



# **REVIEW OF GOLD COAST AIRPORT**

## Noise Abatement Procedures



## Introduction

The purpose of this document is to present an overview of the findings of the review of the Noise Abatement Procedures (NAPs) in place for Gold Coast Airport.

The study was conducted in 2012 to assess the effectiveness of current noise abatement procedures at Gold Coast Airport. It explored options to minimise the impact of aircraft noise on residential areas around Gold Coast Airport, as well as options to move aircraft noise away from residential areas where possible.

The review has found that there is a high level of compliance with the current procedures, and identified some potential areas for improvement which are outlined in the document.

### **Noise Abatement Procedure Review findings in headline terms are:**

- There is excellent compliance with curfew restrictions.
- The preferred runway system has high levels of compliance for all aircraft types and is effective in minimising the impact of aircraft operations on nearby residential areas.
- Overall, adherence to flight paths which are specified in the NAPs is high, with over 90% of flight tracks (which show where an aircraft has actually flown) aligned with the flight paths.
- There were two areas where compliance was not always met:
  - some aircraft arriving from northern ports are not travelling above 5,000 feet until they are directed over water to join final approach.
  - some arrivals from northern ports to Runway 32 (landing from the south) are cutting a corner (for operational purposes) and intercepting final approach over land rather than over water.

### **Proposed changes and recommendations**

The report outlines activities and makes recommendations:

- Airservices is currently working on a proposal to amend the departure procedure from Runway 14 (departing to the south) for jets heading to southern ports so that the track is centred on the Club Banora golf course. This proposal will undergo an environmental assessment in accordance with Airservices' Environment Management System.
- Jet departures to the south from Runway 32 follow a flight procedure which is designed to take them over water as soon as possible. An amendment to this procedure to improve its effectiveness has recently undergone an environmental assessment in accordance with Airservices Environment Management System and commenced operations 3 July 2012. All indications are that it achieves the desired outcome.
- No change to the preferred runway arrangement is recommended.
- Amendment of noise sensitive areas in the Pilot instructions to include more residential areas.
- Potential for new technologies including Smart Tracking.

## What is noise abatement and what are the objectives?

Under the Air Services Act 1995, Airservices has an obligation to provide environmentally responsible services to our customers by minimising the environmental impact of aircraft operations, including the impact of aircraft noise.

Noise abatement is based on the following principles:

- Noise abatement procedures should be optimised to achieve the lowest possible overall impact on the community.
- Noise should be concentrated as much as possible over non-residential areas.
- Noise exposure should be fairly shared whenever possible.
- No suburb, group or individual can demand or expect to be exempt from aircraft noise exposure.

Noise abatement procedures have been developed for each airport on a case by case basis, in response to the local conditions, including the demographic profile of the area in which each airport is situated.

The requirement to follow the NAPs is subject to ensuring that safety is not compromised and can therefore be affected by adverse weather or traffic complexity.

### Noise Abatement Procedure Reviews

Airservices conducts regular reviews at all airports in Australia to check effectiveness of the existing noise abatement procedure in place and look for improvements. The NAP review for the Gold Coast examined a 12 month period<sup>1</sup> of operations at the airport to check the compliance with and effectiveness of the NAPs, and identify whether there were any options to improve the procedures to achieve a better noise outcome for the local community.

### Terms of Reference for the Review

The draft Terms of Reference were presented to the Gold Coast Airport Community Aviation Consultation Group (CACG) and the Aircraft Noise Abatement Consultative Committee (ANACC) for community feedback, and stated that the review aimed to identify:

- a. Current noise distribution
- b. Demography and land use around Gold Coast Airport
- c. Current Noise Abatement Procedures
- d. Compliance with Noise Abatement Procedures
- e. Effectiveness of Noise Abatement Procedures
- f. Forecast growth of traffic (as per Master Plan)
- g. Opportunities for improvement

---

<sup>1</sup> 1 January 2011 to 31 December 2011

## Overview of Gold Coast Airport

Gold Coast Airport is located three kilometres northwest of the border towns of Coolangatta and Tweed Heads. The main runway, 14/32 is used for the majority of aircraft traffic and a smaller runway 17/35 is used mainly by light aircraft.

Throughout the NAP review there are references to the runway configuration in place at Gold Coast Airport.

Runway 14 – runs north to south. Aircraft arrive from the north and aircraft depart to the south when using this runway.

Runway 32 – runs south to north. Aircraft arrive from the south and aircraft depart to the north when using this runway.



There were a total of 63,062 movements at Gold Coast Airport for the 12 month period January 2011 - December 2011. This figure incorporates aircraft movements, including jets, general aviation aircraft and helicopters. There were a total of 37,331 commercial flights.

Gold Coast Airport has experienced a high level of growth over the last ten years, particularly to northern and south-eastern ports, and this is forecast to continue over the next twenty years as detailed in the 2011 Gold Coast Airport Limited Master Plan. While noise is largely concentrated to the areas immediately beyond the ends of each runway, the distribution of noise is affected by the design of flight paths and selection of runways. Noise abatement procedures attempt to mitigate these impacts.

## Noise Abatement Operational Procedures at the Gold Coast

A number of noise abatement procedures are in use at Gold Coast Airport for large aircraft:

- Curfew restricting operations between 11pm and 6am (Queensland time).
- Preferred Runways:
  - When weather conditions permit, Runway 14 is preferred for both landing and take-off (all hours).
- Preferred Flight Paths:
  - The preferred direction for operations is arrivals from the north and departures to the south.
  - For arriving aircraft, maximum use of overwater tracking is utilised until aircraft are established on their final approach course.
- For departing aircraft, procedures to make use of power and flap settings in order to satisfy the noise abatement objectives.

Air Traffic Control (ATC) nominates the runway for use to ensure safety and operational requirements are met, depending on the weather conditions. If weather conditions do not favour a specific runway, the 'preferred' runway is used.



## Curfew Operations

Although Gold Coast Airport is operational 24 hours of the day, there is a night curfew in place which restricts operations in and out of Gold Coast Airport between the hours of 11pm and 6am<sup>2</sup> (Queensland time).

24 movements per annum for jet passenger operations are permitted between 11pm and 11.45pm and four jet freight movements per week are permitted.

The following exceptions apply to the curfew:

- Emergency flights, including medical emergencies
- Fire fighting and rescue flights
- Aircraft issued a dispensation
- Aircraft utilising Gold Coast Airport as an alternate aerodrome

### Compliance with Curfew arrangements

The curfew period of 11pm to 6am has very low traffic levels, with 308 movements recorded during 2011, which is 0.5% of all movements. Of these, a significant number are jet freight movements and helicopters involved in emergency flights, fire fighting or rescues. The Curfew Regulations do not specify which runway should be used for the period 11pm to 6am, so the general noise abatement preference for Runway 14 applies. 41% of arrivals and 43% of departures during the curfew period were on the preferred runway. However, as the control tower is closed at this time, runway selection is the pilot's responsibility.

### Options identified

The curfew is a legislated restriction and any changes are therefore not within the scope of this review.

---

<sup>2</sup> <http://www.infrastructure.gov.au/aviation/environmental/curfews/>

## Preferred Runway

Runway 14 is the preferred runway for noise abatement purposes so that aircraft arrive from the north and depart to the south. Runway selection is determined by ATC based on the wind and weather conditions at the time of the operation. For safety and performance reasons, as far as possible aircraft take off and land into the wind. Therefore, as the wind changes, the duty runway direction may change. This results in different areas around the airport being over flown by aircraft. While Runway 14 is the preferred runway for noise abatement purposes, the prevailing southerly winds at Gold Coast Airport mean that it is also the most used runway.

A preferred runway does not mean that one area (north or south) will get all the traffic as each will get either departures or arrivals, not both.

NAPs will not be a determining factor in runway selection if there is:

- low cloud, thunderstorms and/or poor visibility;
- downwind of more than five knots on a dry runway
- any downwind on a wet runway
- wind shear (refers to the variation of wind over either horizontal or vertical distances)
- a safety consideration raised by the Pilot in command

### Compliance with Preferred Runway Arrangements

65% of arrivals and 67% of departures during ATC hours were on Runway 14, the preferred runway. While this was primarily due to the southerly winds at the airport, wind data has been analysed to show that 29% of movements on Runway 14 were solely for noise abatement purposes.

When a runway is chosen for noise abatement (only when there are light northerly winds), the preferred Runway 14 is used approximately 29% of the time. Therefore weather (not noise abatement) dictates runway selection approximately 71% of the time.

The preferred runway system has extremely high levels of compliance for all aircraft types, so it is effective in minimising the impact of aircraft operations on nearby residential areas. Although that impact cannot be eliminated, the preferred runway system helps split the total traffic over the region fairly equally.

When a runway is chosen based on meteorological conditions (approximately 71% of the time), with the winds generally coming from the south or south east, for aircraft to take off and arrive into the wind, Runway 14 will generally be used (arrivals from the north, departures to the south).

The north experiences the majority of arrivals, the south experiences the majority of departures but in terms of total movements the statistics are relatively equal. This means that communities to the north of the airport experience approximately 73% of arriving jet aircraft (65% of total aircraft movements), while communities to the south experience 73% of departing jet aircraft (66% of total aircraft movements).

Based on noise analysis showing that suburbs closer to the airport experience louder aircraft noise, the preferred runway system was put in place because the nearest residential areas to the airport (in regard to distance) are Tugun and Currumbin (located north of the airport), versus residential areas to the south such as Tweed Heads and Banora Point that are located further from the runway. Generally arriving aircraft are slightly quieter than departing aircraft at a close distance to an airport (eg. Tugun). As the distance from an airport increases (eg. Banora Point), departures tend to be quieter than arrivals because they are at a higher altitude. However this is dependant on aircraft type, and individual people will experience aircraft noise in different ways. The difference in noise profile may not be noticeable by everybody. Further detail is shown in Tables 2-5 below.

Based on this, the preferred runway system, using Runway 14 when there are light northerly winds, means that the suburbs closest to the airport get the slightly quieter arriving aircraft. Residential areas to the south such as Tweed Heads and Banora Point are located further away from the runway than the suburbs of Tugun and Currumbin.

Therefore the most equitable option, based on community views at the time the NAP was implemented (1996), was to have the residential areas closest to the airport overflowed by arrivals and the residential areas that are further away overflowed by departures.

If the preferred runway was changed to Runway 32 (meaning aircraft arrive from the south and depart to the north), there would be more departures overflying Tugun and Currumbin and more arrivals overflying areas to the south of the airport, which would be worse for both suburbs.

If the preferred runway was removed all together, the overall aircraft movements would remain fairly equal between the north and the south. The split between the arrivals and departures would however be more equally split (when compared the current status where the south gets the majority of the departures and the north gets the majority of arrivals).

To demonstrate how movements would be impacted by removing the preferred runway system, this case study uses a theoretical day with 80 aircraft movements – 40 arrivals and 40 departures. On this day, the wind direction changes four times:

Case 1 - With preferred runway noise abatement procedure:

Time 1 (6.00am – 10.00am) - Strong southerly winds (more than 5 knots of downwind), therefore Runway 14 is used. Of the 20 flights over that time, there will be 10 arrivals from the north, 10 departures to the south.

Time 2 (1000 – 1400) - Light southerly winds, therefore Runway 14 still used. Of the 20 flights there will be 10 arrivals from the north and 10 departures to the south.

Time 3 (2.00pm – 6.00 pm) Light northerly winds (less than 5knots), therefore ATC can allocate Runway 14 be used **for noise abatement**. Of the 20 flights during this period there will be 10 arrivals from the north and 10 departures to the south.

Time 4 (6pm – 11pm) - Strong northerly wind (more than 5knots) therefore Runway 32 used. Of the 20 flights there will be 10 arrivals from the south and 10 departures to the north

In this scenario, the 80 aircraft movements will be:



- Affecting suburbs to the North - 30 arrivals from the north; 10 departures to the north (40 flights)
- Affecting suburbs to the South - 30 departures to the south; 10 arrivals from the south (40 flights)

#### Case 2 - No preferred runway noise abatement procedure

Time 1 (6.00am – 10.00am) - Strong southerly winds (more than 5 knots of downwind), therefore Runway 14 is used. Of the 20 flights over that time, there will be 10 arrivals from the north, 10 departures to the south. SAME AS CASE 1

Time 2 (1000 – 1400) - Light southerly winds, therefore Runway 14 still used. Of the 20 flights there will be 10 arrivals from the north and 10 departures to the south. SAME AS CASE 1

Time 3 (2.00pm – 6.00 pm) Light northerly winds (less than 5 knots), therefore Runway 32 will be used **due to the wind direction** (as there is no noise abatement procedure in place to allocate preferred runway). Of the 20 flights there will be 10 arrivals from the south and 10 departures to the north. OPPOSITE OF CASE 1

Time 4 (6pm – 11pm) - Strong northerly wind (more than 5 knots) therefore Runway 32 still used. Of the 20 flights there will be 10 arrivals from the south and 10 departures to the north. SAME AS CASE 1

In this scenario, the 80 aircraft movements will be:

- Affecting suburbs to the North - 20 arrivals from the north; 20 departures to the north (40 flights)
- Affecting suburbs to the South - 20 departures to the south; 20 arrivals from the south (40 flights)

Gold Coast Airport hasn't always had a NAP giving preference to Runway 14. In the absence of a NAP favouring the use of any particular runway for arrivals and departures, then runway selection would be based on weather alone. Therefore, without this NAP, the movements would be on Runway 32 during Time 3 – because when the preferred runway is put in place it is only when there are light northerly winds (less than 5knots). Without this in place, Runway 32 will be allocated as the wind is from the north.

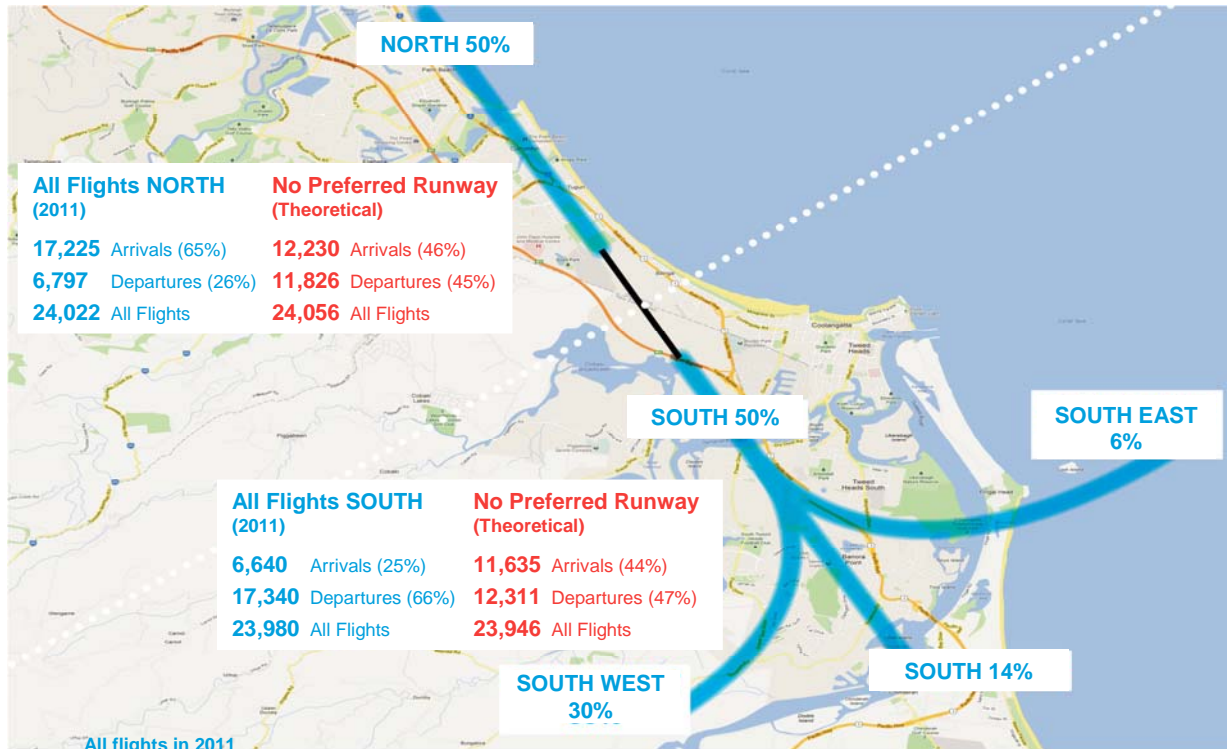
If the preferred runway was removed, approximately 71% of the time, movements would continue as above (arrivals from the north, departures to the south) based on winds.

For the remaining 29% of the time, without the NAP, aircraft movements would be on Runway 32 (arrive from the south, depart to the north). Therefore the south would get an increase in arrivals while still receiving the majority of the departures (because 71% of the time runway is selected due to winds).

Removing the preferred runway would create a better noise outcome for those suburbs to the south that only experience departures such as Fingal Head. However the impact for those suburbs to the south that currently receive both arrivals and departures (including Casuarina, Kingscliff, Chinderah, Banora Point and Tweed Heads) will increase – as those areas will receive more arrivals than they do currently. Any increase in arrivals from the north on Runway 14 will increase the number of departures to the south on Runway 14.

Removing the preferred runway will mean a worse noise outcome for the residential areas immediately to the north of the airport (Tugun and Currumbin) as the number of departures would increase.

Figure 1 below compares theoretical runway usage without NAP, with actual runway movement data from 2011.



Note - Lines are indicative of geographic direction, not an exact flight path. All percentages rounded to nearest percent. Some percentages do not total 100% as movements on short cross-runway are not included.

**Figure 1 Runway Usage Comparison**

In summary, removing the NAP would only change whether a suburb is overflowed by arrivals or departures – the suburb would still be overflowed. However, those parts of the north or south that are only affected by arrivals OR departures would have a different level of overflight. The information below provides an overview of the noise recorded to the north and south of the airport.

Table 2 (below) summarises the noise levels recorded at the Tugun environmental monitoring unit (EMU), and whether arrivals or departures are louder for each aircraft type. Where the difference is less than the standard deviation of all the noise events for that aircraft type, the operations are denoted as equal. The A333 and A332 are louder than other aircraft types on departure and arrival, and also departures of these types are louder than arrivals of these types. For Tugun residents, therefore, arrivals have marginally less overall impact than departures.

Aircraft type	EMU 1 Tugun		
	Arrivals noise (mean in dB(A))	Departures noise (mean in dB(A))	Louder phase
A333	86.0	91.1	Dep
A332	86.3	89.9	Dep
A321	83.4	84.3	Equal
B737	84.2	80.4	Arr
E190	84.0	81.6	Arr
A320	82.6	81.6	Equal
B738	85.6	83.7	Equal
E170	82.6	81.2	Equal

**Table 2 Noise Levels at Tugun EMU**

Table 3 shows the altitude of aircraft over the Tugun EMU. Departures are higher for all types, by between approximately 500 and 700 feet.

Aircraft Type	EMU 1 Tugun							Higher Phase	Diff feet
	Arrivals			Departures					
	Min feet	Max feet	Mean feet	Min feet	Max feet	Mean feet			
A333	103	2,602	449	433	1,365	952	Dep	503	
A332	84	3,209	435	449	1,534	1,069	Dep	634	
A321	32	2,023	402	546	1,651	1,092	Dep	690	
B737	38	2,212	407	350	1,568	1,019	Dep	612	
E190	40	2,160	419	441	1,682	984	Dep	565	
A320	31	4,031	427	403	1,814	1,124	Dep	697	
B738	32	2,363	422	366	1,542	999	Dep	577	
E170	60	1,555	405	546	1,347	999	Dep	594	

**Table 3 Altitudes at Tugun EMU**

Table 4 summarises the noise levels recorded at the Banora Point EMU, and whether arrivals or departures are louder for each aircraft type. In all cases arrivals are louder than departures, although for the A333, the difference is less than the standard deviation of all the noise events for that aircraft type, so the operations are denoted as equal. Therefore, for Banora Point residents in the vicinity of the EMU, departures have less overall impact than arrivals.

Aircraft type	EMU 3 Banora Point		
	Arrivals noise (mean in dB(A))	Departures noise (mean in dB(A))	Louder phase
A333	70.8	68.8	Equal
A332	78.7	70.3	Arr
A321	75.9	73.4	Arr
B737	75.3	71.2	Arr
E190	75.6	72.5	Arr
A320	74.8	72.1	Arr
B738	76.6	72.8	Arr
E170	74.4	70.3	Arr

**Table 4 Noise Levels at Banora Point EMU**

Table 5 shows the altitude of aircraft over the Banora Point EMU. Departures are higher for all types, by between approximately 1,400 and 2,500 feet.

Aircraft Type	EMU 3 Banora Point							
	Arrivals			Departures			Higher Phase	Diff feet
	Min feet	Max feet	Mean feet	Min feet	Max feet	Mean feet		
A333	903	3,119	1,319	2,330	3,763	3,763	Dep	2,444
A332	873	3,568	1,286	1,608	4,517	3,105	Dep	1,819
A321	828	7,206	1,287	1,607	6,334	2,677	Dep	1,390
B737	725	9,445	1,253	1,752	4,699	3,090	Dep	1,837
E190	871	7,036	1,282	1,880	4,808	3,379	Dep	2,097
A320	798	8,333	1,257	1,571	5,476	2,798	Dep	1,541
B738	769	9,054	1,299	1,691	5,285	3,062	Dep	1,763
E170	985	2,994	1,280	2,095	4,467	3,183	Dep	1,903

**Table 5 Altitudes at Banora Point EMU**

### Options for preferred runway

Given the above analysis that the current NAP provides the fairest noise outcome available, Airservices has not recommended to remove or change the preferred runway.

### Reciprocal Runway option

Introduction of reciprocal runways has been investigated, meaning that aircraft using Runway 14/32 would arrive and depart in the same direction), cannot be implemented due to safety reasons. In any case, it would have no overall noise benefit.

## Preferred Flight Paths

The flight paths around Gold Coast Airport have been developed to reflect safety and operational requirements, whilst accommodating community preferences, as previously determined by the ANACC (at the time the community consultation forum in place for Gold Coast Airport) and now through the CACG as much as possible.

The geographic topography of land surrounding Gold Coast Airport means flight paths and noise abatement procedures designed for the north cannot be mirrored for the south. The area to the north of the airport is very close to the coastline allowing aircraft to arrive and depart over water while to the south the coastline is further east meaning there is more land (and communities) in the area before the coastline.

Due to the location of the airport and surrounding residential areas it has not been operationally feasible to devise flight paths which completely avoid overflight of residential areas.

The Gold Coast Airport NAPs also list preferred flight paths, which minimise the impact on residential areas and which balance the impacts on different communities.

The Runway 14 approach procedures (arrive from the north) have been designed to minimise noise impacts to the north of the airport by keeping aircraft over the water as much as possible.

Aircraft departing from Runway 14 (departing to the south) to destinations north, east and south-east turn left on departure, using standard departure procedures. Departures to destinations south use a standard departure procedure with a slight right turn south of the airport and then on a track (runs north to south approximately) through the Club Banora Golf Course. The tracks flown are south east, south west, and south. This lessens the average noise levels but increases the number of people affected. Airservices aims to concentrate noise over non-residential areas wherever possible, and where this is not possible, to share noise fairly by taking an approach most acceptable to the local community where possible.

Aircraft arriving on Runway 32 (arriving from the south) effectively come in from the south. Paths are not divided between south-east, south-west and south as departure tracks are.

Runway 32 departure procedures (depart to the north) to all destinations have been designed to turn aircraft to eastern ports over the ocean as soon as possible.

At the request of the community, Airservices has considered different departure flight paths to northern ports from Runway 14. This trial did not receive community support.

For Runway 14 departures there are therefore no alternatives to the current flight paths which do not overfly residential areas. A number of different variations on headings (the directions applied to the pilot) have been explored, for departures to the north, east and south-east.

For departures to the south, actual tracking could be more centred on the Club Banora golf course. Airservices is currently working on a proposal to amend the departure procedure from Runway 14 for jets heading to southern ports so that the track is centred on the golf

course. This proposal will undergo an environmental assessment in accordance with Airservices Environment Management System.

Airservices is progressing an amendment to departures from Runway 32 to address environmental and traffic management issues. It will ensure all jet departures to southern ports from Runway 32 are able to turn to the east as soon as possible to establish over water. This change is currently undergoing evaluation in accordance with Airservices' Environment Management System.

## Compliance and Effectiveness

Overall, adherence to flight paths which are specified in the NAPs is high, with over 90% of flight tracks aligned with the flight paths. However, 11% of jet arrivals to Runway 14 from northern and north-western ports (arriving from the north) have been shown to have low compliance with the NAP requirement to be above 5,000 feet over land until directed over water to join final approach. In addition, more than 10% of arrivals from northern and eastern ports to Runway 32 are cutting a corner and intercepting final approach path over land rather than water, which causes increased noise levels for some residential areas to the south of the airport.

Having identified this, Airservices will undertake to develop procedures to ensure the NAP requirements are fully met.

The flight paths around Gold Coast Airport have been developed to reflect safety and operational requirements, whilst accommodating community preferences, as previously determined by the ANACC (at the time the community consultation forum in place for Gold Coast Airport) and now through the CACG as much as possible.

Due to the location of the airport and surrounding residential areas it has not been operationally feasible to devise flight paths which completely avoid overflight of the community. Where there are options for locating a flight path, very often a benefit to one area will be achieved by increasing the impact on another area.

### Options for flight paths

Jet departures to the south from Runway 14 follow a flight path which is designed to direct them over Club Banora golf course, to minimise impacts on residences. However, the analysis showed the actual tracking is not as effective as intended. Airservices will commence work on a proposal to amend the path with the intention of achieving tracking along the golf course in a southerly direction. This proposal will undergo an environmental assessment in accordance with Airservices' Environment Management System.

Jet departures to the south from Runway 32 follow a flight procedure which is designed to take them over water as soon as possible. An amendment to this procedure to improve its effectiveness has recently undergone an environmental assessment in accordance with Airservices Environment Management System and commenced operations 3 July 2012. All indications are that it achieves the desired outcome.

### Other Options for Change

Noise Sensitive Areas amended

- Noise sensitive areas mapped in the **Aeronautical Information Package (AIP)** for pilots were prepared many years ago and do not adequately reflect the present



#### Opportunities from new technology

- Smart Tracking flight paths have been trialled at Gold Coast for arrivals and departures since 2007. These flight paths mirror the existing flight paths and show potential for broader application with positive safety, noise and environmental outcomes. Further development of Smart Tracking flight paths is being considered for Gold Coast Airport.

### More Information

The Review of Gold Coast Airport Noise Abatement Procedures can be found at:

<http://www.airservicesaustralia.com/wp-content/uploads/Gold-Coast-Airport-NAP-Review-August-2012.pdf>

For further information contact: [community.relations@airservicesaustralia.com](mailto:community.relations@airservicesaustralia.com)