

Brisbane New Parallel Runway Flight Paths Post Implementation Review (PIR)

FINAL REPORT

Version 1.0

Effective Date: 14 December 2022

Executive Summary

In 2005, Brisbane Airport Corporation commenced the planning and approval process for a new runway, parallel to the existing north-east/south-west oriented main runway. The *Airports Act 1996* required a Major Development Plan (MDP) to be prepared, and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) required an Environmental Impact Statement (EIS). Following completion of all statutory requirements, the MDP/EIS for the new runway was approved by the then-Federal Minister for Transport and Regional Services on 18 September 2007, with works to construct the runway commencing in July 2012.

The New Parallel Runway (NPR) opened on 12 July 2020, introducing new flight paths to accommodate parallel runway operations. The implementation of the new flight paths was based on a “compass” model for arrivals and departures which, in Brisbane’s case, means the new runway caters for aircraft travelling to and from the north and west and the legacy runway caters for traffic travelling to and from the south and east. This was a change to previous operations, which used the legacy runway and cross runway to cater for movements in all directions.

The NPR opened at an unprecedented time globally, due to the COVID-19 pandemic, with domestic flights in April 2020 falling by around 97 per cent from pre-pandemic levels. This resulted in unforeseen traffic patterns and usage for the NPR not foreshadowed in earlier environmental assessments. Extended border closures, extremely limited international flights, and stay-at-home orders had large impacts on travel patterns and the nature of operations at Brisbane and every airport around Australia and the world.

In accordance with Airservices’ National Operating Standard, Post Implementation Reviews (PIRs) are conducted 12 months after airspace and flight path changes to confirm actual noise and aircraft operations. Airservices compares actual operations data with forecasts modelled during final flight path design to identify any variance and the reasons for this. The PIR also aims to identify opportunities to improve noise and operational outcomes, inform future changes and contribute to the continual improvement of Airservices’ flight path and airspace change management process.

Airservices finalised the Terms of Reference for the Brisbane PIR in December 2021, following engagement with the community and industry stakeholders, including five community engagement sessions, an industry workshop and a public comment period.

In January 2022, Airservices engaged Trax International (Trax) to conduct an independent review to make improvement recommendations across all aspects of the design and conduct of Airservices PIR of Brisbane’s Airspace. The Trax [Brisbane New Parallel Runway Flight paths Post Implementation Review Independent Review Final Report](#) was published in August 2022, with Airservices adopting all recommendations. These, and Airservices recommendations, are detailed in this report.

In September 2022, Airservices consulted community and industry stakeholders on the proposed PIR recommendations. This included nine community workshops attended by 232 community members from 88 suburbs, as well as two industry workshops and monthly working group discussions.

On 21 October 2022, Airservices released its draft PIR report for a four-week public comment period, receiving 450 written community submissions, including one submission attaching a petition signed by 1,284 community members. Submissions were also received from Australia’s two largest domestic airlines and from Brisbane Airport Corporation (BAC).

Throughout the PIR, Airservices has consulted and received feedback from the Federal Government-appointed Brisbane Airport PIR Advisory Forum (BAPAF).

Draft PIR Report Feedback

Community feedback in relation to the recommendations of the PIR included:

- **Package One: Strong, transparent and representative governance**
This package was broadly supported, however greater community involvement in key governance arrangements was requested. Community sentiment included the urgent need to establish an independent airport community forum appointed by the Federal Government.

- **Package Two: Maximise flights over water**
This package was supported by communities close to the airport, however bayside communities raised concerns that this would increase noise impacts on their suburbs. The need to prioritise over-water operations, keep aircraft over water for longer and increase the altitude of aircraft before they cross the coast was frequently raised. Additionally, feedback was received on the impact of overnight operations on communities.
- **Package Three: Reduce the frequency and concentration of flights over communities**
This package received mixed feedback, with some community members indicating concern that noise sharing would increase movements over their suburbs. Some communities did not support noise sharing to provide relief for frequently overflowed suburbs. Feedback also noted that noise sharing should not be prioritised over a net noise reduction.
- **Package Four: Wider airspace review**
This package received mixed feedback, with some community members supportive of removing compass operations and introducing multiple arrival and departure paths, while others were concerned this would increase impacts. A runway alternation noise relief option was removed from the recommendations due to a lack of community support. Segregated and semi-mixed operating modes remain in the report but were noted by some as undesirable. Further engagement will be required to confirm support or otherwise for these mode options.

Industry feedback in relation to the recommendations of the PIR identified the following:

- **Package One: Strong, transparent and representative governance**
Support was noted for formal governance mechanisms to enable consideration of safety and the balance between environmental outcomes and community needs.
- **Package Two: Maximise flights over water**
Concerns were raised about potential delays and additional track miles with the increased use of SODPROPS. It was noted this should be carefully managed in relation to increased carbon emissions and passenger delays.
- **Package Three: Reduce the frequency and concentration of flights over communities**
Feedback noted opportunities to review some arrival and departures paths to reduce track miles and the associated fuel burn and carbon emissions.

The final PIR recommendations have been formed giving consideration to Airservices' and Trax' review findings and all feedback received. Table 1 contains the final recommendations of the PIR, which will form the Noise Action Plan for Brisbane.

Next steps

Next steps and a priority program for 2023 can be found at Section 7. Key initiatives include:

- Consultation with the Federal Government-appointed independent airport community forum as the recommendations from the PIR are progressed.
- Establishing governance mechanisms including an assurance check by the Department of Infrastructure, Transport, Regional Development, Communications and the Arts (the Department).
- Consultation on the communication approach for changes delivered in response to this PIR.
- Increase public reporting and transparency of operations.
- Expanding the use of SODROPS mode by increasing capacity, enhancing decision-making criteria and developing flight path changes for daytime operations.
- Developing measures to reduce SODPROPS overflight impacts on bayside communities.
- Reducing the impacts of overnight flights on communities.
- Develop baseline model for pre-NPR and current NPR operations.
- Reducing the impacts of concentrated flight paths to the west of the airport.
- Developing options to increase use of over-water departures during the day.

Table 1 – PIR Recommendations

Package One – Strong, transparent and representative governance (Development and implementation Q3-Q4 2022)
1.1 – Oversight, management and assurance program: Airservices will support government and other stakeholders in the establishment of oversight, management and coordination functions to support flight path change delivery, as well as development of assessment frameworks and independent assurance mechanisms.
1.2 – Industry-wide communications planning: Airservices will work with industry stakeholders, government and community to develop effective communications plans supported by all relevant organisations and agencies, to ensure that information provided is consistent, clear and transparent.
1.3 – Meaningful engagement process: Airservices will work with government, community and industry stakeholders to develop effective community engagement plans and tools, to ensure communities are adequately engaged, have the opportunity to input to decision-making and that the metrics used to make decisions are understood and transparently reported against.
1.4 – Long-term Noise Action Plan: Airservices proposes the recommendations in this report form the initial version of the Noise Action Plan. This plan will implement noise mitigation measures which are well-planned, tracked, reported against and supported by community and industry stakeholder involvement.
Package Two – Maximise flights over the water (Development and implementation in 2023)
2.1 - Air Traffic Control (ATC) Operating Plan to extend the use of SODPROPS: Airservices will develop an ATC Operating Plan, examine options to extend the use of SODPROPS and implement associated design enhancements.
2.2 - Reduce ATC workload and complexity associated with SODPROPS: Airservices will engage with Defence in relation to Amberley airspace, ATC procedures and specific flight paths that constrain SODPROPS operations.
2.3 - Modify specific SODPROPS flight paths and ATC procedures: Airservices will review options to reduce track miles and emissions associated with SODPROPS operations, update ATC procedures to optimise final approach efficiency and review options to reduce the impact of over water operations on affected communities.
2.4 – Reduce the impact of overnight operations on communities
Package Three – Reduce the frequency and concentration of flights over communities (development during 2023 and implementation in 2024)
3.1 – Reduce the frequency and concentration of flights over communities: Airservices will develop options for departure and arrival paths over the city to allow for noise-sharing and to reduce the occurrence of communities being subject to both arrival and departure operations. Airservices will also develop options to reduce the impact on communities of non-jet tactical operations, flight paths further from the airport, merge points and hold downs. In addition, Airservices will introduce opportunities for greater use of advanced navigation technology where this improves community noise outcomes.
Package Four – Optimise the performance of the wider Brisbane airspace system (Development in 2023 and 2024, implementation from 2025)
4.1 - Introduce noise sharing through new operating modes: Airservices will develop options to connect flight paths to all runway ends to provide greater flexibility for noise sharing, and investigate a range of modes, including segregated and semi-mixed modes, to provide periods of respite for communities.
4.2 - Introduce multiple arrival routes over the city: Airservices will develop options for multiple arrival routes which can be alternated on a planned schedule to provide respite to communities. This will be completed in parallel with an already planned IT system upgrade.

CONTENTS

EXECUTIVE SUMMARY	1
1. PURPOSE	5
2. BACKGROUND	5
2.1. New runway development	5
2.2. Runway description	6
2.3. Runway allocation	6
2.4. Current modes of operation	7
2.5. Current flight path design	9
3. PIR CONSIDERATIONS	9
3.1. Terms of Reference	9
3.2. COVID-19 considerations	10
3.3. Independent review	10
3.4. Brisbane Airport Post Implementation Review Advisory Forum	10
4. SUMMARY OF FINDINGS	11
4.1. PIR objectives and areas of focus findings	11
4.2. Review of complaints	17
4.3. Trax International review	18
4.4. Trax Recommendations	19
5. COMMUNITY AND INDUSTRY PERSPECTIVES	20
5.1. Community engagement	20
5.1.1. Response to recommendations	21
5.1.2. Community suggestions	21
5.1.3. General Feedback	22
5.1.4. Communication requirements	22
5.1.5. Operating principles	24
5.2. Industry engagement	24
5.2.1. Response to recommendations	24
5.2.2. Industry suggestions	25
5.3. Draft PIR report feedback	25
5.3.1. Community feedback	25
5.3.2. Industry feedback	26
6. PIR RECOMMENDATIONS	27
6.1. Noise Action Plan for Brisbane	27
7. NEXT STEPS	33
7.1. 2023 priority program	33
APPENDIX A - PIR OBJECTIVES AND FOCUS AREAS	35
APPENDIX B – DETAILED FINDINGS	37
APPENDIX C – TRAX RECOMMENDATIONS INCLUDING AIRSERVICES’ FINDINGS	49
GLOSSARY	65

Enquiries regarding this report should be addressed to:

Community Engagement

Airservices Australia GPO Box 367, Canberra ACT 2601

Email: communityengagement@airservicesaustralia.com

1. Purpose

The purpose of this document is to present the findings of the Brisbane New Parallel Runway Flight Paths Post Implementation Review (PIR), which commenced in July 2021. The PIR's purpose is to review the changes implemented by Airservices in July 2020 to support the commencement of operation of the New Parallel Runway (NPR) runway at Brisbane Airport. The document presents the findings of the Trax International (Trax) independent review, Airservices' review and the outcomes of community and industry stakeholder engagement throughout the PIR.

2. Background

Brisbane Airport, a Federal Government-leased airport managed by Brisbane Airport Corporation Limited (BAC), is the third-busiest airport in Australia and operates 24/7. It is Australia's largest capital city airport by land size. Pre-COVID-19, it serviced 31 airlines, flying to 80 international and domestic destinations; transported 23 million passengers per year; employed 23,000 people; and contributed \$4.7 billion per annum to the Australian economy. Investment in the NPR will continue to foster economic growth through additional flights and greater connectivity.

The new runway opened during the early stages of the COVID-19 pandemic, with state and national border closures soon enacted as a measure to reduce the spread. For Brisbane Airport, these border closures significantly affected not only traffic volume, but the expected operation of the parallel runways. Most travel occurred within the state during the border closures – and airlines changed the mix of aircraft they were operating to meet the reduced demand for air travel and the intrastate travel ports. Brisbane to Cairns ranked as one of the busiest routes in the country during this period, noting it was not in the top 10 routes prior to COVID-19.

With lower traffic numbers, full independent, parallel runway operations – which were the subject of earlier environmental assessments – were not utilised or required. In addition, during periods where the Queensland border was closed, the new runway received the majority of movements in accordance with the compass operations model, which requires the new runway to manage traffic to and from the north and the west.

2.1. New runway development

In 2005, BAC commenced the planning and approval process for the new runway. The Brisbane Airport NPR was recognised as a key driver in the long-term growth of Brisbane and Queensland by creating jobs, opportunities for new destinations and a greater choice of airlines. At a total cost of \$1.1 billion, it was one of the largest new infrastructure projects undertaken in Australia prior to the commencement of construction of Western Sydney International Airport.

The *Airports Act 1996* required a Major Development Plan (MDP) to be prepared, and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) required the development of an Environmental Impact Statement (EIS). The MDP/EIS for the runway was approved by the then-Federal Minister for Transport and Regional Services on 18 September 2007, with works commencing in July 2012. A copy of the MDP/EIS is available on [BAC's website](#). The EIS included concept-level flight path corridors, aircraft movement assumptions and noise-impact assessments.

Airservices developed the final flight path design in 2018 and 2019 based on the approved EIS concept flight path corridors and was required to environmentally assess the flight paths and procedures it developed to determine any material variation from the already assessed and approved concept design. Airservices also environmentally assessed the redesigned higher level air routes associated with the introduction of Brisbane Airport's NPR Project and new arrival and departure paths not included in the 2007 EIS.

Interim operations commenced on 21 May 2020, ahead of the NPR opening on 12 July 2020.

2.2. Runway description

Runway names are determined by the compass heading to which they align. Brisbane's existing (or legacy) runway was referred to as "01" and "19" based on these headings at each runway end (010 and 190 degrees).

Parallel runways have the same numerical designation (01 and 19) because they face in the same direction. They are assigned left (L) and right (R) descriptions to distinguish the four runway ends that aircraft land to and take off from – 01L, 01R, 19L and 19R.

The numerical designation is based on the direction the aircraft is travelling in, and the left and right descriptions translate to the view from the aircraft. For example, flights taking off over-water on the new runway depart from 01L, heading 010 degrees on the left runway, with the existing runway to the right.

As a result, the NPR is known as 01L/19R and the existing runway (legacy) is the reverse, 01R/19L.

Figure 1: Parallel runways at Brisbane Airport



2.3. Runway allocation

The flight paths designed for the new parallel runway operations were primarily intended to serve a "compass operations" model. In a compass operation, aircraft are allocated a runway based on the direction of travel to their destination (for departures) or from their origin (for arrivals), whereby:

- flights departing to or arriving from destinations south or east of Brisbane, such as Sydney, Melbourne and New Zealand, are allocated the legacy runway.
- flights departing to or arriving from destinations north or west, such as Perth, Cairns and most of the international traffic that routes via Asia and the Middle East, are allocated the NPR.

There are some exceptions where the compass operations model may not be applied, including:

- in poor weather conditions, where flights may be reallocated to the other runway for safety reasons
- in the event of an emergency or medical priority, when either runway may be selected to manage aircraft safety
- during runway maintenance works, when one runway is closed to operations, the other runway will manage all aircraft movements
- where operations are solely over water
- when airborne holding exceeds 10 minutes for a single aircraft or accrues 20 minutes per hour for multiple aircraft, to reduce these delays.

In keeping with a condition of the project approval for the NPR, a Noise Abatement Procedure (NAP) applies during the night period (10pm to 6am) that notes the southern end of the NPR (city end) should not be used, except for:

- allowing some non-jet departures from 5am to reduce delays during this peak departure period
- aircraft whose maximum take-off weight exceeds the limit for legacy runway operations – the pilots of these aircraft may nominate the NPR for safety reasons.

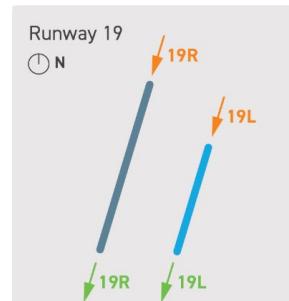
2.4. Current modes of operation

Parallel Runway Operations

Runway 19 Parallel operations

Runway 19 parallel operations occur when winds are from a predominantly southerly direction.

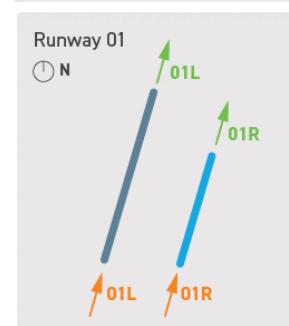
- Aircraft arrive over Moreton Bay to land on the NPR or legacy runway (19R or 19L).
- Aircraft depart over the city from the NPR or legacy runway (19R or 19L).



Runway 01 Parallel operations

Runway 01 parallel operations occur when winds are predominantly from a northerly direction.

- Aircraft arrive over the city to land on the NPR or legacy runway (01L or 01R).
- Aircraft depart over Moreton Bay from the NRP or legacy runway (01L or 01R).

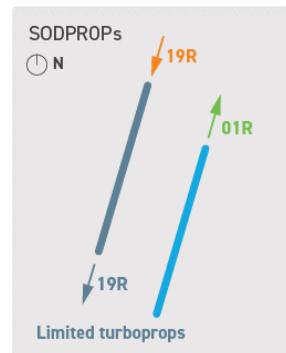


These simultaneous runway operations, in the most favourable wind direction, are the preferred daytime mode due to their ability to manage higher volumes of traffic and weather conditions, where winds are greater than five knots and the runways are not dry.

Simultaneous Opposite Direction Parallel Runway Operations (SODPROPS)

When SODPROPS is in use, all jet operations and most non-jet or turboprop (propeller-driven) aircraft arrive and depart over Moreton Bay.

- Aircraft arrive over Moreton Bay to land on the new runway (19R).
- Aircraft depart over Moreton Bay from the Legacy runway (01R).
- A limited number of non-jet departures can depart over the city from the new runway after 5am if required to manage congestion.



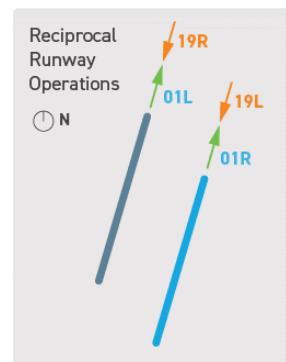
SODPROPS is prioritised between the hours of 10pm and 6am local time, when air traffic volumes are lower. Its use is reliant on several factors including dry runways and no more than a five-knot tailwind. Visibility must be 8km or greater and the cloud base must be 2500ft or higher.

If SODPROPS cannot be used between 10pm and 6am, runway operations in the most favourable wind direction or reciprocal runway operations will be used.

Reciprocal Runway Operations

This mode involves using one of the two runways, with both arrivals and departures over Moreton Bay on that runway.

- Aircraft arrive over Moreton Bay to land on either the NPR (19R) or legacy runway (19L).
- Aircraft depart over Moreton Bay from either the NPR (01L) or legacy runway (01R).



Reciprocal operations is an option if weather conditions are not conducive to using SODPROPS, as this mode has no visibility or cloud-based restrictions. This mode can also be used when one runway is unavailable due to maintenance.

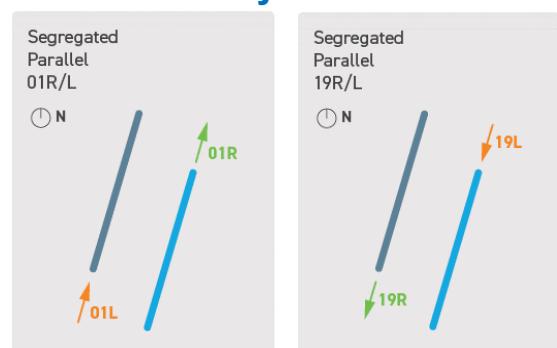
Due to its limited capacity, this mode is only available for use between the hours of 10pm and 6am.

Reciprocal operations can be performed off either runway, however the legacy runway is most often used due to the shorter taxi time for aircraft.

Segregated Parallel Operations to Different Runways

There are two segregated parallel runway operations modes.

- Aircraft arrive over the city to land on the NPR (01L) and depart over Moreton Bay from the legacy runway (01R)
- Aircraft arrive over Moreton Bay to land on the legacy runway (19L) and depart over the city from the NPR (19R).



The specific segregated operations mode selected will predominantly depend on weather conditions.

Segregated operations are not considered a priority mode and are only used when weather conditions prevent the use of simultaneous parallel operations. For example, during operational constraints or very high crosswinds or storm activity within the Brisbane basin, segregated operations will be utilised to maintain separation between aircraft.

2.5. Current flight path design

The current flight path design is shown below, with arrival paths indicated in yellow and departure paths in purple. This includes:

- runway 19 operations – when wind is predominantly from a southerly direction
- runway 01 operations – when wind is predominantly from a northerly direction
- SODPROPS – priority night-time mode with all operations over water.

The various paths connect aircraft to and from other ports across the country and around the world via a complex enroute network that supports both civil and military airport operations.

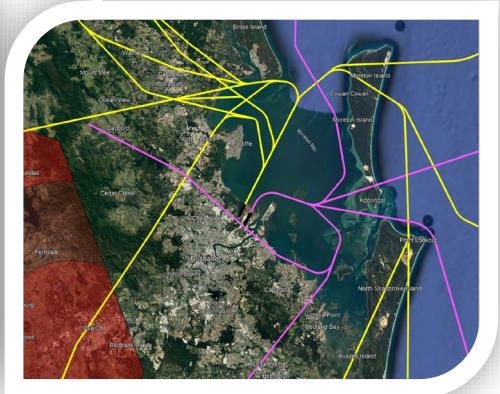
Closer to the airport, the arrivals paths connect to the final straight in approach to the runway at a range of points, catering for different aircraft performance and technology. Similarly, departing aircraft on the runway aligned departure path also turn at different points based on direction of travel and aircraft performance.



Runway 01 Flight Paths



Runway 19 Flight Paths



SODPROPS Flight Paths

3. PIR Considerations

3.1. Terms of Reference

The Terms of Reference (TOR) for the Brisbane Flight Paths PIR were developed in consultation with the community and other stakeholders, including the aviation industry. A number of objectives and key focus areas (see Appendix A) were determined through this engagement, providing guidance for review activity based on specific areas of interest.

Initially, the scope of the PIR included all changes associated with the new runway – arrival and departure paths, modes of operation, NAPs, aeronautical document changes and changes to the Brisbane airspace to support the new operations. The scope was expanded in response to community feedback to also include legacy runway operations, short-term noise improvement trials and ultimately an independent review of Brisbane operations, undertaken by Trax, in parallel to Airservices' review.

The scope does not include elements that are outside of Airservices' remit.

Further details of the scope of the PIR can be found in the [*Brisbane Flight Paths Post Implementation Review Terms of Reference*](#).

3.2. COVID-19 considerations

At the time of creating the TOR, the aviation industry was significantly impacted by the COVID-19 pandemic. This resulted in actual operations at Brisbane Airport being inconsistent with what was forecast in earlier assessments.

With a lack of certainty about when operations would stabilise after the re-opening of international and state borders, the TOR identified the need for a two-phase PIR. Phase one was proposed to assess COVID-19 impacted operations, and phase two post-pandemic operations, at a time when representative air traffic numbers returned, including international air traffic.

In April 2022, with COVID-19 restrictions lifting, a strong return of domestic aircraft operations was experienced across the country, including Brisbane Airport. There was also a return of some international travel, although not to pre-COVID-19 levels.

This return of aircraft operations has allowed the PIR to be completed in a single-phase, enabling recommendations to be confirmed and progressed immediately and without the need for a further review phase.

3.3. Independent review

In January 2022, Airservices' CEO Jason Harfield appointed United Kingdom-based aviation specialist firm, Trax International to independently review and make improvement recommendations across all aspects of the Brisbane flight path design, airspace operation and conduct of the PIR, with a particular focus on opportunities to limit and, where possible, reduce impacts of aircraft noise on the community.

Trax completed an initial review and published an [Interim Report](#) in April 2022, containing a list of possible options that could improve noise outcomes for Brisbane communities. This was refined by Trax through engagement with airlines, Airservices and the community throughout May and June 2022, culminating in a package of recommendations presented in the [Final Report](#), released in August 2022. Airservices adopted all recommendations, subject to further community and stakeholder engagement, which was completed in September 2022.

The Trax Final Report identified four distinct packages of work.

1. Strong, transparent and representative governance: Measures to improve how airspace change is delivered including greater oversight, collaboration across the aviation industry and involvement of the community.
2. Maximise flights over the water: Operational and design changes aimed at increasing the opportunity to have more flights arrive and depart over Moreton Bay, reducing the impact on communities.
3. Reduce the frequency and concentration of flights over communities: Flight path design enhancements able to be delivered under the current compass operations model to reduce the impact on some communities through noise sharing and minor flight path changes.
4. Optimise the performance of the wider Brisbane airspace: Flight path changes and new design moving away from the compass operations model to allow greater flexibility for ATC to manage traffic movements across the airspace, including some noise relief and respite opportunities.

These recommendations, together with Airservices' PIR recommendations, were presented to the community through a series of community workshops in September 2022. This engagement aimed to identify recommendations which were supported, those that were not, additional options for consideration, and to seek community input into the final PIR recommendations.

3.4. Brisbane Airport Post Implementation Review Advisory Forum

The then-Australian Government announced the establishment of the Brisbane Airport Post Implementation Review Advisory Forum (BAPAF) on 24 September 2021.

BAPAF's purpose is to act as an independent, community-orientated forum Airservices can actively consult during the PIR. BAPAF has been consulted throughout the PIR to review documents being released for community and stakeholder consultation and to provide visibility of how feedback from stakeholders and the Brisbane community. This includes areas newly affected by aircraft noise, as well as areas under previous flight paths experiencing changes in noise and operations.

BAPAF comprises the following members:

- Independent Chair of the Forum – Mr Ross Musgrove
- Government nominee – the Hon Robert Borbridge AO
- Government nominee – Ms Claire Moore
- Academic/industry nominee – Professor Douglas Baker
- Chair of the Brisbane Airport Community Aviation Consultation Group – Mr Nigel Chamier AM

BAPAF has met 16 times since their formation.

Based on a recommendation from BAPAF, Airservices implemented the following:

- A 12-month trial of full-length departures which commenced 24 February 2022
- A 12-month trial of SODPROPS extended operating hours between 10pm-8am (previously 10pm-6am) when conditions such as weather and traffic volume allow.

The effectiveness of the trials will be assessed, and a determination on whether to continue, modify or cease the procedures made, through a review in Quarter 1 and 2, 2023.

Work is continuing to implement a new Noise Abatement Procedure which requires jet aircraft to remain on Standard Instrument Departure (SID) until they reach 10-12,000ft. Once implemented, this will be assessed in a same manner as the trials above.

4. Summary of Findings

The TOR included in Section 4, Objectives and Areas of Focus, outlines 17 specific elements that the PIR reviewed. These were developed through engagement with the community and stakeholders.

The following summary of findings is provided in response to this section of the TOR. In addition, a summary of complaints received since runway operations commenced, and how these have been considered through the PIR, has also been provided. This is in direct response to requests received during community workshops held throughout September 2022.

More detailed findings are provided in Appendix B, including links to a number of documents providing fuller assessment information.

4.1. PIR objectives and areas of focus findings

TOR Reference	Description	Result
1.	Review of forecast against actual noise levels	<p>Actual noise results between August 2020-July 2021 were consistent with modelled forecasts prepared for the 2007 EIS and 2018 final flight path design environmental assessment in:</p> <ul style="list-style-type: none"> • Hamilton • Kedron • Bulimba • Nudgee Beach • Annerley • St Lucia • Bardon

TOR Reference	Description	Result
		<ul style="list-style-type: none"> • Salisbury. <p>Differences were found in the following locations:</p> <ul style="list-style-type: none"> • Cannon Hill: A reduction in forecast 70 decibel events compared to the 2007 EIS – most likely due to the introduction of new, advanced navigation technology procedures, not available at the time of the EIS, which provide a shorter approach for capable aircraft, moving traffic away from this location. • Carina: A slight increase in forecast 70 decibel events compared to the 2007 EIS, likely due to the introduction of the advanced navigation procedures noted above moving more aircraft over this location. • Tingalpa: Winter operations are consistent with the 2018 modelling, but higher than initially forecast in the 2007 EIS. This is due to a change in origin/destination ports for the legacy runway, including the addition of some international ports, including the United States of America. Summer results were not affected due to the prevailing weather conditions at that time of year. • New Farm: A noticeable difference in the forecast noise levels, particularly during daytime hours (6am-6pm) with noise levels above 70 decibels. This is due to a large spread of aircraft altitudes not forecast in the earlier assessments and higher-than-anticipated noise levels for the most frequently used aircraft. <p>Assessment completed for the period August 2021 to July 2022 has also found most locations to be consistent with the earlier forecasts, despite the return of air traffic after COVID-19 border closures and other restrictions were lifted. Some exceptions included:</p> <ul style="list-style-type: none"> • New Farm: already noted above to have exceeded original forecasts. • Hamilton: Summer operations are consistent with earlier modelling, but higher than forecast for winter operations. • Nudgee Beach: Daytime, over-water departure and arrival operations above 70 decibels have exceeded forecasts. • Tingalpa: While there has been a substantial increase in air traffic movements over this suburb post COVID-19 border closures, it remains within forecasts except for winter weekend days which are higher than expected.
2.	Airservices' role in community engagement	<p>Airservices played a supporting role to BAC in engaging with communities on the NPR flight paths.</p> <p>It is noted that many community members felt they were not adequately engaged on the changes and that many were unaware of the extent of operations they would experience as a result of the NPR.</p> <p>Communities further from the airport, including Samford and Upper Brookfield, were not a focus for engagement due to being outside the 70 decibel noise contour, which</p>

TOR Reference	Description	Result
		<p>was a key measure used in assessing the impact of the proposed operations.</p> <p>Airservices now engages based on noticeability, rather than defined noise levels, recognising low-ambient noise communities will experience greater noise disturbance.</p> <p>To improve community engagement, the following were introduced:</p> <ul style="list-style-type: none"> • A Community Engagement Framework, which provides a number of commitments to the community and outlines the approach to this engagement • Flight Path Design Principles (FPDP) which seek to achieve a balance between often-competing priorities during flight path design (efficiency, community impact, operational complexity, emissions), having given regard to safety as the highest priority.
3.	Effectiveness of the Brisbane Airport NAPs and potential improvements	<p>Preferred runway mode use was achieved 91 per cent of the time during the day and 94 per cent of the time during the night between 12 July-23 August 2022.</p> <p>Current NAPs prioritise daytime departures over the city and arrivals over water. Community feedback suggests that departures are considered more disruptive than arrivals. Further engagement during implementation of the PIR recommendations will be conducted to determine a preference and if changes to NAP priority are required.</p> <p>Intersection departure NAPs were complied with 99.93 per cent of the time, including during the 2022 trial to restrict intersection departures. Priority/emergency flights are exempt from the NAP and the trial requirements.</p>
4.	Opportunities to minimise the impact of aircraft operations on the community	<p>Section 7 of this report identifies recommendations to minimise the impact of aircraft operations on the community.</p>
5.	Engage genuinely with industry on possible improvements	<p>Airservices has engaged with BAC, airlines and CASA throughout the PIR.</p> <p>BAC has been part of ongoing discussions and review activity as the PIR has progressed and has supported temporary noise monitoring in a number of locations.</p> <p>A Safety Case was submitted to CASA on 29 April 2022 to increase the existing 5-knot tailwind limit for SODPROPS operations at Brisbane Airport to 7-knots.</p> <p>Airlines have identified a number of specific operations they would like to have considered as an outcome of the PIR. They have also supported the short-term noise improvements trials and have been part of ongoing engagement on the results.</p> <p>Industry stakeholders noted a commitment to continue to work towards balanced outcomes that reduce noise impacts for communities.</p>
6.	Engage genuinely with the community to provide opportunities to	<p>The Brisbane community has been engaged throughout the PIR to:</p> <ul style="list-style-type: none"> • seek input to the PIR TOR (five engagement sessions,

TOR Reference	Description	Result
	<p>influence the outcomes of the PIR</p>	<p>plus a public comment period)</p> <ul style="list-style-type: none"> • gain input to the Trax independent review and Final Report (15 Trax-led engagement sessions) • discuss the proposed PIR recommendations and priorities (nine engagement sessions). <p>Complaints received through Airservices' Noise Complaints and Information Service and via direct correspondence have also been considered.</p> <p>The draft PIR report will be subject to a four-week public review and comment period, ahead of finalising the PIR recommendations.</p>
7.	<p>Review of operations, including COVID-19 impacts, unforeseen operations and mitigation measures</p>	<p>As a consequence of border closures due to COVID-19, total passenger numbers fell from approximately 24.5 million passengers travelling on 195,000 flights in 2019, to 8.2 million, travelling on around 111,000 flights, in 2020. Domestic travel made up 88 per cent of the total aircraft movements, with the remaining 12 per cent being international flights.</p> <p>Border closures changed the:</p> <ul style="list-style-type: none"> • origin and destination of flights • aircraft types used to service air travel demand, which generally involved smaller aircraft, with the exception of some intrastate destinations such as Cairns which grew in popularity requiring larger aircraft • runway use, with the new runway receiving a greater number of movements than the legacy runway due to intrastate travel to and from the north • Fly-in/fly-out movement volume, which increased due to public health directives around social distancing. <p>In the 12 months after the new runway opened, there were approximately 120,000 annual aircraft movements, which was approximately 52 per cent of the annual movements forecast in the 2007 EIS and 2018 EIA.</p> <p>International movements were much lower than modelled in 2007 and 2018, with current movements at around 30 per cent of pre-COVID-19 operations.</p> <p>Actual aircraft tracking was largely consistent with the depictions provided in the 2007 EIS and the 2018 EIA, with the exception of:</p> <ul style="list-style-type: none"> • non-jet radar departures and visual approaches, which were not depicted in flight path images due to the tactical nature of these routes (ATC direct aircraft based on compass headings rather than a defined flight path) • new advanced navigation procedures, which were not depicted in the 2007 EIS as they were not available at the time (they were shown in the 2018 flight path information however) • the removal of some departure and arrival paths shown in the 2007 EIS to reduce the complexity of the airspace

TOR Reference	Description	Result
		<ul style="list-style-type: none"> the addition of some departure and arrival paths to support compass operations from the north-west and east.
8.	Review over-water operations and identify opportunities to increase the use of these modes	Section 7 of this report identifies recommendations to increase the use of over water operations.
9.	Review of parallel runway operations, in particular compass operations	Section 7 of this report discusses the constraints in relation to the approved compass operations model and the recommendations to move away from this model.
10.	Seek opportunities to enhance noise sharing across both runways and among the various flight paths	Noise sharing across both runways and among the various flight paths can be achieved through the removal of the compass operations model. This is further discussed in Section 7 of this report.
11.	Seek opportunities to reduce concentration of flight paths over communities, where safe and operationally feasible	Section 7 of this report identifies recommendations to reduce the concentration of flight paths over communities.
12.	Review optimisation measures implemented since runway opening to determine their effectiveness in reducing impact on the community	<p>Two trials commenced on 24 February 2022:</p> <ul style="list-style-type: none"> Extended SODPROPS trial Restriction on Intersection Departures from the new runway trial. <p>The extended SODPROPS trial has identified there is substantial benefit to be gained in improving noise outcomes for communities by extending its operating hours.</p> <ul style="list-style-type: none"> During the first quarter (24 February-23 May 2022) the extended mode was only operational for five hours in total, due to unusually high rainfall. A total of 51 flights that would have otherwise travelled over land were able to be directed over water. During the second quarter (24 May-23 August 2022) the extended mode was operational for 12 hours in the morning extended period (6am-8am), constrained mainly by high winds. It was also in use for 16.5 hours during the evening extended period (8-10pm). A total of 251 flights that would have otherwise travelled over land were able to be directed over water. The total number of aircraft directed over the water during this six-month period, including regular night-time operations, was 4,498 flights. <p>The trial to restrict intersection departures identified a maximum one decibel difference in pre-trial versus trial operations results for jet aircraft and no identifiable difference for turboprop aircraft.</p> <p>A new trial commenced in September 2022 to reduce overflight of island communities subject to arrivals from the</p>

TOR Reference	Description	Result
		south. This involves QantasLink Dash 8 Q400 aircraft using advanced navigation procedures over water. Data will be shared with both the community and industry in 2023. Any potential improvements identified from this trial will form part of the work program for Package Two.
13.	Review of current Brisbane noise monitor locations	<p>The location of the current noise monitors is considered appropriate to capture jet aircraft noise levels close to the airport. A temporary noise monitor has been deployed to capture non-jet aircraft noise levels as part of the trial to restrict intersection departures from the new runway, and a more permanent noise monitor may be required to continue to monitor these movements on an ongoing basis.</p> <p>Feedback received during the PIR has indicated suburbs further away from the airport would also benefit from noise monitoring, and a program of temporary noise monitor placement has been implemented.</p> <p>Noise monitoring locations will be reviewed following implementation of the recommendations of the PIR and changes to Brisbane airspace operations. This will include engagement with the community to determine the most appropriate and valued locations based on final operations locations.</p>
14.	Review of locations further out from the airport to identify opportunities to reduce the density of aircraft overflight through dispersing paths where possible	Section 7 of this report identifies recommendations to reduce the density of aircraft operations on communities further from the airport.
15.	Provision of information on fuel burn and emissions where available.	<p>Information on fuel burn and emissions based on current operations has not yet been prepared, due to the need to focus resources on short-term noise trials and other analysis to support the PIR.</p> <p>A baseline model will be prepared to support engagement on any proposed changes being progressed as a result of this PIR. This baseline will include information on the location, altitude and frequency of use of flight paths, population overflow, fuel burn and CO2 emissions produced by each flight path.</p> <p>In response to community feedback during the September 2022 community workshops, a baseline of operations similar to the above will also be prepared for pre-new runway operations.</p>
16.	Review opportunities to reduce fuel consumption and CO2 emissions	Section 7 of this report identifies recommendations to reduce the track miles for some flight paths, specifically identifying a departure path to the south from the legacy runway as an opportunity, noting the need to also minimise noise impacts for communities.
17.	Review opportunities to reduce complexity of Standard Instrument Arrival (STARs),	Section 7 of this report identifies recommendations to reduce the complexity of Brisbane's airspace operations. These will be transparently considered against community noise benefits and other operational considerations in

TOR Reference	Description	Result
	including reviewing the number of altitude constraints.	determining proposed change options and the final change decision, in consultation with industry, government and the community.

4.2. Review of complaints

In response to requests received throughout the PIR, the following table outlines Airservices' noise complaints over a two-year period, from runway opening in July 2020-July 2022.

It identifies, in order, the locations with the highest number of individual complaints and the total number of contacts received from these community members.

Complainants – Top 20 suburbs July 2020-July 2022			First year of operation July 2020-July 2021		Second year of operation July 2021-July 2022	
Suburb	Complainants	Contacts	Complainants	Contacts	Complainants	Contacts
Balmoral	225	1084	198	702	87	382
New Farm	212	697	181	585	59	112
Hawthorne	193	1220	165	900	67	320
Bulimba	155	726	117	446	66	280
Hamilton	122	670	105	534	34	136
Ascot	115	321	93	221	34	100
Hendra	114	521	94	322	42	199
Teneriffe	69	1118	63	394	13	724
Northgate	66	424	45	362	27	62
Wakerley	58	81	7	7	54	74
Forestdale	50	70	41	53	13	17
East Brisbane	47	127	30	61	23	66
Norman Park	44	123	35	84	13	39
Annerley	41	85	27	38	21	47
Samford Valley	40	201	31	124	18	77
Morningside	39	72	23	37	17	35
Chapel Hill	38	156	21	50	27	106
Tingalpa	38	93	18	27	25	66
Belmont	34	160	12	64	27	96
Taringa	32	64	14	25	23	39

The table below identifies the top 10 complainant issues recorded over this same two-year period.

Top 10 key Brisbane complainant themes

- Arrival and departures over-the-bay not over-the-city
- BAC did not stick to its promises by operating over-the-bay
- Airport should have a curfew
- Aircraft frequency has increased day and night
- Very loud aircraft over my house
- Haven't experienced this noise and frequency before
- Change the flight paths
- Aircraft noise is affecting my health/mental health
- A380 departures at night
- Altitude of aircraft too low

These themes are consistent with feedback received throughout the PIR. While some of the issues raised are outside the scope of this PIR and Airservices' remit (curfews, for example – noting this feedback is being shared with other agencies), many of the other themes are directly reflected in the recommended actions proposed by both Trax and Airservices.

4.3. Trax International review

The first phase of Trax independent review identified an initial “long list” of 49 potential improvement opportunities related to flight paths, ATC procedures, supporting technology and the approach to governance and stakeholder engagement. These potential improvement opportunities were set out in an [Interim Report](#) which provided a high-level evaluation of initial observations.

Trax organised the opportunities identified in this first phase of the independent review into groups, based on their potential to support five key objectives arising from the stakeholder engagement:

- maximise flights over water
- reduce noise impacts when overflying populations
- optimise noise sharing arrangements
- support sustainable growth in the airport's operations
- enhance engagement, coordination and governance processes.

The Interim Report emphasised that, while technically viable, some of the potential improvement opportunities may not be considered feasible or sufficiently beneficial on further examination, especially when evaluated in the context of other interdependent opportunities.

The second phase of the independent review was delivered between April-June 2022. The scope of phase two was to analyse the feasibility, benefits, impacts and dependencies of the potential improvements and consolidate the viable opportunities into manageable work packages. To support this analysis, Trax conducted a series of additional stakeholder meetings – including community focus groups and several workshops with BAC, key airline operators and Airservices.

In its [Final Report](#), Trax identified four work packages with associated actions for consideration. Airservices adopted all recommendations to take forward to further community and stakeholder engagement. Airservices' formal response to the recommendations can be viewed [here](#).

In parallel to the Trax work, Airservices completed the planned review of Brisbane operations in accordance with the PIR TOR. The recommendations of this work have been added to the appropriate work pack in the Trax recommendations (see Appendix C).

The consolidated recommendations were presented to the community at workshops in September 2022. A copy of the presentation explaining the recommendations can be viewed [here](#).

4.4. Tax Recommendations

Package One: Strong, Transparent and Representative Governance

1.1 Establish a program oversight, management and assurance function that coordinates the development and assessment of options for change proposals to the NPR flight path design.	Adopted
1.2 Implement a joined-up Communications Plan for the aviation organisations that are responsible for developing options to communicate effectively with community stakeholders.	Adopted
1.3 Define the engagement process that will be followed to gather meaningful inputs from community and aviation stakeholders to help shape the change proposals.	Adopted
1.4 Produce a long-term Noise Action Plan that clearly lays out how the change proposals and other measures not related to flight path design will contribute to limiting and where possible reducing noise over the short, medium and long-term as traffic levels grow.	Adopted

Package Two: Maximise flights over the water

2.1 Develop and implement an ATC Operating Plan to extend the use of SODPROPS.	Adopted
2.2 Reduce the workload and complexity for Brisbane ATC associated with extending the use SODPROPS.	Adopted
2.3 Modify specific SODPROPS flight paths and ATC procedures, where required, to maximise the potential improvements associated with recommendations 2.1 and 2.2.	Adopted

Package Three: Reduce the frequency and concentration of flights over communities

3.1 Develop and assess options for change proposals to reduce the frequency and concentration of flights over communities, and where they are feasible, engage with all affected stakeholders on the impacts and trade-offs.	Adopted
--	---------

Package Four: Optimise the performance of the wider Brisbane airspace system

4.1 Develop and assess options for change proposals to introduce noise sharing through runway alternation using segregated and semi-mixed runway modes with an updated flight path design that deviates from compass operations, and if feasible engage with all affected stakeholders.	Adopted
4.2 Develop and assess options for change proposals to introduce multiple arrival routes over the city that can be alternated to a planned schedule to deliver respite, and if feasible, engage with all affected stakeholders.	Adopted

5. Community and Industry Perspectives

5.1. Community engagement

Community engagement for the PIR commenced during development of the TOR. A draft TOR was released for an initial public comment period from 30 July to 5 September 2021.

Five engagement sessions were held in October 2021. These were attended by 163 people at the following locations:

- Norman Park (two sessions)
- Hamilton
- Brookfield
- Samford Village

An updated TOR was released for a second public comment period from 1 to 21 November 2021.

Trax facilitated 10 focus groups and one all day drop-in session during their review. These sessions were attended by 326 people and were held at:

- Wynnum
- Samford
- Upper Brookfield
- Toombul
- Morningside (two sessions)
- New Farm (two sessions)
- Hamilton
- Cannon Hill
- Brisbane Airport

To seek feedback on Trax' and Airservices' proposed PIR recommendations, community workshops were held at nine locations, as well as one online session, in September 2022. These sessions were attended by 232 community members from 88 suburbs. Locations included:

- Wynnum
- Toombul
- Upper Brookfield
- Samford
- Morningside
- New Farm
- Capalaba
- St Lucia
- Bribie Island (small group meeting).

Discussion of the recommendations aimed to identify the recommendations that were supported, those that were not, and any other actions that should be considered.

5.1.1. Response to recommendations

The following overarching feedback was recorded in response to the recommendations, noting not all communities were unanimous in support of some elements:

- broad support for a stronger governance model, including a senior level oversight body led by government and involving community representation
- SODPROPS should be the priority mode at all times
- redesign away from the compass operations mode is supported to enable greater operational flexibility and more equitable noise sharing across both runways
- vectoring (tactical direction) of aircraft once they reach a defined height (notionally 4,000ft in the Trax Report) to share noise was supported by some, but not all, community members. Engagement is required on the options developed to confirm a clear preference.
- multiple RNP-AR routes are supported by some, but not all, community members to reduce concentration of operations over the same communities. Engagement is required on the options developed to confirm a clear preference.
- respite areas proposed in the *Trax Final Report*, whereby runway use is alternated between the two runways on different days, providing “on days” and “off days”, received limited support. This was due to the “on day” impacts of taking 100 per cent of traffic as opposed to it being shared between the two runways. The potential for traffic growth over time was also a concern. This recommendation will not be progressed.
- the wider airspace redesign should be accelerated.

5.1.2. Community suggestions

A number of community design suggestions were captured from the community, to be considered as part of the implementation of the PIR recommendations:

- 01 Operations (arrivals over land; departures over water)
 - Keep over-the-bay departures over water for longer – travel down the coastline or go further east to climb higher before crossing the coast.
 - Review speed and height for aircraft off runway 01R (over water) to get them higher before they cross over the Redlands area.
- 19 Operations (arrivals over water; departures over land)
 - Turn departures from runway 19 (over land) immediately to cross back over the airport and to Moreton Bay to climb before coming back over land.
 - Take 19R arrivals (over water) further away from the southern part of Bribie Island.
 - Qlink Dash 8 Q400 advanced navigation technology upgrade supported to shift traffic away from island communities
- Non-jet aircraft
 - Radar (tactical) departure headings should turn non-jet aircraft away from communities and send them out over water.
 - Stop non-jet aircraft climbing and turning at the same time to reduce noise.

- General operations
 - Junction points for multiple procedures should be reviewed so they are not over communities.
 - Move points where arriving and departing aircraft cross to locations further away from the airport so the hold downs happen at a higher altitude.
 - Reduce turning movements that cause vibration.
 - NAP compliance needs to be improved.
 - Gradual glide operations and more aggressive climbs should be an aim of Package 4.
 - Focus on reducing departure operations over communities.
 - If curfews are not possible, the noise from night-time operations has to be addressed through other measures – 2am and 3am flights are not acceptable.
 - CO₂ emissions increases to improve noise outcomes should be considered against opportunities in the redesign process to reduce the length of some other flight paths, saving emissions. The total outcome should be considered rather than just the impacts to a single flight path.

5.1.3. General Feedback

The following overarching feedback was also captured from the community and will be considered during the implementation of the PIR recommendations:

- Noise reduction is preferred before noise sharing.
- Noise shifting is not supported by some communities but is recognised as an option to reduce concentrated operations over some locations.
- Over-the-water operations still impact communities after the aircraft cross the coast to travel inland (though generally at a higher altitude).
- Noise from departures is worse than noise from arrivals.
- Communities who have chosen to live outside the city in quieter locations stressed that they should not be subject to excessive aircraft operations.
- Some community members noted that support for noise sharing versus support for concentration of movements will depend on where you live in relation to those operations.
- Independent airspace design specialists should be involved in design activity that results from the PIR.
- Residents in attendance at the community workshop in Upper Brookfield did not support the recommendations of the PIR in Packages Two, Three and Four, instead stating there should be no aircraft operations over their region. Residents in Upper Brookfield did support recommendations in Package 1 to ensure enhanced governance relating to flight paths.
- Residents of Upper Brookfield also noted concern about aircraft emissions impacts on rainwater tanks.

5.1.4. Communication requirements

During community and industry stakeholder engagement, future communication and information requirements were discussed. The following requests and suggestions were captured:

5.1.4.1. Noise information

- “Noise cone” dispersion information is required to explain noise impacts to communities offset from flight paths.

- Average noise levels should not be the only measure shared with the community. Maximum noise levels should be communicated.
- Need to include noise reflection of buildings, water and valleys in modelling.

5.1.4.2. Operations information

- Publish proposed operation modes ahead of time.
- Publish information on arrival and departure paths compared to actual operations for transparency.
- Publish regular noise monitoring and aircraft movement reporting – what was forecast and what is occurring.
- Provide historic weather pattern information to explain potential of SODPROPS.
- Report altitude of aircraft over the ground as well as noise levels.
- Release information on complaints – how many, about what, what action has been taken.
- Publish a web accessible tool showing the Brisbane airspace and flight paths overlaid on a street map of Brisbane so it is clear to residents, or people considering purchasing property, where the flight paths are located.
- Publish regular flight data to compare to NAPs to enable monitoring of adherence to these procedures.
- Provide an updated forecast of aircraft movements for a five-year projection (this request will be discussed with BAC who provide this information in their master plan updates).
- Information on turboprop operations needs to be included in all design option engagement and operational reporting.

5.1.4.3. Community engagement information

- Provide a baseline of current, as well as pre-runway opening operations, to compare to proposed changes.
- Publish defined metrics that will be used in assessing changes, to ensure accountability and transparency.
- Share the environmental assessment TOR for assessing proposed changes.
- Greater transparency on what to expect from aircraft operations is needed.
- Provide future growth projections for aircraft operations in Brisbane.
- Explain turn requirements of all aircraft so the community is aware of what to expect.
- Provide population density data for areas overflown.
- Publish a quarterly report to the community (what has been heard, what will be done in response and what is the timeline).

5.1.4.4. Engagement materials

- Suggest using same distribution/letter drop method as electoral campaigns, as this information is always received.
- Look at identifiable Airservices' flight path collateral, similar to political party flyers, so they are immediately recognisable.
- Put short updates on corporate website linking to more detailed information.
- Establish a unique microsite that comes up immediately when “aircraft noise” is googled, linking through to Airservices content sites.

- Use community members to provide feedback on communication materials and approach.

5.1.4.5. Industry communication

- Ongoing engagement and updates should continue through the Monthly Aircraft Noise and Performance Working Group meetings.

5.1.5. Operating principles

During community workshops held in September 2022 to discuss the recommended actions, some community members called for Airservices to establish a set of principles which guide future airspace change opportunities. The following is a compilation of suggestions from a number of sessions.

5.1.5.1. Community Suggested Operating Principles

- Residents should be able to sleep at night.
- Rainwater tanks should not be polluted.
- Peace should be possible in the daytime.
- Communities should not be subject to both arrivals and departures.
- Communities subject to concentrated jet traffic should not also be subject to non-jet aircraft movements.
- Noise from departures is worse than noise from arrivals – directing departures away from communities should be prioritised.
- Operations should be over water and non-residential areas where possible
- Noise levels in low ambient noise communities should be considered as having a greater impact from the same decibel noise level than a higher ambient noise community.
- Consider all aircraft operations that a community is subject to – arrivals, departures, general aviation and military – when considering changes and their impact.
- Noisy aircraft should not be allowed to fly over communities at night.
- Legacy runway communities are more affected by aircraft movements at night due to the approval condition on the new runway after 10pm that it should not be used. This should be given consideration when determining fair and equitable day time noise sharing arrangements.

These initial principles will be subject to broader engagement in early 2023 and will be discussed with the government-appointed independent airport community forum during implementation of the PIR recommendations.

5.2. Industry engagement

Industry engagement commenced during development of the TOR. This included an industry briefing and TOR comment period, which was available as part of public comment periods.

During the review, industry engagement was conducted via a monthly working group, and two industry workshops were held in September 2022 to discuss the review recommendations. This engagement aimed sought feedback on the Trax Final Report recommendations, and Airservices' recommendations, and to discuss industry's role in improving noise outcomes for the community.

5.2.1. Response to recommendations

Industry stakeholders noted a commitment to continue to work towards balanced outcomes which reduce noise impacts for communities. This included offers to share operational data, support safety and simulation assessments and ongoing involvement in trials and other initiatives.

5.2.2. Industry suggestions

A number of design suggestions were captured from industry, to be considered as part of the implementation of the PIR recommendations:

- Advanced navigation technology procedures – requests for advanced navigation approach procedures for some non-jet aircraft that are now authorised for these operations (noting in many cases while these may provide noise benefit for communities, they may also require new flight paths).
- Emissions and fuel burn – review the length of some arrival and departures paths to reduce track miles and the associated fuel burn and CO2 emissions. This may also assist in offsetting any additional track miles and CO2 emissions resulting from design and operational changes.
- General operations – review operations where aircraft are not able to consistently perform turns, climbs or other requirements. This will improve safety and flyability and may also result in more reliable tracking of aircraft on these paths.

5.3. Draft PIR report feedback

The draft PIR report was available for community and industry stakeholder feedback over a four-week period, from 21 October to 20 November 2022.

5.3.1. Community feedback

A total of 450 individual community submissions were received. This included a submission from a Federal Member of Parliament attaching an online petition of 1,284 signatures.

Three community drop-in sessions were also held to discuss the report and its recommendations. These were held at:

- Bulimba Golf Club – Wednesday, 9 November 2022 – 12pm to 7pm
- Capalaba Community Centre – Friday, 11 November 2022 – 12.30pm to 7.30pm
- Ashgrove Golf Club – Monday, 14 November 2022 – 12pm to 7pm.

A total of 62 community members attended these sessions.

The most frequently raised comments in this feedback were in relation to:

- Current impact of aircraft noise, particularly night-time operations when people are trying to sleep and turboprop movements in the early hours of the morning.
- Impact of aircraft noise on lifestyle and mental health.
- Over water operations including the SODPROPS mode – with comments both supporting and not supporting the expanded use of this mode.
- Complaints that community engagement in developing the PIR recommendations had not been sufficient in some locations, particularly in the city's southern suburbs.
- Statements that people choose to live out of the city for quiet enjoyment of their homes and they should not be subject to aircraft operations.
- Requests for movement caps and a curfew at Brisbane Airport, as well as levies or restrictions on noisier aircraft, which is outside the scope of this PIR.

Feedback on the specific PIR recommendations was mixed. Themes included:

- Package One: Strong, transparent and representative governance was broadly supported, with the establishment of the Federal Government-led community forum noted as a priority.
- Package Two: Maximise flights over water was supported by communities close to the airport, but concerns were raised by bayside communities that this may increase the impact on their suburbs.

- Package Three: Reduce the frequency and concentration of flights over communities received mixed feedback, with some supporting noise sharing options and others raising concerns. Notably, suburbs to the north-west of the airport felt these noise sharing options would increase the impact on their communities.
- Package Four: Wider airspace review received less feedback than the other packages. Feedback was mixed, with some community members supportive of removing compass operations and the introduction of multiple arrival and departure routes, and others concerned this would result in greater impacts on their communities.

Feedback was also received noting current operational impacts, noise concerns, requests for additional aircraft movement data, as well as a number of suggestions to improve flight path and airspace operation for the community,

As a result of this feedback, a number of changes have been made in this final PIR report. Most notably this includes:

- the addition of a new recommendation (2.4) that will seek to reduce the impact of overnight operations on communities
- confirmation that actions undertaken to expand SODPROPS operations will be implemented in parallel with a review of options to reduce noise impacts for affected bayside communities.

5.3.2. Industry feedback

Submissions were received from two airlines and from BAC. This included:

- Support for formal governance mechanisms to enable balanced consideration of safety, environmental outcomes and community needs.
- Some of the recommendations provided in the draft PIR report would benefit all major airports across Australia, including establishment of oversight mechanisms, reviewing the effectiveness of Noise Abatement Procedures and publishing defined metrics to assess changes.
- Recommendations should be subject to industry input when being investigated and design options developed, to ensure any changes are efficient and environmentally responsible.
- Concerns about potential flight delays and additional track miles with the increased use of SODPROPS, and the need to carefully consider this due to the flow on effects for carbon emissions, passenger delays, and the broader air traffic management system.
- Actions should focus on balanced outcomes which reduce noise impacts for communities.
- Offers to share operational data, support safety and simulation assessments and ongoing involvement in trials and other initiatives.
- Opportunities exist for use of advanced navigation approach procedures for some non-jet aircraft that are now authorised for these operations.
- Opportunities to review some arrival and departures paths to reduce track miles and the associated fuel burn and carbon emissions.
- Opportunities to review operations where aircraft are not able to consistently perform turns, climbs or other requirements.
- The intersection departure trial has shown 99 per cent compliance with little or no noise benefit. A trial end date must be clearly stated.

This feedback will be considered as the PIR recommendations are implemented.

6. PIR Recommendations

After considering the findings of both Trax International and Airservices reviews, along with community inputs and industry feedback, a number of recommendations were presented in the Draft PIR Report.

During PIR community engagement, issues were raised that are not within Airservices' remit, including:

- suggestions that Brisbane Airport be subject to a curfew or movement cap
- calls for some movements to be redirected to other nearby airports, such as Archerfield and Wellcamp (Toowoomba).

These suggestions were not included in the PIR recommendations as they are a matter for the Federal Government.

Other issues were raised that fall within the remit of Brisbane Airport Corporation (BAC).

Feedback on issues that are not within Airservices' remit have been provided to the Department or BAC as appropriate. Both the Department and BAC also directly engaged with the community at Airservices' workshops held throughout September 2022.

Airservices has adopted the proposed indicative timeline for delivery of each package of work as proposed in the *Trax Final Report*. Legislated referral processes for advice from the Federal Government Minister for Environment, CASA approval timeframes and community engagement requirements may result in changes to these proposed timelines. Where noise improvements can be delivered earlier than these proposed timelines, this will be prioritised.

The recommendations of the PIR will be carried forward as the Noise Action Plan for Brisbane. It is noted that as the aviation industry and regulatory landscape evolves, the Noise Action Plan may also evolve. This evolution would be subject to consultation in line with established governance arrangements.

6.1. Noise Action Plan for Brisbane

Package One – Strong, transparent and representative governance (Development and implementation Q3-Q4 2022)

Recommendation 1.1 – Oversight, management and assurance program: Airservices will support government and other stakeholders in the establishment of oversight, management and coordination functions to support flight path change delivery, as well as development of assessment frameworks and independent assurance mechanisms.

- a) An independent airport community forum, supported by third-party technical expertise where required, as a mechanism to ensure coherent, transparent and aligned activities.
 - (aa) The Department will establish governance mechanisms including undertaking assurance checks.
- b) A program management office which provides the disciplines required to ensure that roles and responsibilities are clear, stakeholders work to a common plan, activities are adequately resourced and the risks to delivering the proposed changes are well understood and managed.
- c) A technical coordination group to support the development of options from a technical perspective.
- d) An options development and assessment framework which ensures the criteria and methods used to evaluate the impacts of different options for change proposals are comprehensive and consistent.
- e) An independent assurance process that coordinates the engagement of qualified third parties

not directly involved in the development of the change proposals, to challenge specific aspects of the program from a technical and process perspective, build trust with external stakeholders and support the independent airport community forum as required.

- f) Airservices will support a government-led, assurance process through technical inputs and advice.
- g) Airservices will consider the use of appropriately skilled and qualified consultants to support its legislated technical role in flight path and airspace design.

Recommendation 1.2 – Industry-wide communications planning: Airservices will work with industry stakeholders, government and community to develop effective communications plans supported by all relevant organisations and agencies, to ensure that information provided is consistent, clear and transparent.

- a) Without an effective and well managed approach to communications, flight path changes may generate outcomes that are unacceptable to stakeholders and vociferously challenged.
- b) The importance of an effective communications is based on the expectation that, when done well, it improves the social, environmental and economic outcomes of flight path changes and increases stakeholders' trust in the process for the future.
- c) Conduct engagement on the proposed approach to communications for flight path changes.

Recommendation 1.3 – Meaningful engagement process: Airservices will work with government, community and industry stakeholders to develop effective community engagement plans and tools, to ensure communities are adequately engaged, have the opportunity to input to decision-making and that the metrics used to make decisions are understood and transparently reported against.

- a) The engagement process should confer legitimacy on the development and assessment of options for change proposals.
- b) Those who may be affected by options for change proposals should be encouraged to actively participate in the development and assessment process.
- c) To be effective, stakeholders should be offered the information, time and support to make meaningful contributions.
- d) The outputs of community engagement must be considered conscientiously by the proponents and have the potential to influence the final designs.

Recommendation 1.4 – Long-term Noise Action Plan: Airservices proposes the recommendations in this report form the initial version of the Noise Action Plan. This plan will implement noise mitigation measures which are well-planned, tracked, reported against, and supported by community and industry stakeholder involvement.

- a) Ensure that the specific noise mitigation measures included as part of the plan as it evolves, such as trials, research projects and major changes, are scoped effectively, with agreed objectives, milestones, accountabilities and performance measures.
- b) Track the progress of options development, assessment, engagement and implementation plans linked to specific noise mitigation measures.
- c) Manage the dependencies associated with noise mitigation measures over time, including the rate and scale at which the ATC operation and aircraft operators can adapt to successive changes.
- d) Resolve issues that may impact the achievement of agreed milestones toward the development and implementation of noise mitigation measures.
- e) Maintain cross-industry and community stakeholder involvement and momentum behind the development and implementation of options to manage and, where possible, reduce the impacts of aircraft noise.
- f) Accept the outcome of this PIR as the Noise Action Plan for Brisbane, noting that as the

industry and regulatory landscape evolves, this Plan may also evolve.

- g) Introduce measures to improve NAP compliance.
- h) Increased public reporting and transparency on operations, including NAP compliance, use of published paths and procedures, aircraft noise and altitude, and complaints and actions taken in response.

Package Two – Maximise flights over the water (Development and implementation in 2023)

Recommendation 2.1 - ATC Operating Plan to extend the use of SODPROPS:
Airservices will develop an ATC Operating Plan, examine options to extend the use of SODPROPS and implement associated design enhancements.

- a) Develop and implement an ATC Operating Plan to extend the use of SODPROPS with a focus on weekday evenings, Saturday afternoons and Sunday mornings, when the met conditions and traffic levels permit.
- b) Examine the costs, benefits and operational impacts of extending the use of SODPROPS, including the provision for a moderate amount of flight delay to maintain the use of the mode when traffic demand approaches the maximum capacity for SODPROPS.
- c) Review SODPROPS' daytime operational plan and implement design enhancements to increase use of this mode during daytime hours.

Recommendation 2.2 - Reduce ATC workload and complexity associated with SODPROPS: Airservices will engage with Defence in relation to Amberley airspace, ATC procedures and specific flight paths that constrain SODPROPS operations.

- a) Engage with Defence and RAAF Base Amberley to consider options for the targeted release and/or shared use of specific portions of Amberley segregated airspace to reduce the workload and complexity for Brisbane ATC associated with extending the use of SODPROPS.
- b) Examine options to amend the ATC procedures for coordinating flights that route through the Brisbane airspace system inbound to other destinations which may constrain Brisbane ATC's ability to extend the use of SODPROPS.
- c) Examine options to amend specific flight paths that serve traffic routeing through the Brisbane airspace system inbound to other destinations which may constrain Brisbane ATC's ability to extend the use of SODPROPS.
- d) Develop STARs for Amberley and SIDs for Archerfield to reduce complexity and increase the opportunity to use SODPROPS.
- e) Review operations north and south of Brisbane to enhance overall South-East Queensland operations.

Recommendation 2.3 - Modify specific SODPROPS flight paths and ATC procedures:
Airservices will review options to reduce track miles and emissions associated with SODPROPS operations, update ATC procedures to optimise final approach efficiency and review options to reduce the impact of over water operations on affected communities.

- a) Examine options to reduce the track miles and aircraft emissions generated by the specific arrival and departure routes that flights use during SODPROPS, including the potential to incorporate arrival routes designed to advanced navigation standards.
- b) Examine options to amend the ATC procedures used to manage inbound traffic when SODPROPS is in use to enable pilots to optimise the descent to final approach.
- c) Examine short-term options to moderately increase the tactical use of over-the-water operations when the simultaneous parallel runway modes are in use. For example, launching occasional departures in a 01 direction while the airport is configured for 19 operations when traffic conditions, met constraints and other operational factors confirm it is safe to do so.

- d) Examine opportunities to improve over water departure paths that fly over communities after they cross the coastline to increase height, maintain over water for longer, or travel further east.
- e) Examine opportunities to modify weather condition constraints, where safe, to allow greater use of SODPROPS.
- f) Develop mechanisms to report on SODPROPS usage, including transparent explanation of when this mode has not been applied and the reasons for this.

The intent of Package 2 recommendations is to enable SODPROPS to be operated as the number one priority mode at all times, subject to weather and other published operational constraints.

Note: Expansion of SODPROPS operations should be delivered in parallel to reviewing operations over bayside communities, to ensure any increased use of SODPROPS does not increase impacts on these communities.

Recommendation 2.4 – Reduce the impact of overnight operations on communities

- a) Examine opportunities to shift night-time operations over water or away from inland communities, including redesign of SIDs and STARs for night-time operations (10pm to 6am).
- b) Engage with industry (including time critical freight operators) to assess the impact on operations of additional track miles required to support night-time operations which provide night-time respite.
- c) Develop specific night-time operating modes that will apply between 10pm and 6am.

Package Three – Reduce the frequency and concentration of flights over communities (Development during 2023 and implementation in 2024)

Recommendation 3.1 – Reduce the frequency and concentration of flights over communities: Airservices will develop options for departure and arrival paths over the city to allow for noise-sharing and to reduce the occurrence of communities being subject to both arrival and departure operations. Airservices will also develop options to reduce the impact on communities of non-jet tactical operations, flight paths further from the airport, merge points and hold downs. In addition, Airservices will introduce opportunities for greater use of advanced navigation technology where this improves community noise outcomes.

- a) Options to redesign the two departure routes over the city from the new runway to the north so the flight paths are offset from the extended runway centreline and follow a different track over the ground to that overflowed by inbound traffic on final approach to the new runway.
- b) Options to redesign the two departure routes over the city from the new runway so they diverge and the flight paths each follow different tracks over the ground.
- c) Options to redesign the two departure routes over the city from the existing runway used after 10pm so the flight paths follow a different track over the ground to that overflowed by the new runway departure routes used in the daytime.
- d) Options to introduce an ATC procedure to vector outbound flights using the two departure routes over the city from the new runway when a specific altitude has been reached (e.g., 4000ft) that would disperse the tracks over the ground because aircraft with higher climb rates would reach the specified altitude quicker and turn sooner.
- e) Options to redesign the three departure routes over the city from the existing runway to the south so they follow different tracks over the ground and potentially save track mileage, by turning sooner and/or tighter.
- f) Options to redesign two of the arrival routes over the city to the new runway from the north so the flight paths converge further to the west and the tracks over the ground are different to those overflowed by outbound traffic heading north.
- g) Options to re-evaluate three of the standard compass headings that non-jet departures are instructed to follow after take-off (subject to the impacts on operational capacity) so that the

tracks over the ground may be dispersed or repositioned over water.

- h) The development of a baseline option that describes the actual impacts created by the existing NPR flight paths over the city and outer suburbs in terms that are directly comparable to the options for any proposed modifications.
 - i) Develop baseline that describes actual impact pre-NPR over the city and outer suburbs.
 - j) Investigate opportunities for jet aircraft early turns to avoid overflight of communities.
 - k) Replace RWY 01L WACKO SID departures to the west with the existing RWY 01R WACKO SID to reduce overflight of Bribie Island.
 - l) Review of SIDs to determine if track miles can be reduced to improve industry outcomes (and potentially offset increased track miles for other changes).
 - m) Redesign STARs and merge arrivals further north to reduce overflight of suburbs to the north and north-west of the airport.
 - n) Engage with Defence and RAAF Base Amberley to access airspace to reduce overflight of suburbs to the north-west of the airport.
 - o) Redesign MORBI non-jet visual STAR to avoid the Redcliffe Peninsula.
 - p) Introduce advanced navigation (RNP-AR) approaches for suitable certified non-jet aircraft.
 - q) Redesign flight paths leading to the independent parallel runway operations final approach commencement point to both runways to meet new ruleset requirements and reduce overflight of communities.
 - r) Design separated procedural SIDs, one for jet aircraft and one for non-jet aircraft, to better share aircraft noise.
 - s) Review the lead in waypoints on approach to the new runway to allow a shallower intercept angle to improve operations for all aircraft types and to reduce the impact on communities.
 - t) Redesign of STAR height requirements to reduce level segments over communities and improve continuous decent of aircraft, reducing noise impacts.
 - u) Review options to keep over-the-bay departures over water for longer, reducing impact on communities as they turn to travel over land.
 - v) Review speed and height for aircraft off runway off the legacy runway over water to get them higher before they cross the over land.
 - w) Investigate turning departures over land immediately to cross back over the airport to climb over water.
 - x) Redesign arrivals over water to the new runway to take aircraft further away from the southern part of Bribie Island.
 - y) Redesign non-jet departures to avoid turning and climbing at the same time.
 - z) Investigate moving RNP-AR join point to the new runway further north (similar to the old river track).
 - aa) Redesign the junction points for multiple procedures to they are not over communities.
 - bb) Introduce gradual glide operations and more aggressive climbs to reduce noise.
 - cc) Investigate benefit of reducing departure operations over communities, including engagement with communities to confirm if departures are more disruptive than arrivals.

Package Four – Optimise the performance of the wider Brisbane airspace system (Development in 2023 and 2024, implementation from 2025)

Recommendation 4.1 - Introduce noise sharing through new operating modes:
Airservices will develop options to connect flight paths to all runway ends to provide

greater flexibility for noise sharing, and investigate a range of modes, including segregated and semi-mixed modes, to provide periods of respite for communities.

- a) The options included in work Package Four will take longer to develop than those in packages Two and Three because of the scale and complexity of the proposed changes, extending the expected timelines for implementation into 2025.
- b) The options to introduce new noise-sharing runway modes supported by an updated flight path design that deviates from compass operations should be configured to align with the modifications implemented as part of package three.
- c) It is important to emphasise that the areas that would benefit from temporary periods of relief through runway alternation would at other times experience comparatively more noise events when the alternation schedule is reversed.
- d) It is envisaged that the segregated and semi-mixed runway modes would be used alongside the simultaneous parallel modes and SODPROPS as part of a system to manage noise as traffic levels grow, designed with community and aviation stakeholders in a long-term Noise Action Plan.
- e) The options for a runway alternation schedule should consider the use of the semi-mixed modes, where departures use both runways and arrivals operate to one, or arrivals use both runways and departures operate from one, so that the airport's capacity can be allocated to accommodate peaks in traffic demand at different times.
- f) Dedicated safety assurance work, ATC simulations and aviation stakeholder engagement should be conducted to assess the risks associated with switching between the segregated modes and simultaneous parallel operations.
- g) Redesign of flight paths to support removal of compass operations and greater flexibility to share noise and provide respite operations.
- h) Design SIDs and STARs for each departure/arrival gate from/to each runway to support new modes to provide noise sharing.

Recommendation 4.2 - Introduce multiple arrival routes over the city: Airservices will develop options for multiple arrival routes which can be alternated on a planned schedule to provide respite to communities. This will be completed in parallel with an already planned IT system upgrade.

- a) The NPR flight path design includes several arrival routes that use advanced navigation standards for more precise and flexible approaches, and which may be re-configured and supplemented with additional routes to deliver planned respite for some communities through alternation.
- b) The existing IT systems used by Brisbane ATC to support air navigation do not have the capacity to manage multiple alternating arrival routes. Airservices is implementing a national program of IT system upgrades, which when complete, is expected to enable options for respite routes on arrival to be developed and assessed for the Brisbane airspace system.
- c) Options to introduce respite routes on arrival should be incorporated into the proposed changes to the flight path design required to enable runway alternation.
- d) If, following the outcome of stakeholder engagement, options to implement runway alternation are not progressed, respite routes on arrival should be considered in isolation through a separate engagement exercise with community and aviation stakeholders, for use with simultaneous parallel operations.
- e) It is important to emphasise that the areas that would benefit from the use of respite routes on arrival would at other times experience comparatively more noise events when the alternation schedule is reversed and that the total population overflowed would increase.
- f) The introduction of respite routes would add significant complexity to the Brisbane airspace system, creating interactions with other arrival and departure routes and interdependencies with the airspace structures that integrate Brisbane traffic with the wider enroute network. The

improvements expected from introducing respite routes should be assessed against the impacts on flight efficiency and aircraft emissions where longer tracks and sub-optimal climb and descent profiles are required to accommodate alternation.

7. Next Steps

It is anticipated an independent airport community forum will be appointed by the Federal Government. The recommendations of this PIR will be consulted on with this forum, ahead of any broader community engagement, and will be implemented through Airservices' flight path change processes. This involves a series of stages, depending on the complexity of the change:

- Design including safety assessment, simulation, community and industry engagement.
- Environmental Assessment to confirm any impacts, the nature of these impacts and if referral to the Federal Government Environment Minister is required due to the significance of any impacts.
- Community engagement to seek input to the detailed proposed change or change options.
- Final design to respond to community feedback.
- Regulatory approvals as required.
- Publishing of the new flight path or procedure ahead of implementation.
- Community information to ensure awareness of the implementation of the new flight path or procedure.

A Community Engagement Plan will be developed as a guide throughout delivery of the PIR recommendations. This will include ongoing information updates and engagement on proposed changes as they are designed and assessed. This Plan will be informed by feedback gathered during the PIR and will be shared with the community for comment ahead of finalising.

7.1. 2023 priority program

The following actions responding to the PIR recommendations will be progressed throughout 2023. A more detailed program, sharing the timeframe for all elements, will be provided in early 2023.

Community engagement will follow each of the actions relating to flight path or operational changes, to gather inputs prior to any decision being made to implement the proposed change.

Rec #	Description	Proposed completion
1.1	Commence consulting with the government-appointed independent airport community forum	Q1
1.1	Establish governance mechanisms including an assurance check by the Department	Q1
1.2	Community engagement on proposed communication approach for delivery of changes in response to the PIR, including confirming operating principles	Q1/Q2
1.4	Increase public reporting and transparency of operations, including SODPROPS use, NAPs application, aircraft tracking and altitude, noise information and complaints	Q1/Q2
2.1 2.2	Expand the use of SODPROPS mode by increasing capacity, enhancing decision-making criteria, and developing flight path changes for daytime operations	Q4
2.3	Develop proposals to increase height and over water operations for	Q2

	SODPROPS departures to reduce impacts on bayside communities	
2.4	Develop proposals to reduce the impact of overnight operations	Q1
3.1	Development of baseline model for pre-NPR and current NPR operations	Q1
3.1	Developing options to increase use of over water departures during the day	Q2
3.1	Develop proposals to reduce the impact of concentrated flight paths to the west of the airport	Q3

APPENDIX A - PIR Objectives and Focus Areas

A Terms of Reference for this PIR was developed in consultation with the community and other stakeholders, including aviation industry in late 2021. As a result, a number of specific objectives and focus areas were determined. These are presented below.

1. Review the forecast noise levels in the Airservices Environmental Assessment (EIA) against actual aircraft movement data and noise levels post-implementation and provide updated information to the community.
2. Review Airservices' role in community engagement and the information provided on aircraft noise and operations to identify any learnings and potential improvements.
3. Review the effectiveness of the Brisbane Airport Noise Abatement Procedures (NAPs) and identify any potential improvements.
4. Identify opportunities to minimise the impact of aircraft operations on the community, including investigation of community suggested alternatives, and consider these against Airservices Flight Path Design Principles.
5. Engage genuinely with industry - airport, airlines, general aviation operators and industry associations, as well as Airservices Air Traffic Control - including industry and operator suggested alternatives and consider these against Airservices Flight Path Design Principles.
6. Engage genuinely with the community to provide opportunities to influence the outcomes of the PIR in accordance with Airservices Community Engagement Framework.
7. Review of operations to identify:
 - the impact COVID-19 has had on operations
 - any unforeseen operations which will be addressed as the industry recovers and the airport operations change
 - any mitigation measures that can be progressed to address unforeseen COVID-19 operating conditions.
8. Review over-the-bay operations and identify opportunities to increase the use of these modes where safe and feasible.
9. Review of parallel runway operations, in particular the approved and communicated compass operations and modes of operation, to identify if other safe and feasible operating options exist.
10. Seek opportunities to enhance noise sharing across both runways and among the various flight paths for each. This will include engagement with the community to identify noise sharing principles against which to assess these options.
11. Seek opportunities to reduce concentration of flight paths over communities, where safe and operationally feasible (noting some navigation technologies concentrate operations through the use of precise navigation systems).
12. Review optimisation measures implemented since runway opening to determine their effectiveness in reducing the impact of operations on the community and if opportunities for further improvements exist.
13. Review of current Brisbane noise monitor locations to ensure they are sited in locations most subject to aircraft movement and where they provide the greatest overall noise profile information.
14. Review of locations further out from the airport to identify opportunities to reduce the density of aircraft overflight through dispersing paths, where possible.
15. Provision of information on fuel burn and emissions where available.

The following objectives and areas of focus were also agreed to address specific known areas of interest for the aviation industry:

16. Review opportunities to reduce fuel consumption and CO2 emissions
17. Review opportunities to reduce complexity of Standard Terminal Instrument Arrival (STARs) including reviewing the number of altitude constraints.

This report will provide findings in relation to each of these objectives and focus areas, along with recommendations for further action, investigation or improvement opportunities.

APPENDIX B – Detailed Findings

The following key findings resulted from Airservices' PIR review of items noted in the TOR Objectives and Areas of Focus.

1. Review of forecast against actual noise levels

Noise modelling was conducted by BAC in the development of the 2007 EIS. Additional modelling was also undertaken by Airservices and BAC in 2018 as part of the assessment of the final flight path design. To provide a complete comparison, both the 2007 EIS and 2018 final design modelled noise forecasts have been compared to the actual noise monitoring results.

A comparison has been provided between EIS, 2018 final design as represented in the BAC Flight Path Tool and actual noise levels recorded at each community location where a Noise Monitoring Terminal (NMT) is located.

These detailed findings have been considered in the development of the PIR recommendations.

Forecast vs Actual Noise August 2020 to July 2021

The data provided on actual noise in this summary was collected between August 2020 and July 2021, when air traffic was being affected by the impacts of the COVID-19 global pandemic.

Cannon Hill

Reduction in modelled N70 events between the 2007 EIS and 2018 final design EA, particularly during a summer weekday, summer weekend, winter weekday and winter weekend. This reduction is likely attributable to the introduction of Required Navigation Performance – Authorisation Required (RNP-AR) flight paths which were not in use at the time of the 2007 EIS. The RNP-AR provides capable aircraft with a shorter approach option to the Legacy Runway may have moved some aircraft away from Cannon Hill.

Hamilton

Actual noise results are consistent with the modelled forecast.

Kedron

Actual noise results are consistent with the modelled forecast.

Bulimba

Actual noise results are consistent with the modelled forecast.

Carina

Slight increase in modelled N70 events. The increase in the number of N70 events for this area may be attributed to the introduction of RNP-AR flight paths which were not in use at the time of the 2007 EIS and was assessed as a separate change by Airservices. The 2018 final flight path design modelling did not identify RNP-AR operations at Carina as being consistently at or over 70dBA, thus why these events are not indicated in the Airservices Environmental Assessment column above.

Nudgee Beach

Actual noise results are consistent with the modelled forecast.

Tingalpa

Actual noise results are consistent with the modelled forecast, except for winter weekday and winter weekend, which is consistent with 2018 modelling but higher than initially forecast in the EIS. This difference between EIS and 2018 final design modelling is due to a change in distribution of origin/destination ports for runway 19L (legacy runway) in the period between the two studies, with this runway allocated more destinations, including some internationals including the United States of America. The summer forecasts were not affected as much, as there is more use of runway 01 parallel operations at this time due to higher pattern of northerly winds, which results in less departures over this area.

Annerley

Actual noise results are consistent with the modelled forecast.

New Farm

Analysis of the modelled vs actual N70 noise events for New Farm has noted that there is a noticeable difference in the predicted impacts, particularly during daytime hours (6am to 6pm).

Aircraft altitude: There is large spread in aircraft altitudes over the noise monitoring terminal. This is likely due to varying meteorological conditions and aircraft performance, noting that older aircraft will perform differently to newer models. Information on expected aircraft type is provided in the [Aircraft Noise Modelling & Monitoring Fact Sheet](#).

Aircraft noise projections: In some cases, the modelled noise levels for specific aircraft types were higher than forecast. This includes:

- Departures from the new runway (runway 19R) over the city for the:
 - B738 aircraft – noise modelling results at the New Farm monitor were expected to be just under 70dBA. The actual measured noise level was 70dBA on average, with 60 percent of operations at or over 70dBA.
 - A320 aircraft – noise modelling results at the New Farm monitor were expected to be under 70dBA. The actual measured noise level was 69dBA on average, however 40 percent of these operations were at or over 70dBA.
 - F100 aircraft – noise modelling results at the New Farm monitor were expected to be under 70dBA. The actual measured noise level was 70dBA on average, with 71 percent of these operations at or over 70dBA. (Note: there are more of these aircraft types than forecast).
- Arrivals over the city to the new runway (runway 01L) by:
 - A320s, B712s and F100 aircraft were expected to be in the 64 to 68dBA range. The actual measured noise levels were 67 to 69dBA on average, however a percentage of these operations were at or over 70dBA.
 - Noise Monitor location: The noise monitor is located on the contour line that separates 70dBA and 60dBA, which is not a hard line and noise levels within both ranges would be expected at this location (the further inside a contour that a monitor is located the more stable the noise readings that would be expected.) At New Farm, there are two arrival flight paths that operate over the noise monitor. A straight in Instrument Landing System (ILS)/visual approach arrival flight path and a left turn joining the RNP-AR flight path. The noise levels from operations using the RNP-AR flight path were under 70dBA (both modelled and actual), while the ILS/visual flight path were at or over 70dBA in the actual noise levels.

St Lucia

Actual noise results are consistent with the modelled forecast.

Bardon

Actual noise results are consistent with the modelled forecast.

Salisbury

Actual noise results are consistent with the modelled forecast.

Further details of these findings, including specific noise measures, can be viewed in the [Aircraft Noise: Modelled vs Actuals Summary](#).

Forecast vs Actual Noise August 2021 to July 2022

The data provided on actual noise in this summary was collected between August 2021 and July 2022, as air traffic recovered from the impacts of the COVID-19 pandemic.

The findings indicate most locations are consistent with the earlier forecasts. The following exceptions are noted:

New Farm

As noted above, New Farm has been found to differ in actual noise events to those forecast in earlier assessment. The reasons noted above remain consistent across both assessment periods.

Hamilton

Summer operations are consistent with earlier modelling. Winter operations were higher than forecast (58 actual events compared to 49 forecast), which may be due to operational reasons, for example during poor weather (noting the ongoing wet weather conditions in South-East Queensland over this period).

Nudgee Beach

Day time over water runway 01L departures and runway 19R arrival operations have exceeded earlier forecasts. The noise results in this location are highly variable due to aircraft being low. This increases the angle of the aircraft to the noise monitor.

The trial to restrict intersection departures from the new runway, which commenced in February 2022 may also have affected this result.

Tingalpa

There has been a substantial increase in air traffic movements over this suburb post COVID-19 border closure restrictions being lifted, with operations to and from the southern states returning to almost pre-COVID-19 levels.

Tingalpa remains within forecasts operations except for winter weekend days which are higher than was initially forecast in the 2007 EIS, but consistent with the later 2018 EIA. The difference between the EIS and EIA forecasts was due to a change of compass runway operations, which allocated international destinations including the United States of America to the legacy runway.

The summer operations were not affected, as there is more use of runway 01 operations at this time due to higher pattern of northerly winds.

Due to the requirement under the *Airports Act 1996* to use an N70 measure (number of events above 70 decibels) to determine locations that would be deemed to have a significant impact as defined in the *EPBC Act*, locations further from the airport, including Upper Brookfield, Brookfield and Samford, did not have forecast noise levels defined in the 2007 EIS. As a result, a comparison of forecast versus actual noise levels is not available for these locations.

Further details of these findings, including specific noise measures, can be viewed in the [Aircraft Noise: Modelled vs Actuals Summary 2022](#).

2. Airservices' role in community engagement

Community engagement during the 2007 EIS was implemented by BAC, in accordance with the legislated process governing project approvals. At this time, the flight paths were presented as a concept design. In 2018, Airservices completed final flight path and airspace design, adhering as much as possible to the approved concept design presented in the 2007 EIS to remain consistent with this approval. Community engagement continued to be led by BAC, with support from Airservices.

Since this time, Airservices has developed new, contemporary community engagement procedures, including a [Community Engagement Framework](#) which provides a number of [commitments](#) to the community in relation to engagement and outlines the [approach](#) to this engagement.

Importantly, Airservices now engages earlier with communities on proposed changes, seeks to clearly identify the nature and extent of potential impacts from these changes, and conducts assurance against all engagement to identify if all potentially impacted communities have been given adequate opportunity to participation in the engagement program.

[Flight Path Design Principles](#) (FPDP) were published in 2021 following national engagement. These Principles seek to achieve a balance between often-competing priorities during flight path design (efficiency, community impact, operational complexity, emissions), having given regard to safety as the highest priority.

Throughout the PIR, it was noted that many community members felt they were not adequately engaged on the changes, and many were unaware of the extent of operations they would experience as a result of the new parallel runway.

Suburbs situated further from the airport, including Samford and Upper Brookfield, did not receive equal engagement focus as those located closer to the airport, due to the application of the assessment process directed by the *Airports Act 1996* and *Environmental Protection and Biodiversity Conservations Act 1999* (EPBC Act), which prescribed 70 decibels as the trigger for significance for noise impact. These locations were outside the modelled contour for 70 decibel noise events.

Airservices has since updated how environmental assessment outcomes are applied to community engagement, now using a “noticeability” measure to determine engagement requirements, rather than a higher “significance” level prescribed in project approval requirements. This includes recognition of lower ambient noise communities and the fact that any change in aircraft operations may be noticeable regardless of the resulting noise level.

3. Effectiveness of the Brisbane Airport NAPs and potential improvements

Noise Abatement Procedures (NAPs) are developed to reduce the impact of aircraft operations on communities. Brisbane Airport has six NAPs, relating to preferred runway use, jet departures over land, intersection departures, preferred flight paths, use of reverse thrust on landing and training aircraft.

The effectiveness of NAPs was reviewed and this identified:

- When weather permitted, the preferred runway modes were achieved 91 per cent of the time during the day and 94 per cent of the time during the night (12 Jul 2020 to 23 Aug 2022).
 - During the day (6am-10pm local) the preferred mode is for runway 19L/R arrivals over water and 19L/R departures over land:
 - the weather favoured Priority 1 runway use 69 per cent of the time
 - operation in this priority was achieved 87 per cent during these periods. The remaining time includes time taken to transition between modes.
 - During night-time (10pm-6am local) the preferred mode is SODPROPS – runway 19R arrivals over water and runway 01R departures over water:
 - weather conditions favoured Priority 1 runway use 47 per cent of the time
 - operation in this priority was achieved 90 per cent during these periods. The remaining time includes time taken to transition between modes.
 - During night-time second preferred operating mode is Reciprocal Runway Operations - runway 19L/R arrivals over water and RWY 01R departures over water legacy runway:
 - conditions favoured Priority 2 less than 1 per cent (27 hours) of the time
 - operation in this priority was achieved 74 per cent (20 hours) during these periods. The remaining time includes time taken to transition between modes.

- During night-time, the next preferred mode is runway 19L/R arrivals over water and runway 19L departures over land from the legacy runway:
 - conditions favoured this Priority 3 runway use 37 per cent of the time
 - operation in this priority was achieved 97 per cent during these periods (during the other 3 percent of that time, Priorities 1-2 were applied).
- During night-time least preferred mode is runway 01R arrivals to the legacy runway and runway 01L/R departures over water:
 - conditions favoured this Priority 4 runway use 16 per cent of the time
 - operation in this priority was achieved 98 per cent during these periods (during the other 2 percent of that time, priorities 1-3 were applied).
- Intersection departure NAPs, including the new runway restriction on intersection departures trial, was complied with 99.93 per cent of the time. Priority/emergency flights are exempt from the NAP and the trial and account for the .07 per cent of movements that conducted an intersection departure.

It is noted that current NAPs prioritise daytime departures over the city and arriving traffic over the water. Feedback from community members who attended the PIR community workshops has indicated that disruption from departing aircraft is generally, but not always, greater than from arriving traffic. Further engagement on preference will be conducted to understand the broader community preference ahead of considering any changes to preferred runway use NAPs.

4. Opportunities to minimise the impact of aircraft operations on the community

Section 7 of this report identifies recommendations to minimise the impact of aircraft operations on the community. These opportunities were garnered from the Trax independent review and Airservices' review activities.

5. Engage genuinely with industry on possible improvements

BAC, airlines and the Civil Aviation Safety Authority (CASA) have been engaged throughout the Brisbane Flight Paths PIR.

BAC has been part of ongoing discussions and review activity as the PIR has progressed. Representatives from BAC attended all Airservices' facilitated community engagement workshops to understand community concerns and opportunities to improve noise outcome across Brisbane.

Following feedback it received during the PIR process, from residents wanting to better understand noise levels in their neighbourhood, BAC purchased a noise monitoring terminal. This is deployed for short periods at different locations across Brisbane, such as Balmoral, Upper Brookfield and Cedar Creek, for the purposes of:

- Recording the aircraft noise levels from aircraft arriving and departing from Brisbane Airport
- Recording the relative altitude of aircraft overflying the area; and
- Making area specific observations to inform investigations into noise and flight path data affecting each area.

A copy of the reports can be found at [Noise Management | Brisbane Airport \(bne.com.au\)](#).

BAC plans to deploy the monitor to Upper Brookfield again, to investigate site-specific amplification due to the local topography, and also to the Redlands area over the coming months.

Airline engagement has included:

- Monthly Aircraft Noise and Performance Working Group meetings – to seek input to planning and review of shorter-term improvement opportunities, including trials.
- Industry workshops held in September – to review the recommendations of the Trax Final Report and Airservices findings and recommendations and discuss industry's role in improving noise outcomes for the community.
- General engagement to discuss a range of PIR elements and community noise feedback.

Airlines have also identified a number of specific operations they would like to have considered as an outcome of the PIR. These relate to:

- Operations where aircraft are not able to consistently perform turns, climbs or other requirements.
- Requests for advanced navigation approach procedures for some turboprop aircraft that are now authorised for these operations (noting in many cases these may also provide noise benefit for communities).
- Consideration of shortening some arrival and departure paths to reduce track miles and the associated fuel burn and CO₂ emissions.

A Safety Case was submitted to CASA on 29 April 2022 to increase the existing 5-knot tailwind limit for SODPROPS operations at Brisbane Airport to 7-knots. CASA is still considering this submission and has been briefed regularly on the progress of the PIR and community interests.

6. Engage genuinely with the community to provide opportunities to influence the outcomes of the PIR

The Brisbane community has been engaged throughout the PIR to:

- seek input to the PIR TOR and identify specific areas of interest and concern for investigation (5 engagement sessions plus public comment period)
- input to the Trax independent review and Final Report (15 Trax-led engagement sessions)
- discuss the proposed PIR recommendations and priorities for developing a Noise Action Plan for Brisbane (9 engagement sessions).

The draft PIR report was subject to a four-week public review and comment period, ahead of finalising the PIR recommendations.

Complaints received since runway opening have also been considered as part of this engagement, with a particular focus on identifying aspects of Brisbane airspace operation that are causing greatest concern. See Section point 18 below for further details.

The recommendations of the PIR have been developed following consideration of the Trax recommendations and Airservices' PIR findings and recommendations, and discussion of these with the community and industry stakeholders. Some of the recommendations were overwhelmingly supported, others received some support, while others were not desired.

Airservices will continue to engage with the community as the recommendations are delivered. This will include a range of measures, from regular progress updates and improved data sharing, to focus groups on specific issues or area of focus, through to broad scale engagement on proposed options for changes to Brisbane airspace operations.

7. Review of operations, including COVID-19 impacts, unforeseen operations and mitigation measures

Prior to the COVID-19 pandemic, Brisbane Airport served approximately 24.5 million passengers in 2019, travelling on around 195,000 flights. Domestic travel made up 82 per cent of the total flights, with 18 per cent serving international travellers.

In 2020, as a consequence of COVID-19 border closures, total passenger numbers fell to approximately 8.2 million, travelling on around 111,000 flights. Domestic travel made up 88 per cent of the total aircraft movements, with the remaining 12 per cent being international flights.

Border closures continued to impact passenger and flight movements throughout 2021, with around 8.2 million passengers travelling on approximately 123,000 flights. Domestic travel continued to be the dominant mode of travel, with around 93 per cent of all flights being to domestic locations.

In the year to date (2022), total passenger numbers have increased to around 12 million (due to both state and international borders re-opening), of which 87 per cent were domestic passengers. The total number of aircraft movements (year to date) equates to around 124,000 with 7.5 per cent of those flights destined for international destinations.

Some of the key operational implications of the COVID-19 pandemic on Brisbane airspace operations have included:

- Border closures changing origin and destination of flights (with some destinations yet to resume).
- Reduced number of wide-bodied jets due to reduced international traffic.
- Intrastate traffic continued during state border closures resulting in greater use of the new runway relative to the legacy runway, due to the compass operating model (the percentage use is now back to 60 per cent legacy and 40 per cent new).
- Fly in/fly out (FIFO) traffic increased due to public health directives, such as social distancing requirements allowing less people on the same aircraft.
- (Early) retirement of older, large aircraft within some of the fleets, such as the Boeing 747.
- Increased number of propeller-driven aircraft to maximise passenger loading for short haul intrastate routes.
- Some (limited duration) increased aircraft size on popular intrastate routes (e.g., Brisbane-Cairns) to cater for demand.

Airservices conducted a review of operations to compare forecast operations in the 2007 EIS, the 2018 final flight path design and actual operations. The key findings of this review were:

- In the 12 months after the new runway opened there were approximately 120,000 annual aircraft movements, which was approximately 52 per cent of the annual movements forecast in the 2007 EIS and 2018 EIA.
- International movements were much lower than was modelled in 2007 and 2018, with current movements at around 30 per cent of pre-COVID-19 operations.
- Actual aircraft tracking was largely consistent with the depictions provided in the 2007 EIS and the 2018 EIA.
- Some differences were observed between the 2007 EIS and the 2018 final flight path design, with actual movements reflecting the latter design. This included:
 - Required Navigation Performance – Authorisation Required (RNP-AR) advanced navigation technology flight paths, which provides a highly precise tracking to turn onto final approach closer to the airport. This technology did not exist at the time of the EIS. The flight paths were introduced for the new runway during the 2018 final design and were depicted on the BAC Flight Path Tool.
 - Some additional SIDs were designed in 2018 that were not included in the 2007 EIS. These were required to facilitate compass operations to the north-west and the east.
 - Removal of some SIDs to reduce the number of departure routes and enhance aircraft separation.
 - Addition of night-time SID from the legacy runway to travel north. This was not included in the 2007 EIS as the requirement to have departures after 10pm off the legacy runway was a condition of the project approval after the EIS was completed.

This was included in the 2018 final design and BAC Flight Path Tool, and actual movements are consistent with this.

STARs from the west were not depicted in the 2007 EIS due to the proximity to Amberley airspace. These were added in the 2018 final design and included on the BAC Flight Path Tool. Aircraft movements that are tactically managed by ATC through issuing of compass heading directions or using visual procedures were not shown in the earlier 2007 or 2018 depictions, due to their tactical nature. This includes:

- Wide spread of non-jet (turboprop) aircraft movements shown in actual results.
- Operations requiring tactical management by ATC to ensure separation from other flight paths including a SID off new runway over water, which turns west to cross the coastline to continue in a north-westerly direction. This has a wide spread of movements due to the need to separate it from a non-jet departure to the north.
- High altitude tactical management of departures from the new runway over land to the north, which show a wide spread of movements after turning right, above 10,000ft.
- Wide spread of actual arrivals to the legacy runway over water to manage separation of aircraft and weather events.

Further detail can be found in the [Forecast vs Actual Operations Review](#).

8. Review over-water operations and identify opportunities to increase the use of these modes

Section 7 of this report identifies recommendations to increase the use of over water operations, including the current operational constraints that would need to be addressed to increase the use of this mode, particularly during daytime hours.

9. Review of parallel runway operations, in particular compass operations

Section 7 of this report discusses the constraints in relation to the approved compass operations model and the recommendations to move away from this model. These opportunities have been the result of the Trax independent review and Airservices' review activity.

10. Seek opportunities to enhance noise sharing across both runways and among the various flight paths

Noise sharing across both runways and among the various flight paths can be achieved through the removal of the compass operations model. This is further discussed in Section 6 of this report.

11. Seek opportunities to reduce concentration of flight paths over communities, where safe and operationally feasible

Section 7 of this report identifies recommendations to reduce the concentration of flight paths over communities. These opportunities have been the result of the Trax independent review and Airservices' review activity.

12. Review optimisation measures implemented since runway opening to determine their effectiveness in reducing impact on the community

Trials of short-term noise improvement opportunities were implemented during the PIR. These trials were limited to opportunities that would not change where aircraft track over land, to ensure new communities would not be affected.

Two trials commenced on 24 February 2022:

- Extended Simultaneous Opposite Direction Parallel Runway Operations trial
- Restriction on Intersection Departures from the New Runway trial.

These trials aimed to identify if a noise reduction benefit would result from a more permanent implementation of the changed operation.

A third trial commenced on 5 September 2022:

- QantasLink Dash 8 Q400 use of existing RNP-AR flight path over Moreton Bay.

Extended Simultaneous Opposite Direction Parallel Runway Operations (SODPROPS) trial

SODPROPS is prioritised between the hours of 10pm and 6am daily. This trial extended SODPROPS operations to 8am on Saturday and Sunday mornings, when weather conditions allowed. A further extension period was added on 7 May 2022, with SODPROPS commencing at 8pm on a Saturday evening.

Two quarterly reports have been produced over the first six months of the trial. They identified:

- During the first quarter (24 February to 23 May 2022), the extended mode was able to be operated for only five hours in total, due to unusually high rainfall. A total of 51 flights that would have otherwise travelled over land were able to be directed over water.
- During the second quarter (24 May to 23 August 2022) the extended mode was able to be operated for 12 hours in the morning extended period (6am to 8am), due to weather conditions, mainly high winds. It was also able to be operated for 16.5 hours during the evening extended period (8pm to 10pm). A total of 251 flights that would have otherwise travelled over land were able to be directed over water.

On occasions where the operating conditions allowed, the extended period was continued through to 10am.

This trial has identified there is substantial benefit to be gained in improving noise outcomes for communities by extending SODPROPS operating hours. This is highlighted further when the total 24/7 SODPROPS usage over this same period (24 February to 23 August 2022) is considered:

- Total hours SODPROPS operated – 662 hours
- Total movements operated over water – 4,498 flights.

Measures to increase the opportunity to operate in SODPROPS mode are presented in Section 7 of this report.

Restriction on Intersection Departures from the New Runway trial

Aircraft departing from the new runway in Brisbane can start their take-off roll at different starting points along the runway. An aircraft that carries out a full-length departure commences take off from the northern end of the runway. An intersection departure occurs when an aircraft departs from points further along the runway where a taxiway intersects.

Jet aircraft are permitted to conduct intersection departures between 6am and 10pm Australian Eastern Standard Time (AEST) and between 5am and 10pm when other Australian states are on Daylight Savings Time. Turboprop and small-jet aircraft are permitted to conduct intersection departures at any time.

Following community feedback that the use of intersection departures was resulting in greater noise for communities, due to aircraft not being as high as they might otherwise be if using the full runway length, a trial restricting intersection departures commenced on 24 February 2022.

Two quarterly reports have been produced over the first six months of the trial. They identified:

- During both quarters (24 February to 23 August 2022), noise monitor results indicated a maximum of one decibel difference in pre-trial versus trial operations results for jet aircraft, and no identifiable difference for turboprop aircraft.

Over both quarters, noise readings at the runway end, Hamilton and St Lucia increased by one decibel for jet aircraft. A reduction of one decibel was observed for Bulimba in the first quarter.

Community feedback on the effect of this trial has been mixed, with most comments received stating no observable difference in noise levels, however some stating a minor improvement.

QantasLink Dash 8 Q400 use of existing RNP-AR flight path over Moreton Bay

This trial utilises an existing Required Navigation Performance – Authorisation Required (RNP-AR) flight path (GPS navigation system) over the Moreton Bay for QantasLink arrivals to Runway 19L (legacy runway).

Currently, QantasLink Dash 8 Q400 turboprop flights arriving from the south (from destinations such as Albury, Wagga Wagga and Coffs Harbour) fly north along the coast from the Gold Coast to Oonooncoo Bay, off Russell Island. From there, aircraft fly north over Dunwich on North Stradbroke Island, Moreton Island and over Cowan before turning south for arrival to Runway 19L.

The trial is expected to deliver improved noise and environmental outcomes by moving aircraft further away from North Stradbroke Island and Moreton Island. Use of this flight path will also reduce track miles flown, fuel burn and carbon dioxide (CO₂) emissions. Data will be shared with both the community and industry in 2023. Any potential improvements identified from this trial will form part of the work program for Package Two.

13. Review of current Brisbane noise monitor locations

Brisbane currently has 13 noise monitors in place to record noise generated by aircraft movements from both the legacy and new runway. These are located at:

- Runway end 19L
- Runway end 19R
- Bardon
- Bulimba
- Cannon Hill
- Carina
- Hamilton
- Kedron

- New Farm
- Nudgee Beach
- Salisbury
- St Lucia
- Tingalpa.

The location of the current noise monitors is considered appropriate to capture jet aircraft noise levels close to the airport, that is, suburbs that are within the final approach or initial departure operations area. A temporary noise monitor has been deployed to capture non-jet aircraft noise levels as part of the trial to restrict intersection departures from the new runway, and a more permanent noise monitor may be required to continue to monitor these movements on an ongoing basis.

Feedback received during the PIR has indicated suburbs further away from the airport would also benefit from noise monitoring, and a program of temporary noise monitor placement delivered jointly by BAC and Airservices was implemented. Temporary noise monitors have been located at Balmoral Hill, Upper Brookfield, Samford, Cedar Creek and Coorparoo.

Noise monitoring locations will be reviewed following implementation of the recommendations of the PIR and determination of changes to Brisbane operations. This will include engagement with the community to determine the most appropriate and valued locations.

During the PIR, requests for noise monitors were received from some communities. This was responded to through a temporary noise monitoring program

More recent requests for monitoring in locations including the Redlands area have been received. A program for ongoing temporary noise monitoring at key locations across the city is currently being developed.

14. Review of locations further out from the airport to identify opportunities to reduce the density of aircraft overflight through dispersing paths where possible

Section 7 of this report identifies recommendations to reduce the density of aircraft operations on communities further from the airport. These opportunities have been the result of the Trax independent review and Airservices' review activity.

15. Provision of information on fuel burn and emissions where available.

Information on fuel burn and emissions based on current operations has not yet been prepared, due to the need to focus resources on short-term noise trials and other analysis to support the PIR.

A baseline model will be prepared to support engagement on any proposed changes being progressed as a result of the Noise Action Plan for Brisbane. This baseline will include information on the location, altitude and frequency of use of flight paths, population overflown, fuel burn and CO₂ emissions produced by each flight path.

This baseline will enable direct comparison of any proposed changes to this baseline.

Based on community feedback during the September 2022 community feedbacks, a baseline of operations similar to the above will also be prepared for pre-new runway operations.

16. Review opportunities to reduce fuel consumption and CO2 emissions

Section 7 of this report identifies recommendations to reduce the track miles on some flight paths, specifically identifying a Standard Instrument Departure (SIDs) to the south from the legacy runway as an opportunity.

The design and assessment of changes included in the Noise Action Plan for Brisbane will include consideration of fuel consumption and CO2 emissions. This will be transparently considered against community noise benefits and other operational considerations in determining proposed change options and the final change decision.

17. Review opportunities to reduce complexity of Standard Instrument Arrival (STARs) including reviewing the number of altitude constraints.

Section 7 of this report identifies recommendations to reduce the complexity of Brisbane's airspace operations.

These will be transparently considered against community noise benefits and other operational considerations in determining proposed change options and the final change decision, in consultation with industry, government and the community.

APPENDIX C – Trax Recommendations Including Airservices' Findings

The following presents Trax' recommendations and action descriptions, together with Airservices' PIR findings and recommendations related to each.

These recommendations were presented with images to support discussion at community workshops held throughout September 2022. The presentation pack can be viewed [here](#).

The images provided in the presentation pack are indicative only to support understanding of the proposed action, and do not represent the final proposed flight path location.

Package One: Strong, transparent and representative governance

Timelines: Development and implementation in Q3-Q4 2022

Ref	Recommendation	Description
1.1	Establish a programme oversight, management and assurance function that coordinates the development and assessment of options for change proposals to the NPR flight path design	<ul style="list-style-type: none"> a) A senior-level oversight group tasked with coordinating the various activities at a strategic level to ensure they are coherent, transparent and aligned to the achievement of a balanced set of objectives. b) A programme management office that provides the disciplines required to ensure that roles and responsibilities are clear, stakeholders work to a common plan, activities are adequately resourced and the risks to delivering the proposed changes are well understood and managed. c) A technical coordination group to support the development of options from a technical perspective. d) An options development and assessment framework that ensures the criteria and methods used to evaluate the impacts of different options for change proposals are comprehensive and consistent. e) An independent assurance process that coordinates the engagement of qualified third parties not directly involved in the development of the change proposals to challenge specific aspects of the Programme from a technical and process perspective and build trust with external stakeholders.
1.2	Implement a joined-up Communications Plan for the aviation organisations that are responsible for developing options to communicate effectively with community stakeholders	<ul style="list-style-type: none"> a) Without an effective and well managed approach to communications, flight path changes may generate outcomes that are unacceptable to stakeholders and vociferously challenged. b) The importance of an effective communications is based on the expectation that, when done well, it improves the social, environmental and economic outcomes of flight path changes and increases stakeholders' trust in the process for the future.
1.3	Define the engagement process that will be followed to gather meaningful inputs from community and aviation stakeholders to help shape the change proposals	<ul style="list-style-type: none"> a) The engagement process should confer legitimacy on the development and assessment of options for change proposals. b) Those who may be affected by options for change proposals should be encouraged to actively participate in the development and assessment process. c) To be effective, stakeholders should be offered the information, time and support to make meaningful contributions.

Ref	Recommendation	Description
		d) The outputs of community engagement must be considered conscientiously by the proponents and have the potential to influence the final designs.
1.4	Produce a long-term Noise Action Plan that clearly lays out how the change proposals and other measures not related to flight path design will contribute to limiting and where possible reducing noise over the short, medium and long-term as traffic levels grow	<p>a) Ensure that the specific noise mitigation measures included as part of the plan as it evolves (including trials, research projects and major changes) are scoped effectively, with agreed objectives, milestones, accountabilities and performance measures.</p> <p>b) Track the progress of options development, assessment, engagement and implementation plans linked to specific noise mitigation measures.</p> <p>c) Manage the dependencies associated with noise mitigation measures over time, including the rate and scale at which the ATC operation and aircraft operators can adapt to successive changes.</p> <p>d) Resolve issues that may impact the achievement of agreed milestones toward the development and implementation of noise mitigation measures.</p> <p>e) Maintain cross-industry and community stakeholder involvement and momentum behind the development and implementation of options to manage and where possible reduce the impacts of aircraft noise.</p>

Package Two: Maximise flights over the water

Timelines: Development and implementation in 2023

Ref	Recommendation	Description	Airservices review findings
2.1	Develop and implement an ATC Operating Plan to extend the use of SODPROPS	<p>a) Develop and implement an ATC Operating Plan to extend the use of SODPROPS with a focus on weekday evenings, Saturday afternoons and Sunday mornings, when the met conditions and traffic levels permit.</p> <p>b) Examine the costs, benefits and operational impacts of extending the use of SODPROPS, including the provision for a moderate amount of flight delay to maintain the use of the mode when traffic demand approaches the maximum capacity for simultaneous opposite direction parallel operations.</p>	<p>SODPROPS is the preferred mode at any time of day, however current limitations need to be addressed, including:</p> <ul style="list-style-type: none"> • Airspace design over water • ENLIP STAR not available when Amberley airspace active • Management of non-jet departures • RNP-AR procedures are not available during SODPROPS under current operating rules, due to RNP-AR approaches not being developed at the time of forming the rules. Airservices is in the process of reviewing this ruleset. <p>Suggested improvement:</p> <ul style="list-style-type: none"> • Review SODPROP daytime operational plan and implement design enhancements to enable greater use of this mode.

Ref	Recommendation	Description	Airservices review findings
2.2	Reduce the workload and complexity for Brisbane ATC associated with extending the use SODPROPS	<p>a) Engage with Defence and RAAF Base Amberley to consider options for the targeted release and/or shared use of specific portions of Amberley segregated airspace to reduce the workload and complexity for Brisbane ATC associated with extending the use of SODPROPS.</p>	<p>The air route network and location of Amberley military airspace funnels aircraft for other airports through Brisbane airspace</p> <p>Operations to Amberley regularly conflict with Brisbane Airport operations</p> <p>Amberley restricted airspace and associated access corridors further impact Brisbane operations.</p> <p>Suggested improvements:</p> <ul style="list-style-type: none"> – Investigate solutions regarding Amberley restricted areas and associated military access corridors. – Implement STARs for Amberley. – Implement SIDs for Archerfield Airport. <p>Community engagement required on changes to flight path location to support final decision</p>
		<p>b) Examine options to amend the ATC procedures for coordinating flights that route through the Brisbane airspace system inbound to other destinations and may constrain Brisbane ATC's ability to extend the use of SODPROPS.</p>	<p>Opportunities exist to reduce complexity and increase the ability to operate SODPROPS in periods of higher air traffic movement.</p> <p>Suggested improvement:</p> <ul style="list-style-type: none"> – Amend ATC procedures to provide for greater use of SODPROPS at all times of the day.
		<p>c) Examine options to amend specific flight paths that serve traffic routeing through the Brisbane airspace system inbound to other destinations and may constrain Brisbane ATC's ability to extend the use of SODPROPS.</p>	<p>Operations to the north and south of Brisbane (particularly arrivals) regularly conflict with Brisbane Airport operations.</p> <p>Operations via Brisbane airspace conflict with SODPROPS use during daytime hours.</p> <p>Suggested improvements:</p> <ul style="list-style-type: none"> – Review the routing of other traffic through Brisbane airspace and investigate opportunities to separate flight paths for the different airports. – Review northern and southern operations as part of the review of the Brisbane SODPROP operating plan. – Community engagement required on changes to flight path location to support final decision.

Ref	Recommendation	Description	Airservices review findings
2.3	Modify specific SODPROPS flight paths and ATC procedures, where required, to maximise the potential improvements associated with recommendations 2.1 and 2.2	<p>a) Examine options to reduce the track miles and aircraft emissions generated by the specific arrival and departure routes that flights use during SODPROPS, including the potential to incorporate arrival routes designed to advanced navigation standards.</p>	<p>This action would be heavily dependent on the outcome of 2.1 and 2.2.</p> <p>Our Flight Path Design Principles seek to strike balanced between efficiency, community impacts and operational complexity, and will be applied to all design change proposals.</p> <p>Extensive, transparent engagement will be implemented to confirm trade-offs and seek input to decision-making.</p>
		<p>b) Examine options to amend the ATC procedures used to manage inbound traffic when SODPROPS is in use to enable pilots to optimise the descent to final approach.</p>	
		<p>c) Examine short-term options to moderately increase the tactical use of over-the-water operations when the simultaneous parallel runway modes are in use, for example launching occasional departures in a 01 direction while the airport is configured for 19 operations when traffic conditions, met constraints and other operational factors confirm it is safe to do so.</p>	<p>This option would require detailed assessment of a range of factors.</p> <p>Engagement with CASA would be required to confirm if this operation is consistent with international rulesets and if it would meet Australian safety standards.</p> <p>Assessment outcomes and any associated decisions will be shared transparently with community and industry stakeholders.</p>
			<p>Airservices has noted concerns being raised by members of the Redlands community about the potential for increased operations over bayside communities as a result of Package Two recommendations.</p> <p>Flights to and from Brisbane to destinations south generally fly over the Redlands area when over the water departure modes are in use. When not in over the water departure modes, these aircraft fly over Tingalpa and Logan.</p> <p>Aircraft are generally above 10,000ft when they cross the coastline in the over the water departure mode.</p> <p>Opportunities exist to review these departure paths as part of the broader flight path design review.</p> <p>Community engagement required on changes to flight path location or airspace operations to support final decision.</p>

Package Three: Reduce the frequency and concentration of flights over communities

Timelines: Development during 2023 and implementation in 2024

Ref	Recommendation	Description	Airservices review
3.1	Develop and assess options for change proposals to reduce the frequency and concentration of flights over communities, and where they are feasible, engage with all affected stakeholders on the impacts and trade-offs	a) Options to redesign the two departure routes over the city from the new runway to the north so the flight paths are offset from the extended runway centreline and follow a different track over the ground to that overflowed by inbound traffic on final approach to the new runway.	<p>The RWY 19L and 19R SID (departure over land to the north) follow the same path after they turn, meaning they need to be tactically managed by ATC and they overfly the same communities.</p> <p>Suggested improvements:</p> <ul style="list-style-type: none"> - Redesign the RWY 19L SID further south to separate the two operations. - Community engagement required on changes to flight path location to support final decision.
		b) Options to redesign the two departure routes over the city from the new runway so they diverge and the flight paths each follow different tracks over the ground.	<p>Airservices was asked by the community to review the opportunity for jet aircraft to turn early when using RWY 19R (new runway over land) departures, and notes:</p> <ul style="list-style-type: none"> - Currently, the non-jet departures turn right earlier than jet aircraft off 19R. This is to provide separation from the faster following jets. - Implementation of earlier turns for jet aircraft would require redesign of RWY 19 operations to the north of the airport to continue to provide this separation. <p>Suggested improvements:</p> <ul style="list-style-type: none"> - Investigate opportunities for jet aircraft early turns as part of SID design review. - Community engagement required on changes to flight path location to support final decision.

Ref	Recommendation	Description	Airservices review
		c) Options to redesign the two departure routes over the city from the existing runway used after 10 pm so the flight paths follow a different track over the ground to that overflowed by the new runway departure routes used in the daytime.	<p>RWY 19R (new runway, city end) can only be used after 10pm if weather or operational issues require (eg. in an emergency or if the legacy runway is unavailable)</p> <p>This SID from runway 19L (legacy runway over land) and 19R (new runway over land) follow the same path, thus night-time departures from the legacy runway travelling north and east, fly over the same communities as daytime use of this SID from the new runway.</p> <p>Suggested improvement:</p> <ul style="list-style-type: none"> – Per 3.1(b) redesign the RWY 19L SID further south to separate the two operations. <p>Community engagement required on changes to flight path location to support final decision.</p>
			<p>Airservices has reviewed the operation of the SID from RWY 01L (new runway) that departs over water to travel north-west (known as the WACKO SID due to the waypoint it flies to) and notes:</p> <ul style="list-style-type: none"> – This SID replaced the pre-existing WACKO SID from the legacy runway, when the new runway opened, and compass operations commenced – The legacy WACKO SID is more efficient, safer, and due to the height when crossing the coastline, has a lower noise impact on communities than the current operation – The WACKO SID crosses the coastline at Bribie Island with a wide splay of aircraft movements due to the need for ATC to tactically separate traffic from a radar SID travelling north from the same runway. <p>Suggested improvements:</p> <ul style="list-style-type: none"> – Replace RWY 01L WACKO SID departures to the west with the existing RWY 01R WACKO SID. <p>Community engagement required on changes to airspace operation to support final decision.</p>

Ref	Recommendation	Description	Airservices review
			<p>Airservices has received airline feedback requesting a review of some SIDs to reduce the total track miles flown.</p> <p>Suggested improvement:</p> <ul style="list-style-type: none"> – Review of SIDs to determine if track miles can be reduced. <p>Community engagement required on changes to flight path location to support final decision</p>
	d)	<p>Options to introduce an ATC procedure to vector outbound flights using the two departure routes over the city from the new runway when a specific altitude has been reached (e.g. 4000ft) that would disperse the tracks over the ground because aircraft with higher climb rates would reach the specified altitude quicker and turn sooner.</p>	<p>Airservices has reviewed SID adherence in response to community concerns noting aircraft are not remaining on the published flight paths, and notes:</p> <ul style="list-style-type: none"> – Performance differentials between turboprops and large international aircraft will mean 4,000ft is reached at different points. – BAPAF requested Airservices to investigated a new SID Noise Abatement Procedure (NAP) to keep aircraft on the SIDs to 10-12,000ft. This is currently being environmentally assessed and is planned to be introduced before the end of 2022. <p>Community engagement required to determine if adherence to the SIDs or dispersion of aircraft movements is preferred.</p>
	e)	<p>Options to redesign the three departure routes over the city from the existing runway to the south so they follow different tracks over the ground and potentially save track mileage, by turning sooner and/or tighter.</p>	<p>Improvements could be made to jet and non-jet operations from this runway by creating new separated paths, better sharing noise.</p> <p>Suggested improvements:</p> <ul style="list-style-type: none"> – Design separated procedural SIDs, one for jet aircraft and one for non-jet aircraft. <p>Community engagement required on changes to flight path location to support final decision.</p>

Ref	Recommendation	Description	Airservices review
		f) Options to redesign two of the arrival routes over the city to the new runway from the north so the flight paths converge further to the west and the tracks over the ground are different to those overflown by outbound traffic heading north.	<p>Some STARs require level segments over communities to safely separate arrival from departure operations. These level segments can generate additional noise.</p> <p>Suggested improvements:</p> <ul style="list-style-type: none"> – Redesign of STAR height requirements to reduce level segments over communities and improve continuous decent of aircraft. This will reduce engine thrust and mechanical noise, providing an improve noise outcome. <p>Community engagement required on changes to flight path height or operation to support final decision.</p>
			<p>Airservices reviewed opportunities to reduce concentration of aircraft movements over communities further from the airport, giving particular regard to locations including Brookfield and Samford, noting the low ambient noise conditions, and notes:</p> <ul style="list-style-type: none"> – The current arrivals for RWY 01L (new runway over land) come from three STAR waypoints (WOODY, SMOKA, MORBI) then track over Samford and Brookfield for one of three approaches (ILS, Visual or RNP-AR). <p>Suggested improvements:</p> <ul style="list-style-type: none"> – The opportunity exists to remove the visual approach, and merge arrivals further north of these areas, so they can track closer to the Amberley airspace boundary, where possible, moving noise slightly west or east of existing communities. – Department of Defence and RAAF Base Amberley are being engaged to explore opportunities for access to Amberley airspace to further reduce the impact of aircraft operations over these communities. <p>Community engagement required on changes to flight path location to support final decision.</p>

Ref	Recommendation	Description	Airservices review
			<p>The MORBI non-jet visual STAR to runway 19R (new runway over water) from the west, overflies the Redcliffe Peninsula, impacting residential areas.</p> <p>Suggested improvement:</p> <ul style="list-style-type: none"> – Investigate options for STAR design to avoid the Redcliffe Peninsula
			<p>Airservices has reviewed opportunities to expand the use of advanced navigation approach routes and notes:</p> <ul style="list-style-type: none"> – Non-jet aircraft are being equipped with RNP-AR technology and their crews certified to fly these procedures. – There is no RNP-AR approach available from the MORBI STAR (from the west) to runway 19R (over water arrival). – RNP-AR technology allows shorter approaches to join final approach and will assist in reducing aircraft movements over communities, such as Redcliffe. <p>Suggested improvements:</p> <ul style="list-style-type: none"> – Introduce an RNP-AR approach for non-jet traffic. <p>Community engagement required on changes to flight path location over land to support final decision.</p>

Ref	Recommendation	Description	Airservices review
			<p>Due to an ICAO ruleset change in 2021, the point at which initial approach to RWY 01L (new runway over land) and 01R (legacy runway over land) commences needs to be reviewed for independent parallel runway operations.</p> <p>The new rules requires aircraft to be established on the final approach and under tower ATC control earlier. This requires a review of flights paths leading to this point.</p> <p>Suggested improvements:</p> <ul style="list-style-type: none"> – Review flight paths leading to the final approach commencement point to meet the ruleset requirements. – Redesign arrival paths to reduce the impact on communities where possible. <p>Community engagement required on changes to flight path location to support final decision.</p>
			<p>Airline feedback has been received noting the turn radius onto the final approach to RWY 01L (new runway over land), particularly in strong tailwind conditions, requires design review.</p> <p>Suggested improvements:</p> <ul style="list-style-type: none"> – Review the lead in waypoints on this approach as part of broader PIR design review to allow a shallower intercept angle and to reduce the impact on communities where possible. <p>Community engagement required on changes to flight path location to support final decision.</p>

Ref	Recommendation	Description	Airservices review
			<p>Airservices had reviewed the constraints to Brisbane airspace operations as a result of the Amberley military restricted area and notes:</p> <p>The location of RAAF Amberley airspace is restrictive for Brisbane arrivals to runway 01L and 01R from the north and west. There is little room to move aircraft for sequencing or noise relief and this airspace boundary affects the location of STARs from the north.</p> <p>The STARs inbound from the southwest (via the ENLIP waypoint) are required to descend through Amberley airspace.</p> <p>Suggested improvements:</p> <ul style="list-style-type: none"> – Review Amberley airspace boundary and STAR design as part of broader PIR STAR design review. – Engagement is underway with the Department of Defence and RAAF Base Amberley. <p>Community engagement required on changes to flight path location to support final decision.</p>
		<p>g) Options to re-evaluate three of the standard compass headings that non-jet departures are instructed to follow after take-off (subject to the impacts on operational capacity) so that the tracks over the ground may be dispersed or repositioned over water.</p>	<p>Non-jet radar SIDs pass over a number of communities and opportunities exist to improve outcomes through the design review. Some conflicts currently exist between radar SIDs and missed approaches.</p> <p>Suggested improvements:</p> <ul style="list-style-type: none"> – Investigate non-jet radar SID headings that will reduce the impact on communities. <p>Community engagement required on radar SID operation to support final decision.</p>
		<p>h) The development of a baseline option that describes the actual impacts created by the existing NPR flight paths over the city and outer suburbs in terms that are directly comparable to the options for any proposed modifications.</p>	<p>Feedback received during community workshops will be used to develop this baseline.</p>

Package Four: Optimize the performance of the wider Brisbane airspace system

Timelines: Development in 2023 & 2024, implementation from 2025

Ref	Recommendation	Description	Airservices review
4.1	Develop and assess options for change proposals to introduce noise sharing through runway alternation using segregated and semi-mixed runway modes with an updated flight path design that deviates from compass operations, and if feasible engage with all affected stakeholders	a) The options included in work package four will take longer to develop than those in packages two and three because of the scale and complexity of the proposed changes, extending the expected timelines for implementation into 2025.	<p>Compass operations at Brisbane is restricting flexibility for ATC to operate dedicated arrival and departure runways (and other noise-sharing modes) which would offer potential community noise improvements.</p> <p>Suggested improvements:</p> <ul style="list-style-type: none"> - Review new modes that will provide for better noise sharing or respite opportunities. - Investigate SIDs and STARs for each departure/arrival gate from/to each runway to support these new modes. <p>Community engagement required on changes to flight path location to support final decision.</p>
		b) The options to introduce new noise-sharing runway modes supported by an updated flight path design that deviates from compass operations should be configured to align with the modifications implemented as part of package three.	<p>Airservices shared details of how this mode would operate and the implications for communities. It is noted:</p> <ul style="list-style-type: none"> - During periods where the runway is in noise relief mode, no operations will be experienced (emergencies notwithstanding). - During periods where the runway is not in noise relief mode, it will take all movements (100 per cent of arrivals or departures). - The volume of aircraft movements experienced during the non-noise relief mode periods will be approximately double the current volume experienced. <p>Community feedback on this mode was not supportive.</p>
		c) It is important to emphasize that the areas that would benefit from temporary periods of relief through runway alternation would at other times experience comparatively more noise events when the alternation schedule is reversed.	

Ref	Recommendation	Description	Airservices review
		d) It is envisaged that the segregated and semi-mixed runway modes would be used alongside the simultaneous parallel modes and SODPROPS as part of a system to manage noise as traffic levels grow, designed with community and aviation stakeholders in a long-term Noise Action Plan.	<p>Segregated mode can only be operated currently in one mode with arrivals over the city to the new runway and departures over water from the legacy runway. Flight paths to allow other configurations of these modes are not currently in place.</p> <p>Operation of segregated mode has been limited to date due to the impact to new runway communities.</p> <p>Suggested improvements:</p> <ul style="list-style-type: none"> – Design flight paths to connect all runways to allow noise sharing opportunities. <p>Community engagement required on changes to flight path location to support final decision.</p>
		e) The options for a runway alternation schedule should consider the use of the semi-mixed modes, where departures use both runways and arrivals operate to one, or arrivals use both runways and departures operate from one, so that the airport's capacity can be allocated to accommodate peaks in traffic demand at different times.	<p>Compass operations at Brisbane restricts the ability to operate noise sharing modes.</p> <p>Suggested improvement:</p> <ul style="list-style-type: none"> – Review the application of compass operations. – Review new modes that will provide for better noise sharing or respite opportunities. – Design flight paths to connect all runways to allow noise sharing opportunities. <p>Community engagement required on changes to flight path location to support final decision.</p>
		f) The options for the dimensions of the noise relief areas introduced as part of runway alternation should be informed by stakeholder engagement with the affected communities. Significant engagement with communities and aviation stakeholders should also be conducted to gather inputs on the proposed changes to the flight path design needed to ensure the noise relief areas are effective when in use and the airport can operate efficiently in all modes.	<p>New flight paths are required to connect southern operations to the new runway and northern operations to the legacy runway.</p> <p>Community engagement required on changes to flight path location to support final decision.</p>

Ref	Recommendation	Description	Airservices review
		g) Engagement with community and aviation stakeholders should influence how the noise relief areas are used if established, in particular the schedule of alternation.	Community engagement required on changes to flight path location to support final decision.
		h) Dedicated safety assurance work, ATC simulations and aviation stakeholder engagement should be conducted to assess the risks associated with switching between the segregated modes and simultaneous parallel operations.	
4.2	Develop and assess options for change proposals to introduce multiple arrival routes over the city that can be alternated to a planned schedule to deliver respite, and if feasible engage with all affected stakeholders	a) The NPR flight path design includes several arrival routes that use advanced navigation standards for more precise and flexible approaches and may be re-configured and supplemented with additional routes to deliver planned respite for some communities through alternation.	RNP-AR paths have the effect of concentrating noise due to the precise nature of the navigation technology. Community engagement required on changes to flight path location and airspace operation to support final decision.
			Airservices received a community request to investigate moving the location of the RNP-AR join point to the new runway further north (similar to the old river track), and notes: <ul style="list-style-type: none">- Opportunities to move the join point north will be investigated as part of this package Community engagement required on changes to flight path location to support final decision.
		b) The existing IT systems used by Brisbane ATC to support air navigation do not have the capacity to manage multiple alternating arrival routes. ASA is implementing a national programme of IT system upgrades that when complete is expected to enable options for respite routes on arrival to be developed and assessed for the Brisbane airspace system.	

Ref	Recommendation	Description	Airservices review
		c) Options to introduce respite routes on arrival should be incorporated into the proposed changes to the flight path design required to enable runway alternation.	
		d) If following the outcome of stakeholder engagement, options to implement runway alternation are not progressed, respite routes on arrival should be considered in isolation through a separate engagement exercise with community and aviation stakeholders for use with simultaneous parallel operations.	
		e) It is important to emphasize that the areas that would benefit from the use of respite routes on arrival would at other times experience comparatively more noise events when the alternation schedule is reversed and that the total population overflown would increase.	
		f) The introduction of respite routes would add significant complexity to the Brisbane airspace system, creating interactions with other arrival and departure routes and interdependencies with the airspace structures that integrate Brisbane traffic with the wider enroute network. The improvements expected from introducing respite routes should be assessed against the impacts on flight efficiency and aircraft emissions where longer tracks and sub-optimal climb and descent profiles are required to accommodate alternation.	

APPENDIX D – Mapping of Recommendations

Draft PIR Recommendation	Final PIR Recommendation
1.1 (a) A senior-level oversight group tasked with coordinating the various activities at a strategic level to ensure they are coherent, transparent and aligned to the achievement of a balanced set of objectives.	1.1(a) An independent airport community forum, supported by third party technical expertise where required, as a mechanism to ensure coherent, transparent and aligned activities. 1.1 (aa) The Department will establish governance mechanisms including undertaking assurance checks.
1.4 (f) Accept the outcome of this PIR as the Interim Noise Action Plan for Brisbane, noting the senior-level oversight group may wish to expand its focus.	1.4 (f) Accept the outcome of this PIR as the Noise Action Plan for Brisbane, noting that as the industry and regulatory landscape evolves, this Plan may also evolve.
2.3(d) Examine opportunities to improve over-the-bay departure paths that fly over communities after they cross the coastline to increase height or maintain over water for longer.	2.3 (d) Examine opportunities to improve over-the-bay departure paths that fly over communities after they cross the coastline to increase height or maintain over water for longer or travel further east .
	New 2.3 (e) Examine opportunities to modify weather condition constraints, where safe, to allow greater use of SODPROPS.
	New 2.3(f) Develop mechanisms to report on SODPROPS usage, including transparent explanation of when this mode has not been applied and the reasons for this.
	New 2.4 Reduce the impact of overnight operations on communities <ul style="list-style-type: none"> (a) Examine opportunities to shift night- time operations over the bay or away from inland communities, including redesign of SIDs and STARs for night- time operations (10pm to 6am). (b) Engage with industry (including time critical freight operators) to assess the impact on operations of additional track miles required to support night-time operations which provide respite. (c) Develop specific night-time operating modes that will apply between 10pm and 6am.

Glossary

Term/Abbreviation	Description
ATC	Air Traffic Control
BAPAF	Brisbane Airport Post Implementation Review Advisory Forum
CASA	Civil Aviation Safety Authority (Australian aviation safety regulator)
CCO	Continuous Climb Operations (aircraft climb at a consistent gradient)
CDO	Continuous Descent Operations (aircraft descend at a consistent gradient)
ICAO	International Civil Aviation Organization (International body governing aviation rules)
Level segment	Aircraft on descent level off for a period, generally for separation, before recommencing descent
Missed approach	A procedure for every runway that aircraft will follow if they are unable to land on their first attempt.
NAP	Noise Abatement Procedure
Non-jet	Turboprop/propeller driven aircraft
Radar SID	Tactically managed Standard Instrument Departure (SID) whereby ATC provides a compass heading for aircraft to travel to rather than a fixed flight path
RWY	Runway
RWY 01L	New parallel runway - arrivals over land and departures over water
RWY 19R	New parallel runway - arrivals over water and departures over land
RWY 01R	Legacy runway - arrivals over land and departures over water
RWY 19L	Legacy runway - arrivals over water and departures over land
SID	Standard Instrument Departure (instrument rather than visual navigation)
SODPROPS	Simultaneous Opposite Direction Runway Operations (all operations over water)
STAR	Standard Instrument Arrival or Standard Terminal Arrival Route (instrument rather than visual navigation)
Turboprop	Propeller-driven aircraft which use a gas turbine engine