the prescribed cloud base is at or below approximately 800 feet (244 metres), and/or

b. the visibility from the air traffic control tower looking out along the ILS flight path is less than approximately 4km.



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3.1.3 **PREFERRED RWY 14 APCH (ALL HOURS)**

The following priorities will be applied for RWY 14 APCH for turbo jet and non turbo jet ACFT ABV 5,700KG MTOW unless due weather or critical operational requirements:

1. RNAV-W (RNP) RWY 14, RNAV-Y (RNP) RWY 14
2. RNAV-Z (GNSS) RWY 14, VISUAL APCH RWY 14
3. ILS RWY 14 (training and recency not permitted)

Figure 3: Preferred RWY14 approach procedures at Gold Coast Airport, *Source: Airservices AIP, Aerodrome & Procedure Chart*

[4] IFR are procedures and rules for how aircraft are to be operated when visual reference cannot be used for navigation by pilots

[5] https://www.airservicesaustralia.com/aip/pending/dap/AeroProcChartsTOC.htm

[6] https://www.airservicesaustralia.com/aip/current/ersa/FAC_YBCG_13AUG2020.pdf

[7] https://www.airservicesaustralia.com/aip/current/dap/BCGNA04-160_13AUG2020.pdf

The NAPs priority order for approaches to RWY14 are:

1. **'Smart Tracking' (RNP-AR)**
2. **Area Navigation (RNAV) approach or Visual approach**
3. **Instrument Landing System (ILS)**

Safety is always paramount for aircraft operations, and the pilot is ultimately responsible for deciding which approach is most suitable for the safe operation of their aircraft.

The ILS can be used for training purposes, but as described in the NAPs in AIP/ En Route Supplement Australia (ERSA), use of the ILS for the purposes of training:

a. is not be permitted for aircraft with a maximum take-off weight (MTOW) above 5,700kg

b. is permitted for aircraft with a maximum take-off weight (MTOW) below 5,700kg (light aircraft) only between the hours of 9am and 5pm local time.

6.4. Curfew Operations

Under Department of Infrastructure, Transport, Regional Development and Communications (DITRDC) requirements, a curfew applies at Gold Coast Airport which restricts the operation of aircraft with a Maximum Take Off Weight (MTOW) greater than 34,000kg between 11pm and 6am.

This potentially includes arrivals on to RWY14 using the ILS approach.

The curfew conditions state:

> *While most aircraft operations are prohibited during his period, there is provision for the operation or emergency aircraft, some small jets, propeller-driven aircraft and freight movements*.

Jet aircraft greater than 34 tonnes are allowed to arrive during curfew hours if they are:

- operating under the yearly passenger jet aircraft quota of 24
- operating under the weekly freight jet aircraft quota of four
- aircraft involved in an emergency
- aircraft that hold a curfew dispensation from DITRDC as permitted under the *Air Navigation (Gold Coast Airport Curfew) Regulations 2018*.

An analysis of ILS operations during curfew hours is included in Section 9.4.

Further information on the Gold Coast Airport curfew is available at the Department's website: https://www.infrastructure.gov.au/aviation/environmental/curfews/GoldCoastAirport/GoldCoastCurfewBrief.aspx

7. AIRSERVICES 2014 EIA

Airservices 2014 EIA addressed the potential impacts of aircraft noise on communities, the natural environment, and heritage sites, as a result of the implementation of the proposed arrival procedures associated with the ILS.

The assessment focused only on the proposed arrival procedures associated with the ILS at that time, and did not assess the use of other visual or instrument approaches. The EIA assumptions, noise modelling and findings pre-dated the subsequent AAT conditions that limited the ILS usage through the RWY14 NAPs.

7.1. ILS Flight Paths

The proposed flight paths used in the 2014 EIA are presented in **Figure 4**.

They were designed so that operations from the south and east would use the flight path depicted as solid yellow lines over water from the waypoint KEGAN.

Aircraft arriving from the north and west would be vectored by ATC within the triangular area between the dotted yellow lines (the 'vectoring corridor') to intercept the 'straight-in' ILS approach path (depicted as the solid yellow lines from the tip of the triangle to RWY14 in the **Figure 4**).

Figure 4: Flight paths used for the Airservices 2014 EIA, *Source: Airservices Fact Sheet – Instrument Landing System for Gold Coast Airport*

The impacts were broadly addressed in three regions, as shown below in **Figure 5**.

Region 1 (light green area) captured the final approach procedure closest to the airport, while Region 2 (orange) captured the approach procedure via the KEGAN waypoint, and Region 3 (pink cross-hatched area) captured the approaches from the north in the 'vectoring corridor'.

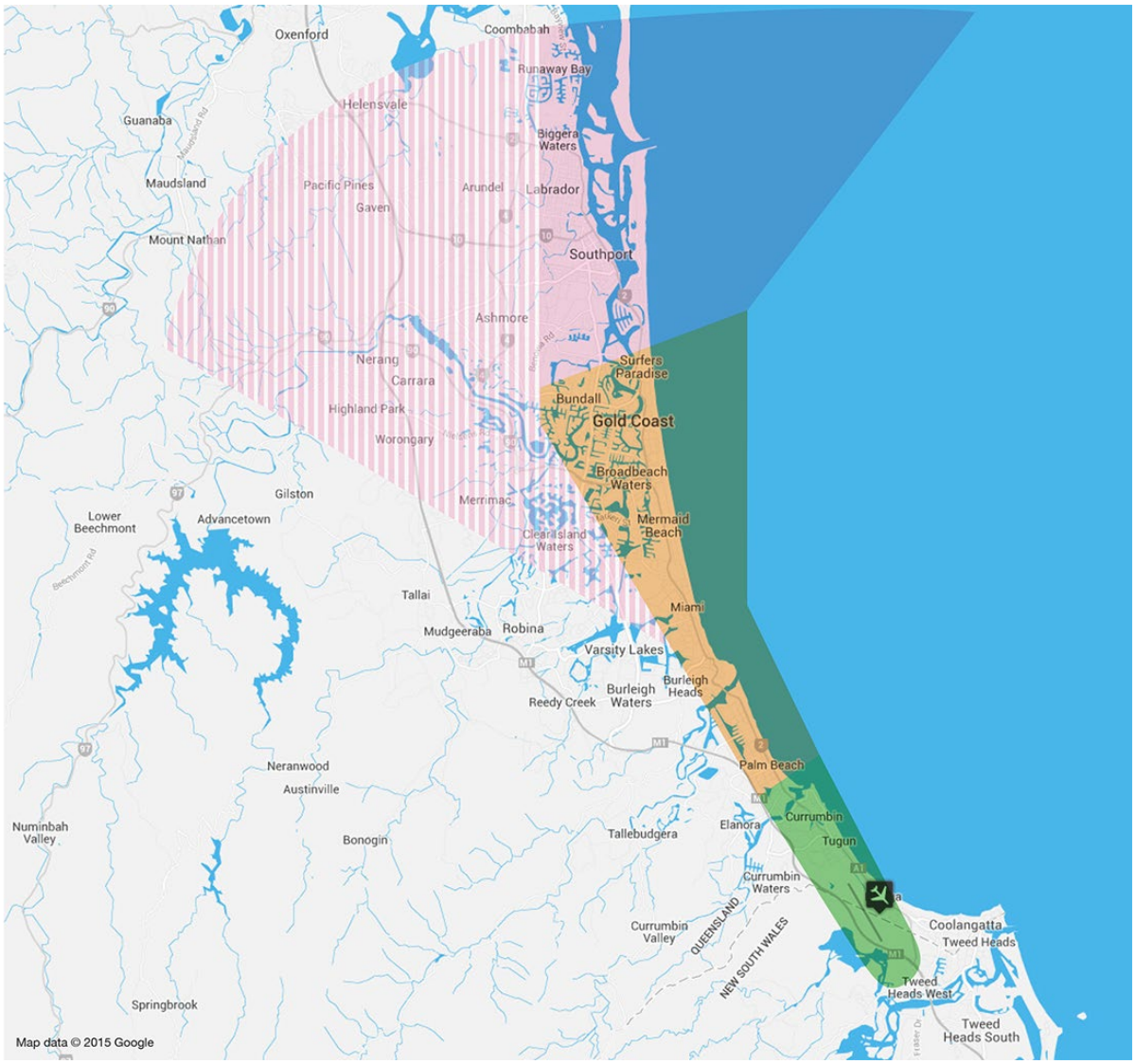

Figure 5: Regions of environmental impact – proposed Gold Coast ILS arrival procedures, *Source: Airservices ILS Fact Sheet*.

7.2. Daily ILS Usage

Using aircraft movement data from the 2012-2013 financial year, the 2014 EIA defined three traffic scenarios of forecast use of the proposed ILS arrival procedure (the KEGAN approach and the 'straight-in' approach from the 'vectoring area'). The scenarios forecast the following use of the ILS procedures:

- **Low** traffic scenario – 10% of busy day arrivals (8 aircraft)
- **Medium** traffic scenario – 40% of busy day arrivals (33 aircraft)
- **High** traffic scenario – 100% of busy day arrivals (82 aircraft).

The 2014 EIA included noise modelling for all three scenarios. The EIA findings were based on the high traffic scenario to identify the 'worst case scenario' of predicted noise impacts.

7.3. Assumptions

The 2014 EIA used the following base assumptions described in **Table 1**.

Table 1: Airservices 2014 EIA base assumptions

Element	2014 EIA assumptions
ILS usage	High traffic scenario – 100% of busy day arrivals (82 aircraft) would use the ILS arrival procedures, and The high traffic scenario was limited to approximately 10 days of the year (noting that these conditions may not occur on consecutive days).
Flight paths	The schedules contained a portion (approximately 15%) of traffic vectored by ATC onto the ILS 'straight-in' approach (generally arrivals from Far North Queensland and South East Asia), as well as use of a flight path from the waypoint KEGAN (approximately 85%) located over water (generally arrivals from the south including Sydney, Melbourne and Canberra). Region 1 – 82 aircraft on a busy day Region 2 – 82 aircraft on a busy day Region 3 – 12 aircraft on a busy day Once aircraft are established on ('locked on') to the ILS, the 'straight-in' ILS approach path to RWY 14 would be directly aligned with the direction of runway ('runway aligned').
Aircraft type	Only jet and turbo prop aircraft were considered as other aircraft (including piston aircraft) are generally not equipped with the systems to fly the ILS. Based on 2012-13 financial year air traffic movement data at Gold Coast Airport three aircraft types were chosen as typical aircraft types to carry out the noise modelling in the 2014 EIA: • Typical international jet – Airbus A330 (although there were very few A330s operating at Gold Coast Airport in 2012-13, this aircraft was used to model the loudest aircraft type operating at the airport in the 2014 EIA). • Typical domestic jet – Airbus A320 (the A320 was modelled as the most common aircraft type operating at the airport, with approximately 35% more arrivals than the B738 at the time). • Typical turbo prop – De Havilland Canada Dash 8 (the DHC8 was modelled to represent all the turbo props as one of the loudest turbo prop types operating at the airport at the time).
Approach angle	The ILS approach path would be 'runway aligned' (i.e. a 'straight-in' approach)
ILS intercept location	Aircraft would intercept the ILS via the vectoring area from the north and an approach path from the waypoint KEGAN over water.
Altitude	Aircraft would fly a standard approach profile on the ILS approach path (as contained in the integrated noise model (INM) used at the time).
Reference locations	Noise modelling in the 2014 EIA was based on 42 reference locations, which included noise sensitive receivers identified in Regions 1, 2 and 3 (namely schools, medical facilities, places of worship and community centres).

7.4. Noise Modelling

Airservices 2014 EIA used the US Federal Aviation Administration's (FAA) Integrated Noise Model (INM), version 7.0d, to model noise impacts.

The 2014 EIA modelled the potential impacts of the proposed ILS approach paths using the following noise metrics at 42 reference locations (including schools, hospitals and other noise sensitive sites):

1. **Maximum single event noise levels (L_{Amax})** – to describe the maximum noise levels of a single aircraft noise event at one point in time.
2. **Number of noise events above a certain level (Nxx)** – to describe the average daily number of aircraft noise events above a certain noise level, e.g. 60 dB(A)[8] in a certain area.

   This metric is often depicted using contour maps, where N60-20 (20 movements a day generating a 60 dB(A) or above noise level), N60-10 (10 movements a day generating 60 dB(A) or above noise level), N60-5 (5 movements a day generating 60 dB(A) or above noise level) etc., are represented as contour lines, where the lines indicate the areas (within the contours) that will experience that average number of noise events.
3. **Equivalent average noise level (L_{Aeq})** – a measurement in dB(A) designed to represent a varying sound source, over a period of time, as a single number.

For each of the three traffic scenarios, modelling was done to predict the number of aircraft noise events above 60 dB(A) and 70 dB(A), i.e. N60 and N70, and equivalent average noise levels (L_{Aeq}) at each receptor.

The EIA findings were based on the 'high traffic scenario' to identify the 'worst case scenario' of predicted noise impacts on the community.

7.5. 2014 EIA Findings

Airservices 2014 EIA defined the environmental impacts of the proposed ILS approaches across the three regions. An excerpt from the EIA is provided below.

7.5.1. Region 1

Under normal operating conditions, the proposed ILS flight paths and procedures assign aircraft arriving from southern ports a Standard Instrument Arrival (STAR) via the KEGAN waypoint. Aircraft arrivals from northern ports will be vectored to join the ILS approach from between 8 and 12 nautical miles (NM) from the threshold of RWY 14, whilst remaining east of the coast to the maximum extent possible.

The proposed ILS flight paths and procedures in Region 1 are identical to existing VOR approaches to RWY 14 and will continue to impact all areas currently under existing flight paths (including Tugun and Bilinga).

Region 1 is not expected to experience additional noise impacts as a result of the proposed ILS.

7.5.2. Region 2

Whenever operational, the proposed ILS flight paths and procedures will result in a number of suburbs being newly exposed to aircraft movements and aircraft noise events of up to 74 dB(A). This extends across an estimated population of 59,950 in the areas of Currumbin, Burleigh Heads, Palm Beach, Miami, Broadbeach, Surfers Paradise and Mermaid Beach. Under normal operating conditions, other locations will not be impacted.

[8] dB(A) – A-weighted decibels dB(A), are an expression of the relative loudness of sounds in air as perceived by the human ear.

It is important to note that average and cumulative noise measures have been modelled on a 'worst case' scenario; information provided by Gold Coast Airport Limited indicates that these high usage rates of the ILS are expected to be limited to approximately 10 days of the year (noting that these conditions may not occur on consecutive days).

Region 2 is expected to experience additional noise impacts at noticeable levels as a result of the proposed ILS – noting that these would be limited to those times when the ILS is operational.

7.5.3. Region 3

Under normal operating conditions it is proposed that aircraft being vectored onto the proposed ILS approach will remain within the narrow, coastal corridor. This is to be achieved through the operation of a Noise Abatement Procedure (NAP).

Under this scenario a population of up to 76,650 people will be potentially impacted within the L_{Aeq} day 40 dB(A) contour, and as defined in the Modelling Thresholds section of this Environmental Assessment.

However, normal operating conditions will need to be varied on an infrequent basis, in order to cater for high volumes of air traffic, adverse weather events, and aircraft or medical emergency. In these circumstances Air Traffic Control (ATC) may vector aircraft onto the proposed ILS flight path from across a broader geographical area and consequently impact a wider catchment.

Under these conditions, a population estimated at 197,150 (Region 3) people may experience increased aircraft noise levels of up to 65 dB(A) L_{Amax}. (Note – L_{Amax} threshold criteria have been applied across the broad region as these are more meaningful given the low traffic levels).

Based on current traffic levels these events are not expected to exceed 12 arrivals per day for aircraft traffic arrivals from northern ports (based on the busiest day for the 2012/13 study period). It is expected that these aircraft would be spread across the region, rather than concentrated on a single flight path.

While the maximum noise level of an individual overflight will be noticeably louder than ambient conditions, it is likely that in the context of the low traffic levels and infrequency of these noise events, the noise impact may not negatively affect the amenity of the region.

Furthermore, current practice permits aircraft to be vectored within this region, when transiting to existing approach procedures at Gold Coast Airport (VOR and RNAV approaches), and therefore such flights are known to be occurring at the present time.

Existing Noise Abatement Procedures (NAPs) at the Gold Coast instruct aircraft to maintain altitude and off-shore approaches where possible, so as to minimise community noise impacts.

Review of NAP compliance indicates that compliance with these instructions is high, and this is not expected to change following implementation of the proposed ILS.

It is not expected that the proposed ILS would give rise to more than 15 over flights at any single location in any 12 month period.

Region 3 is not expected to experience significant noise impacts as a result of the proposed ILS.

8. CHANGES POST AIRSERVICES 2014 EIA

Between 2014 and 2019, Airservices implemented several flight path changes that ultimately altered the disposition and management of air traffic operations across the arrivals and approaches to RWY14 at Gold Coast Airport.

8.1. Flight Path Changes

In November 2014, Airservices implemented RNP-AR ('Smart Tracking') technology for all suitably equipped aircraft landing on RWY14[9], following a trial of these operations. The 'Smart Tracking' flight path was entirely within a longstanding 'visual' flight path corridor for aircraft arriving from the south-east to land from the north on RWY14.

It was expected that utilisation of the 'Smart Tracking' flight path would increase over time as more operators obtained authorisation for its use. In 2016, the PIR for this change identified that approximately 60% of all instrument arrivals to RWY14 were using this flight path[10].

This change contributed to the overall reduction in the use of the ILS, with approved operators preferring the RNP-AR ('Smart Tracking') due to its safety, efficiency and environmental advantages, even in poor weather conditions.

In August 2016, as part of a national navigation modernisation program, there was an amendment to the existing RWY14 RNAV-Z[11] approach to provide a runway-aligned approach, moving this flight path over water and further away from communities. There was also an adjustment to the VOR and non-directional radio beacon (NDB) to off-set it by 5 degrees, also bringing this approach further over water.

These collective changes resulted in an increase in the available arrival and approach options to RWY14, reduced the expected use of the ILS, and included increased over water operations wherever possible to minimise the effect of aircraft operations on the community.

8.2. Removal of KEGAN Waypoint

The KEGAN arrival to the ILS approach that was modelled in the 2014 EIA was based on a concept design in the Gold Coast Airport ILS MDP, which included assumptions about the intercept distance and angle. In December 2018, CASA conducted flight validation of the ILS approach and approved the use of the ILS approach straight section but did not approve the arrival flight path over water. While the design was compliant with necessary design standards, CASA requested Airservices conduct a further review to ensure the procedure was operationally feasible for all operators.

As a result, the KEGAN arrival was not implemented and, instead the arrival procedure required ATC to vector aircraft to intercept the ILS at 2,500 feet by 18km (10 nautical miles) from the airport.

This change of traffic management meant aircraft would be vectored further into Region 3, and intercept the ILS slightly lower, approximately 300 feet lower than modelled.

However, because the number of aircraft expected to use the ILS post-implementation was considered to be much less than had been assessed in the 2014 EIA, the noise exposure associated with the change of procedure was not expected to be noticeable.

[9] https://www.airservicesaustralia.com/projects/flight-path-changes/2014-changes/

[10] https://www.airservicesaustralia.com/wp-content/uploads/Gold-Coast-RNP-Post-Implementation-Review.pdf

[11] https://www.airservicesaustralia.com/projects/flight-path-changes/2016-changes/

8.3. RWY14 NAPs

The AAT conditions required the development of NAPs, limiting the use of the ILS to poor visibility conditions, for operational requirements, or in emergency situations. The NAPs were published in January 2019 ahead of the implementation of the ILS on 28 February 2019.

Airservices met the requirements of the AAT conditions, and took two opportunities to clarify use of the ILS to further constrain operations by:

- specifically including the term ‘critical’ to describe operational requirements, to ensure the ILS was used only for emergency conditions or when the pilot has determined it is required to ensure a safe arrival.

  The addition of the term ‘critical’ ensures that operators can not seek permission to use the ILS for purposes of operational efficiency such as reduced track miles or fuel burn or convenience.

- working with GCAPL to permit training on the ILS for aircraft with a MTOW below 5,700kg (light aircraft) only between the hours of 9am and 5pm local time.

9. 2020 PIR REVIEW

In accordance with the Ministerial conditions, the PIR consisted of activities to validate the assumptions and forecast modelled noise levels associated with the ILS operations from the 2014 EIA, and noise monitoring during the peak period of ILS usage.

The objective was to identify any findings of difference in relation to modelled noise levels compared to actual noise levels, and to identify recommendations for future environmental assessment and noise modelling procedures.

9.1. Methodology

9.1.1. Data Sources

The PIR analysis period was 28 February 2019 to 29 February 2020. This included a noise-monitoring period between 1 November 2019 and 29 February 2020.

This PIR used data obtained through Airservices Operational Data Analysis Suite (ODAS) and Airservices Noise and Flight Path Monitoring System (NFPMS) at Gold Coast Airport.

Usage of the ILS by eligible aircraft was analysed using ODAS, which included departure and arrival airports and times, aircraft type, registration, and trajectories for flights that have submitted valid flight plans. It also provided aircraft movement data for IFR operations.

Flights without a valid flight plan, such as VFR operations, are not usually captured in ODAS, and were not factored in this analysis.

Both data sources were used to conduct the analysis in this PIR.

9.1.2. Noise Modelling

The noise modelling in the 2014 EIA was undertaken using the US FAA INM. The FAA Aviation Environmental Design Tool (AEDT) has now superseded the INM, and is the software Airservices uses for noise modelling.

To assess the integrity of the original INM for the PIR, the noise modelling of the L_{Amax} was conducted using INM with the same assumptions as the 2014 EIA and then cross-checked with the AEDT. In most cases, the resulting noise level comparison was within 1 dB(A) to 3 dB(A), at the specific noise monitoring locations. Changes in noise levels of 3 dB(A) are unlikely to be perceptible.

The modelling confirmed that the INM had been within appropriate tolerances for the noise assessment, and in most cases were 1 dB(A) to 3 dB(A) more than the AEDT software had modelled.

The AEDT model was then used to generate the noise contours to assess the effectiveness of the NAP as described in Section 10.

9.1.3. Noise Monitoring

In accordance with the Ministerial conditions for the PIR, Airservices deployed short-term noise monitors in the suburbs of Broadbeach and Miami, north of Gold Coast Airport, to supplement monitoring provided through a permanent noise monitor at Tugun (**Figure 6**). These sites were chosen based on:

1. Their proximity to the ILS arrival procedures and their distance from the existing Airservices permanent noise monitor at Tugun.
2. Their location within Region 2 of the 2014 EIA which was identified as the region of greatest community noise impact as a result the proposed ILS approach paths.
3. Their location being as close as possible to the 2014 EIA's reference locations based on the location of noise sensitive receivers or other factors. At the Miami location, the reference location was the Miami State High School. At the Broadbeach location, this was the approximate location where the northern vectoring area meets the ILS approach path.

4. Site availability and suitability (this includes considerations around landowners' approvals, work health and safety issues when installing equipment on rooftops, topography, and influence from other noise sources – e.g. surf, busy roads, etc.).
5. Community feedback following consultation that requested a monitor at Broadbeach.

The short-term noise monitors were deployed from 1 November 2019 to 29 February 2020.

This period was chosen because storms and poor weather conditions are more likely at the Gold Coast during summer, and therefore the ILS was more likely to be used and noise outcomes more likely to be reflective of the worst-case scenario, which is consistent with the EIA approach.

The short-term noise-monitoring period occurred prior to the impacts of the COVID-19 pandemic on aircraft movement numbers and the data can be viewed as an appropriate representative sample.

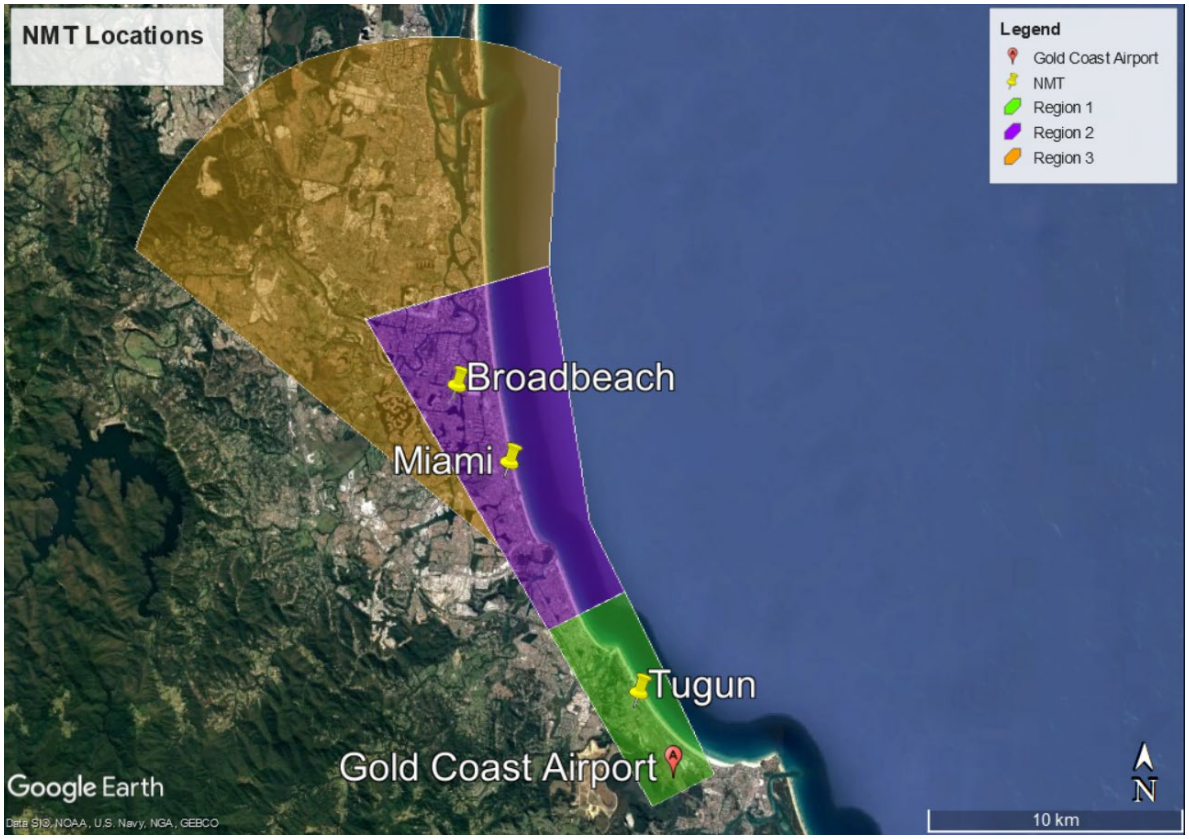

Figure 6: Noise monitoring locations during the PIR monitoring period, 28 October 2019 to 29 February 2020, (yellow pins), Airservices 2014 EIA regions (coloured shading)

The following sections describe the validation of the Airservices 2014 EIA assumptions.

9.2. ILS Flight Paths

Actual flight tracks obtained from the NFPMS for jet and turbo prop aircraft identified as using the Gold Coast Airport ILS during the PIR analysis period are shown in **Figure 7** and **Figure 8**, overlaid on the regions identified in the 2014 EIA.

The flight tracks for jet (**Figure 7**) and turbo prop aircraft (**Figure 8**) are broadly distributed over Region 3, as the aircraft were vectored by ATC to intercept the ILS arrival procedure.

As the aircraft move into Region 2 and then Region 1 to the airport, their flight paths became increasingly concentrated on the ILS path, which is as expected.

The PIR analysis found that aircraft arriving from the south joined the ILS in a greater distribution over the coast and north of Broadbeach, than was expected of the proposed KEGAN approach in the 2014 EIA.

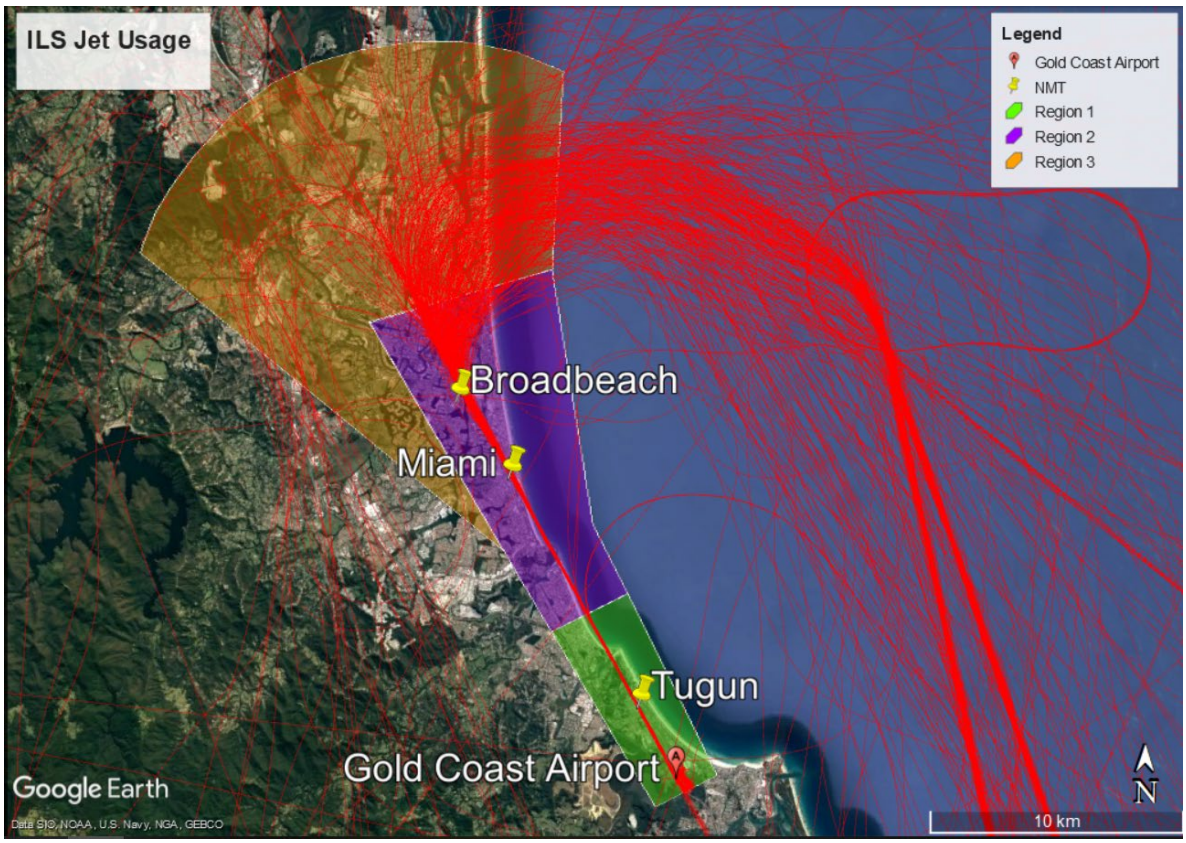

Figure 7: Jet aircraft flight tracks (red) using the ILS arrival procedure to RWY14 Gold Coast Airport during the PIR analysis period, 28 February 2019 to 29 February 2020

Turbo prop aircraft in **Figure 8** were vectored onto the ILS and join in the expected region. These flight tracks are broadly consistent with what was modelled in the 2014 EIA for aircraft arriving in the 'vectoring area' to the north of the airport.

As described in Section 10, the overall noise impacts on communities north of the airport was analysed pre- and post-implementation and had only changed slightly due to the implementation of the ILS, from less than one to an average of one to four noise events at 60 dB(A) or above, per day (during the month of highest ILS usage).

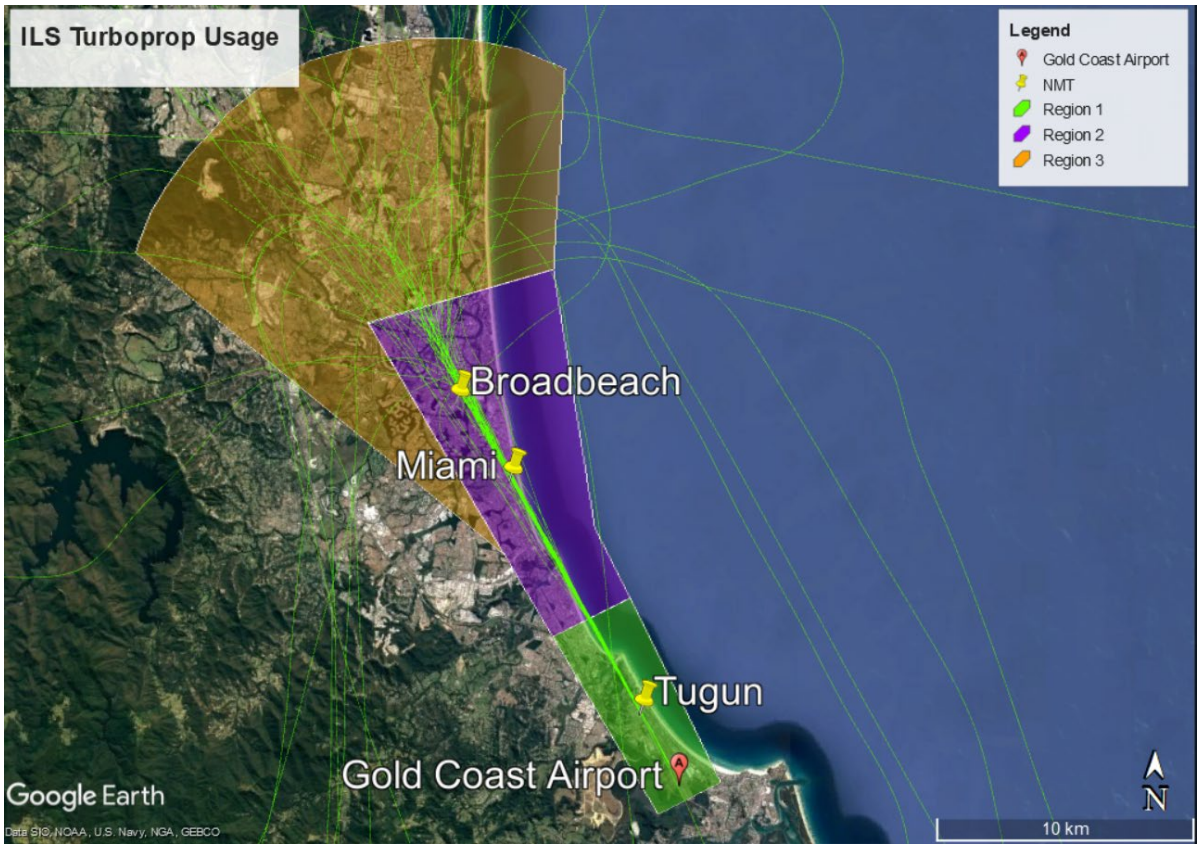

Figure 8: Flight paths of turbo prop aircraft (green lines) using the ILS arrival procedure to RWY 14 Gold Coast Airport during the PIR analysis period, 28 February 2019 to 29 February 2020

9.3. Daily ILS Usage

Daily ILS usage between 28 February 2019 and 29 February 2020 was obtained from the Airservices ODAS.

The total ILS usage during this period was 833, which consisted of 442 jet operations (53%) and 391 turbo prop/piston operations (47%). Of the total operations, turbo props represented approximately 6% and piston aircraft represented approximately 41% of operations.

This data was overlaid with the low, medium and high daily traffic scenarios as developed in the 2014 EIA (**Figure 9**) to assess how the predicted traffic scenarios compared to the actual ILS usage.

Table 2 provides the ILS estimated use as presented in the Gold Coast Airport MDP and Airservices ILS usage scenario (2014 EIA).

Table 2: ILS Estimated Use (Gold Coast Airport ILS MDP)[12]

Estimated Use	Estimated number of arriving aircraft per day (based on 55 arriving RPT aircraft per day)	Estimated number of arriving aircraft per day (based on 82 arriving aircraft per day)	Estimated days of use per year	Airservices ILS Usage Scenario (2014 EIA)
Fine weather day (approx. 10% of all arrivals using the ILS)	5	8	Approx 140	Low
Partly bad weather day (40% of all arrivals using ILS because of bad weather)	22	33	Approx 90	Medium
Extremely bad weather day (100% ILS use, i.e all arrivals using the ILS	55	82	Approx 10	High

During the PIR analysis period:

- There were 349 days (i.e. 95% of the year) where the ILS usage was much less than the 2014 low traffic scenario (i.e. approximately 140 days).
- There were 14 days (i.e. 4% of the year) where the ILS usage was greater than the 2014 low traffic scenario but still less than the medium traffic scenario (i.e. approximately 90 days).
- There were 4 days (i.e. 1% of the year) where the ILS usage was greater than the medium traffic scenario, but this was still notably less than the high traffic scenario (i.e. approximately 10 days).
- The maximum daily actual ILS usage was on 6 February 2020 with 45 aircraft, which was less than the high traffic scenario of 82 aircraft considered in the 2014 EIA.

  Furthermore, the 45 aircraft consisted of jet, turbo prop and piston aircraft, compared to the 2014 EIA, which estimated 82 jet and turbo prop operations only, and did not assess piston operations.

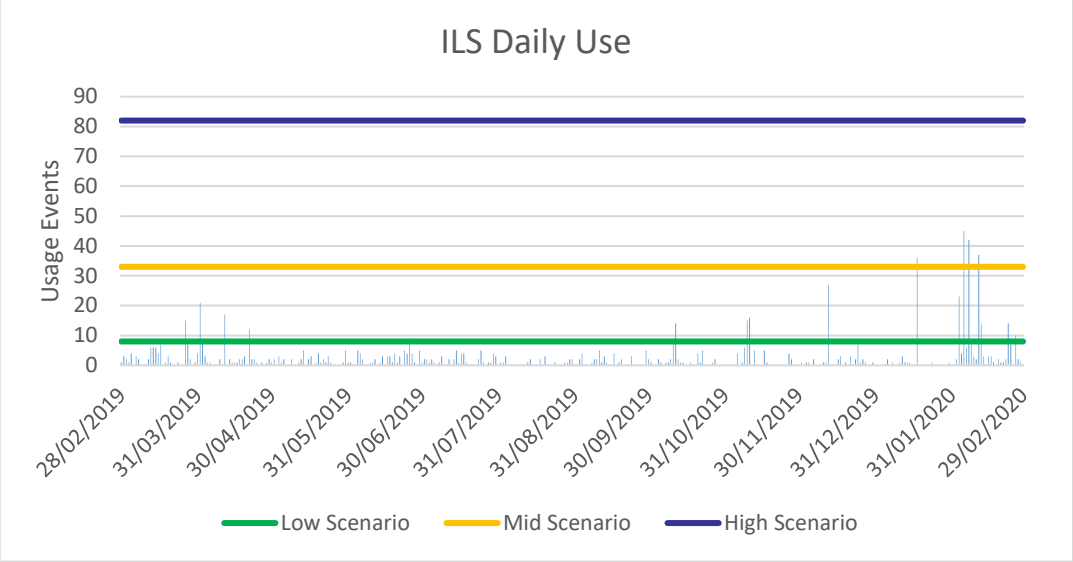

Figure 9: Daily actual Gold Coast Airport ILS usage numbers and Airservices 2014 EIA ILS usage traffic scenarios (low, medium and high), *Source: Airservices ODAS*

[12] Gold Coast Airport ILS MDP 2016

9.4. Curfew Operations

Between 28 February 2019 and 29 February 2020, there were 27 aircraft greater than 34,000kg MTOW that arrived on RWY14 between the hours of 11pm and 6am; however there was only one aircraft, a B734 freighter that used the ILS.

There were 36 aircraft less than 34,000kg MTOW that arrived to RWY14 during the curfew hours of 11pm to 6am. Eight of these aircraft used the ILS 'straight-in' approach, and this was in accordance with NAPs and approved curfew operations.

9.5. Aircraft Types

In the 2014 EIA three jet and turbo prop aircraft types were chosen as typical aircraft operating at Gold Coast Airport for the purposes of noise modelling, based on 2012-2013 financial year movement data:

- **Typical international jet** – Airbus A330 (this aircraft was used to model the loudest aircraft type operating at the airport)
- **Typical domestic jet** – Airbus A320 (the most common aircraft type, with approximately 35% more arrivals than the B738).
- **Typical turbo prop** – De Havilland Canada DHC8 (one of the loudest turbo prop types operating at the airport at the time).

Traffic counts of the 10 most common aircraft to use the ILS for arrivals to RWY14 at Gold Coast Airport are listed in **Table 3.**

During the PIR analysis period, the most common aircraft to use the ILS was the Boeing B738 (25.1% of arrivals), followed by the Airbus A320 (19.9% of arrivals).

The aircraft assigned as the typical international jet aircraft in the 2014 EIA (the Airbus A330), used the ILS only five times during the analysis period. The aircraft assigned as the typical turbo prop in the 2014 EIA (the De Havilland Canada DHC8) used the ILS only four times during the analysis period.

Table 3: Counts of top 10 aircraft types that used the ILS for arrivals to RWY14 at Gold Coast Airport during the PIR analysis period

Aircraft Name	Aircraft Type	Count	% Total
Boeing 737-800 (B738)	Jet	186	25.1
Airbus A320 (A320)	Jet	147	19.9
Beech 76 (BE76)	Piston	66	8.9
Airbus A321 (A321)	Jet	42	5.7
Van's RV6 (RV6)	Piston	34	4.6
Diamond DA42 (DA42)	Piston	27	3.6
Boeing 717-200 (B712)	Jet	18	2.4
Cessna 172 (C172)	Piston	17	2.3
Cirrus SR22 (SR22)	Piston	16	2.2
Cessna Caravan (C208)	Turbo prop	14	1.9

Although during the PIR analysis period the Boeing B738 aircraft were the most common aircraft to use the ILS, the most common jet aircraft arriving at Gold Coast Airport for the period 2019/2020 is still the Airbus A320 (**Table 4**).

This is consistent with the assumptions in the 2014 EIA that the A320 was an appropriate representative aircraft for typical domestic operations at Gold Coast Airport, for the purposes of noise modelling.

Table 4: Jet arrival composition since 2014 EIA

Aircraft Type	28 Feb 2013 to 28 Feb 2014		28 Feb 2019 to 29 Feb 2020	
	Arrivals	% of total jet arrivals	Arrivals	% of total jet arrivals
A320	9,058	44.9%	8,180	39.1%
B738	6,738	33.4%	8,111	38.8%

9.6. Seasonal Operations

Use of the ILS at Gold Coast Airport is seasonal in nature due to the weather patterns, particularly related to storm activity and periods of low visibility (**Figure 10**).

During the PIR analysis period, the greatest usage was recorded in February 2020 with 28% of all ILS usage occurring in this month (235 aircraft), while August 2019 recorded the least ILS usage, with only 20 aircraft using the ILS.

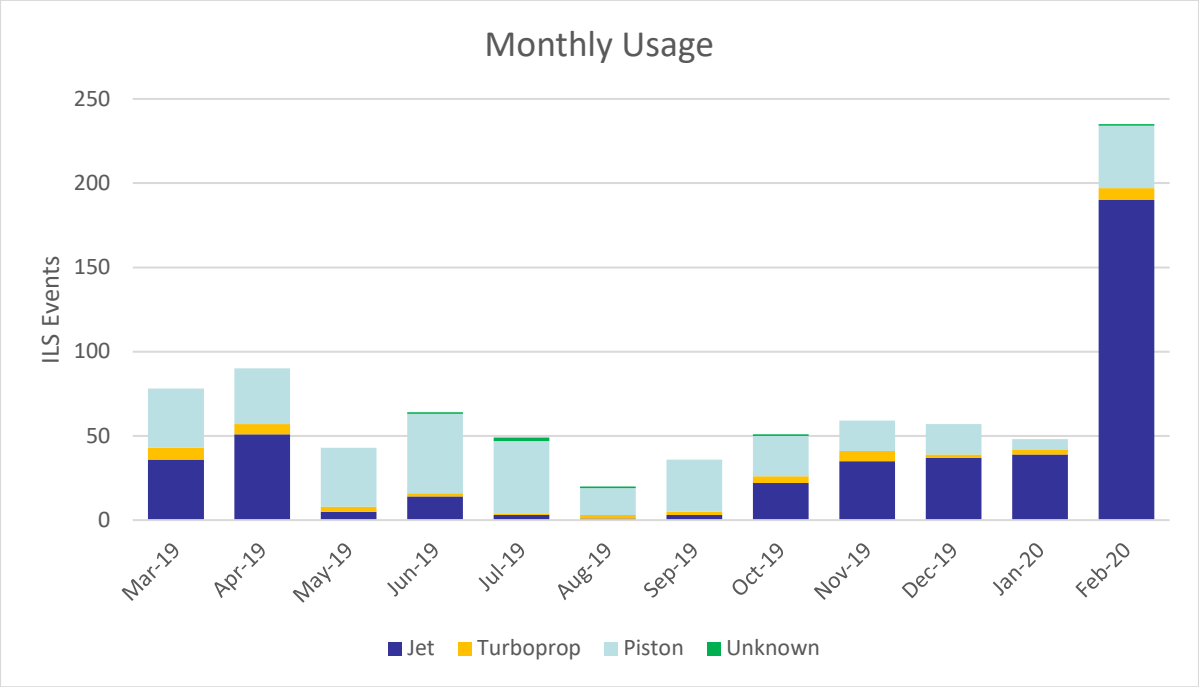

Figure 10: Monthly Gold Coast Airport ILS usage, by aircraft type, March 2019 to February 2020

9.7. Aircraft Altitude Profiles

Using NFPMS data, analysis of actual altitude profiles of jet and turbo prop aircraft using the ILS to RWY14 during the PIR analysis period were compared to the INM standard approach procedure profile used in the 2014 EIA.

The comparison identified that jet aircraft (**Figure 11**) tend to be concentrated on the ILS path as expected and the angle of descent closely matches the actual altitude profiles of jet aircraft used in the 2014 EIA.

Turbo prop aircraft (**Figure 12**) tend to be concentrated on the ILS path as expected, however there is still some variation about this path. The angle of descent used in the INM for the 2014 EIA broadly aligns with the actual altitude profiles of turbo prop aircraft during the analysis period.

NFPMS data identified that both jet and turbo prop aircraft in the vicinity of the Broadbeach noise monitor were actually between 150 and 350 feet lower than was modelled, when aircraft were assumed to be tracking via the proposed KEGAN flight path. As previously discussed, this proposed flight path was subsequently not implemented.

This lower altitude is attributed to the fact that both jet and turbo prop operations are being vectored by ATC to intercept the ILS in this vicinity, at approximately 2,500 feet and between 14km to 16km from the RWY14 threshold. It is standard procedure when ATC vector aircraft to intercept ('lock on') the ILS prior to conducting the 'straight-in' approach that they approach the glide path from below and do so at an altitude that ensures safe operations and stable approaches.

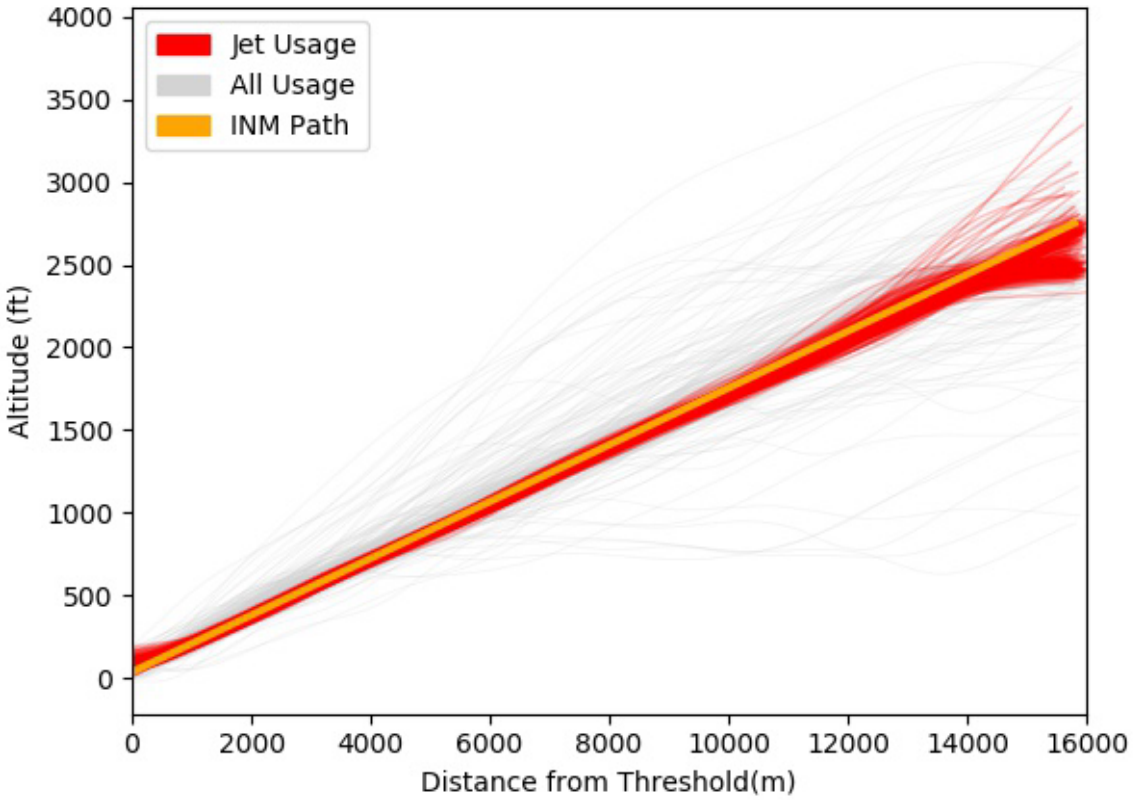

Figure 11: Altitude profiles for jet aircraft (red) using the ILS arrival procedure to RWY 14 at Gold Coast Airport during the PIR analysis period; other aircraft are shown in grey. *Source: ANOMS*

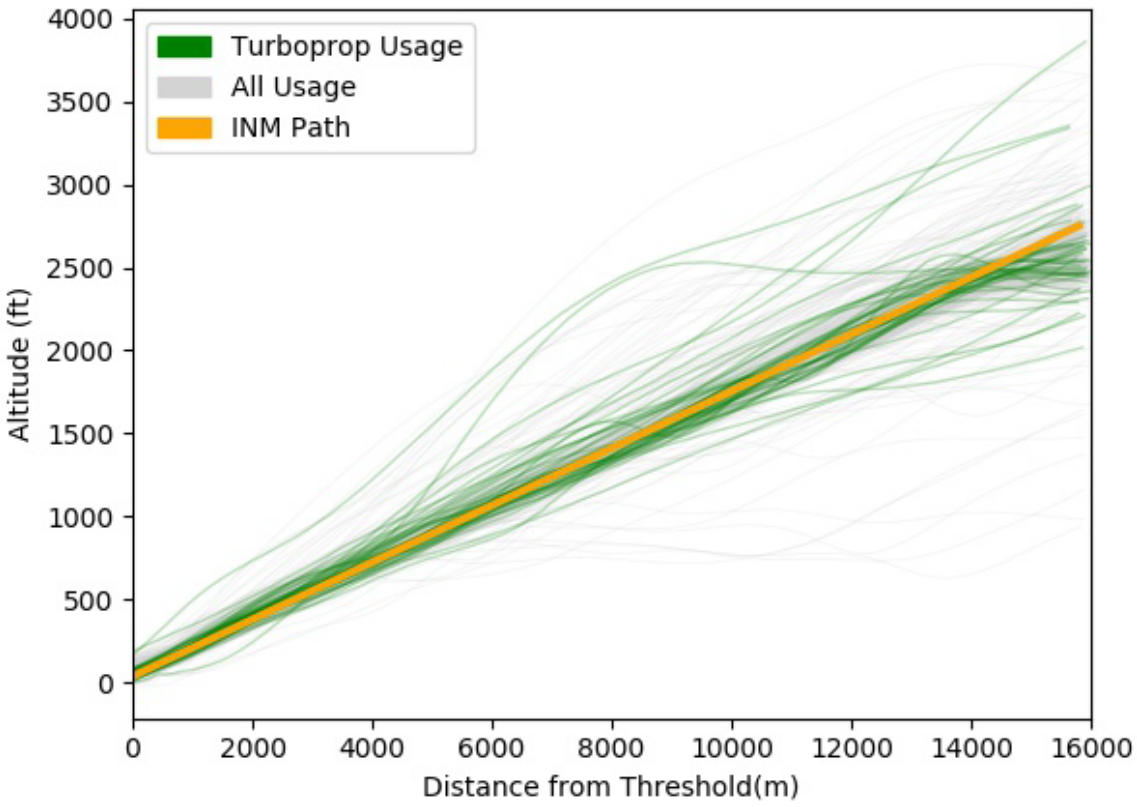

Figure 12: Altitude profiles for turbo prop aircraft (green) using the ILS arrival procedure to RWY 14 at Gold Coast Airport during the PIR analysis period other aircraft are shown in grey *Source: ANOMS*

9.8. Other Findings

Piston aircraft types were not modelled in the 2014 EIA, as their expected utilisation of the ILS approach procedure was not able to be determined at that time. This is because some piston aircraft are not equipped to fly the full ILS approach, and others may only fly part of the procedure for training purposes.

Piston aircraft are typically training aircraft of less than 5,700kg MTOW and as such are permitted to use the ILS under the AAT conditions, and NAPs.

Prior to the introduction of the ILS, piston aircraft would commonly conduct visual or VOR approaches to RWY 14 over water, following the coastline. The introduction of the ILS at the Gold Coast Airport provided an additional opportunity for local flight training schools who have actively used the ILS for training purposes.

Instrument flight training activities using the ILS are restricted to between 9am and 5pm local time.

During the PIR analysis period, ILS usage data shows that piston aircraft made up 41% of all identified ILS arrivals.

The flight paths for piston aircraft (**Figure 13)** showed a wide distribution in Region 3, similar to jet and turbo prop aircraft. Flight paths of piston aircraft showed a comparatively wider distribution over Region 2 than jet and turbo prop aircraft, before converging on the ILS path in Region 1.

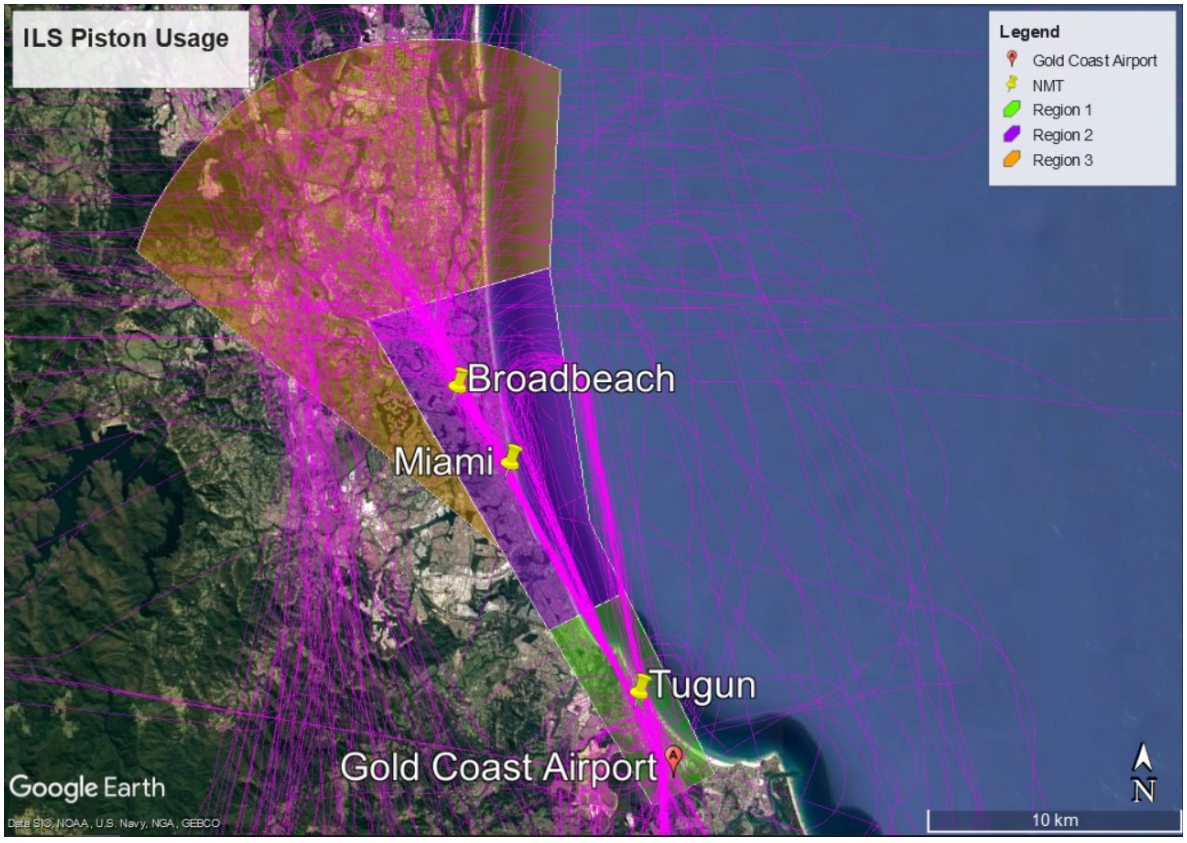

Figure 13: Flight paths of piston aircraft (magenta lines) using the ILS arrival procedure to RWY 14 Gold Coast Airport during the PIR analysis period, 28 February 2019 to 29 February 2020

The altitude range of piston aircraft types (**Figure 14**) reflects some concentration close to the modelled ILS path, however there is high amount of variation both above and below this line. This is likely due to piston aircraft typically not carrying the necessary equipment to conduct an ILS approach, or that they are conducting training activities, or operating on the flight path for other reasons.

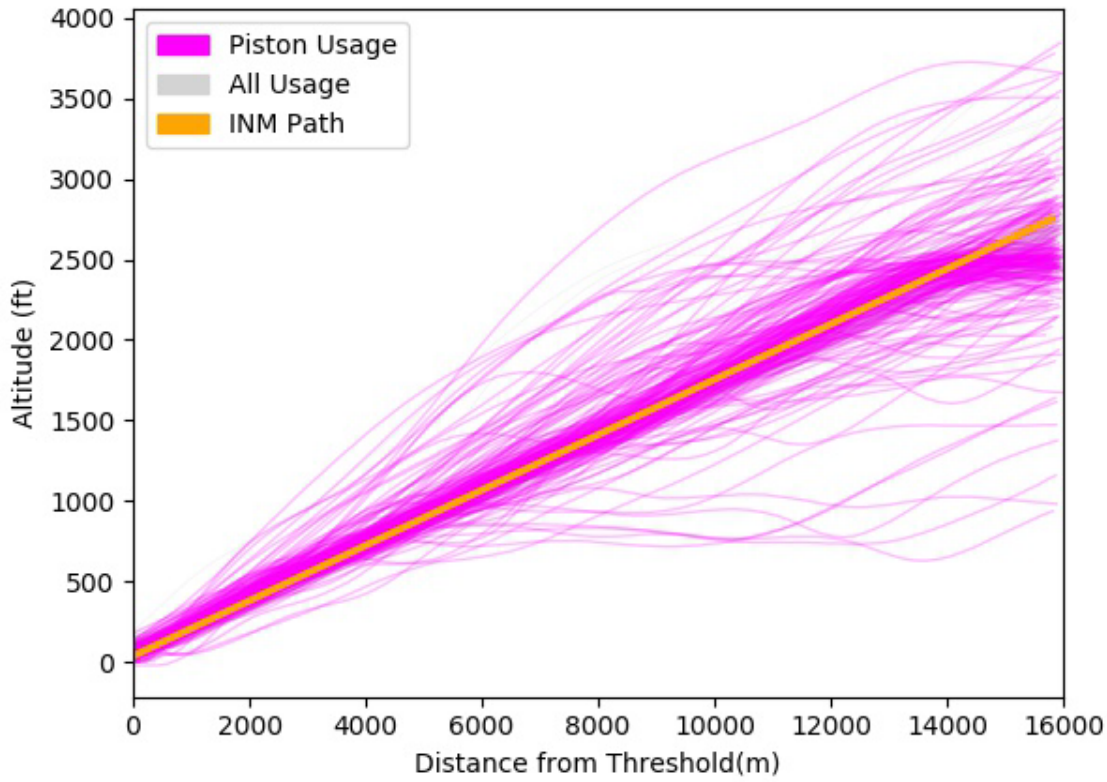

Figure 14: Altitude profiles for piston aircraft using the ILS arrival procedure to RWY 14 at Gold Coast Airport during the PIR analysis period, 28 February 2020 to 29 February 2020

9.9. Noise Levels

9.9.1. Data Quality

The quality of measurement data obtained by the three noise monitors at Broadbeach, Miami and Tugun were assessed against the acceptable limits of aircraft noise measurements as defined by *Acoustics — Unattended monitoring of aircraft sound in the vicinity of airports* ISO20906:2009[13].

This standard outlines a number of considerations that need to be taken into account when selecting a potential noise-monitoring site. One of these considerations is the angle from the ground plane between the monitor and aircraft.

The majority of recordings were within the acceptable limits, and aircraft noise events that were not within these acceptable limits were excluded from this assessment. Another element to consider is the impact of excessive background noise.

The measurement methodology (L_{Amax}) represents the 'maximum single event noise levels' recorded at the time of the aircraft flying over the monitor. The measurement also contains background noise from the environment (including birds or rain, wind and surf during poor weather), and any other community noise sources (such as vehicles and construction noise).

When placing temporary noise monitors in built up areas, it is possible that community and environmental noise sources can influence the actual L_{Amax} noise monitoring results, resulting in an increased noise measurement. It is currently not technically possible to extract the aircraft noise levels from background ambient noise levels.

[13] https://www.iso.org/standard/35580.html

In reviewing the quality of the temporary noise monitoring data, it was identified that the duration of the aircraft noise events at the Miami noise monitoring location were excessive at almost four times the expected duration of a typical aircraft operation. This indicates an issue with the physical environment of the temporary noise monitor.

The Miami monitor was located on top of a medical centre in close proximity to metal roof sheeting and nearby road traffic. Noise reflections from the roof, and elevated ambient noise levels due to high winds and rain as well as wet weather road traffic, are likely to have had an influence on the noise measurements, resulting in excessively long duration noise events. It was therefore determined that the results of this noise monitor cannot be considered reliable.

The temporary noise monitor at Broadbeach and the permanent monitor at Tugun both provided readings in keeping with the duration expected for aircraft movement and are considered reliable.

9.9.2. L_{Amax} Comparison

For the purposes of the PIR, a comparison was conducted between the measured L_{Amax} single event maximum noise levels recorded during the short-term noise monitor deployment, and the same noise levels predicted by the INM in the 2014 EIA.

Airservices 2014 EIA modelled the proposed arrival and approach procedures that included the majority of operations using the KEGAN flight path, and the remainder being vectored by ATC within the 'vectoring area' to intercept the 'straight-in' ILS approach path (**Figure 15**).

As described in Section 8.2, this procedure was not implemented, and all aircraft for the ILS procedure are required to be vectored by ATC to intercept the ILS at 2,500 feet approximately 14km from the RWY14 threshold.

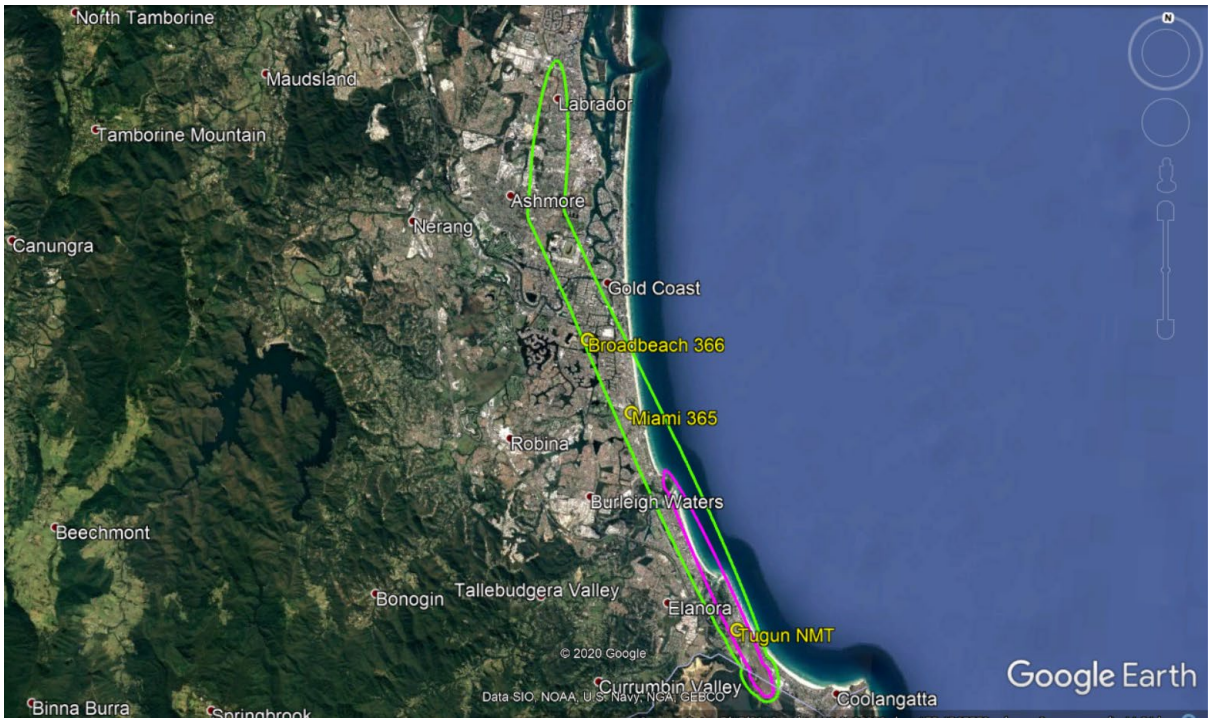

Figure 15: 2014 EIA Single event (L_{Amax}) noise contours for A320 aircraft for the 'straight-in' approach, L_{Amax} 60 dB(A) (green), L_{Amax} 70 dB(A) (magenta), Source: Airservices 2014 EIA

The combination of the changes to arrival procedures and aircraft operations in the vicinity of the Broadbeach noise monitor were due to the change to the proposed KEGAN flight path and the lower profile of aircraft as identified in Sections 9.7 and 9.8. These, combined with the elevated ambient noise levels at the Miami noise monitor, resulted in differences in the actual L_{Amax} noise level contours (**Figure 16**), and measured noise levels (**Table 5**) compared to those modelled in the 2014 EIA.

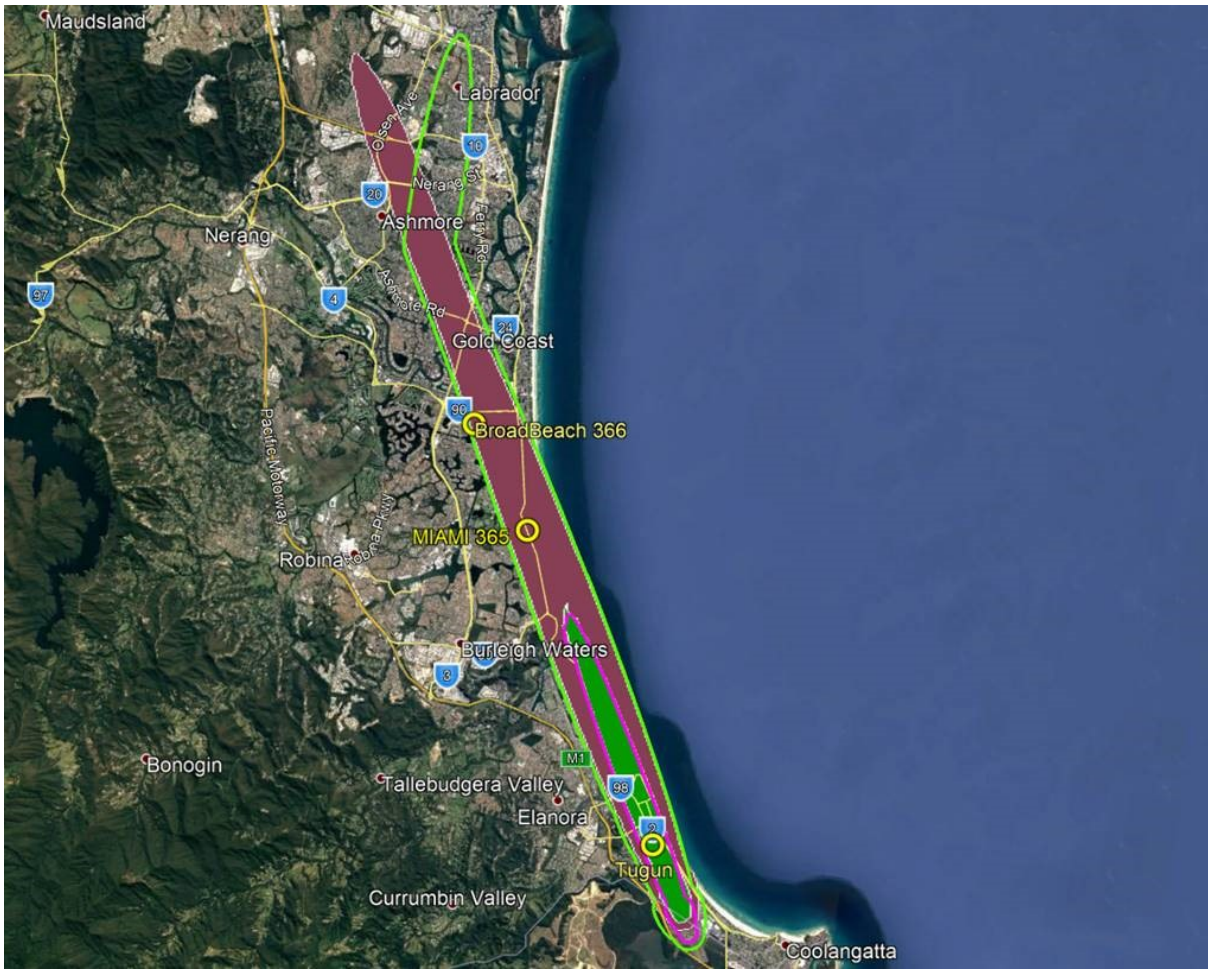

Figure 16: 2014 EIA Single event (L_{Amax}) noise contours for A320 aircraft for the 'straight-in' approach, L_{Amax} 60 dB(A) (green), L_{Amax} 70 dB(A) (magenta), overlayed on the PIR 2020 AEDT model (solid shaded area)

The specific noise level findings are presented in **Table 5**.

Table 5: Comparison of measured L_{Amax} and INM modelled L_{Amax} noise levels for the Gold Coast Airport RWY14 ILS

Noise Monitor Location	Aircraft Type	Event Count	INM modelled L_{Amax} in dB(A)	Average measured L_{Amax} in dB(A) in 2020	Difference between average measured & INM modelled L_{Amax} in dB(A)
Broadbeach	A320	84	61.7	66.6	+4.9
	B738	108	62.5	66.3	+3.8
Miami	A320	77	66.3	71.5	+5.2
	B738	103	69.1	71.3	+2.2
Tugun	A320	144	85.8	83.5	-2.3
	B738	186	88.0	86.4	-1.6

The INM modelling typically showed lower L_{Amax} noise levels at the Broadbeach and Miami locations and higher L_{Amax} at Tugun, than the actual noise measurements:

- Broadbeach – The INM modelled L_{Amax} for A320 and B738 aircraft were generally lower than the actual noise measurements, attributed to the aircraft flying lower in this location due to ATC vectoring.
- Miami – The INM modelled L_{Amax} levels for A320 and B738 were generally lower than the actual noise measurements, likely due to the lower altitude profiles of these aircraft in this location, and the ambient noise impacts.
- Tugun – The INM modelled L_{Amax} levels for A320 and B738 were higher than almost all of the actual noise measurements at levels that are not expected to be perceptible by the human ear.

There were not enough A330 or Dash 8 aircraft noise events during the monitoring period to reliably compare to the INM modelling from the 2014 EIA.

The INM modelling presents only expected noise events derived from documented noise levels for the aircraft types that will use the flight paths and procedures.

9.9.3. Broadbeach Noise Levels

Following community feedback, we undertook further analysis of noise levels from the Broadbeach noise monitor.

The Broadbeach noise monitor was located around 15km from the runway threshold at the approximate location where the northern vectoring area meets the ILS approach path.

At this location the altitude of arrival aircraft (**Figure 17**) can be generally categorised into two groups:

- Those performing a level segment at 2500ft (shown in red), or
- Those performing a continuous decent around 300ft higher at 2800ft (shown in blue).

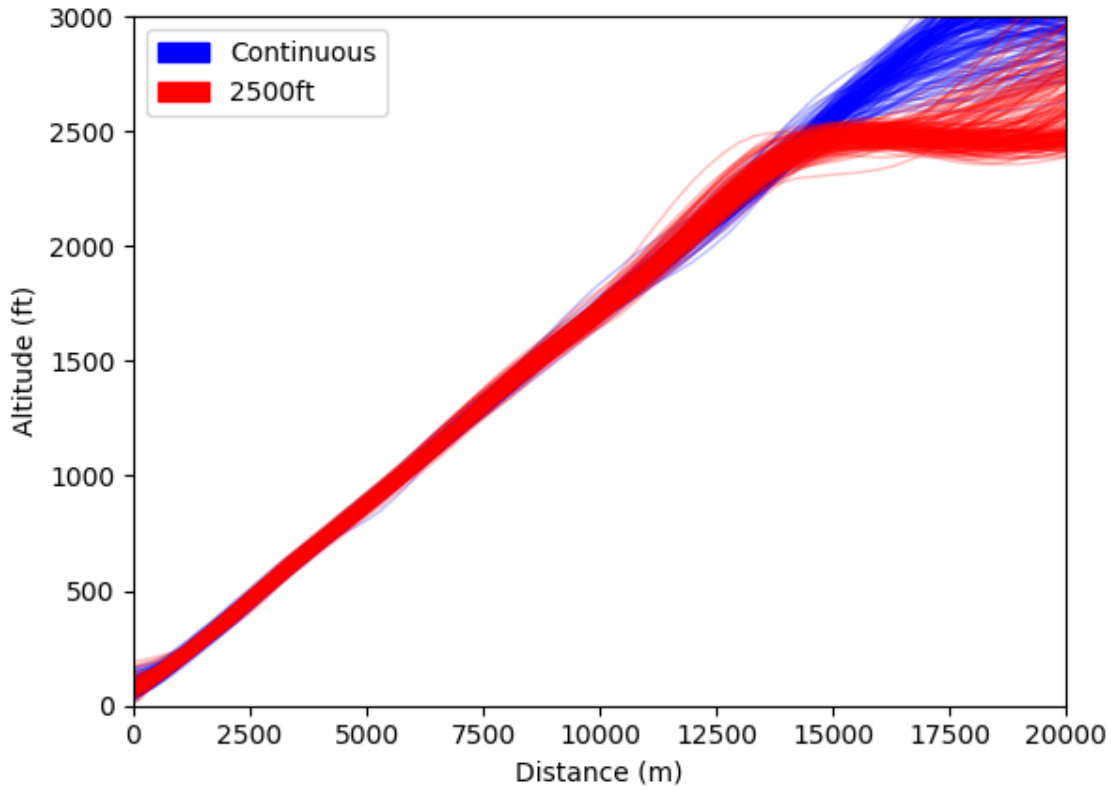

Figure 17: Altitude profiles for jet aircraft using the ILS arrival procedure to RWY 14 at Gold Coast Airport during the PIR analysis period, 28 February 2020 to 29 February 2020

The measured noise levels from the Broadbeach noise monitor for the two main types of aircraft using the ILS are in the table below (**Table 6**). The difference was between 0.5 dB(A) and 1.6 dB(A). The change in average noise level of less than 3 dB(A) is not likely to be perceptible.

Table 6: Comparison of measured L_{Amax} at the Broadbeach Temporary Noise Monitor

Aircraft Name	2500ft group Average LAmax	Continuous Decent group Average LAmax	Difference
Boeing 737-800 (B738)	67.5	65.9	1.6
Airbus A320 (A320)	66.9	66.4	0.5

9.10. EIA Analysis Summary

This PIR sought to review and validate the assumptions and forecast noise levels associated with the ILS operations from the 2014 EIA. The following provides a summary:

- **ILS usage**

  During the PIR analysis period:

  - For 349 days (95%) the ILS usage was much less than the 2014 low traffic scenario.
  - There were 14 days (i.e. 4% of the year) where ILS usage was greater than the 2014 low traffic scenario but still less than the medium traffic scenario.
  - There were 4 days (i.e. 1% of the year) where ILS usage was greater than the medium traffic scenario, but this was still notably less than the high traffic scenario.
  - The maximum daily actual ILS usage was on 6 February 2020 with 45 aircraft, which was almost 55% of the high traffic scenario of 82 aircraft considered in the 2014 EIA.

    Furthermore, the 45 aircraft consisted of jet, turbo prop and piston aircraft compared to the 2014 EIA, which estimated 82 jet and turbo prop operations, and did not assess piston operations.

- **Flight paths**

  The proposed flight paths to the ILS approach used in the 2014 EIA had approximately 85% of aircraft using a flight path from waypoint KEGAN located over water, and approximately 15% of traffic vectored by ATC onto the ILS 'straight-in' approach.

  However the KEGAN flight path was not approved for CASA for implementation and as a result, the arrival procedure required ATC to vector 100% aircraft who were conducting an ILS approach to intercept the ILS at 2,500 feet by 18km (10 nautical miles) from the airport.

  Aircraft arriving from the south joined the ILS in a greater distribution over the coast and north of Broadbeach than was expected of the proposed KEGAN approach in the 2014 EIA.

  Additionally in 2014 the RNP-AR ('Smart Tracking') approach was implemented at Gold Coast Airport and this resulted in 60% of all instrument arrivals to RWY14 using this flight path. This change contributed to the overall reduction in the use of the ILS, with approved operators preferring the RNP-AR ('Smart Tracking') due to its safety, efficiency and environmental advantages, even in poor weather conditions.

  In August 2016, as part of a national navigation modernisation program, there was an amendment to the existing RWY14 RNAV-Z[14] approach to provide a runway-aligned approach, moving this flight path over water and further away from communities.

  These collective changes resulted in an increase in the available arrival and approach options to RWY14, reduced the expected use of the ILS, and included increased over water operations wherever possible to minimise the effect of aircraft operations on the community.

- **Aircraft type**

  The most common jet aircraft arriving on the ILS at Gold Coast Airport for the period 2019/2020 was still the Airbus A320 and this is consistent with the assumptions in the 2014 EIA. However, during the PIR analysis period the B738 was the most frequently operated aircraft on the ILS and therefore the comparative assessments included both the A320 and B738.

  Piston aircraft types were not modelled in the 2014 EIA, as their expected utilisation of the ILS approach procedure was not able to be determined at that time. This is because some piston

[14] https://www.airservicesaustralia.com/projects/flight-path-changes/2016-changes/

aircraft are not equipped to fly the full ILS approach, and others may only fly part of the procedure for training purposes.

The introduction of the ILS at the Gold Coast Airport provided an additional opportunity for local flight training schools who have actively used the ILS for training purposes.

During the PIR analysis period, ILS usage data shows that piston aircraft made up 41% of all identified ILS arrivals.

Notably though, piston aircraft are typically training aircraft of less than 5,700kg MTOW and as such are permitted to use the ILS under the AAT conditions, and NAPs. Furthermore, instrument flight training activities using the ILS are restricted to between 9am and 5pm local time.

- **Approach angle, ILS intercept location and altitude**

  Jet and turbo-prop aircraft tended to be concentrated on the ILS path as expected and the angle of descent closely matched the actual altitude profiles of jet aircraft used in the 2014 EIA.

  The approach angle for the ILS was consistent with the assumption in the 2014 EIA. However, when the proposed KEGAN flight path was not implemented, ATC were required to vector aircraft to intercept the ILS between 14 and 16km from the RWY14 threshold, at 2,500 feet. This resulted in aircraft intercepting the ILS slightly lower (approximately 300 feet) than the proposed KEGAN flight path design.

  The altitude range of piston aircraft types reflects some concentration close to the modelled ILS path, however there is a high amount of variation both above and below this line. This is likely due to piston aircraft typically not carrying the necessary equipment to conduct an ILS approach, or that they are conducting training activities, or operating on the flight path for other reasons.

- **Noise levels**

  A comparison was conducted between the measured L_{Amax} single event maximum noise levels recorded during the short-term noise monitor deployment, and the same noise levels predicted by the INM in the 2014 EIA.

  The combination of the following resulted in differences in the actual L_{Amax} noise level contours and measured noise levels compared to those modelled in the 2014 EIA:

  - changes in arrival procedure and aircraft operations in the vicinity of the Broadbeach noise monitor due to the KEGAN flight path
  - lower profile of aircraft as identified in Sections 9.7 and 9.8
  - elevated ambient noise levels at the Miami noise monitor.

  The overall noise impacts on communities north of the airport was analysed pre and post-ILS implementation. It was identified that the overall noise impacts on communities north of the airport changed slightly due to the implementation of the ILS, during the month of highest ILS usage, from less than one to an average of one to four noise events at 60 dB(A) or above, per day.

  This is well below the maximum forecast daily impacts in this area, as assessed in the Airservices 2014 EIA, which forecast modelled aircraft noise events of up to 74 dB(A), up to 82 times a day and up to 10 days a year.

10. NOISE ABATEMENT PROCEDURES

As part of the PIR we committed to a review of the application of the NAPs related to the use of the RWY14 Preferred Approaches and specifically the use of the ILS approach, to determine if the conditions for use were met and the priorities were being adhered to.

10.1. Preferred RWY 14 Approaches

Airservices AIP Aerodrome and Procedure Charts for Gold Coast Airport[15] describe the NAPs for Gold Coast including the Preferred Approaches to RWY14 for jet and turbo prop aircraft above 5,700kg MTOW arriving on RWY14.

As described in Section 6.2, the two high precision RNP approach procedures (RNAV-W and RNAV-Y) mainly track over water and are the instrument approaches used in priority order ahead of the RNAV-Z (GNSS) and then the ILS approach.

For the NAPs to be effective, ATC and pilots must adhere to these priorities wherever practicable, subject to weather or critical operational requirements.

10.2. Conditions for ILS Usage

The ILS approach assists in the safe and predictable landing of operations, particularly in low-visibility and inclement weather situations. Airports without an ILS can experience higher levels of missed approaches, unstable approaches and in some cases, diversions to alternate airports when safe landing is not possible.

The NAPs for the Preferred Approaches for RWY14 required that the ILS be used as the last priority approach, except due to weather or operational requirement.

We conducted a review of ILS usage between 28 February 2019 and 29 February 2020, and included the weather (cloud base and low visibility) that was recorded at the time on the Automatic Terminal Information Service (ATIS)[16], to ascertain if there was compliance with the ILS conditions of use.

The ILS was used by 442 jet aircraft, of which 90% used it when ATC had nominated it as the approach on the ATIS due to the prescribed cloud base and low visibility conditions.

Approximately 10% used the ILS approach when it was not nominated by ATC on the ATIS.

On these occasions, Airservices examined the weather and operational conditions at the time to determine if the operations were compliant with the NAPs.

In several cases, the aircraft had attempted to fly the RNP or RNAV approach, and could not sight the runway at the required decision altitude so had conducted a missed approach and were re-processed by ATC for the ILS approach due to visibility.

In some cases, the pilots had advised of critical operational requirements due to on-board navigational equipment issues or emergencies.

On the few occasions where Airservices was not able to determine the reason for the ILS usage (i.e. critical operational requirements), we contacted the operators directly, seeking further information, and reinforcing the requirements of the NAPs, approach priorities, and consideration of these operations on the community.

[15] https://www.airservicesaustralia.com/aip/pending/dap/BCGNA04-160_13AUG2020.pdf

[16] ATIS - the automatic provision of current, routine information to arriving and departing aircraft throughout a specified portion of time by means of continued and repetitive voice broadcasts.

An example email to operators is provided below:

> *We have commissioned a new ILS system at the Gold Coast aerodrome for RWY14 and this installation has been subject to AAT conditions that the ILS must only be used for critical operational requirements or in inclement weather conditions which are lower than the minima on all other approaches available.*
>
> *I have attached a copy of the AAT decision for your reference and the associated NAPs.*
>
> *Airservices has developed internal procedures to trigger the nomination of the ILS based on cloud base (800ft) and visibility (4000m). The reason I am writing to you is because on [date], your aircraft [registration] used the GC ILS, landing at [time].*
>
> *The ILS had not been nominated for use by ATC. While the reason given by the pilot was that the aircraft was not RNP capable, the second preference under the NAPs is RNAV (GNSS), with ILS third preference. As part of our commitment to deliver on the Administrative Appeals Tribunal conditions re ILS use on the Gold Coast, Airservices has undertaken to communicate with airlines in relation to the published noise requirements where necessary.*
>
> *As such, can I ask that you provide your crews with advice of this situation and the requirement to set up for the RNAV-Z for RWY14 whenever possible. If the weather trigger conditions are reached, ATC will either nominate the ILS on the ATIS or provide directed advice to the pilot in command of the expectation of the ILS. Of course this does not mean that the pilot in command cannot still advise of a critical operational requirement to utilise the ILS but, in accordance with the NAPs, this cannot not be for training or recency.*

In many cases operators reported that their pilots had flown the RNP-AR or RNAV and had not been able to achieve visibility by the decision height for the approach, had been required to conduct a missed approach and were re-sequenced into an approach using the ILS. This was predominantly in deteriorating visibility conditions but prior to the ILS being nominated on the ATIS or by ATC.

In some cases operators reported that their crews had experienced emergency conditions, or critical operational conditions that could affect the continued safe operations on other approaches.

In a few circumstances during the early post-implementation period of the ILS, operators advised us that their airline crews had prepared for approach using the ILS and had either misunderstood the application of the NAPs, or were unfamiliar with operations at the Gold Coast. In these cases, we provided educational material and offers of briefings to their Chief and Check Pilots to ensure improved compliance.

There were no instances where the ILS was used by jet or larger turbo prop aircraft for the purposes of crew training or recency.

This data confirms that the operational use of the ILS is consistent with the intent of the AAT conditions and in accordance with the NAPs. Airservices continues to work closely with airlines and operators to ensure correct application of the priorities as per NAPs.

10.3. Preferred Approach Procedures

The 2014 EIA assumed that aircraft arriving to RWY14 would fly either the VOR approach, the RNAV, or the ILS flight path. As discussed in Section 8.1, the introduction of the RNP-AR approach, and the runway-aligned RNAV approach created more opportunity for flight path distribution, and operations over water.

To determine the effectiveness of the NAPs, an analysis of arrival traffic numbers on the arrival procedures to RWY14 was completed. To enable comparison, the percentage of instrument flight procedures was calculated for February 2019 (pre-implementation) and February 2020 (post-implementation), noting this month reflects the highest usage of the ILS due to poor weather and low-visibility conditions.

A series of aircraft flight track density plots were generated using NFPMS data to show the overall pattern of flight paths pre- and post-ILS implementation.

The density plot in **Figure 18** shows the general pattern of arrival aircraft to RWY14 before ILS implementation for the month of February 2019.

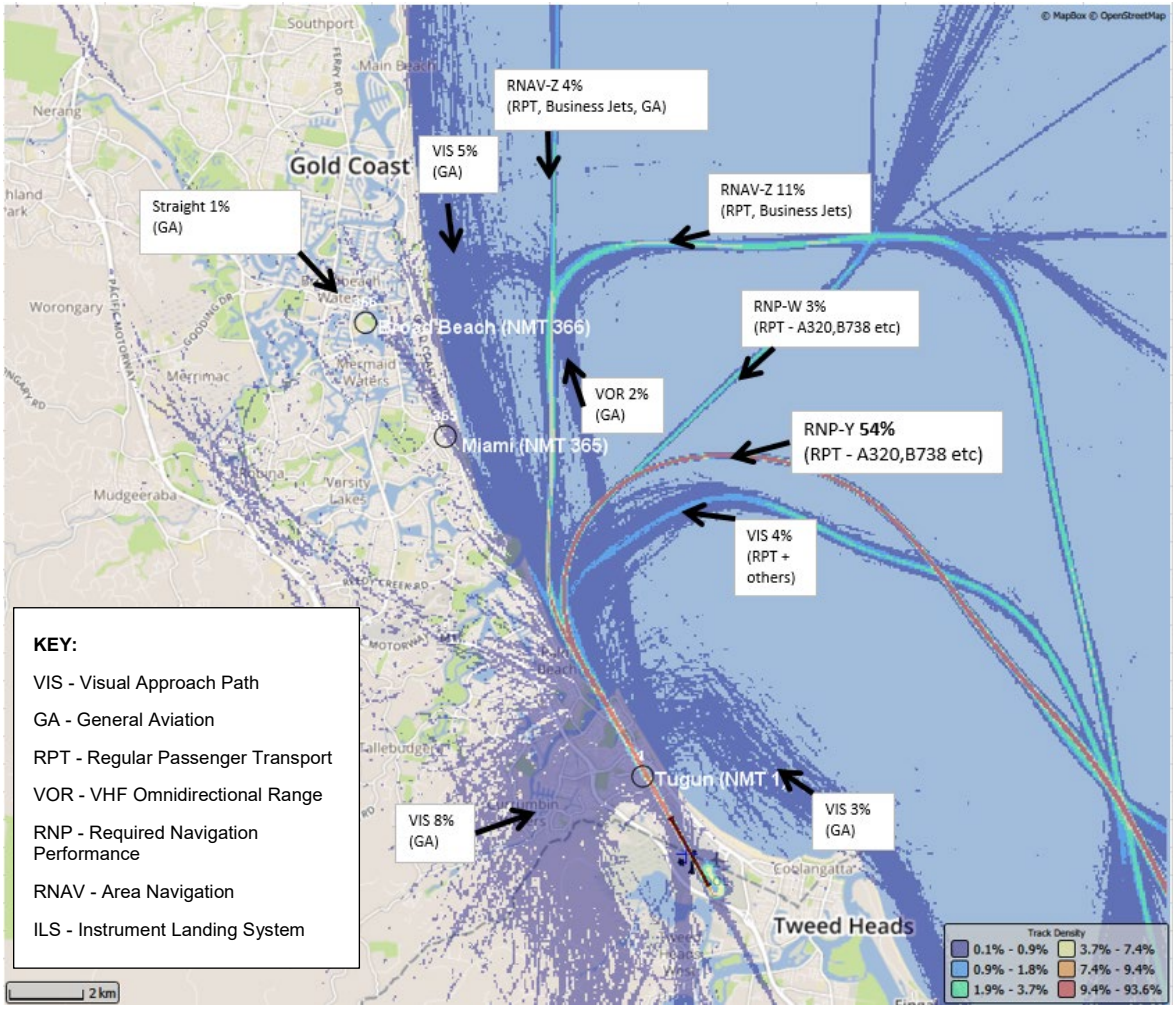

Figure 18: Percentage use of arrival procedures to RWY 14 at Gold Coast Airport based on February 2019 data, pre ILS implementation (with track density plot), *Source: Airservices NFPMS data*

The RNP approaches shows the highest concentration and usage, with 57% of traffic (identified as Regular Passenger Transport traffic, i.e. scheduled flights), with the RNAV approaches representing approximately 15% of all arrivals. Some RPT operations conducted visual approaches when operational conditions were suitable.

The use of the RNP-AR prior to the ILS implementation is consistent with the expectation that RNP-AR flight path would be preferred by industry and its utilisation would increase over time.

***Note:** In this assessment, the total percentage use of each labelled flight path does not equal 100%. This is due to the flight tracks being manually counted and a small percentage (4%) not being captured. This small percentage is likely to be GA traffic, and not on any defined flight path.*

The density plot in **Figure 19** shows the general pattern of arrival aircraft to RWY14 post ILS implementation for the month of February 2020.

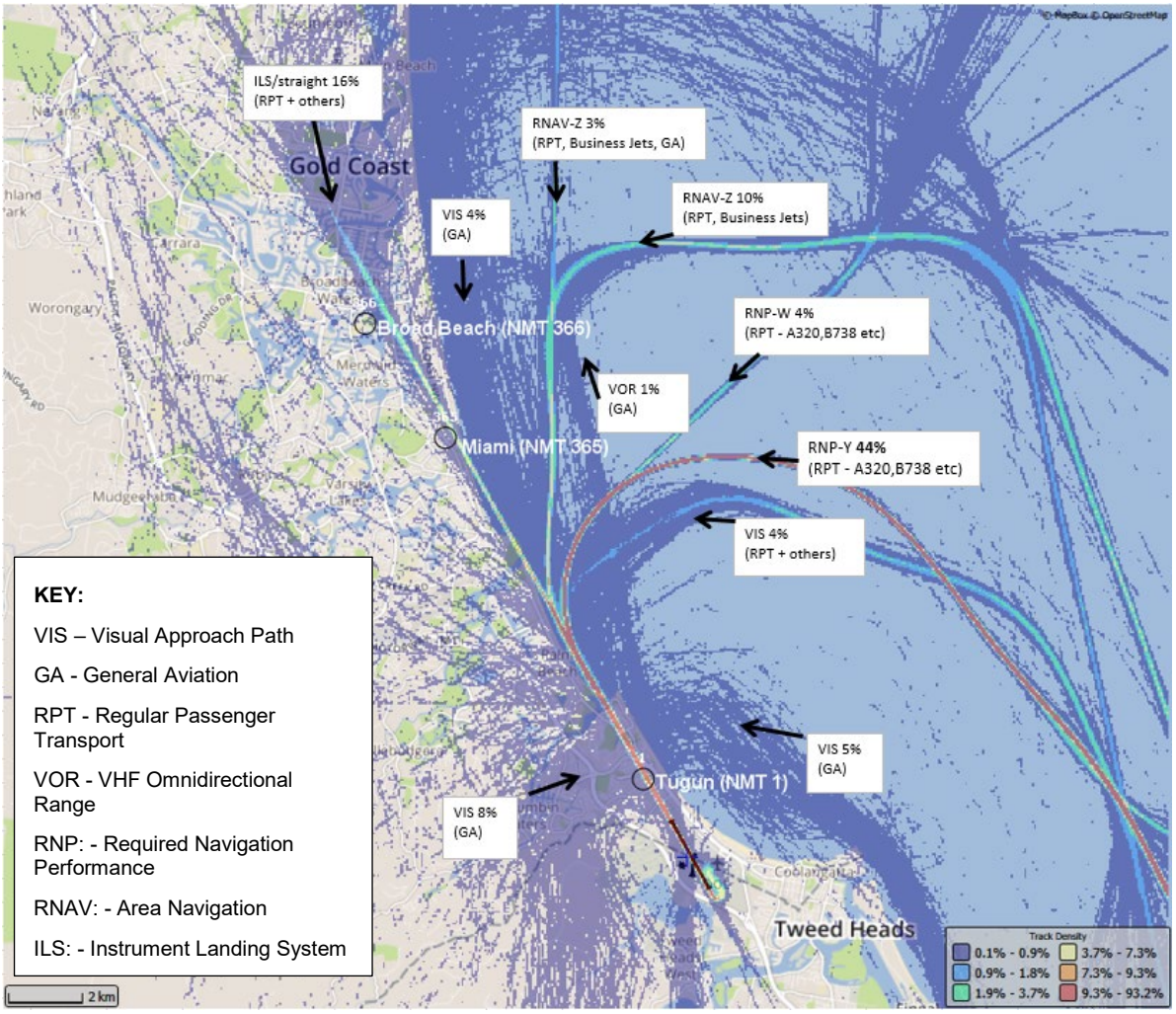

Figure 19: Percentage use of arrival procedures to RWY 14 at Gold Coast Airport based on February 2020 data, post ILS implementation (with track density plot), *Source: Airservices NFPMS data*

The RNP approach procedures to Runway 14 had the highest usage, with 48% of total arrival traffic.

The proportion of traffic that was established on the ILS flight path aligned with the runway (16%) was a combination of RPT (13.3%) and smaller GA aircraft (2.4%). It is beyond the scope of this analysis to identify if these GA aircraft were suitably equipped and were actually using the ILS approach, however, with MTOW of less than 5,700kg, they were exempt from the NAPs.

***Note:** In the above calculation of usage, the total percentage use of each labelled flight path does not equal 100%. This is due to the flight tracks being manually counted and a small percentage (2%) not being captured. This small percentage was likely GA aircraft conducting visual approaches, and not on any defined flight path.*

The analysis confirmed that post implementation of the ILS, the RNP approach procedures to RWY14 at Gold Coast Airport continue to be used as first priority for aircraft conducting instrument approaches.

With reference to the data sample in February 2020, distribution of arriving jet and turbo prop aircraft was as follows:

- 48% used the RNP procedures
- 17% used RNAV or Visual approaches
- 13% using the ILS approach procedure.

Over 18% of general aviation flew visual or VOR approaches.

This is consistent with the priorities in the published RWY14 preferred approaches NAPs, and meets the requirements of the AAT conditions.

10.4. NAPS noise modelling

The 2014 EIA modelled noise contours based on the assumption that all aircraft would use the ILS flight path, when weather and operation conditions required it.

As there had been several flight path changes since the 2014 EIA, and the NAPs came into effect in 2019, as part of this PIR we undertook an analysis of the noise contours pre and post-implementation of the ILS and NAPs to determine any change in noise levels resulting from their introduction.

The pre and post-ILS periods and number of aircraft operations in each modelled scenario is as follows:

- Pre-ILS (1 October 2018 to 28 February 2019): 6,780 operations
- Post-ILS (1 October 2019 to 29 February 2020): 5,428 operations.

The N60 contours represent the average daily noise events at or above 60 dB(A).

The following contour plots were generated in AEDT for all aircraft arriving to RWY14 during the analysis periods above (excluding helicopters).

The N60 contours in **Figure 20** present the range from 1 to 43 average daily noise events above 60 dB(A). The contour lines are all the same thickness and represent areas that have the same N60 value (similar to pressure isobars on a weather map).

These contours generally follow the instrument approach procedures to RWY14, and are most concentrated on the more frequently used RNP approach procedures, compared to the ILS approach procedure.

In the pre-ILS implementation period, the area where the Miami short-term noise monitor was located is not within the contour, meaning it received an average of less than one aircraft noise event at 60 dB(A) or above, per day.

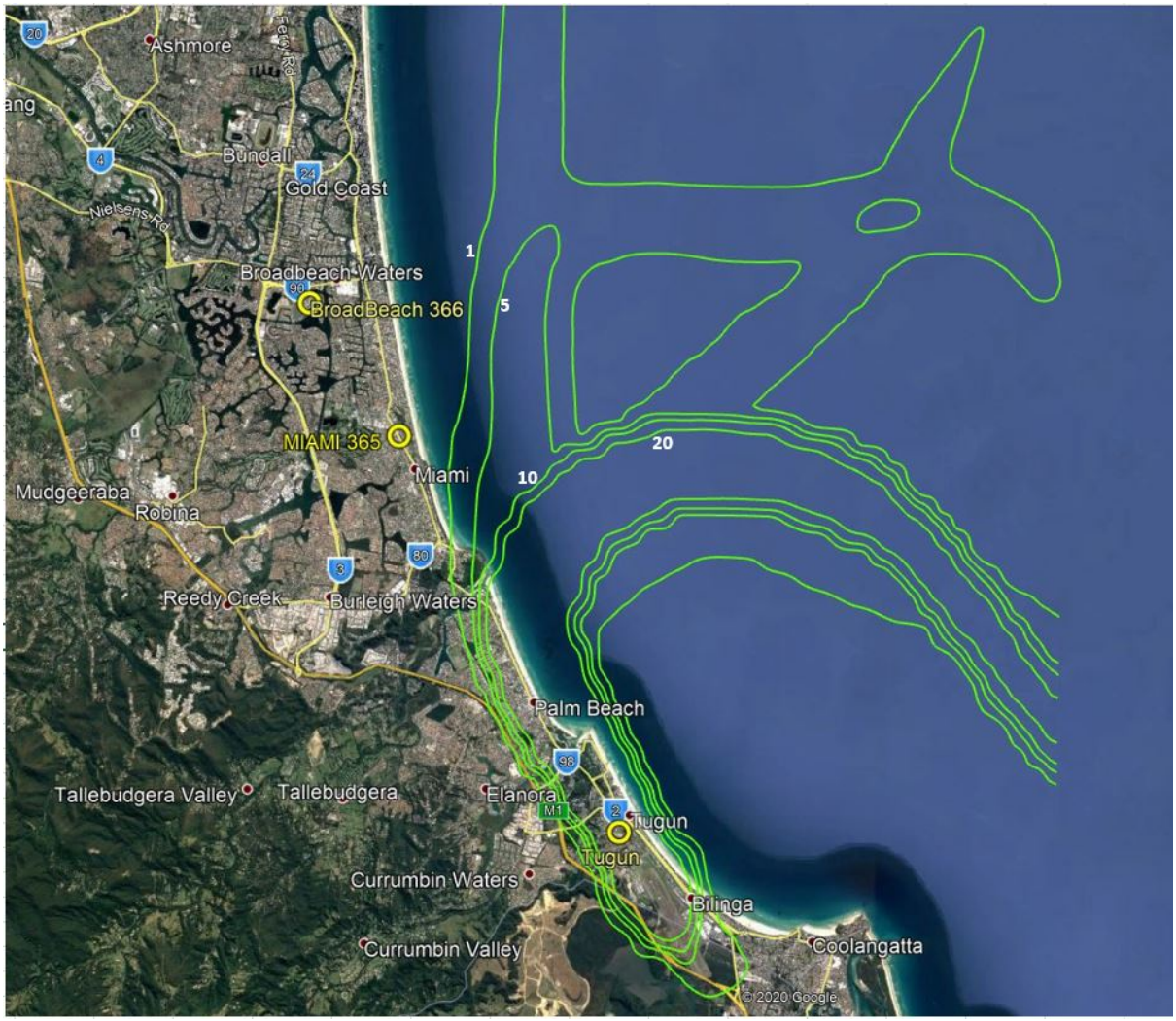

Figure 20: Daily average N60 contours for aircraft arriving to RWY14 at Gold Coast Airport, pre ILS implementation. Broadbeach, Miami and Tugun Noise Monitor locations are depicted in small yellow circles, *Source: AEDT*

In the post-ILS implementation period, this area is under the ILS 'straight-in' approach path, and received an average of 2 aircraft noise events at 60 dB(A) or above per day. In the N60 plot, the contour lines range from 1 to 34 average daily noise events above 60 dB(A).

The Broadbeach noise-monitoring location received between one to four noise events at 60 dB(A) or above per day (**Figure 21**).

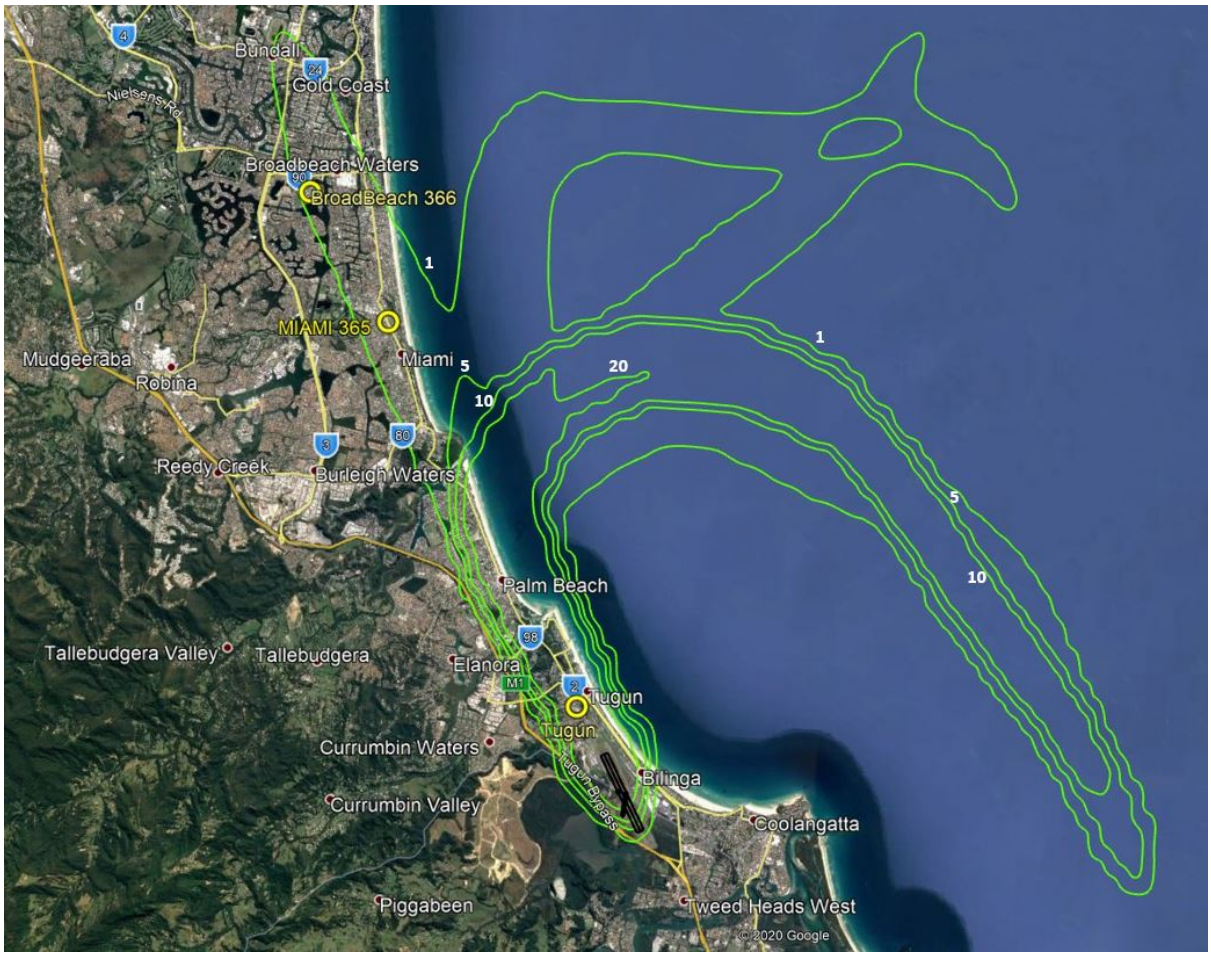

Figure 21: Daily average N60 contours for aircraft arriving to RWY14 at Gold Coast Airport, post ILS implementation, *Source: AEDT*

This analysis of N60 noise contours identified that the overall noise impacts on communities north of the airport has changed slightly due to the implementation of the ILS, during the month of highest ILS usage, from less than one to an average of one to four aircraft noise events at 60 dB(A) or above, per day.

This is well below the maximum forecast daily impacts in this area, as assessed in Airservices 2014 EIA, which forecast modelled aircraft noise events of up to 74 dB(A), up to 82 times a day and up to 10 days a year.

11. COMMUNITY ENGAGEMENT

The PIR included a review of the effectiveness of community engagement activities and information presented by Airservices in 2018-2019 in relation to forecast noise impacts and application of the NAPs associated with the implementation of the RWY14 ILS at Gold Coast Airport.

It also included a comparison of the information previously provided with that identified through the PIR activities.

In conducting this review, Airservices sought public comment and submissions from the Gold Coast community regarding the information Airservices had provided in support of the ILS implementation.

The purpose of this part of the PIR is to identify if additional information can be provided to the Gold Coast community to improve clarity and understanding regarding expected noise exposure, the application of the NAPs, and reporting on the use of the ILS.

11.1. Pre-ILS Implementation Engagement (2018-2019)

In 2018 and 2019, Airservices undertook community engagement to provide information on the forecast noise impacts associated with ILS usage, and the NAPs for RWY14 preferred approaches.

Activities included:

- presentations on the NAPs to the CACG in July and November 2018 and to the ANACC in October 2018
- information about the ILS NAPs, including fact sheets, published on a dedicated page on the Airservices website
- newspaper notices about the NAPs in the Gold Coast Bulletin (27 November 2018) and the Gold Coast Sun (28 November 2019)
- direct email communication about the NAPs to Gold Coast residents registered with NCIS, elected representatives and noise sensitive sites, including schools and hospitals.

11.1.1. CACG/ANACC Presentation

Gold Coast Airport has a Community Aviation Consultation Group (CACG) and an Airport Noise Abatement Consultative Committee (ANACC). More than 15 community groups are represented in addition to airport users and businesses, DITRDC and local elected representatives. The groups meet approximately quarterly on a staggered timing cycle.

While Airservices is not a member of either the Gold Coast CACG or the ANACC, we attend through a standing invitation to participate.

In 2018 Airservices commenced development of the draft NAPs and committed to presenting these to the Gold Coast CACG and ANACC at the following meetings:

- 25 July 2018 - CACG - Airservices presented a high level overview of the draft NAPs and explained how these would meet the approval conditions from the AAT ruling. Airservices took an action at the meeting to provide an update on the proposed engagement plan and activities at the next CACG meeting.
- 25 October 2018 - ANACC - Airservices presented a detailed overview of each of the elements the draft NAPs and invited ANACC members to provide comment on the draft NAPs including any suggestions. Airservices committed to examining the systems available to support regular reports on ILS usage and NAPs compliance, and provided an overview of the NAPs engagement plan and activities. Airservices took an action at this meeting to review capability to report on when the NAPs are not complied with.
- 7 November 2018 – CACG – The information above was presented. At this meeting is was agreed that Airservices would report all usage of the ILS flight path to each ANACC meeting for a period of one year from commencement, with brief explanatory notes for the reasons for use. The information provided to the CACG and ANACC during this period is in **Appendix D**.

- 7 February 2019 - ANACC - Airservices provided an update on the ILS noise monitoring and implementation of the ILS. Community members also submitted written concerns regarding the release of the NAPs through Airservices AIP[17], specifically questioning whether the NAPs met the requirements of the AAT conditions.

11.1.2. ILS Fact Sheet 2018

In November 2018, Airservices published a fact sheet on the ILS (**Appendix E**). The fact sheet contained information about the ILS and detailed noise exposure information for the regions (per the description in the 2014 EIA) that were affected by the ILS.

At this time, the proposed primary arrival for ILS operations was still expected to be the KEGAN flight path, with a smaller percentage of aircraft vectored by ATC in Region 3. In addition, the expected ILS utilisation rate also had not been adjusted to reflect the use of the RNP-AR approach to RWY14, which was implemented in November 2014.

The *Post Implementation Review Gold Coast Airport – Runway 14 Smart Tracking Approach* (2016)[18] identified that, for aircraft arriving from the south-east, the 'Smart Tracking' approach was shorter in distance by about 15 nautical miles (28 km) to Runway 14 than the proposed ILS. Airlines had indicated their preference for this approach due to the reduction in aircraft fuel consumption and emissions.

RNP utilisation in November 2018 was approximately 60% of all arrivals to RWY14[19].

Therefore, the information provided by Airservices regarding ILS usage and associated noise based on the 2014 EIA, did not provide contemporary information regarding the expected operations post-implementation of the ILS.

11.1.3. ILS NAPs Fact Sheet 2018

In November 2018, Airservices also released a fact sheet on the ILS Noise Abatement Procedures (**Appendix F**). This fact sheet described the proposed flight paths for arriving aircraft based on the 2014 EIA and the NAPs for the ILS.

The fact sheet explained how ATC would determine the weather conditions (cloud base and visibility) at which the ILS flight path approach would be nominated for approaches. The fact sheet also outlined Airservices commitment to reporting on the use of the ILS and the application of NAPs. It also clarified that:

- the ILS approach would only be used when poor weather affects visibility, for operational requirements or during emergencies
- ATC would advise pilots to use the ILS when weather conditions did not permit the use of alternate arrival paths. The precise weather conditions for use of the ILS were prescribed and recorded in the standard operating procedures
- this would occur when the prescribed cloud base is at or below approximately 800 feet (244 metres) and/or the visibility from the tower looking out along the ILS flight path is less than approximately 4km. These criteria would be recorded in air traffic control standard operating procedures
- to nominate the ILS approach, ATC can be required to predict weather conditions up to 30 minutes prior to an aircraft arrival. Weather conditions can be highly localised and there will be instances when weather conditions close to the airport require use of the ILS, despite the weather being clearer further away (e.g. at the start of the ILS approach)

[17] AIP SUP H04/19

[18] https://www.airservicesaustralia.com/wp-content/uploads/Gold-Coast-RNP-Post-Implementation-Review.pdf

[19] http://aircraftnoiseinfo.emsbk.com/goldcoast/flight-paths/

- further conditions on the use of the ILS for training purposes were incorporated, including that aircraft with a maximum take-off weight below 5,700kg (light aircraft) were permitted to use the ILS for training only between 9am and 5pm local time.

This information helped addressed AAT Condition 4.

11.1.4. Updated ILS and ILS NAPs Fact Sheets 2019

As described in Section 8.2, in December 2018, as part of the approval process, CASA conducted flight validation for the ILS and approved the use of the ILS 'straight-in' approach, but did not approve the ILS over water approach (KEGAN waypoint).

As a result, aircraft arriving to the airport have been required to be vectored by ATC to intercept with the ILS approach path.

Airservices updated the November 2018 fact sheets for the ILS and ILS NAPs to reflect this advice, and these were released in February 2019 (**Appendix G**)

The updates included information on the ILS flight validation and the subsequent changes to the design that required aircraft to be vectored to intercept the ILS and removal of the over water ILS flight path.

However, the fact sheet did not contain information regarding the adjusted noise exposure associated with this change in operations. While the expected noise exposure was now predicted to be much less that the 2014 EIA forecast, this information was not provided to the community.

11.2. Post-ILS Implementation - ILS Reporting

Following the implementation of the ILS, reporting to the Gold Coast CACG and ANACC commenced. This included:

- 6 March 2019 - CACG - update provided on the short-term noise monitoring that would occur to support the PIR.
- 6 June 2019 - ANACC - a presentation and separate report was provided to the ANACC on the ILS usage, including date, time and reason for use.
- 3 July 2019 - CACG - an action was taken to consider the reporting on ILS arrivals for the CACG, noting this reporting was already being provided to the ANACC.
- 10 October 2019 - ANACC - an update and presentation was provided on the PIR noise monitoring consultation.
- 6 November 2019 - CACG - ILS reporting discussions were led by the ANACC Chair, as part of the ANACC minutes.
- 6 February 2020 - ANACC - an update on ILS usage was provided. In response to member requests, Airservices took an action to provide ILS usage data in a similar manner to the previously provided tabulated form. The report was subsequently provided for an approximate 12 month period (28 February 2019 to 18 January 2020).
- 4 March 2020 - CACG - an ILS summary report provided to the ANACC was provided as part of the ANACC minutes, which were circulated to the CACG.

Feedback from some members of the ANACC indicated that they had been supportive of the format and content of the initial reporting, and expressed concern that the level of reporting at subsequent meetings had either not been consistent with this format or did not provide the desired level of detail.

11.3. Temporary Noise Monitoring for PIR (2019)

In support of the PIR, Airservices was required to identify the location of two temporary noise monitors. While Airservices had identified the location of the first temporary noise monitor under the ILS 'straight-in' approach, the location of the second monitor was subject to engagement with the community.

This second temporary noise monitor was proposed to provide additional information to the community in the ILS 'vectoring corridor' further north, where aircraft are operating in the early stages of the ILS approach.

At the 3 July 2019 CACG meeting, an update was provided on preparations for the PIR and feedback was requested on the proposed zones for installation of the second temporary noise monitor.

From 17 September to 1 October 2019, engagement was undertaken with the community regarding the location of this monitor. Information was provided on the engagement platform, *Engage Airservices,* which included resources, FAQs, a timeline, Map of Proposed Zones[20].

The ANACC provided Airservices with feedback regarding the preferred location of the second monitor. This feedback resulted in selection of the Broadbeach location.

The Summary of Feedback Report is available on Engage Airservices - https://engage.airservicesaustralia.com/48463/widgets/256463/documents/118785

At the 6 November 2019 CACG meeting, a summary of the engagement activities and the location of the temporary noise monitors was confirmed.

11.4. PIR Public Comment (2020)

To support this PIR, Airservices developed a community engagement approach which included a four week public comment period that commenced on 23 July 2020 and concluded on 20 August 2020.

Airservices asked for comments on the community engagement activities and information provided in 2018/19 regarding the forecast noise levels and Noise Abatement Procedures (NAPs) associated with the Gold Coast Airport ILS. In particular, feedback was sought on:

- the effectiveness of the 2018/19 communication about NAPs to determine if the information was clear about what the NAPs would do to reduce noise impacts for the community
- if the community experience of the ILS usage and NAPs application had been consistent with what was communicated.

As part of this engagement, on 6 July 2020 a briefing was provided on the PIR process to members of the ANACC and the CACG.

A dedicated project page was available on *Engage Airservices.* The public comment periods was promoted through direct correspondence to community members registered with NCIS and *Engage Airservices,* and to elected representatives, a newspaper advertisement was placed in the Gold Coast Bulletin and information provided through social media and via Council offices and libraries.

Community members could provide comments to their community representatives on the CACG or ANACC, or directly to Airservices through *Engage Airservices* or in writing.

During the public comment period, there were 177 visits to the Gold Coast Airport Instrument Landing System Post Implementation Review project page on *Engage Airservices*.

Airservices received 14 comments from 13 users of *Engage Airservices*. Of these, five were registered users and eight were unregistered. One comment was duplicated. A further three submissions were received by email.

[20] https://engage.airservicesaustralia.com/gold-coast-temporary-noise-monitors

Feedback was analysed and classified into the following categories:

- effectiveness of communication about NAPs
- community experience of the ILS (including NAPs)
- community engagement experience
- ILS reporting
- other.

11.4.1. Effectiveness of communication about NAPs

Six comments in the feedback and submissions related to Airservices communication about the NAPs. The comments indicated there was a requirement to clarify the purpose of the NAPs and how they would reduce noise impacts.

One submission expressed dissatisfaction that there had not been more community involvement in the development of the NAPs. This submission also expressed a desire for Airservices to make changes to the current NAPs wording around use of the ILS.

> *"Consistent with Condition 6 of the Conditions of Approval, the requirement that the ILS is not to be used for traffic sequencing needs to be clearly and expressly articulated in SUP H04/19."*

While the NAPs are an aviation operational document for pilots, and the language and instructions are specific to this audience, Airservices will review the specific community concerns raised prior to, and as part of this, PIR regarding the wording of the NAPs.

Where changes are not possible within the constraints of the aviation rule set, Airservices will provide additional public information regarding the NAPs, including briefings to the CACG and ANACC.

11.4.2. Community Experience of the ILS

Eight comments in the feedback and submissions related to noise levels, heights of arriving aircraft, and usage of the ILS. Six comments indicated a negative experience and two comments indicated that the noise experience was less than what they had expected.

The range of comments indicated that for some community members, the experience of aircraft operations, including usage of the ILS and application of the NAPs, was not consistent with the information that was provided.

> *"The noise level at my home in [x] is extreme when these huge planes approach for landing, further there is no consistency on heights at which they approach, some are ridiculously low."*
>
> *"I live on the top floor of [x] apartment, during training or bad weather days I can see the wide body aircraft flying overhead as they join the ILS. The noise is much less than I thought it would be in fact about 10% of the noise the scenic flight helicopters make."*
>
> *"I live in [x] and can see the aircraft using the ILS. However I can hardly hear them and think the ability not to have to divert the aircraft in bad weather is a positive for the Gold Coast."*

Some members of the community also indicated they felt there were instances of non-compliance of the ILS NAPs with the AAT conditions. In particular, community members commented that they thought the ILS was being used much more than permitted, including during periods of non-inclement weather.

> *"Since the ILS coming into operation, pilots are choosing to use the ILS when there is only a slight cloud cover and light or even NOT even any rain!"*
>
> *"[I] have also reported a number of our domestic flights using the ILS when criteria were not met. I still do not understand why this is the case."*

The analysis provided in Section 9 (2020 PIR Analysis) and Section 10 (NAPs), confirmed the use of the ILS was in accordance with the NAPs, including priority of approaches and the conditions of use.

These sections also provide information on aircraft altitude profiles and noise levels of arriving aircraft.

Piston aircraft types were not modelled in the 2014 EIA. However, the introduction of the ILS at the Gold Coast Airport introduced an additional instrument flight training navigation tool for local flight training schools, and training activities using the ILS increased notably post implementation. Prior to the introduction of the ILS, piston aircraft would commonly conduct visual or VOR approaches to RWY14 over water, following the coastline.

During the PIR analysis period, ILS usage data shows that piston aircraft made up 41% of all identified ILS arrivals. This may account for community experience of perceived non-authorised and additional aircraft using the ILS approach.

Airservices will provide additional public information regarding how aircraft are using the ILS and NAPs and the current noise exposure associated with the range of operations to RWY14, Airservices will also provide information to explain how the NAPs are achieving the AAT conditions and intent.

11.4.3. Community Engagement experience

Five comments in the feedback and submissions related to the general experience of Airservices community engagement. The comments were varied and included both feedback on the Public Comment Period for the PIR (2020) and the previous engagement on the ILS and NAPs (2018-2019).

The comments indicate that the community found the engagement process cumbersome and some community members thought the NAPs and ILS engagement focussed on industry.

Some comments suggested areas for improvement including the provision of more transparent and accessible information.

> *"I have found the participation process cumbersome and weighted towards a particular outcome."*
>
> *"xx has engaged extensively with Airservices [and the x] in an effort to have its concerns addressed regarding the ongoing and transparent reporting of uses of the ILS.*"

Regarding the community engagement for the PIR, some members of the community were concerned at the timeframe for and the scope of the PIR, both of which were determined through Ministerial advice and conditions. One comment related to the timing of the PIR, particularly given the disruption associated with COVID-19 and another sought clarification and a change to the scope.

Other feedback indicated that members of the community wanted a clear commitment in relation to Airservices future reporting of ILS usage.

Airservices continues to invest in improved community engagement systems, governance, and processes as demonstrated by the use of the dedicated *Engage Airservices* engagement platform, the development of *Flight Path Design Principles,* and the release of our *Community Engagement Framework* in August 2020.

We will apply our framework and work with the community to ensure we provide clear, proactive, inclusive, accessible, responsive, transparent engagement with communities who may be affected by proposed changes to flight paths and airspace.

11.4.4. ILS Reporting

Airservices fact sheets outlined the commitment to reporting, which included reporting on the use of the ILS at the Gold Coast ANACC and CACG, until a post implementation review was conducted.

As described in Section 11, following implementation of the ILS in February 2019, Airservices presented information on the ILS to the CACG and ANACC in a range of formats. Comments received from community members as part of the PIR received indicated that some felt that Airservices ongoing and future reporting on the use of the ILS could be improved in terms of content and format and should be accessible, publically available information.

In particular, comments from one submission indicated Airservices standard reporting on the ILS usage was inconsistent and asked that Airservices provide detailed tabulated usage data to ensure transparency and confidence in the data that was provided.

> *"there still remains a troubling lack of clarity regarding a commitment, and indeed an apparent reluctance to commit, by Airservices to provide ongoing and transparent reporting of ILS usage"*
>
> *"Airservices [and x] need to clearly and unequivocally commit to ongoing reporting of all uses of the ILS (date, time, ILS nomination period, aircraft call sign/type, reasons)."*

The community feedback highlights inconsistencies with the structure and content of ILS reporting including the level of detail provided, making it difficult for some community members to reconcile the extent of the use of the ILS with the AAT conditions and NAPs.

Airservices will consult with the ANACC regarding the format of future reporting on the ILS usage to ensure information is transparent and available for the CACG and ANACC meetings. We will also provide the information on the Airservices website.

11.4.5. Other

Nine comments in the feedback and submissions related to general enquiries about aircraft operations and general noise complaints. Where the comment related to an enquiry or noise complaint, community members were provided with information on how to contact Airservices Noise Complaints and Information Service (NCIS).

Some members of the community also commented on areas outside of Airservices influence or role, including the relationship between aviation activities and property values, and the enforcement of rules within the aviation industry.

One comment suggested an alternate flight path, another discussed the weighting of amenity and safety and another questioned the scope of the PIR.

All comments and submissions were responded to.

12. FINDINGS AND RECOMMENDED ACTIONS

ILS usage

The ILS usage was found to be much less than originally assessed in the 2014 EIA.

The analysis found 45 aircraft (jet, turbo prop and piston) used the ILS on a busy day, compared to the 82 busy day jet and turbo prop operations as forecast in the 2014 EIA.

This reduction in ILS usage was primarily due to the implementation of the RNP-AR to RWY14, the amendment in 2016 to the RNAV-Z (GNSS) approach to provide a runway-aligned approach over water, and the NAPs for the preferred approach to RWY14.

The community engagement information provided by Airservices in 2018-2019 regarding ILS usage and associated noise exposure was based on the 2014 EIA, despite flight path changes implemented in 2014 and 2016 that could have reduced ILS usage.

The overall noise impacts on communities north of the airport was identified to have changed slightly due to the implementation of the ILS, during the month of highest ILS usage, from less than one to an average of one to four aircraft noise events at 60 dB(A) or above, per day.

This is well below the maximum forecast daily impacts in this area, as assessed in Airservices 2014 EIA, which forecast modelled aircraft noise events of up to 74 dB(A), up to 82 times a day and up to 10 days a year.

This meant that the information provided was not as contemporary as possible regarding the expected operations post-implementation of the ILS.

Recommended Action 1

We will provide updated information derived from this report in a succinct and accessible format to the community regarding the use of Preferred Approaches to RWY14, the distribution of arriving traffic across the RNP and RNAV, and the associated noise exposure.

Flight paths and altitude

The proposed flight paths to the ILS approach used in the 2014 EIA had approximately 85% of aircraft using a flight path from waypoint KEGAN located over water, and approximately 15% of traffic vectored by ATC onto the ILS ‘straight-in’ approach.

However the KEGAN flight path was not approved for CASA for implementation and as a result, the arrival procedure required ATC to vector 100% aircraft who were conducting an ILS approach to intercept the ILS at 2,500 feet by 18km (10 nautical miles) from the airport.

This meant aircraft arriving from the south joined the ILS in a greater distribution over the coast and north of Broadbeach than was expected of the proposed KEGAN approach in the 2014 EIA.

Jet and turbo-prop aircraft tended to be concentrated on the ILS path as expected and the angle of descent closely matched the actual altitude profiles of jet aircraft used in the 2014 EIA. The approach angle for the ILS was consistent with the assumption in the 2014 EIA. However aircraft intercept the ILS slightly lower (approximately 300 feet) than the proposed KEGAN flight path design.

Recommended Action 2

We will review the arrival flight paths to the ILS for RWY14 to identify possible noise improvements for the community. This will include consultation with the ANACC and CACG to identify safe, feasible and appropriate proposals. This will also include engagement with the Gold Coast community.

Aircraft type

There has been an increase in B738 aircraft and a decrease in A320 aircraft arriving at Gold Coast Airport since 2014, however the A320 is still the most frequent domestic airline aircraft operating at the Gold Coast Airport.

Piston aircraft types were not modelled in the 2014 EIA, as their expected utilisation of the ILS approach procedure was not able to be determined at that time. During the PIR analysis period, ILS usage data shows that piston aircraft made up 41% of all identified ILS arrivals.

Piston aircraft less than 5,700kg MTOW are using the ILS 'straight-in' approach in all weather conditions, including for training purposes from 9am to 5pm. These operations are compliant with the NAPs.

Recommended Action 3

We will include a broader mix of aircraft types in all future noise modelling and flight path change considerations to ensure a representative assessment.

We will add piston aircraft utilisation of the ILS to future reporting.

NAPs - Conditions for ILS use and preferred approach procedures

Airservices met the requirements of the AAT conditions in the development of the NAPs.

Airservices took two additional opportunities to further constrain operations by restricting use to 'critical' operational requirements and limiting the time of training operations for light aircraft.

The operational use of the ILS is consistent with the intent of the AAT conditions and in accordance with the NAPs. Analysis identified that 90% of operators used the ILS in conditions of low visibility of cloud base, and approximately 10% used it for operational requirements.

Analysis also confirmed that prior to the implementation of the ILS in February 2019, 57% of scheduled jet flights used the RNP-AR approach, with 15% of all arrivals using the RNAV approaches.

Post-ILS implementation, the RNP-AR approach procedures to RWY14 continue to be used as first priority for aircraft conducting instrument approaches, with the RNAV and Visual approaches used as second priority and the ILS approach procedure being used as last priority, except in weather and critical operational requirements.

This is consistent with the priorities in the published RWY14 preferred approaches NAPs, and meets the requirements of the AAT conditions.

There is some community concern and confusion regarding how the NAPs are achieving the AAT conditions and intent, and questions regarding the wording of the NAPs in their current format.

Recommended Action 4

a) *We will continue to work closely with airlines and operators to ensure correct application of the priorities as per NAPs.*

b) *We will provide information derived from this report in a succinct and accessible format to the community to explain how the NAPs are achieving the AAT conditions and intent.*

c) *While the NAPs are an aviation operational document for pilots, and the language and instructions are specific to this audience and can constrained by the aviation rule set, Airservices will review the specific community concerns raised prior to, and as part of this, PIR regarding the wording of the NAPs.*

We will consult with the ANACC regarding this review and provide briefings to the CACG. The findings of the review will be available on the Airservices website.

ILS and NAPs Reporting

There have been inconsistencies with the structure and content of Airservices ILS reporting including the level of detail provided.

Recommended Action 5

Airservices will consult with the ANACC regarding the format of future reporting on the ILS usage to ensure information is transparent and available for the CACG and ANACC meetings.

We will provide this information on Airservices website.

Community Engagement

Some members of the community reported that they found Airservices engagement process to be cumbersome and needed to include the provision of more transparent and accessible information.

In August 2020, Airservices released our *Community Engagement Framework*, which includes *Our Commitment to Community Engagement* and *Our Community Engagement Approach*. We will apply our framework and work with communities who may be affected by proposed changes to flight paths and airspace to ensure we provide clear, proactive, inclusive, accessible, responsive, transparent engagement with communities.

Recommended Action 6

We will provide a briefing to the CACG and ANACC on our 'Community Engagement Framework'.

Noise monitoring

The quality of measurement data obtained by the three noise monitors at Broadbeach, Miami and Tugun were within the acceptable limits in terms of the angle of the aircraft to the monitor location. The temporary noise monitor at Broadbeach and the permanent monitor at Tugun provided reliable readings during the noise-monitoring period. An issue with the siting of the temporary noise monitor at Miami was identified, and this resulted in increased ambient noise levels associated with weather events and road traffic noise in the vicinity, affecting its reliability.

Recommended Action 7

When predicting noise levels from aircraft using specific instrument procedures designed to be used in adverse weather conditions, we will make specific allowance for increased ambient noise levels in future EIAs (due to the influence of high winds, rain and thunder on ambient noise levels). Information on these allowances will be included in community information. This will improve the accuracy of the modelled forecast noise exposure.

We thank the Gold Coast Airport Pty Ltd, the Gold Coast Airport Community Aviation Consultation Group and Airport Noise Abatement Consultative Committee, and broader Gold Coast community for their contribution to Airservices Post Implementation Review of the Instrument Landing System at Gold Coast Airport.

13. DEFINITIONS

Within this document, the following acronyms and definitions apply:

Term	Definition
A320	Airbus A320
AAT	Administrative Appeals Tribunal
AEDT	Aviation Environment Design Tool, FAA
AIP	Aeronautical Information Publication
ANACC	Airport Noise Abatement Consultative Committee
ANEF	Australian Noise Exposure Forecast
ANO	Aircraft Noise Ombudsman
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
B734	Boeing 737-400
B738	Boeing 737-800
CACG	Community Aviation Consultation Group
CASA	Civil Aviation Safety Authority
CDO	Continuous Descent Operations
dB(A)	Adjusted decibels
DITRDC	Department of Infrastructure, Transport, Regional Development and Communities
EIA	Environmental Impact Assessment
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)
ERSA	En Route Supplement Australia
FAA	Federal Aviation Administration (USA)
GA	General Aviation
GCAPL	Gold Coast Airport Pty Ltd
GNSS	Global Navigation Satellite System
IFR	Instrument Flight Rules
ILS	Instrument Landing System
INM	Integrated Noise Model, FAA
L_{Aeq}	A measurement in dB(A) designed to represent a varying sound source, over a period of time, as a single number
L_{Amax}	A measure to describe the maximum noise levels of a single aircraft noise event at one point in time
MDP	Major Development Plan
MTOW	Maximum Take-Off Weight
NAPs	Noise Abatement Procedures

Term	Definition
NFPMS	Noise and Flight Path Monitoring System
Nxx	A measure to describe the average daily number of aircraft noise events above a certain noise level, e.g. 60 dB(A) in a certain area
ODAS	Operational Data Analysis Suite
PIR	Post Implementation Review
RNAV	Area Navigation
RNP-AR	Required Navigation Procedure – Authorisation Required (RNP-AR)
RPT	Regular Public Transport
RWY	Runway
STAR	Standard Instrument Arrival
VFR	Visual Flight Rules
VOR	VHF Omni-Directional Range
WebTrak	A community-facing platform for reviewing airport operations (flight tracks) and noise

14. APPENDICES

APPENDIX A – COMMONWEALTH ENVIRONMENT MINISTER'S ADVICE

APPENDIX B – COMMONWEALTH INFRASTRUCTURE MINISTER'S APPROVAL CONDITIONS

APPENDIX C – ADMINISTRATIVE APPEALS TRIBUNAL CONDITIONS

APPENDIX D – CACG AND ANACC PRESENTATIONS (ILS CONTENT)

APPENDIX E – ILS FACT SHEET (2018)

APPENDIX F – ILS NAPS FACT SHEET (2018)

APPENDIX G – UPDATED FACT SHEETS (2019)