HOBART AIRSPACE DESIGN REVIEW

Post Implementation Review Report

FINAL

Effective: 04 April 2022

CHANGE SUMMARY

Version	Date	Change Description
0.1	18 October 2021	Draft report for internal review
0.2	5 November 2021	Draft report for community and industry feedback
1.0	04 April 2022	Final report for publishing *Refer to Appendix L for a summary of document changes*

CONTENTS

Disclaimer: While the information contained in this document has been presented with all due care, Airservices does not represent that the information is free from errors or omission.

EXECUTIVE SUMMARY

In September 2017, Airservices introduced changes to arrival and departure flight paths at Hobart Airport that were designed to organise aircraft onto standard routes called Standard Terminal Arrival Routes (STAR) and Standard Instrument Departure (SID) routes. The implementation of the new flight paths was associated with satellite-based navigation systems aimed at improving the safety of aircraft landing and departing at Hobart Airport.

In response to community concern about these flight paths and the associated environmental assessment and community engagement process, Airservices committed to a comprehensive review of the Hobart SIDs and STARs. This was known as the Hobart Airspace Design Review and was undertaken by Airservices between January 2018 and March 2019. The flight path changes determined through the Design Review, as well as changes to the Tasmanian high level routes, new procedures associated with the relocation of the very high frequency omni-directional range (VOR) navigation aid, and changes to Noise Abatement Procedures (NAPs), were all implemented on 7 November 2019.

In accordance with our internal National Operating Standard, Airservices conducts Post Implementation Reviews (PIRs) into airspace and flight path changes to verify assumptions made about potential environmental and community impacts, and to determine the effectiveness of the environmental impact assessment and community engagement processes. The outcomes of PIRs inform future changes and improve the overall change management process.

The scope of the Hobart PIR was developed in consultation with the community and considers the flight path changes implemented by Airservices on 7 November 2019, the supporting environmental assessment (EA), and community information regarding aircraft operations and forecast noise. To support the PIR, short-term noise monitors were located at Richmond, Primrose Sands and Connellys Marsh for a period of six months. As part of the PIR, Airservices also sought suggested flight path alternatives from the community and industry.

Key Findings

The key findings of the PIR were:

- Overall, the EA for the changes to SIDs and STARs correctly identified and considered the communities that were to be affected by the flight path changes. There were differences with the EA modelling and actual PIR operations due to:
  - the noise modelling in the EA was based on a representative summer busy day and representative winter busy day which did not always reflect the variable weather conditions (and therefore runway use) that occurred during the PIR period. As result, the PIR analysis shows use of Runway 12 that was not modelled in the EA Winter results
  - aircraft operations have varied as a result of the COVID-19 impacts on air travel. The PIR period had a busy day average of 66 operations in comparison to 75 busy day movements modelled in the EA
  - in response to COVID-19 impacts, airlines have also made changes to the types of aircraft being used, with an unanticipated increase in smaller passenger jets, such as the Boeing 717-200 (B712), as well as larger freighter aircraft
  - flight path use was affected by the varied movements numbers and changes in aircraft fleet mix as a result of COVID-19 impacts. In particular, use of the Runway 30 arrivals route over Primrose Sands and Carlton River (RWY30 RNP-AR STAR) was higher than expected due to increased uptake of Required Navigation Performance - Authorization Required (RNP-AR) technology and a higher focus on fuel burn and emissions by aircraft operators.
- Aircraft are tracking in accordance with the published SIDs and STARs. Arriving aircraft are generally operating at the altitudes expected in the EA, while departing aircraft are generally operating at higher altitudes than expected.
- Based on the short-term noise monitoring, noise events above 60 dBA were higher than estimated at Primrose Sands (by 2.8-5.2 average daily events) and Connellys Marsh (by 2.7-

2.9 average daily events), and lower than estimated for Richmond (by 8.6-10.1 average daily events). The EA noise modelling did not indicate noise levels above 70 dBA, however noise events above 70 dBA were recorded by all three monitors (there were 2.7-4.5 average daily noise events recorded above 70 dBA at Primrose Sands, 0.5-0.7 daily events at Richmond, and 0.0-0.1 average daily events at Connellys Marsh). This is the result of a range of factors, including the changes in aircraft fleet mix, noise event variation (to get an average noise level there will be some events above and below that level) particularly for aircraft that have a modelled noise level just under 70 dBA, and community and environment noise sources being included in some noise measurements.

- The 'newly overflown' assessment criteria at the time of the EA was applied to the PIR period operations. The original assessment was based on noise modelling thresholds to determine areas of interest, and then a visual assessment of Airservices flight radar tracks to determine if existing tracks were evident in the areas of interest. When applying this same approach to PIR operations and using Airservices flight radar data from 2017 (prior to the original implementation of SIDs and STARs), no areas would be considered to be newly overflown. Since the original EA was completed in 2018, Airservices has updated its criteria for newly overflown.
- The PIR compared actual aircraft flight tracks with the EA for the high level route changes and found that aircraft are operating as expected, with actual flight tracks concentrated along the main high level route structure. Jet aircraft were generally at a higher altitude than estimated in the EA. Usage of the high level routes was lower than expected due to the ongoing impacts on COVID-19 on air travel.
- The review of the EA for the VOR Relocation found that actual use of the VOR approaches for pilot training purposes was much less during the PIR period than forecast in the EA, with PIR use of approximately once per week in comparison to the EA prediction of one movement per busy day and increasing over time to two movements per day. The PIR also identified a few occurrences of commercial passenger jets that used the VOR approach due a misinterpretation of published flight requirements that has since been clarified with air traffic controllers.
- The review of the Hobart Airport NAPs found that the majority of suitably equipped aircraft were using the SIDs and STARs as specified in the NAPs. The general exceptions to the NAPs being applied have been flights to Antarctica (due to the fuel critical nature of the flights), military aircraft (when requested by the pilot) and medical priority flights.
- There are some differences between actual operations during the PIR period and the information about expected aircraft operations that was provided to the community in 2018, 2019, and on the *Aircraft in Your Neighbourhood* website in 2020. These differences relate to the frequency and altitude of aircraft operations on specific SIDs and STARs.
- From the 34 submissions received for community suggested alternatives, 19 flight path change scenarios were identified for assessment. These scenarios were assessed against criteria relating to safety and compliance, operational efficiency, environmental and network impacts. The assessment found:
  - eight suggestions did not meet safety requirements and will not progress for further assessment
  - three suggestions were found to increase air traffic control and/or pilot complexity and workloads, thereby reducing the overall safety of the system, and were not suitable to progress for further assessment
  - three suggestions were not suitable to progress for further assessment due to reduced operational efficiency and delays for aircraft operators, while not providing a substantial improvement to the community
  - five suggestions were found to be safe and feasible. Of these, three suggestions are recommended to progress for further assessment. Two feasible suggestions are not preferred as the improvement objectives are better achieved by one of the other suggestions recommended to progress.

- Industry requested improvements were received for new flight paths between Hobart and New Zealand due to the current flight path arrangements having excessive track miles, fuel burn and emissions and therefore not being suitable for long-term flight operations. Nine flight path suggestions were assessed against criteria relating to safety and compliance, operational efficiency, environmental and network impacts. The assessment found four flight path suggestions were feasible to progress for further assessment.
- Noise modelling was produced to assess a potential improvement to the NAPs that considers preferred runway use at sensitive times of the day. The noise modelling confirmed that improved noise outcomes would be achieved through the suggested NAPs change.

Recommended actions

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

Recommended Action 1

For future noise modelling, rather than selecting a representative busy day for summer and winter, Airservices will identify a busy week that is representative of the variable weather and operational conditions across each analysis period.

Recommended Action 2

Airservices will release updated community information on the Engage Airservices and Aircraft in Your Neighbourhood websites to reflect the PIR findings regarding the altitude and frequency of aircraft operations on each flight path.

Recommended Action 3

For future assessments of community suggested flight path alternatives, Airservices will determine a flight path buffer for sensitive site analysis that takes into account the aircraft altitude and spread of tracks on the flight paths.

Recommended Action 4

Airservices will undertake further assessment of the community suggested change of moving the RWY30 RNP-AR STAR 2-3 km to the east.

Recommended Action 5

Airservices will undertake further assessment of a potential NAPs change to specify preferred runway use at sensitive times of the day, including further community and industry engagement to determine what times of day or night would apply and operational requirements for exemptions.

Recommended Action 6

Airservices will undertake further investigation of the community suggested flight path change to move RWY30 arrivals to the east coast (over water) to determine an appropriate STAR starting waypoint and validate the track miles assessment.

Recommended Action 7

Airservices will undertake further assessment of a suggested new RWY30 departure route (alternative 2) to New Zealand.

Recommended Action 8

Airservices will undertake further assessment of a suggested new RWY12 departure route (alternative 2) to New Zealand.

Recommended Action 9

Airservices will undertake further assessment of a suggested new RWY12 arrival route (alternative 1) from New Zealand.

Recommended Action 10

Airservices will undertake further assessment of a suggested new RWY30 arrival route (alternative 1) from New Zealand.

Recommended Action 11

Airservices will review available noise modelling software tools for consideration of water bodies in terrain models to better account for noise reflection over water sources when noise monitoring data is not available to calibrate the noise model.

1 PURPOSE

The purpose of this document is to present the findings of a Post Implementation Review (PIR) of the Airservices environmental assessments and community information that supported flight path changes implemented by Airservices at Hobart Airport on 7 November 2019. It also provides the outcomes of Airservices review of community and industry suggested flight path alternatives submitted during the PIR.

2 BACKGROUND

In September 2017, Airservices introduced changes to arrival and departure flight paths at Hobart Airport. The changes were designed to organise aircraft departing from or arriving at Hobart Airport onto standard routes called Standard Terminal Arrival Routes (STARs) and Standard Instrument Departure (SIDs) routes. The implementation of new flight paths was associated with satellite-based navigation systems aimed at improving the safety of aircraft landing at and departing from Hobart Airport.

In response to community concern about these flight paths and the associated environmental assessment and community engagement process, Airservices committed to a comprehensive review of the Hobart SIDs and STARs. This was known as the Hobart Airspace Design Review (the Design Review) and was undertaken by Airservices between January 2018 and March 2019.

At the conclusion of the Design Review, Airservices released the following reports:

- *Hobart Airspace Design Review – Proposed Design Feedback Consultation Summary Report* (Version 1.0, 21 March 2019) that summarised the community feedback received through engagement activities undertaken between 31 October 2018 and 7 January 2019
- *Hobart Airspace Design Review Final Report* (March 2019) that described the final airspace design to be implemented and summarised the consideration of feedback that informed the final design.

The Design Review included an Environmental Assessment (EA) of the proposed design, and an EA Addendum for the final design that had been shaped by the community feedback. The EA, EA Addendum and other community engagement resources, information and summary of activities, were published on the Airservices Australia and *Engage Airservices* websites.

EAs were also completed for changes to the Tasmanian high level routes, and new procedures associated with the relocation of the very high frequency omni-directional range (VOR) navigation aid. Information about these flight path changes was also provided on the Airservices and *Engage Airservices* websites.

The flight path changes from the Design Review, Tasmanian high level routes, VOR relocation and Noise Abatement Procedures (NAPs) were implemented on 7 November 2019.

Table 1: Hobart Airspace Design Review timeline of key events

Timeline	Event
Sep 2017	STARs and SIDs are introduced at Hobart Airport Fact Sheet - Changes to Arrival and Departure Flight Paths at Hobart Airport (Sep 2017)
Nov 2017	Airservices commits to amending the arrival flight path (from 1 March 2018) to Runway 30 in response to community feedback about the new SIDs and STARs Hobart Runway 30 STAR Review Report (Nov 2017)
Jan 2018	Hobart Airspace Design Review commenced to review the SIDs and STARs Hobart Airport Airspace Design Review - Terms of Reference (Jan 2018)
Apr 2018	Aircraft Noise Ombudsman (ANO) completes investigation into complaints about the introduction of the new flight paths in Hobart. (All recommendations were fully

Timeline	Event
	accepted and implemented by Airservices and were subsequently closed by the ANO in 2019 and 2020) ANO Investigation into complaints about the introduction of new flight paths in Hobart (Apr 2018)
Jul 2018 – Mar 2019	Consultation undertaken with community and industry stakeholders on the proposed Design Review changes, including social impact analysis Fact Sheet - Hobart Flight Paths Consultation Information (Jul 2018) Social Impact Overview of Hobart Airspace Changes - Consultation Summary Report (Aug 2018) Community Engagement Plan for Hobart Airspace Design Review (Sep 2018) Community Engagement Plan Survey Results (Sep 2018) Hobart Airspace Design Review - Flight Path Design Considerations (Sep 2018) Hobart Airspace Design Review - Stakeholder Reference Panel Summary Report (Sep 2018) Hobart Airspace Design Review - Stakeholder Reference Panel 2 Summary Report (Oct 2018) Hobart Airspace Design Review - Industry Consultation Feedback Summary (Feb 2019) Hobart Airspace Design Review - Proposed Design Feedback Consultation Summary Report (Feb 2019 - updated Mar 2019)
Nov 2018 – Mar 2019	Design Review change alternatives are assessed for safety, efficiency, environment, and community considerations Environmental Assessment of Proposed Changes to SIDs and STARs at Hobart Airport (Nov 2018) Fact Sheet - Hobart Airspace Proposed Design Development Process (Jan 2019) Hobart Airspace Design Review - Environmental Assessment Addendum (Mar 2019)
Mar 2019	Airservices publishes the final report for the Hobart Airspace Design Review Hobart Airspace Design Review – Final Report (Mar 2019)
May 2019	Airservices publishes a range of location-specific fact sheets about the flight path changes commencing on 7 November 2019 Hobart Airspace Changes – Fact Sheets (see Previous Documents > 2019)
Nov 2020	Airservices seeks expressions of interest from property owners to host temporary noise monitors Fact Sheet - Short Term Noise Monitor Installation EOI (Nov 2020)
Nov 2020 – Jan 2021	The Terms of Reference (ToR) for the PIR is developed in consultation with community and stakeholders Hobart Airspace Design Review PIR - draft Terms of Reference for comment (Nov 2020) Hobart Airspace Design Review PIR - Consideration of Feedback on draft Terms of Reference (Jan 2021) Hobart Airspace Design Review PIR - Terms of Reference (Jan 2021)
Feb 2021 – Mar 2021	Airservices seeks community suggested alternatives as part of the PIR Fact Sheet - Hobart PIR Community Suggested Alternatives (Feb 2021) Summary of Q&A Topics from Hobart PIR Webex (Mar 2021) Hobart PIR - Community Suggested Alternatives Webex Panel Meeting Presentation (Mar 2021)

Timeline	Event
Feb 2021	Airservices completes preliminary operational analysis of the flight path changes introduced on 7 November 2019 Hobart PIR - Preliminary findings aircraft movement data analysis (Feb 2021)
Nov 2021	Airservices releases the draft PIR report for public comment Hobart draft PIR Report A community information session for the draft PIR Report is held in Hobart on 13 November Hobart PIR Community Information Session – Airservices Presentation Hobart PIR Community Information Session – Questions and Answers Hobart PIR Community Information Session – Video Recording
April 2022	This final PIR report is published Consideration of Feedback on the Draft PIR Report

3 PIR SCOPE

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

The scope of the Hobart Airspace PIR is to review the changes implemented by Airservices on 7 November 2019, including:

- Instrument flight procedures (SIDs, STARs and approaches) and the use of the VOR
- Noise Abatement Procedures (NAPs)
- Tasmanian high level route changes associated with the Hobart Airspace Design Review
- supporting environmental assessments
- community information regarding aircraft operations and forecast noise.

As part of the PIR, the opportunity for the community and industry to submit suggested flight path alternatives was also provided.

4 OBJECTIVES AND PROCESS

The objectives of the PIR are to:

1. validate the assumptions and forecast noise levels in the following EAs against actual aircraft movement data:
    - *EA of Proposed Changes to Standard Instrument Departures and Standard Arrival Routes at Hobart Airport* (Version 1.3, 8 November 2018) and *EA Addendum* (Version 2.3, 28 March 2019)
    - *EA of Proposed New Route Structure for Hobart Airport* (Version 1.0, 10 April 2019)
    - *EA of Hobart Airport VOR Relocation* (Version 1.0, 31 January 2018)
2. review community information to ensure it reflects the most up to date information regarding the use of the flight paths, procedures, routes and actual aircraft noise levels
3. identify opportunities to minimise the impact of aircraft operations on the community

4. provide stakeholders with the opportunity to submit flight path alternatives, including amendments to the NAPs.

As part of validating the assumptions of the EAs for the Hobart PIR, Airservices committed to examine the application of 'newly overflown' assessment criteria, with consideration of actual noise levels obtained through the short-term noise monitoring and actual aircraft movements. This will be achieved by using the methodology applied in assessing the 2019 changes with consideration of actual operational conditions, with the objective to identify any potential improvements to newly overflown criteria and application.

Where community suggested alternatives for flight paths are assessed as safe, efficient, operationally feasible, and environmentally appropriate, the Airservices flight path change management process will apply in accordance with the current version of the Airservices *National Operating Standard (NOS) Environmental Management of Changes to Aircraft Operations (AA-NOS-ENV-2.100)*.

Where proposals for changes to flight paths and/or procedures are determined to progress, the Airservices *Flight Path Design Principles* will apply.

Where this would result in an associated change to Hobart Airport airspace, the Airspace Change Proposal assessment and approval process through the Civil Aviation Safety Authority (CASA) will apply.

Airservices will engage with the community in accordance with the Airservices *Community Engagement Framework*, including the opportunity to provide feedback on the draft PIR Report.

4.1 PIR Process

The PIR process consists of the following core activities:

- desktop noise modelling comparing the assumptions and findings of the EA with actual aircraft movement data
- on-ground short-term noise monitoring to augment the desktop review and provide actual aircraft noise data
- review of community information regarding forecast aircraft noise and operational impacts on community against actual aircraft movement data, and provision of updated information where required
- consideration of stakeholder feedback regarding the safety, operational management, efficiency and community noise impacts of the flight paths, including community suggested alternatives to flight paths and/or procedures.

5 CURRENT OPERATIONS AT HOBART AIRPORT

5.1 Airport Description

Hobart International Airport (IATA code: HBA, ICAO code: YMHB) is located 17 km north-east of central Hobart in the suburb of Cambridge. The airport has one 2.7 km long runway (RWY12/30) which is aligned north-west/south-east. Figure 1 shows an aerial image of Hobart Airport.

Figure 1: Aerial image of Hobart Airport *(Source: Google Earth)*

A runway can be used in two directions. Weather, in particular wind speed and direction, is usually the main reason for selecting which runway end is in use. The runway end in use determines the direction that aircraft take-off and land and the flight paths that are used.

The runway use at Hobart Airport is highly seasonal due to the prevailing winds. For the majority of the year, when there are north-westerly winds, arriving and departing aircraft operate to and from the south-east end of the runway, referred to as Runway 30 (RWY30). During summer the wind varies and the north-west end of the runway, referred to as Runway 12 (RWY12), and RWY30 are both used.

The majority of operations at Hobart Airport have historically been domestic scheduled passenger operations, with regular Qantas, QantasLink, Jetstar, Virgin Australia and, until 2020, Tigerair services. Hobart Airport is the departure point for flights to Antarctica and is also used for military operations. The Royal Flying Doctor Service has its base at Hobart Airport.

General aviation[1] aircraft mainly operate from the nearby Cambridge Aerodrome, including both fixed wing aircraft and helicopter training, aerial firefighting operations, and scenic flights. There are pilot

[1] The International Civil Aviation Organization classifies general aviation as covering a range of operations that are not commercial air transport services, such as aerial work (e.g. agriculture, photography, surveying, search and rescue), instructional flying and pleasure flying

training schools based at Cambridge Aerodrome, and they undertake circuit training in the Hobart Control Zone[2] .

5.2 Arrival and Departure Procedures

Flight paths at Hobart Airport are designed as standardised paths that segregate arriving aircraft from departing aircraft. The standardised flight paths are referred to as a Standard Instrument Departure (SID) or Standard Instrument Arrival (STAR) route.

The term 'flight path' is used to refer to the mapped three-dimensional corridor within which aircraft flying under the Instrument Flight Rules[3] (IFR) are expected to operate most of the time. IFR procedures are designed for specific on-board navigation aids and ground-based aids located at an airport. Hobart Airport has procedures based on the following technology:

- Area Navigation (RNAV)[4] – utilises on-board global navigation satellite systems (GNSS) to provide guidance to pilots
- Required Navigation Performance - Authorization Required (RNP-AR)[5] – utilises on-board avionics equipment and can only be flown by CASA authorised pilots and approved aircraft. These approaches allow aircraft to fly with a higher degree of accuracy and assist in providing safe and predictable landings in all weather conditions, including inclement weather and low visibility. RNP-AR procedures have previously been referred to as 'RNP' and 'Smart Tracking'
- Instrument Landing System (ILS) – utilises an on-ground radio-based navigation aid, located at Hobart Airport, that uses two radio beams to provide pilots with both vertical and horizontal guidance during an approach to land. ILS approaches are available for RWY12 only
- Very high frequency omni-directional range (VOR) – utilises an on-ground short-range radio navigation aid located at Hobart Airport to emit radio signals that allow pilots to determine their position. Since 7 November 2019, VOR approaches have only been available for pilot training purposes and as part of the backup navigation network.

In addition, separate departure flight paths are designed for jet and non-jet aircraft so that the slower non-jet aircraft are separated from the faster jet aircraft.

Although flight paths are shown as a line on map, the actual flight paths flown can be a number of kilometres wide. Aircraft may fly differently within these corridors for a range of reasons, including aircraft type, speed and weight. Aircraft may deviate from published flight paths for a range of reasons, including weather and operational requirements.

Flight navigation also requires the use of waypoints, which are specified geographical locations where an aircraft will intercept the next segment of the flight route. Each waypoint is a five-letter capitalised word (that is pronounceable and distinct to pilots and air traffic controllers).

General aviation operations, including helicopters, commonly fly Visual Flight Rules (VFR) where the pilot uses visual references on the ground rather than flying on a set flight path.

5.2.1 Aircraft Arrivals

The STARs and approaches into Hobart Airport are shown in Figure 2 and described in Table 2.

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[2] Hobart Control Zone refers to the volume of controlled airspace that is established to protect air traffic operations

[3] Instrument Flight Rules are rules which allow properly equipped aircraft to be flown in all weather conditions, by reference to aircraft navigation instruments

[4] The International Civil Aviation Organization has mandated changes to the naming conventions for aeronautical charts, and all published RNAV(GNSS) approaches are progressively being renamed to RNP approaches

[5] Due to the mandated ICAO naming convention changes (see footnote above), the full acronym RNP-AR is being used in this report to avoid confusion with the required terminology change of RNAV(GNSS) to RNP. Aeronautical charts are being updated to display 'RNP (AR)'.

There are multiple approach paths for each end of the runway, which are used based on the direction that the aircraft is coming from and the avionics technology available on-board the aircraft. Aircraft that are equipped for RNP-AR operations can join the final approach path approximately 3 nautical miles (NM) (or 6 km) from the runway or, if they do not have the required technology, they will join 6-11 NM (12-20 km) from the runway. If weather and operational conditions allow, approaches can be made closer to the airport using the fixed visual approach (which replicates the RNP-AR approach path from waypoints BAVUR and VETOR). Once the aircraft has joined the final approach, they descend towards the runway in a straight line.

The altitude an aircraft is when it begins its final approach will depend on the remaining distance of flight to the runway. There is a regulated minimum altitude for aircraft at all stages of arrival that is determined by the height of terrain in the vicinity of the aircraft, however aircraft are usually well above this minimum altitude. Aircraft will generally descend on a glide slope of three degrees.

Figure 2: Current arrival flight paths into Hobart Airport

Table 2: Hobart Airport arrival flight paths

PIR Reference	Description	Published Procedure
RWY12 RNP-AR STAR	This flight path comprises the RNP-AR STAR, RNP-AR approach and fixed visual approach. Aircraft fly the RNP-AR STAR from either waypoint MORGO or IPLET, then join the RNP-AR approach at waypoint VETOR and conduct a wide arc (over Richmond) that aligns the aircraft with the runway centreline ~4NM prior to landing. A fixed visual approach replicates the RNP-AR approach path from waypoint VETOR and can be used by non-RNP-AR equipped aircraft when weather and operational conditions allow. Unless otherwise specified, for the EAs and the PIR, the non-RNP-AR equipped aircraft using the fixed visual approach have been included with the RNP-AR arrivals.	• STAR IPLET FIVE VICTOR ARRIVAL (RNAV) • STAR IPLET FIVE WHISKEY ARRIVAL (RNAV) • RNAV-W (RNP) RWY12

PIR Reference	Description	Published Procedure
RWY12 RNAV STAR	Aircraft will track from either waypoint MORGO or IPLET and will join the ILS Approach or RNAV Approach at waypoint BUSKA, aligning with the runway ~16NM from the start of the runway.	• STAR IPLET FIVE ALPHA ARRIVAL (RNAV) • STAR MORGO ONE ALPHA ARRIVAL (RNAV)
RWY12 RNAV Approach	A satellite-based approach aligned with runway centreline ~16NM prior to landing, beginning at waypoint BUSKA.	• RNAV-Z (GNSS) RWY 12
RWY12 ILS Approach	Approach aligned with the runway centreline ~16NM prior to landing, beginning at waypoint BUSKA.	• ILS-Z OR LOC-Z RWY 12 • ILS-Y OR LOC-Y RWY 12
RWY12 VOR Approach	Approach used for training purposes by aircraft less than 5,700 kg, or if no alternative approach exists	• VOR RWY 12
RWY30 RNP-AR STAR	This flight path comprises the RNP-AR STAR, RNP-AR approach and Fixed Visual Segment. Aircraft will fly the RNP-AR STAR from either waypoint MORGO or IPLET, then join the RNP-AR approach at waypoint BAVUR and cross the coastline over Carlton / Primrose Sands to align with RWY30 centreline ~3NM prior to landing. A fixed visual approach replicates the RNP-AR approach from waypoint BAVUR and can be used by non-RNP-AR equipped aircraft when weather and operational conditions allow. Unless otherwise specified, for the EAs and PIR the non-RNP-AR aircraft using the fixed visual approach have been included with the RNP-AR arrivals.	• STAR IPLET FIVE VICTOR ARRIVAL (RNAV) • STAR IPLET FIVE WHISKEY ARRIVAL (RNAV) • STAR MORGO ONE VICTOR ARRIVAL (RNAV) • STAR MORGO ONE WHISKEY ARRIVAL (RNAV) • RNAV-W (RNP) RWY 30
RWY30 RNAV STAR	Aircraft will track from either waypoint MORGO or IPLET, with the two STARs joining near Copping and then crossing the coastline between Connellys Marsh and Dunalley to join the RNAV Approach at waypoint PIDOS.	• STAR IPLET FIVE ALPHA ARRIVAL (RNAV) • STAR MORGO ONE ALPHA ARRIVAL (RNAV)
RWY30 RNAV Approach	A satellite-based Y-shaped approach (beginning at waypoint PIDOS) that aligns the aircraft with the runway centreline ~8NM prior to landing.	• RNAV-Z (GNSS) RWY 30
RWY30 VOR Approach	Approach used for training purposes by aircraft less than 5,700 kg, or if no alternative approach exists	• VOR-Z RWY 30 • VOR-Y RWY 30

5.2.2 Aircraft Departures

The SIDs from Hobart Airport are shown in Figure 3 and described in Table 3.

Departure flight paths are designed to follow the runway centreline for a distance sufficient to stabilise aircraft prior to turning toward their destinations.

There are separate SIDs for jet aircraft and non-jet aircraft. Jet departures continue straight ahead in their take-off direction for at least 7NM (13 km) prior to turning. Because they are slower, non-jet aircraft will typically make a turn sooner after departure than jet aircraft as this makes separation and traffic management less complex for air traffic control and improves airport efficiency.

The altitude of departing aircraft depends on the aircraft's climb rate, which is influenced by the wind direction and speed, temperature, air pressure, aircraft type, and aircraft weight (this can vary depending on passenger numbers and fuel load). There are regulated minimum altitudes, governed by international standards, which are based on terrain heights in the vicinity of flight paths. Modern aircraft performance usually results in aircraft being much higher than minimum regulated altitudes. Aircraft taking off generally climb at a higher gradient than the descent gradient for aircraft landing.

The departure flight path being used will take into consideration the arrival flight paths or other departure paths that may need to be crossed.

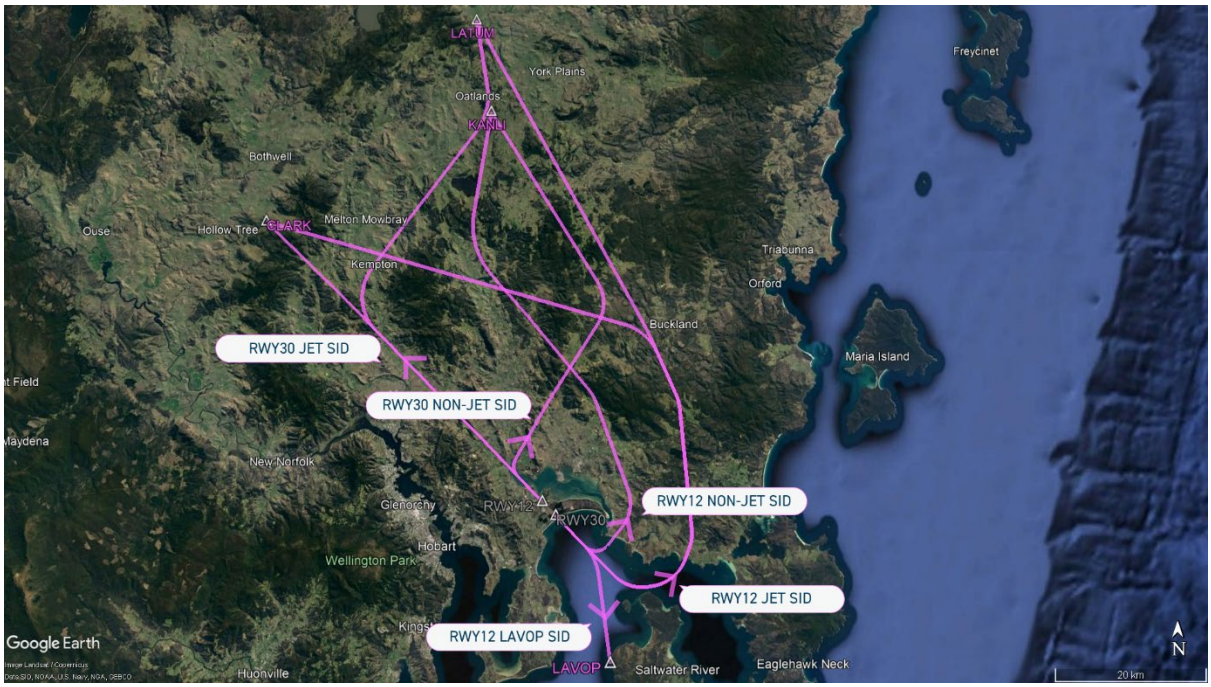


Figure 3: Current departure flight paths for Hobart Airport

Table 3: Hobart Airport departure flight procedures

PIR Reference	Description	Published Procedure
RWY12 JET SID	Jet aircraft depart to the south and turn to cross the coastline near Connellys Marsh, then track to the north past Nugent	• SID CLARK TWO DEPARTURE (RNAV) • SID LATUM TWO DEPARTURE (JET) (RNAV)
RWY12 NON-JET SID	Non-jet aircraft depart to the south and turn to cross the coastline over Dodges Ferry / Carlton, then track to the north-west past Forcett	• SID KANLI THREE DEPARTURE (NON-JET) (RNAV)
RWY12 LAVOP SID	Used primarily for departures to Antarctica, aircraft will turn to the south ~3NM after take-off and fly to the west of Sloping Island	• SID LAVOP ONE DEPARTURE (RNAV)
RWY30 JET SID	Jet aircraft depart to the north-west, turn right over Dysart/Kempton and then track to the north	• SID CLARK TWO DEPARTURE (RNAV) • SID LATUM TWO DEPARTURE (JET) (RNAV)
RWY30 NON-JET SID	Non-jet aircraft depart to the north-west, turn right over Richmond/Penna and then track to the north	• SID KANLI THREE DEPARTURE (NON-JET) (RNAV)

5.3 Noise Abatement Procedures

Every major airport has Noise Abatement Procedures (NAPs), which are procedures designed to reduce the impact of aircraft noise on the community.

There are some limitations to the use of NAPs. Air traffic control or pilots may not be able to use them in certain situations, for example due to weather conditions or operational requirements. NAPs are not compulsory and cannot be enforced by air traffic control but are encouraged through regular engagement with airlines.

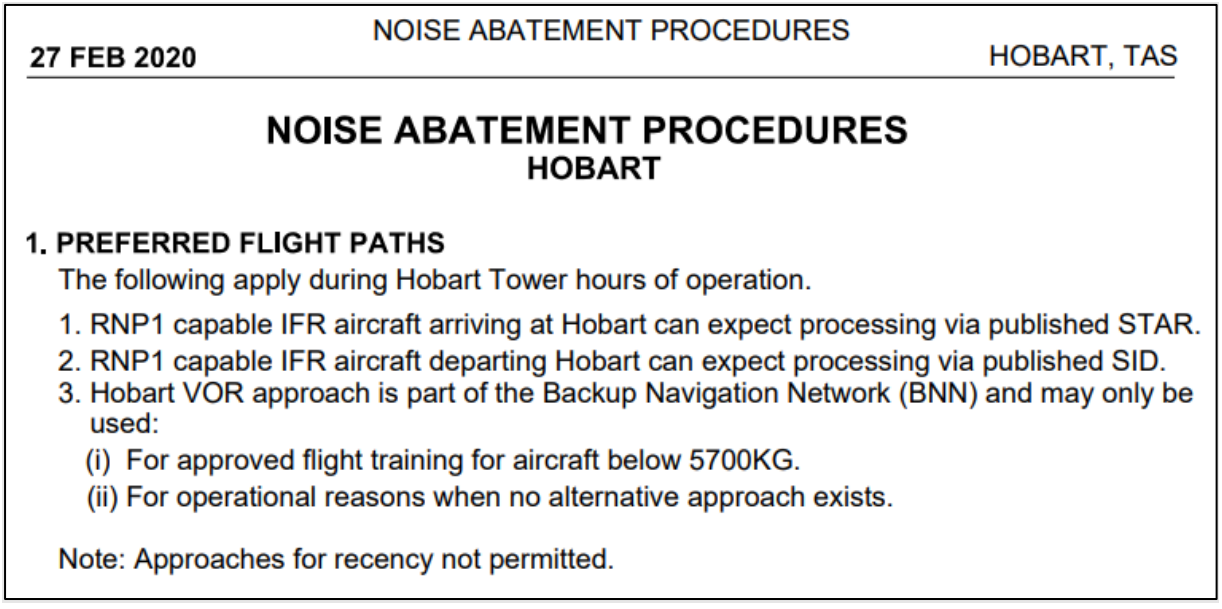
As shown in Figure 4**,** Airservices has NAPs at Hobart Airport for aircraft operating under Instrument Flight Rules. These instructions are published in the Airservices *Aeronautical Information Publication (AIP) DAP 164 Aerodrome and Procedure Charts*[6]*.*

During Hobart Airport air traffic control tower hours (currently 5.50am to 10.10pm), the NAPs preference STAR and SID instrument procedures for aircraft that are equipped to support performance-based navigation operations (referred to as 'RNP1' in the NAPs).

The VOR Approach is the least preferred instrument option and may only be used for flight training for small aircraft (under 5,700 kg maximum take-off weight) or for operational reasons when no alternative approach exists.

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

An assessment of the effectiveness of the Hobart Airport NAPs is discussed in Appendix E.



NOISE ABATEMENT PROCEDURES

27 FEB 2020 HOBART, TAS

NOISE ABATEMENT PROCEDURES
HOBART

1. PREFERRED FLIGHT PATHS

The following apply during Hobart Tower hours of operation.

1. RNP1 capable IFR aircraft arriving at Hobart can expect processing via published STAR.
2. RNP1 capable IFR aircraft departing Hobart can expect processing via published SID.
3. Hobart VOR approach is part of the Backup Navigation Network (BNN) and may only be used:
   (i) For approved flight training for aircraft below 5700KG.
   (ii) For operational reasons when no alternative approach exists.

Note: Approaches for recency not permitted.

Figure 4: Hobart Airport Noise Abatement Procedures (*Source: Airservices AIP, Aerodrome and Procedure Chart)*

[6] https://www.airservicesaustralia.com/aip/aip.asp

6 REVIEW OF EA FOR CHANGES TO SIDS AND STARS

The Hobart Airspace Design Review was undertaken by Airservices between January 2018 and March 2019 and identified a number of changes to the SIDs and STARs at Hobart Airport. These changes were implemented in early November 2019.

The detailed review of the EA for the changes to SIDs and STARs is provided at Appendix A and provides:

- a review of the technical assumptions used to develop the noise modelling for use in the EA
- detailed analysis of each flight path of the final implemented changes against the EA assumptions
- the results of noise monitoring activities undertaken in community areas surrounding Hobart Airport
- an analysis of aircraft operations and noise levels post flight path changes against environmental criteria used for the original EA
- discussion on environmental impacts.

The EA evaluated two scenarios, winter and summer, to address the seasonal variation of air traffic at Hobart Airport. The PIR is based on data from 1 January to 30 June 2021 to provide a six month period that aligns with the EA six month data period (January to July 2018).

The findings of the PIR are summarised below.

Operations

The PIR period had a busy day average of 66 operations in comparison to 75 busy day movements modelled in the EA. Aircraft operations have varied since early 2020 as a result of the COVID-19 impacts on air travel.

In response to COVID-19 impacts, airlines have also made changes to the types of aircraft being used. While the Boeing 737-800 (B738) and Airbus A320 continued to be the most common passenger jet aircraft operating at Hobart Airport, during the PIR period there was an unanticipated increase in the number of the smaller Boeing 717-200 (B712) aircraft. There has also been a higher demand for freight operations, often resulting in larger aircraft being flown, due to the reduced freight volumes able to be carried on passenger services.

Runway Use

During summer the wind varies and both RWY30 and RWY12 are used. The PIR data shows a higher percentage use of RWY12 than what was modelled in the EA. This was due to the EA modelling being based on a representative summer busy day which did not reflect the variable conditions over the analysis period.

RWY30 is used the majority of the time during winter months due to the prevailing north-westerly winds, and the EA modelling was based on a representative winter busy day. However, the PIR data included autumn months that had varied runway use, and as result the PIR analysis shows RWY12 use that was not modelled in the EA.

Recommended Action 1

For future noise modelling, rather than selecting a representative busy day for summer and winter, Airservices will identify a busy week that is representative of the variable weather and operational conditions across each analysis period.

Flight paths and altitude

Aircraft are tracking in accordance with the published SIDs and STARs.

Flight path use differed between the EA and PIR due to the EA modelling being based on runway use for representative summer and winter busy days and RWY12 movements not being modelled for the winter period. In addition, flight path use over the PIR period was affected by the varied movement numbers and changes in aircraft fleet mix as a result of COVID-19 impacts.

Arriving aircraft are generally operating at the altitudes expected, while departures are generally operating at higher altitudes than expected in the EA.

The PIR findings have been used to develop updated noise modelling.

Night movements

The EA reported an average of five daily movements during night hours (11pm to 6am[7]) operating at Hobart Airport between January and July 2018. The PIR period had an average of 1.1 daily movements during night hours, with three night movements on a typical busy day (90th percentile). Night movements represent 2.1% of all flights during the PIR period.

Short-term noise monitoring

To support the PIR analysis, short-term noise monitors were located at Richmond, Primrose Sands and Connellys Marsh for a period of six months.

Noise events above 60 dBA were higher than estimated in the EA for Primrose Sands and Connellys Marsh, and lower than estimated for Richmond. This reflects the differences in modelled and actual runway and flight path use, with use of the RWY30 RNP-AR STAR higher than expected due to aircraft fleet mix changes in response to COVID-19 impacts and higher use of the fixed visual approach. In addition, RWY12 arrivals and departures were not modelled for the EA Winter period due to the use of a representative winter busy day that did not reflect the variable conditions that occurred over the PIR period. The PIR found:

- Primrose Sands recorded a greater number of events above 60 dBA than what was estimated in the EA. There was an average of 8.8 daily events during the PIR Summer period compared to 6-7 daily events modelled for the EA Summer period, and 15.2 daily events during the PIR Winter period compared to 10-11 daily events modelled for the EA Winter period. The average total movements per day at Primrose Sands closely matches the measured events above 60 dBA, indicating that all aircraft traffic over this area reaches noise levels of at least 60 dBA
- Connellys Marsh recorded higher measured noise events than what was estimated in the EA. Approximately one-third of all movements over Connellys Marsh were above 60 dBA. There was average of 4.9 daily events above 60 dBA during the PIR Summer period compared to 2-3 daily events modelled in the EA, and an average 2.7 daily events during the PIR Winter period with no daily events modelled in the EA
- Richmond recorded a lower number of measured noise events than what was estimated in the EA, with an average of 17.9 daily events above 60 dBA for the PIR Summer period and an average of 21.4 daily events for the PIR Winter period. In comparison, there were 28-29 events modelled for the EA Summer period and 30-31 daily events modelled for the EA Winter period.

The EA modelling did not indicate noise levels above 70 dBA, however noise events were recorded by all three monitors. The noise events above 70 dBA are the result of a range of factors, including:

- changes in aircraft fleet mix as a result of COVID-19 impacts
- noise event variation (to get an average noise level there will be some events above and below that level) particularly for aircraft that have a modelled noise level just under 70 dBA
- community and environment noise sources being included in some noise measurements.

[7] Airservices defines night as 11pm to 6am, consistent with relevant Commonwealth curfew legislation (regardless of whether or not a curfew is in place at an airport)

The PIR found:

- Primrose Sands recorded an average of 2.7 daily events above 70 dBA for the PIR Summer and an average of 4.5 daily events during the PIR Winter period
- Connellys Marsh recorded a total of 12 individual events above 70 dBA during the six month PIR period
- Richmond recorded an average of 0.5 daily events above 70 dBA for the PIR Summer and an average of 0.7 daily events during the PIR Winter period.

PIR noise modelling

The AEDT noise modelling software has been calibrated with the short-term noise monitoring data and revised N60 (noise events above 60 dBA) and N70 (noise events above 70 dBA) contours were produced for the PIR period. The updated noise modelling is achieving a closer correlation with actual measured results but is still conservatively predicting a greater number of N60 and N70 daily noise events than what was captured by the short-term noise monitors.

Recommended Action 11

Airservices will review available noise modelling software tools for consideration of water bodies in terrain models to better account for noise reflection over water sources when noise monitoring data is not available to calibrate the noise model.

Summary

Overall, the EA correctly identified and considered the communities that were to be affected by the flight path changes.

There were differences with the EA modelling and actual PIR operations due to the selection of a representative summer and winter busy day as the basis of modelling, which did not reflect the variable weather conditions (and therefore runway use) that occurred over the PIR assessment period.

In addition, flight path use was affected by the varied movements numbers and changes in aircraft fleet mix as a result of the COVID-19 impacts on air travel. In particular, there was higher than expected use of the RWY30 RNP-AR STAR (including fixed visual approach) due partly to the unanticipated change in commercial aircraft types being operated, as well as an increased uptake of RNP-AR technology and a higher focus on fuel burn and emissions by aircraft operators.

7 REVIEW OF NEWLY OVERFLOWN ASSESSMENT

As part of validating the assumptions of the EA for the changes to SIDs and STARs, Airservices has examined the application of ‘newly overflown’ assessment criteria, with consideration of actual noise levels obtained through the PIR short-term noise monitoring and aircraft movements.

The detailed review of the newly overflown assessment is provided at Appendix B.

The original EA newly overflown assessment approach, which was based on noise modelling thresholds to determine areas of interest and then a visual assessment of Airservices flight radar data to determine if there were existing overflights, was applied to actual operations during the PIR period. The review found:

- While there are differences between the applicable EA N60_10 and PIR N60_10 noise modelling contours (N60_10 refers to more than 10 average daily noise events above 60 dBA, which was the noise modelling threshold), both the EA and PIR modelling included the communities of Primrose Sands, Carlton and Carlton River. The PIR N60_10 extends further inland at Carlton River than the EA N60_10, but no longer crosses the coastline near Connellys Marsh. The change in the noise modelling contours is attributed to the calibration of the noise model to reflect short-term noise monitoring and PIR results, fleet mix changes as a result of COVID-19 impacts, as well as higher use of the RWY30 RNP-AR STAR due to

increased uptake of RNP-AR technology and higher than expected number of aircraft using the fixed visual approach because of an increased focus on efficiency and fuel burn savings by aircraft operators.

- The PIR used Airservices flight radar data for the period January to July 2017 (prior to the original SIDs and STARs being implemented) as the comparison period to consider if the PIR area of interest (PIR N60_10 contour) received any overflights prior to the change. Due to the aircraft tracks that were evident in 2017, there would not be any areas considered to be newly overflown.

Since the original EA was completed in 2018, Airservices has updated its criteria for newly overflown and applies single event noise modelling to assess whether a proposed change is noticeable, and then whether there is currently negligible existing aircraft noise (i.e. less than one overflight per day, during the daytime 6am-11pm). The current criteria (at the time of the assessment) will be applied for any of the community or industry suggested alternatives, detailed in Appendix G and Appendix H, that proceed for further consideration and are accepted for flight path design and subsequent EA.

8 REVIEW OF EA FOR HIGH LEVEL ROUTE CHANGES

To support the implementation of the Hobart Airspace Design Review flight path changes, some changes were also required to the high level route structure across Tasmania. SIDs and STARs require high level routes (more than 12,000 ft above ground level) to connect aircraft with their destinations, and changes were made to ensure aircraft could connect seamlessly to the appropriate high level routes with reduced crossover and route complexity.

The detailed review of the EA for the high level route changes is provided at Appendix C.

The changes to the Tasmanian high level routes resulted in some variation to the patterns of how aircraft overfly areas of Tasmania when travelling to or from Hobart Airport. Given the proposed changes occurred at altitudes above 12,000 ft, the EA determined that the potential noise impacts would be minimal. The changes were expected to be visually noticeable to residents in communities below the new routes.

The PIR compared Airservices flight radar tracks with the EA for the high level route changes and found that:

- aircraft were operating as expected, with actual flight tracks concentrated along the main high level route structure
- jet aircraft were generally at a higher altitude than estimated in the EA
- usage of the high level routes was lower than expected due to the ongoing impacts on COVID-19 on air travel.

9 REVIEW OF EA FOR VOR RELOCATION

The very high frequency omni-directional range (VOR) navigation aid was located on land required by Hobart Airport for an extension of the runway and was subsequently turned off and relocated to a new site on the airport, requiring amendment of the instrument approaches that utilise the VOR. As VOR approach procedures are designed with tracking towards the navigation aid, movement of the aid itself required the procedures to be rotated one degree.

Ground-based navigation aids, such as VORs, have been progressively decommissioned across Australia as the transition to satellite-based navigation is implemented. A number of ground-based navigation aids, including the Hobart VOR, have been retained as a backup navigation network contingency.

The NAPs for Hobart Airport (see Section 5.3) identify that VOR approaches may only be used for approved flight training for aircraft below 5,700 kg or for operational reasons when no alternative approach exists.

The detailed review of the EA for the VOR relocation is provided at Appendix D.

The PIR found:

- actual use of the VOR during the PIR period for pilot training purposes was much less than forecast in the EA, with PIR use of approximately once per week in comparison to the EA prediction of one movement per busy day and increasing over time to two movements per day
- seven of the nine aircraft that followed the RWY30 VOR approach during the PIR period were passenger jets (B712s and a B738) that were conducting VOR approaches due to a misinterpretation of the requirements in the *En Route Supplement Australia*[8] aeronautical information publication. This has since been clarified with air traffic controllers.

10 REVIEW OF NOISE ABATEMENT PROCEDURES

As part of the PIR, Airservices committed to a review of the application of the Hobart Airport NAPs to determine if the conditions for use were met and the priorities were being adhered to.

The detailed review of the NAPs in provided at Appendix E.

The NAPs prescribe the use of a SID or STAR for all IFR aircraft during air traffic control hours. As there are a number of different published SIDs and STARs (due to different navigation technologies), the specific SID or STAR operated by the aircraft is based on the aircraft's navigation capability and the prevailing weather conditions.

The NAPs also require VOR approaches to only be available for pilot training purposes by aircraft below 5,700kg or for operational reasons when no alternative approach exists.

The review of the Hobart Airport NAPs found:

- the majority of suitably equipped aircraft were using the SIDs and STARs as specified in the NAPs
- the general exceptions to the NAPs being applied have been flights to Antarctica (due to the fuel critical nature of the flights), military aircraft (when requested by the pilot) and medical priority flights
- VOR approaches for pilot training purposes are being conducted approximately once every two weeks, with demand varying depending on the training needs of local training providers
- there were seven occasions of passenger jet aircraft (B712s and a B738) conducting a VOR approach to RWY30 during the PIR period, which was found to be due to a misinterpretation of the requirements in the *En Route Supplement Australia* aeronautical information publication that has since been clarified with air traffic controllers.

A potential improvement to the Hobart Airport NAPs has been identified through the review of community suggested alternatives. The assessment of the potential NAPs change is provided at Appendix I.1.

[8] https://www.airservicesaustralia.com/aip/aip.asp

11 REVIEW OF COMMUNITY INFORMATION

One of the objectives of the PIR was to review community information to ensure it reflects the most up to date information regarding the use of the flight paths, procedures, routes and actual aircraft noise levels.

The review of the community information is provided at Appendix F.

Following community consultation and finalisation of the flight path designs, in May 2019 Airservices released information about the expected noise impacts and operations. The community information was based on the EAs and included a range of fact sheets on each of the changes.

In February 2021, Airservices released preliminary findings for an interim three-month summer period (2019/2020) which compared actual aircraft movements with the community information provided in May 2019. The analysis of the interim summer data identified some differences to what was advised in the original fact sheets, with departing aircraft generally operating at higher flight altitudes than expected, higher than expected busy day movements for RWY30 RNP-AR STAR arrivals, and lower busy day movements on the RNAV STAR arrival procedures.

Since that time, COVID-19 impacts on air travel have resulted in changes to the types of aircraft being used and frequency of operations. Based on the findings of the PIR, there are some differences between the information provided to the community in 2018 and 2019 and the actual operations during the PIR period. These differences relate to the frequency and altitude of aircraft operations on specific SIDs and STARs.

In December 2020, Airservices launched the *Aircraft in Your Neighbourhood* online portal for Hobart. The portal provides customised information about flight operations, based on the specific location identified through entering an address or dropping a pin on the online map. The website includes information about how the Hobart Airport runways are used, flight paths at Hobart Airport and Cambridge Aerodrome, the frequency and altitude of flights at the specific location for a chosen month, and how much variation should be expected for that location. Some of this information is based on the original EA forecasts and/or interim summer analysis.

Recommended Action 2

Airservices will release updated community information on the Engage Airservices and Aircraft in Your Neighbourhood websites to reflect the PIR findings regarding the altitude and frequency of aircraft operations on each flight path.

12 COMMUNITY SUGGESTED ALTERNATIVES

The PIR included a formal engagement period, from 11 March to 19 May 2021, for community suggested alternatives. The suggestions received were grouped into themes based on the flight path they related to, then the type of change (lateral, vertical etc), and lastly by the specific details of the suggestion. The flight path themes were then assessed against four key elements: safety and operational compliance; operational efficiency and feasibility; environmental; and network.

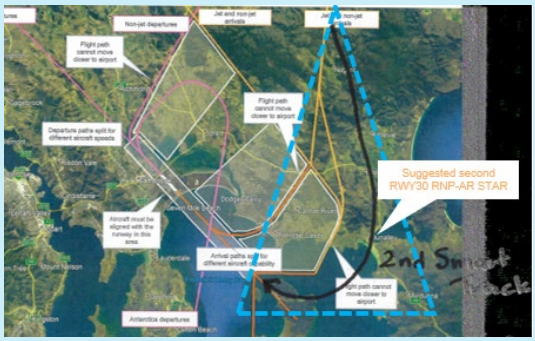
The detailed assessments of the community suggested alternatives is provided in Appendix G.

The full content of each community submission, with reference to the PIR Report section where the suggestion has been considered, is provided at Appendix J.

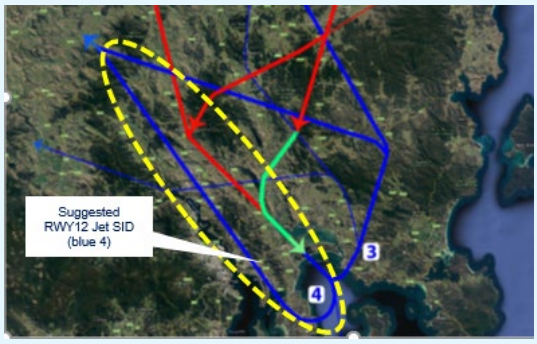
A summary of the suggestions and the assessment outcome is shown in Table 4 below.

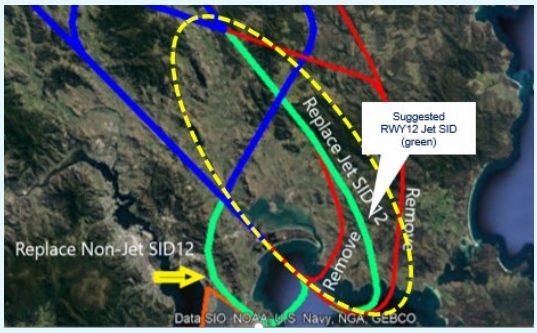
Table 4: Summary of community suggested alternative assessments

Community Suggestion	Assessment Summary
Reinstate pre-2017 flight paths	• The flight paths in place at Hobart Airport prior to September 2017 were based on the VOR navigation aid that utilises radio waves. VOR technology is being phased out and replaced with flight procedures based on satellite-based navigation technology. Current flight paths must be designed according to the current international standards for satellite-based navigation and the pre-2017 flight paths do not meet current design standards ***Assessment outcome:*** *does not meet safety and operational compliance and will not progress for further assessment*
Increase altitude of RWY30 RNP-AR STAR over Primrose Sands & Carlton River 	• There is not adequate remaining flight distance to the runway for aircraft to be at a higher altitude over this location and remain within a safe descent operating profile ***Assessment outcome:*** *does not meet safety and operational compliance and will not progress for further assessment*
Move RWY30 RNP-AR STAR to the east 	Two scenarios considered: 1) moving the STAR 2-3 km to the east, and 2) moving the STAR 7-9 km to the east. • Scenario 1 reduces the number of residential dwellings overflown from 380 to 15. Additional 3-4NM track miles, 11-25kg fuel burn and 33-81kg CO_2 emissions per flight ***Assessment outcome:*** *safe and feasible and is recommended to progress for further assessment.* • Scenario 2 concentrates all RWY30 arrivals on the RNAV STAR location and results in a single STAR to RWY30. Additional 7NM track miles, 25-45kg fuel burn and 79-141kg CO_2 emissions per flight ***Assessment outcome:*** *safe and feasible, however is not recommended to progress for further assessment as the objectives of the suggestion are better achieved by Scenario 1*

Community Suggestion	Assessment Summary
Add second RWY30 RNP-AR STAR to the east to noise share 	• Additional complexity for ATC • Additional 10NM track miles, 36-64kg fuel burn and 112-202kg CO_2 emissions per flight from the east coast of mainland Australia (which would use the suggested STAR), and goes against RNP-AR principles to reduce track miles by providing shorter and more efficient approaches • Distributes approx. one third of RWY30 aircraft arrivals to suggested STAR, however it creates noise exposure for areas not currently experiencing aircraft operations ***Assessment outcome:*** *not recommended to progress for further assessment due to additional complexity, does not meet intent of RNP-AR approaches to be shorter and more efficient, and creates noise exposure for areas not currently experiencing aircraft operations*
RWY30 arrivals to use RNAV STAR at night 	• Results in improved noise outcomes (night-time respite) for communities under the RWY30 RNP-AR STAR • Could be achieved through a NAPs requirement for the RNAV STAR to be the preferred RWY30 flight path at night • Additional 7NM track miles, 25-45 kg fuel burn and 79-142 kg CO_2 emissions for flights at night ***Assessment outcome:*** *potential NAPs change is safe and feasible and is recommended to progress for further assessment*
Move RWY30 arrivals to the east coast 	• Adds complexity for ATC and requires change to air traffic control airspace volumes and approval from CASA • Reduces flights for communities under the current STARs as arrivals from Brisbane and Sydney would use suggested STAR • Additional 5-18NM track miles, 17-116 kg fuel burn and 56-365 kg CO_2 emissions per flight ***Assessment outcome:*** *safe and notionally feasible. Further investigation will be undertaken to determine an appropriate location for the STAR starting point and validate the associated track miles assessment*

Community Suggestion	Assessment Summary
Move RWY30 arrivals to the east 	• Requires moving waypoint BAVUR, and adds complexity due to changed crossing points for arrivals from Melbourne and the RWY30 Non-jet SID departures • Similar number of dwellings overflown however suggested change includes areas previously (but not currently) overflown as well as newly overflown areas • Additional 3-10 NM track miles, 11-64kg fuel burn and 34-203kg CO_2 emissions per flight ***Assessment outcome:*** *safe and notionally feasible, however is not recommended to progress for further assessment as the objectives of this suggestion are better achieved by the suggestion to move RWY30 arrivals to the east coast (see above)*
Move RWY30 RNAV STAR west of the airport 	• Aircraft operations to the west of Hobart Airport have previously been considered but did not proceed due to the safety risks identified by aircraft operators, including turbulence and wind shear risks due to the terrain ***Assessment outcome:*** *will not progress for further assessment due to the safety risks previously identified by aircraft operators*
Move RWY12 Non-jet SID to the east 	Two scenarios considered: 1) moving the Non-jet SID east towards Primrose Sands, and 2) moving the Non-jet SID east towards Connellys Marsh • Jet SID and Non-jet SID would no longer be able to operate independently (of the other SID) due to the reduction in lateral separation, resulting in operational delays • Scenario 1 concentrates noise over areas under the current RNP-AR STAR. Additional 4NM track miles per flight • Scenario 2 reduces the number of dwellings overflown. Additional 8NM track miles per flight ***Assessment outcome:*** *due to the requirement for the Jet SID and Non-jet SID to be able to operate independently, neither Scenario 1 nor Scenario 2 will progress for further assessment*

Community Suggestion	Assessment Summary
Move RWY12 Non-jet SID west of the airport 	• A non-jet departure to the south-west cannot be designed to comply with standards due to the terrain and separation requirements with arriving aircraft ***Assessment outcome:*** *does not meet safety and operational compliance and will not progress for further assessment*
Move RWY12 Jet SID west of the airport 	• A jet departure to the south-west cannot be designed to comply with standards • Aircraft operations to the west of Hobart Airport have previously been considered but did not proceed due to the safety risks identified by aircraft operators, including turbulence and wind shear risks due to the terrain ***Assessment outcome:*** *does not meet safety and operational compliance and will not progress for further assessment*
Move RWY12 Jet SID to the west 	Three scenarios considered: moving the Jet SID 1) 9km to the west, 2) 6-7 km to the west, and 3) 3km to the west • Scenario 1 – moving jet departures 9km to the west (location of the Non-jet SID) does not meet current design standards for jets ***Assessment outcome:*** *Scenario 1 does not meet safety and operational compliance and will not progress for further assessment* • For scenarios 2 and 3, Jet SID and Non-jet SID would no longer be able to operate independently (of the other SID) due to the reduction in lateral separation, resulting in operational delays • Scenario 2 - number of dwellings overflown increased from 20 to 498. Reduction of 14-25kg fuel and 45-81kg CO_2 emissions per flight • Scenario 3 - number of dwellings overflown increased from 14 to 29. Reduction of 2NM track miles, 7-13kg fuel and 22-41kg CO_2 emissions per flight ***Assessment outcome:*** *due to the requirement for the Jet SID and Non-jet SID to be able to operate independently, neither Scenario 2 nor Scenario 3 are recommended to progress for further assessment*

Community Suggestion	Assessment Summary
Move RWY12 Jet SID over Frederick Henry Bay 	• Does not meet safety and design standards due to the climb gradients and turn radius required, as well as increased ATC complexity ***Assessment outcome:*** *does not meet safety and operational compliance and will not progress for further assessment*
Move RWY12 Jet SID to the east coast 	• Would only be used by aircraft departing to Brisbane and Sydney and has similar track miles. Small reduction in number of dwellings overflown, from 15 to 4 (plus 1 accommodation facility), however overflies areas not under any previous or current flight paths • Increases complexity for ATC due to tactically managed flight separation issues. Change to air traffic control airspace volumes and approval from CASA would be required ***Assessment outcome:*** *not recommended to progress for further assessment due to the impacts on operational complexity and does not achieve noise improvement outcomes*
RWY12 Jet SID to turn north-west earlier 	• Jet SID cannot share or be close to the same flight paths as non-jets due to separation requirements (per separate assessment, the Non-jet SID cannot be moved to the west of the airport and must remain to the east) ***Assessment outcome:*** *does not meet safety and operational compliance and will not progress for further assessment*
Introduce curfew for night flights	• The application of a curfew at Hobart Airport is a Commonwealth government policy decision. However, preferred runway use for specific times of the day can be achieved through NAPs. ***Assessment outcome:*** *recommended to progress NAPs option for specifying preferred runway use at sensitive times of the day*
Implement Class C Approach Services	• The purpose of the PIR is to review changes implemented by Airservices ***Assessment outcome:*** *not part of the PIR scope*

Recommended Action 3

For future assessments of community suggested flight path alternatives, Airservices will determine a flight path buffer for sensitive site analysis that takes into account the aircraft altitude and spread of tracks on the flight paths.

Recommended Action 4

Airservices will undertake further assessment of the community suggested change of moving the RWY30 RNP-AR STAR 2-3 km to the east.

Recommended Action 5

Airservices will undertake further assessment of a potential NAPs change to specify preferred runway use at sensitive times of the day, including further community and industry engagement to determine what times of day or night would apply and operational requirements for exemptions.

Recommended Action 6

Airservices will undertake further investigation of the community suggested flight path change to move RWY30 arrivals to the east coast (over water) to determine an appropriate STAR starting waypoint and validate the track miles assessment.

13 INDUSTRY REQUESTED IMPROVEMENTS

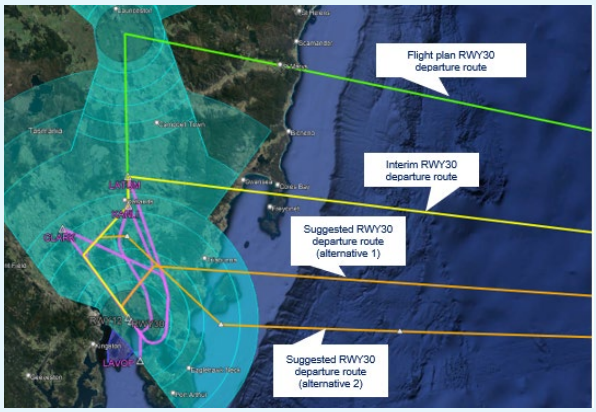
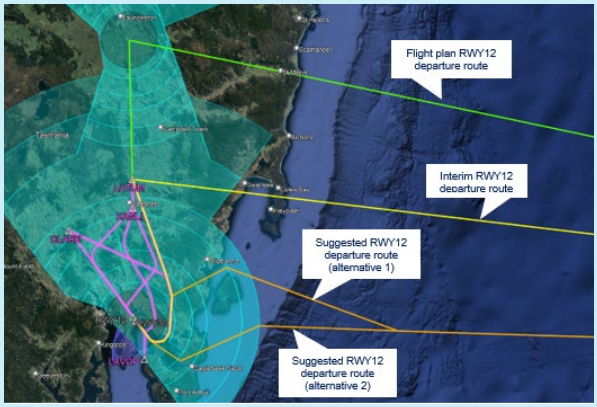
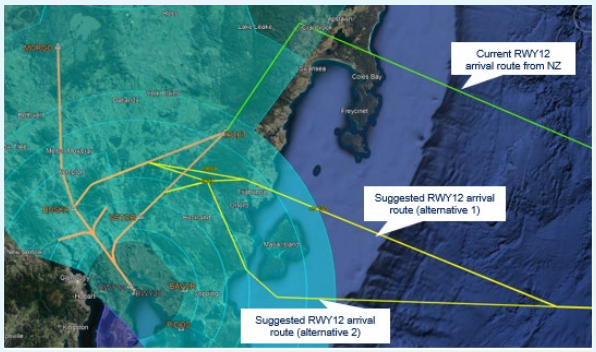
Feedback on the Hobart Airspace Design Review was sought from airlines that operate at Hobart Airport.

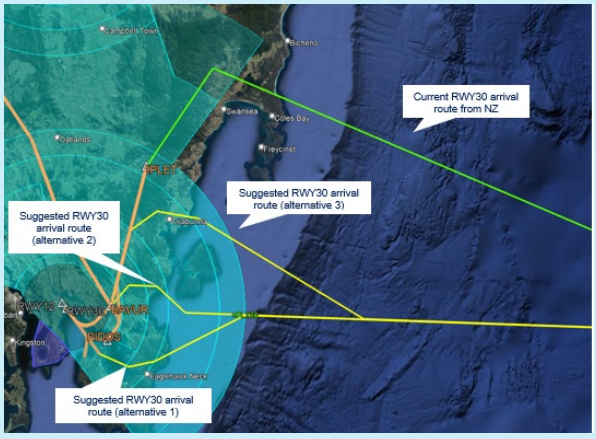
Air New Zealand introduced flights to Hobart Airport on 22 April 2021 as a result of the COVID-19 ‘travel bubble’ arrangements with New Zealand. The current flight routes are based on published procedures and result in excessive track miles (and therefore fuel burn and emissions), and Air New Zealand requested new published flight routes that reduce track miles and achieve greater cost and time efficiencies for flights between New Zealand and Hobart. Shorter interim flight routes for departures to NZ have been possible due to the lower traffic levels (resulting from COVID-19 travel restrictions), however a more efficient and permanent flight path is needed to support long term operations.

The industry suggested flight paths have been assessed using the same criteria that was applied to the community suggested alternatives. The detailed assessments of the industry suggested flight paths are provided at Appendix H.

A summary of the suggestions and the assessment outcome is shown in Table 5 below.

Table 5: Summary of industry suggested flight path assessments

Industry Suggestion	Assessment Summary
New RWY30 departure flight path to NZ 	• Alternative 1 departs via the Non-jet SID and was rejected due to the speed restrictions on the Non-Jet SID being only suitable for non-jets and therefore not complying with design and safety standards ***Assessment outcome:*** *Alternative 1 does not meet safety and operational compliance and will not progress for further assessment* • Alternative 2 is safe, reduces complexity, and has a reduction of 6NM track miles, 36kg fuel burn and 112kg CO_2 emissions per flight. There is an increase from 8 to 50 dwellings overflown, however aircraft are at a high altitude ***Assessment outcome:*** *Alternative 2 is safe and feasible and is recommended to progress for further assessment*
New RWY12 departure flight path to NZ 	• Alternative 2 was preferred due to overflying fewer residential dwellings and having the least track miles in comparison to alternative 1 • Alternative 2 is safe, reduces ATC complexity, has a reduction of 6NM track miles, 36kg fuel burn and 112kg CO_2 emissions per flight, and reduces the number of dwellings overflown from 47 to 1 ***Assessment outcome:*** *Alternative 2 is recommended to progress for further assessment*
New RWY12 arrival route from NZ 	• Alternative 1 is safe, has a reduction of 17-20NM track miles, 102-120kg fuel burn and 322-380kg CO_2 emissions per flight, and overflies a similar number of dwellings as the current flight path (18 compared to 21 currently) • Alternative 2 is not the preferred option as it increases ATC complexity and aircraft track over land for a longer period of time ***Assessment outcome:*** *Alternative 1 is recommended to progress for further assessment*

Industry Suggestion	Assessment Summary
New RWY30 arrival route from NZ 	• Alternative 1 is safe, the number of dwellings overflown is reduced from 363 to 2, and it provides a reduction of 38NM track miles, 228kg fuel burn and 721kg CO_2 emissions per flight • Alternative 2 has complex turns that would increase difficulty flying in adverse weather (particularly strong winds) • Alternative 3 has excessive track miles and overflies significantly more dwellings than alternative 1 ***Assessment outcome:*** *Alternative 1 is recommended to progress for further assessment*

Recommended Action 7

Airservices will undertake further assessment of a suggested new RWY30 departure route (alternative 2) to New Zealand.

Recommended Action 8

Airservices will undertake further assessment of a suggested new RWY12 departure route (alternative 2) to New Zealand.

Recommended Action 9

Airservices will undertake further assessment of a suggested new RWY12 arrival route (alternative 1) from New Zealand.

Recommended Action 10

Airservices will undertake further assessment of a suggested new RWY30 arrival route (alternative 1) from New Zealand.

14 AIRSERVICES SUGGESTED IMPROVEMENTS

One of the objectives of the PIR was to identify opportunities to minimise the impact of aircraft operations on the community.

There was limited feedback received on NAPs from the community, industry or operational staff during the PIR.

The PIR identified that there have been more flights over Primrose Sands, Carlton and Carlton River than anticipated due to the increased use of the fixed visual approach and the increased uptake of RNP-AR technology by aircraft operators. This trend is expected to continue as more aircraft become equipped with RNP-AR technology and aircraft operators increasingly focus on fuel burn costs and emissions.

To provide improved noise outcomes for communities under the RWY30 RNP-AR STAR, Airservices considered a potential change to add a NAP which specifies preferred runway use at sensitive times of the day, such as early morning or evening/night when there is less ambient noise. Based on this proposal, the assessment of the community suggested alternative for the RWY30 RNAV STAR to be solely used at night-time (with no flights on the RNP-AR STAR) determined that this may be feasible to achieve through the NAPs. The analysis of the potential improvement to the NAPs is detailed at Appendix I.

An updated noise model was developed to assess the potential redistribution of arrival traffic during specific hours of the day, based on the scenario of the RWY30 RNP-AR STAR only being used during the day (9am to 5pm). The N60 noise modelling for this scenario showed a reduction of noise events above 60 dBA for Primrose Sands, reducing from 18-20 average daily events in the PIR model to 12-14 average daily noise events for the NAPs change scenario. This analysis indicates improved noise outcomes can be achieved through the suggested NAPs change.

Recommended Action 5

Airservices will undertake further assessment of a potential NAPs change to specify preferred runway use at sensitive times of the day, including further community and industry engagement to determine what times of day or night would apply and operational requirements for exemptions.

15 RECOMMENDED ACTIONS

Review of EA for SIDs and STARs

Recommended Action 1

For future noise modelling, rather than selecting a representative busy day for summer and winter, Airservices will identify a busy week that is representative of the variable weather and operational conditions across each analysis period.

Recommended Action 11

Airservices will review available noise modelling software tools for consideration of water bodies in terrain models to better account for noise reflection over water sources when noise monitoring data is not available to calibrate the noise model.

Review of Community Information

Recommended Action 2

Airservices will release updated community information on the Engage Airservices and Aircraft in Your Neighbourhood websites to reflect the PIR findings regarding the altitude and frequency of aircraft operations on each flight path.

Community Suggested Alternatives

Recommended Action 3

For future assessments of community suggested flight path alternatives, Airservices will determine a flight path buffer for sensitive site analysis that takes into account the aircraft altitude and spread of tracks on the flight paths.

Recommended Action 4

Airservices will undertake further assessment of the community suggested change of moving the RWY30 RNP-AR STAR 2-3 km to the east.

Recommended Action 5

Airservices will undertake further assessment of a potential NAPs change to specify preferred runway use at sensitive times of the day, including further community and industry engagement to determine what times of day or night would apply and operational requirements for exemptions.

Recommended Action 6

Airservices will undertake further investigation of the community suggested flight path change to move RWY30 arrivals to the east coast (over water) to determine an appropriate STAR starting waypoint and validate the track miles assessment.

Industry Requested Improvements

Recommended Action 7

Airservices will undertake further assessment of a suggested new RWY30 departure route (alternative 2) to New Zealand.

Recommended Action 8

Airservices will undertake further assessment of a suggested new RWY12 departure route (alternative 2) to New Zealand.

Recommended Action 9

Airservices will undertake further assessment of a suggested new RWY12 arrival route (alternative 1) from New Zealand.

Recommended Action 10

Airservices will undertake further assessment of a suggested new RWY30 arrival route (alternative 1) from New Zealand.

Potential Improvements

Recommended Action 5

Airservices will undertake further assessment of a potential NAPs change to specify preferred runway use at sensitive times of the day, including further community and industry engagement to determine what times of day or night would apply and operational requirements for exemptions.

16 DEFINITIONS

Within this document, the following acronyms and definitions apply:

Term	Definition
A320	Airbus A320
AEDT	Aviation Environment Design Tool
AIP	Aeronautical Information Publication
ANO	Aircraft Noise Ombudsman
ANOMS	Airport Noise and Operations Monitoring System
ATC	Air Traffic Control
ATSB	Australian Transport Safety Bureau
B738	Boeing 737-800
CASA	Civil Aviation Safety Authority
CO_2	Carbon dioxide
dBA	Adjusted decibels
EA	Environmental Assessment
ERSA	En Route Supplement Australia
GNSS	Global Navigation Satellite System
IFR	Instrument Flight Rules
ILS	Instrument Landing System
NAPs	Noise Abatement Procedures
NCIS	Airservices Noise Complaints and Information Service
NFPMS	Noise and Flight Path Monitoring System
NM	Nautical miles
NMT	Noise monitoring terminal
N60/N70	A measure to describe the average daily number of aircraft noise events above 60 or 70 decibels (dBA) in a certain area
ODAS	Operational Data Analysis Suite
PIR	Post Implementation Review
RNAV	Area Navigation
RNP-AR	Required Navigation Procedure – Authorisation Required (RNP-AR)
RPT	Regular Public Transport
RWY	Runway
SID	Standard Instrument Departure
STAR	Standard Instrument Arrival
VFR	Visual Flight Rules
VOR	Very High Frequency Omni-Directional Range

APPENDIX A - REVIEW OF EA FOR CHANGES TO SIDS AND STARS

The final airspace design was addressed in the *Environmental Assessment of the Proposed Changes to SIDs and STARs at Hobart Airport (EA-1407)* (Addendum version 2.3, effective date 28 March 2019) and implemented in early November 2019.

The PIR of the EA for the changes to SIDs and STARs provides:

- a review of the technical assumptions used to develop the noise modelling for use in the EA
- detailed analysis of each flight path of the final implemented changes against assumptions of the EA
- the results of noise monitoring activities undertaken in community areas surrounding Hobart Airport
- an analysis of aircraft operations and noise levels post flight path changes against environmental criteria used for the original EA
- discussion on environmental impacts.

A.1 Review Methodology

A.1.1 Data Sources

Airservices maintains a Noise and Flight Path Monitoring System (NFPMS). The NFPMS contains flight track and aircraft operational information from the Airservices radar systems and, where available, correlates the flight track data with permanent or temporary noise monitors that are located in the airport surrounds. The PIR has used NFPMS data for Hobart Airport.

A.1.2 Noise Modelling

Noise modelling has been produced with the US Federal Aviation Administration's Aviation Environmental Design Tool[9] (AEDT) software. The AEDT is used to model aircraft performance in space and time to estimate aircraft noise consequences on the ground.

The Airservices National Operating Standard *AA-ENV-NOS-2.100 Environmental management of aircraft operations* applies 'Number-Above' noise modelling (number of events experienced above a defined noise level) to assess aircraft noise exposure. Consistent with the Commonwealth's discussion paper on *Expanding Ways to Describe and Assess Aircraft Noise*[10], the *National Airports Safeguarding Framework Guideline A - Measures for Managing Impacts of Aircraft Noise*[11], and the *Standards Australia Handbook SA HB 149:2016 Acoustics - Guidance on producing information on aircraft noise*, the metrics commonly used in Australia and by Airservices are N60 and N70 contours. N70 refers to the number (N) of aircraft noise events exceeding 70 decibels (dBA[12]), which generally equates to an internal noise level of 60 dBA (with windows open) and is considered to be the level at which activities such as conversation and watching television can be disturbed. N60 is typically used for consideration of night-time noise, as an outside noise level of 60 dBA generally equates to an internal noise level of 50 dBA (with windows open) which is considered to be close to the point at which the noise may cause awakening.

[9] https://aedt.faa.gov/

[10] https://www.infrastructure.gov.au/media-centre/publications/expanding-ways-describe-and-assess-aircraft-noise-discussion-paper

[11] https://www.infrastructure.gov.au/aviation/environmental/airport_safeguarding/nasf/

[12] Sound is measured on a logarithmic scale using decibels (dB). When sound is measured by acoustic equipment, a correction factor is applied to reflect the sensitivity of the human ear. This factor is referred to as being A-weight corrected and is indicated by dBA.

A.1.3 Short-Term Noise Monitoring

To collect aircraft noise event data for the PIR, Airservices sought expressions of interest from property owners to host short-term noise monitors on their properties. Short noise monitors were installed in the suburbs of Richmond, Primrose Sands and Connellys Marsh between January and June 2021. These areas experience regular aircraft traffic and are in the EA noise contours forecast to experience noise events at or above 60 dBA. For the duration of the noise monitoring, the noise event data captured by each monitor was available to view on the online *WebTrak* tool which uses information from Airservices flight radars and allows users to view information for specific aircraft movements.

The analysis of the short-term noise monitoring data is detailed in Section A.8.

A.1.4 PIR Scenarios

The EA evaluated two scenarios, winter and summer[13], to address the seasonal variation of air traffic at Hobart Airport. For the EA, a baseline data period of six months (between January and July 2018) was used to estimate airport busy day (90th percentile[14]) air traffic movements. A representative busy day for summer and winter were selected from the six-month period to establish the distribution of traffic and aircraft types for the noise modelling.

An Interim Summer data period of 1 December 2019 to 1 March 2020 (three months) was analysed to provide preliminary findings to the community in February 2021.

The full data range for the PIR is from 1 January to 30 June 2021 to provide a six month period that aligns with the original EA data period. The PIR period has been divided into two seasonal periods:

- PIR Summer: 1 January to 31 March 2021
- PIR Winter: 1 April to 30 June 2021

Figure 5 shows the monthly aircraft movements for Hobart Airport, with the corresponding range for the EA, Interim Summer period, and full PIR period.

Aircraft operations at Hobart Airport have varied since March 2020 as a result of the ongoing impacts of COVID-19 on air travel.

[13] Winter and summer scenarios are typically developed for aircraft noise modelling as they represent the most distinct shift in seasonal variations. In addition, the worldwide aviation industry operates to two separate schedules - Northern Winter and Northern Winter – that take into account scheduling changes required for the various daylight savings time changeovers as well as the flight impacts associated with weather condition changes.

[14] The 90th percentile is a standard measure for interpreting data. The 90th percentile busy day represents a typical airport busy day.

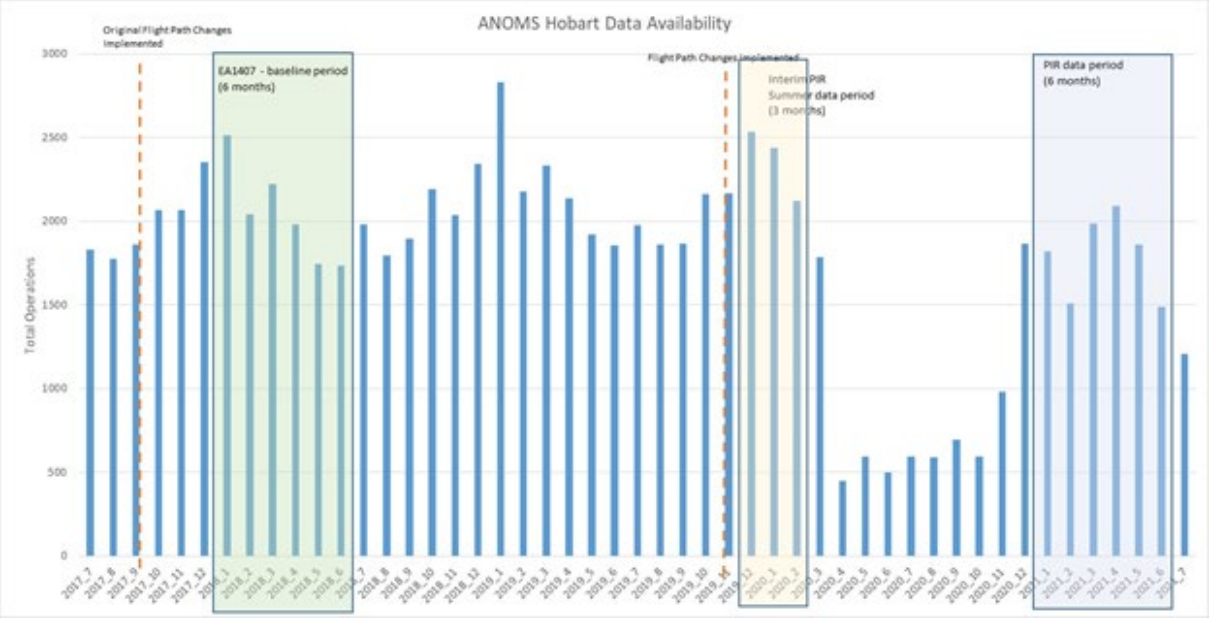


Figure 5: Hobart Airport monthly aircraft movements and EA (green), Interim Summer (yellow) and PIR (blue) periods (*Source: NFPMS*)

A.2 Aircraft Operations

Table 6 provides a comparison of the estimated busy day movement numbers used in the EA and actual data for the Interim Summer and PIR periods. The busy day data is for fixed wing aircraft movements at Hobart Airport only (i.e. excludes Cambridge Aerodrome movements and helicopters).

Hobart Airport typically experiences an increase in operations over the summer period. In the EA, the data range analysed to obtain busy day figures covered a 6-month period between January and July 2018. For the interim summer analysis, three months of summer data was considered and therefore produced higher busy day averages.

The PIR period had a typical busy day (90th percentile) of 66 operations, which is nine operations less per day than what was modelled in the EA. As noted previously, aircraft operations have varied since March 2020 as a result of the impacts of COVID-19 on air travel.

Table 6: EA and PIR aircraft movement comparison

	EA	Interim Summer	PIR
Period	Jan - July 2018 (6 months)	Dec 2019 - Mar 2020 (3 months)	Jan - Jun 2021 (6 months)
Busy day minimum movements	41	35	28
Busy day maximum movements	90	104	82
Busy day average movements	62	77.9	52.4
Busy day (90th percentile) movements	75	93	66

A.3 Aircraft Types

The most common types of passenger jet aircraft that operated at Hobart Airport over the analysis periods are shown in Table 7.

The Boeing 737-800 (B738) and Airbus A320 (A320) continued to be the most common jet aircraft operating at Hobart Airport. During the PIR period, there was an unanticipated increase in the number of Boeing 717-200 (B712) passenger aircraft and the larger freight Boeing 777-300 (B77W) aircraft.

There are several factors that can influence the aircraft fleet being operated to and from Hobart Airport:

- COVID-19 has affected the routes that operate between Australian cities, also affecting the size or type of aircraft being flown
- in response to COVID-19 impacts on travel, airlines and aircraft operators have often utilised smaller aircraft due to the lower number of people flying
- there has been a higher demand for freight operations, often resulting in larger freight aircraft being flown, due to the reduced freight volumes able to be carried on the smaller and/or less frequent passenger services.

Table 7: Common jet aircraft types at Hobart Airport

AIRCRAFT TYPE	AIRCRAFT MOVEMENTS EA (modelled)	AIRCRAFT MOVEMENTS PIR (actual)
Boeing 737-800 (B738)	4,218	2,238
Airbus A320 (A320)	3,149	2,257
Airbus A321 (A321)	1,061	810
Boeing 717-200 (B712)	945	1,844
Boeing 737-300 (B733)	167	140
Boeing 737-700 (B737)	60	3
Boeing 737-300 freighter (B73Y)	45	60
Boeing 777-300ER (B77W) (freighter)	0	33
Boeing 737-400 (B734)	2	16
Gulfstream 5 (GLF5)	36	0
Canadair Challenger (CL60)	28	12
Airbus A319 (A319)	20	6
Airbus A321neo (A21N)	0	6

A.4 Meteorological Conditions

Table 8 compares the meteorological inputs to the AEDT model and the actual conditions during the PIR analysis period. The meteorological data is sourced from the daily weather observations for Hobart Airport published on the Bureau of Meteorology website.

The small differences between the modelled and actual meteorological inputs are not expected to cause much change in noise modelling outputs.

Table 8: Comparison of meteorological conditions

	EA (modelled)	PIR (actual)
Temperature	AEDT default airport parameter for Hobart Airport: 12.5°C	Average minimum: 9.5°C Average maximum: 18.9°C Average: 14.2°C
Pressure (sea level)	1014.2	1014.2
Relative humidity	65.5%	61.2%
Wind speed (knots)	8.53	10.0

A.5 Runway Use Distribution

The distribution of aircraft traffic to runway direction for each analysis period is shown in Table 9.

During summer the wind varies and both RWY30 and RWY12 are used. The PIR Summer data shows a higher percentage use of RWY12 than what was modelled for the EA. This is because the EA modelling was based on a single representative summer day which did not always reflect the weather and operational variations over the full period.

RWY30 is used the majority of time during winter months due to the prevailing north-westerly winds, and the EA modelling was based on a representative winter day. However, the PIR Winter period is from April to July, and thus includes autumn months. As a result, the PIR Winter data shows RWY12 use that was not modelled in the EA.

A number of operations were designated as 'Touch and Go[15]' in the NFPMS. These operations were not included in the EA and are also therefore not included in the runway distribution calculation, causing the total percentages for the PIR period to be less than 100.

Table 9: Runway distribution for assessment periods

		EA	Interim Summer	PIR
Summer	Data period	Jan – Apr 2018	Dec 2019 - Mar 2020	Jan – Mar 2021
	RWY12	42.0%	50.2%	48.9%
	RWY30	56.0%	49.8%	50.6%
Winter	Data period	Apr - Jul 2018	n/a	Apr - Jul 2021
	RWY12	0%		19.0%
	RWY30	100%		80.6%

Figure 6 shows the runway usage for each month of the PIR.

[15] A 'Touch and Go' means the aircraft departed and landed back at the same airport in the same flight. Many circuit training flights are recorded as a 'Touch and Go'. Aircraft that fly to training areas and then return, or undertake short navigational flights in the area, may also be recorded as a 'Touch and Go'.

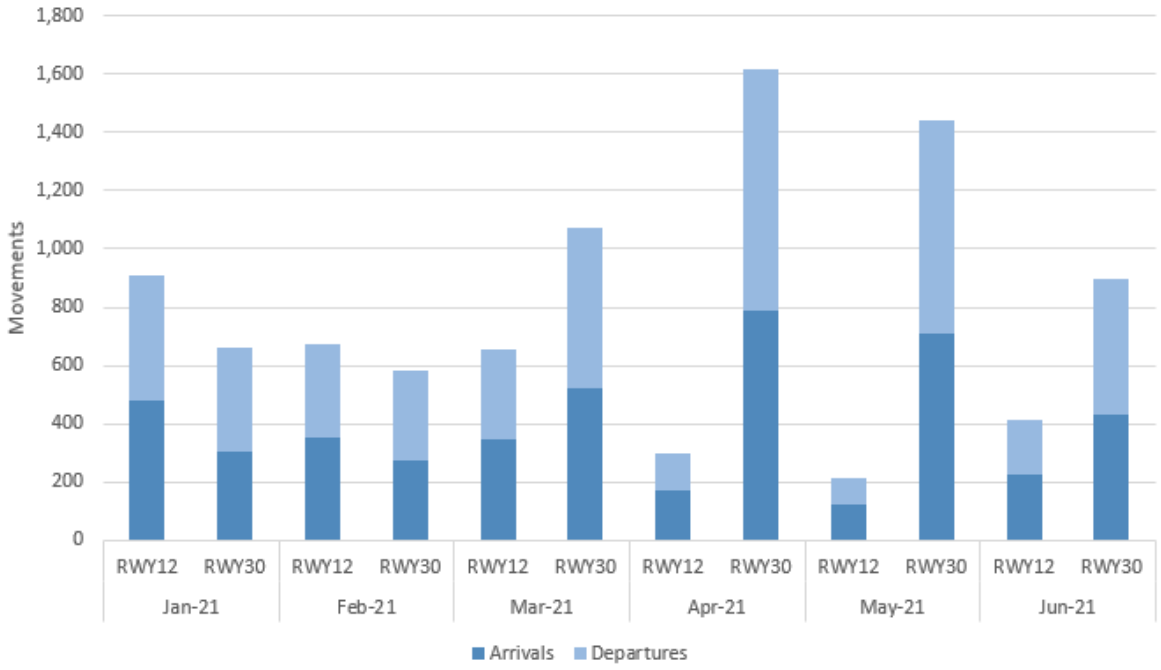


Figure 6: PIR monthly runway use *(Source: NFPMS)*

A.6 Flight Path Use

The review of actual flight tracks, aircraft vertical profiles and frequency of use for each flight procedure is based on manual track allocation using the NFPMS. From time to time, aircraft operations may not follow prescribed SIDs and STARs and therefore are not included in the analysis or imagery. In addition, only aircraft operations at Hobart Airport are shown.

The EA modelling is based on average flights per day and the PIR daily average is provided for comparison. The minimum and maximum number of movements per day during the PIR Summer and Winter periods are also provided to show the day-to-day variation that can occur due to weather and operational conditions.

A.6.1 RWY12 Non-jet SID

Table 10 compares the modelled and actual number of flights per day for the RWY12 Non-jet SID. The EA modelled two movements per day for the Summer period and this was close to the average 1.9 movements per day for the PIR Summer period. As noted in Section A.5, movements for RWY12 during the winter period were excluded from EA modelling, while for the actual PIR Winter period there was an average of 0.6 non-jet movements per day.

Table 10: Movements per day RWY12 Non-jet SID

RWY12 Non-jet SID	EA (modelled)		PIR (actual)	
	Summer	Winter	Summer	Winter
Movements per day	2	0	Average: 1.9 Minimum: 0 Maximum: 7	Average: 0.6 Minimum: 0 Maximum: 5

Actual aircraft tracks and the modelled AEDT track for the RWY12 Non-Jet SID are shown in Figure 7. The modelled track is midway between the spread of actual flight tracks. Actual flight tracks have a distribution of around 3 km as they cross over the coast. Figure 8 shows the actual non-jet tracks by altitude.

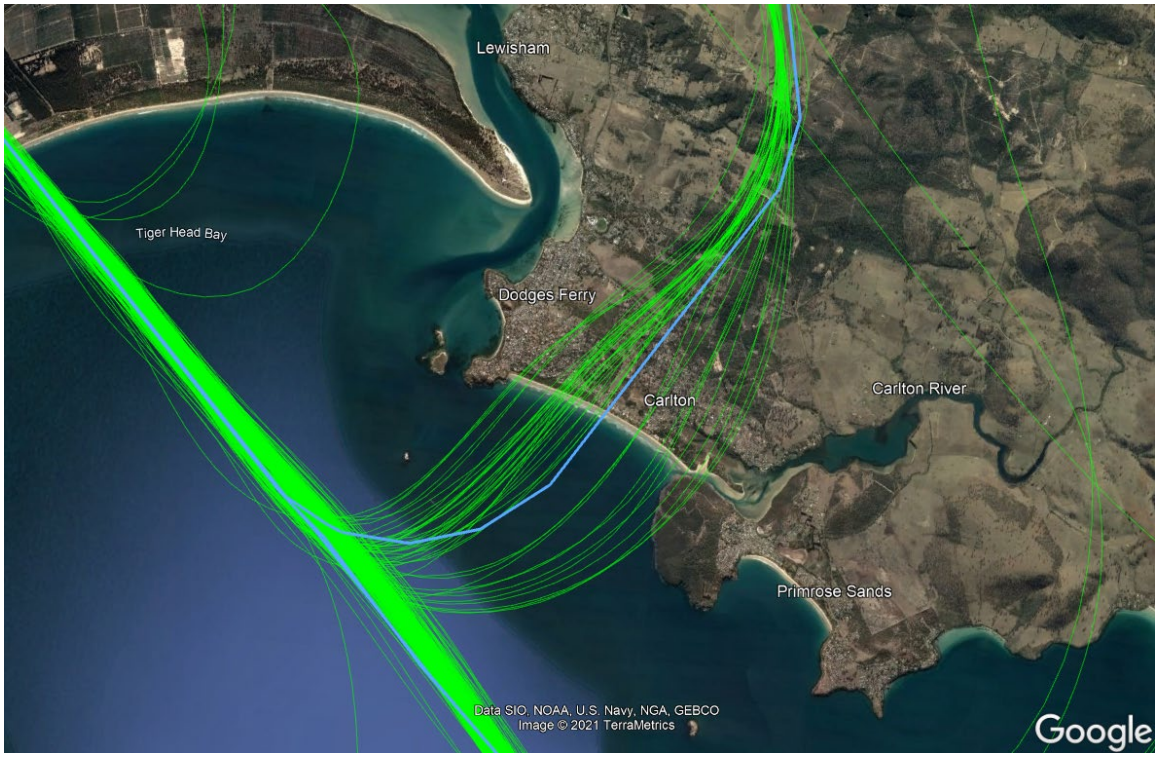


Figure 7: RWY12 Non-jet SID actual tracks (green) and modelled AEDT flight path (blue) (*Source: NFPMS*)

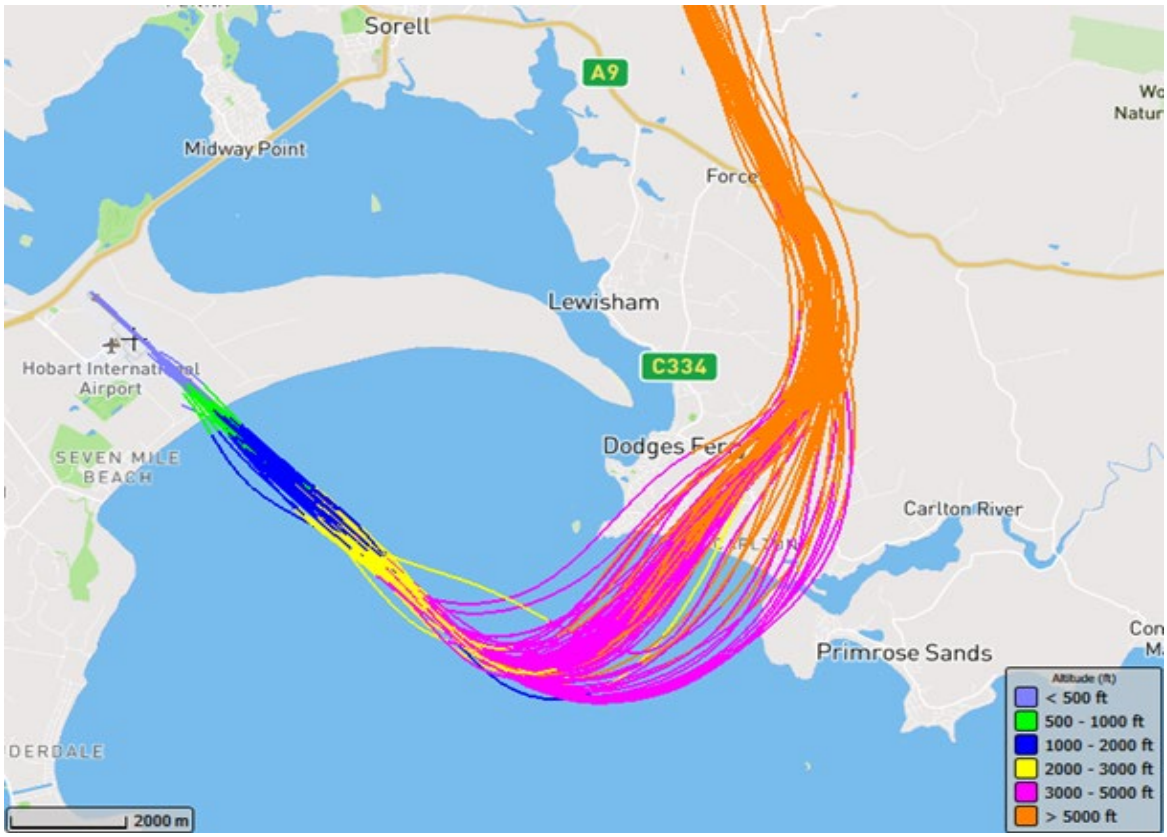


Figure 8: RWY12 Non-jet SID flight tracks and altitude *(Source: NFPMS)*

The vertical profile of RWY12 Non-jet SID departures, based on average flight altitude and distance from the runway, is shown in Figure 9.

The average altitude ('mean') of non-jet departures at the coastline near Carlton is 4,500 ft, with a flight track distance of 12.5 km from the airport. This is the higher than the average 3,000 ft altitude advised in the 2019 community information.

The average attitude of aircraft over Arthur Highway is 6,500 ft with a flight track distance of 19.5 km from the airport. As a comparison, Figure 9 also shows the EA modelled vertical profile for the SAAB 340 (SF34). There is a difference of 1,000 ft between the mean aircraft altitude (all aircraft types) and the modelled SF34 profile near Carlton.

The altitude of RWY12 non-jet departing aircraft has been updated in the AEDT PIR model to reflect actual observations and improve the noise modelling (see Section A.9).

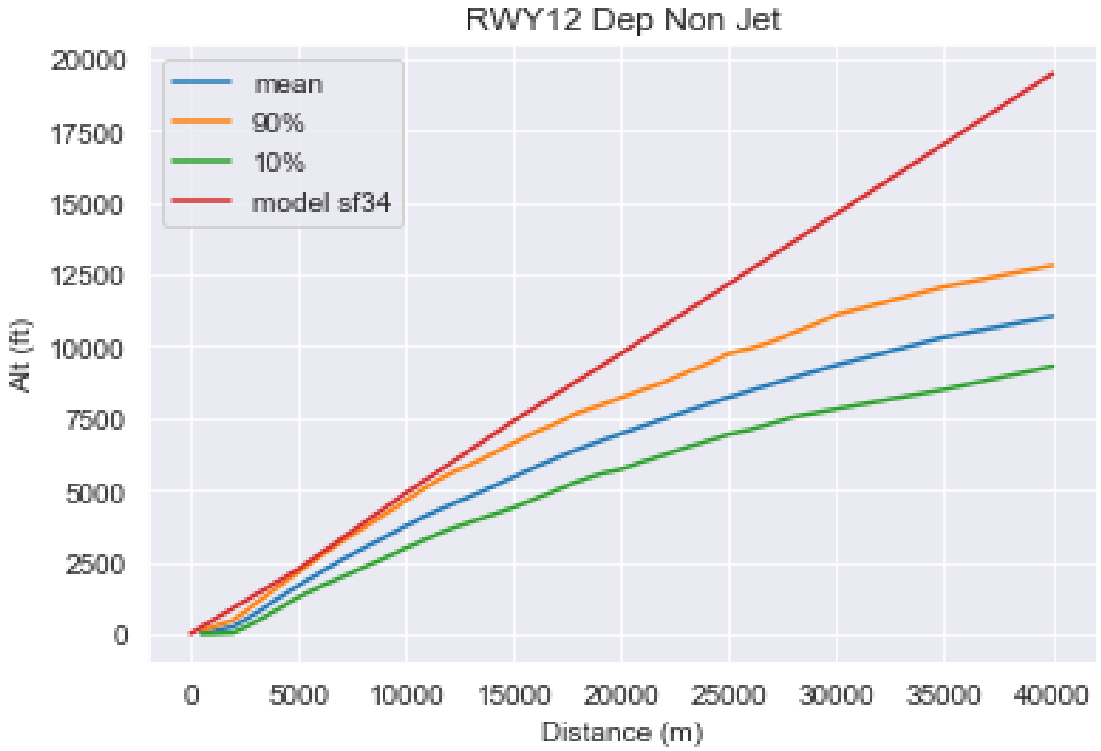


Figure 9: Vertical profile of RWY12 Non-jet SID movements and EA modelled SF34 *(Source: NFPMS)*

A.6.2 RWY12 Jet SID

Table 11 compares the modelled and actual number of flights per day for the RWY12 Jet SID. The EA modelled 15 movements per day during the Summer period, which was higher than the average 9.2 movements during the PIR period. As noted in Section A.5, movements for RWY12 during the Winter period were excluded from EA modelling, while for the actual PIR Winter period there was an average of 3.6 jet movements per day.

Table 11: RWY12 Jet SID movements per day

RWY12 Jet SID	EA (modelled)		PIR (actual)	
	Summer	Winter	Summer	Winter
Movements per day	15	0	Average: 9.2 Minimum: 0 Maximum: 22	Average: 3.6 Minimum: 0 Maximum: 23

A comparison of actual RWY12 Jet SID tracks and the modelled AEDT flight path is shown in Figure 10. Actual tracks by altitude are shown in Figure 11.

Figure 10: RWY12 departure flight tracks (green) and modelled AEDT flight paths (blue) *(Source: NFPMS)*

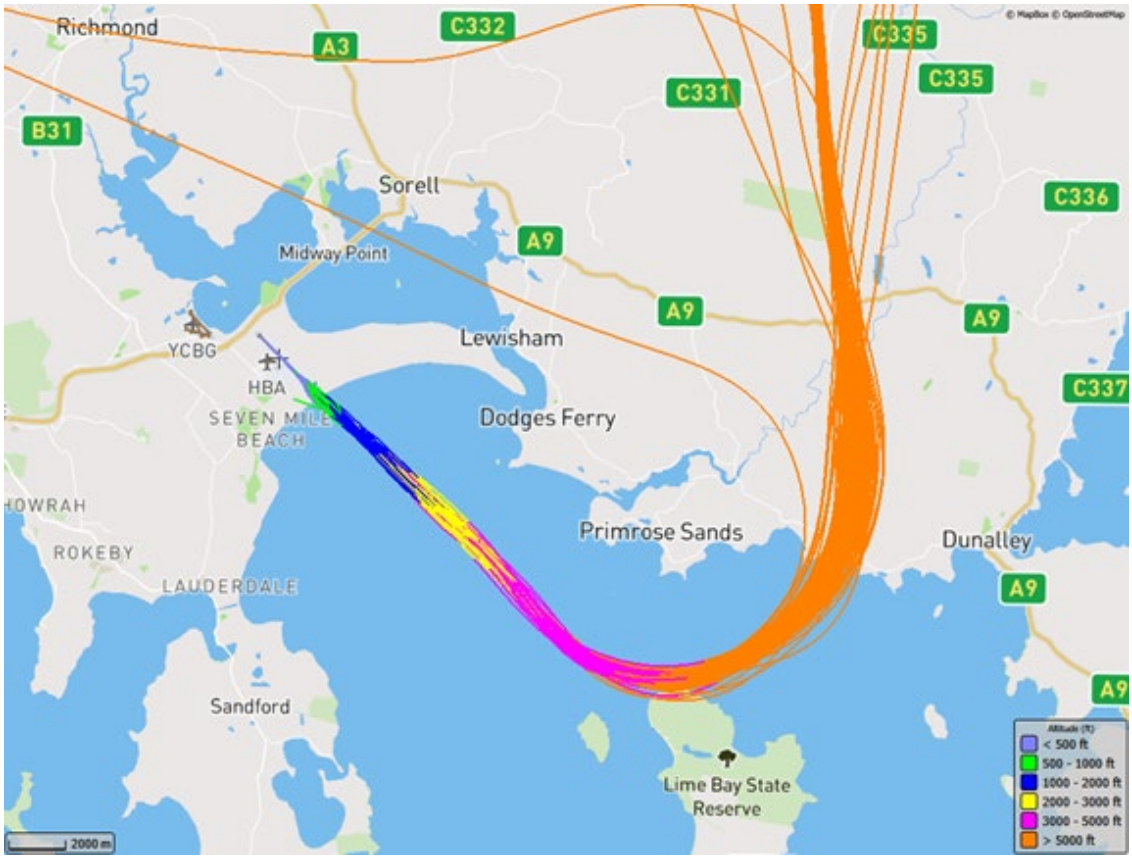


Figure 11: RWY12 Jet SID flight tracks and altitude *(Source: NFPMS)*

The vertical profile of RWY12 Jet SID departures is shown in Figure 12. The EA modelled vertical profile for the most common type of aircraft using the SID, the B738, is included for comparison. For the B738, actual aircraft altitudes on departure are lower than modelled, resulting in slightly higher noise levels on the ground than what was modelled.

The average altitude of aircraft near Lime Bay Reserve is 4,800 ft (flight track distance of 16 km from the runway), 7,000 ft when crossing the coastline at Connellys Marsh (23 km from the runway), and 10,000 ft when crossing Arthur Highway (32 km from the runway).

The altitude of RWY12 jet departing aircraft has been updated in the AEDT PIR model to reflect actual observations and improve the noise modelling (see Section A.9).

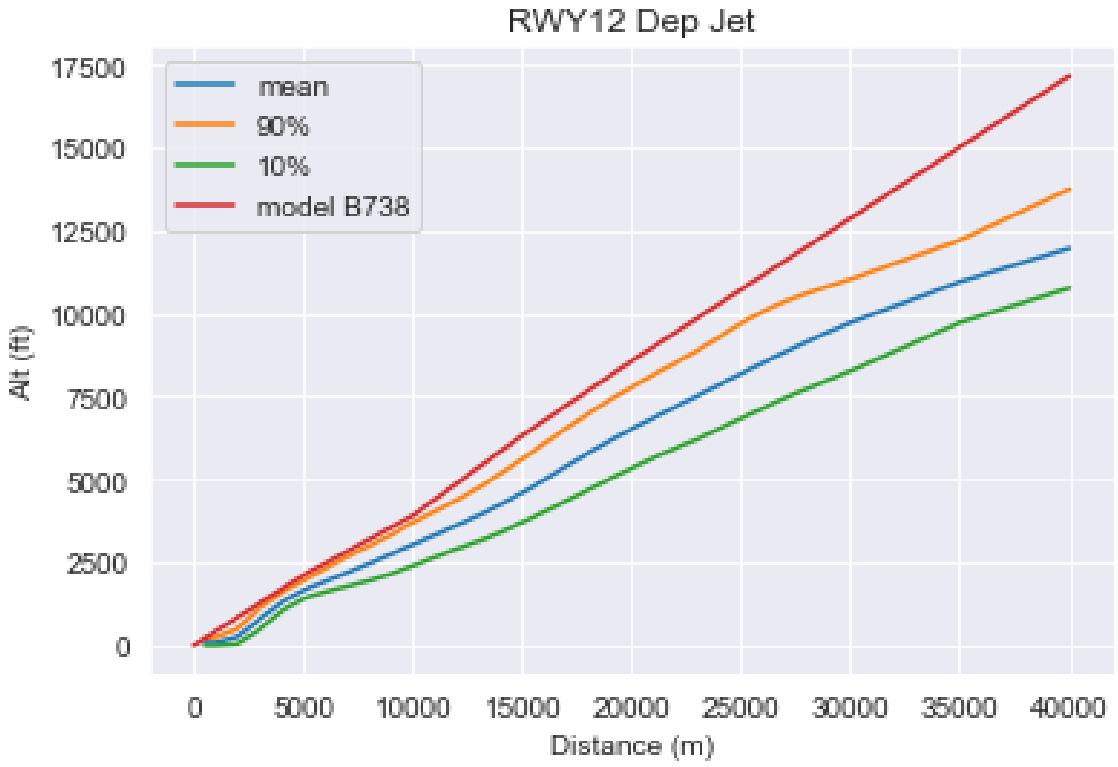


Figure 12: Vertical profile of RWY12 Jet SID movements and EA modelled B738 *(Source: NFPMS)*

A.6.3 RWY30 Non-jet SID

Table 12 compares the modelled and actual number of flights per day for the RWY30 Non-jet SID. The EA modelled number of movements per day during both the summer and winter periods was higher than the actual PIR events.

Table 12: RWY30 Non-jet SID movements per day

RWY30 Non-jet SID	EA (modelled)		PIR (actual)	
	Summer	Winter	Summer	Winter
Movements per day	4	5	Average: 1.5 Minimum: 0 Maximum: 5	Average: 2.2 Minimum: 0 Maximum: 7

A comparison of actual RWY30 Non-jet SID tracks and the modelled AEDT flight path is shown in Figure 13. Actual tracks by altitude are shown in Figure 14.

Figure 13: RWY30 actual flight tracks (green) and modelled AEDT flight paths (blue) *(Source: NFPMS)*

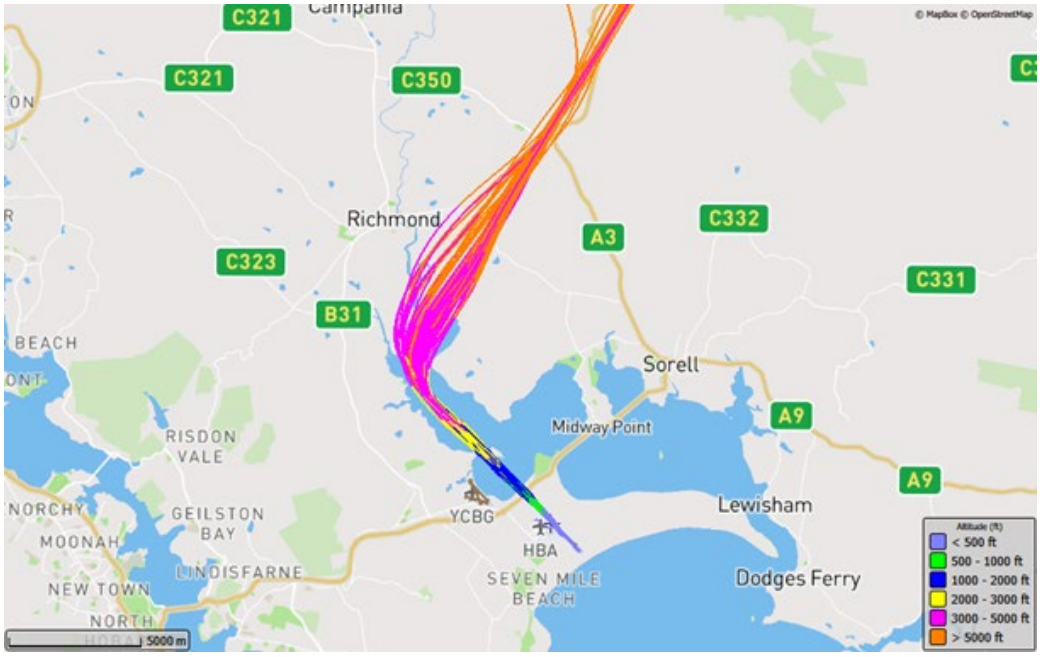


Figure 14: RWY30 Non-jet SID flight tracks *(Source: NFPMS)*

The vertical profile of RWY30 Non-jet SID departures is shown in Figure 15. As a comparison, the EA modelled SF34 profile is similar to the mean altitude of all non-jet departures until around 4,000 ft.

The average altitude of aircraft overflying Brinktop Road is 6,000 ft (flight track distance of 15 km from the runway).

The altitude of non-jet aircraft departing RWY30 has been updated in the AEDT PIR model to reflect actual observations and improve the noise modelling (see Section A.9).

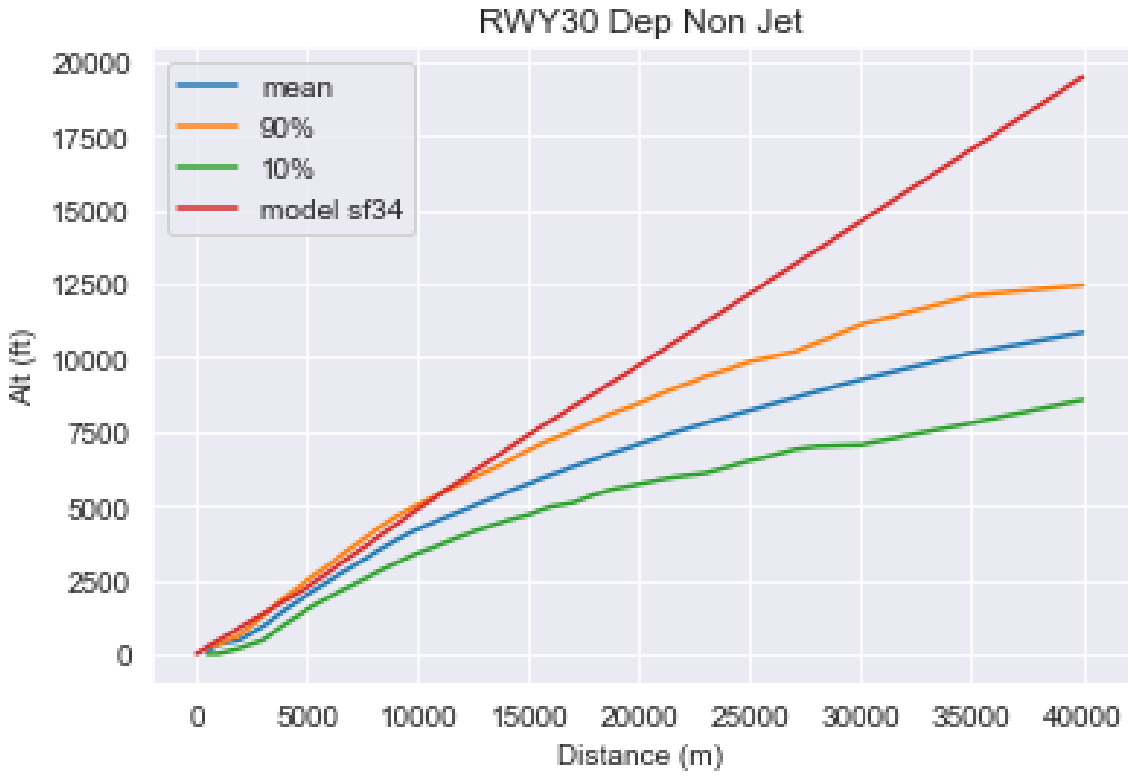


Figure 15: Vertical profiles of RWY30 Non-jet SID movements and EA modelled SF34 *(Source: NFPMS)*

A.6.4 RWY30 Jet SID

Table 13 compares the modelled and actual number of flights per day for the RWY30 Jet SID. The EA modelled number of movements per day during both the summer and winter periods was much higher than the actual PIR events.

Table 13: RWY30 Jet SID movements per day

RWY30 Jet SID	EA (modelled)		PIR (actual)	
	Summer	Winter	Summer	Winter
Movements per day	18	31	Average: 10.3 Minimum: 0 Maximum: 25	Average: 18.2 Minimum: 0 Maximum: 31

A comparison of actual RWY12 Jet SID tracks and the modelled AEDT flight path is shown in Figure 16. Actual tracks by altitude are shown in Figure 17.

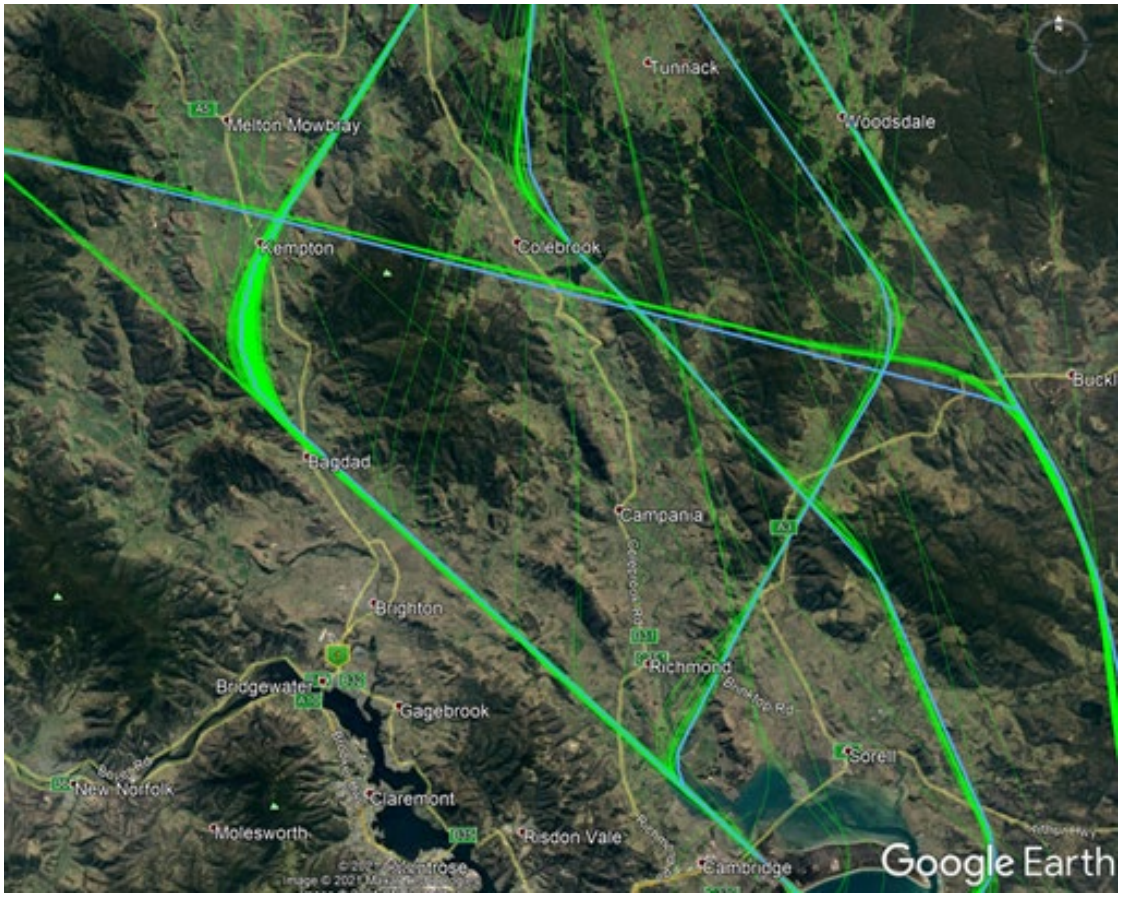


Figure 16: RWY30 actual departure tracks (green) and modelled AEDT flight paths (blue) *(Source: NFPMS)*

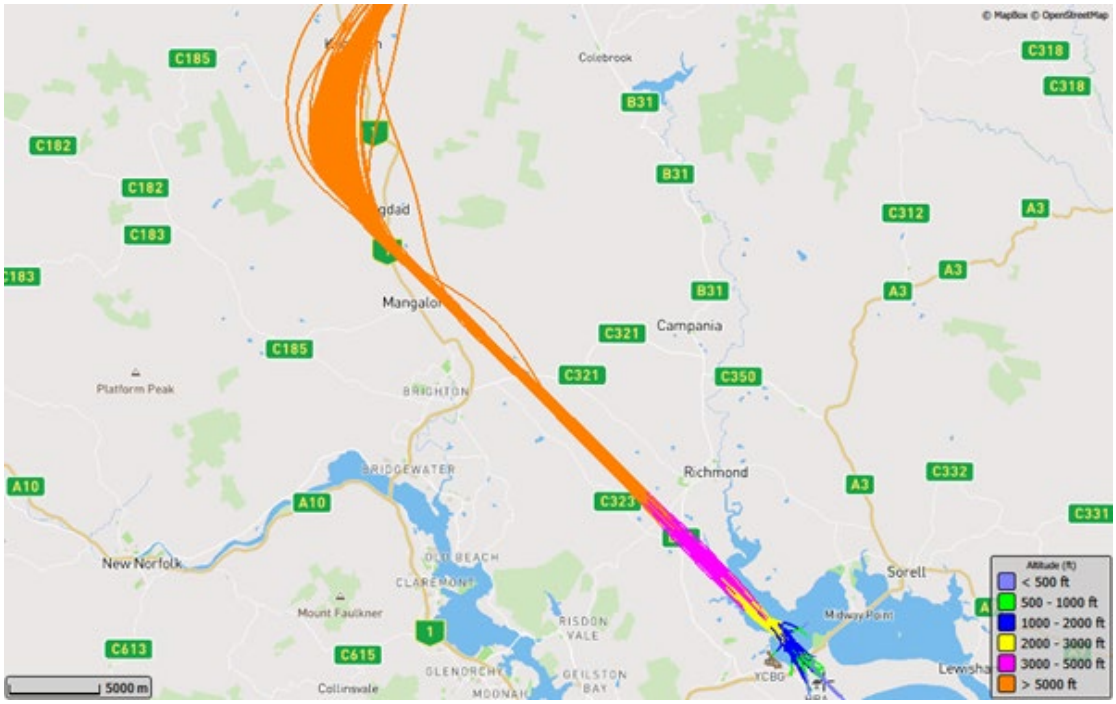


Figure 17: RWY30 Jet SID flight tracks by altitude *(Source: NFPMS)*

The vertical profile of RWY30 Jet SID departures is shown in Figure 18. The EA modelled vertical profile for the B738 is similar to the 90th percentile of actual tracks for all aircraft types.

The average aircraft altitude near Kempton is 14,000 ft with a flight track distance of 42 km from the runway.

The altitude of RWY12 jet departures has been updated in the AEDT PIR model to reflect actual observations and improve the noise modelling (see Section A.9).

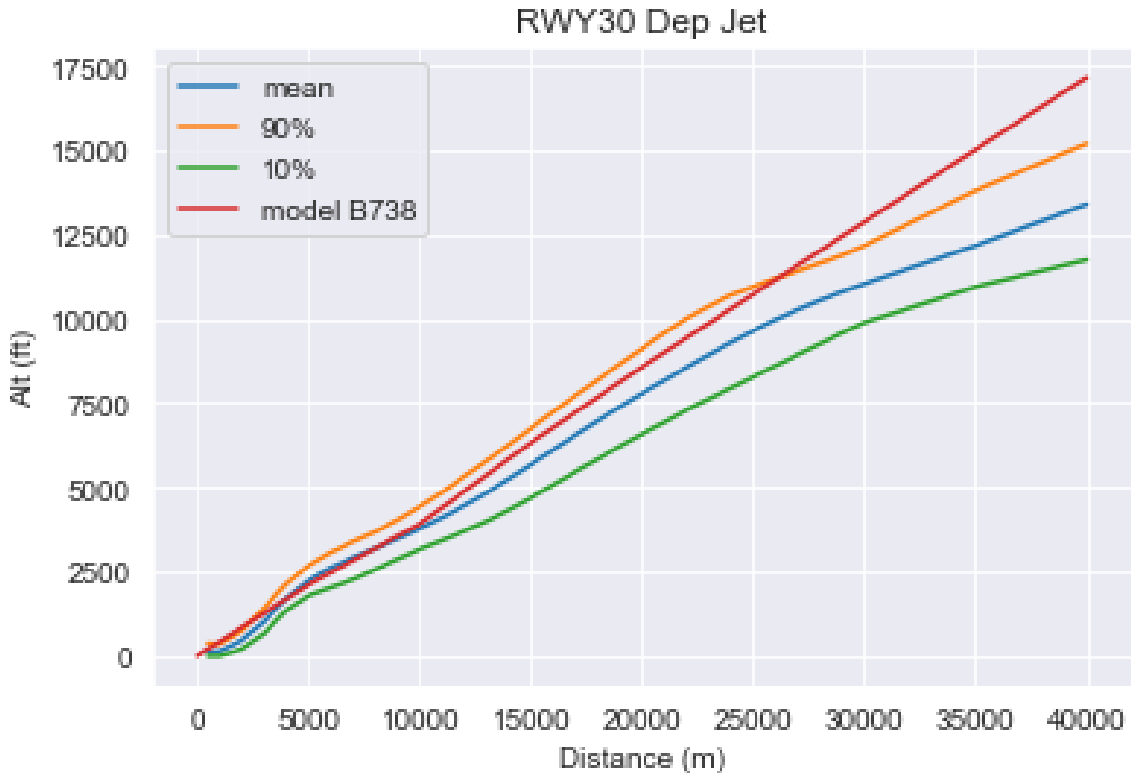


Figure 18: Vertical profile of RWY30 Jet SID movements and EA modelled B738 *(Source: NFPMS)*

A.6.5 RWY30 RNAV STAR

Table 14 compares the modelled and actual number of flights per day for the RWY30 RNAV STAR. The EA modelled average number of movements per day during both the Summer and Winter periods was significantly higher than the actual PIR events.

Table 14: RWY30 RNAV STAR movements per day

RWY30 RNAV STAR	EA (modelled)		PIR (actual)	
	Summer	Winter	Summer	Winter
Movements per day	14	22	Average: 2.7 Minimum: 0 Maximum: 11	Average: 5.4 Minimum: 0 Maximum: 16

A comparison of actual RWY30 RNAV STAR tracks and the modelled AEDT flight path is shown in Figure 19. Actual tracks by altitude are shown in Figure 20.

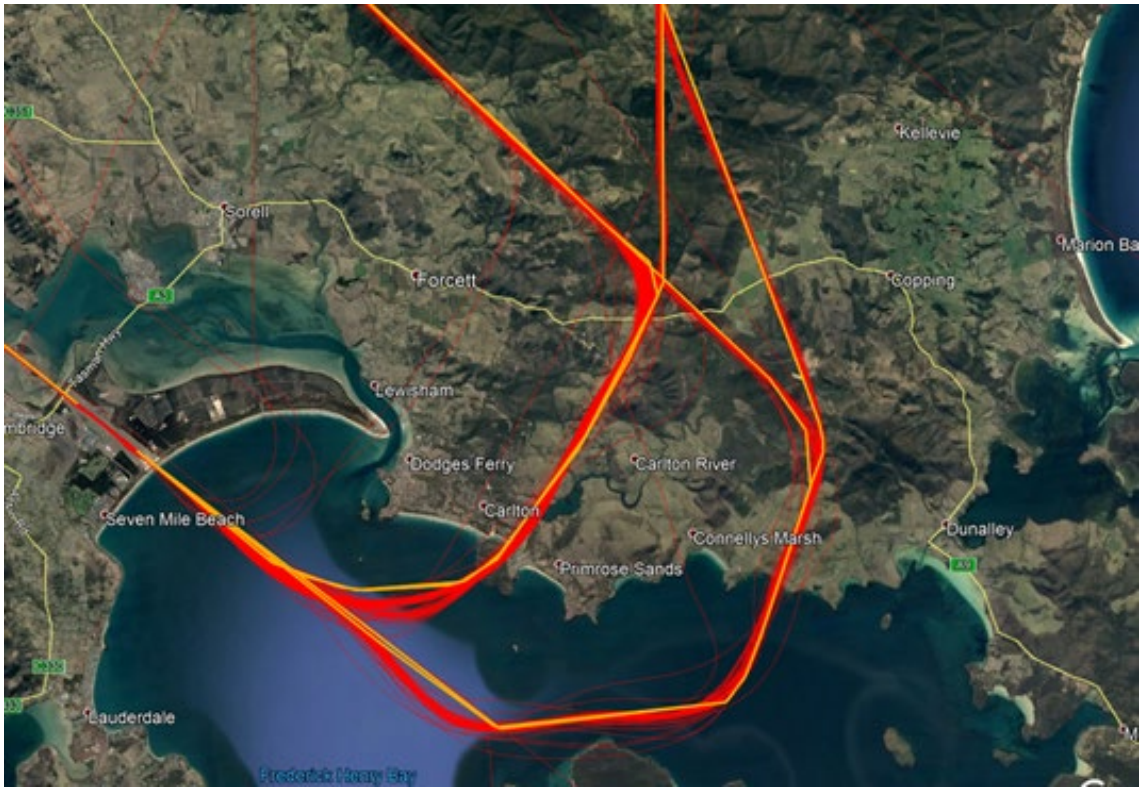


Figure 19: RWY30 arrival tracks (red) and modelled AEDT flight paths (orange) *(Source: NFPMS)*

Figure 20: RWY30 RNAV STAR flight tracks and altitude *(Source: NFPMS)*

The vertical profile of RWY30 RNAV STAR arrivals is shown in Figure 21. Above 3,000 ft, the B738 is modelled at a lower altitude than the mean average of all aircraft tracks. The average altitude of aircraft crossing the coastline at Connellys Marsh is 4,500 ft, with a flight track distance of 25 km from the airport. Waypoint PIDOS is 20 km from the runway.

The altitude of RWY30 RNAV arrivals has been updated in the AEDT PIR model to reflect actual observations and improve the noise modelling (see Section A.9).

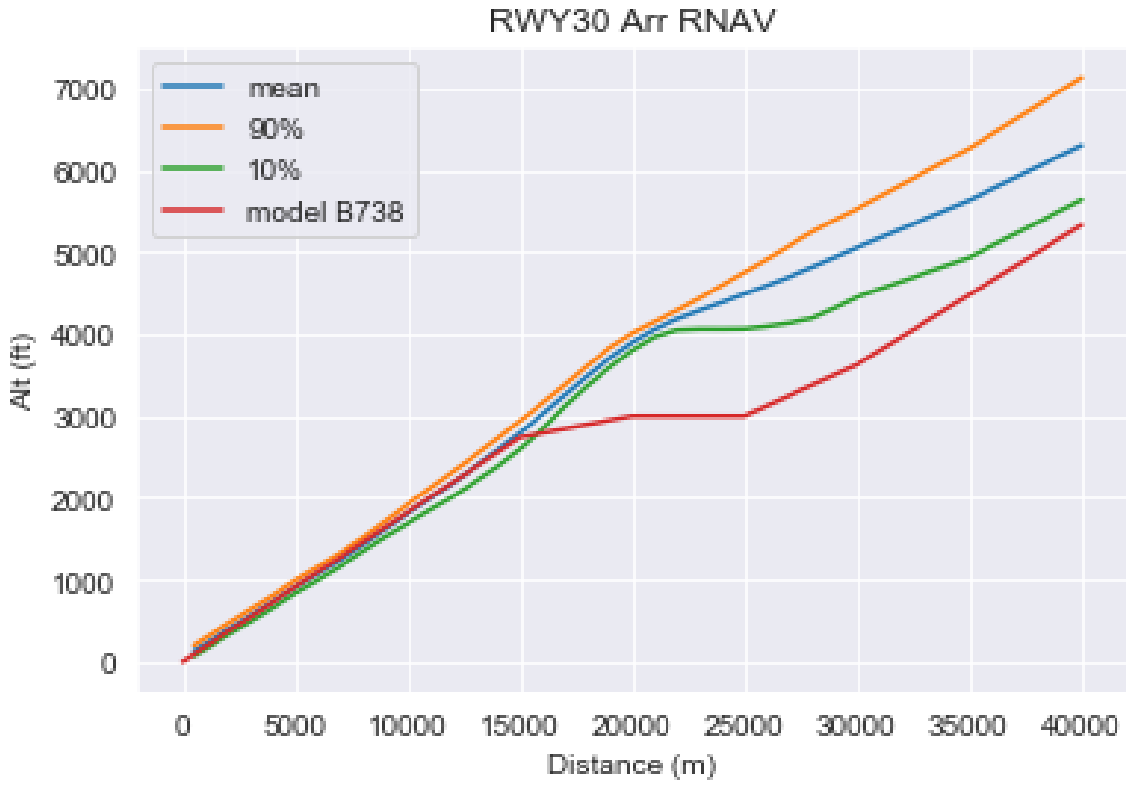


Figure 21: Vertical profile RWY30 RNAV STAR movements and EA modelled B738 *(Source: NFPMS)*

A.6.6 RWY30 RNP-AR STAR

Table 15 compares the modelled and actual number of flights per day for the RWY30 RNP-AR STAR. In comparison to what was modelled for the EA, the PIR Summer period had an additional 1.9 average daily movements while the PIR Winter period had an additional 4.3 average daily movements.

Table 15: RWY30 RNP-AR STAR movements per day

RWY30 RNP-AR STAR	EA (modelled)		PIR (actual)	
	Summer	Winter	Summer	Winter
Movements per day	7	11	Average: 8.9 Minimum: 0 Maximum: 25	Average: 15.3 Minimum: 0 Maximum: 31

A comparison of actual RWY30 RNP-AR STAR tracks and the modelled AEDT flight path is shown in Figure 22. Actual tracks by altitude are shown in Figure 23.

Figure 22: RWY30 RNP-AR arrival tracks (red) and modelled AEDT flight path (orange) *(Source: NFPMS)*

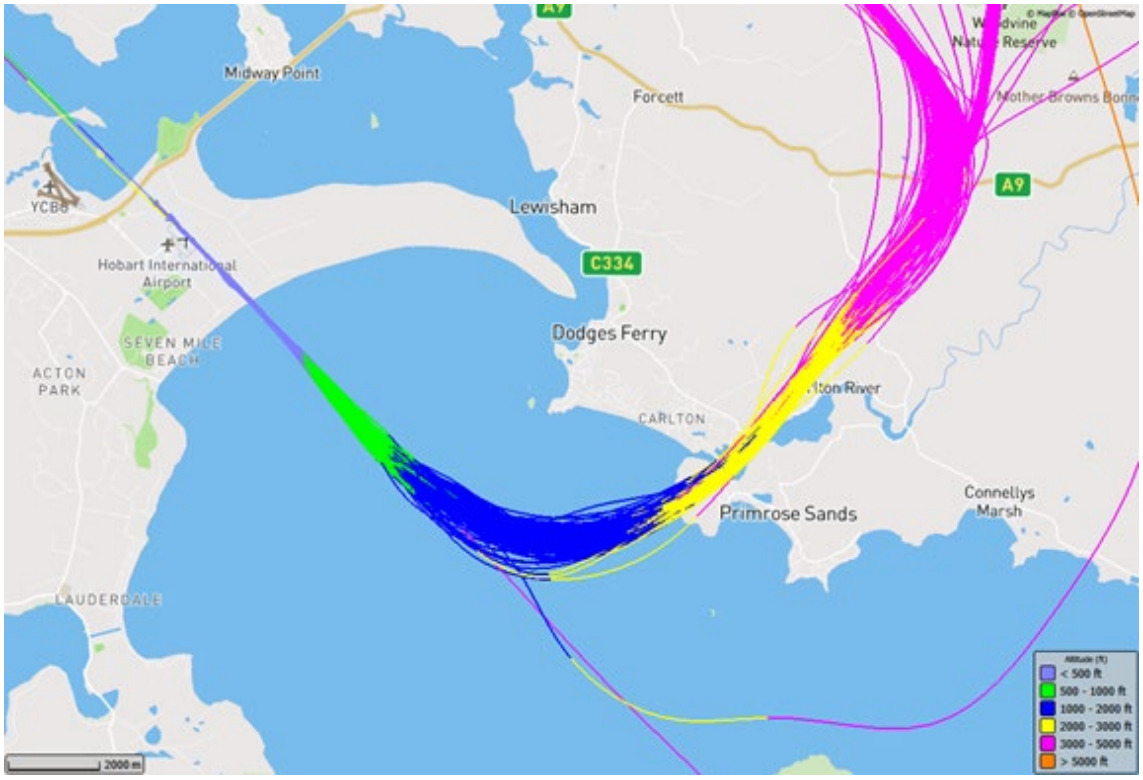


Figure 23: RWY30 RNP-AR STAR flight tracks and altitude *(Source: NFPMS)*

The vertical profile of RWY30 RNP-AR STAR arrivals is shown in Figure 24. The modelled vertical profile for a B738 arrival is included for comparison. Above 3,000 ft, the B738 is modelled at a lower altitude than the mean average of all aircraft tracks.

The average altitude of arriving aircraft crossing the coastline at Primrose Sands is 2,400 ft, with a flight track distance of 14 km from the airport.

The altitude of RWY30 RNP-AR STAR arrivals has been updated in the AEDT PIR model to reflect actual observations and improve the noise modelling (see Section A.9).

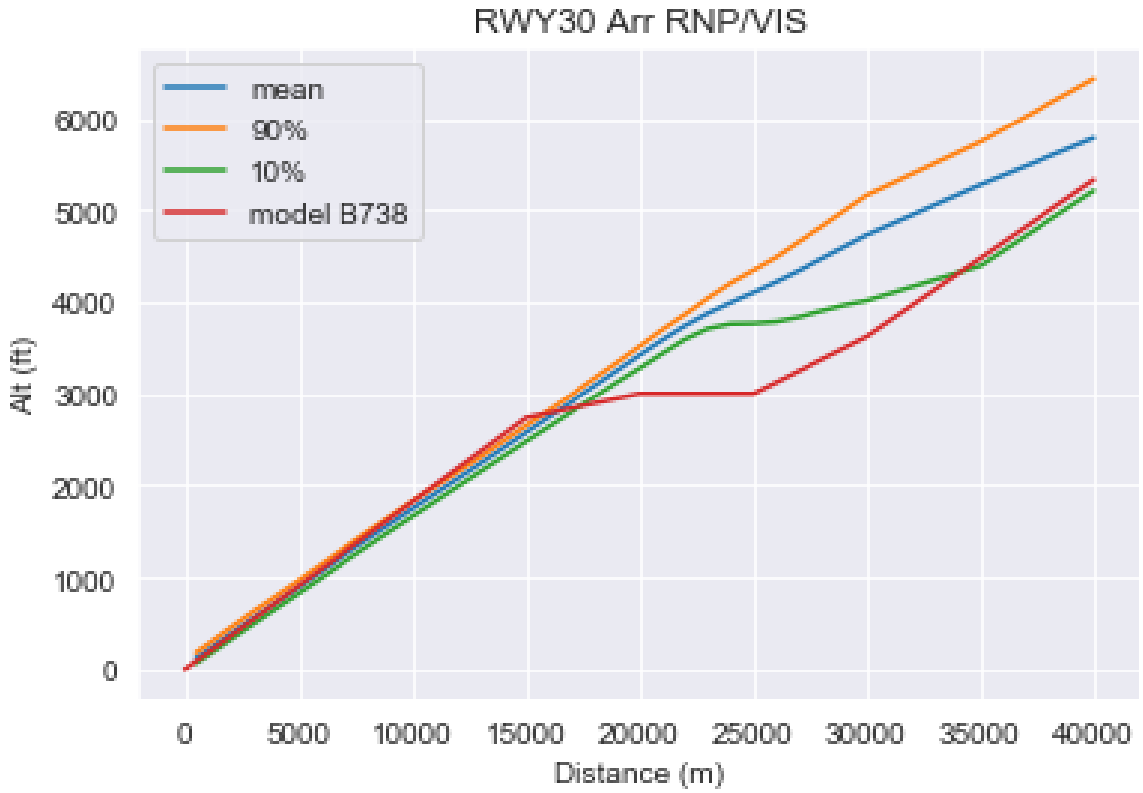


Figure 24: Vertical profile RWY30 RNP-AR STAR movements and EA modelled B738 *(Source: NFPMS)*

A.6.7 RWY12 RNP-AR STAR

Table 16 compares the modelled and actual number of flights per day for the RWY12 RNP-AR STAR. The average daily movements for the actual PIR Summer period is similar to what was modelled in the EA. There were no RWY12 arrivals modelled for the EA Winter period, while the actual PIR Winter data shows an average of 1.1 flights per day using the RNP-AR STAR.

Table 16: RWY12 RNP-AR STAR movements per day

RWY12 RNP-AR STAR	EA (modelled)		PIR (actual)	
	Summer	Winter	Summer	Winter
Movements per day	3	0	Average: 3.2 Minimum: 0 Maximum: 9	Average: 1.1 Minimum: 0 Maximum: 9

A comparison of actual RWY12 RNP-AR STAR tracks and the modelled AEDT flight path is shown in Figure 25. Actual tracks by altitude are shown in Figure 26.

Figure 25: RWY12 arrival tracks (red) and modelled AEDT flight paths (orange) *(Source: NFPMS)*

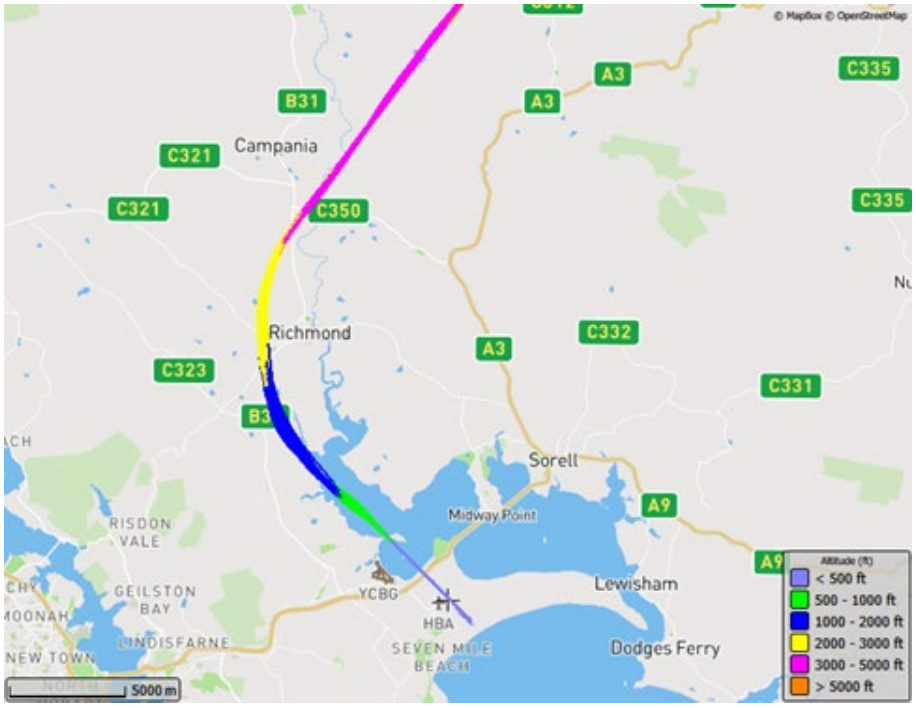


Figure 26: RWY12 RNP-AR STAR flight tracks and altitude *(Source: NFPMS)*

The vertical profile of RWY12 RNP-AR STAR arrivals is shown in Figure 27. The modelled vertical profile for a B738 arrival is included for comparison. Above 3,000 ft, the B738 is modelled at a lower altitude than the mean average of all aircraft tracks. The average altitude past Richmond is 3,000 ft with a flight track distance of 18 km from the airport.

The altitude of RWY12 RNP-AR STAR arrivals has been updated in the AEDT PIR model to reflect actual observations and improve the noise modelling (see Section A.9).

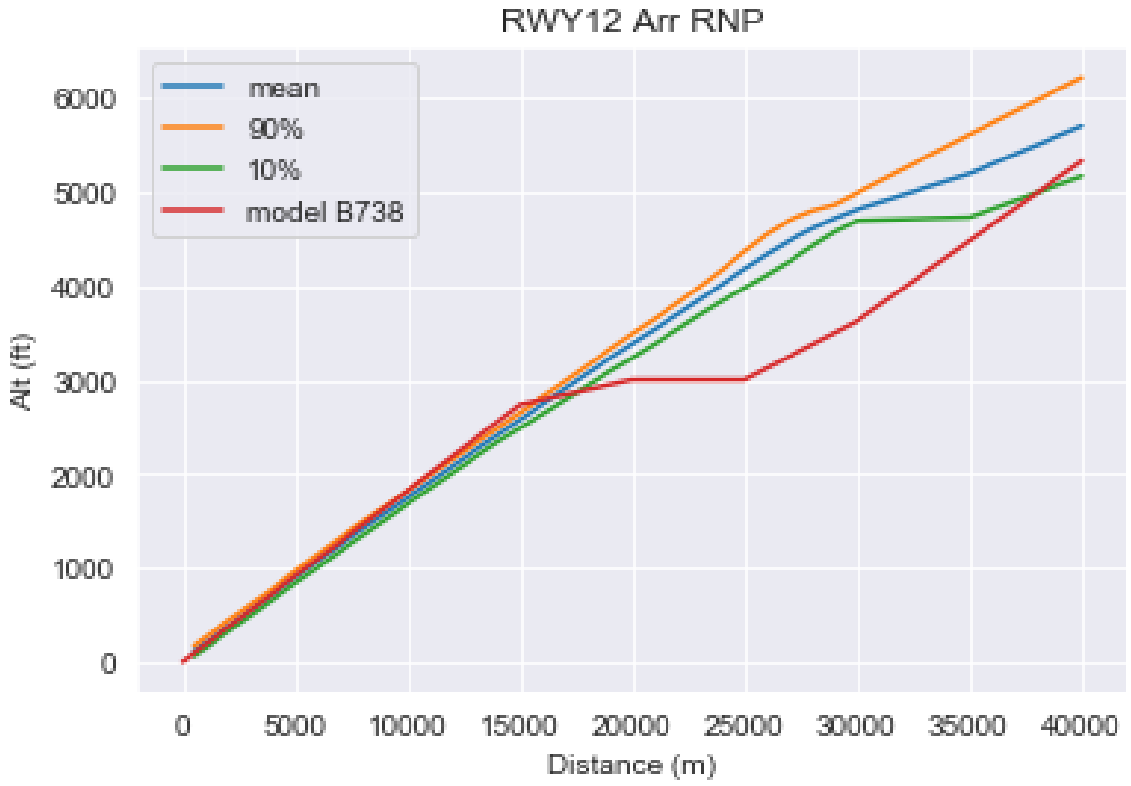


Figure 27: Vertical profile RWY12 RNP-AR STAR movements and EA modelled B738 *(Source: NFPMS)*

A.6.8 RWY12 RNAV STAR

Table 17 compares the modelled and actual number of flights per day for the RWY12 RNAV STAR. For the summer periods, the actual average daily movements were lower than what was modelled in the EA. There were no RWY12 arrivals modelled for the EA Winter period, while the actual PIR Winter data shows an average of 4.3 flights per day.

Table 17: RWY12 RNAV STAR movements per day

RWY12 RNAV STAR	EA (modelled)		PIR (actual)	
	Summer	Winter	Summer	Winter
Movements per day	14	0	Average: 9.3 Minimum: 0 Maximum: 24	Average: 4.3 Minimum: 0 Maximum: 24

A comparison of actual RWY12 RNAV STAR tracks and the modelled AEDT flight path is shown in Figure 28. Actual tracks by altitude are shown in Figure 29.

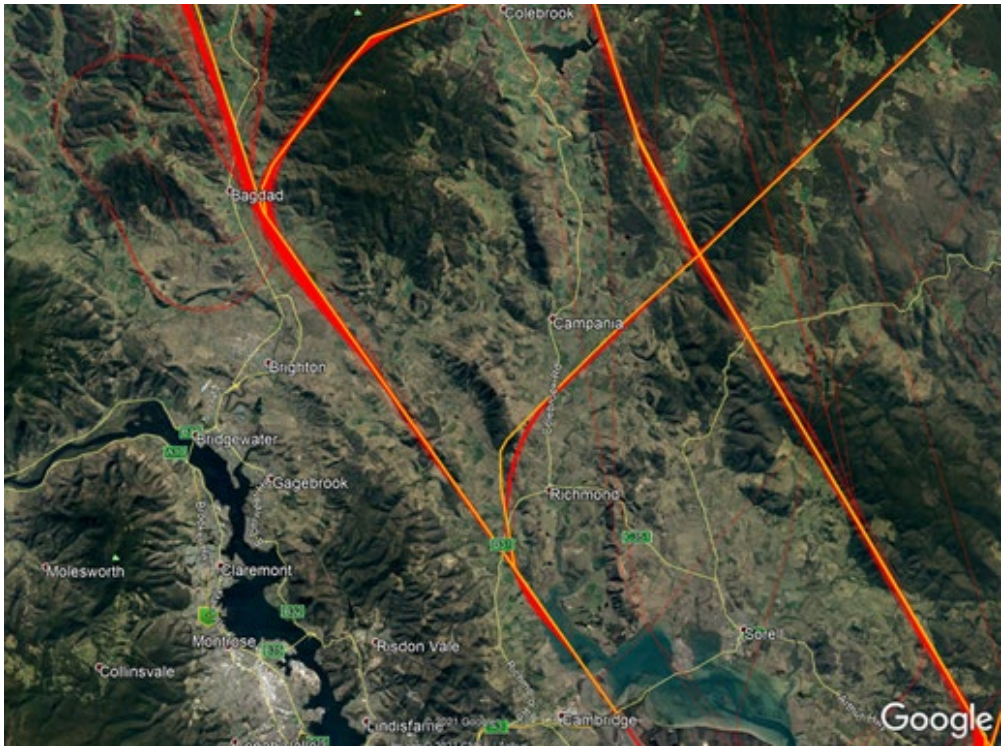


Figure 28: RWY12 arrival tracks (red) and modelled AEDT flight paths (orange) *(Source: NFPMS)*

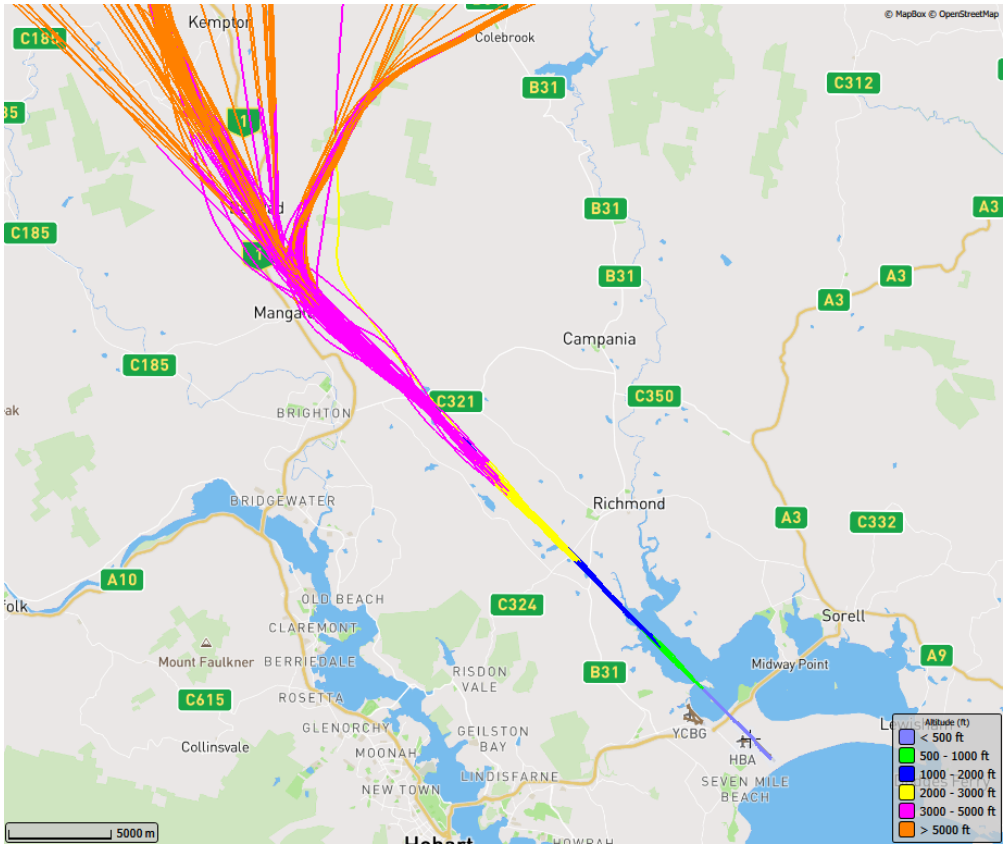


Figure 29: RWY12 RNAV STAR flight tracks and altitude *(Source: NFPMS)*

The vertical profile of aircraft operating on the RWY12 RNAV STAR is shown Figure 30. The modelled vertical profile for a B738 is included for comparison.

The average flight altitude near Kempton is 5,800 ft with a flight track distance of 45 km from the runway. The average flight altitude near Colebrook is 6,500 ft with a flight track distance of 48.5 km from the runway.

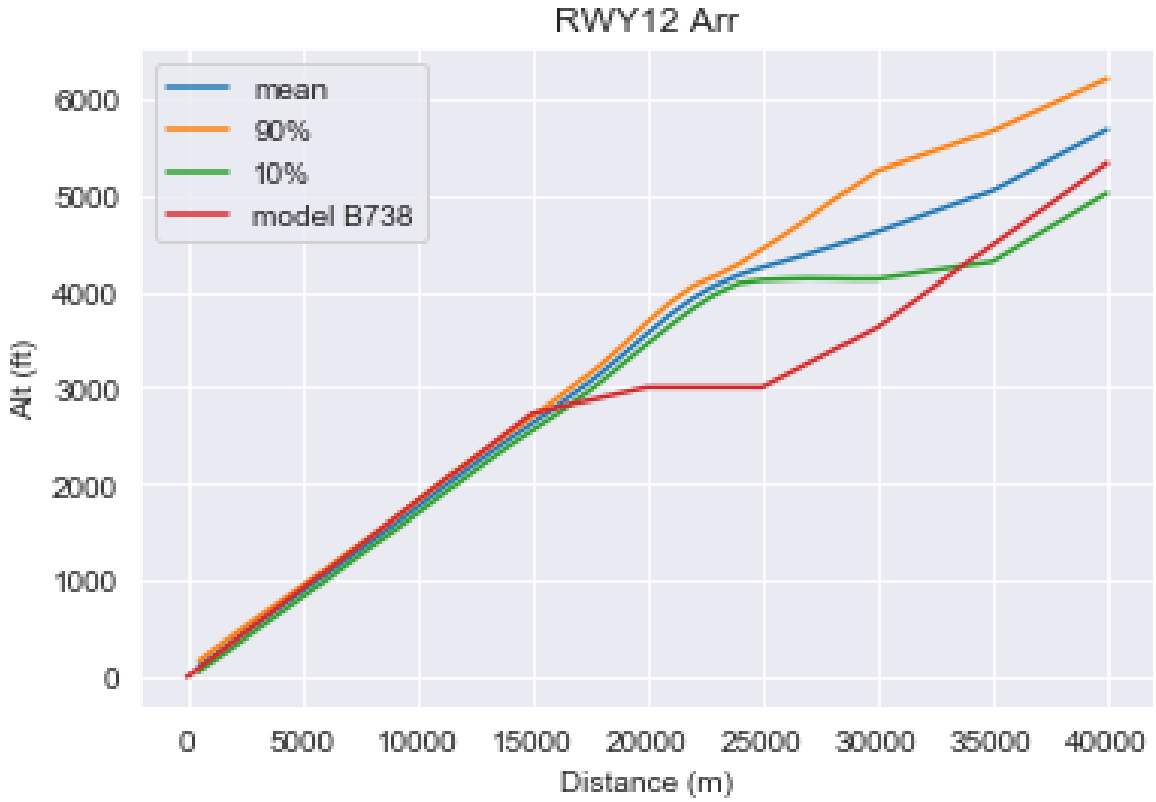


Figure 30: Vertical profile of RWY12 RNAV STAR movements and EA modelled B738 *(Source: NFPMS)*

A.6.9 Arrival Flight Path Use

One of the EA modelling assumptions was the percentage split of arrival traffic between the RNP-AR STAR and the RNAV STAR. Table 18 compares the use of the STARs for what was modelled in the EA, and the actual usage during the interim summer period and the PIR period.

The actual percentage usage of the RWY30 RNP-AR STAR is greater than estimated in the EA in both summer and winter. The higher actual use is attributed to higher than expected use of the fixed visual approach (that aligns with the RNP-AR STAR from waypoint BAVUR and is included with the RNP-AR STAR usage analysis). This is due partly to the unanticipated change in commercial aircraft types being operated as a result of the COVID-19 impacts on air travel, as well as an increased uptake of RNP-AR technology by aircraft operators. This trend of higher RNP-AR STAR usage is expected to continue as more aircraft operators move to implementing RNP-AR technology on their aircraft. The increased use of the RWY30 RNP-AR STAR effects the communities of Primrose Sands, Carlton and Carlton River, which experience more frequent operations than projected.

As noted in Section A.5, RWY12 arrivals were not modelled in the EA during the winter scenario due to the modelling being based on a single representative winter day, however aircraft operated in this direction during the PIR Winter period.

Table 18: Runway use comparison for RNP-AR and RNAV arrivals

	EA	Interim Summer	PIR
SUMMER	Jan - Apr 2018	Dec 2019 - March 2020	Jan - Mar 2021
RWY12 Arrivals			
RNP-AR STAR	18%	26%	25.8%
RNAV STAR	82%	73%	74.2%
RWY30 Arrivals			
RNP-AR STAR	33%	83%	76.8%
RNAV STAR	67%	12%	23.2%
WINTER	Apr - Jul 2018		Apr - Jul 2021
RWY12 Arrivals			
RNP-AR STAR			20.5%
RNAV STAR			79.5%
RWY30 Arrivals			
RNP-AR STAR	33.3%		75%
RNAV STAR	66.7%		25%

A.7 Night Movements

The EA reported an average of around 5 daily night movements (11pm to 6am[16]) operating at Hobart Airport during the months of January to June 2018 (based on NFPMS data).

The average daily movement numbers by hour during the PIR period are shown in Figure 31. The PIR period had an average of 1.1 daily movements during night hours (11pm to 6am), which is much less than modelled in the EA. The 90th percentile (busy day) movement number for night-time operations during the PIR period was 3 movements. Night movements represent 2.1% of all flights during the PIR period. The PIR analysis reflects aircraft operations impacted by COVID-19 travel restrictions and may not be representative of operations once travel restrictions are lifted.

[16] Airservices defines night to be 11pm to 6am, consistent with relevant Commonwealth curfew legislation (regardless of whether or not a curfew is in place at an airport)

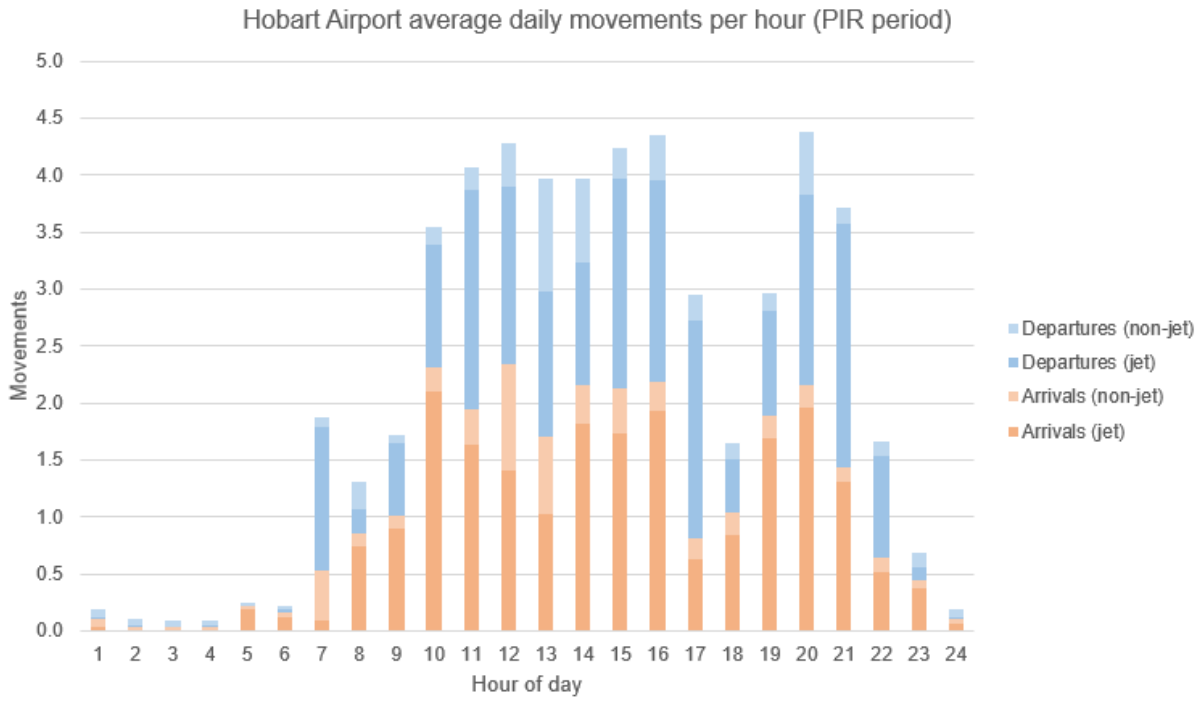


Figure 31: Average daily movements by hour for the PIR period *(Source: NFPMS)*

A.8 Short-Term Noise Monitoring Results

Short-term noise monitoring was undertaken at Richmond, Primrose Sands and Connellys Marsh to support the PIR analysis. Helicopter movements have been excluded to compare the measured noise events against the operations that were modelled and assessed in the EA (which did not include helicopter movements). Some additional noise events from smaller aircraft operating from Cambridge Aerodrome were captured by the noise monitors, however they have also been excluded from the PIR analysis.

The monitoring events are a recording of noise levels above a specified threshold specific to each noise monitoring terminal (NMT) to reflect the ambient environment. The threshold for each NMT is determined by the acoustic technicians, based on the initial noise readings when the NMTs are installed. Measurements of ambient noise are taken at specific times of the day to ensure appropriate calibration of the NMT to its surrounding environment. Thresholds will typically be much lower for low ambient noise areas, such as rural settings.

The NMT recordings are then matched to Airservices flight radar tracks to determine the aircraft type and altitude associated that noise event. The NMT events capture the total sound level occurring at the time of the aircraft overflying the monitor, including background noise from the environment (such as birds, rain and wind) and community noise sources (such as vehicles and machinery). A manual check of a sample of the highest noise events identified that community noise, such as tractors and other machinery use, are included in some of the noise events. It is not technically possible to separate the aircraft noise levels from background ambient noise levels, so the community and environment noise sources may result in some increased noise measurements.

The measured N60 and N70 number-above metrics are calculated for an average day (total number of noise events divided by the number of days in the PIR Summer and winter measurement periods).

A.8.1 Noise Event Variation

The AEDT noise modelling is based on the noise certification testing undertaken by the aircraft manufacturer (performed in accordance with the relevant chapters of ICAO Annex 16 Volume 1, Environmental Protection – Aircraft Noise). The AEDT estimates aircraft noise levels by using the aircraft manufacturer noise data and then making adjustments to account for distance and the

principles of atmospheric absorption. The modelled aircraft noise levels are therefore representative of the meteorological conditions and flight path altitudes set in the AEDT model.

Actual noise event data from on-ground monitoring will reflect the specific aircraft and meteorological conditions present at the time of the noise event. The same aircraft, operating on the same flight path and at the same altitude, can result in a different noise level on the ground each time it operates due to factors such as the aircraft's weight at the time of the noise event, the way the aircraft is being flown by the pilot and the aircraft settings, and the meteorological conditions. Changes in atmospheric conditions that impact the density of the air, such as rain, fog and increased humidity, can allow sound to travel further and therefore impact the clarity and volume of sound being received on the ground. Wind will cause sound waves to bend in the direction that the wind is flowing, while low cloud cover can increase the noise level by reflecting noise back to the ground and producing an echo effect.

An example of noise variation is provided in Figure 32, which shows the range of recorded noise levels that were correlated to B738 arrivals at the Primrose Sands NMT. Changes in noise levels of up to 3 dBA are unlikely to be perceptible to the human ear.

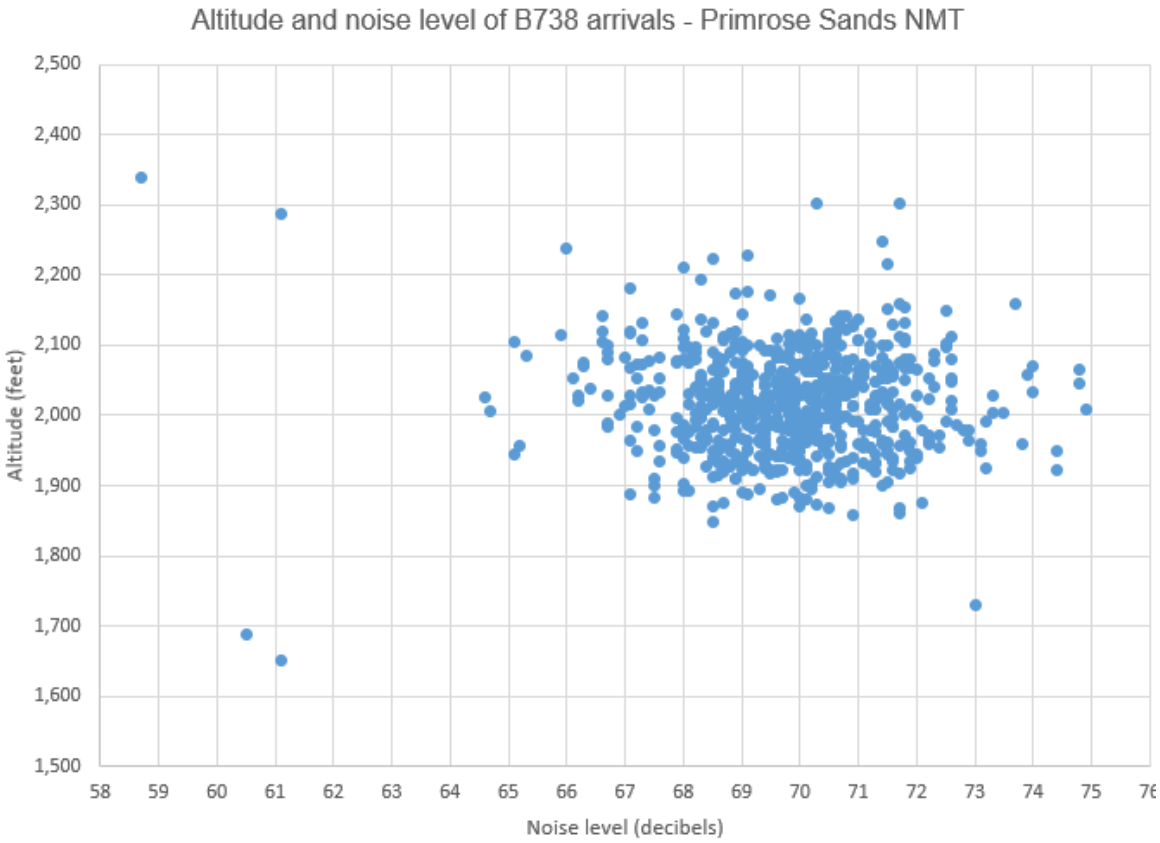


Figure 32: B738 arrivals by altitude and noise level – Primrose Sands NMT *(Source: NFPMS)*

A.8.2 Noise Monitoring – Primrose Sands

The NMT at Primrose Sands was located at a residential property under the RWY30 RNP-AR STAR, as shown in Figure 33.

Figure 33: Primrose Sands Noise Monitoring Terminal (NMT) *(Source: NFPMS)*

The comparison between the NMT data and the EA forecasts are shown in Table 19.

The number of PIR noise events above 60 dBA and 70 dBA were greater for both the summer and winter periods than what was estimated in the EA.

The average total movements per day closely matches the measured N60 events, indicating that all arrival traffic over this area reach noise levels of at least 60 dBA.

The EA modelling for Primrose Sands did not indicate noise levels above 70 dBA, however the NMT recorded an average of 2.7 daily events for the PIR Summer period and an average of 4.5 daily events during the PIR Winter period. This is the result of a range of factors, including changes in aircraft fleet mix as a result of COVID-19 impacts, noise event variation (described in Section A.8.1) particularly for aircraft that have a modelled noise level just under 70 dBA, and community and environment noise sources being included in some noise measurements.

The number of daily N60 and N70 daily noise events are shown in Figure 34 and Figure 35. The total number of N60 events in a day ranged from none (when RWY30 was not in use) to 30 events. N70 events ranged from none to 12 daily events. Figure 36 shows the average N60 and N70 events by hour of day.

Table 19: Primrose Sands noise monitoring summary

	Summer		Winter	
	EA (modelled)	PIR (measured)	EA (modelled)	PIR (measured)
Avg. total movements per day (RWY30 arrivals only)	7	8.9	11	15.3
N60 average daily noise events	6 to 7	8.8	10 to 11	15.2
N70 average daily noise events	0	2.7	0	4.5

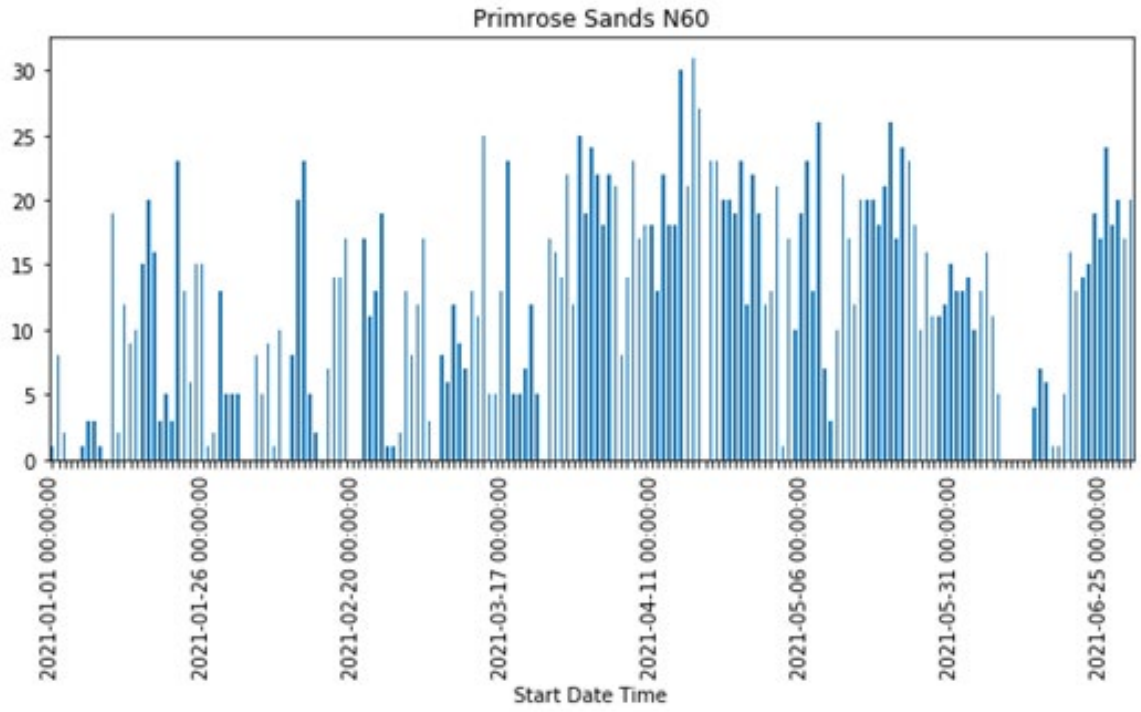


Figure 34: Primrose Sands NMT – Daily N60 Noise Events *(Source: NFPMS)*

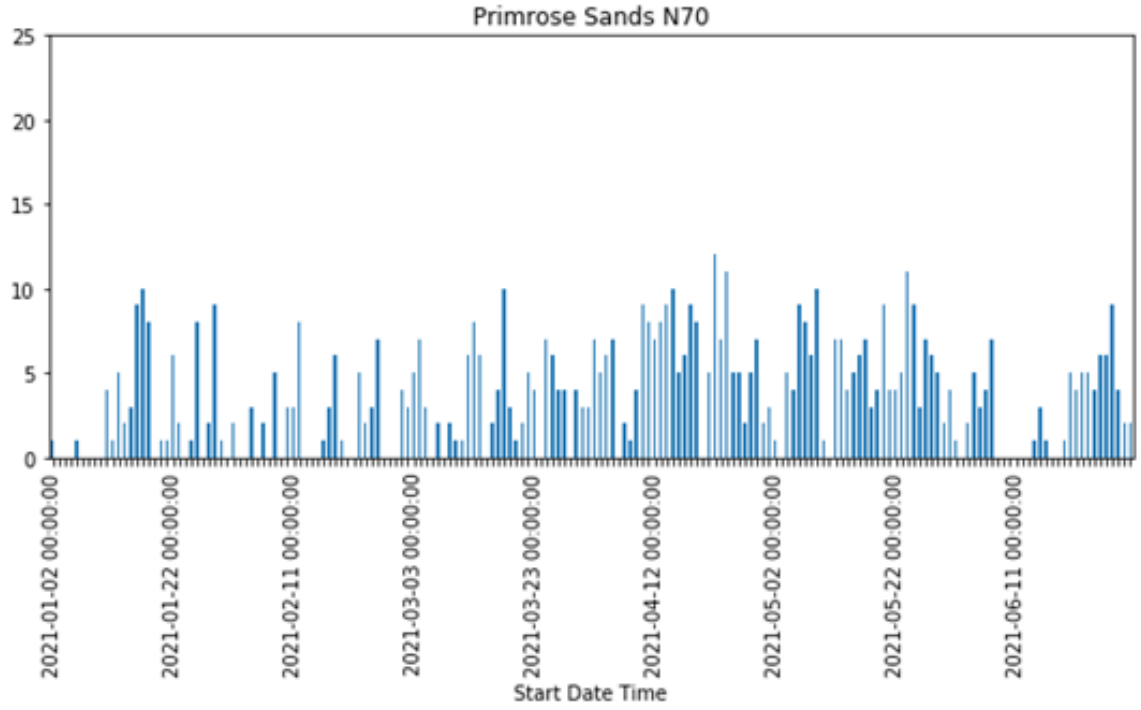


Figure 35: Primrose Sands NMT – Daily N70 Noise Events *(Source: NFPMS)*

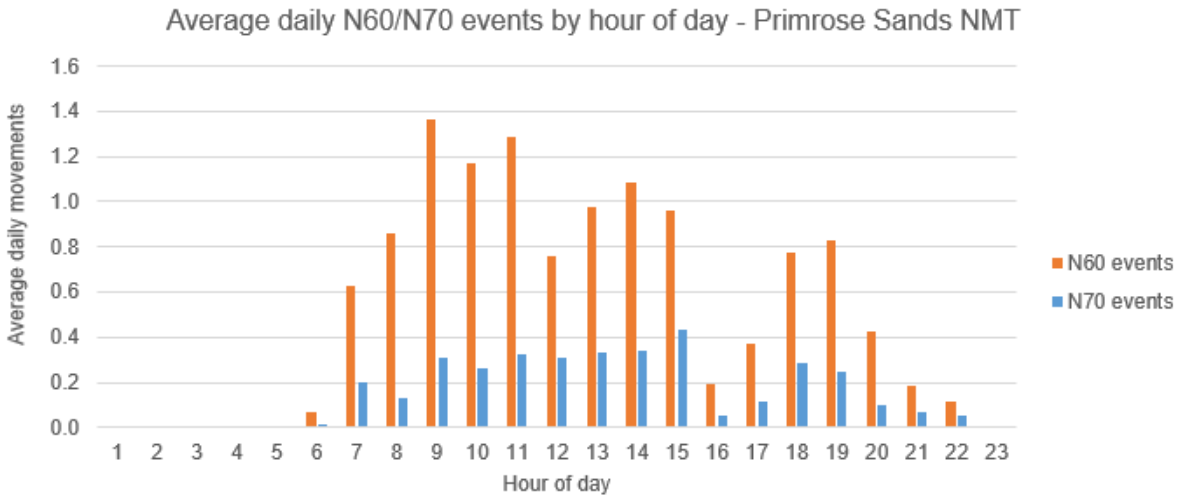


Figure 36: Primrose Sands NMT – average daily N60/N70 events by hour of day *(Source: NFPMS)*

A.8.3 Noise Monitoring – Connellys Marsh

Figure 37 shows the location of the short-term NMT at Connellys Marsh, which was located at a residential property on the coastline.

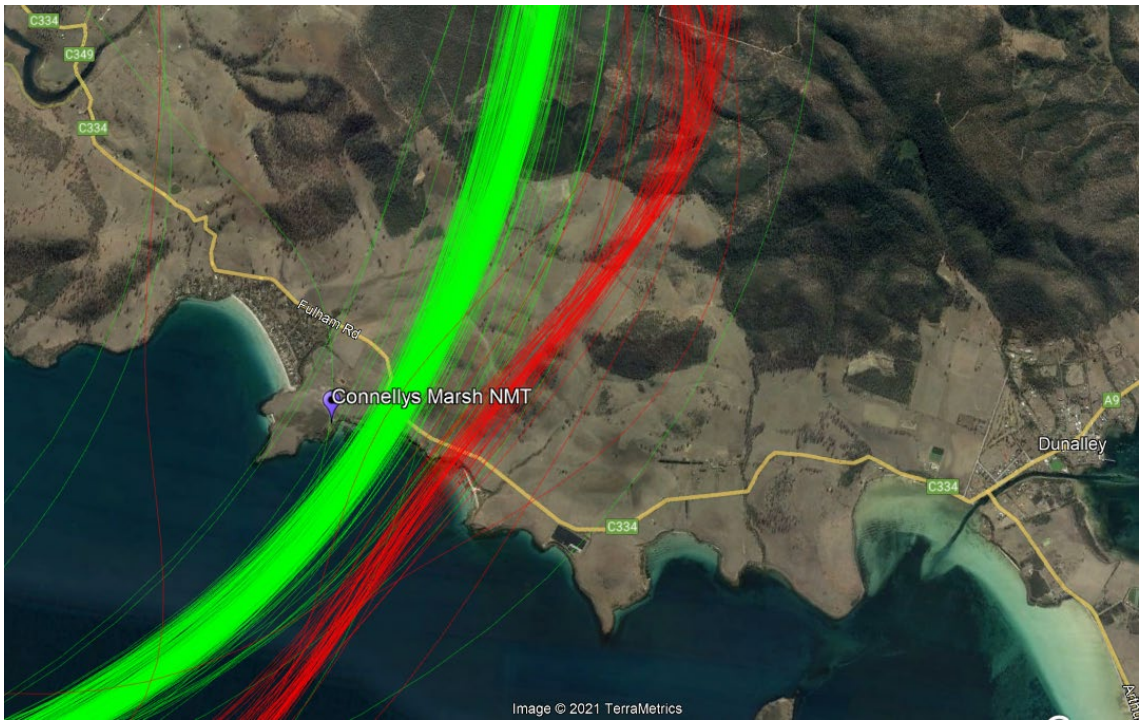


Figure 37: Connellys Marsh Noise Monitoring Terminal (NMT) *(Source: NFPMS)*

Due to the Connellys Marsh NMT being located on the coastline and therefore subject to increased ambient noise levels from factors such as wind and waves, wind speeds were monitored on site and correlated noise events with wind speeds of greater than 10m/s (36 km/h) were removed from the dataset in accordance with *ISO 20906 Acoustics – Unattended monitoring of aircraft sound in the vicinity of airports*.

Table 20 compares the NMT data with estimations from the EA. The average total number of movements per day is the combination of arrivals using the RWY30 RNAV STAR and departures on the RWY12 Jet SID.

The number of measured noise events above 60 dBA was greater than estimated in the EA for both the summer and winter periods. The EA modelling for Connellys Marsh did not indicate noise levels above 70 dBA, however the NMT recorded an average of 0.1 N70 events per day during the PIR Summer period.

The number of N60 and N70 daily noise events are shown in Figure 38 and Figure 39. The number of daily events above 60 dBA ranged from none to 16. There was a total of 12 individual N70 events during the six month PIR period. Figure 40 shows the average N60 and N70 events by hour of day.

Table 20: Connellys Marsh noise monitoring summary

	Summer		Winter	
	EA (modelled)	PIR (measured)	EA (modelled)	PIR (measured)
Avg. total movements per day	29	11.9	22	9.0
N60 daily noise events	2 to 3	4.9	0	2.7
N70 daily noise events	0	0.1	0	0.0

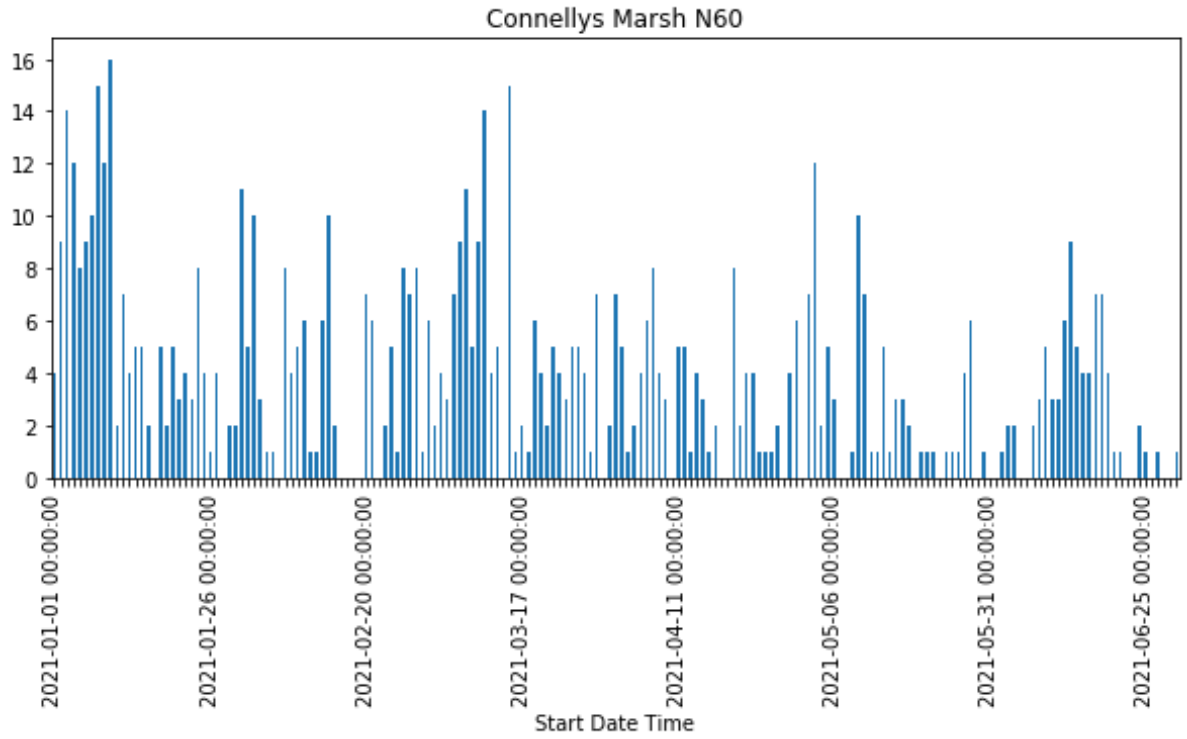


Figure 38: Connellys Marsh NMT – Daily N60 Noise Events *(Source: NFPMS)*

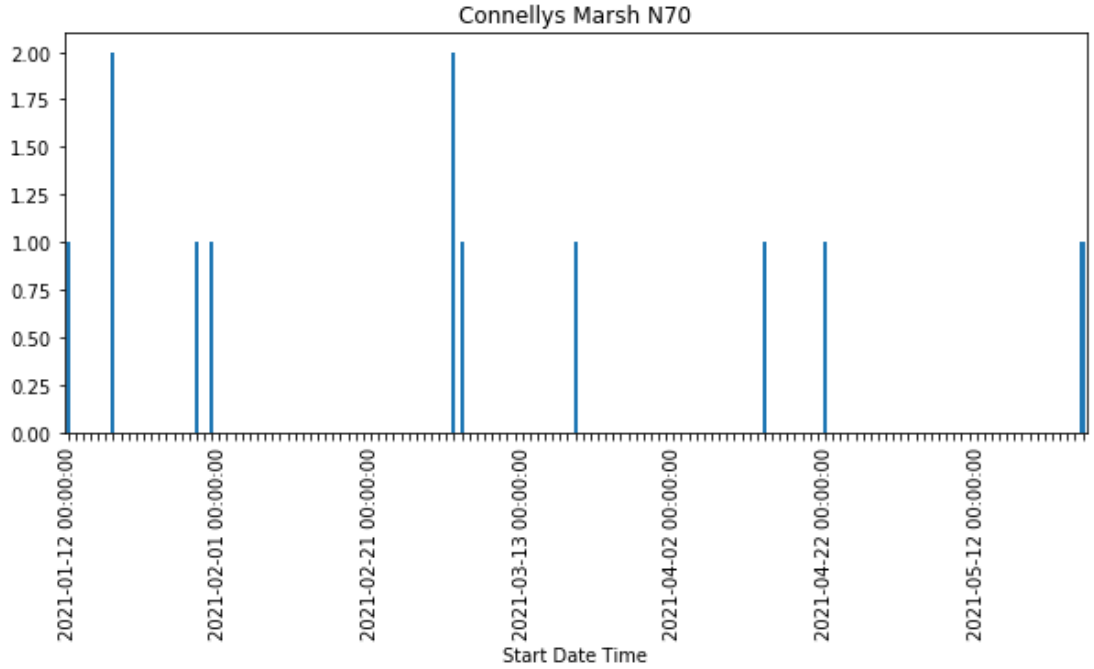


Figure 39: Connellys Marsh NMT – Daily N70 Noise Events *(Source: NFPMS)*

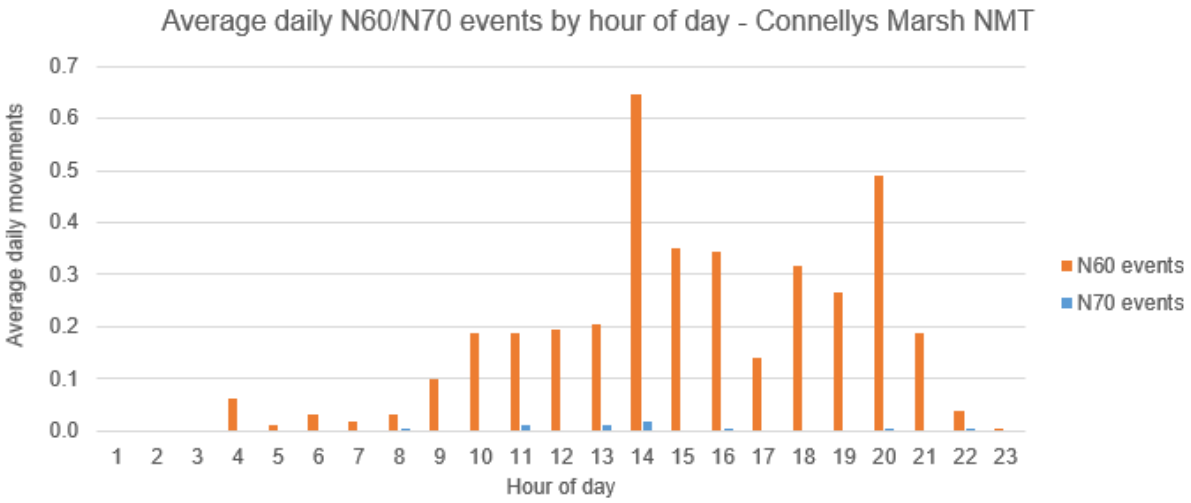


Figure 40: Connellys Marsh NMT – average daily N60/N70 events by hour of day *(Source: NFPMS)*

A.8.4 Noise Monitoring – Richmond

The location of the short-term NMT at Richmond is shown in Figure 41. It was located at a residential property.

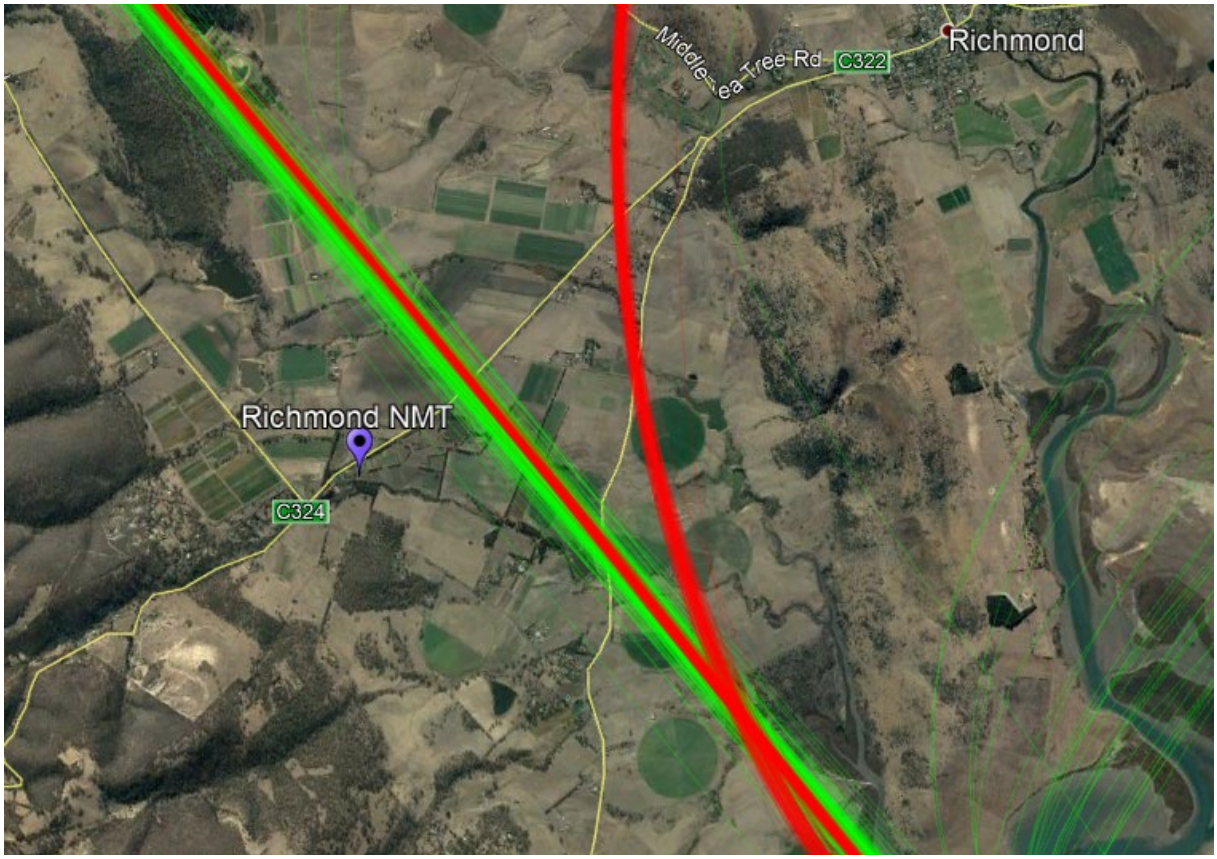


Figure 41: Richmond NMT Location *(Source: NFPMS)*

Table 21 provides a comparison of the NMT data and the estimations from the EA. The average total movements per day is the combination of arrivals using the RWY12 RNAV STAR and departures on the RWY30 Jet SID.

The number of measured noise events above 60 dBA was less than estimated in the EA for both the summer and winter periods due to total movements being less than forecast. Consistent with the EA modelling, the number of measured N60 events is very close to the actual movements per day, indicating that nearly all movements over this area reach a noise level of at least 60 dBA.

The EA did not indicate noise levels above 70 dBA at the Richmond NMT location, however there were a number of days where the NMT recorded N70 events during the PIR period.

The number of N60 and N70 daily noise events are shown in Figure 42 and Figure 43. The number of daily events above 60 dBA ranged from none to 36, while the number of daily events above 70 dBA ranged from none to five. Figure 44 shows the average N60 and N70 events by hour of day.

Table 21: Richmond noise monitoring data

	Summer		Winter	
	EA (modelled)	PIR (measured)	EA (modelled)	PIR (measured)
Avg. total movements per day	32	19.7	31	22.5
N60 average daily noise events	28 to 29	17.9	30 to 31	21.4
N70 average daily noise events	0	0.5	0	0.7

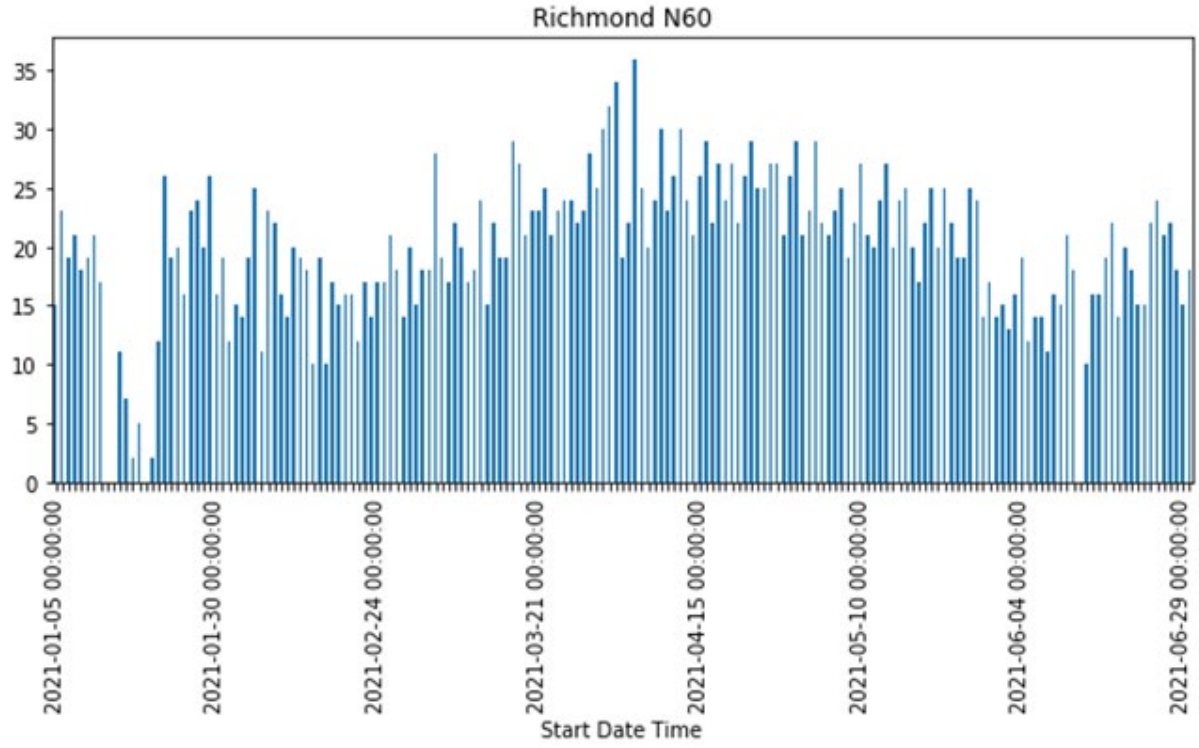


Figure 42: Richmond NMT – Daily N60 Noise Events *(Source: NFPMS)*

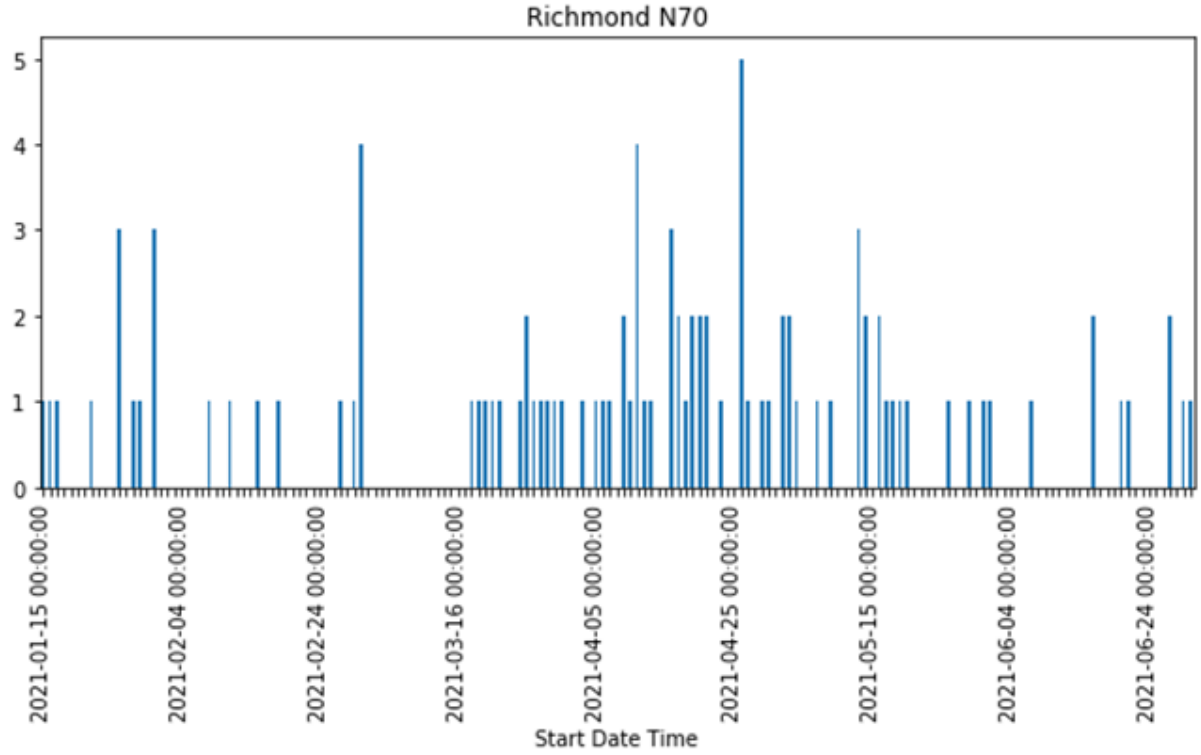


Figure 43: Richmond NMT – Daily N70 Noise Events *(Source: NFPMS)*

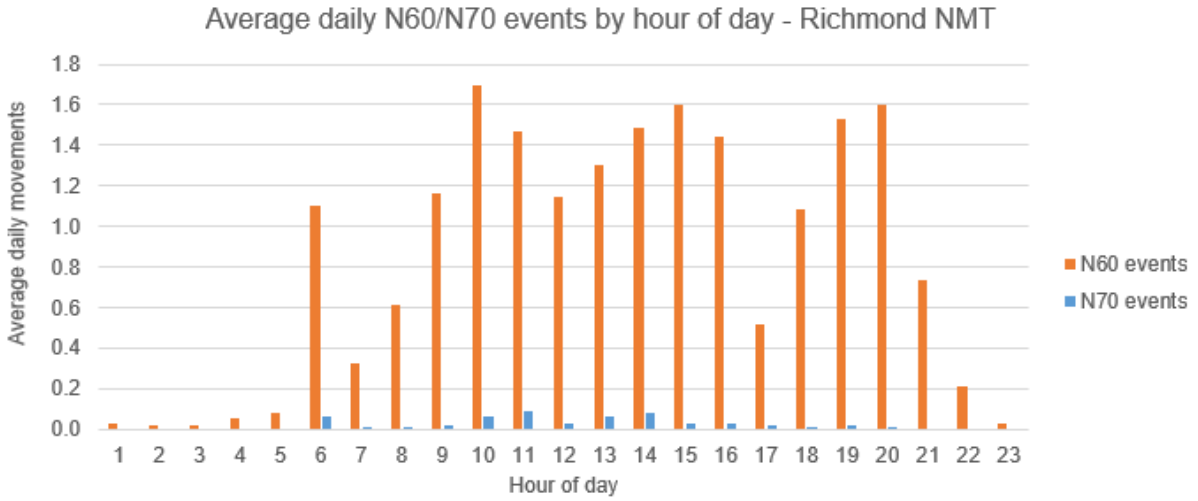


Figure 44: Richmond NMT – average daily N60/N70 events by hour of day *(Source: NFPMS)*

A.9 PIR Noise Modelling

An updated noise model in AEDT has been created to evaluate the current operations for the PIR period. The PIR model has been calibrated with measured noise levels from the short-term noise monitors in the field and actual aircraft flight paths including vertical profiles.

A.9.1 Operations

Table 22 shows a comparison of the weekly (7 days) number of movements for the most common aircraft types modelled for the EA and the PIR.

To establish a representation of noise levels for the PIR Summer and winter periods, the busiest week in each period was used. The aircraft movements were then distributed by directional flow and flight tracks according to analysis of the whole PIR period. This methodology slightly differs from the original EA, where a single representative busy day was used. The PIR Model captures a better representation of aircraft types and distribution of traffic over the summer and winter periods, including the changes to fleet mix due to the COVID-19 impacts on air travel (see Section A.3).

Table 22: Comparison of EA and PIR modelled weekly movements by aircraft type

Aircraft Type	EA*		PIR Model	
	Summer	Winter	Summer	Winter
Airbus A320	210	133	100	144
Airbus A321	42	14	36	42
Boeing 717-200 (B712)	42	42	80	100
Boing 737-400 (B734)		14		
Boeing 737-800 (B738)	154	21	88	104
Beechcraft Super King Air 200 (BE20)	63	35	29	28
Saab 340 (SF34)			12	12
Fairchild Swearingen Metroliner 23 (SW4)	14	14	28	26
**EA based on a representative busy day of traffic*				

A.9.2 Runway Distributions

The updated AEDT model for the PIR included the flow of traffic shown in Table 23 to represent the actual distribution of traffic during the PIR period.

Table 23: AEDT PIR model – runway distribution

	Runway	EA	PIR Actual	PIR Model
Summer	RWY12	42.0%	48.9%	49%
	RWY30	56.0%	50.6%	51%
Winter	RWY12	0%	19.0%	20%
	RWY30	100%	80.6%	80%

A.9.3 Arrival Distributions

The updated AEDT model for the PIR includes the distribution of arrival traffic shown in Table 24, based on analysis of operations during the PIR period, and has been applied to both summer and winter scenarios.

Table 24: AEDT PIR model – arrivals distribution

	RWY12 arrival (via IPLET)	RWY12 arrival (via MORGO)	RWY30 arrival (via IPLET/MORGO)
RNP-AR capable aircraft	RNAV 74% RNP-AR 26%	RNAV 100% RNP-AR 0%**	RNAV 23% RNP-AR 77%
Non RNP-AR capable aircraft	RNAV 74% FVA* 26%	RNAV 100% FVA* 0%	RNAV 23% FVA* 77%

** Fixed visual approach*

*** Aircraft arriving to RWY12 from waypoint MORGO are quickly runway aligned and do not follow the RNP-AR flight path*

A.9.4 Departure Distributions

For the updated AEDT model, the distribution of departure traffic was determined based on an analysis of aircraft type and destination airports. For jet aircraft types, around 92% were assigned to the route via waypoint LATUM and 8% to the route via waypoint CLARK. For non-jet aircraft types, the majority are assigned to the route via waypoint KANLI (75%) and 25% to waypoints LATUM/CLARK.

A.9.5 PIR Model Calibrations

A calibration activity was performed to ensure the modelled noise levels generated by AEDT matched NMT noise levels to better reflect the on-ground experience of noise. This was achieved through:

- the selection of departure stage lengths to match aircraft average vertical profiles, and
- adjustments to the AEDT noise-power-distance (NPD) curves.

An example of the calibration process is shown Figure 45. The vertical profiles of a departing A320 are shown in blue, overlaid with the available stage length profiles in AEDT in red. Generally, the largest stage lengths were selected in the updated modelling as this resulted in the closest correlation of modelled and NMT noise levels.

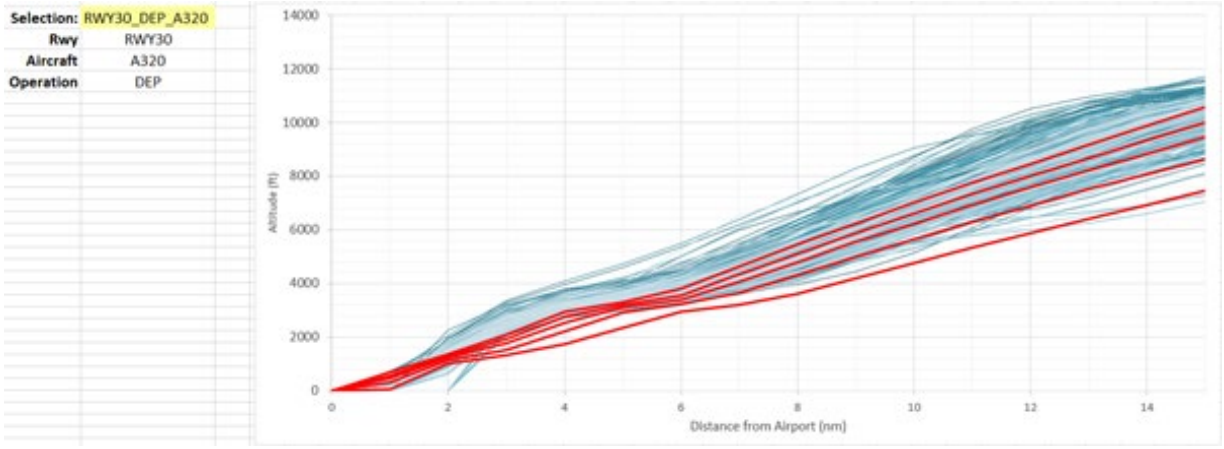


Figure 45: Example of AEDT vertical profile calibration *(Source: AEDT)*

A.9.6 Aircraft Noise Reflection Over Water

As described in Section A.8.1, the AEDT modelling is based on the noise certification testing undertaken by the aircraft manufacturer and performed in accordance with the relevant chapters of ICAO Annex 16 Volume 1 Environmental Protection – Aircraft Noise. The AEDT estimates aircraft noise levels by using the aircraft manufacturer noise data and then applying adjustments to account for distance and the principles of atmospheric absorption. These adjustments are referred to as lateral attenuation, and take into account ground reflection, refraction, and aircraft shielding and engine installation effects.

The standard lateral attenuation adjustment in AEDT has been derived from field measurements made over grass-covered, acoustically soft terrain. The software currently makes some corrections for noise levels over hard surfaces (e.g. water) for propeller aircraft, so it is possible that the modelling can under predict noise for jet aircraft in areas that are predominantly hard surfaces. This limitation is addressed through calibrating AEDT noise models with actual noise monitoring data when it is available. The Connellys Marsh short-term noise monitor was located at a property on the coastline and the noise levels recorded at this monitor captured the reflection of aircraft noise over water. The AEDT modelling completed for the PIR has therefore accounted for the reflective impacts of the surrounding water bodies through the calibration of the AEDT model with the actual noise monitoring data.

At the community Information Session for the draft PIR Report, Airservices took an action to review what software tools are available to improve the consideration of water bodies in the terrain model.

The FAA has indicated that one of the AEDT's future development goals is to enhance noise modelling for airports near water, based on the FAA supported research for 'Improving AEDT Noise Modelling of Mixed Ground Surfaces'[17] that was conducted in 2017 through the Airport Cooperative Research Program.

A.9.7 PIR Model Results

N60 and N70 noise contours for the updated AEDT model for the PIR Summer and winter periods are shown in Figure 46 to Figure 53. The outer contour represents 10 average daily movements with the inner contours representing an incremental increase of two average daily movements. The PIR Model reflects aircraft operations impacted by COVID-19 travel restrictions and may not be representative of operations once travel restrictions are lifted.

[17] https://www.nap.edu/catalog/24822/improving-aedt-noise-modeling-of-mixed-ground-surfaces

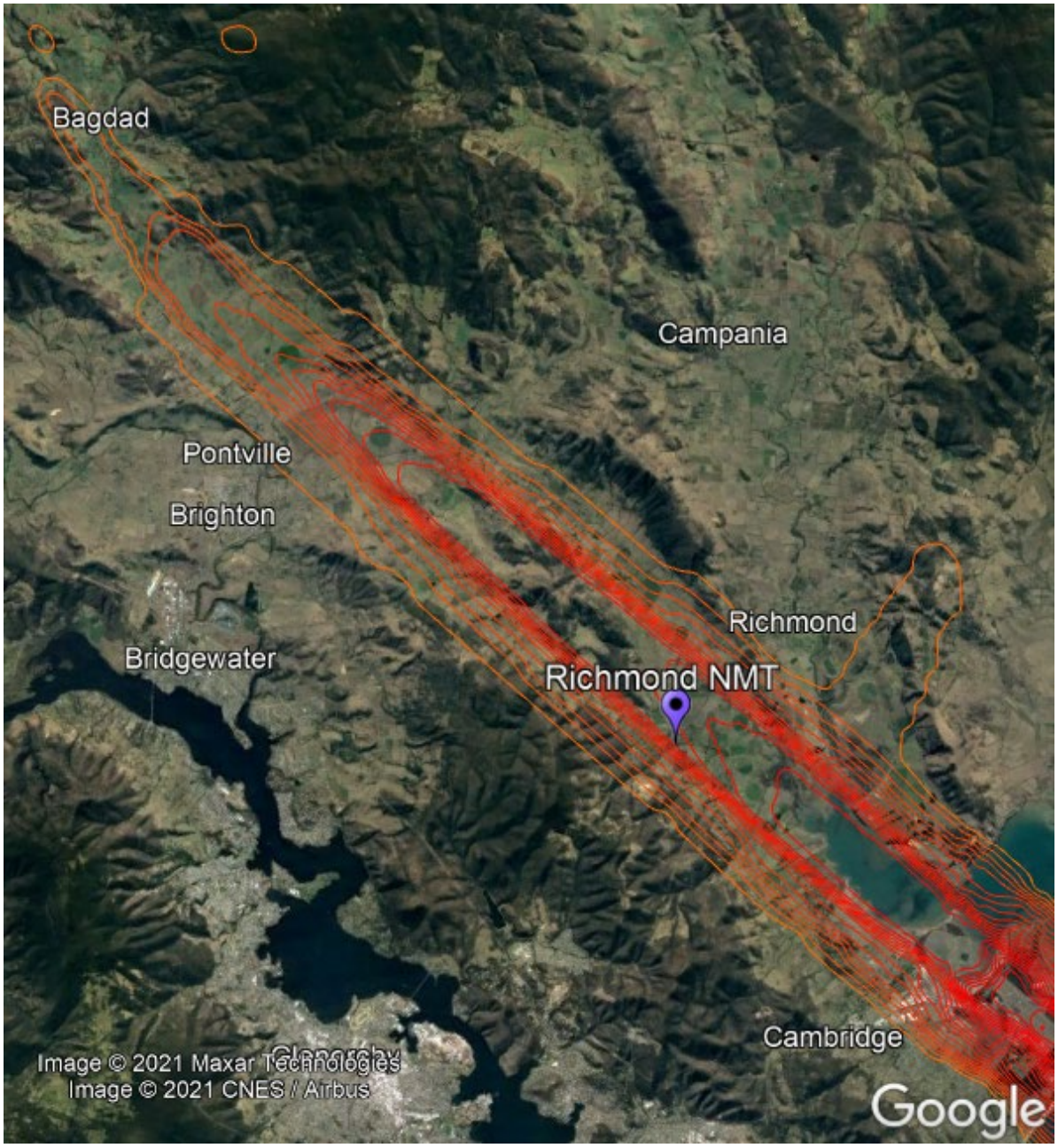


Figure 46: PIR Summer N60 – western communities (*Source: AEDT*)

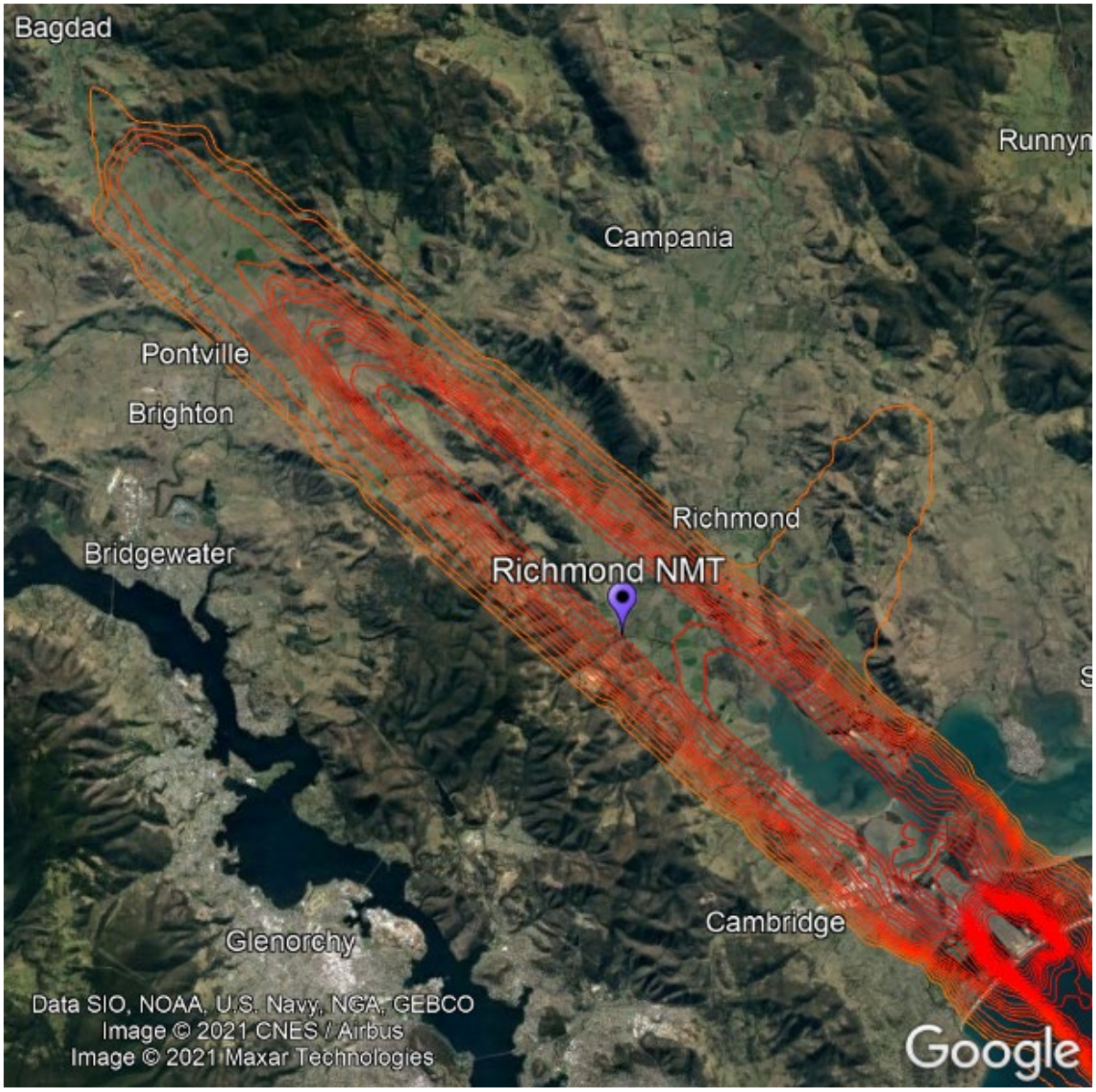


Figure 47: PIR Winter N60 – western communities (*Source: AEDT*)

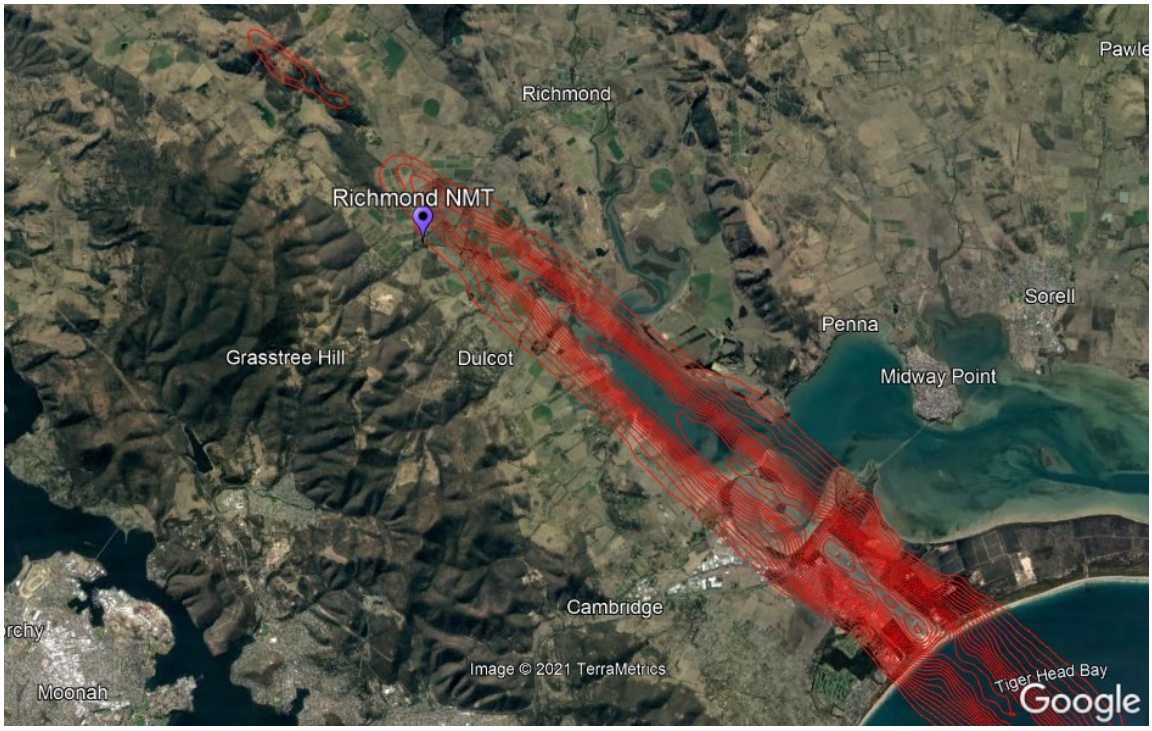


Figure 48: PIR Summer N70 – western communities (*Source: AEDT*)

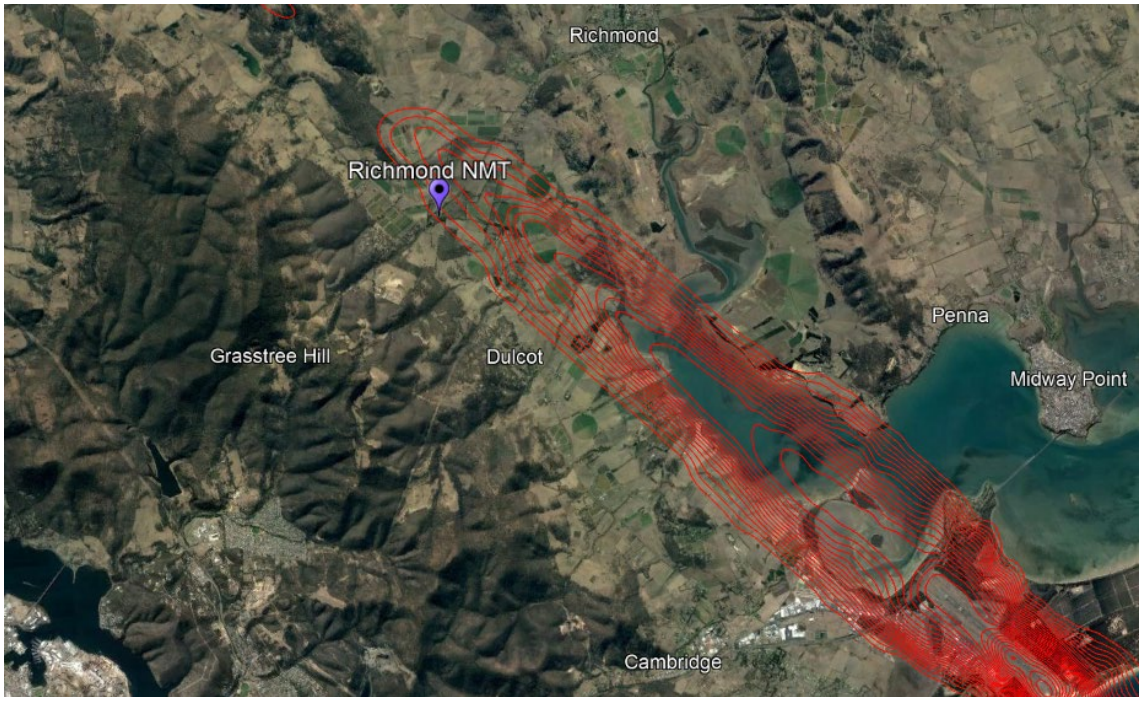


Figure 49: PIR Winter N70 – western communities (*Source: AEDT*)

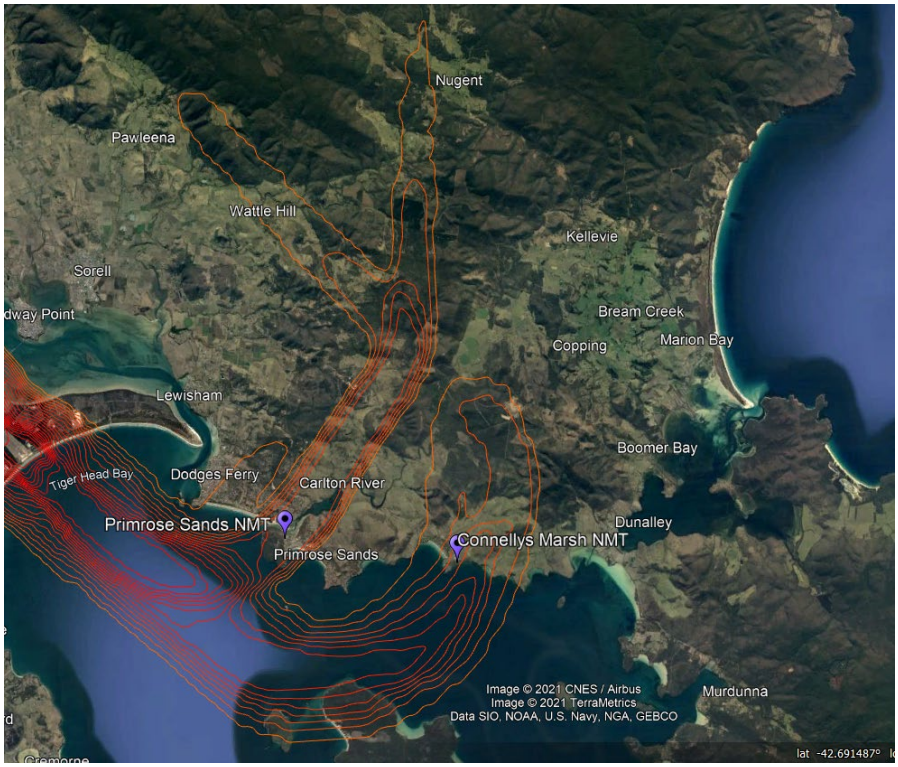


Figure 50: PIR Summer N60 – eastern communities (*Source: AEDT*)

Figure 51: PIR Winter N60 – eastern communities (*Source: AEDT*)

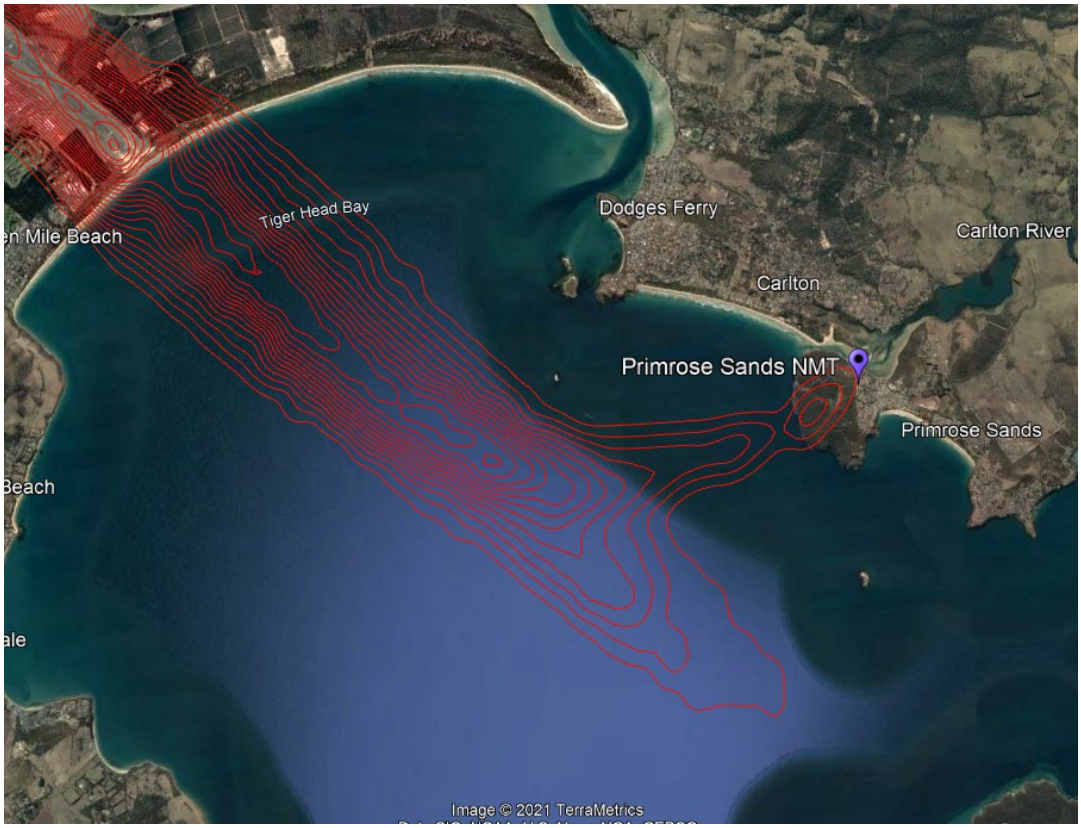


Figure 52: PIR Summer N70 – eastern communities (*Source: AEDT*)

Figure 53: PIR Winter N70 - eastern communities (*Source: AEDT*)

A.9.8 EA and PIR Comparison

Table 25 provides a comparison of measured aircraft noise events and outputs from the noise modelling for the original EA and the updated AEDT model for the PIR.

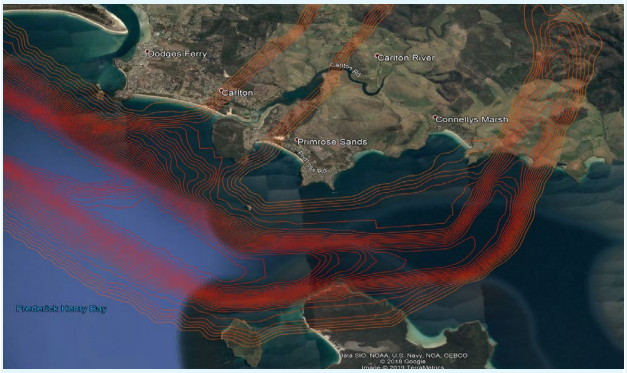
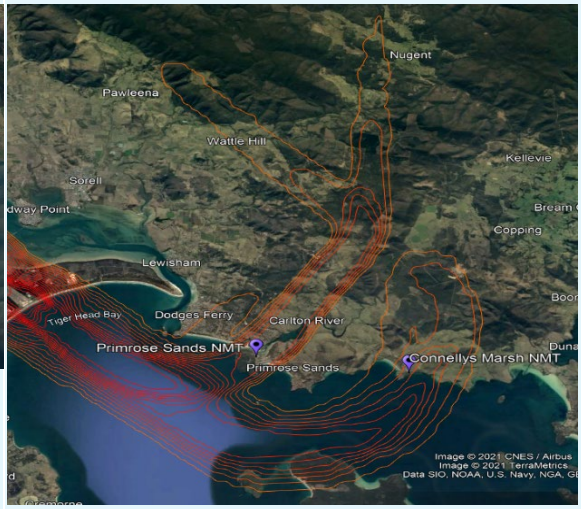
Table 25: Comparison of modelled and measured noise events

		N60 average daily events			N70 average daily events		
		EA (modelled)	NMT (measured)	PIR Model	EA (modelled)	NMT (measured)	PIR Model
Primrose Sands	Summer	28 to 29	8.8	10 to 12	0	2.7	1 to 2
	Winter	30 to 31	15.2	18 to 20	0	4.5	2 to 4
Connellys Marsh	Summer	2 to 3	4.9	6 to 8	0	0.1	0
	Winter	0	2.7	2 to 4	0	0.0	0
Richmond	Summer	28 to 29	17.9	22 to 24	0	0.5	1 to 2
	Winter	30 to 31	21.4	26 to 28	0	0.7	2 to 4

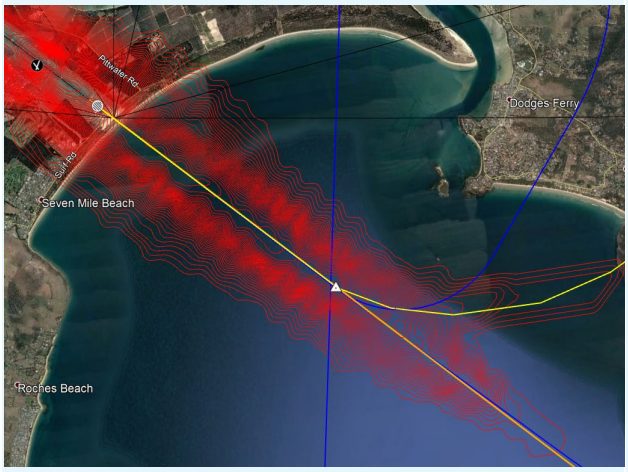
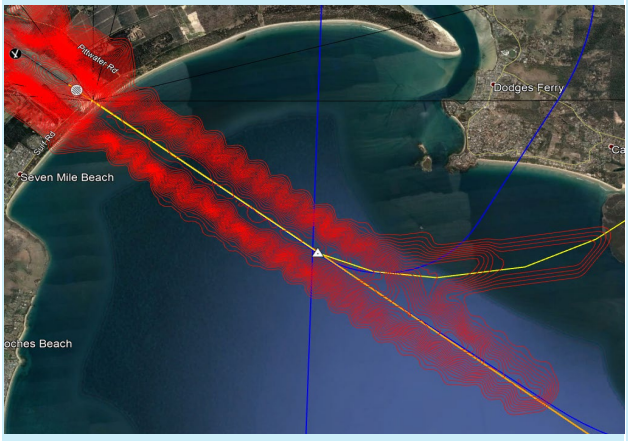
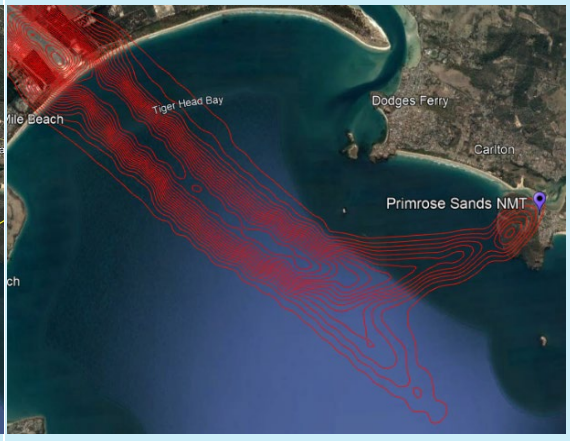
The updated AEDT noise modelling for the PIR is achieving a closer correlation with actual measured results. It is still conservatively predicting a greater number of N60 and N70 daily noise events than what was captured by the short-term noise monitors.

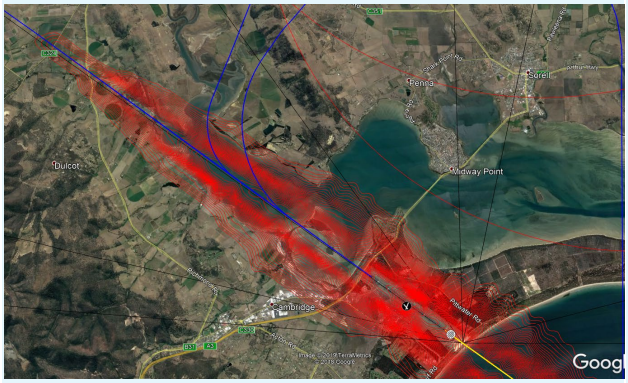
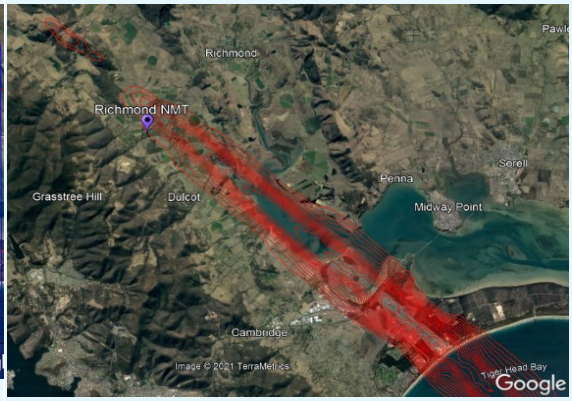
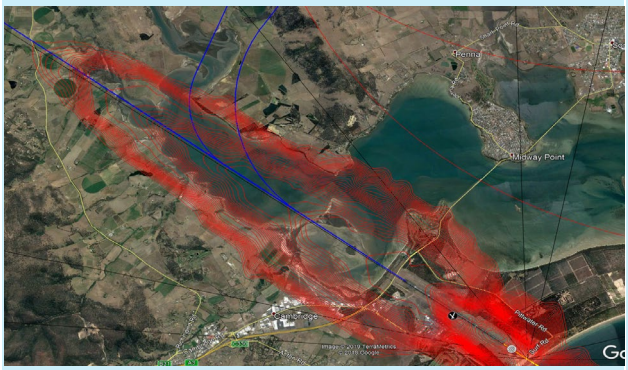
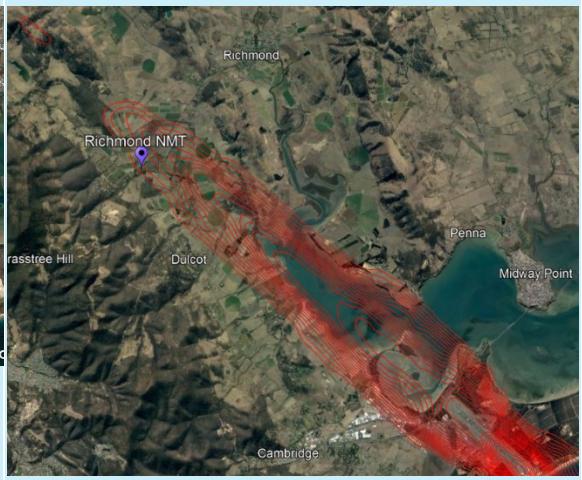
A comparison of the EA and PIR Model N60 and N70 contours are provided in Table 26.

Table 26: Comparison of EA and PIR Model N60 and N70 contours

EA Noise Modelling[18]	PIR Model
Summer N60 (east)	
	

[18] *Environmental Assessment of Proposed Changes to SIDs and STARs at Hobart Airport, Addendum v2.3*

EA Noise Modelling[18]	PIR Model
Winter N60 (east)	
	
Summer N70 (east)	
	
Winter N70 (east)	
	

EA Noise Modelling[18]	PIR Model
Summer N70 (west)	
	
Winter N70 (west)	
	

A.10 PIR Findings – Review of EA for SID & STAR Changes

Operations

The PIR period had a busy day average of 66 operations in comparison to 75 busy day movements modelled in the EA. Aircraft operations have varied as a result of the COVID-19 impacts on air travel.

In response to COVID-19 impacts, airlines have also made changes to the types of aircraft being used. While the Boeing 737-800 (B738) and Airbus A320 continued to be the most common passenger jet aircraft operating at Hobart Airport, during the PIR period there was an unanticipated increase in the number of the smaller Boeing 717-200 (B712) aircraft. There was also a higher demand for freight operations, often resulting in larger aircraft being flown, due to the reduced freight volumes able to be carried on passenger services.

Runway Use

During summer the wind varies and both RWY30 and RWY12 are used. The PIR data shows a higher percentage use of RWY12 than what was modelled in the EA due to the EA modelling being based on a representative summer busy day and representative winter busy day which did not reflect the variable conditions over the PIR analysis periods.

RWY30 is used the majority of the time during winter months due to the prevailing north-westerly winds, and the EA modelling was based on a representative winter day. However, the PIR data included autumn months that had varied runway use, and as result the PIR analysis shows RWY12 use that was not modelled in the EA.

Recommended Action 1

For future noise modelling, rather than selecting a representative busy day for summer and winter, Airservices will identify a busy week that is representative of the variable weather and operational conditions across each analysis period.

Flight paths and altitude

Aircraft are tracking in accordance with the published SIDs and STARs.

Flight path use differed between the EA and PIR due to the EA modelling being based on runway use for a representative summer and winter day and RWY12 movements not being modelled for the winter period. In addition, flight path use was affected by the varied movements numbers and changes in aircraft fleet mix as a result of COVID-19 impacts.

Arriving aircraft are generally operating at the altitudes expected, while departures are generally operating at higher altitudes than expected in the EA.

The PIR findings have been used to develop an updated AEDT model and improve the noise modelling.

Night movements

The EA reported an average of 5 daily movements during night hours (between 11pm to 6am) operating at Hobart Airport from January to June 2018. The PIR period had an average of 1.1 daily movements during night hours, with 3 night movements on a typical busy day (90th percentile). Night movements represent 2.1% of all flights during the PIR period.

Short-term noise monitoring

To support the PIR analysis, short-term noise monitors were located at Richmond, Primrose Sands and Connellys Marsh for a period of six months.

Noise events above 60 dBA were higher than estimated in the EA for Primrose Sands and Connellys Marsh, and lower than estimated for Richmond. This reflects the differences in modelled and actual runway and flight path use, with use of the RWY30 RNP-AR STAR higher than expected due to aircraft fleet mix changes in response to COVID-19 impacts and higher use of the fixed visual approach. In addition, RWY12 arrivals and departures were not modelled for the EA Winter period due to the use of a representative winter busy day that did not reflect the variable conditions that occurred over the PIR period. The PIR found:

- Primrose Sands recorded a greater number of events above 60 dBA than what was estimated in the EA. There was an average of 8.8 daily events during the PIR Summer period compared to 6-7 daily events modelled for the EA Summer period, and 15.2 daily events during the PIR Winter period compared to 10-11 daily events modelled for the EA Winter period. The average total movements per day at Primrose Sands closely matches the measured events above 60 dBA, indicating that all aircraft traffic over this area reaches noise levels of at least 60 dBA
- Connellys Marsh recorded higher measured noise events than what was estimated in the EA. Approximately one-third of all movements over Connellys Marsh were above 60 dBA. There was average of 4.9 daily events above 60 dBA during the PIR Summer period compared to 2-3 daily events modelled in the EA, and an average 2.7 daily events during the PIR Winter period with no daily events modelled in the EA
- Richmond recorded a lower number of measured noise events than what was estimated in the EA, with an average of 17.9 daily events above 60 dBA for the PIR Summer period and an average of 21.4 daily events for the PIR Winter period. In comparison, there were 28-29 events modelled for the EA Summer period and 30-31 daily events modelled for the EA Winter period.

The EA modelling did not indicate noise levels above 70 dBA, however noise events were recorded by all three monitors. The noise events above 70 dBA are the result of a range of factors, including:

- changes in aircraft fleet mix as a result of COVID-19 impacts

- noise event variation (to get an average noise level there will be some events above and below that level) particularly for aircraft that have a modelled noise level just under 70 dBA
- community and environment noise sources being included in some noise measurements.

The PIR found:

- Primrose Sands recorded an average of 2.7 daily events above 70 dBA for the PIR Summer and an average of 4.5 daily events during the PIR Winter period
- Connellys Marsh recorded a total of 12 individual events above 70 dBA during the six month PIR period
- Richmond recorded an average of 0.5 daily events above 70 dBA for the PIR Summer and an average of 0.7 daily events during the PIR Winter period.

PIR noise modelling

The AEDT modelling software has been calibrated with the short-term noise monitoring data and revised N60 and N70 contours were produced for the PIR period. The updated noise modelling is achieving a closer correlation with actual measured results but is still conservatively predicting a greater number of N60 and N70 daily noise events than what was captured by the short-term noise monitors. The PIR Model reflects aircraft operations impacted by COVID-19 travel restrictions and may not be representative of operations once travel restrictions are lifted.

Recommended Action 11

Airservices will review available noise modelling software tools for consideration of water bodies in terrain models to better account for noise reflection over water sources when noise monitoring data is not available to calibrate the noise model.

Summary

Overall, the EA correctly identified and considered the communities that were to be affected by the flight path changes.

There were differences with the EA modelling and actual PIR operations due to the selection of a representative summer and winter busy day as the basis of modelling, which did not reflect the variable weather conditions (and therefore runway use) that occurred over the PIR assessment period.

In addition, flight path use was affected by the varied movements numbers and changes in aircraft fleet mix as a result of the COVID-19 impacts on air travel. In particular, there was higher than expected use of the RWY30 RNP-AR STAR (including fixed visual approach) due partly to the unanticipated change in commercial aircraft types being operated, as well as an increased uptake of RNP-AR technology and a higher focus on fuel burn and emissions by aircraft operators.

APPENDIX B - REVIEW OF NEWLY OVERFLOWN ASSESSMENT

As part of validating the assumptions of the EAs for the Hobart PIR, Airservices has examined the application of 'newly overflown' assessment criteria, with consideration of actual noise levels obtained through short-term noise monitoring and aircraft movements. This was achieved by using the original EA methodology with consideration of actual operational conditions, with the objective to identify any potential improvements to newly overflown criteria and application.

B.1 EA Newly Overflown Criteria

The newly overflown criteria applied in the EA (*Environmental Assessment 1407 of Proposed Changes to SIDs and STARs at Hobart Airport v1.3, effective 8 November 2018*) was based on the Airservices *National Operating Standard AA-NOS-ENV-2.100 Environmental Management of Changes to Aircraft Operations*, version 12 effective 1 May 2018, which is shown in Figure 54. Urban and rural residential environments had separate significance criteria, with a lower threshold for rural areas, and the EA conservatively adopted the rural residential thresholds for the original assessment. The criteria also defined lower limits of N60, N65 and N70 noise events for assessment of areas where the proposed change could be considered for being newly overflown.

The NOS did not provide specific guidance on the quantity of existing overflights that would lead to a newly overflown determination and also did not specify whether a change in operation type (i.e. arrival or departure) or aircraft type (e.g. general aviation or passenger jet) should be considered in the evaluation.

Table 3: Aviation noise EPBC Act referral thresholds for locations which experience a low number of existing flights or are newly overflown

Location type	Noise Metric	Day (6am-11pm)	Night (11pm – 6am)
Urban residential	N70	> 10 flights	> 1 flight
	N65	> 25 flights	> 2 flights
	N60	> 50 flights	> 3 flights
Rural residential	N70	> 7 flights	> 1 flight
	N65	> 17 flights	
	N60	> 33 flights	> 2 flights
Newly overflown	N70	> 0 flights	
	N65		
	N60	> 10 flights	> 0 flights

Figure 54: Airservices newly overflown noise metric assessment criteria 2018 *(Source: AA-NOS-ENV-2.100 Environmental Management of Changes to Aircraft Operations, version 12 effective 1 May 2018)*

The N60 and N70 contours were used for the EA evaluation as the N65 threshold was expected to fall between the two other criteria.

Night (11pm to 6am) movements were shown in the EA to be negligible over areas to the south of the airport, and the EA therefore focused on day (6am to 11pm) operations.

Based on the N60 contour of more than 10 average daily noise events above 60 dBA, an area of interest was identified in the EA for Primrose Sands, Carlton and Carlton River. The approach in the EA was to determine whether this area of interest was 'newly overflown' through a graphical analysis of Airservices flight radar data. The flight track analysis from the EA was based on a three-month period, from January to March 2018, and is shown in Figure 55 with the area of interest depicted by the yellow circle (2.5km radius circle). The flight track analysis shows all aircraft traffic in this area, including Cambridge Aerodrome and Hobart Airport helicopter operations. The EA determined that

the area of interest had some level of existing traffic and was therefore not considered to be newly overflown.

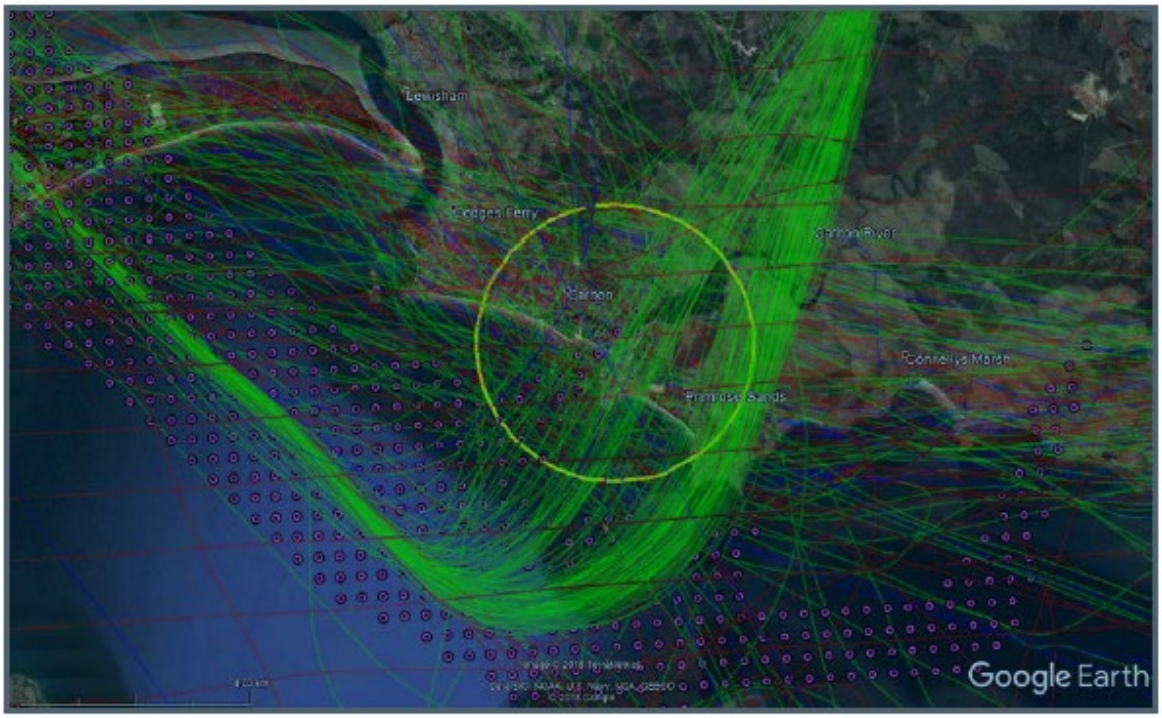


Figure 26: Radar flight tracks from Airservices NFPMS for a 3 month period (January to March 2018), within a 2.5km radius of the Carlton River mouth (shown as the yellow circle), with departures shown in green, arrivals in red and overflights in blue (data extracted on 5/10/2018). Also shown are the AEDT noise modelling results for the HB-ML Arr East alternative at Hobart Airport, showing receptor points (pink dots) with more than 10 flights with noise levels of 60dB(A) or above (ie. N60 >10).

Figure 55: 2018 EA flight track analysis for newly overflown assessment *(Source: Environmental Assessment 1407 of Proposed Changes to SIDs and STARs at Hobart Airport, v1.3)*

B.2 PIR Assessment

Section A.9 describes the updated AEDT model that was developed for the PIR period. Using the updated PIR model, the newly overflown analysis has been performed using the EA methodology and actual operational conditions from the PIR period. Additionally, data from January to July 2017 (prior to the implementation of the original SID and STAR flight path changes) has been considered for analysis.

The threshold of more than 10 average daily noise events above 60 dBA (per the original NOS criteria) was applied. Figure 56 shows a comparison of the EA Winter N60_10 and the updated PIR Winter N60_10 (where N60_10 refers to more than 10 average daily noise events above 60 dBA). The EA Winter N60_10 contour included parts of Carlton, Carlton River and Primrose Sands, while the PIR Winter N60_10 contour extends further inland at Carlton River but no longer crosses the coastline near Connellys Marsh.

The change in the contours is attributed to the cumulative impact of a range of factors, including the calibration of the AEDT model to reflect short-term noise monitoring and PIR results, the fleet mix changes as a result of COVID-19 impacts, a higher use of the RNP-AR STAR due to increased uptake of RNP-AR technology and higher than expected number of aircraft using the fixed visual approach (that aligns with the RNP-AR STAR) in response to an increased focus on efficiency and

fuel burn savings by aircraft operators. It would not have been possible to predict many of these factors at the time of the original EA modelling.

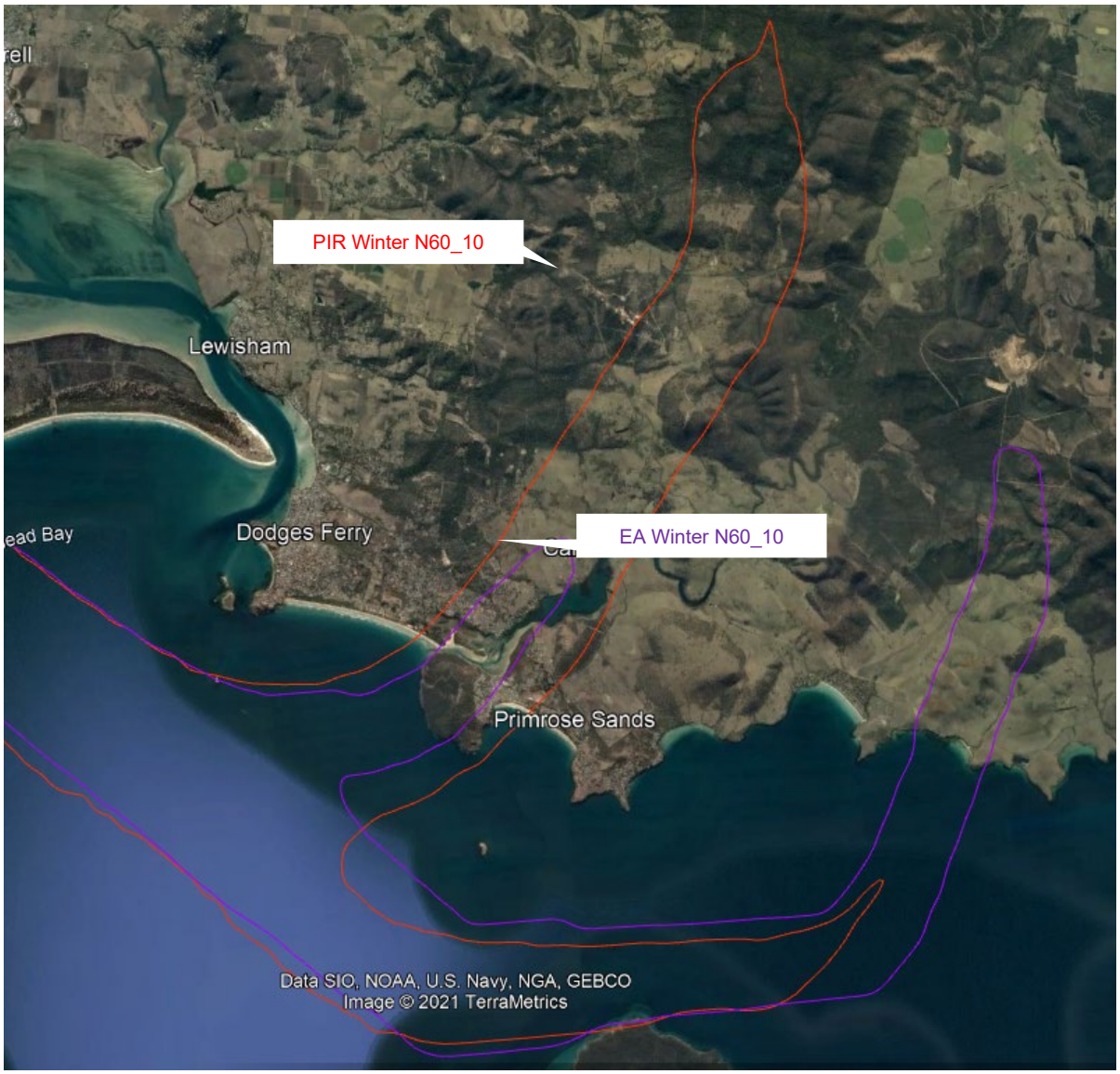


Figure 56: Comparison of EA Winter N60_10 (purple) and PIR Winter N60_10 (red) (*Source: AEDT*)

The PIR Winter N60_10 (red contour) was evaluated on the same basis as the EA. Flight track data was extracted for the period January to July 2017 (Figure 57) as well as January to July 2021 (Figure 58). This provides a comparison of six months of actual flight tracks prior to the SIDs and STARs being introduced in November 2017, and also the current flight tracks based on the final Hobart Airspace Design Review. Prior to November 2017 aircraft movements were distributed over wider areas, whereas the SIDs and STARs result in movements being concentrated onto the specific flight paths.

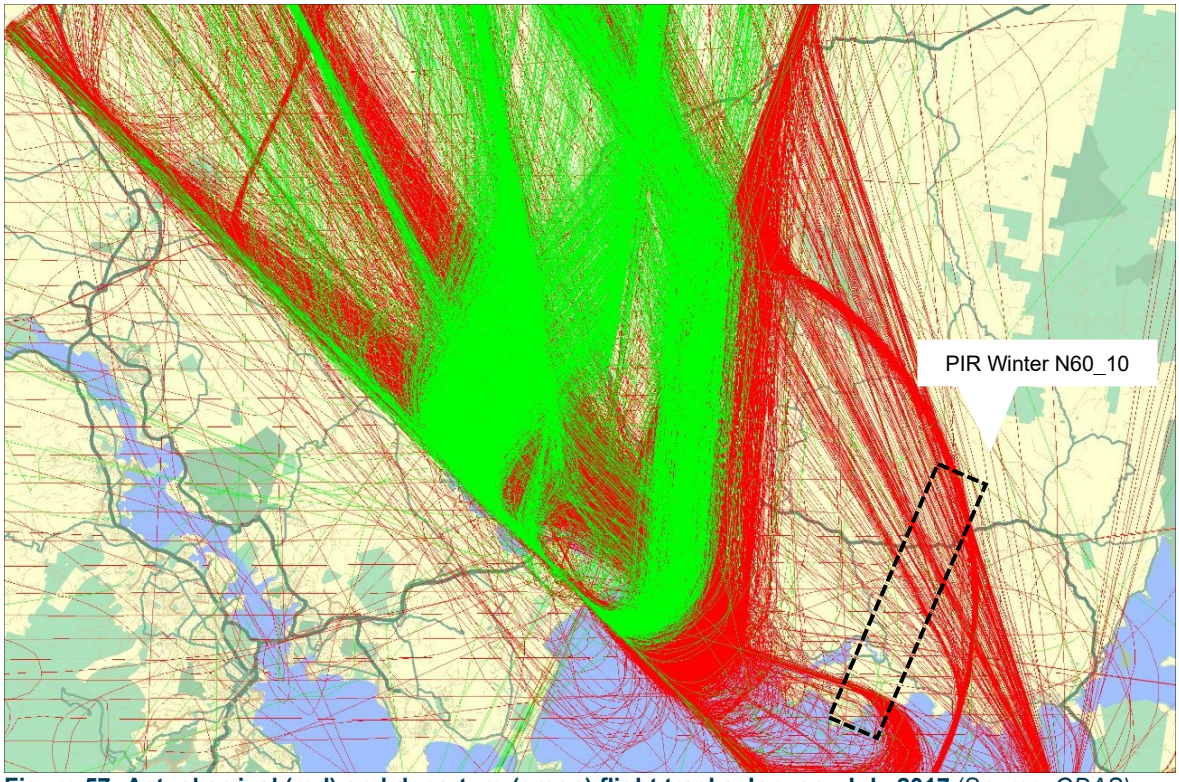


Figure 57: Actual arrival (red) and departure (green) flight tracks January-July 2017 *(Source: ODAS)*

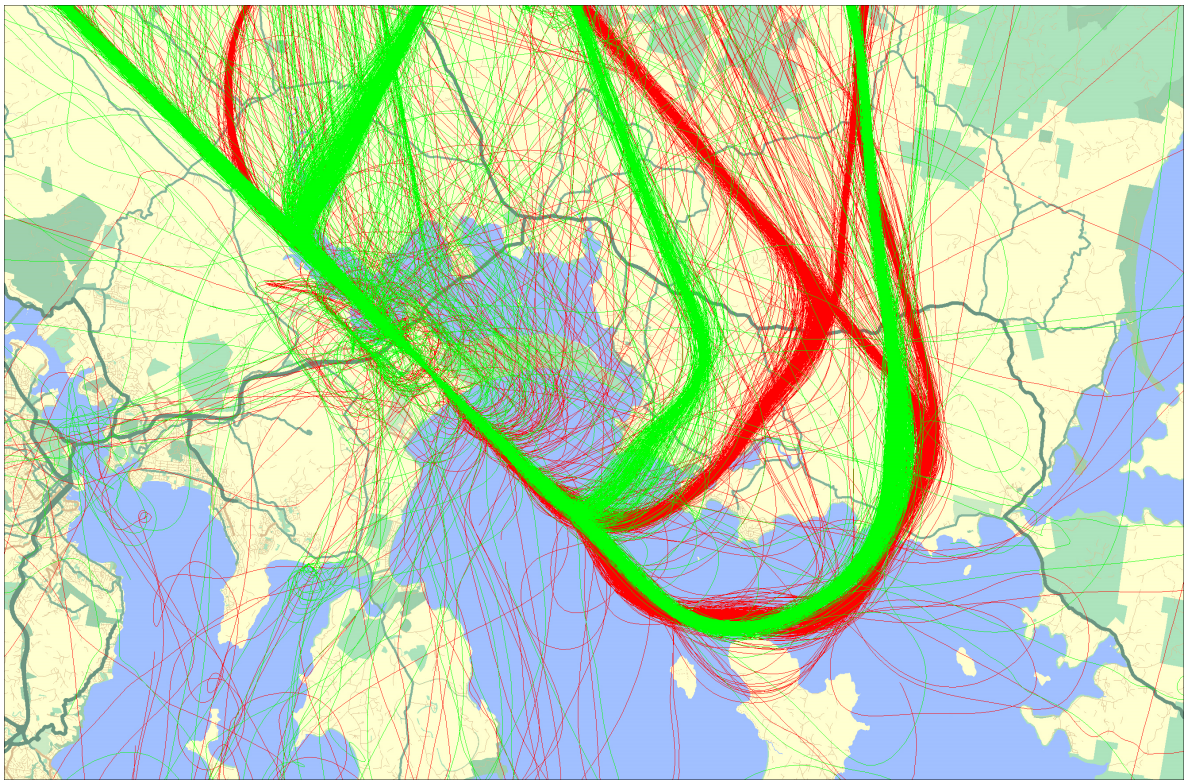


Figure 58: Actual arrival (red) and departure (green) flight tracks January-July 2021 *(Source: ANOMS)*

The analysis of the 2017 flight track data shows a spread of actual aircraft traffic, with concentrated tracks from the VOR approach overflying the residential areas of Primrose Sands, Carlton and Dodges Ferry (area of interest in the EA) and the approach over Dunalley. In the PIR N60_10 contour there is a range of density of aircraft tracks. The land area within the PIR N60_10 contour has evident

aircraft tracks and, when applying the original EA approach of a visual assessment, would not be considered to be newly overflown.

To complete the PIR analysis, an investigation into current operations during night hours (11pm to 6am) was performed. As shown in Figure 59, the night flights over the PIR N60_10 area was found to be negligible, with a total of four jet and three non-jet flights.

Based on this analysis, when applying the original EA newly overflown assessment approach to actual operations during the PIR period and considering flight track data from prior to the original implementation of SIDs and STARs, there are no areas that are determined to be newly overflown.

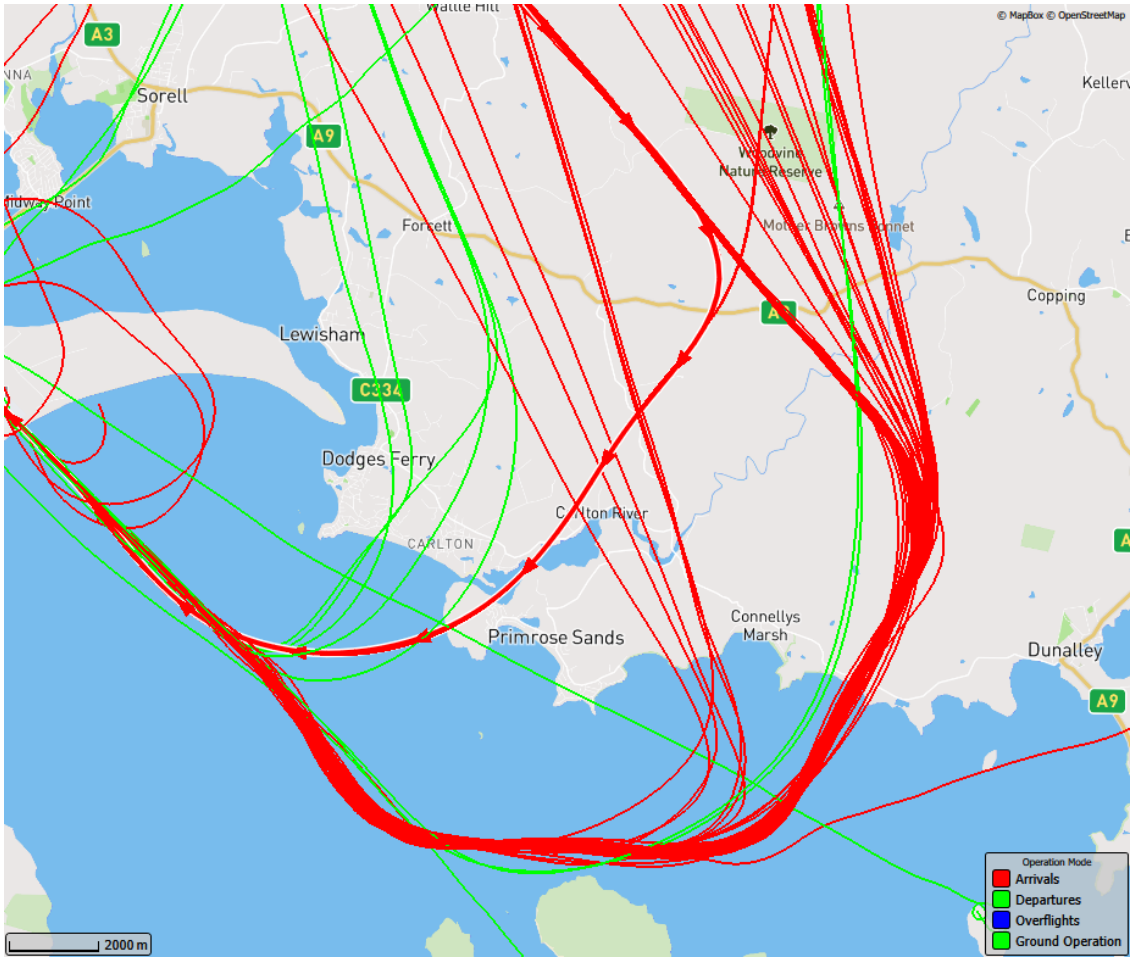


Figure 59: Actual arrival (red) and departure (green) flight tracks January to July 2021 – night hours
(Source: ANOMS)

B.2.1 Requested Analysis

At the community information session for the draft PIR report, Airservices took an action to include additional analysis of flight tracks for the review of the newly overflown assessment, including the number of flights, aircraft types, average flight altitude, and the size of the geographical land area considered.

Actual flight track data

Table 27 shows the radar flight track data for January to June in 2017 (pre- implementation of SIDs and STARs), 2018 (pre- Hobart Airspace Design Review flight path changes) and 2021 (post- Hobart Airspace Design Review changes).

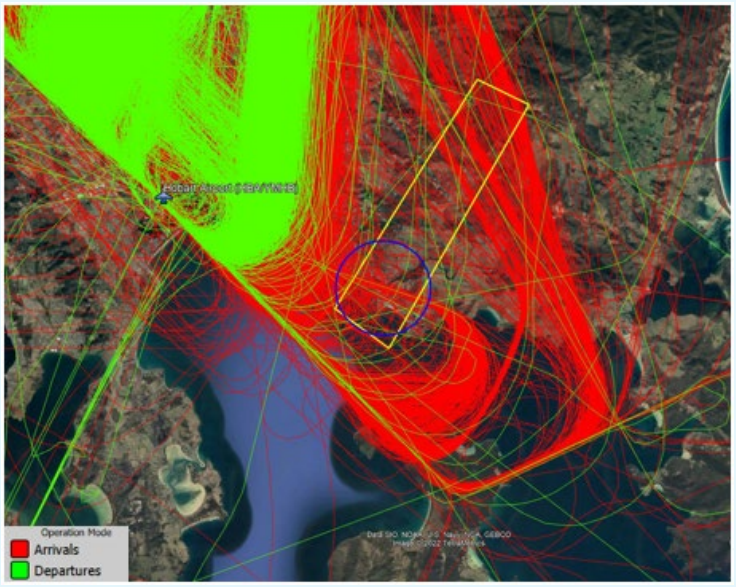
The radar track data for 2017 was sourced from the Airservices Operational Data Analysis Suite (ODAS). ODAS captures radar tracks for aircraft operating under Instrument Flight Rules (IFR), which includes the majority of fixed-wing operations at Hobart Airport but not helicopter movements or Cambridge Aerodrome operations.

The 2018 and 2021 flight tracks were sourced from the Airservices Airport Noise and Operations Monitoring System (ANOMS) (introduced in July 2017) and shows all aircraft operations at Hobart Airport and Cambridge Aerodrome. Helicopter movements have been excluded from the analysis.

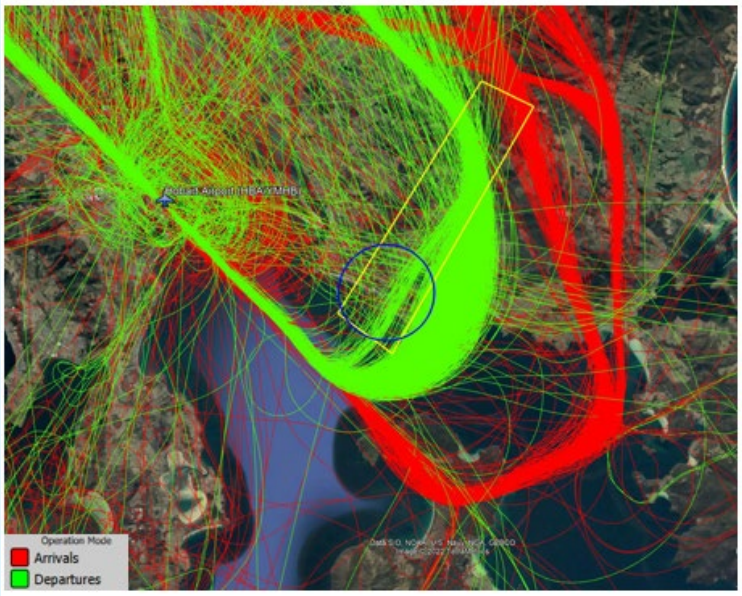
This additional review of the radar flight track data shows that the 2018 EA area of interest (see Section B.1) was overflown by fixed-wing aircraft operations in 2017, 2018 and 2021. In 2017, the majority of aircraft operations within the 2018 EA area of interest (blue circle) were arrivals using the VOR approach, whereas following the 2018 and 2019 flight path changes the area was subject to both arrival and departure aircraft traffic.

Section B.2 describes the range of factors that have resulted in the changed noise contours and PIR N60_10 area (yellow rectangle).

Table 27: Radar flight track data comparison – January to June 2017, 2018, and 2021

Radar flight track data comparison – January to June 2017	
 *January – June 2017 radar track data: Hobart Airport fixed wing movements only, excludes Cambridge Aerodrome and helicopter operations (Source: ODAS)*	Total fixed wing movements (Hobart Airport only): 11,428 *Total movements within the 2018 EA N60_10 area of interest (blue circle):* Total operations: 450 Average weekly operations: 17.4 Average altitude: 2,000-5,000ft *Total movements within the 2021 PIR N60_10 area (yellow rectangle):* Total operations: 930 Average weekly operations: 35.9 Average altitude: 3,800-6,000ft

Radar flight track data comparison – January to June 2018



January – June 2018 radar track data: Hobart and Cambridge fixed wing movements, excludes helicopter operations (Source: ANOMS)

January to June 2018 total fixed wing movements (Hobart and Cambridge): 22,838

Total movements within the 2018 EA N60_10 area of interest (blue circle):

Total operations: 230

Average weekly operations: 8.9

Average altitude: 1,000-7,300ft

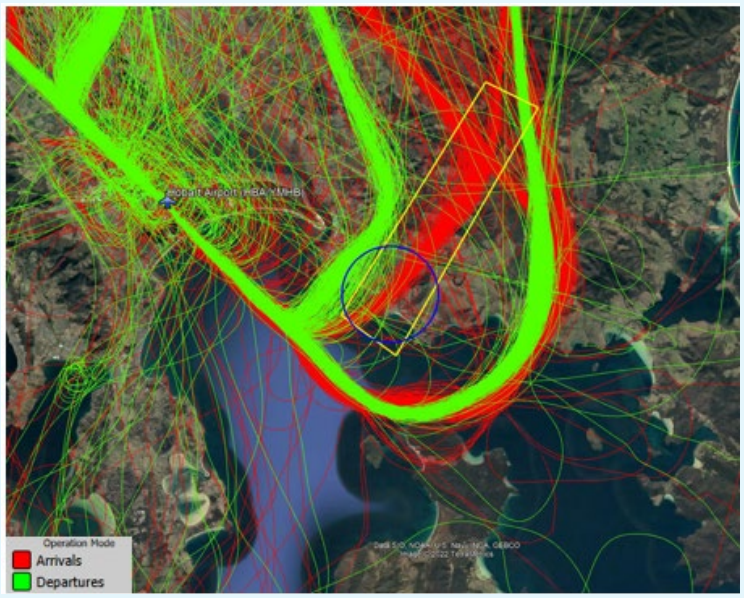
Total movements within the 2021 PIR N60_10 area (yellow rectangle):

Total operations: 4,210

Average weekly operations: 162.8

Average altitude: 3,800-8,800ft

Radar flight track data comparison – January to June 2018



January – June 2021 radar track data: Hobart and Cambridge fixed wing movements, excludes helicopter operations (Source: ANOMS)

January to June 2021 total fixed wing movements (Hobart and Cambridge): 24,492

Total movements within the 2018 EA N60_10 area of interest (blue circle):

Total operations: 2,290

Average weekly operations: 88.5

Average altitude: 1,200-7,000ft

Total movements within the 2021 PIR N60_10 area (yellow rectangle):

Total operations: 4,070

Average weekly operations: 157.4

Average altitude: 2,500-10,000ft

The top aircraft types within the EA N60_10 area of interest (blue circle) and PIR N60_10 area (yellow rectangle) for 2017, 2018 and 2021 are provided in Table 28.

Table 28: Radar flight track data 2017, 2018 and 2021 – top aircraft mix

Top aircraft mix within the area of interest	2017 January-June		2018 January-June		2021 January-June	
	Within EA area of interest	Within PIR N60_10 area	Within EA area of interest	Within PIR N60_10 area	Within EA area of interest	Within PIR N60_10 area
Boeing 717-200 (B712)	33%	29%	0%	8%	6%	22%
Airbus A320	36%	31%	32%	33%	16%	28%
Boeing 737-800 (B738)	16%	29%	15%	44%	18%	28%
Beechcraft Super King Air 200 (BE20)	0%	0%	35%	3%	24%	4%
Airbus A321	14%	10%	13%	10%	6%	10%
Fairchild Swearingen Metroliner 23 (SW4)	1%	1%	5%	2%	26%	5%
SAAB 340 (SF34)	0%	0%	0%	0%	4%	3%

Area covered

The original EA area of interest (blue circle) is a 2.5km radius area based on the N60_10 noise contour covering a geographical area of 7.85 km^2.

The PIR Winter N60_10 area (yellow rectangle) is based on the updated PIR noise modelling (see Section A.9) and covers a geographical area of 52.5 km^2.

B.3 Current Criteria

The current *National Operating Standard (NOS) AA-NOS-ENV-2.100* (version 15, effective 29 June 2019) is shown in Figure 60. It determines noise sensitive receivers (NSRs) to be newly overflown if the proposed change has been identified as noticeable and the area currently experiences negligible existing aircraft noise (i.e. less than one overflight per day, during the daytime 6am-11pm). Urban and rural areas have separate criteria for determining the noticeability of a change, with 50 dBA single event contours applied for urban areas and 42 dBA single event noise contours applied for rural areas. The noise noticeability criteria was adopted in 2019 as part of Airservices' continuous improvement efforts and was developed with consideration of thresholds from Australian state and territory regulations for industrial noise. It applies single event noise contours (LAmax) with consideration of the existing background noise level for urban or rural areas (alternate criteria exists for an environmental impact assessment (EIA) that is completed without noise modelling). The revision to the NOS involved consultation with the (now) Commonwealth Department of Agriculture, Water and the Environment, and the (now) Department of Infrastructure, Transport, Regional Development and Communications.

The current criteria (at the time of assessment) will be applied for any of the community or industry suggested alternatives, detailed in Appendix G and Appendix H, that are recommended to progress for further assessment. The process for further assessment of these suggested alternatives is described in Appendix K.

1.2 Consideration of aircraft 'noise noticeability' and 'newly overflown' NSRs

Determining whether a given NSR (or community) will experience 'noticeable' aircraft noise, or will be 'newly overflown', allows us to carry out qualitative consideration of the potential effects of flight path changes, and determine how best to manage them (including community engagement or flight path redesign).

1.2.1 Noise noticeability

Aircraft noise noticeability shall be determined in one of the following two ways, depending on whether noise modelling is conducted as part of an EIA:

a) EIA with noise modelling:
- 50 dB(A) single event noise contours (LAmax) are modelled for urban areas; and 42dB(A) contours are modelled for rural areas,
- Any overflights of NSRs within the above contours are considered to be 'noticeable'.

b) EIA without noise modelling:
- An area is identified 10km either side of the nominal flight path for urban areas (representative of 50dB(A) noise levels), and 20 km[25] either side of the nominal flight path for rural areas (representative of 42dB(A) noise levels), up to a maximum distance of 35 nautical miles (nm) from the relevant runway threshold,
- Any overflights of NSRs within the above areas are considered to be 'noticeable'.

Note – where part of an existing procedure remains unchanged under the proposed change, that part of the design is excluded from noticeability modelling or the other noticeability identification process described above.

1.2.2 Determining newly overflown NSRs

A NSR is considered to be "newly overflown" if:

- The proposed change has been identified as 'noticeable', AND
- The NSR currently experiences negligible existing aircraft noise – i.e. less than one overflight per day, during the daytime (i.e. 6:00 am – 11:00pm).

Figure 60: Airservices current aircraft noise noticeability and newly overflown assessment criteria
(Source: Airservices National Operating Standard AA-NOS-ENV-2.100 Environmental Management of Changes to Aircraft Operations, version 15 effective 29 June 2019)

B.4 PIR Findings – Newly Overflown Review

The original EA newly overflown assessment approach, which was based on noise modelling thresholds to determine areas of interest and then a visual assessment of Airservices flight radar data to determine if there were existing overflights, was applied to actual operations during the PIR period. The review found:

- While there are differences between the applicable EA N60_10 and PIR N60_10 noise modelling contours (N60_10 refers to more than 10 average daily noise events above 60 dBA, which was the noise modelling threshold), both the EA and PIR modelling included the communities of Primrose Sands, Carlton and Carlton River. The PIR N60_10 extends further inland at Carlton River than the EA N60_10, but no longer crosses the coastline near Connellys Marsh. The change in the noise modelling contours is attributed to the calibration of the noise model to reflect short-term noise monitoring and PIR results, fleet mix changes as a result of COVID-19 impacts, as well as higher use of the RWY30 RNP-AR STAR due to increased uptake of RNP-AR technology and higher than expected number of aircraft using the fixed visual approach because of an increased focus on efficiency and fuel burn savings by aircraft operators.

- The PIR used Airservices flight radar data for the period January to July 2017 (prior to the original SIDs and STARs being implemented) as the comparison period to consider if the PIR area of interest (PIR N60_10 contour) received any overflights prior to the change. Due to the aircraft tracks that were evident in 2017, there would not be any areas considered to be newly overflown.

Since the original EA was completed in 2018, Airservices has updated its criteria for newly overflown and applies single event noise modelling to assess whether a proposed change is noticeable, and then whether there is currently negligible existing aircraft noise (i.e. less than one overflight per day, during the daytime 6am-11pm). The current criteria (at the time of the assessment) will be applied for any of the community or industry suggested alternatives, detailed in Appendix G and Appendix H, that are recommended to progress for further assessment. The process for further assessment of these suggested alternatives is described in Appendix K.

APPENDIX C - REVIEW OF EA FOR HIGH LEVEL ROUTE CHANGES

To support the implementation of the Hobart Airspace Design Review flight paths, some changes were required to the high level route structure across Tasmania. SIDs and STARs require high level routes (more than 12,000 ft above ground level) to connect aircraft with their destinations, and changes were made to ensure aircraft could connect seamlessly to the appropriate high level routes with reduced cross over and route complexity.

These changes were addressed in the *Environmental Assessment of the Proposed New Route Structure for Hobart Airport* (EA-1433) (version 1.0, effective 10 April 2019). The Civil Aviation Safety Authority's Office of Airspace Regulation approved the airspace change proposal in May 2019, and the changes to the high level routes were implemented in early November 2019.

The PIR review of the Tasmanian high level route changes used current data from Airservices Operational Data Analysis Suite (ODAS) to establish actual aircraft tracking against the high level route structure. A sample of data from January 2021 has been used in the analysis. Actual aircraft noise levels were not determined as there were no noise monitors located close to the high level route paths.

The EA included an analysis of the following high level route changes shown in Figure 61:

- Moving arrivals from Melbourne to track on the existing route between waypoint IRSOM to waypoint MORGO (previously called HR037)
- Arrivals from Adelaide and Perth will track on a new route from waypoint SALEM to waypoint MORGO
- Non-jet arrivals from King Island will track on a new route from Wynyard Airport (WYY NBD) to waypoint LIFFY
- Moving departures to Perth and Adelaide track on an existing route via waypoint CLARK to waypoint SALEM

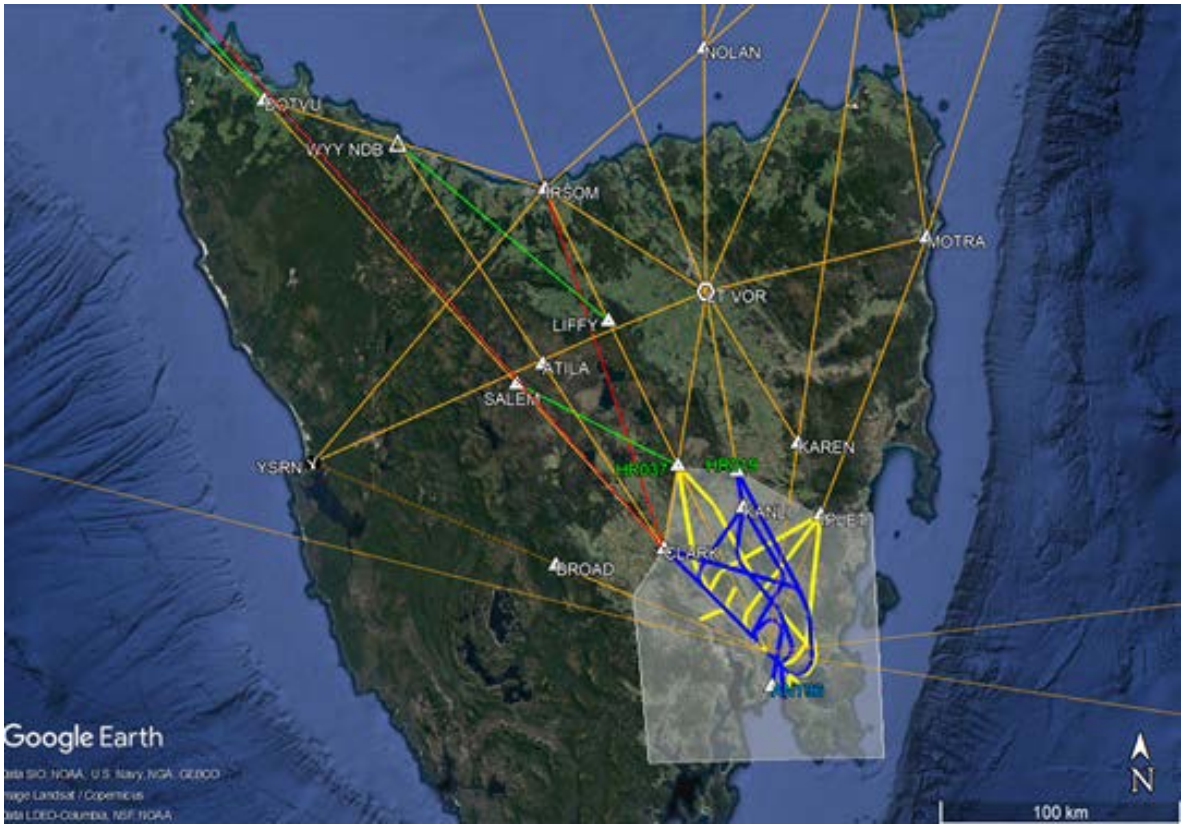


Figure 61: Tasmanian high level route changes – 2019 new routes (green) and deleted routes (red)
(Source: EA (1433) of proposed New Route Structure for Hobart Airport, version 1.0)

C.1 High Level Arrival Routes

C.1.1 Arrivals from Melbourne

Arrivals from Melbourne (and Essendon) into Hobart were changed to track via the existing route W282 south of waypoint IRSOM (Devonport) to connect with waypoint MORGO (previously referred to as HR037) via waypoint LIFFY.

The actual arrival flight tracks (light blue), shown in Figure 62, are concentrated along the route from waypoints IRSOM, LIFFY and MORGO and show that aircraft are following the changed high level route structure (orange). Route V544 (WYY NBD to LIFFY) is shown in green. After aircraft track from Wynyard to waypoint LIFFY, they then track to waypoint MORGO.

The town of Deloraine was referred to in the EA and is directly overflown as expected. Some aircraft appear to directly track to waypoint MORGO. Table 29 provides a comparison of the EA and PIR assessments. At the time of the EA, flights from Melbourne represented 55% of all inbound traffic. There have been less flights from Melbourne than what was expected, due to the impacts on COVID-19 on air travel.

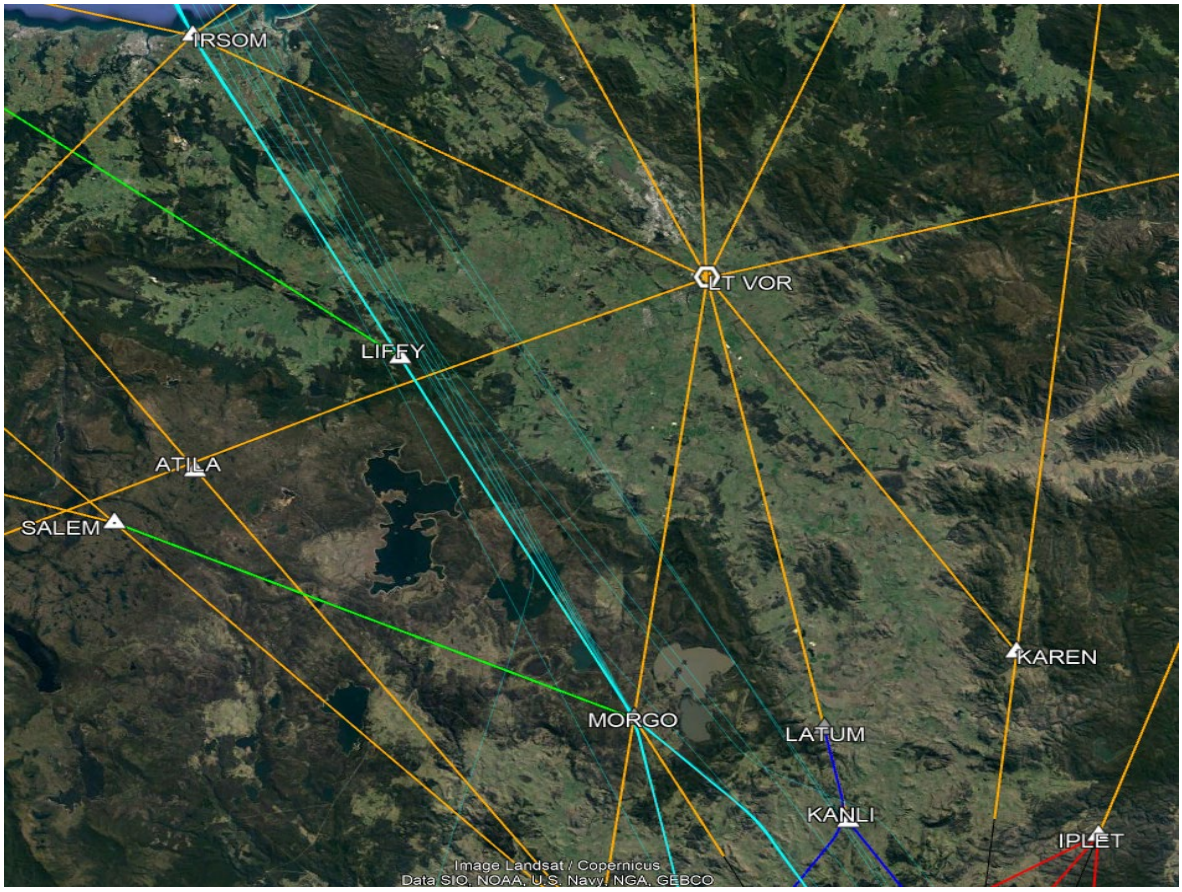


Figure 62: Tasmanian ATS Routes – arrivals from Melbourne *(Source: ODAS)*

Table 29: High Level Arrival Routes– arrivals from Melbourne

	EA	PIR
Average daily aircraft movements	Currently 18 to 24 aircraft per day, including B738 and A320 aircraft types	Average of 9.7 arrivals per day. This includes the expected B738 and A320 aircraft types.
Aircraft altitude	Just prior to MORGO, aircraft will be descending through 13,000 ft for RWY12 and descending through 15,000 ft for RWY30.	The average altitude at MORGO was 13,870 ft for jets and 12,482ft for propeller aircraft.
Noise levels	Noise levels expected to be less than 46 dBA (modelled on B738 arrival)	Noise levels not recorded

C.1.2 Arrivals from North-West Tasmania

The new route connects non-jet aircraft from Wynyard (WYY NDB) (including traffic from King Island) to waypoint LIFFY to then join with arrival traffic from Melbourne at waypoint MORGO.

Actual aircraft tracks (light blue) and the high level route structure (orange) are shown in Figure 63.

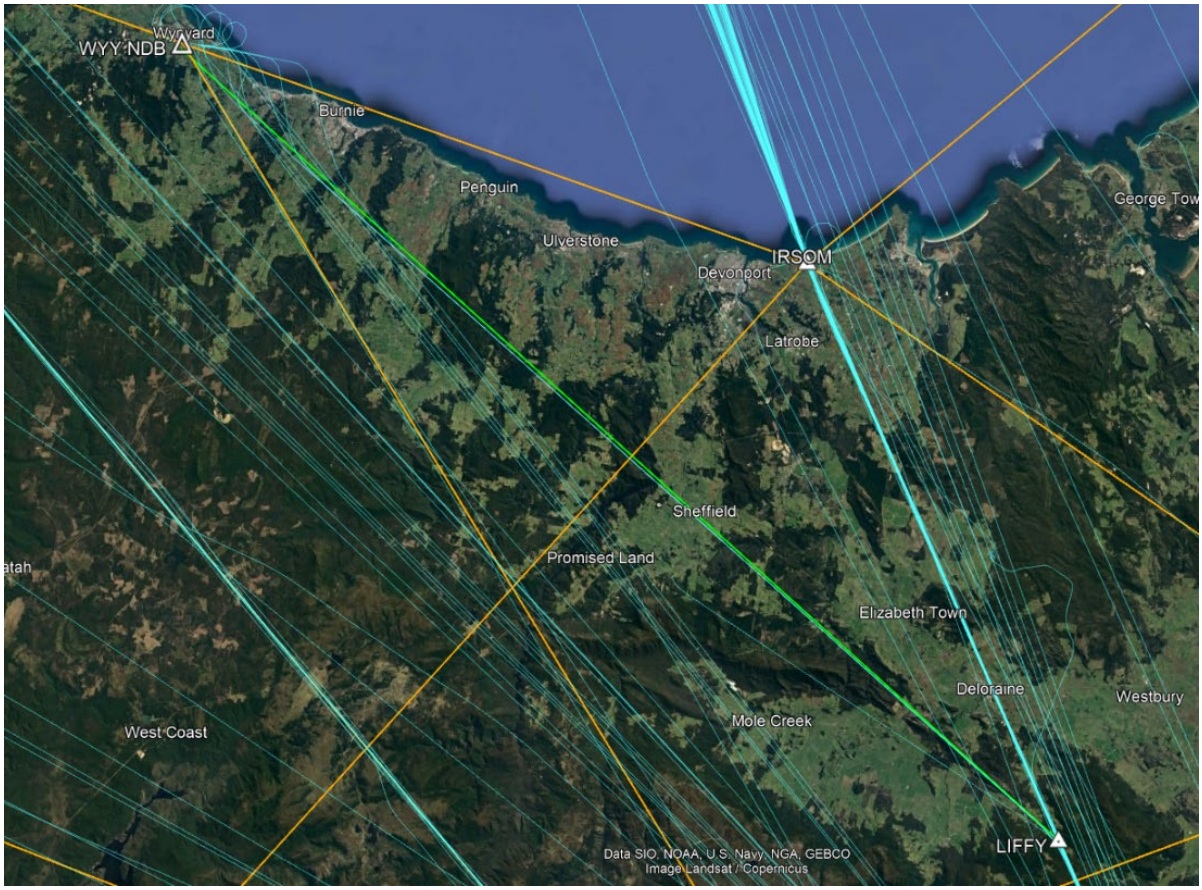


Figure 63: Tasmanian ATS Routes – arrivals from north-west Tasmania *(Source: ODAS)*

Table 30 provides a comparison of the EA and PIR assessments. There have been less flights than expected due to the impacts on COVID-19 on air travel.

Table 30: High Level Arrival Routes– arrivals from north-west Tasmania

	EA	PIR
Average daily aircraft movements	Currently 2-4 non-jet movements per week, by twin engine propeller aircraft (BE20 - Beechcraft Super King Air 200) per week	Average of 0.6 arrivals per day from Wynyard Airport or 4.2 per week. Of these, a portion used the WYY NDB to LIFFY route. A large portion appeared to directly track to MORGO.
Aircraft altitude	Likely 12,000 ft	Aircraft track at an altitude of 15,000 ft between WYY and LIFFY and are the BE20 aircraft type.
Noise levels	Below 55 dBA (based on a Cessna Conquest C441, which is the BE20 substitution aircraft identified in *AS2021:2015 Acoustics – Aircraft noise intrusion – Building siting and construction*)	Noise levels not recorded. Actual aircraft altitude is higher than expected and noise on the ground would therefore be lower than expected.

C.1.3 Arrivals from Adelaide and Perth

Arrivals from Adelaide were changed to track via the waypoint SALEM and then via the new route between SALEM and MORGO. Arrivals from Perth continued tracking across the Southern Ocean to waypoint SALEM and then via the new route between waypoints SALEM and MORGO.

Actual arrival tracks (light blue) and the high level route structure (orange) are shown in Figure 64. The tracks are concentrated along the route from waypoint SALEM to MORGO, indicating that aircraft are using the new route as expected.

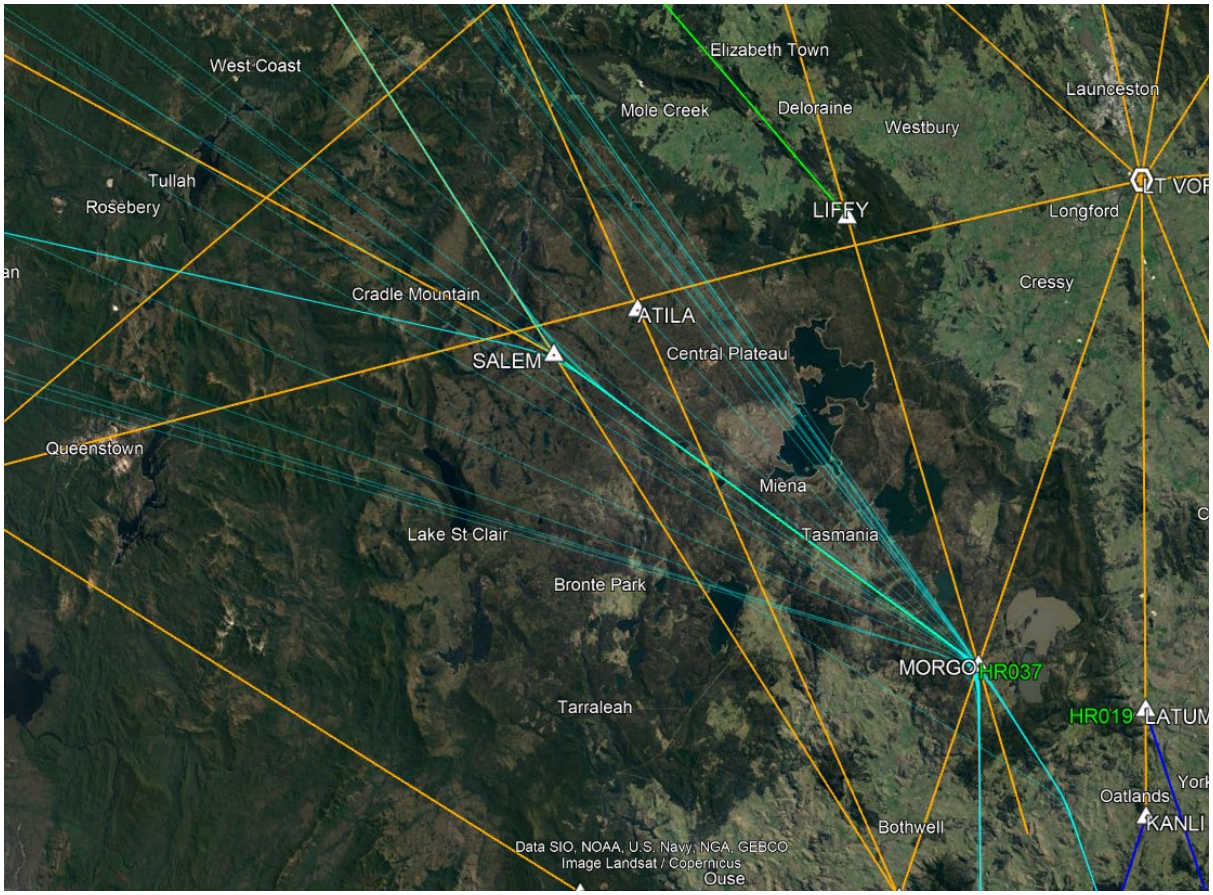


Figure 64: Tasmanian ATS Routes – arrivals from Adelaide and Perth *(Source: ODAS)*

Table 31 provides a summary of the EA and PIR assessments. There have been less flights than expected due to the impacts on COVID-19 on air travel.

Table 31: High Level Arrival Routes– arrivals from Adelaide and Perth

	EA	PIR
Average daily aircraft movements	Currently one flight per day from Adelaide (A320) and four flights per week from Perth to Hobart (B738).	Average of 0.7 arrivals per day from Adelaide and 1 from Perth.
Aircraft altitude	Just prior to waypoint MORGO, aircraft will be descending through 13,000 ft for arrivals to RWY12 and descending through 15,000 ft for arrivals to RWY30.	The average altitude at MORGO was 13,870 ft for jets and 12,482ft for propeller aircraft.
Noise levels	At 5,400 ft altitude, noise levels on the ground are less than 55 dBA for a B738 and less than 53 dBA for an A320 at 5,400 ft. Noise levels at locations that will be overflown will be lower due to the higher altitude.	Noise levels not recorded

C.2 High Level Departure Routes

C.2.1 Departures to Adelaide and Perth

The route for aircraft departing to Adelaide and Perth (and other Western Australian airports) continued tracking outbound via waypoint CLARK and then via a new route to waypoint SALEM.

Actual aircraft departure tracks (yellow) and the high level route structure (orange) are shown in Figure 65 and indicate that aircraft are using the SALEM to CLARK route as expected.

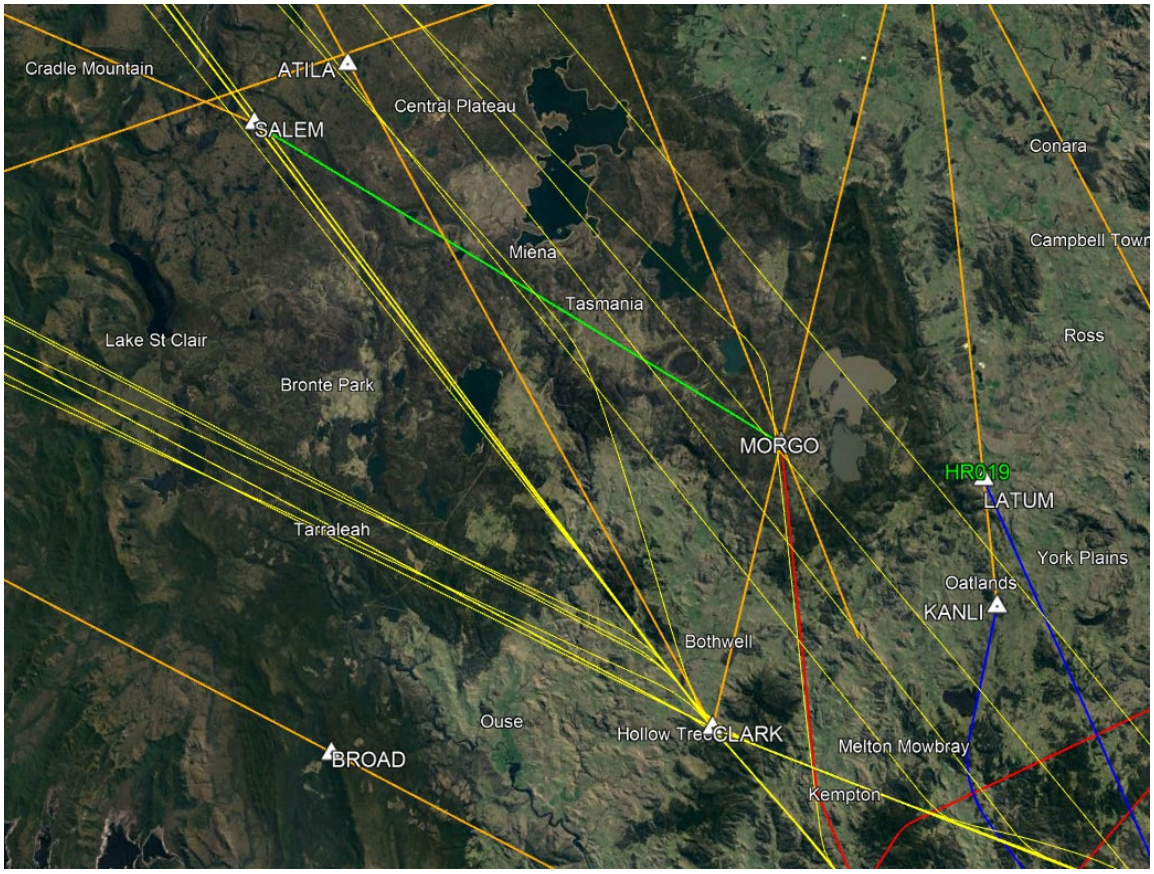


Figure 65: Tasmanian ATS Routes – departures to Adelaide and Perth *(Source: ODAS)*

Table 32 provides a summary of the EA and PIR assessments. There have been less flights than expected due to the impacts on COVID-19 on air travel.

Table 32: Tasmanian ATS Routes – Departures to Perth and Adelaide

	EA	PIR
Average daily aircraft movements	Currently one flight per day to Adelaide from Hobart (A320) and four flights per week to Perth from Hobart (B738).	Average of 0.7 departures per day to Adelaide and 0.9 departures per week to Perth.
Aircraft altitude	At waypoint CLARK, jet aircraft are anticipated to be above 13,000 ft, and will be above 20,000 ft by SALEM waypoint.	The average altitude at CLARK was 20,000 ft for jets and 15,800 ft for propeller aircraft. The average altitude at SALEM was 25,000 ft for jets and 17,100 ft for propeller aircraft.
Noise levels	Less than 46 dBA at waypoint CLARK (modelled on B738. The A320 is modelled at 43 dBA).	Noise levels not recorded. Actual jet aircraft average altitude is much higher than expected and noise on the ground would therefore be lower than expected.

C.3 PIR Findings – Review of EA for High Level Route Changes

The changes to the Tasmanian high level routes resulted in some variation to the patterns of how aircraft overfly areas of Tasmania when travelling to or from Hobart Airport. Given the changes occurred at altitudes above 13,000 ft, the expected noise impacts were considered to be minimal. The changes were expected to be visually noticeable to residents in communities below the new routes.

The PIR compared actual aircraft flight tracks information with the EA for the high level route changes and found that:

- aircraft are operating as expected, with actual flight tracks concentrated along the main high level route structure
- jet aircraft are generally at a higher altitude than estimated in the EA
- usage of the high level routes is lower than expected due to the ongoing impacts on COVID-19 on air travel.

APPENDIX D - REVIEW OF EA FOR VOR RELOCATION

The VOR navigation aid was located on land required by Hobart Airport for an extension of the runway and was subsequently turned off and relocated to a new site on the airport, requiring amendment of the instrument approaches that utilise the VOR. As VOR approach procedures are designed with tracking towards the navigation aid, movement of the aid itself required the procedures to be rotated one degree.

Ground-based navigation aids, such as VORs, have been progressively decommissioned across Australia as the transition to satellite-based navigation is implemented. A number of ground-based navigation aids, including the Hobart VOR, have been retained as a backup navigation network contingency.

The NAPs for Hobart Airport (see Section 5.3) identify that VOR approaches may only be used for approved flight training for aircraft below 5,700 kg or for operational reasons when no alternative approach exists.

These changes were addressed in in the *Environmental Assessment of Hobart Airport – VOR Relocation* (EA-1255) (version 1.0, dated 31 January 2018).

This review of the EA uses current NFPMS data for Hobart Airport to provide an analysis of aircraft operations following the VOR changes and a discussion on environmental impacts.

D.1 EA Predicted Use of VOR Approaches

The EA for the VOR relocation was based on traffic numbers from 2017 and estimated that one VOR flight operation could be expected per busy day and an average of one movement every three days. It also assumed that with forecast growth the VOR usage would increase to two movements per day.

For the period 1 July to 30 September 2017 the VOR arrivals were only using the 10 DME arc[19] for RWY30, as shown in Figure 66. There were no Airservices flight radar tracks during this period for the VOR approach to RWY12. Figure 67 provides further analysis of VOR traffic in 2017, undertaken as part of the PIR, which shows that aircraft also previously used the ‘tear drop’ arrival path overflying the airport and community areas of Carlton, Primrose Sands and Dodges Ferry.

[19] A DME arc is a procedure used for an aircraft to transition from the enroute environment to an instrument approach. Its radius defined by a distance measuring equipment (DME) distance from the VOR.

Figure 66: VOR flight tracks to RWY30 (magenta) for the period 1 July to 30 September 2017 *(Source: Environment Assessment of Hobart Airport VOR Relocation, version 1.0 effective 31 January 2018)*

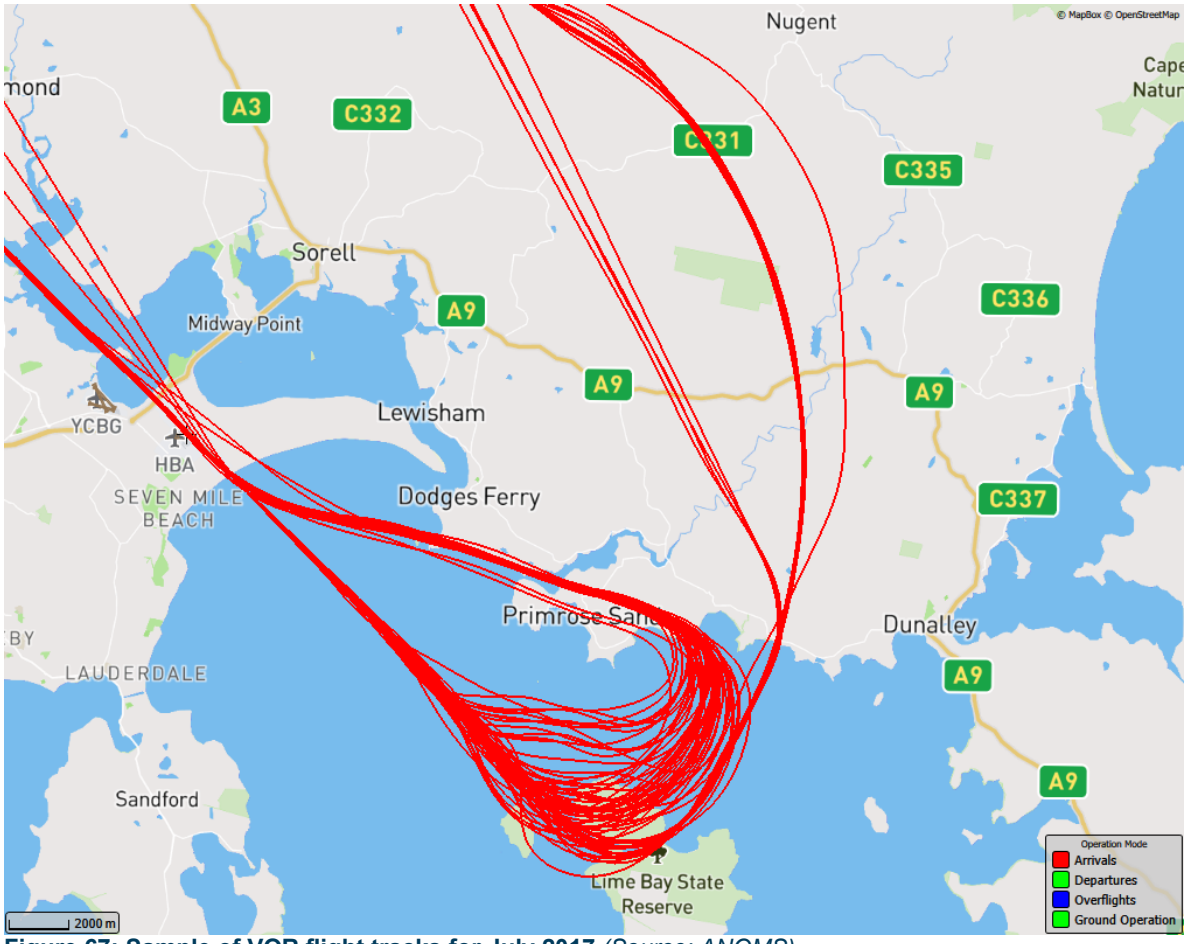


Figure 67: Sample of VOR flight tracks for July 2017 *(Source: ANOMS)*

D.2 PIR Use of VOR Approaches

An analysis of current ANOMS data during the PIR period (January 2021 to July 2021), shown in Figure 68, identifies nine aircraft that followed the VOR using the 11 DME arc. Seven of these aircraft were passenger jets (B712s and a B738) and were conducting VOR approaches due to a misinterpretation of the requirements in the *En Route Supplement Australia*[20] aeronautical information publication that has since been clarified with air traffic controllers. This is discussed further in Appendix E.

Actual VOR usage is difficult to extract from flight track data as it requires visually searching for tracks that follow the expected VOR approach path. ATC input suggests usage of around 1 to 2 times every two weeks or pilot training is possible. This is much less than the predicted usage within the original EA of two per day.

The current pattern of arrival traffic to RWY30 does not use the 'tear drop' VOR flight path that travels overhead the airport and areas of Primrose Sands, Carlton and Dodges Ferry.

[20] https://www.airservicesaustralia.com/aip/aip.asp

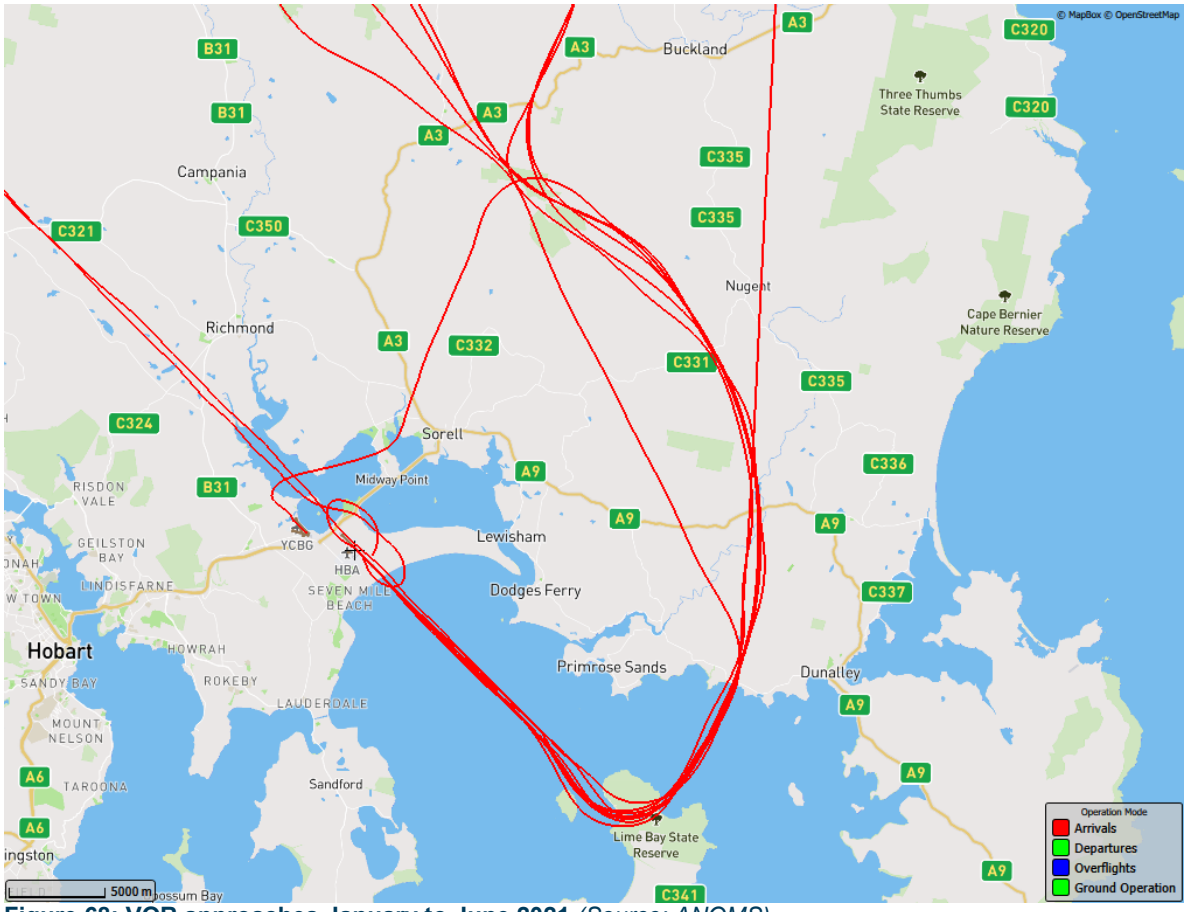


Figure 68: VOR approaches January to June 2021 *(Source: ANOMS)*

D.3 PIR Findings – Review of EA for VOR Relocation

Since 2018, VOR approaches are only available for pilot training purposes and as part of the Backup Navigation Network. The PIR found:

- seven of the nine aircraft that followed the VOR using the 11 DME arc were passenger jets (B712s and a B738) that were conducting VOR approaches due to a misinterpretation of the requirements in the *En Route Supplement Australia* aeronautical information publication that has since been clarified with air traffic controllers
- actual use of the VOR during the PIR period for pilot training purposes was found to be much less than forecast in the EA, with current use of approximately once per week in comparison to the EA prediction of two movements per day.

APPENDIX E - REVIEW OF NOISE ABATEMENT PROCEDURES

E.1 Operational Review

As part of the PIR, Airservices committed to a review of the application of the NAPs to determine if the conditions for use were met and the priorities were being adhered to.

The PIR operational review is based on desktop review by air traffic controllers at Hobart Airport.

The NAPs prescribe the use of a SID or STAR for all IFR aircraft during air traffic control hours. As there are a number of different published SIDs and STARs (due to different navigation technologies), the specific SID or STAR operated by the aircraft is based on the aircraft's navigation capability and the prevailing weather conditions.

This includes the Air New Zealand flights that commenced operations at Hobart Airport in April 2021, which have been processed by air traffic control via the available SIDs and STARs despite the extra track miles that this imposes on the airline.

The general exceptions to the NAP being applied have been:

- Flights to Antarctica are processed via the most efficient flight route available (dependent on weather conditions and other traffic) due to the fuel critical nature of the flights
- Military aircraft are processed via the SIDs and STARs unless their operational need differs, and they are then processed as per the pilot request
- Medical priority aircraft have at times been processed other than via the SIDs and STARs, dependent on weather and other traffic
- On rare occasions pilots have indicated an operational requirement for an alternative SID or STAR and this has been accommodated by air traffic controllers.

In accordance with the published NAPs, VOR approaches are only available for pilot training purposes by aircraft below 5,700kg unless no other alternative approach exists. In practice, VOR approaches for pilot training purposes are being conducted approximately once every two weeks, with demand varying depending on the training needs of local training providers.

As noted in Appendix D, the PIR identified seven occasions of passenger jet aircraft (B712s and a B738) conducting a VOR approach to RWY30 during the PIR period. This was found to be due to a misinterpretation of the requirements in the *En Route Supplement Australia* aeronautical information publication that has since been clarified with air traffic controllers.

E.2 Flight Track Analysis

Density plots of actual aircraft operations have been reviewed to assess compliance with the NAPs. The density plots are based on a single month of aircraft flight track operations and show the concentration of air traffic. The period in 2017 (Figure 69), before any flight path changes, shows a diverse pattern of air traffic. In comparison, the period in 2020 (Figure 70) shows aircraft movements concentrated on the SIDs and STARs.

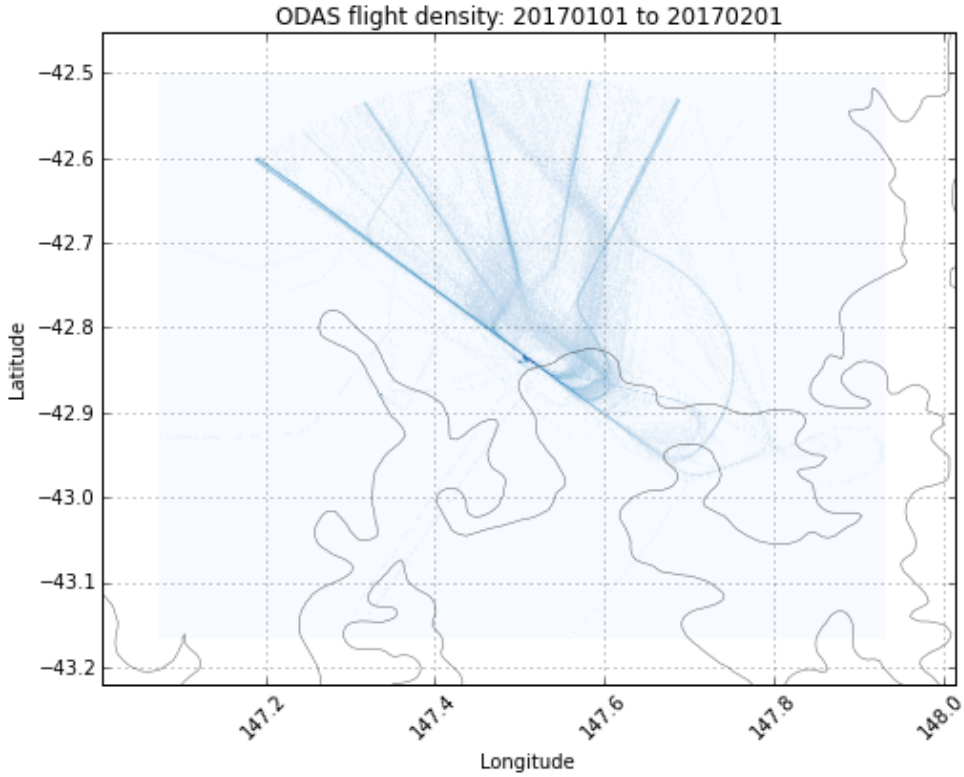


Figure 69: Hobart Airport flight density 1 January to 1 February 2017 *(Source: ODAS)*

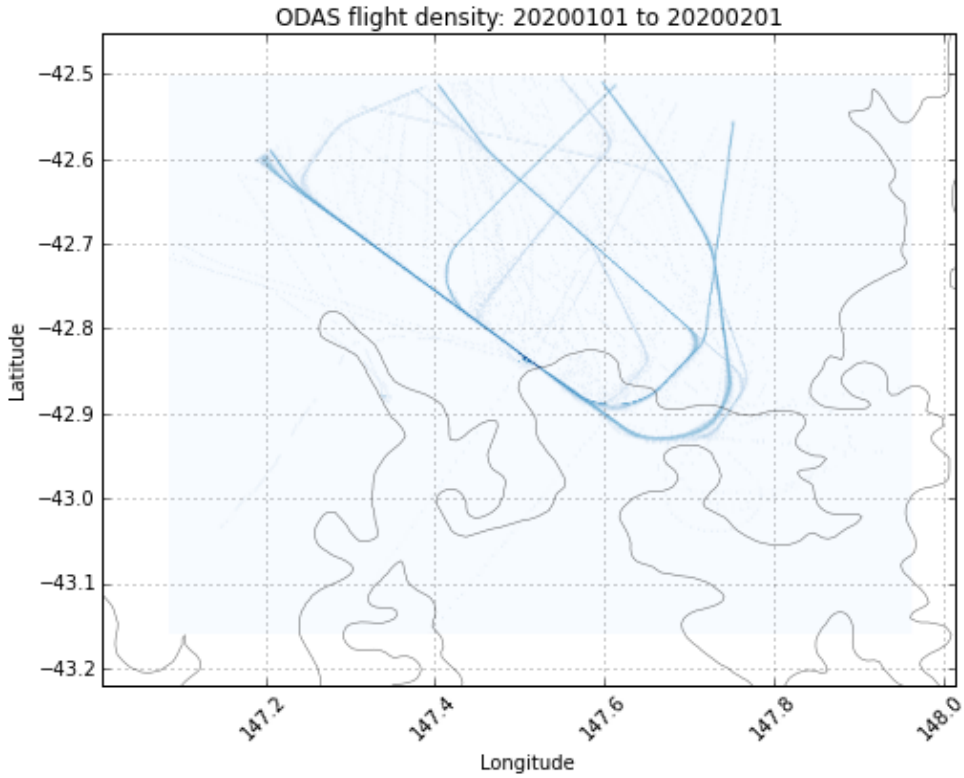


Figure 70: Hobart Airport flight density 1 January to 1 February 2020 *(Source: ODAS)*

E.3 PIR Findings – Review of Noise Abatement Procedures

The NAPs prescribe the use of a SID or STAR for all IFR aircraft during air traffic control hours, and for VOR approaches to only be available for pilot training purposes by aircraft below 5,700kg unless no other alternative approach exists. The review of the Hobart Airport NAPs has determined:

- the majority of suitably equipped aircraft were using the SIDs and STARs as specified in the NAPs
- the general exceptions to the NAP being applied have been flights to Antarctica (due to the fuel critical nature of the flights), military aircraft (when requested by the pilot) and medical priority aircraft
- VOR approaches for pilot training purposes are being conducted approximately once every two weeks
- there were seven occasions of passenger jet aircraft (B712s and a B738) conducting a VOR approach to RWY30 during the PIR period, which was found to be due to a misinterpretation of the requirements in the *En Route Supplement Australia* aeronautical information publication that has since been clarified with air traffic controllers.

A potential improvement to the Hobart Airport NAPs has been identified through the review of community suggested alternatives and is detailed in Section I.1.

APPENDIX F - REVIEW OF COMMUNITY INFORMATION

F.1 Airspace Changes

In May 2019, following community consultation and finalisation of the flight path designs, Airservices released information about the expected noise impacts and operations post implementation. The community information was based on the EAs and included:

- infographic posters
- overview fact sheet
- VOR fact sheet
- Tasmanian high altitude routes fact sheet
- noise fact sheets
- location specific fact sheets.

F.2 Preliminary Analysis

In February 2021, Airservices released preliminary findings comparing actual aircraft movements (from summer 2019/2020 data) with the community information provided in May 2019.

The analysis for the Interim Summer period found:

- the majority of aircraft were tracking in accordance with the published flight procedures
- departures were generally operating at higher flight altitudes than expected
- arrivals were generally operating at the flight altitudes expected
- 90th percentile 'busy day figures for departures were similar to expected
- Busy day figures for RWY30 arrivals were higher on the RNP-AR procedures and lower on the RNAV procedures. This reflects the increased uptake of RNP-AR capability over time by airlines operating at Hobart Airport.

F.3 Review of Community Information

F.3.1 Fact Sheets

Based on the findings of the PIR, there are some differences between the expected aircraft operations and noise information provided to the community in 2018 and 2019 and the actual operations during the PIR period. These differences relate to the frequency and altitude of aircraft operations on specific SIDs and STARs.

Updated information on the frequency and altitude of aircraft operations for each SID and STAR was provided to the community in February 2021, based on the Interim Summer analysis for aircraft operations between 1 December 2019 and 1 March 2020. Since that time, COVID-19 impacts on air travel have resulted in changes to the types of aircraft being used and frequency of operations.

F.3.2 Aircraft in Your Neighbourhood

In December 2020, Airservices launched the *Aircraft in Your Neighbourhood* online portal for Hobart. The portal provides customised information about flight operations, based on the specific location identified through entering an address or dropping a pin on the online map. The website includes information about how the Hobart Airport runways are used, flight paths at Hobart Airport and Cambridge Aerodrome, the frequency and altitude of flights at the specific location for a chosen month, how much variation should be expected for that location, rules that apply for aircraft

operations, a link to WebTrak, and noise complaints reporting. (The *WebTrak* tool uses information from Airservices flight radars and allows users to view information for a specific flight, including aircraft type, altitude, and origin and destination.) Some of the information about runway and flight path use is based on the original EA forecasts and/or interim summer analysis.

F.4 PIR Findings – Review of Community Information

Based on the findings of the PIR, there are some differences between the expected aircraft operations and noise information provided to the community in 2018 and 2019 and the actual operations during the PIR period. These differences relate to the frequency and altitude of aircraft operations on specific SIDs and STARs.

Recommended Action 2

Airservices will release updated community information on the Engage Airservices and Aircraft in Your Neighbourhood websites to reflect the PIR findings regarding the altitude and frequency of aircraft operations on each flight path.

APPENDIX G - COMMUNITY SUGGESTED ALTERNATIVES

The PIR included a formal community suggested alternatives engagement period from 11 March to 19 May 2021.

Information was provided on *Engage Airservices* on 26 February, prior to the submission period, which included resources (fact sheet and updated community specific information), FAQs, and a Submission Form. A Webex meeting was held on 10 March 2021 to answer questions from the community about suggested alternatives. A recording of the meeting and a summary of the questions asked and responses was published on *Engage Airservices* following the meeting.

The public comment period for community suggested alternatives was promoted through direct correspondence to community members registered with *Engage Airservices*, elected representatives and councils, and information provided through local council social media accounts.

Over the period of the above activities, there were 745 visits to the Hobart Airspace Design Review project page on *Engage Airservices*, 59 downloads of the updated community specific information and 54 downloads of the community suggested alternatives fact sheet.

A total of 26 submissions were received through the online submission form, including one submission that was signed by over 100 community members. An additional eight submissions were received through other methods, comprising four submissions by email, two submissions through the Questions function on *Engage Airservices*, one submission by post and one submission through NCIS.

As part of the online submission form, community members were asked to select which of the 11 instrument flight paths they wanted to suggest a change to. Of the 11 options, only five were selected and are shown in Figure 71. The online submission form also asked community members to select the type of change they were suggesting from four options. Figure 72 shows the number of selections received for each option.

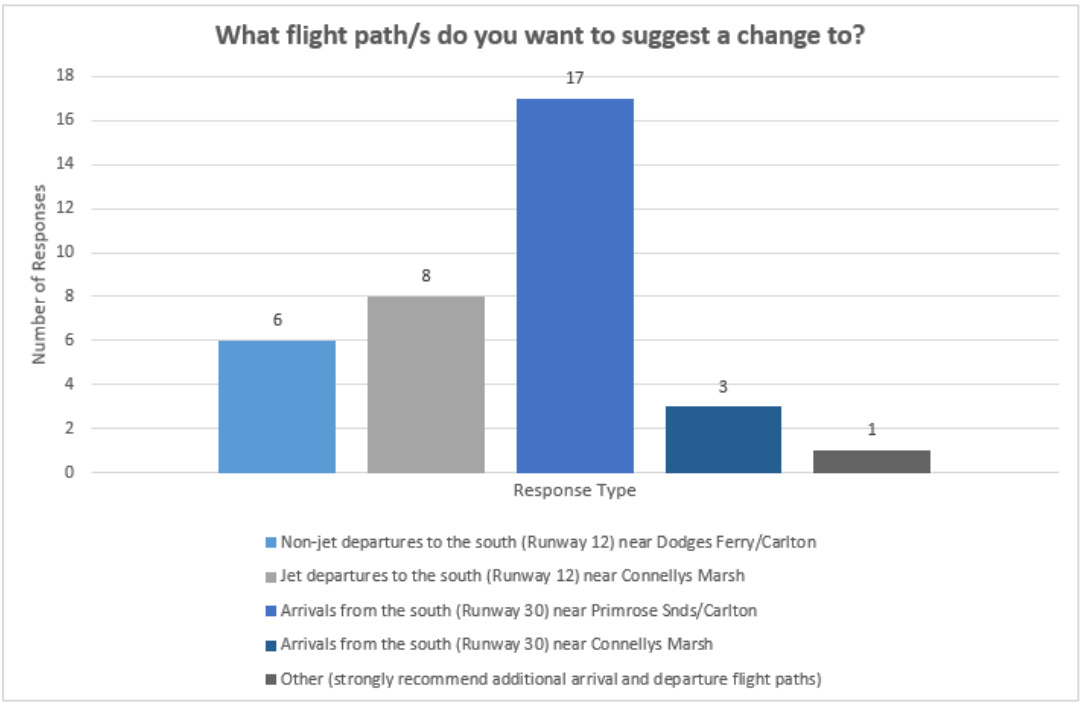


Figure 71: Responses to community suggested alternatives online submission form (Question 1)

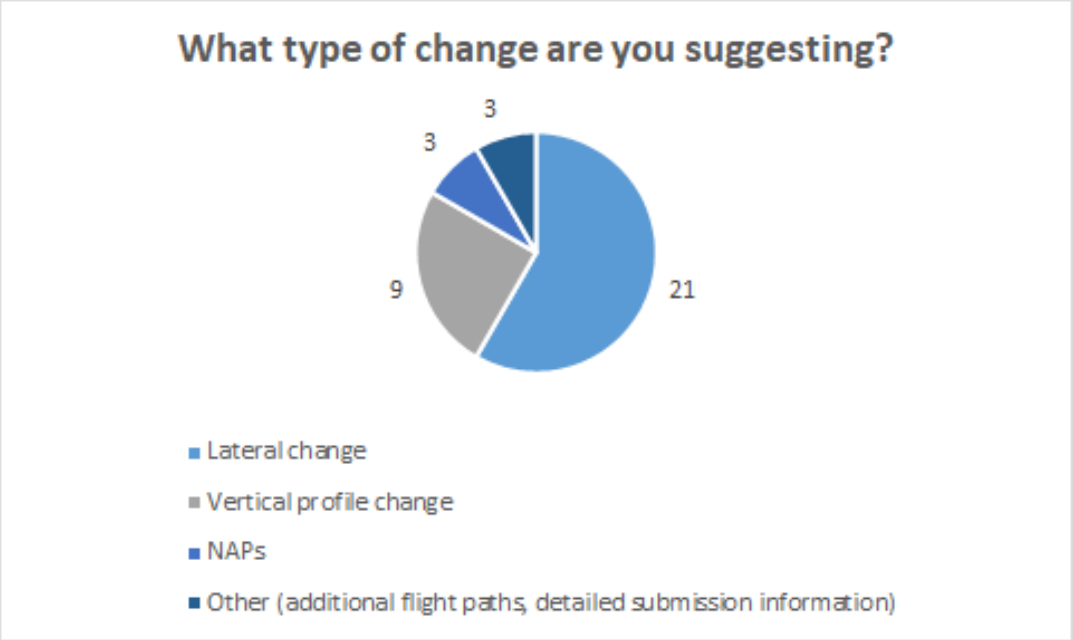


Figure 72: Responses to community suggested alternatives online submission form (Question 2)

Submissions were reviewed and grouped by which flight path they related to, then the type of change (lateral, vertical etc), and lastly by the specific details of the suggestion.

Suggestions were grouped into the themes shown in Table 33. The assessment of these suggestions is presented in Section G.2. The full content of each submission, and reference to the PIR Report section where the suggestion has been considered, is provided at Appendix J.

Consistent with the *Community Engagement Framework*, Airservices seeks to be transparent in considering all feedback and sharing information on the decision-making process. The PIR has therefore assessed every flight path change suggestion that was submitted during the public comment period, including suggestions for flight path changes that have been considered and disregarded previously.

Table 33: Community Suggested Alternative themes for assessment

Flight path description	Change
All	Reinstate pre-2017 flight paths
RWY30 RNP-AR STAR (Arrivals from the south, near Primrose Sands / Carlton)	Increase altitude
	Move to the east
	Add a second RNP-AR STAR to noise share
	Don't use at night
RWY30 RNAV STAR (Arrivals from the south, near Connellys Marsh)	Move to the east coast
	Move to the east
	Move west of the airport
RWY12 Non-jet SID (Non-jet departures to the south, near Dodges Ferry / Carlton)	Move to the east
	Move west of the airport
RWY12 Jet SID	Move west of the airport
	Move to the west

Flight path description	Change
(Jet departures to the south, near Connellys Marsh)	Move over Frederick Henry Bay
	Move to the east coast
	Turn to the north-west earlier
Other	Avoid specific areas
	Introduce curfew for night movements
	Implement Class C Airspace Approach Services

G.1 Assessment Methodology

The assessment of suggested alternatives was completed through desktop reviews by Airservices staff from Safety and Environment, Flight Path Design, Air Traffic Control and Community Engagement.

G.1.1 Assessment Criteria

Airservices regularly investigates community suggested alternatives for flight paths and/or procedures it has implemented.

The flight path alternatives submitted as part of the PIR have been considered against four key elements: safety and operational compliance; operational efficiency and feasibility; environmental; and network. This includes:

Safety and operational compliance assessment – does the change comply with international and national safety and design standards?

Operational efficiency and feasibility assessment – is the change flyable and efficient? Does the change:

- add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)
- increase track miles for industry (creating additional operational cost)?

Environmental assessment – is the change environmentally appropriate? Does the change:

- reduce noise levels or the number of people impacted
- affect new communities
- better share the impact of noise in keeping with Airservices Flight Path Design Principles (proposals that seek to move aircraft noise from one community to another are not considered responsible)
- result in greater track miles for industry (creating additional emissions)
- impact areas of national environmental significance[21] and noise sensitive sites[22]
- impact areas of future residential development or areas of high tourism value?

Network assessment – does the change:

- have flow on effects or require changes to other procedures or flight paths

[21] Matters of National Environmental Significance (MNES) are defined in the Environment Protection and Biodiversity Conservation Act 1999 (Cth)

[22] Noise sensitive sites are defined in Australian Standard AS2021:2015 Acoustics – Aircraft noise intrusion – Building siting and construction

- impact or benefit overall network efficiency
- involve a cost
- have a benefit appropriate to the cost?

The *Air Services Act 1995* requires that Airservices, "*In exercising its powers and performing its functions, must regard the safety of air navigation as the most important consideration*".

When considering flight path design, safety is assured through:

- separation of aircraft from each other according to flight rules and the type of air traffic service provided
- clearance between aircraft and terrain and/or man-made obstacles
- segregation of aircraft operations
- the ability of aircraft to operate safely within their performance envelope
- minimising operational complexity.

The design and operation of flight paths must meet the following CASA regulations and standards, as well as International Civil Aviation Organization (ICAO) standards and recommended practices that have been adopted by CASA for application in Australia:

- *Air Services Act 1995* (Cth)
- Airports (Protection of Airspace) Regulations 1996 (Cth)
- *Civil Aviation Safety Regulations 1998* (Cth) (CASR) Part 173 – Instrument flight procedure design
- CASR Manual of Standards Part 173 – Standards Applicable to Instrument Flight Procedures Design
- ICAO DOC 8168 Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS)
- ICAO DOC 9613 Performance-based Navigation (PBN) Manual
- ICAO DOC 9905 Required Navigation Performance Authorization Required (RNP-AR) Procedure Design Manual

If a community suggestion does not meet the safety and compliance assessment it will not be able to progress, regardless of how it would perform against the other assessment criteria.

For the environmental assessment, estimated counts of sensitive sites, including residential dwellings, are based on data provided by the Tasmanian Department of Primary Industries, Parks, Water and Environment (DPIPWE). In order to compare each community and industry suggested alternative with the existing final airspace design flight paths, a buffer of 500m either side of the published flight paths has been applied to the nominal flight tracks. Sensitive sites within this buffer are consequently counted. On the relevant images, residential dwellings are displayed as black square and other sensitive sites, such as schools and accommodation facilities, are displayed as a red square.

The PIR desktop review does not consider the altitude of the aircraft, frequency of flights or noise levels. This will be determined as part of the EA for community suggestions that progress for further assessment, based on the criteria specified in the Airservices *National Operating Standard AA-ENV-NOS-2.100 Environmental management of aircraft operations.*

The Department of Agriculture, Water and the Environment's Protected Matters Search Tool[23] was used to determine matters of national environmental significance or other matters protected by the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) that are likely to be

[23] https://www.environment.gov.au/epbc/protected-matters-search-tool

overflown by the suggested flight path change. For suggestions that progress for further assessment, the EA will consider the impact of proposed flight path changes on these areas.

Land use zoning was determined through the Tasmanian Government *iplan*[24] online maps to indicate the planned uses of the land being overflown by suggested flight paths.

The images used to display the suggested flight path alternatives were either provided as part of a community submission, used in previous consultation activities, or are concept locations overlayed on Google Earth imagery. They provide an indicative location for each scenario assessed as part of the PIR.

G.1.2 Future technology changes

Flight path procedures for Hobart Airport are designed to provide both procedural separation (where separation of aircraft is built into the flight path design) and surveillance separation (where radar systems are used by air traffic controllers to separate aircraft). The current minimum requirement for procedural and surveillance separation at Hobart is 5NM (Nautical Miles).

At this time, a reduction to the current 5NM separation standard is not possible at Hobart due to the surveillance equipment being used and the large scale of airspace that air traffic controllers are viewing for Hobart operations.

There may be the potential for a reduction of the 5NM separation standard in the future, if, for example, there is a change to procedural and/or surveillance standards or radar surveillance equipment. However, there are no changes anticipated in Hobart in the near future and the current separation standard will therefore remain in place.

G.2 Assessment of Community Suggestions

G.2.1 Community suggestion: Reinstate pre-2017 flight paths

The flight paths in place at Hobart Airport prior to September 2017 were based on the VOR navigation aid that utilises radio waves. The VOR is older technology compared to the satellite-based approaches that now are available. The VOR does not provide vertical guidance, or the same degree of landing predictability and precision as satellite navigation.

The CASA mandated[25] that effective from February 2016, aircraft operating under Instrument Flight Rules must transition from ground-based navigation, such as VORs, to satellite-based navigation as the primary technology. As a result of the CASA directive, Airservices has been phasing out VOR navigation within Australia.

The VOR procedures at Hobart Airport have subsequently been replaced with satellite-based procedures, consistent with Australian airspace policy. The VOR was relocated to a new site at Hobart Airport in 2019, and VOR approaches are now only available for backup navigation and training purposes.

Reverting to the pre-2017 flight paths is not an alternative that Airservices can consider. The current international standards for flight path procedure design are different to those that existed when the VOR procedures were developed, and all current flight paths must be designed according to the current international standards.

Assessment outcome: the suggestion to reinstate the pre-2017 flight paths does not meet the Airservices safety and operational compliance assessment and will not progress for further assessment.

[24] https://iplan.tas.gov.au/

[25] Civil Aviation Order 20.18

G.2.2 Community suggestion: Increase altitude of RWY30 RNP-AR STAR

Suggestions were made to increase the flight altitude of RWY30 RNP-AR arrivals over the areas of Primrose Sands, Carlton and Carlton River, as shown in Figure 73. Aircraft in this area are currently at an average of 2,400 ft as they descend to land at the airport. Suggestions ranged from increasing the height of aircraft in this area from 5,000 ft through to 6,000-7,000 ft.

The assessment of this suggestion is shown in Table 34.

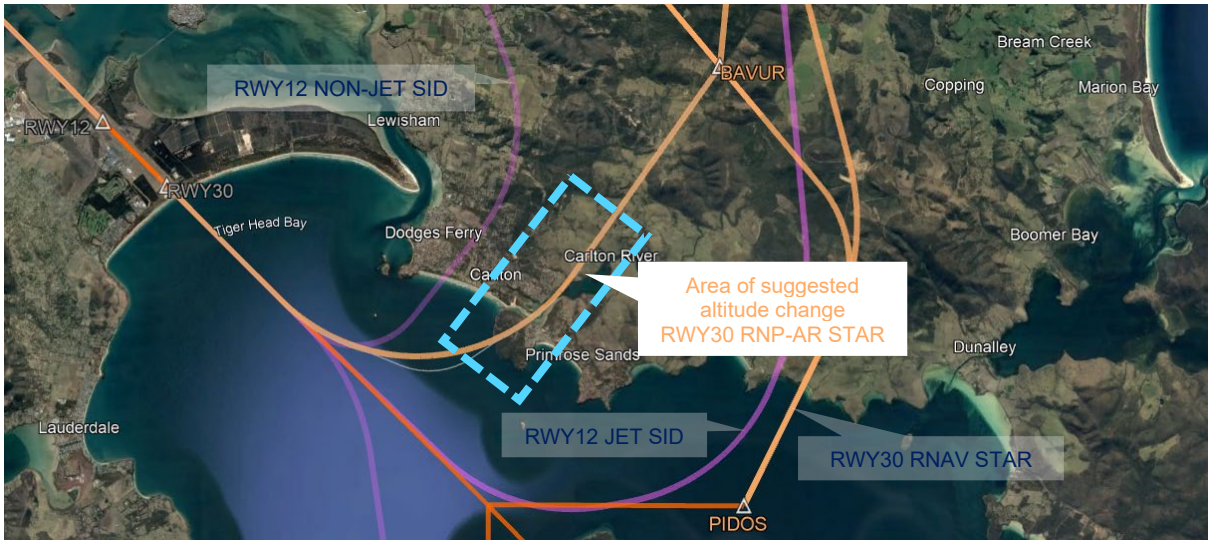


Figure 73: RWY30 RNP-AR STAR area of suggested altitude change (blue) (*Source: Google Earth)*

Table 34: Assessment of community suggestion: increase altitude of RWY30 RNP-AR STAR

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	Not safe and compliant	Aircraft must be able to operate safely within their descent profile and comply with international and Australian design standards. The altitude an aircraft can be at when it begins its final approach depends on the remaining distance of flight to the runway and the descent profile that the aircraft can achieve. Aircraft generally descend to land using a descent profile of 3 degrees. For the suggested change, at this location of the RNP-AR STAR aircraft are approximately 14.5 km (7-8NM) from the runway and this is the minimum distance needed for a safe and stable landing with this descent profile. An example of the 3 degree descent profile, with the location of Carlton marked, is shown in Figure **74**. There is not adequate distance from Carlton to the airport for aircraft to be able to descend from 5,000 ft or above. For aircraft to be at a minimum of 5,000 ft around Carlton they would need to approach on descent profile of at least 6 degrees. At this point aircraft are getting ready to land and have their wheels down and flaps out and flying at 6 degrees (or more) would risk aircraft stalling and therefore be outside of their safe operating profile.

Figure 74: Example of aircraft 3 degree descent profile

Assessment outcome: the suggestion to increase the altitude of the RWY30 RNP-AR STAR does not meet the Airservices safety and operational compliance assessment and will not progress for further assessment.

G.2.3 Community suggestion: Move RWY30 RNP-AR STAR east

Suggestions were made to move the current RWY30 RNP-AR arrivals east. The suggested locations varied from using the vacant land between Dunalley and Connellys Marsh, moving over Connellys Marsh, moving closer to Dunalley, closer to Marion Bay (Copping), crossing land at Fulham Point, moving halfway between the current position and Primrose Sands, moving 2-3 km east through farmland, moving 3 km east to Red Hills, and moving 7-9 km east.

The range of suggestions provides two scenarios for assessment: moving the RWY30 RNP-AR STAR 2-3 km east or moving 7-9 km east. As shown in Figure 75, the second scenario would place the RNP-AR STAR close to the location of the current RNAV STAR, which is located east of Connellys Marsh and overflies the Copping Landfill site.

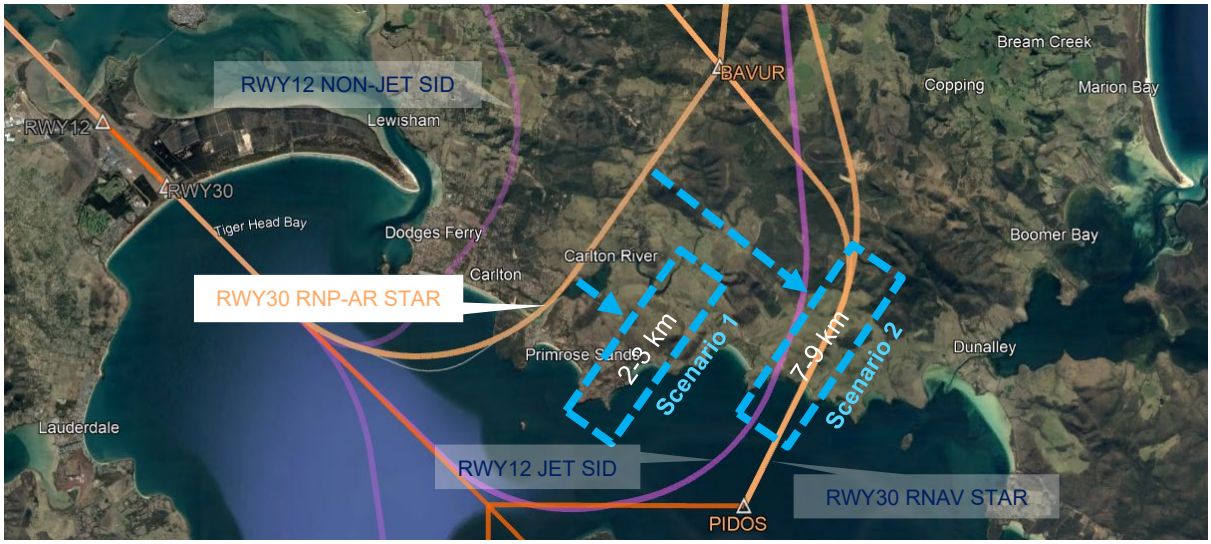


Figure 75: RWY30 RNP-AR STAR with locations of suggested move (blue) *(Source: Google Earth)*

Scenario 1

Figure 76 shows the locations of residential dwellings and other sensitive sites in proximity to the current and the suggested RWY30 RNP-AR STAR moved 2-3 km east.

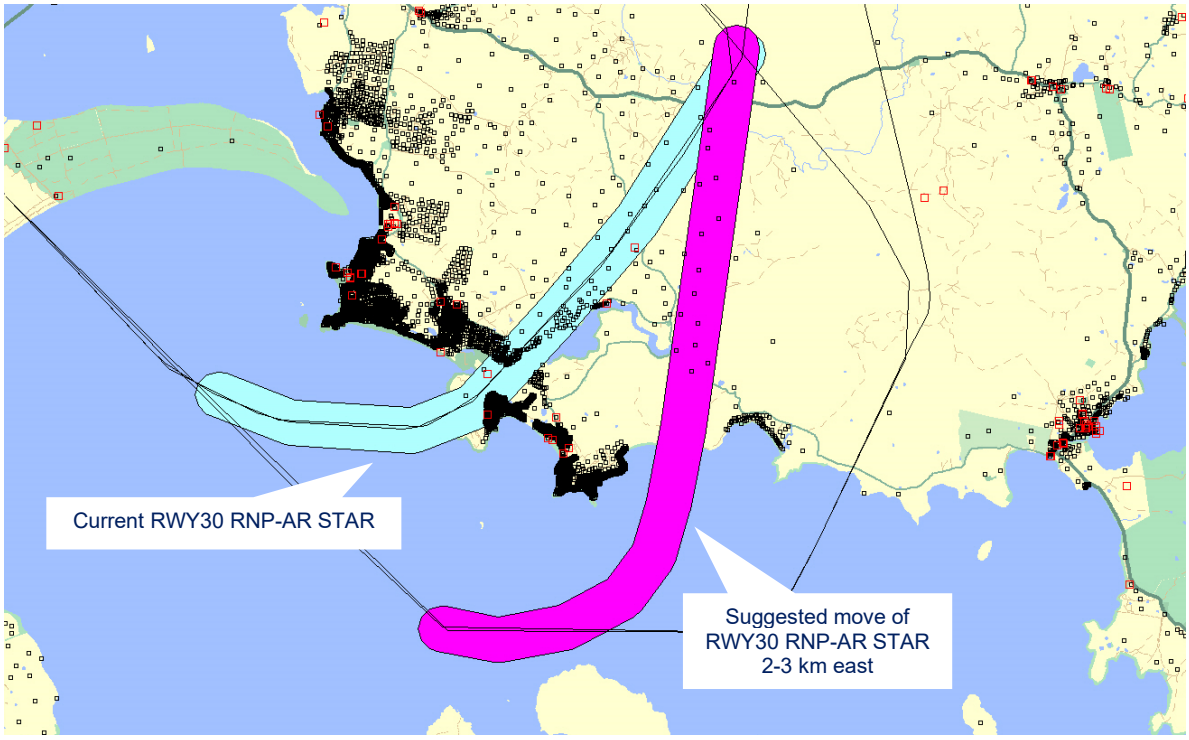


Figure 76: Sensitive sites overflown by current (blue) RWY30 RNP-AR STAR and suggested move 2-3 km east (pink) *(Source: DPIPWE data)*

The assessment for moving the RWY30 RNP-AR STAR 2-3 km to the east is summarised in Table 35.

Table 35: Assessment of community suggestion: move RWY30 RNP-AR STAR east 2-3 km

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	Yes	
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	No	
	Increase track miles for industry (creating additional operational cost)	Yes	Additional 3-4NM track miles per flight (RNP-AR STARs are designed to reduce aircraft flight time and track miles by being shorter and more efficient approaches) Minor impact on the efficiency of arrivals from the north-west (e.g. Melbourne and Perth) due to additional track miles and creates a less than ideal descent profile
Environmental Is the change environmentally appropriate?	Reduce noise levels or the number of people impacted	Yes	Reduces the number of dwellings overflown from 380 dwellings to 15 dwellings. The RNP-AR STAR would also no longer overfly two accommodation facilities (Carlton River B&B and Steeles Island Retreat). However, it would further concentrate arrivals near Connellys Marsh, which is already close to the current RWY30 RNP-AR STAR and RWY12 Jet SID.
	Affect new communities	No	Overflies areas to the east of Primrose Sands and Carlton River, and west of Connellys Marsh, that previously experienced RWY30 arrivals (pre-Sep 2017 change) and/or RWY12 departures (post Sep 2017 change)
	Better share the impact of noise in keeping with Airservices Flight Path Design Principles	No	Displaces arrivals aircraft noise to areas with reduced number of noise sensitive sites. However, concentrates the aircraft operations near Connelly's Marsh which is already close to the RWY30 RNP-AR STAR and RWY12 Jet SID movements
	Result in greater track miles for industry (creating additional emissions)	Yes	Additional 11-25kg fuel burn and 33-81kg CO_2 emissions per flight (depending on type of aircraft)
	Impact areas of national environmental	Yes	RNP-AR arrivals would align with the RWY30 centreline within 1 km of Lime Bay

Assessment Criteria Does the change:		Assessment outcome	Description
	significance and noise sensitive sites		State Reserve and ~5 km from the Coal Mines Historic Site buffer zone
	Impact areas of future residential development or areas of high tourism value	Yes	Moves all RWY30 arrivals towards the northern tip of the Lime Bay State Reserve and 7 km from the Coal Mines Historic Site tourism areas. Suggested overfly area is zoned Rural Resource, with small sections zoned Environmental Management (at Carlton River and the coastline).
Network	Have flow on effects or require changes to other procedures or flight paths	No	Minor change required to ATC sequencing criteria
	Impact or benefit overall network efficiency	No	No impact on Cambridge Aerodrome operations. No impact on overall efficiency of air traffic network operations within Tasmania or mainland Australia.
	Involve a cost	Yes	Design, assessment and implementation (including documentation amendments and ATC training) for a new instrument procedure
	Have a benefit appropriate to the cost	Not determined	Reduces number of residential dwellings overflown from 380 to 15 Additional 3-4NM track miles and 11-25kg fuel burn per flight

Assessment outcome: the suggestion to move the RWY30 RNP-AR STAR 2-3km to the east is safe and feasible and is recommended to progress for further assessment.

Scenario 2

Figure 77 shows the locations of existing residential dwellings and community facilities and the suggested RWY30 RNP-AR STAR moved 7-9 km east. The assessment of this suggestion is summarised in Table 36.

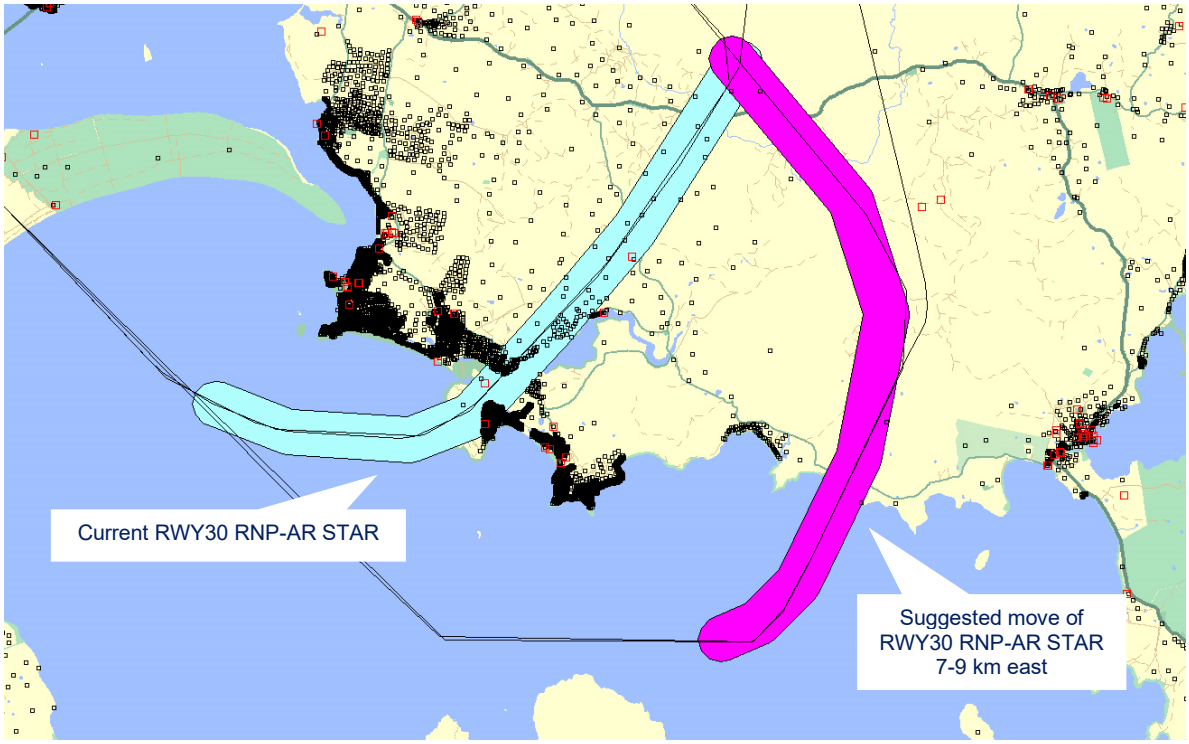


Figure 77: Sensitive sites overflown by current (blue) RWY30 RNP-AR STAR and suggested move 7-9 km east (pink) *(Source: DPIPWE data)*

Table 36: Assessment of community suggestion: move RWY30 RNP-AR STAR east 7-9 km

Assessment Criteria	Does the change:	Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	Yes	
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	No	Reduces complexity for ATC sequencing due to all arrival aircraft operating on one STAR
	Increase track miles for industry (creating additional operational cost)	Yes	Additional 7NM track miles per flight. Impacts on the efficiency of the arrivals from the north-west (e.g. Melbourne) due to additional track miles and a slightly less than ideal descent rate (and therefore higher fuel burn) Having only one STAR is inconsistent with having separate procedures for varying aircraft technologies and does not provide the expected benefit for RNP-AR equipped aircraft to be able to reduce track miles by flying shorter and more efficient approaches.

Assessment Criteria Does the change:		Assessment outcome	Description
Environmental Is the change environmentally appropriate?	Reduce noise levels or the number of people impacted	Yes	Reduces the number of dwellings overflown from 380 to 7. RNP-AR STAR arrivals would also no longer overfly two accommodation facilities (Carlton River B&B and Steeles Island Retreat). However, it would concentrate all RWY30 arrivals on the RNAV STAR and increase noise events for this area.
	Affect new communities	No	Moves all RWY30 arrivals onto existing RNAV STAR
	Better share the impact of noise in keeping with Airservices Flight Path Design Principles	No	Displaces arrival aircraft noise to areas with less noise sensitive sites. However, concentrates all RWY30 arrivals on the RNAV STAR which is also close to RWY12 Jet SID and further concentrates noise over this area.
	Result in greater track miles for industry (creating additional emissions)	Yes	Additional 25-45kg fuel burn and 79-141kg CO_2 emissions per flight (depending on type of aircraft)
	Impact areas of national environmental significance and noise sensitive sites	Yes	All RWY30 arrivals would operate on existing RNAV STAR, putting more flights close to Lime Bay State Reserve and ~5 km from the Coal Mines Historic Site buffer zone.
	Impact areas of future residential development or areas of high tourism value	Yes	Moves all RWY30 arrival flights near the Lime Bay State Reserve and 5 km from the Coal Mines Historic Site (buffer zone) tourism areas. Overfly area is zoned Rural Resource, with small sections zoned Utilities (Copping) and Environmental Management
Network	Have flow on effects or require changes to other procedures or flight paths	No	
	Impact or benefit overall network efficiency	No	No impact on Cambridge Aerodrome operations. No impact on overall efficiency of air traffic network operations within Tasmania or mainland Australia.
	Involve a cost	Yes	Assessment and implementation of removal of RNP-AR approach
	Have a benefit appropriate to the cost	No	Reduction in the number of dwellings overflown from 380 to 7, however it removes distribution of noise by concentrating all RWY30 arrivals on the RNAV STAR.

Assessment Criteria Does the change:		Assessment outcome	Description
			Results in a single approach path (does not provide separate approach procedures for varying aircraft navigation technology) and is inconsistent with intention of RNP-AR flight paths to be designed to reduce aircraft flight time and track miles by being shorter and more efficient approaches. Additional 7NM track miles, 25-45kg fuel burn and 79-141kg CO_2 emissions per flight.

Assessment outcome: the suggestion to move the RWY30 RNP-AR STAR 7-9 km to the east is safe and feasible, however, is not recommended to progress for further assessment as the objectives of the suggestion are better achieved by the suggestion to move the RWY30 RNP-AR STAR 2-3 km to the east.

G.2.4 Community suggestion: Add second RWY30 RNP-AR STAR to noise share

Suggestions were made to add an additional RWY30 RNP-AR arrival path to the east of the current position to share aircraft noise. The suggested second RNP-AR arrival flight path, shown in Figure 78, tracks west of Kelleviand then over Copping and Dunalley.

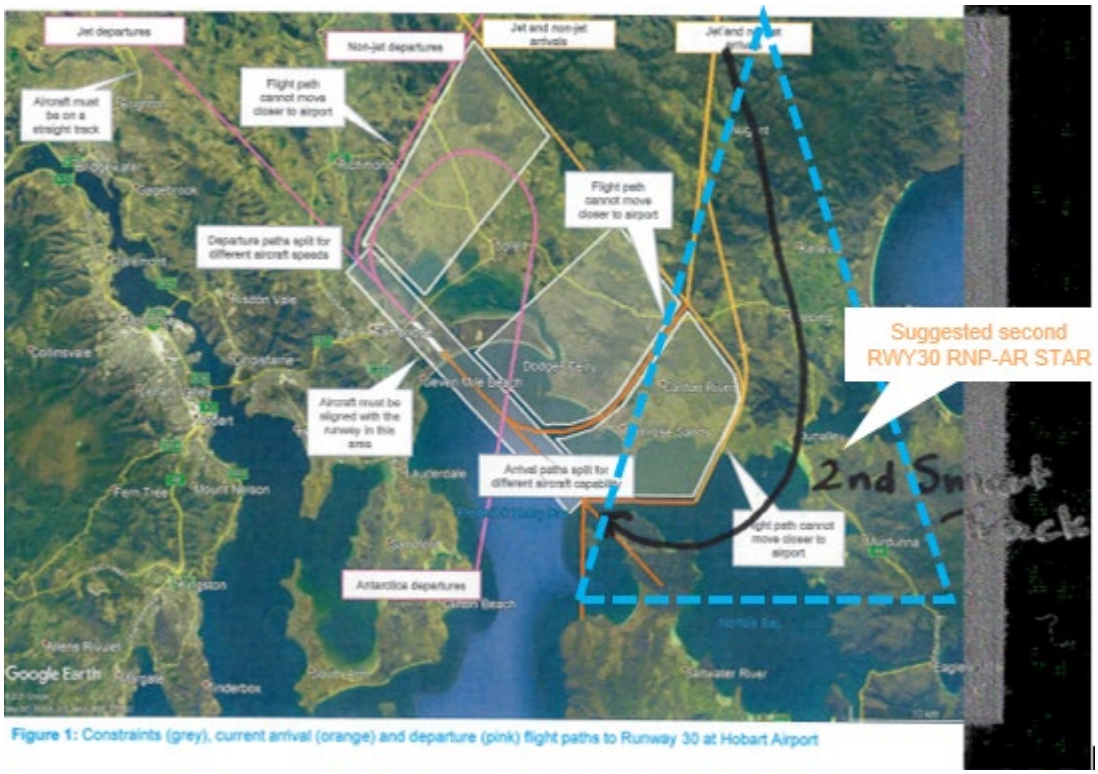


Figure 78: Suggested second RWY30 RNP-AR STAR (black) (*Source: Community Submission #20)*

Figure 79 shows the locations of residential dwellings and other sensitive sites in proximity to the current and suggested second RWY30 RNP-AR arrival flight path. The assessment of this suggestion is summarised in Table 37.

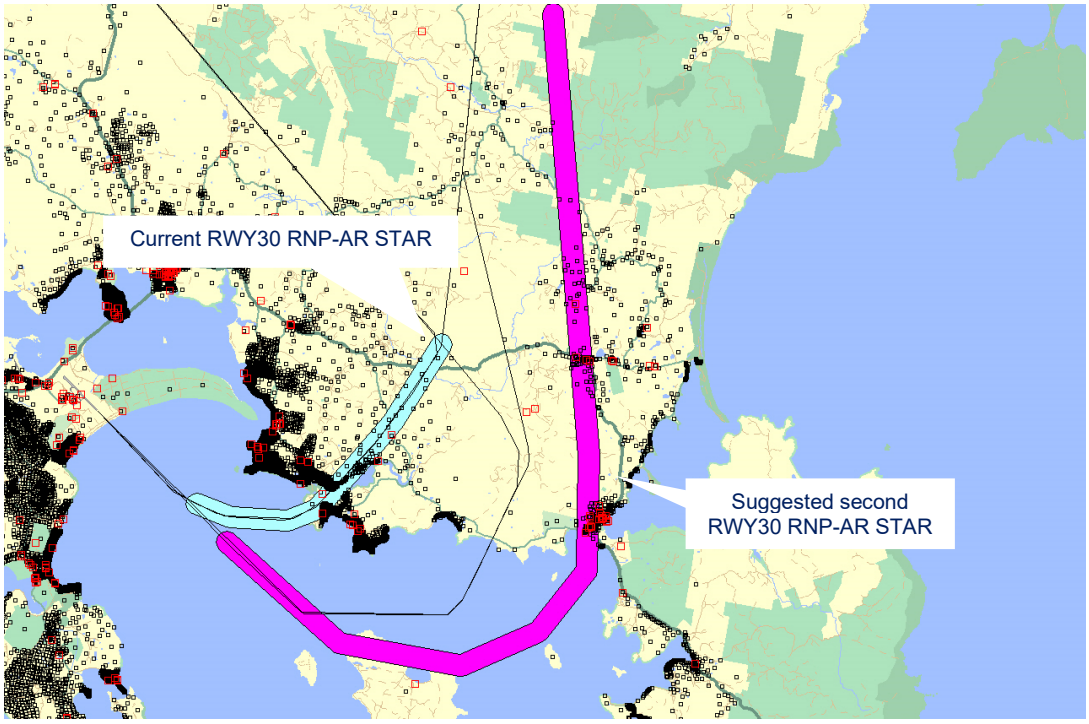


Figure 79: Sensitive sites overflown by current (blue) and suggested second (pink) RWY30 RNP-AR STAR (*Source: DPIPWE data)*

Table 37: Assessment of community suggestion: add second RWY30 RNP-AR STAR to noise share

Assessment Criteria Does the change:		Assessment outcome	Details
Safety and operational compliance	Comply with international and national safety and design standards	Yes	
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	Yes	Adds complexity for ATC as having three STARs increases (from 4 to 6) different sequencing conflicts for controllers to manage (more procedures require more ATC workload and more room for error)
	Increase track miles for industry (creating additional operational cost)	Yes	Additional ~10NM track miles by per flight for flights arriving from the east coast of mainland Australia. RNP-AR approaches are designed to reduce aircraft flight time and track miles by being shorter and more efficient approaches. Creating an additional RNP-AR arrival further to the east goes against these principles and there would be no incentive for aircraft operators to use this STAR or equip their aircraft with RNP-AR technology.

Assessment Criteria Does the change:		Assessment outcome	Details
Environmental Is the change environmentally appropriate?	Reduce noise levels or the number of people impacted	Yes / No	Intent of suggestion is to spread RWY30 RNP-AR operations between current STAR (overflies 380 dwellings) and suggested second STAR (overflies 161 dwellings, and the Copping and Bream Creek community halls). However, the suggested RNP-AR would only be used by arrivals from the east coast of Australia. The majority (approx. two-thirds) of arrivals are from Melbourne which would remain on the current RNP-AR as the additional time and track miles for Melbourne arrivals to use the suggested RNP-AR goes against RNP principles to be more efficient by reducing flight time and track miles. Suggestion therefore shifts one-third of arrivals from one community to another, resulting in an improvement in the number of noise events for communities under the existing flight path but placing new noise on areas not currently under a published flight path.
	Affect new communities	Yes	Suggested flight path will overfly areas near Wielangta Forest Reserve, the towns of Dunalley, Copping and Kellevie which previously (post Sep 2017 change) were overflown by RWY30 arrivals, and areas that have not previously had a published flight path overhead.
	Better share the impact of noise in keeping with Airservices Flight Path Design Principles	Yes	Suggested second RNP-AR flight path would distribute some aircraft operations and noise across different locations (noting that two-thirds of arrival traffic – i.e. Melbourne arrivals – would continue to use the existing RNP-AR STAR).
	Result in greater track miles for industry (creating additional emissions)	Yes	Additional 36-64kg fuel burn and 112-202kg CO_2 emissions per flight (depending on type of aircraft)
	Impact areas of national environmental significance and noise sensitive sites	Yes	Brings aircraft closer to Lime Bay State Reserve and the Coal Mines Historic Site located at Saltwater River.
	Impact areas of future residential development or areas of high tourism value	Yes	Overflies the northern tip of the Lime Bay State Reserve and brings aircraft closer to the Coal Mines Historic Site natural tourism areas.

Assessment Criteria Does the change:		Assessment outcome	Details
			Overfly area is mostly zoned Rural Resource, with residential zoning at Dunalley and Copping.
Network	Have flow on effects or require changes to other procedures or flight paths	No	
	Impact or benefit overall network efficiency	No	No impact on Cambridge Aerodrome operations. No impact on overall efficiency of air traffic network operations within Tasmania or mainland Australia.
	Involve a cost	Yes	Design, assessment and implementation (including documentation amendments and ATC training) for a new instrument procedure
	Have a benefit appropriate to the cost	No	Additional complexity for ATC. RWY30 aircraft arrivals and noise shared over multiple areas. Overflies areas that have not previously been under a published flight path. Additional 10NM track miles and 36-64kg fuel burn for flights from the east coast of mainland Australia. Suggested STAR goes against RNP-AR principles to reduce aircraft flight time and track miles by being shorter and more efficient approach.

Assessment outcome: the suggestion to create a second RWY30 RNP-AR STAR for noise sharing is safe but not recommended to progress for further assessment due to the additional complexity for ATC, not achieving RNP-AR purpose of providing shorter and more efficient approaches, as well as creating noise exposure for residential areas not currently experiencing aircraft operations.

G.2.5 Community suggestion: RWY30 arrivals use only RNAV STAR at night

Two submissions suggested that the RWY30 RNP-AR STAR is not used at night and all RWY30 arrival aircraft use the RNAV STAR instead. The location of the two RWY30 STARs are shown in Figure 80.

Figure 81 shows the locations of residential dwellings and other sensitive sites in proximity to the current RWY30 RNP-AR STAR and RWY30 RNAV STAR.

The assessment of this suggestion is summarised in Table 38.

Figure 80: Suggested change for all RWY30 arrivals to use RWY30 RNAV STAR at night *(Source: Google Earth)*

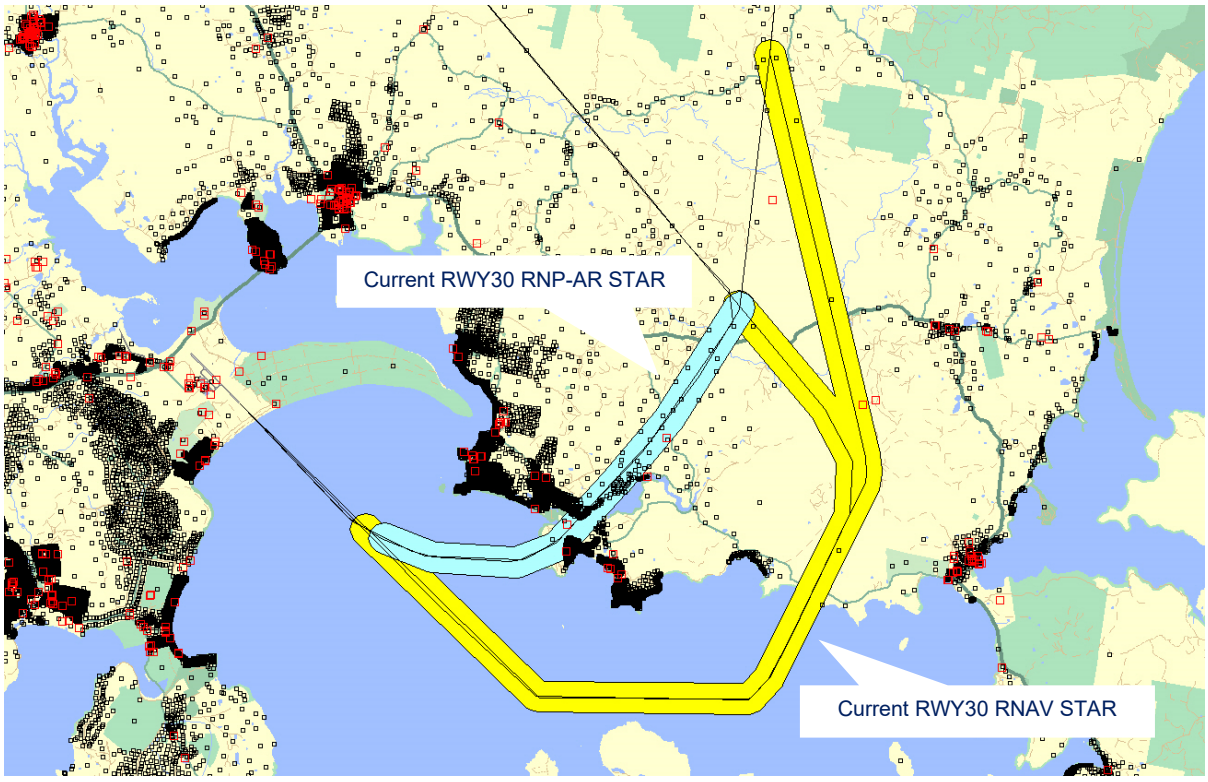


Figure 81: Sensitive sites overflown by current RWY30 RNP-AR STAR (blue) and current RWY30 RNAV STAR (yellow) (*Source: DPIPWE data)*

Table 38: Assessment of community suggestion: RWY30 arrivals to use only RWY30 RNAV STAR at night

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and	Yes	

Assessment Criteria Does the change:		Assessment outcome	Description
	national safety and design standards		
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	No	Suggestion can be implemented through NAPs to advise that the RNAV STAR is the preferred RWY30 flight path to be used at night
	Increase track miles for industry (creating additional operational cost)	Yes	Additional 6-8NM track miles for each night arrival that would otherwise use the RNP-AR STAR
Environmental Is the change environmentally appropriate?	Reduce noise levels or the number of people impacted	Yes	Reduces number of sensitive sites overflown at night. The RNP-AR STAR overflies 380 dwellings, the Carlton River B&B and Steeles Island Retreat, while the RWY30 RNAV STAR overflies 7 dwellings. Aircraft using the RWY30 RNAV STAR are at a higher altitude when crossing the coast (compared to the RNP-AR STAR).
	Affect new communities	No	No change to existing flight paths
	Better share the impact of noise in keeping with Airservices Flight Path Design Principles	Yes	Arrival flights and noise distributed at night to provide residents overflown by the RWY30 RNP-AR STAR (e.g. Primrose Sands and Carlton) with periods of respite
	Result in greater track miles for industry (creating additional emissions)	Yes	Additional 25-45 kg fuel per flight and 79-142 kg CO_2 emissions for each night arrival that would otherwise use the RNP-AR STAR. Aircraft arriving from Melbourne would have a less optimal descent gradient (and therefore higher fuel burn) in comparison with the RNP-AR STAR.
	Impact areas of national environmental significance and noise sensitive sites	Yes	Increases the number of night-time flights close to the Lime Bay State Reserve and 7 km from the Coal Mines Historic Site
	Impact areas of future residential development or areas of high tourism value	Yes	Concentrates all night-time flights near the Lime Bay State Reserve and 7 km from the Coal Mines Historic Site tourism areas. Area overflown by RWY30 RNAV STAR is predominantly zoned Rural Resource and Utilities (near Copping).

Assessment Criteria Does the change:		Assessment outcome	Description
Network	Have flow on effects or require changes to other procedures or flight paths	No	NAPs change only
	Impact or benefit overall network efficiency	No	No impact on Cambridge Aerodrome operations. No impact on overall efficiency of air traffic network operations within Tasmania or mainland Australia.
	Involve a cost	Yes	Assessment and implementation of NAPs change
	Have a benefit appropriate to the cost	Not determined	Improved noise outcomes (night-time respite) for communities under the RWY30 RNP-AR STAR. Additional 7NM track miles, 25-45 kg fuel burn and 79-142 kg CO_2 emissions per night flight.

Assessment outcome: the suggestion for RWY30 arrivals to use only the RNAV STAR at night is safe and feasible and can be achieved through NAPs. The potential change to the NAPs is considered further in Appendix I.

G.2.6 Community suggestion: Move RWY30 arrivals to the east coast

A suggestion was made to move the RWY30 STARs to the east and have arriving aircraft follow the coastline to Dunalley.

The suggestion for arrivals to follow the coastline is similar to the arrival flight path alternative presented during the community consultation in 2018, which included potential easterly flight paths off the coast of Tasmania for aircraft arriving from Sydney or Brisbane. The 2018 RNP-AR STAR alternative (yellow route) tracked west of Maria Island and over the Wielangta Forest, as shown in Figure 82. The 2018 community consultation, which included the *Stakeholder Reference Panel* and the *Social Impact Overview of the Hobart Airspace Changes*, indicated mixed reactions to the alternative of a flight route along the east coast. This alternative flight path along the east coast was removed from the final design following a review of all alternatives presented to the community. It was noted that CASA approval would be required for the change to air traffic control airspace volumes as a result of the alternative flight paths.

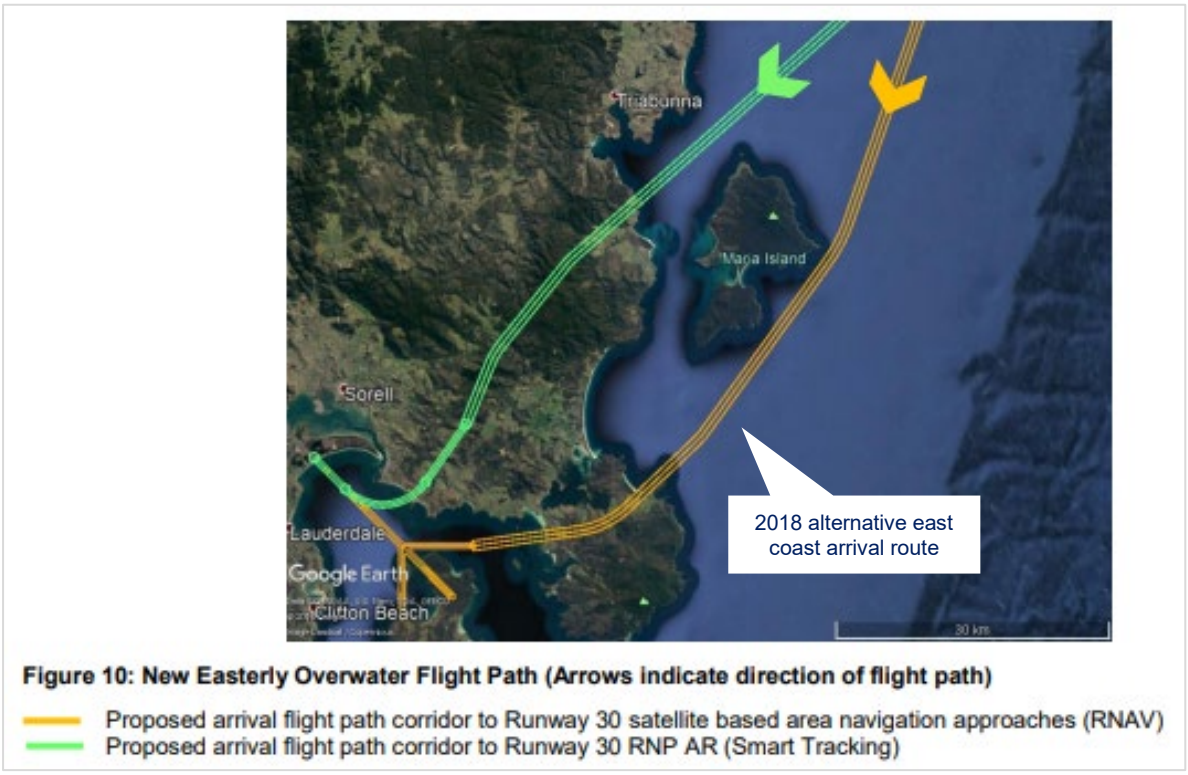


Figure 82: 2018 alternative to move RWY30 arrivals to the east coast (*Source: Hobart Proposed Flight Path Designs Fact Sheet – November 2018 Update)*

Figure 83 shows the locations of residential dwellings and other sensitive sites in proximity to the suggested RWY30 arrival path along the east coast. The assessment of this suggestion is summarised in Table 39.

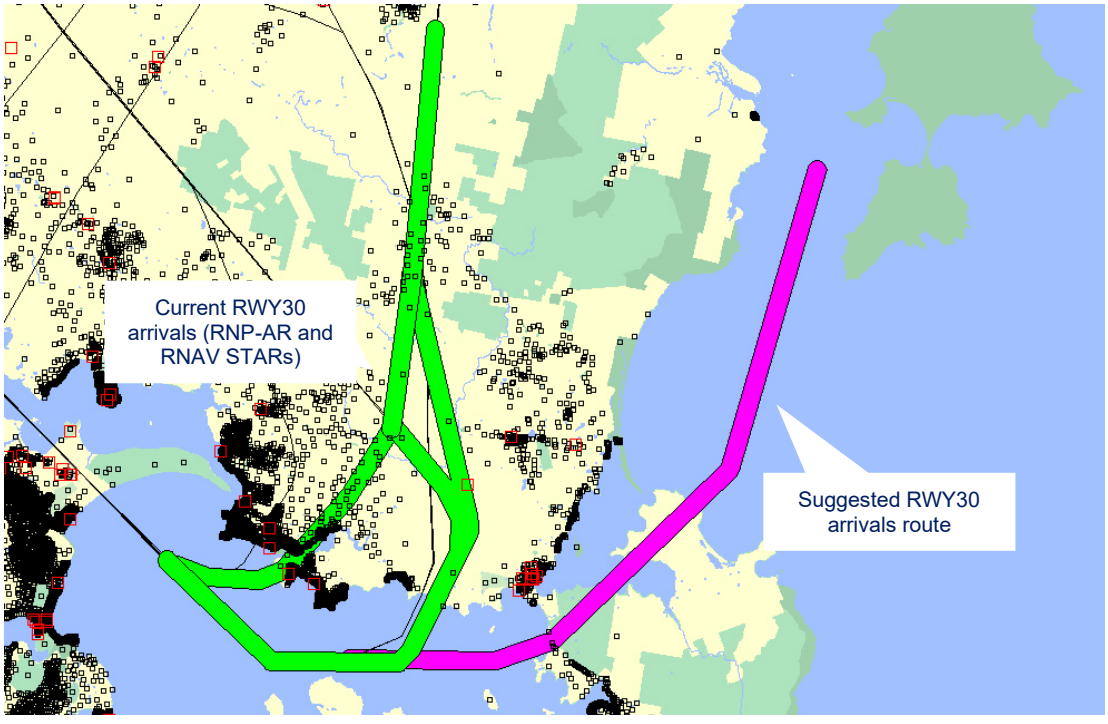


Figure 83: Sensitive sites overflown by suggested RWY30 arrivals route along east coast (*Source: DPIPWE data)*

Table 39: Assessment of community suggestion: move RWY30 STARs to the east coast

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	Yes	
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	Yes	Suggested STAR would only be used for arrivals from the east coast of mainland Australia – arrivals from Melbourne and Perth (approx. 2/3 of all arrival flights) would need to continue to use the existing STARs due to excessive track miles to reach the suggested STAR Adds complexity for ATC as having three STARs increases (from 4 to 6) different sequencing conflicts for controllers to manage (more procedures require more ATC workload and more room for error)
	Increase track miles for industry (creating additional emissions and operational cost)	Yes	For arrivals from Sydney and Brisbane, additional 5NM* track miles to RWY30 and additional 18NM* track miles to the RWY12 RNP-AR STAR and RNAV STAR *(*dependent on the location of the common STAR starting point that provides paths to both RWY12 and RWY30).*
Environmental Is the change environmentally appropriate?	Reduce noise levels or the number of people impacted	Yes	Would reduce number of flights on RWY30 RNP-AR and RNAV STARs due Brisbane and Sydney arrivals using suggested STAR. Current RNP-AR STAR overflies 387 dwellings and RWY30 RNAV STAR overflies 7 dwellings, while suggested STAR overflies 5 dwellings and 1 place of accommodation (Sunset Beach Cabins).
	Affect new communities	Yes	Suggested flight path overflies Murdunna which has not previously had a published flight path overhead (RWY30 arrivals pre and post Sep-2017 turned over water near Murdunna)
	Better share the impact of noise in keeping with Airservices Flight Path Design Principles	Yes	Distributes aircraft operations and noise over multiple areas and would provide some respite to communities under the current STARs. However, overflies communities not under a current published flight path.
	Result in greater track miles for industry (creating additional emissions)	Yes	Additional 17-32 kg fuel burn and 56-102 kg CO_2 emissions for arrivals from Sydney and Brisbane for RWY30. Additional 64-116 kg fuel burn and 202-365 kg CO_2 emissions for arrivals from Sydney and Brisbane for both the

Assessment Criteria Does the change:		Assessment outcome	Description
			RWY12 RNP-AR STAR and RNAV STAR (a STAR has a common starting point with paths to both runway directions).
	Impact areas of national environmental significance and noise sensitive sites	Yes	Suggested STAR would overfly or be close to the Lime Bay State Reserve, Coal Mines Historic Site, Tasman National Park, Yellow Bluff Creek Conservation Area (and areas in Bangor under Conservation Covenant), Long Spit Private Nature Reserve, Cape Bernie Nature Reserve and Maria Island National Park
	Impact areas of future residential development or areas of high tourism value	Yes	Suggested STAR would overfly or be close to natural tourism areas identified above. Overfly area is zoned Rural Resource and Environmental Management.
Network	Have flow on effects or require changes to other procedures or flight paths	No	Due to STARs having a common starting point with paths to both runway directions, the new STARs to both RW12 and RWY30 (for Brisbane and Sydney arrivals) would be designed to work safely with other SIDs and STARs
	Impact or benefit overall network efficiency	No	No impact on Cambridge Aerodrome operations. No impact on overall efficiency of air traffic network operations within Tasmania or mainland Australia.
	Involve a cost	Yes	Design, assessment and implementation (including documentation amendments and ATC training) for a new instrument procedures and CASA airspace change process
	Have a benefit appropriate to the cost	Not determined	Adds complexity for ATC (due to there being three different STARs to manage) Additional 5-18NM track miles, 17-116 kg fuel burn and 56-365 kg CO_2 emissions per flight. Would provide some respite to communities under the current STARs - arrivals from Brisbane and Sydney would use suggested STAR (overflies 5 dwellings and 1 place of accommodation) and therefore reduce the number of flights on the current RNP-AR STAR (overflies 387 dwellings) and the RNAV STAR (7 dwellings). However, it would overfly communities not under a current published flight path. Change to air traffic control airspace volumes and approval from CASA is required.

Assessment outcome: the suggestion for a new RWY30 STAR along the east coast is safe and notionally feasible, noting it was previously discounted in 2018. Due to ongoing community interest in this option, further investigation will be undertaken to determine an appropriate location for the common STAR starting point (for flight paths to both RWY12 and RWY30) and validating the associated track miles assessment.

G.2.7 Community suggestion: Move RWY30 RNP-AR and RNAV arrivals to the east

A suggestion was made to move the RWY30 STARs to the east (to move flights away from waypoint BAVUR) and have arriving aircraft track down the Wielangta Forest Reserve. This suggestion requires waypoint BAVUR to be moved to the east, as shown in Figure 84.

Figure 84: Community suggestion to move RWY30 STARs east (*Source: Google Earth)*

Figure 85 shows the locations of residential dwellings and community facilities in proximity to the suggested move of the RWY30 RNAV and RNP-AR arrivals to the east. The assessment of this suggestion is summarised in Table 40.

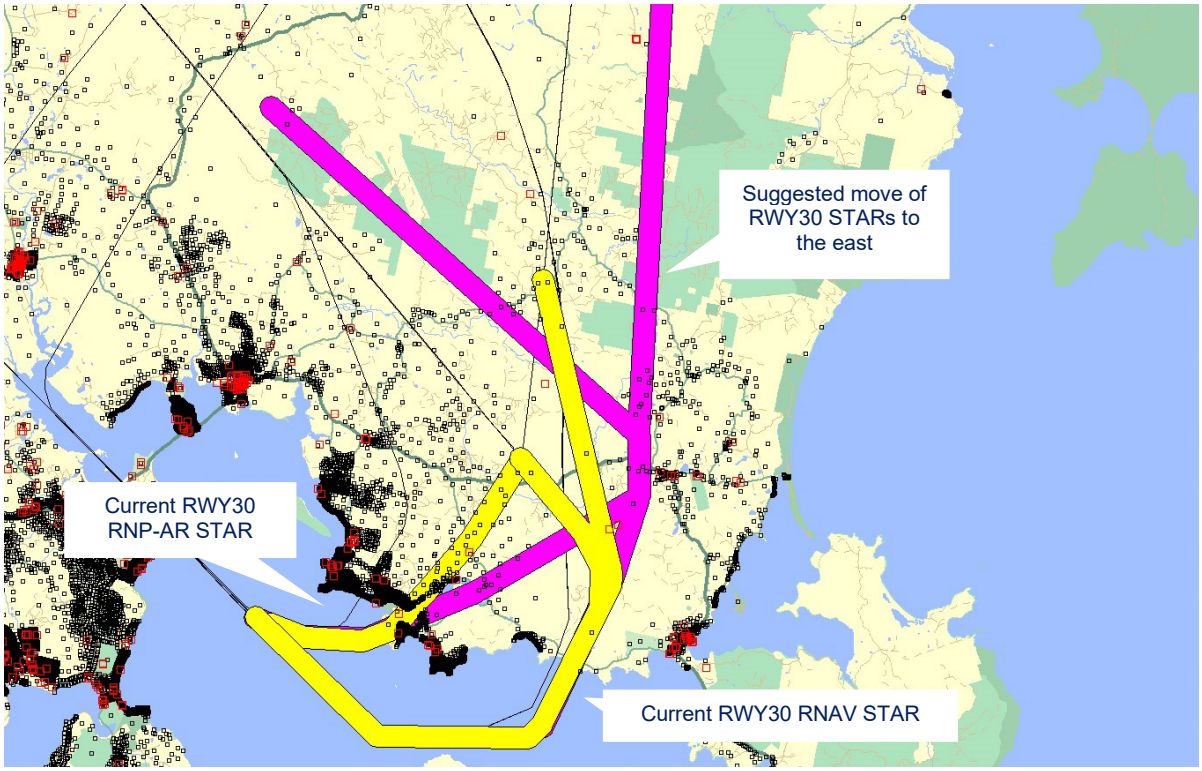


Figure 85: Sensitive sites overflown by current (yellow) and suggested move (pink) of RWY30 STARs
(Source: DPIPWE data)

Table 40: Assessment of community suggestion: move RWY30 STARs to the east

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	Yes	Requires relocation of waypoint BAVUR and redesign of all RWY30 STARs. Compliance would need to be achieved as part of redesign
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	Yes	Moves the crossing point for RWY30 arrivals from Melbourne and the RWY30 Non-jet (KANLI) SID departures. Impact on the efficiency of arrivals from the north-west, e.g. Melbourne, due to additional track miles and creates a less than ideal descent profile (and therefore increased fuel burn).
	Increase track miles for industry (creating additional emissions and operational cost)	Yes	Additional 10NM track miles for arrivals coming from the north-west (e.g. Melbourne) and 3NM track miles for aircraft arriving from east-coast of Australia.
Environmental	Reduce noise levels or the number of people impacted	No	The existing RWY30 RNAV STAR overflies 7 dwellings, and the RNP-AR STAR overflies 380 dwellings. The suggested change overflies 370 dwellings.

Assessment Criteria Does the change:		Assessment outcome	Description
Is the change environmentally appropriate?	Affect new communities	Yes	Suggested flight path will overfly areas previously overflown but not under a current published flightpath, including Kellevie, Copping, Dunalley and areas of Carlton River. New areas overflown are to the east of Nugent and around the Wielangta Forest Reserve.
	Better share the impact of noise in keeping with Airservices Flight Path Design Principles	No	The flights coming via IPLET are from Brisbane, Gold Coast, Sydney and Canberra but not by aircraft from Melbourne, Adelaide, Launceston and other locations north-west of Hobart. The majority of aircraft arriving from Brisbane, Gold Coast, Sydney and Canberra are equipped with and approved to use RNP-AR and would continue using the RNP-AR STAR rather than the RNAV, resulting in minimal noise distribution.
	Result in greater track miles for industry (creating additional emissions)	Yes	Additional 35-64kg fuel burn and 112-203kg CO_2 emissions for arrivals coming from the north-west (e.g. Melbourne and Perth), and 11-19kg fuel burn and 34-61kg CO_2 emissions for aircraft arriving from the east coast of mainland Australia.
	Impact areas of national environmental significance and noise sensitive sites	Yes	Overflies Wielangta Conservation Area, Woodvine Nature Reserve and areas under Conservation Covenant. Puts arriving aircraft close to Bellettes Bay Conservation Area.
	Impact areas of future residential development or areas of high tourism value	Yes	Overflies natural tourism areas identified above. Overfly area is zoned Rural Resource, with small sections zoned Environmental Management and Utilities (Copping).
Network	Have flow on effects or require changes to other procedures or flight paths	Yes	Requires redesign of RWY12 STARs. Impacts the crossing point between aircraft arriving from Melbourne and aircraft departing on the RWY30 Non-jet SID
	Impact or benefit overall network efficiency	No	No impact on Cambridge Aerodrome operations. No impact on overall efficiency of air traffic network operations within Tasmania or mainland Australia.
	Involve a cost	Yes	Design, assessment and implementation (including documentation amendments and ATC training) for new RWY12 STARs
	Have a benefit appropriate to the	No	Similar number of dwellings overflown. Suggested change includes areas

Assessment Criteria Does the change:		Assessment outcome	Description
	cost		previously (but not currently) overflown as well as newly overflown areas. Additional 3-10 NM track miles, 11-64kg fuel burn and 34-203kg CO_2 emissions per flight

Assessment outcome: the suggestion to move the RWY30 STARs (and therefore waypoint BAVUR) to the east is safe and notionally feasible but is not recommended to progress as the objectives of this suggestion are better achieved by the suggestion to move RWY30 arrivals to the east coast (see Section G.2.6).

G.2.8 Community suggestion: Move RWY30 RNAV STAR west of the airport

A suggestion was made to revisit the previous western approach proposal. Figure 86 shows the western sector arrival flight path alternative considered in 2017.

Aircraft operations to the west of Hobart Airport have previously been considered by Airservices and documented in the Airservices *Environmental Assessment of Proposed Changes to SIDs and STARS at Hobart Airport* (version 1.3, effective 8 November 2018), the *Airservices Hobart Runway 30 STAR Review Report* (November 2017), and the *CASA Airspace Review of Hobart 2019*. Due to the safety issues identified by aircraft operators, the proposal for flight paths to the west of the airport did not proceed. Airservices considered the previous assessments and feedback as part of the PIR. The issues previously identified continue to be applicable and are summarised in Table 41. As a result, this suggestion will not progress for further assessment.

Figure 86: Previously considered alternative – western sector approach *(Source: Airservices Hobart Runway 30 STAR Review Report, November 2017)*

Table 41: Assessment of community suggestion: move RWY30 RNAV STAR west of the airport

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	Yes	A potential STAR for western sector operations has previously been considered by Airservices, however did not proceed due to the safety risks identified by aircraft operators (see below)
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	Yes	Safety risks previously identified by aircraft operators include: - Increased Controlled Flight into Terrain (CTIF) risk due to proximity to terrain rich environments - Increased turbulence and wind shear risks associated with terrain (due to orographic uplift) - Potential mix of jet RPT and general aviation traffic - Increased icing risk due to aircraft operating at low levels in proximity to high terrain - The availability of an acceptable manoeuvring area for aircraft. - Operations that track along the Derwent River would not provide adequate manoeuvring margins to establish a safe and stabilised final approach for large jet aircraft. - Likelihood of an unstable approach and take-off climb performance considerations during one-engine inoperative operations. Increase complexity for ATC and pilots due to departing aircraft being on wrong side of the anti-clockwise racetrack route pattern between Melbourne and Hobart and needing to cross to the eastern side of the arrival route at a later stage. A significant proportion of local light aircraft operations are concentrated to the west of Hobart Airport, at Cambridge Aerodrome and to the west of existing controlled airspace. As a result of the current airspace and route design, a natural segregation exists between a high proportion of slow moving, light aircraft and fast moving, jet aircraft. Removal of this natural segregation by placing STARs to the west would increase complexity of the airspace, affect ATC workload/ capacity and impact current unrestricted access to the existing uncontrolled airspace for light aircraft.

Assessment Criteria Does the change:		Assessment outcome	Description
	Increase track miles for industry (creating additional operational cost)	Not determined	Due to the safety issues identified previously by aircraft operators, indicative flight path locations were not considered for analysis.
Environmental Is the change environmentally appropriate?	Reduce noise levels or the number of people impacted	No	The western sector includes the most populated areas in Hobart
	Affect new communities	Not determined	Due to the safety issues identified previously by aircraft operators, indicative flight path locations were not considered for analysis.
	Better share the impact of noise in keeping with Airservices Flight Path Design Principles	Not determined	As above
	result in greater track miles for industry (creating additional emissions)	Not determined	As above
	Impact areas of national environmental significance and noise sensitive sites	Not determined	As above
	Impact areas of future residential development or areas of high tourism value	Not determined	As above
Network	Have flow on effects or require changes to other procedures or flight paths	Yes	The area to the west Hobart Airport is outside the current limits of controlled airspace and includes Danger Area D316 (training area for general aviation aircraft). Any flight paths to the west would require the western boundary of controlled airspace to be shifted significantly further west, while also causing Danger Area D316 to be removed and re-established elsewhere within the vicinity of Hobart.
	Impact or benefit overall network efficiency	Impact	The need to reduce or move D316 would impact operations at Cambridge Aerodrome and reduce the efficient use of and equitable access to airspace.
	Involve a cost	Yes	Design, assessment and implementation (including documentation amendments and ATC training) for a new instrument

Assessment Criteria Does the change:		Assessment outcome	Description
			procedure. Airspace design and approvals processes to move/reduce D316.
	Have a benefit appropriate to the cost	No	Safety is the most important consideration, and the safety risks identified by aircraft operators negate any potential benefit

Assessment outcome: due to the safety risks for western sector operations previously identified by aircraft operators, the suggestion to move the RWY30 RNAV STAR to the west of the airport will not progress for further assessment.

G.2.9 Community suggestion: Move RWY12 Non-jet SID east

Suggestions were made to move the RWY12 Non-jet SID to the east. Submissions suggested moving the RWY12 Non-jet SID closer towards Connellys Marsh or moving it approximately halfway between its current position and Primrose Sands (which would place the non-jet departures around the same location as the current RNP-AR STAR). These two scenarios are shown in Figure 87.

Figure 87: Assessment scenarios for suggested move of RWY12 Non-jet SID east *(Source: Google Earth)*

Figure 88 shows the locations of residential dwellings and other sensitive sites in proximity to the suggested move of RWY12 Non-jet SID to the RNP-AR STAR location, and Figure 89 shows the suggested move towards Connellys Marsh. Due to lateral separation considerations between non-jet and jet departures, these scenarios are assessed together in Table 42.

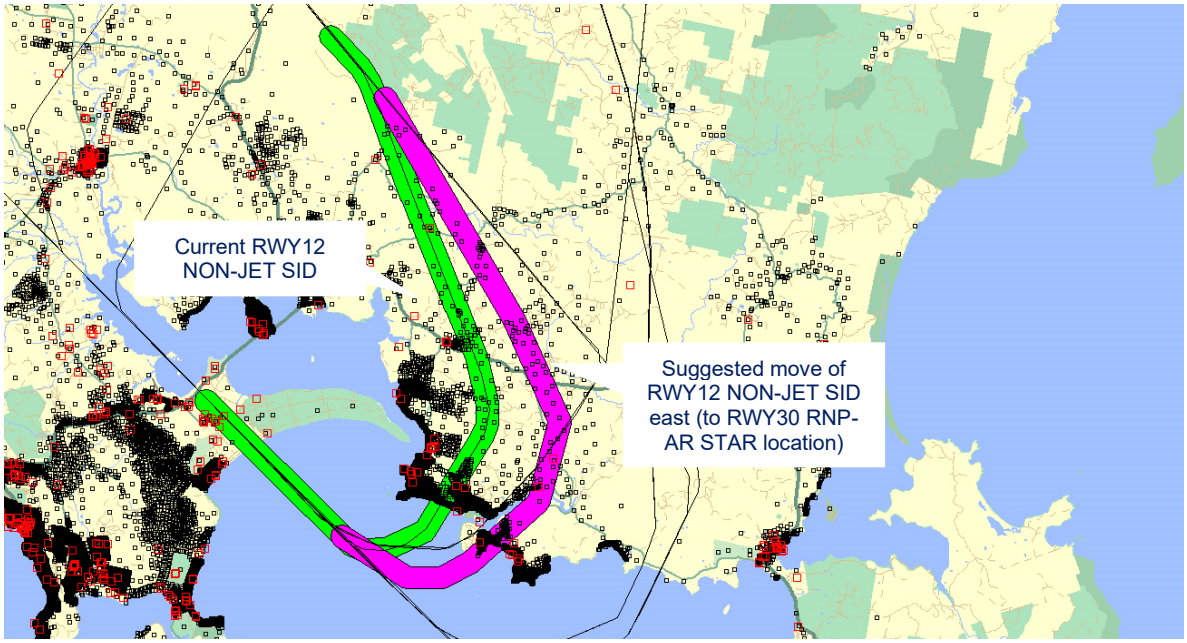


Figure 88: Sensitive sites overflown by current (green) RWY12 Non-jet SID and suggested move (pink) east to RNP-AR STAR location *(Source: DPIPWE data)*

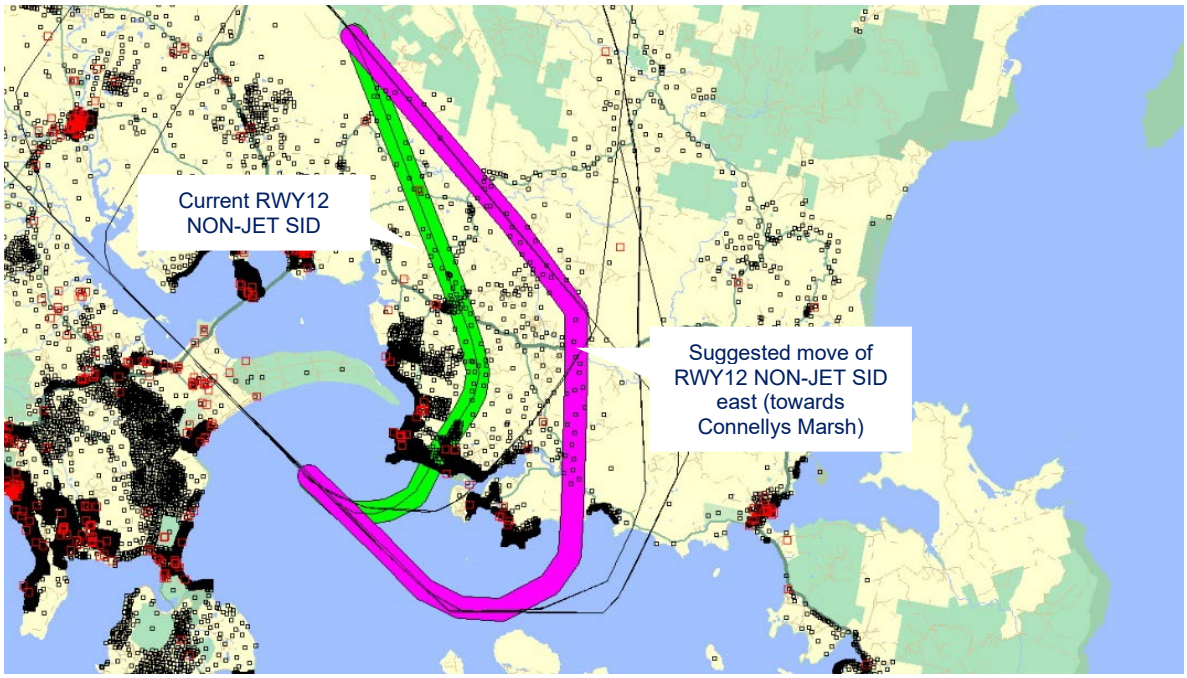


Figure 89: Sensitive sites overflown by current (green) RWY12 Non-jet SID and suggested move east towards Connellys Marsh *(Source: DPIPWE data)*

Table 42: Assessment of community suggestion: move RWY12 Non-jet SID to the east

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety	Yes	

Assessment Criteria Does the change:		Assessment outcome	Description
	and design standards		
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	Yes	In Hobart a minimum of 5NM separation is required between the Jet SID and Non-jet SID to enable the safe and independent operation of both departure procedures. Both suggested options reduce this separation and therefore they do not meet the safety standards required for the Jet SID and Non-jet SID to operate independently of each other, resulting in delays as faster jets are held on the ground for longer.
	Increase track miles for industry (creating additional operational cost)	Yes	Additional 4NM track miles per flight if the Non-jet SID is moved near the RNP-AR STAR. Additional 8NM track miles per flight if the Non-jet SID is moved near Connellys Marsh.
Environmental Is the change environmentally appropriate?	Reduce noise levels or the number of people impacted	No Yes	For the suggested move of the Non-Jet SID to the RNP-AR STAR location, there is an increase in number of dwellings overflown, from 400 under the current Non-jet SID* to 498 dwellings under the suggested SID (which also overflies the Steeles Island Retreat and Carlton River B&B). For the suggested move closer to Connellys Marsh, there is a reduction in number of dwellings overflown, from 400 under the current Non-jet SID* to 44 dwellings under the suggested SID. *(*noting the spread of non-jet traffic is nearly 3 km across the coastline, while this assessment considers a 1 km buffer)* Both scenarios concentrate aircraft noise near the Primrose Sands and Carlton River areas that already experience RWY30 RNP-AR STAR arrivals.
	Affect new communities	No	The first scenario concentrates noise on areas under current RNP-AR STAR. Suggested move close to Connellys Marsh includes areas previously overflown by RWY30 arrivals (pre Sep 2017 change), RWY12 departures (post Sep 2017 change), and overflies or is close to areas under the current RNP-AR STAR.
	Better share the impact of noise in keeping with Airservices Flight	No	Suggestion to move Non-jet SID to RNP-AR STAR location concentrates flights on areas already receiving RNP-AR STAR arrivals.

Assessment Criteria Does the change:		Assessment outcome	Description
	Path Design Principles		Suggestion to move the Non-jet SID closer to Connellys Marsh reduces the number of dwellings overflown but concentrates aircraft noise near the Primrose Sands and Carlton River areas that already experience RWY30 RNP-AR STAR arrivals
	Result in greater track miles for industry (creating additional emissions)	Yes	Additional 14-25kg fuel burn per flight and 45-81kg CO_2 emissions per flight for moving the Non-jet SID to the RNP-AR STAR location. Moving the Non-jet SID closer to Connellys Marsh would result in additional 28-51kg fuel burn and 90-162kg CO_2 emissions per flight
	Impact areas of national environmental significance and noise sensitive sites	No	Both scenarios overfly an area in Carlton River under Conservation Covenant (under current RNP-AR STAR)
	Impact areas of future residential development or areas of high tourism value	No	Overfly areas for both scenarios are predominantly zoned Rural Resource, with areas at the coastline and Carlton River zoned Environmental Management
Network	Have flow on effects or require changes to other procedures or flight paths	Yes	Update to ATC procedures due to Jet SID and Non-jet SID no longer able to operate independently
	Impact or benefit overall network efficiency	No	No impact on Cambridge Aerodrome operations. No impact on overall efficiency of air traffic network operations within Tasmania or mainland Australia.
	Involve a cost	Yes	Design, assessment and implementation (including documentation amendments and ATC training) for a new instrument procedure
	Have a benefit appropriate to the cost	No	Jet SID and Non-jet SID would no longer be able to operate independently (of the other SID) due to reduction in lateral separation, resulting in operational delays. First scenario concentrates noise over areas under the current RNP-AR STAR, with additional 4NM track miles per flight. Second scenario reduces number of dwellings overflown, however results in additional 8NM track miles per flight and overflies some areas that already experience RNP-AR STAR arrivals.

Assessment outcome:

- The suggestion to move the Non-jet SID near the RNP-AR STAR is safe but not recommended to progress for further assessment due to the inability to adequately separate jet and non-jet aircraft departures to the required standard and reducing operational efficiency through delays to jet operations, as well as concentrating more noise events over a community already overflown and an increase in the number of dwellings overflown.
- The suggestion to move the Non-jet SID near Connellys Marsh is safe but not recommended to progress for further assessment due to the inability to adequately separate jet and non-jet aircraft departures to the required standard and reducing operational efficiency through delays to jet operations, as well as resulting in an increase in track miles for industry.

G.2.10 Community suggestion: Move RWY12 Non-jet SID west of the airport

A suggestion was made to move RWY12 non-jet departures to the west of Hobart Airport. The suggestion received is shown in Figure 90.

The assessment of this suggestion is summarised in Table 43. As noted in Section G.2.8, aircraft operations to the west of Hobart Airport have previously been considered by Airservices but did not proceed due to the safety issues identified by aircraft operators.

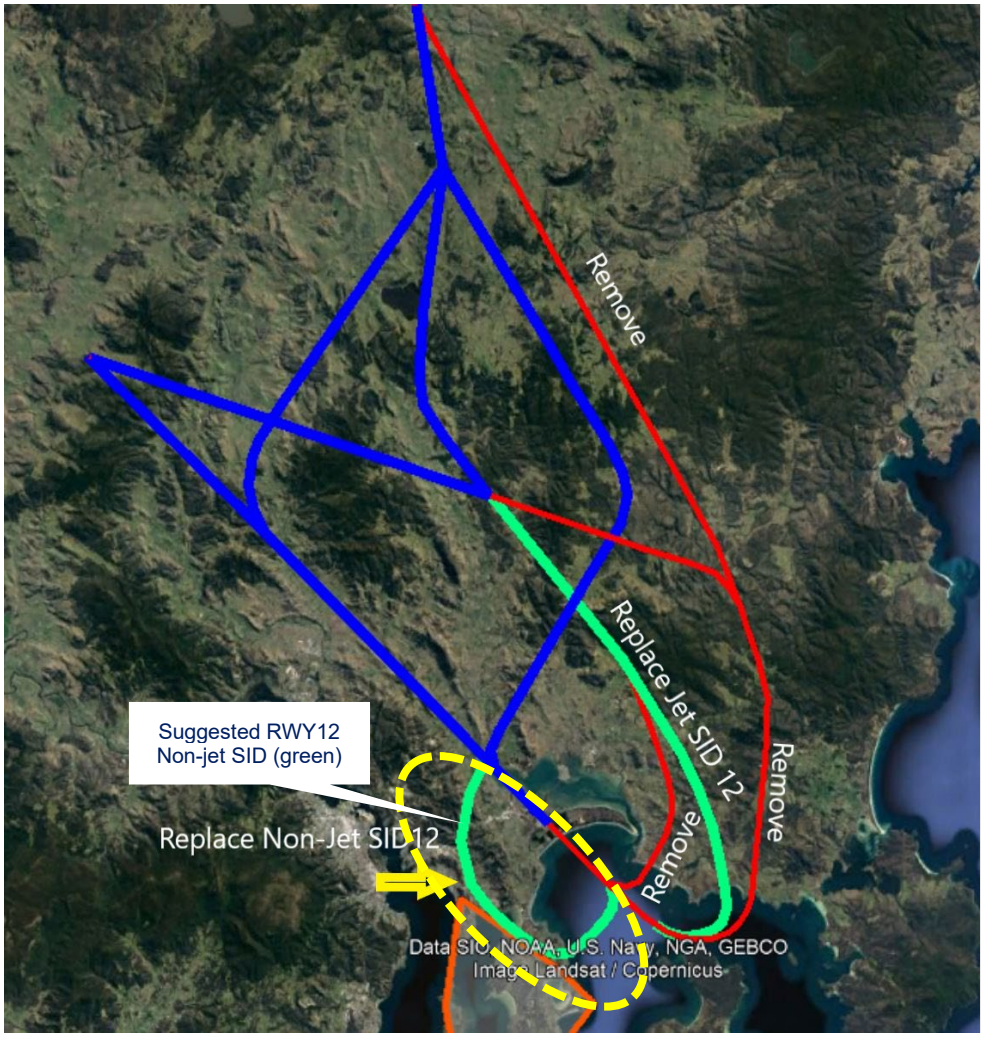


Figure 90: Suggested RWY12 Non-jet SID to the west of Hobart Airport (circled green track) *(Source: Community suggestion #25)*

Table 43: Assessment of community suggestion: move RWY12 Non-jet SID to west of the airport

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	Not compliant	The terrain immediately west of Hobart Airport prevents the suggested non-jet departure from meeting minimum climb gradient criteria. Additionally, there is insufficient distance for non-jet aircraft to climb to a suitable altitude that would satisfy separation requirements with aircraft arriving RWY12 via the ILS or RNP-AR STAR. The suggested SID (and its required airspace buffers) would not be contained within the controlled airspace boundary to the south-west of Hobart Airport.

Assessment outcome: the suggestion to move the RWY12 Non-jet SID to the west of the airport does not meet the Airservices safety and operational compliance assessment and will not progress for further assessment.

G.2.11 Community suggestion: Move RWY12 Jet SID west of the airport

Suggestions were made to move RWY12 jet departures to the west of Hobart Airport. A specific suggestion for a new Jet SID is shown in Figure 91.

The assessment of this suggestion is summarised in Table 44. As noted previously, aircraft operations to the west of Hobart Airport have previously been considered by Airservices but did not proceed due to the safety issues identified by aircraft operators.

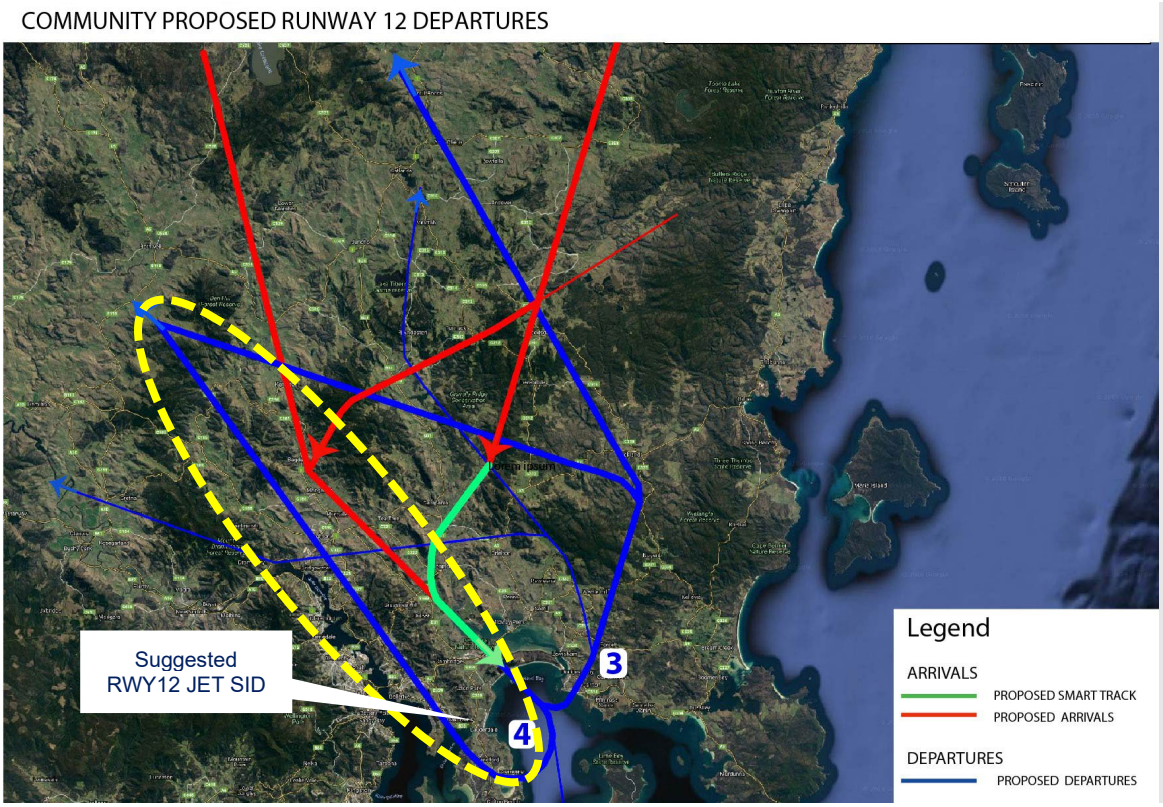


Figure 91: Community suggested alternative for new RWY12 Jet SID to the west of Hobart Airport (blue tracks marked with the number 4) (*Source: Community Submission #23)*

Table 44: Assessment of community suggestion: move RWY12 Jet SID west of the airport

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	comply with international and national safety and design standards	No	A jet departure to the south-west cannot be designed to comply with standards. The combination of minimum aircraft speeds, maximum aircraft bank angles, terrain, minimum segment distances between waypoints, and airspace containment minimum distances, result in the suggestion being impossible.

Assessment outcome: the suggestion to move the RWY12 Jet SID to the west of the airport does not meet the Airservices safety and operational compliance assessment and will not progress for further assessment.

G.2.12 Community suggestion: Move RWY12 Jet SID west

Suggestions were made to move the RWY12 Jet SID to the west of its current location. Submissions varied on the revised location for the Jet SID, including the current Non-jet SID location, at least 10 km from Boomer Bay, the pre-2017 location, towards Primrose Sands / Carlton, avoiding areas around waypoint BAVUR, or moving as close as possible to the airport. A number of submissions suggested that the RWY12 Jet SID be changed to the location suggested in 2018 which crosses the coastline between Primrose Sands and Connellys Marsh. Another suggestion was to add a second Jet SID close to the airport, around the location of the existing Non-jet SID, and to use the second Jet SID when the Non-jet SID is not in use.

Figure 92 shows the three scenarios considered for assessment: moving the RWY12 Jet SID 9 km west to align with the RWY12 Non-jet SID, moving the Jet SID 6-7 km west to the location of the RWY30 RNP-AR STAR, and moving the Jet SID 3 km to the west to cross the coastline between Primrose Sands and Connellys Marsh.

Figure 92: Assessment scenarios for suggestion to move RWY12 Jet SID west *(Source: Google Earth)*

Scenario 1

The assessment of moving the Non-jet SID to align with the Non-jet SID is summarised in Table 45.

Table 45: Assessment of community suggestion: move RWY12 Jet SID west to align with Non-jet SID

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	No	It is not possible to replicate the current Non-jet SID for jets as it includes a speed limit on the turn to ensure aircraft are able to execute this turn and then be on a straight departure to get up to the required altitude to separate with RWY12 arrivals. A Jet SID is designed with different criteria to meet performance requirements for jets.

Assessment outcome: the suggestion to align the RWY12 Jet SID with the Non-jet SID does not meet the Airservices safety and operational compliance assessment and will not progress for further assessment.

Scenario 2

Figure 93 shows the locations of sensitive sites in proximity to the suggested move of the RWY12 Jet SID 6-7 km to the west. The assessment of this suggestion is summarised in Table 46.

Figure 93: Sensitive sites overflown by current (green) and suggested move 6-7 km west (pink) for RWY12 JET SID *(Source: DPIPWE dwelling data)*

Table 46: Assessment of community suggestion: move RWY12 Jet SID 6-7 km west

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	Yes	
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	Yes	In Hobart a minimum of 5NM separation is required between the Jet SID and Non-jet SID to enable the safe and independent operation of both departure procedures. The suggestion reduces this separation and therefore does not meet the safety standards required for the Jet SID and Non-jet SID to operate independently of each other (resulting in delays as faster jets are held on the ground for longer).
	Increase track miles for industry (creating additional operational cost)	No	Reduction of 4NM track miles for jet departures
Environmental	Reduce noise levels or the	No	Current Jet SID overflies 20 dwellings, while suggested Jet SID overflies 498

Assessment Criteria	Does the change:	Assessment outcome	Description
Is the change environmentally appropriate?	number of people impacted		dwellings and the Primrose Sands RSL and Carlton River B&B.
	Affect new communities	No	Overflies communities that currently experience RWY12 Non-jet SID departures and RWY30 RNP-AR STAR arrivals
	Better share the impact of noise in keeping with Airservices Flight Path Design Principles	No	Suggestion concentrates noise over communities that already experience non-jet departures and/or RWY30 RNP-AR STAR arrivals, meaning that these communities would be subject to nearly all aircraft operations to the south of the airport.
	Result in greater track miles for industry (creating additional emissions)	No	Reduction of 14-25kg fuel per flight and 45-81kg CO_2 emissions per flight for jet departures
	Impact areas of national environmental significance and noise sensitive sites	Yes	Overflies small land tracts under Conservation Covenant
	Impact areas of future residential development or areas of high tourism value	No	Overfly area is zoned Low Density Residential and Rural Living at Primrose Sands and the Carlton River, Environmental Management zoning at the coastline and Carlton River, and the remaining area zoned Rural Resource
Network	Have flow on effects or require changes to other procedures or flight paths	Yes	Update to ATC procedures due to dependent Non-Jet and Jet SID operations
	Impact or benefit overall network efficiency	No	No impact on Cambridge Aerodrome operations. No impact on overall efficiency of air traffic network operations within Tasmania or mainland Australia.
	Involve a cost	Yes	Design, assessment and implementation (including documentation amendments and ATC training) for a new instrument procedure
	Have a benefit appropriate to the cost	No	Jet SID and Non-jet SID would no longer be able to operate independently (of the other SID) due to reduction in lateral separation, resulting in operational delays. Number of dwellings overflown increased from 20 to 498.

Assessment Criteria Does the change:		Assessment outcome	Description
			Reduction of 14-25kg fuel per flight and 45-81kg CO_2 emissions per flight for jet departures for industry.

Assessment outcome: the suggestion to move the RWY12 Jet SID 6-7 km to the west is safe but is not recommended to progress for further assessment due to the inability to adequately separate jet and non-jet aircraft departures to the required standard and reducing operational efficiency through delays to jet operations, as well as an increase in the number of dwellings overflown.

Scenario 3

Figure 94 shows the locations of sensitive sites in proximity to the suggested move of the RWY12 Jet SID 3 km to the west. The assessment of this suggestion is summarised in Table 47.

Figure 94: Sensitive sites overflown by current (green) and suggested move 3 km west (pink) for RWY12 JET SID *(Source: DPIPWE data)*

Table 47: Assessment of community suggestion: move RWY12 Jet SID 3 km west

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	Yes	

Assessment Criteria Does the change:		Assessment outcome	Description
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	Yes	In Hobart a minimum of 5NM separation is required between the Jet SID and Non-jet SID to enable the safe and independent operation of both departure procedures. The suggestion reduces this separation and therefore does not meet the safety standards required for the Jet SID and Non-jet SID to operate independently of each other (resulting in delays as faster jets are held on the ground for longer).
	Increase track miles for industry (creating additional operational cost)	No	Reduces track miles by 2NM for each jet departure
Environmental Is the change environmentally appropriate?	Reduce noise levels or the number of people impacted	No	The current Jet SID overflies 14 dwellings, and the suggested SID overflies 29 dwellings.
	Affect new communities	Yes	The suggested SID overflies areas that are not currently under a published flight path
	Better share the impact of noise in keeping with Airservices Flight Path Design Principles	No	Overflies more residential dwellings than the current SID
	Result in greater track miles for industry (creating additional emissions)	No	Reduction of 7-13kg fuel and 22-41kg CO_2 emissions per flight
	Impact areas of national environmental significance and noise sensitive sites	No	Overflies land tracts under Conservation Covenant (Riverside, Storm Bay Carlton and Carlton River)
	Impact areas of future residential development or areas of high tourism value	No	Overfly area is zoned Environmental Management at the coastline and the Carlton River, and the remaining area is zoned Rural Resource
Network	Have flow on effects or require changes to other procedures or flight paths	Yes	Update to ATC procedures due to dependent Non-Jet and Jet SID operations
	Impact or benefit overall network efficiency	No	No impact on Cambridge Aerodrome operations. No impact on overall efficiency of air traffic network operations within Tasmania or mainland Australia.
	Involve a cost	Yes	Design, assessment and implementation (including documentation amendments and

Assessment Criteria Does the change:		Assessment outcome	Description
			ATC training) for a new instrument procedure
	Have a benefit appropriate to the cost	No	Jet SID and Non-jet SID would no longer be able to operate independently (of the other SID) due to reduction in lateral separation, resulting in operational delays. Number of dwellings overflown increased from 14 to 29. Reduction of 2NM track miles, 7-13kg fuel and 22-41kg CO_2 emissions per flight.

Assessment outcome: the suggestion to move the RWY12 Jet SID 3 km to the west is safe but is not recommended to progress for further assessment due to the inability to adequately separate jet and non-jet aircraft departures to the required standard and reducing operational efficiency through delays to jet operations, as well as an increase in dwellings overflown in locations not currently experiencing aircraft operations.

G.2.13 Community suggestion: Move RWY12 Jet SID over Frederick Henry Bay

One suggestion was made to have jets departing RWY12 undertake a 360 degree turn and then track back over the airport at approximately 10,000 ft, as shown in Figure 95.

The assessment of this suggestion is summarised in Table 48.

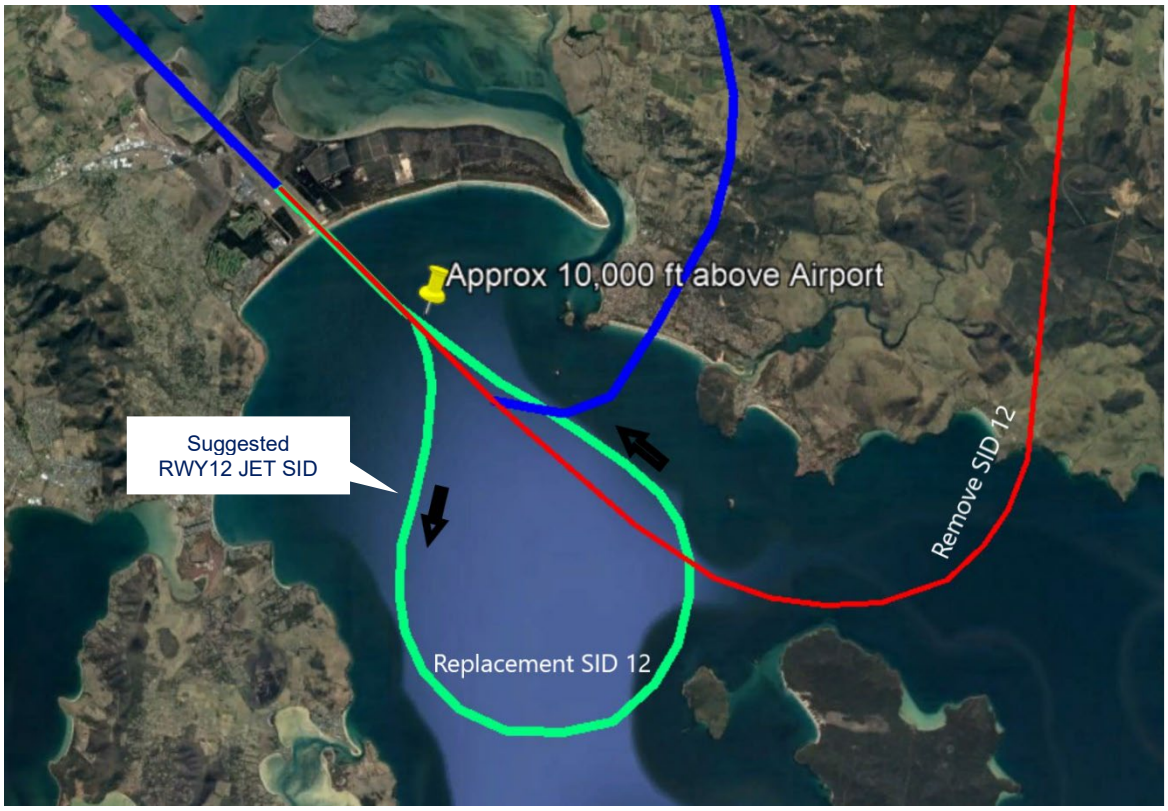


Figure 95: Suggested RWY12 Jet SID over Frederick Henry Bay (green) *(Source: Community Submission #28)*

Table 48: Assessment of community suggestion: move RWY12 jet departures over Frederick Henry Bay

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	No	Flight path design must cater for the range of aircraft that will operate on the flight paths. To achieve an altitude of approximately 10,000 ft, aircraft need to climb at a gradient of approximately 11 percent. This gradient is not achievable by all aircraft in all environmental conditions. The turn radius is also not achievable for a jet aircraft (irrespective of the climb gradient and altitude) within the bank angle and speed parameters set out in ICAO DOC 8168 (PANS-OPS), particularly so soon after departure. The combination of large bank angles, limiting speed restrictions and small number of track miles would result in 10,000 ft being an unachievable altitude to reach. The suggested SID (and its required airspace buffers) is not contained within controlled airspace, nor is there sufficient separation with Danger Area D316 that sits immediately outside the controlled airspace boundary. This would also disqualify any wider turn. Additionally such a SID would increase complexity of ATC vertical separation for the jet aircraft then tracking overhead the airport.

Assessment outcome: the suggestion to move RWY12 jet departures over Frederick Henry Bay does not meet the Airservices safety and operational compliance assessment and will not progress for further assessment.

G.2.14 Community suggestion: Move RWY12 Jet SID to the east coast

Suggestions were made to have jets departing RWY12 fly further south-east before tracking up the coast of Tasmania and is shown in Figure 96.

Figure 97 shows the locations of sensitive sites in proximity to the suggested move of the RWY12 Jet SID to the east coast. The assessment of this suggestion is summarised in Table 49.

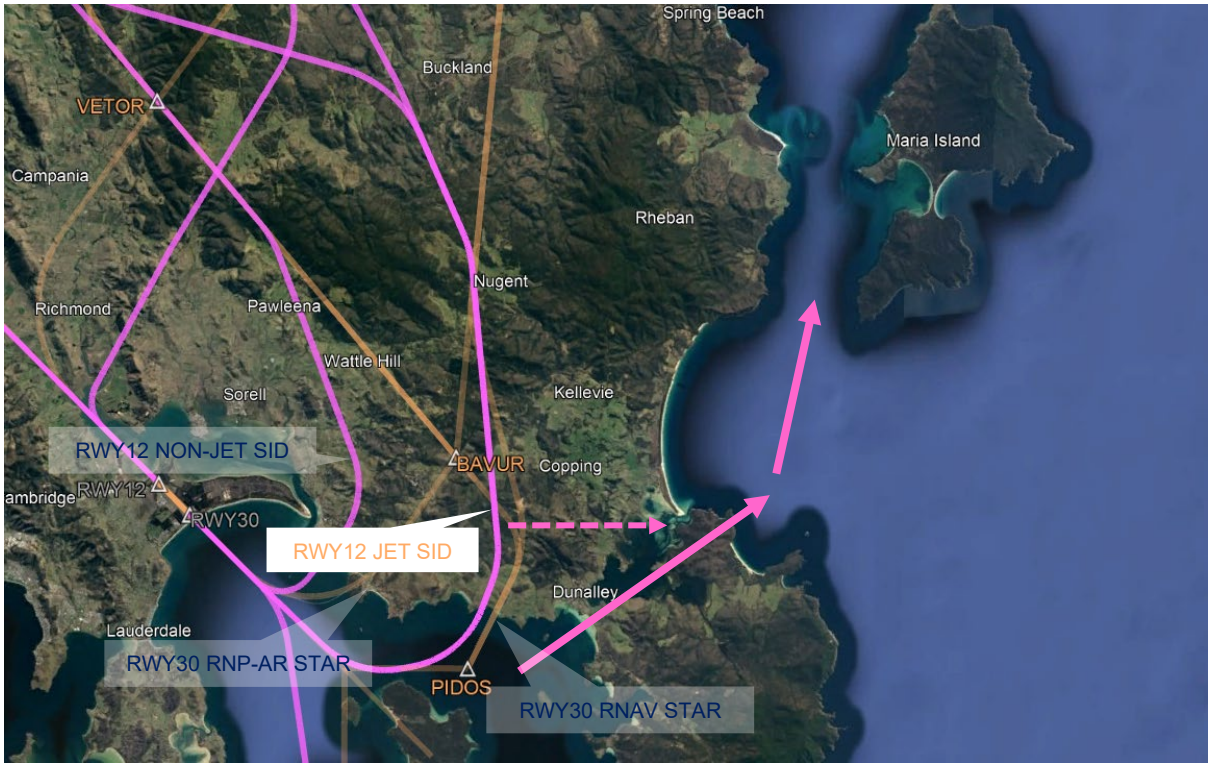


Figure 96: Community suggestion: Move RWY12 Jet SID to east coast *(Source: Google Earth)*

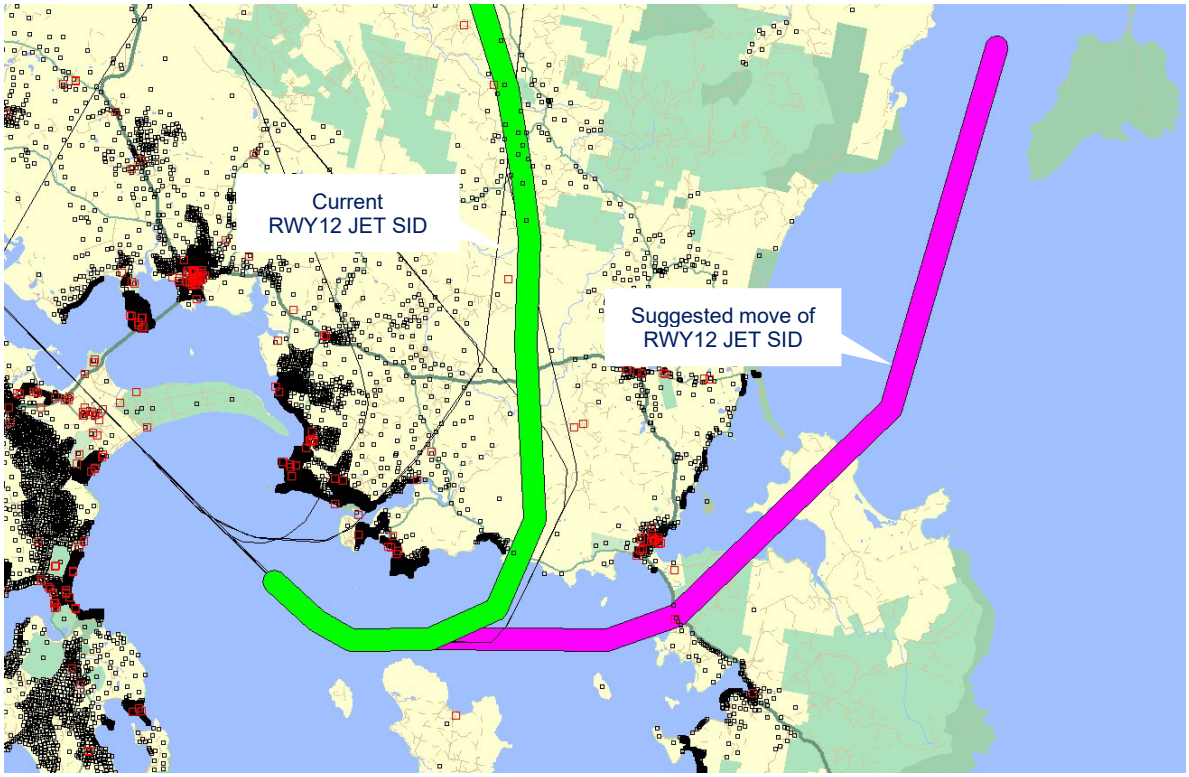


Figure 97: Sensitive sites overflown by current (green) RWY12 Jet SID and suggested (pink) move to the east coast *(Source: DPIPWE data)*

Table 49: Assessment of community suggestion: move RWY12 Jet SID to east coast

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	Yes	
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	Yes	Suggested SID would only be used by aircraft departing to Brisbane and Sydney, but not by aircraft going to Melbourne or west of Melbourne which would still require the existing RWY12 Jet SID. Suggested SID creates a tactically managed separation issue (requires changing an aircraft's speed, altitude or direction to maintain separation with other aircraft) which is against safety by design principles where the flight path is designed to achieve strategical separation. If departures track east of Maria Island, ATC complexity would increase in the enroute system due to the cross with arrivals from Brisbane and Sydney happening over the Bass Strait (not ideal with both aircraft at cruise).
	Increase track miles for industry (creating additional operational cost)	No	Track miles are expected to be similar (has not been quantified due to unknown factors for managing tactical crossovers for aircraft departing to Sydney or Brisbane)
Environmental Is the change environmentally appropriate?	Reduce noise levels or the number of people impacted	Yes	The current Jet SID overflies 15 dwellings, and the suggested SID overflies 4 dwellings and an accommodation facility (Sunset Beach Cabins) which are not under a current published flight path
	Affect new communities	Yes	There are no current (or previous) published flight paths along the east coast
	Better share the impact of noise in keeping with Airservices Flight Path Design Principles	No	Suggested SID would be used by aircraft departing to the mainland Australia east coast (Brisbane and Sydney) and reduce departures using existing Jet SID, sharing jet departure noise over multiple areas. However, suggested Jet SID would overfly new areas that have not previously been under any published flight paths.
	Result in greater track miles for industry (creating additional emissions)	No	Track miles (and therefore fuel burn and emissions) are expected to be similar
	Impact areas of national	Yes	Suggested SID would overfly or be close to the Lime Bay State Reserve, Coal Mines

Assessment Criteria Does the change:		Assessment outcome	Description
	environmental significance and noise sensitive sites		Historic Site, Tasman National Park, Yellow Bluff Creek Conservation Area (and areas in Bangor under Conservation Covenant), Long Spit Private Nature Reserve, Cape Bernie Nature Reserve and Maria Island National Park
	Impact areas of future residential development or areas of high tourism value	Yes	Suggested SID would overfly or be close to natural tourism areas identified above. Overfly area is zoned Rural Resource and Environmental Management.
Network	Have flow on effects or require changes to other procedures or flight paths	Yes	Change to air traffic control airspace volumes and approval from CASA would be required
	Impact or benefit overall network efficiency	Yes	Efficiency of aircraft tracking over the eastern portion of Bass Strait may be affected due to enroute crossing that is not required currently No impact on Cambridge Aerodrome operations.
	Involve a cost	Yes	Design, assessment, and implementation (including documentation amendments and ATC training) for a new instrument procedure and CASA airspace volume change process
	Have a benefit appropriate to the cost	No	Suggested SID would only be used by aircraft departing to Brisbane and Sydney. Increased complexity for ATC due to tactically managed flight separation issues. Reduction in number of dwellings overflown from 15 to 4. Track miles are expected to be similar (for Brisbane and Sydney departures). Change to air traffic control airspace volumes and approval from CASA is required.

Assessment outcome: the suggestion to move the RWY12 Jet SID to the east coast is not recommended to progress for further assessment due to the impacts on operational complexity and minor reduction in number of dwellings overflown.

G.2.15 Community suggestion: RWY12 Jet SID to turn north-west earlier

A suggestion was made to turn the RWY12 Jet SID to the north-west after crossing the coastline. This suggestion, shown in Figure 98, involves removing the current Non-Jet and Jet SIDs and moving the Non-Jet SID to the west of Hobart Airport (moving the Non-jet SID to the west of the airport is assessed separately in Section G.2.10).

The assessment of this suggested is summarised in Table 50.

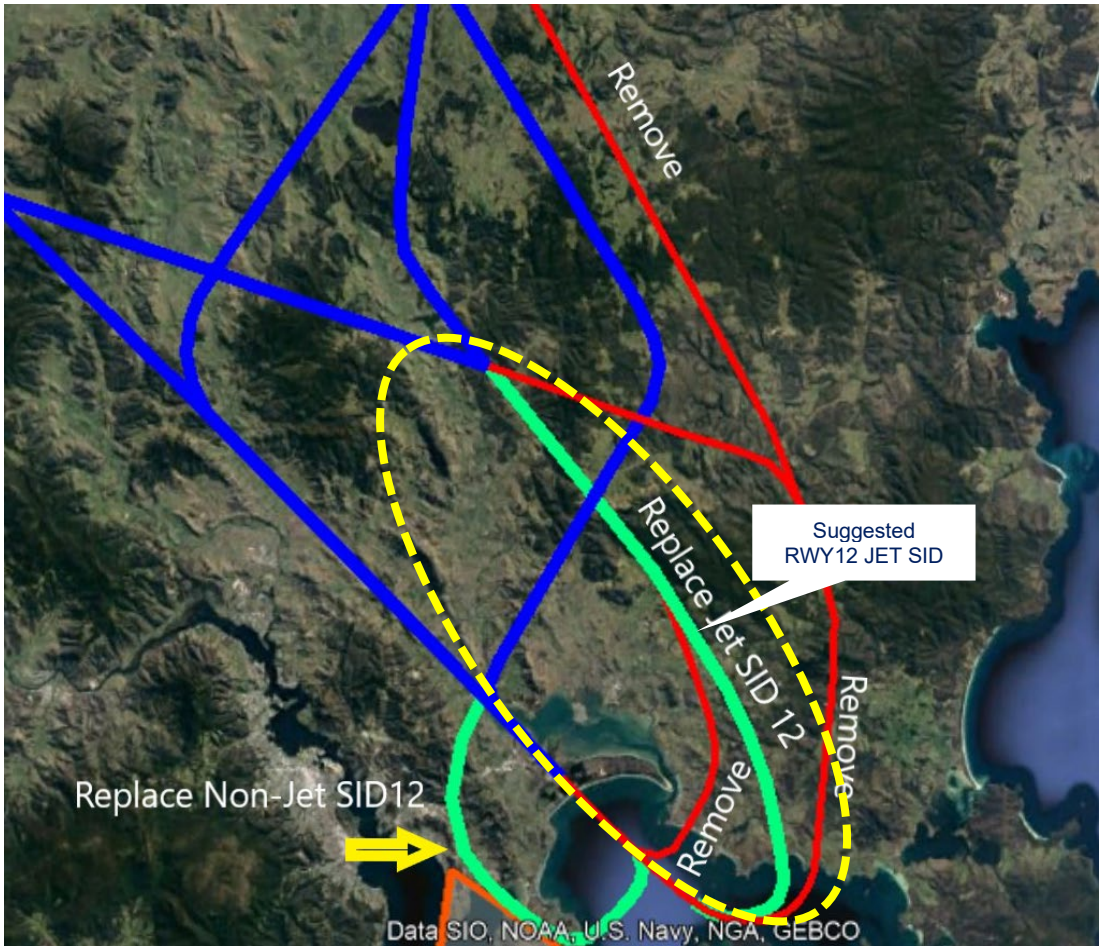


Figure 98: Suggested new RWY12 Jet SID (longer green track) *(Source: Community suggestion #25)*

Table 50: Assessment of community suggestion: RWY12 Jet departures to turn to the north-west earlier

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	No	Due to the separation requirements between jet and non-jet aircraft, once the aircraft have turned off the initial departure heading from the runway the Jet SID cannot share or be close to the same flight paths as non-jets. As identified in G.2.10, the RWY12 Non-jet SID cannot be moved west of the airport and must remain to the east, and the suggested RWY12 Jet SID does not meet separation requirements with the Non-jet SID.

Assessment outcome: the suggestion for RWY12 Jet departures to turn to the north-west earlier does not meet the Airservices safety and operational compliance assessment and will not progress for further assessment.

G.2.16 Community suggestion: Avoid flight paths over specific areas

Suggestions were made to avoids flights over a number of specific areas, including Dunalley, Norfolk Bay, and the Forestier Peninsular.

The Airservices Flight Path Design Principles states that aircraft noise is an inevitable by-product of aircraft operations, and it is not possible to guarantee any suburb, group or individual exemption from

aircraft noise exposure. Flight paths can be constrained by the location of an airport and the orientation of the runway(s), the local weather ad meteorological conditions, the natural and/or urban terrain, aircraft performance and/or navigation capability, or the existing air traffic network and airspace architecture.

Airservices considers flight path designs that distribute aircraft operations and noise across multiple areas.

Frederick Henry Bay and Norfolk Bay receive RWY12 departures and RWY30 arrivals due to the location and orientation of the runway at Hobart Airport.

Assessment outcome: it is not possible to guarantee any suburb, group or individual exemption from aircraft noise exposure.

G.2.17 Community suggestion: Introduce curfew for night flights

A suggestion was made to implement a curfew to stop early morning and late night flights over the Carlton River area.

The application of a curfew at Hobart Airport is a Commonwealth government policy decision. Curfews at federally leased airports are administered by the Department of Infrastructure, Transport, Regional Development and Communications.

However, preferred runway use for specific times of the day can be achieved through NAPs. A suggestion for all RWY30 arrival aircraft to use the RWY30 RNAV STAR at night is considered in Section G.2.5, and the potential NAPs change is detailed in Appendix I.

Assessment outcome: Airservices will progress consideration of a potential NAPs change to specify preferred runway use at sensitive times of the day.

G.2.18 Community suggestion: Implement Class C Approach Services

Suggestions were made to implement Class C Approach Services at Hobart Airport.

The purpose of the PIR is to review changes implemented by Airservices. The current airspace and approach service at Hobart Airport is Class D. Class C Airspace has not yet been introduced at Hobart Airport, and therefore a change to Class C Airspace, including any changes to Airservices radar surveillance, are outside the scope of the PIR.

Assessment outcome: Implementation of Class C Approach Services is not part of the PIR scope.

G.3 PIR Findings – Community Suggested Alternatives

Assessment Methodology

Recommended Action 3

For future assessments of community suggested flight path alternatives, Airservices will determine a flight path buffer for sensitive site analysis that takes into account the aircraft altitude and spread of tracks on the flight paths.

Assessment of Community Suggested Alternatives

The community suggested alternatives were assessed against criteria relating to safety and compliance, operational efficiency, environmental and network impacts. From the 34 submissions received during the public comment period, 19 flight path change scenarios were identified for assessment. For the flight path changes assessed:

- seven suggestions did not meet the safety and compliance assessment and will not progress for further assessment
- three suggestions were found to increase air traffic control and/or pilot complexity and workloads, thereby reducing the overall safety of the system, and were not suitable to progress for further assessment
- one suggestion was not suitable to progress for further assessment due to flight safety risks

for aircraft operators

- three suggestions were therefore not suitable to progress for further assessment due to reduced operational efficiency and delays for aircraft operators, while not providing a substantial improvement to the community
- five suggestions were found to be safe and feasible. Of these, three suggestions are recommended to progress for further assessment. Two feasible suggestions are not preferred as the improvement objectives are better achieved by one of the other suggestions recommended to progress.

Table 51 provides a summary of all the community suggested alternative scenarios and the assessment outcome for each of the four key assessment categories.

Table 51: Summary of community suggested flight path alternatives against assessment criteria

Community Suggestion	Safety and Compliance	Operational Efficiency	Environmental	Network	Outcome
Reinstate pre-2017 arrival and departure flight paths	✗				Does not meet design standards and will not progress for further assessment
RWY30 RNP-AR STAR – increase altitude	✗				Does not meet safety and compliance standards and will not progress for further assessment
RWY30 RNP-AR STAR – move east 2-3 km	✓	~	~	~	Reduces number of dwellings overflown, however adds track miles for industry ***Recommended to progress for further assessment***
RWY30 RNP-AR STAR – move east 7-9 km	✓	✗	~	~	Concentrates all RWY30 arrivals on RNAV STAR. Will not progress as improvement objectives are better achieved through an alternate suggestion
Add second RWY30 RNP-AR STAR to noise share	✓	✗	~	~	Will not progress for further assessment due to additional complexity for ATC and being inefficient for industry
RWY30 RNP-AR arrivals – use RWY30 RNAV STAR at night	✓	~	~	~	Can be achieved through NAPs ***Recommended to progress for further assessment***
Move RWY30 arrivals to the east coast	✓	✗	~	~	Safe and notionally feasible, however requires determination of STAR starting waypoint and validation of track miles assessment ***Recommended to progress for further investigation***

Community Suggestion	Safety and Compliance	Operational Efficiency	Environmental	Network	Outcome
RWY30 RNP-AR and RNAV STARs – move east	✓	✗	✗	✗	Will not progress as improvement objectives are better achieved through an alternate suggestion
RWY30 RNAV STAR – move west of airport (western sector)	✓	✗	-	✗	Will not progress for further assessment due to safety risks previously identified by aircraft operators
RWY12 Non-jet SID – move east (near RWY30 RNP-AR STAR)	✓	✗	✗	✗	Will not progress for further assessment due to reduced operational efficiency and delays for aircraft operators
RWY12 Non-jet SID – move east (towards Connellys Marsh)	✓	✗	✗	✗	Will not progress for further assessment due to reduced operational efficiency and delays for aircraft operators
RWY12 Non-jet SID – move west of airport (western sector)	✗				Does not meet design standards and will not progress for further assessment
RWY12 Jet SID – move west of airport (western sector)	✗				Does not meet design standards and will not progress for further assessment
RWY12 Jet SID – move west to align with Non-jet SID	✗				Does not meet design standards will not progress for further assessment
RWY12 Jet SID – move west 3 km	✓	✗	✓	~	Will not progress for further assessment due to increased complexity and operational delays
RWY12 Jet SID – move west 6-7 km	✓	✗	~	~	Will not progress for further assessment due to reduced operational efficiency and delays for aircraft operators
RWY12 Jet SID – move over water (Frederick Henry Bay)	✗				Does not meet design standards and will not progress for further assessment
RWY12 Jet SID – move to east coast	✓	✗	✗	✗	Will not progress for further assessment due to increased complexity and minimal improvement in number of dwellings overflown
RWY12 Jet SID – turn to the north-west earlier	✗				Does not meet design standards and will not progress for further assessment

Community Suggestion	Safety and Compliance	Operational Efficiency	Environmental	Network	Outcome
Avoid flight paths over specific areas					It is not possible to guarantee any suburb, group or individual exemption from aircraft noise exposure
Introduce curfew for night flights					Airport curfews are a commonwealth government policy decision. However, NAPs can specify preferred runway for use at sensitive times of the day
Implement Class C Approach Services					Outside the scope of the PIR

✓ positive outcomes
~ combination of positive and negative outcomes
✗ negative outcomes

Recommended Action 4

Airservices will undertake further assessment of the community suggested change of moving the RWY30 RNP-AR STAR 2-3 km to the east.

Recommended Action 5

Airservices will undertake further assessment of a potential NAPs change to specify preferred runway use at sensitive times of the day, including further community and industry engagement to determine what times of day or night would apply and operational requirements for exemptions.

Recommended Action 6

Airservices will undertake further investigation of the community suggested flight path change to move RWY30 arrivals to the east coast (over water) to determine an appropriate STAR starting waypoint and validate the track miles assessment.

APPENDIX H - INDUSTRY REQUESTED IMPROVEMENTS

H.1 Airline Customers

Feedback on the Hobart Airspace Design Review was sought from airlines that operate at Hobart Airport.

Qantas acknowledged support of the current airspace design. Qantas continues to encourage implementation of procedures for RNP-AR arrivals and RNAV SIDs and STARs that use satellite-based technology to support safe, efficient and reduced emissions arrivals and departures. In addition, Qantas seeks continued implementation of continuous descent approaches where possible, to reduce emissions and provide pilots with safe, repeatable and consistent arrival procedures.

Air New Zealand introduced flights to Hobart Airport on 22 April 2021 as a result of the COVID-19 'travel bubble' arrangements with New Zealand. The current flight routes are based on published procedures and result in excessive track miles (and therefore fuel burn and emissions), and Air New Zealand requested new published flight routes that reduce track miles and achieve greater cost and time efficiencies for flights between New Zealand and Hobart.

H.2 Assessment of Industry Suggestions

The industry suggested flight paths have been assessed using the same criteria that was applied to the community suggested alternatives (see Section G.1).

H.2.1 Industry suggestion: New RWY30 departure route to New Zealand

As shown in Figure 99, Air New Zealand currently depart from RWY30 via the northbound Jet SID, with ATC procedures requiring the aircraft to remain on this SID until reaching waypoint LATUM for environmental reasons. The available planned route (green) has excessive track miles and therefore fuel burn and emissions. The planned flight route is based on published procedures in the *En Route Supplement Australia*[26] and requires aircraft to carry adequate fuel for that flight plan. Due to the excessive track miles, as an interim solution that has only been possible due to lower traffic levels caused by COVID-19 travel restrictions, air traffic controllers tactically manage the aircraft to turn off the SID at waypoint LATUM (yellow route) when it is above 20,000 ft.

There were two RWY30 departure route suggestions for the permanent flight path solution which are shown in Figure 99 (orange routes). The first alternative was for flights to New Zealand to depart RWY30 via the non-jet SID route. This suggestion was rejected due to the speed restrictions on the Non-Jet SID being only suitable for non-jets and therefore did not comply with design and safety standards.

The second alternative has flights to New Zealand using the RWY30 Jet SID until waypoint PIDIX, which ensures aircraft are above 14,000 ft, and then tracking south of Maria Island and crossing above arriving aircraft from Sydney and Brisbane at a point which ensures adequate vertical separation.

[26] https://www.airservicesaustralia.com/aip/aip.asp

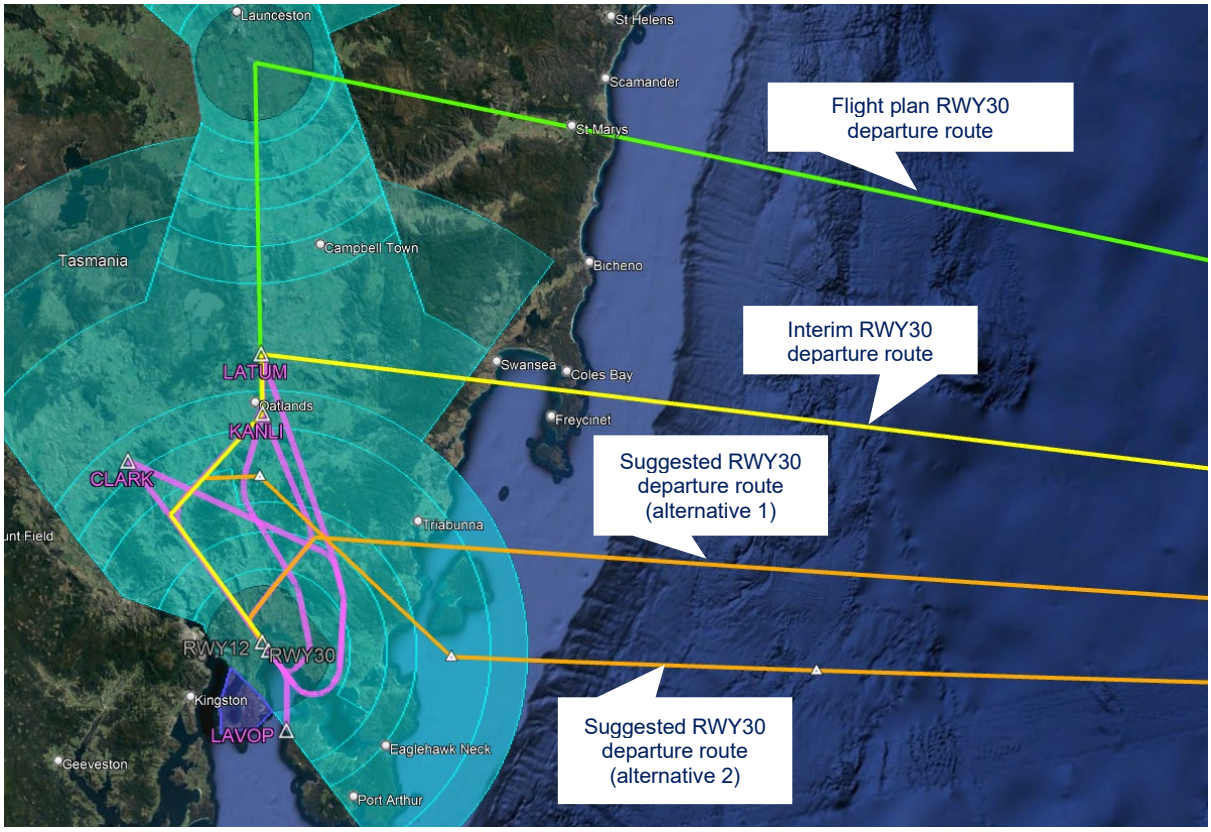


Figure 99: Current planned (green), interim (yellow) and suggested (orange) RWY30 departure route to NZ

Figure 100 shows the locations of residential dwellings and sensitive sites in proximity to the second alternative RWY30 departure route for departures to New Zealand. The assessment of this suggestion is summarised in Table 52.

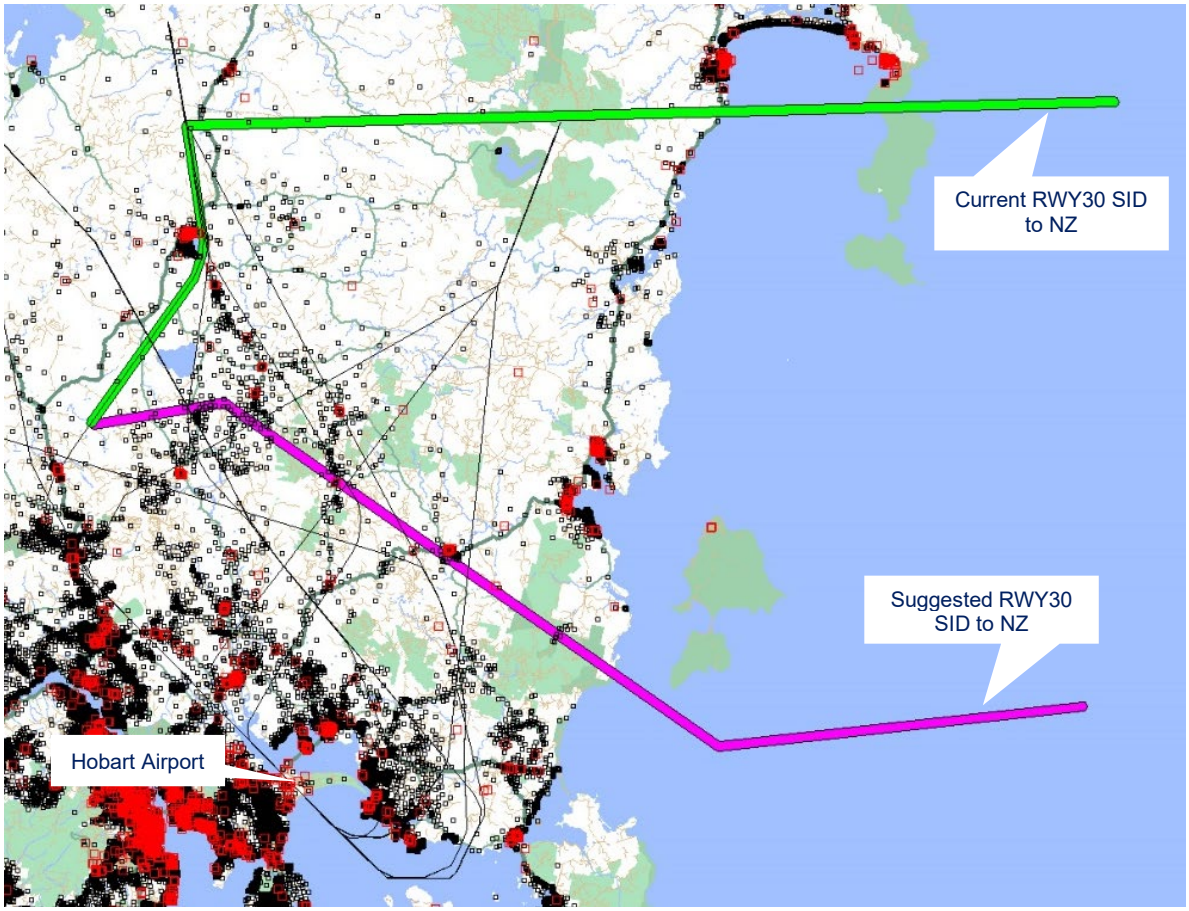


Figure 100: Sensitive sites overflown by current (green) and suggested (pink) RWY30 SID to NZ - alternative 2 *(Source: DPIPWE data)*

Table 52: Assessment of industry suggestion: new RWY30 SID for departures to NZ - alternative 2

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	Yes	
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	No	Reduces complexity and improves safety through natural vertical separation with aircraft on the IPLET STARs
	Increase track miles for industry (creating additional operational cost)	No	Reduction of 6NM track miles per flight
Environmental	Reduce noise levels or the number of people impacted	No	Starting at the point where the NZ flight path deviates from the existing Jet SID (aircraft altitude ~14,000 ft), the current route overflies 8 dwellings, and the suggested route

Assessment Criteria Does the change:		Assessment outcome	Description
Is the change environmentally appropriate?			overflies 50 dwellings. Flights will cross the coastline at 25,000 – 30,000 ft.
	Affect new communities	Yes	The new areas (not under any current published flight path) overflown by the suggested RWY30 SID are predominantly forest reserves and conservation areas
	Better share the impact of noise in keeping with Airservices Flight Path Design Principles	No	Increases number of dwellings overflown by departures to NZ
	Result in greater track miles for industry (creating additional emissions)	No	Reduction of 36kg fuel burn and 112kg CO_2 emissions per flight
	Impact areas of national environmental significance and noise sensitive sites	Yes	Suggested SID overflies the Gravelly Ridge and Brown Mountain conservation areas, Wielangta Forest Reserve, before crossing the coastline at Cape Bernier Nature Reserve and flying close to the southern end of Maria Island.
	Impact areas of future residential development or areas of high tourism value	Yes	Overflies nature tourism attractions (national parks and nature reserves) identified above New overfly area is mostly zoned Rural Resource, with smaller areas of Environmental Management and Significant Agricultural.
Network	Have flow on effects or require changes to other procedures or flight paths	No	The suggested departure follows the existing jet SID to a point where it is vertically separated with all arrivals
	Impact or benefit overall network efficiency	No	No impact on Cambridge Aerodrome operations. No impact on overall efficiency of air traffic network operations within Tasmania or mainland Australia.
	Involve a cost	Yes	Design, assessment and implementation (including documentation amendments and ATC training) for a new instrument procedure
	Have a benefit appropriate to the cost	Yes (safety)	Reduces complexity and improves safety. Overflies natural tourism and conservation areas.

Assessment Criteria Does the change:		Assessment outcome	Description
			Number of dwellings overflown increased from 8 to 50. Reduction of 6NM track miles, 36kg fuel burn and 112kg CO_2 emissions per flight.

Assessment outcome: the suggested RWY30 Jet SID for flights to New Zealand is safe and feasible, noting the increase in dwellings overflown are at a high altitude, and is recommended to progress for further assessment.

H.2.2 Industry suggestion: New RWY12 departure route to New Zealand

Departures to NZ from RWY12 currently operate via the northbound Jet SID with ATC procedures requiring the aircraft to remain on this SID until reaching waypoint LATUM for environmental reasons.

As shown in Figure 101, the available planned route (green) has excessive track miles and therefore fuel burn and emissions. As an interim solution that has only been possible due to lower traffic levels as a result of COVID-19 travel restrictions, ATC will tactically manage the aircraft to turn off the SID at waypoint LATUM (yellow route) when it is above 20,000 ft.

Air New Zealand proposed two options for the RWY departure route to NZ, shown as orange routes in Figure 101. The first alternative follows the current jet departure until waypoint DUMIT (just north of Nugent) and then north of Maria Island towards New Zealand, while the second alternative continues on runway heading for longer than the current jet SID, tracking over land between Murdunna and Eaglehawk Neck. This second alternative was preferred due to overflying fewer residential dwellings and having the least track miles.

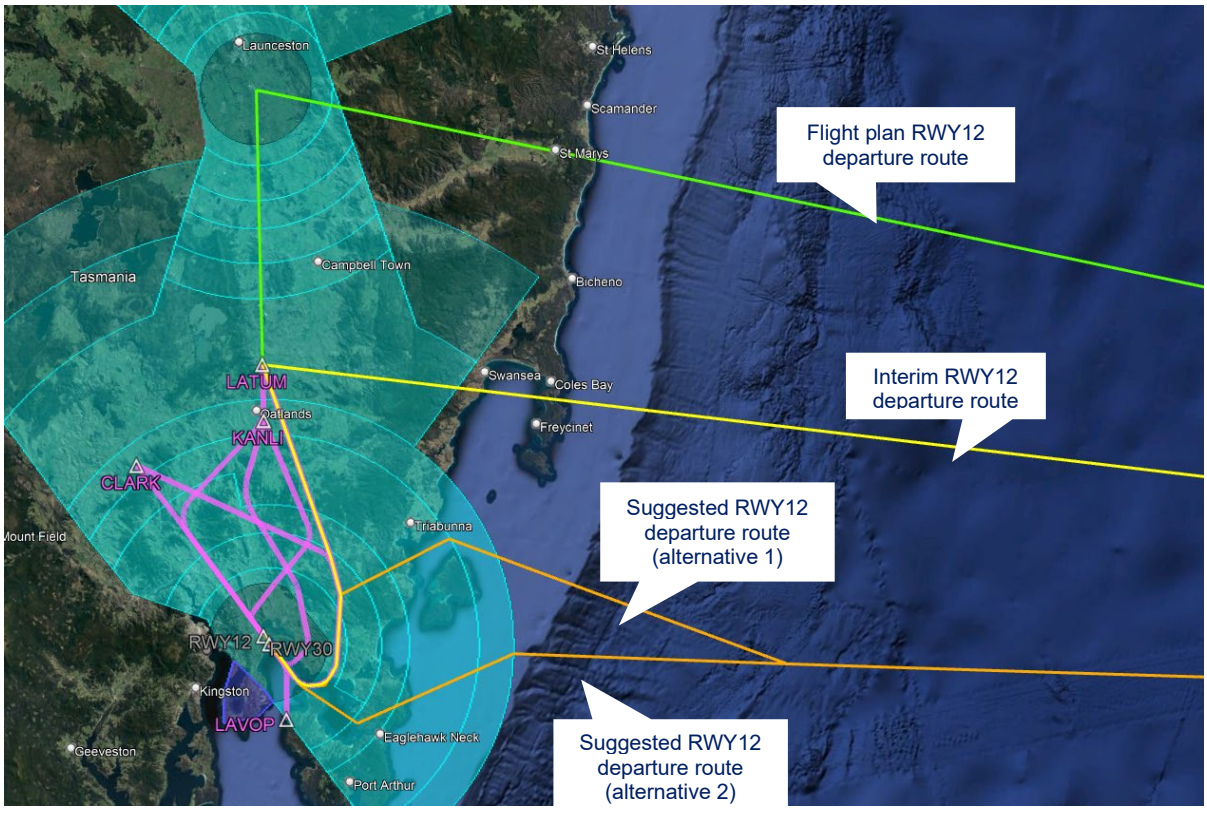


Figure 101: Planned (green), actual (yellow) and suggested (orange) RWY12 departure route to NZ

Figure 102 shows the locations of residential dwellings and sensitive sites in proximity to the second alternative RWY12 departure route to NZ. The assessment of this suggestion is summarised in Table 53.

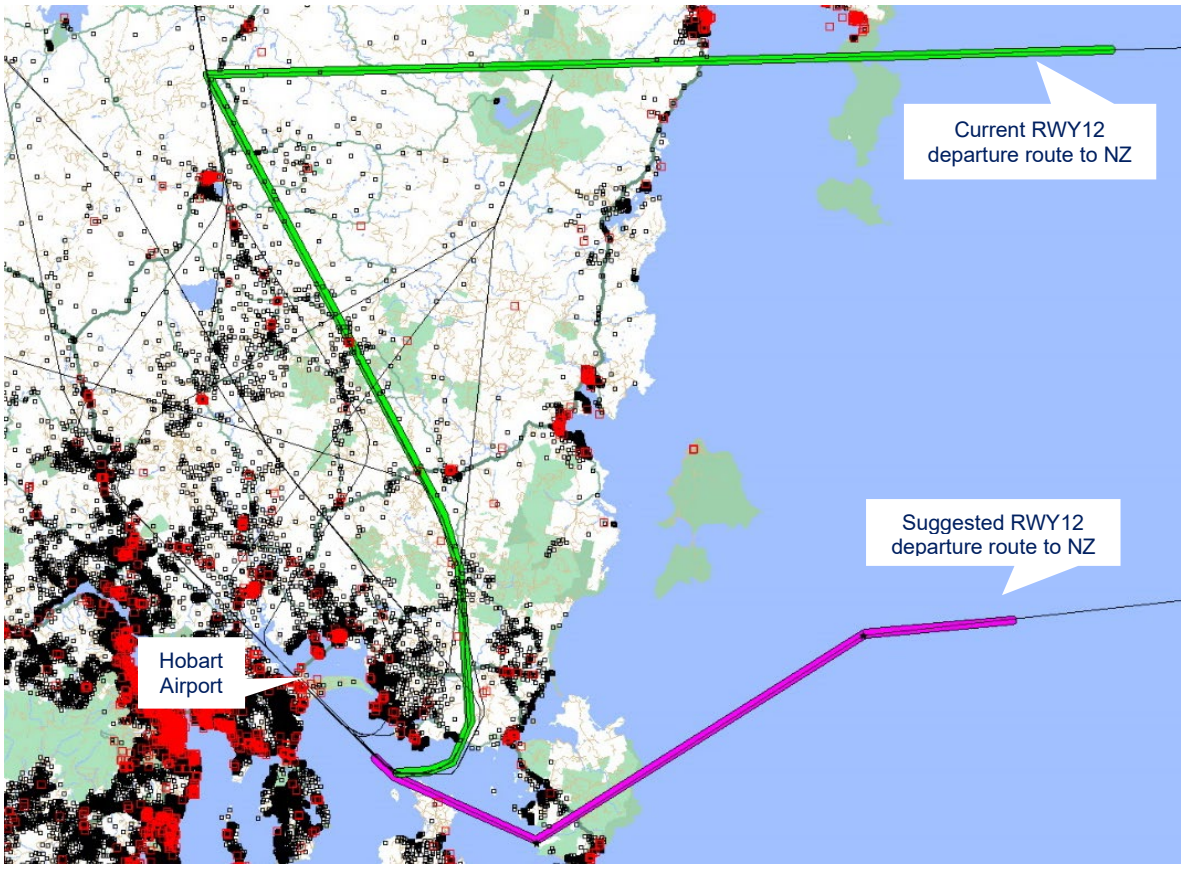


Figure 102: Sensitive sites overflown by current (green) and suggested (pink) RWY12 departure route to NZ – alternative 2 *(Source: DPIPWE data)*

Table 53: Assessment of industry suggestion: New RWY12 departure route to NZ – alternative 2

Assessment Criteria Does the change:		**Assessment outcome**	**Description**
Safety and operational compliance	Comply with international and national safety and design standards	Yes	
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	No	Reduces complexity as Air NZ aircraft are separated sooner from aircraft arriving into Hobart, with no crossing tracks
	Increase track miles for industry (creating additional operational cost)	No	Reduction of 53NM track miles per flight
Environmental	Reduce noise levels or the number of people impacted	Yes	The current route overflies 47 dwellings, and the suggested route overflies the Lime Bay Campground and 1 dwelling.

Assessment Criteria Does the change:		Assessment outcome	Description
Is the change environmentally appropriate?			Aircraft will cross the coastline near Murdunna at approximately 8,000 ft.
	Affect new communities	Yes	Suggested STAR overflies Murdunna, which is not under any current published flight path.
	Better share the impact of noise in keeping with Airservices Flight Path Design Principles	Not determined	Reduces number of dwellings overflown, however will overfly areas not under a current published flight path
	Result in greater track miles for industry (creating additional emissions)	No	Reduction of 318.4kg of fuel burn and 1,005kg CO_2 emissions per flight
	Impact areas of national environmental significance and noise sensitive sites	Yes	Crosses northern end of Lime Bay State Reserve, Eagle Bay-Flinders Bay Conservation Area, Tasman National Park, and is close to Coal Mine Historic Site and Yellow Bluff Creek Conservation Areas
	Impact areas of future residential development or areas of high tourism value	Yes	Overfly area is zoned Rural Resource and Environmental Management. Overflies nature tourism attractions (national parks, conservation areas and the historic site) identified above. Aircraft will be at approximately 6,000 ft when near the Coal Mines Historic Site.
Network	Have flow on effects or require changes to other procedures or flight paths	No	Suggested flight path is independent of all other flight paths
	impact or benefit overall network efficiency	No	No impact on Cambridge Aerodrome operations. No impact on overall efficiency of air traffic network operations within Tasmania or mainland Australia.
	Involve a cost	Yes	Design, assessment and implementation (including documentation amendments and ATC training) for a new instrument procedure
	Have a benefit appropriate to the cost	Yes	Reduces ATC complexity. Overflies some areas of national environmental significance. Reduction of 53NM track miles, 318.4kg fuel burn and 1005kg CO_2 emissions per flight.

Assessment Criteria Does the change:		Assessment outcome	Description
			Number of dwellings overflown reduced from 47 to 1.

Assessment outcome: the suggested RWY12 departure route to New Zealand is safe and feasible and is recommended to progress for further assessment.

H.2.3 Industry suggestion: New RWY12 arrival route from New Zealand

As shown in Figure 103, Air New Zealand arrivals to RWY12 currently (green route) join the existing path for arrivals from Sydney and Brisbane, north of Freycinet. This is not suitable long-term due to the excessive track miles, fuel burn and emissions. Two alternatives (yellow routes) were suggested for the RWY12 arrivals from NZ. The first alternative tracks north of Maria Island, crossing the coast north of Triabunna and joining the existing STARs (for Sydney and Brisbane arrivals) near Woodsdale. The second option tracked south of Maria Island and then northwest to join the existing STARs but is not the preferred option due to increased ATC complexity (in managing the airspace between the airport and Maria Island) and tracking over land for a longer period of time.

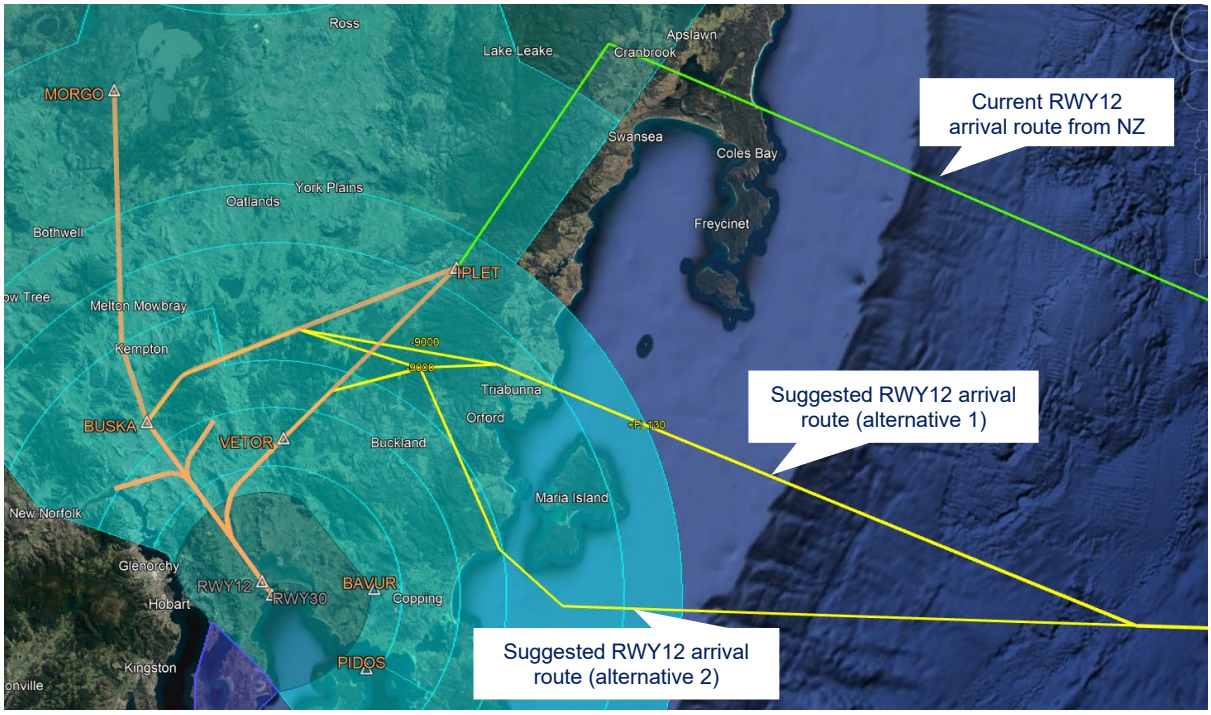


Figure 103: Current (green) and suggested (yellow) RWY12 arrival route from NZ

Figure 104 shows the locations of residential dwellings and sensitive sites in proximity to the first alternative RWY12 arrival route for flights from NZ.

The assessment of this suggestion is summarised in Table 54.

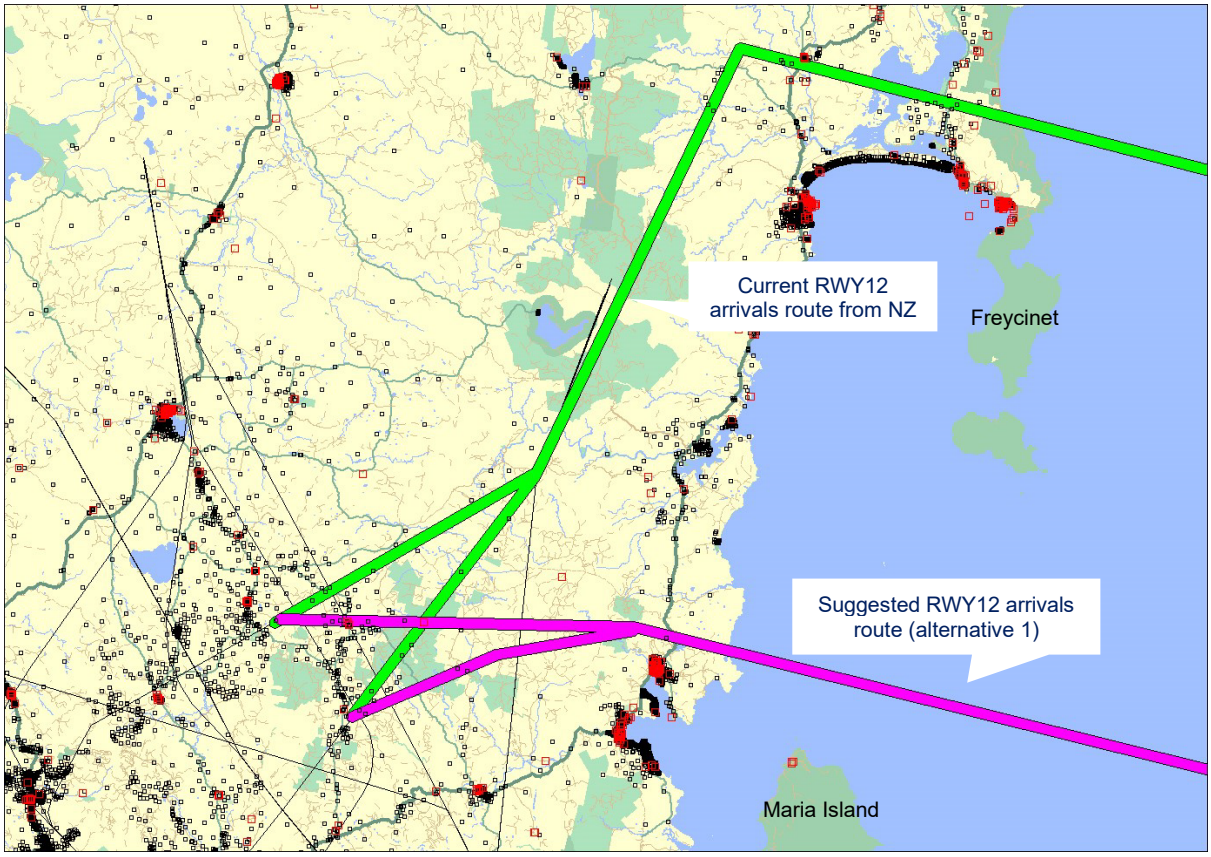


Figure 104: Sensitive sites overflown by current (green) and suggested (pink) RWY12 arrivals route from NZ - alternative 1 *(Source: DPIPWE data)*

Table 54: Assessment of industry suggestion: new RWY12 arrivals route from NZ – alternative 1

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	Yes	
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	No	By the time the NZ arrivals are in the vicinity of other traffic, they are vertically separated with departures and sequenced with arrivals
	Increase track miles for industry (creating additional operational cost)	No	Decrease in track miles of 20NM for RNP-AR STAR arrivals and 17NM for the ILS STAR (used in bad weather)
Environmental Is the change environmentally appropriate?	Reduce noise levels or the number of people impacted		The current arrivals route from NZ overflies 21 dwellings. The suggested route overflies 18 dwellings.
	Affect new communities	Yes	Visual impact of NZ arrivals in areas not previously overflown prior to aircraft joining existing STARs

Assessment Criteria Does the change:		Assessment outcome	Description
	Better share the impact of noise in keeping with Airservices Flight Path Design Principles	Yes	Reduced track miles over land. Suggested route joins existing STARs closer to the airport.
	Result in greater track miles for industry (creating additional emissions)	No	Reduction of 102-120kg fuel burn and 322-380kg CO_2 emissions per flight
	Impact areas of national environmental significance and noise sensitive sites	Yes	Visual impact of aircraft to the north of Maria Island (>5 km laterally and at 12,000 ft altitude) and overflying MacLaines Creek Forest Reserve Area at approximately 9,000 ft
	Impact areas of future residential development or areas of high tourism value	Yes	Visual impact for nature tourism attractions identified above. Land zoning is mainly Rural Resource, with small sections zoned Significant Agricultural and Environmental Management.
Network	Have flow on effects or require changes to other procedures or flight paths	No	NZ arrivals will be vertically separated with departures as they join the existing STARs
	Impact or benefit overall network efficiency	No	No impact on Cambridge Aerodrome operations. No impact on overall efficiency of air traffic network operations within Tasmania or mainland Australia.
	Involve a cost	Yes	Design, assessment and implementation (including documentation amendments and ATC training) for a new instrument procedure
	Have a benefit appropriate to the cost	Yes	Overflies some areas of national environmental significance. Reduction of 17-20NM track miles, 102-120kg fuel burn and 322-380kg CO_2 emissions per flight

Assessment outcome: the suggested RWY12 arrivals route from New Zealand is safe and feasible and is recommended to progress for further assessment.

H.2.4 Industry suggestion: New RWY30 arrival route from New Zealand

RWY30 arrivals from NZ currently join the existing IPLET STAR (Sydney and Brisbane arrivals) north of Freycinet. This is not suitable long-term due to excessive track miles, fuel burn and emissions.

Three alternative options were proposed for the new RWY arrival route from NZ and are shown in Figure 105. The first alternative tracks south of Maria Island, crossing the coast north of Eaglehawk Neck, then entering the bay between Murdunna and Eaglehawk Neck and connecting to the RWY30 Approach.

The second alternative tracks south of Maria Island, then northwest towards Nugent to join the RNP-AR approach. This alternative was rejected by due to complex left and right turns compared to the first alternative, increasing the difficulty for Air New Zealand to fly during adverse weather (particularly in strong winds).

The third alternative tracks north of Maria Island and Triabunna, joining the existing IPLET STAR, connecting to both the RNP-AR and RNAV STARs. This option was ruled out due to excessive track miles and aircraft overflying more residential areas compared to the first alternative (362 compared to 2 dwellings).

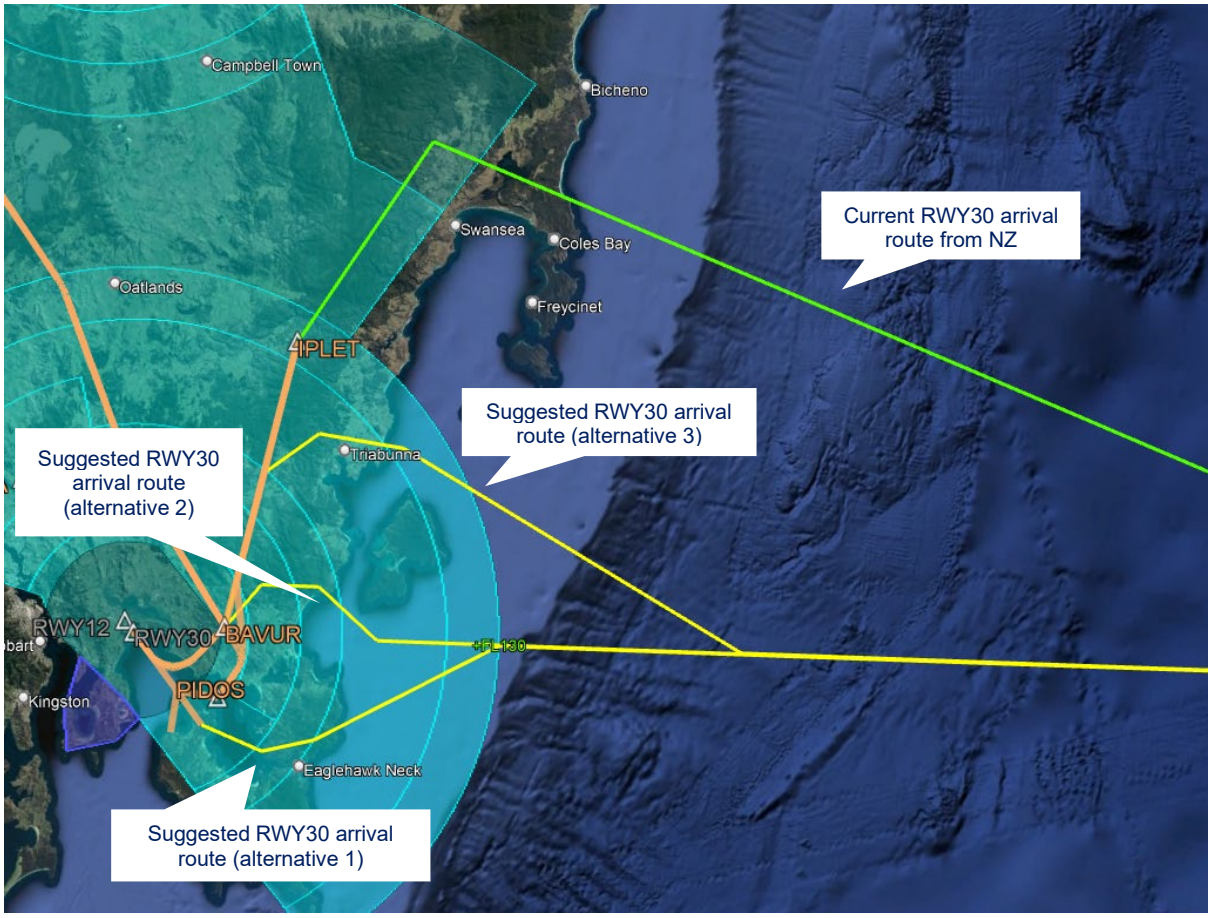


Figure 105: Current (green) and suggested (yellow) RWY30 arrival route from NZ

Figure 106 shows the locations of sensitive sites in proximity to the current and first alternative RWY30 arrival route. The assessment of this suggestion is summarised in Table 55.

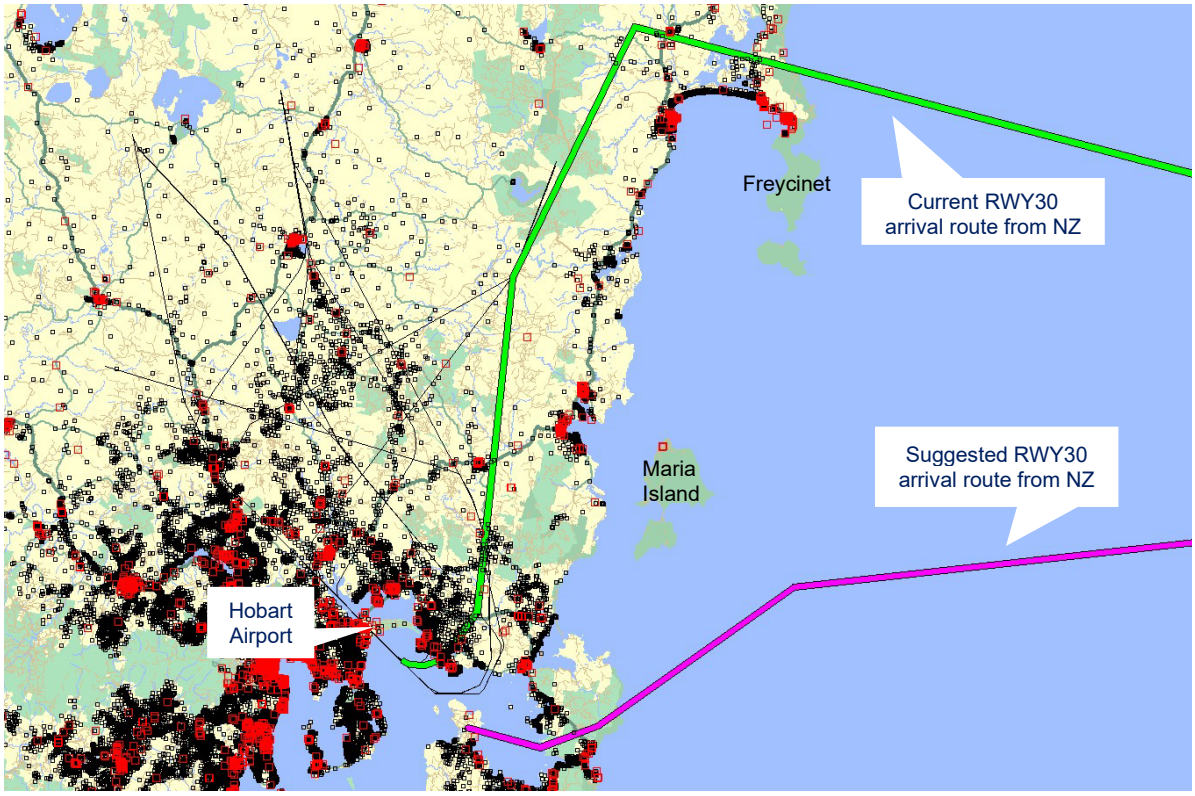


Figure 106: Sensitive sites overflown by current (green) and suggested (pink) RWY30 STAR to NZ – alternative 2 *(Source: DPIPWE data)*

Table 55: Assessment of industry suggestion: RWY30 STAR from NZ – alternative 1

Assessment Criteria Does the change:		Assessment outcome	Description
Safety and operational compliance	Comply with international and national safety and design standards	Yes	
Operational efficiency and feasibility Is the change flyable and efficient?	Add complexity to operations (the work of ATC in managing the airspace or pilot workload in flying the flight path)	No	The suggested route is independent to all other arrivals and departures, requiring only the normal sequencing consideration.
	Increase track miles for industry (creating additional operational cost)	No	Reduction of 38NM track miles per flight
Environmental Is the change environmentally appropriate?	Reduce noise levels or the number of people impacted	Yes	The current route overflies 363 dwellings, while the suggested route overflies 2 dwellings at Murdunna.
	Affect new communities	Yes	Suggested route overflies Murdunna, which is not under any current published flight path.
	Better share the impact of noise in keeping with	Yes	Reduces number of dwellings overflown by NZ arrival flights

Assessment Criteria Does the change:		Assessment outcome	Description
	Airservices Flight Path Design Principles		
	Result in greater track miles for industry (creating additional emissions)	No	Reduction of 228.3kg fuel burn and 721kg CO_2 emissions per flight
	Impact areas of national environmental significance and noise sensitive sites	Yes	Crosses the coastline over Abel Tasman National Park (5,500 ft-6,000 ft) and overflies Eaglehawk Bay – Flinders Bay Conservation Area, Coal Mines Historic Site and Lime Bay State Reserve
	Impact areas of future residential development or areas of high tourism value	Yes	Overflies the nature tourism attractions (national parks, conservation areas and the historic site) identified above. Overfly area is zoned Rural Resource and Environmental Management.
Network	Have flow on effects or require changes to other procedures or flight paths	No	
	Impact or benefit overall network efficiency	No	No impact on Cambridge Aerodrome operations. No impact on overall efficiency of air traffic network operations within Tasmania or mainland Australia.
	Involve a cost	Yes	Design, assessment and implementation (including documentation amendments and ATC training) for a new instrument procedure
	Have a benefit appropriate to the cost	Yes	Overflies areas of national environmental significance. Number of dwellings overflown reduced from 363 to 2. Reduction of 38NM track miles, 228kg fuel burn and 721kg CO_2 emissions per flight.

Assessment outcome: the suggested RWY30 arrivals route from New Zealand is safe and feasible and is recommended to progress for further assessment.

H.3 PIR Findings – Industry Requested Improvements

Table 56 provides a summary of the industry requested improvements and the assessment outcome for each of the four key assessment categories.

Table 56: Summary of industry suggested flight paths against assessment criteria

Industry suggestion	Safety and compliance	Operational efficiency	Environmental	Network	Outcome
New RWY30 departure route to NZ - alternative 1 (depart via non-jet SID)	✗				Does not meet safety standards as speed restrictions on the Non-Jet SID are not suitable for jet aircraft.
New RWY30 departure route to NZ – alternative 2 (via waypoint PIDIX and south of Maria Island)	✓	✓	~	✓	Reduces complexity and improves safety. **Recommended to progress for further assessment.**
New RWY12 departure route to NZ – alternative 1 (via waypoint DUMIT and then north of Maria Island)	✓	✓	~	✓	Reduces complexity and has reduction in track miles, fuel burn and emissions. **Recommended to progress for further assessment.**
New RWY12 departure route to NZ – alternative 2 (crossing over Eaglehawk Neck)	✓	✓	~	✓	Has more track miles and overflies more residential dwellings than alternative 1 and is not preferred option to progress to progress for further assessment.
New RWY12 arrival route from NZ – alternative 1 (north of Maria Island)	✓	✓	~	✓	Reduction in track miles, fuel burn and emissions. **Recommended to progress for further assessment.**
New RWY12 arrival route from NZ – alternative 2 (south of Maria Island)	✓	~	~	✓	Is not the preferred option to progress for further assessment as it increases ATC complexity and tracks over land for a longer period of time
New RWY30 arrival route from NZ – alternative 1 (crossing over Eaglehawk Neck)	✓	✓	~	✓	Reduction in track miles, fuel burn and emissions. **Recommended to progress for further assessment.**
New RWY30 arrival route from NZ – alternative 2 (south of Maria Island)	✓	~	~	✓	Is not the preferred option to progress for further assessment due to complex left and right turns compared to the first alternative, increasing the difficulty to fly during adverse weather (particularly in strong winds)
New RWY30 arrival route from NZ – alternative 2 (north of Maria Island)	✓	~	~	✓	Is not the preferred option to progress for further assessment due to excessive track miles and aircraft overflying more residential areas compared to the first alternative

✓ positive outcomes
~ combination of positive and negative outcomes
✗ negative outcomes

Recommended Action 7

Airservices will undertake further assessment of a suggested new RWY30 departure route (alternative 2) to New Zealand.

Recommended Action 8

Airservices will undertake further assessment of a suggested new RWY12 departure route (alternative 2) to New Zealand.

Recommended Action 9

Airservices will undertake further assessment of a suggested new RWY12 arrival route (alternative 1) from New Zealand.

Recommended Action 10

Airservices will undertake further assessment of a suggested new RWY30 arrival route (alternative 1) from New Zealand.

APPENDIX I - AIRSERVICES SUGGESTED IMPROVEMENTS

One of the objectives of the PIR was to identify opportunities to minimise the impact of aircraft operations on the community. In undertaking the PIR, a potential improvement to the NAPs was identified.

I.1 Noise Abatement Procedures

There was limited feedback received on NAPs from the community, industry or operational staff during the PIR.

The PIR identified that there have been more flights over Primrose Sands, Carlton and Carlton River than anticipated due to the increased use of the fixed visual approach and the increased uptake of RNP-AR technology by aircraft operators. This trend is expected to continue as more aircraft become equipped with RNP-AR technology and aircraft operators increasingly focus on fuel burn costs and emissions.

To provide improved noise outcomes for communities under the RWY30 RNP-AR STAR, Airservices considered a potential change for the NAPs to specify preferred runway use at sensitive times of the day when there is less ambient noise. Based on this proposal, the assessment of the community suggested alternative for the RWY30 RNAV STAR to be solely used at night-time (with no flights on the RNP-AR STAR) (Section G.2.5) determined that this would be feasible to achieve through the NAPs.

Typically, NAPs can include:

- preferred flight tracks and/or runway directions of operation (e.g. Runway x for landing and Runway x for take-off)
- Noise Abatement Departure Procedures (NADP) such as directing aircraft to depart over water at night
- approach procedures such as Continuous Descent Operations and low power, low drag techniques
- modified flight path angles to adjust climb gradients
- restrictions on engine run-ups (a type of engine check) and/or ground equipment use.

Communities near airports may be sensitive to aircraft operations at different times of the day and night. To minimise aircraft noise on these communities, NAPs can also include requirements for specific times of operation, including nominating the preferred runway use.

The current NAPs for Hobart Airport do not include preferred runways or flight paths and do not include considerations for time of operations.

I.1.1 PIR Modelled Noise Improvement Scenario

To evaluate suggested noise improvements for community areas south of Hobart Airport, the updated AEDT model for the PIR was used to assess the potential re-distribution of arrival traffic during hours of the day through NAPs.

In this scenario, the introduction of NAPs would be used to distribute the use of the RNP-AR flight path during certain periods of the day. Through a NAP, the RWY30 RNAV STAR could be preferred at sensitive times of the day, such as early morning, evening and/or night. This is expected to provide some relief to the communities overflown by the RNP-AR STAR and better share the aircraft noise by placing aircraft over less populated areas during these periods of the day. Due to the differing lengths of the RNP-AR and RNAV approaches this would also mean that aircraft are at higher levels when they cross the coast (average of 4,500 ft compared to average of 2,400 ft) and therefore quieter.

To determine a useful distribution of traffic on the RNAV and RNP-AR, an analysis of the hourly distribution from the PIR Winter period is shown in Figure 107. RNP-AR capable arrivals during hours of 9am to 5pm represent 63% with remaining 37% during the evening and night 6pm to 8am.

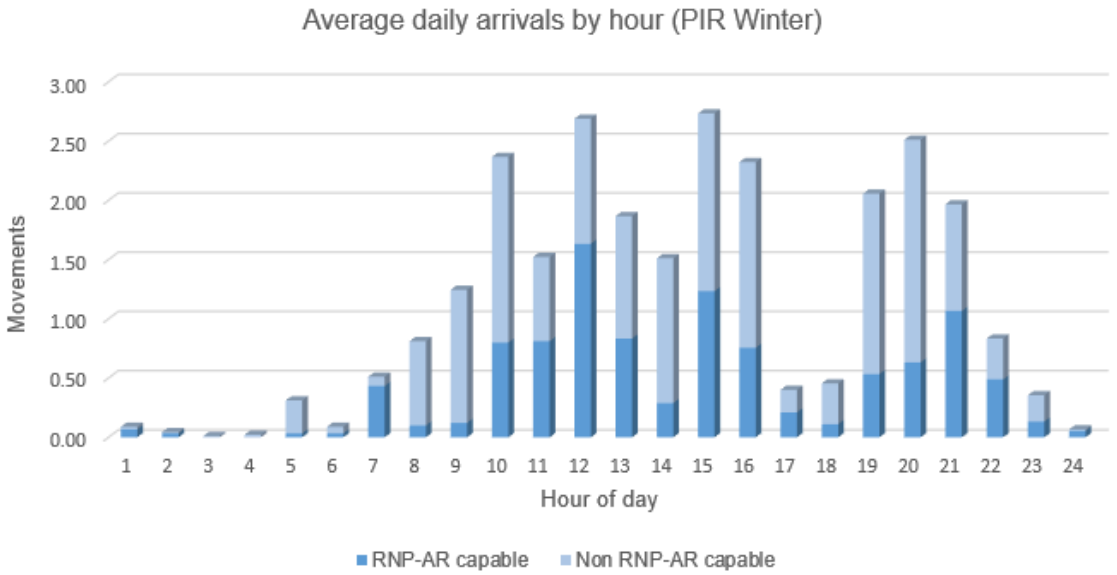


Figure 107: Hourly distribution of common jet arrival traffic, April to June 2021 (*Source: NFPMS*)

To model this scenario, the arrival traffic was redistributed to the RNAV STAR and RNP-AR STAR based on time of day. During periods where the RNP-AR STAR is in use during the day (9am to 5pm), some portion of traffic will still require the RNAV.

The indicative N60 winter noise contours for the suggested NAPs improvement are shown in Figure 108. The N60 contours are shown in increments of two. For Primrose Sands, the contours indicate 12-14 average daily N60 noise events which is a reduction from 18-20 N60 events shown in the PIR Model (see Section A.9). More aircraft traffic is directed towards the areas of Connellys Marsh where there are 12-14 N60 events at the coastline and 2-4 N60 events in the main community areas.

This analysis indicates improved noise outcomes can be achieved through the suggested NAPs change.

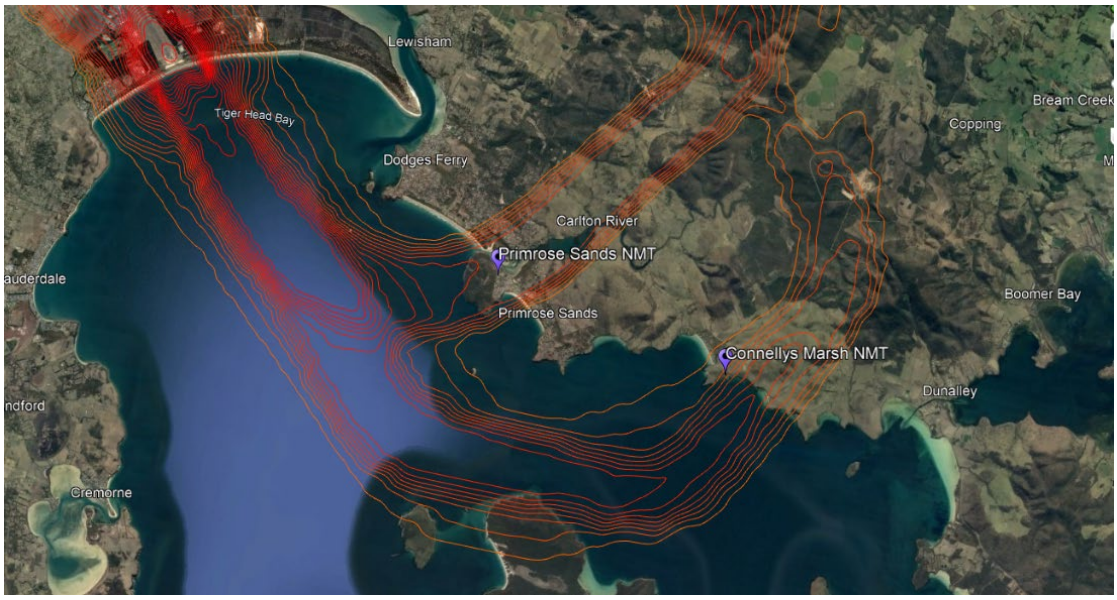


Figure 108: Winter N60 for NAPs noise improvement scenario (*Source: AEDT*)

I.2 PIR Findings – Airservices Suggested Improvements

The assessment of community suggested alternatives identified a potential improvement that could be implemented through the NAPs. The suggested NAPs change would specify that the RWY30 RNAV STAR is the preferred arrivals flight path at specific times of the day, which reduces the number of flights on the RNP-AR STAR and better share the aircraft noise by placing aircraft over less populated areas during sensitive times of the day.

The AEDT noise model developed for the PIR operations (PIR Model) was used to assess whether improved noise outcomes would be achieved through the suggested NAPs change. The modelling identified that that a reduction of 6 average daily N60 noise events is possible through the suggested NAPs change.

Recommended Action 5

Airservices will undertake further assessment of a potential NAPs change to specify preferred runway use at sensitive times of the day, including further community and industry engagement to determine what times of day or night would apply and operational requirements for exemptions.

APPENDIX J - COMMUNITY SUBMISSIONS

Table 57 details the full submissions received for community suggested alternatives. Submissions have been edited to remove identifying information (such as names and addresses).

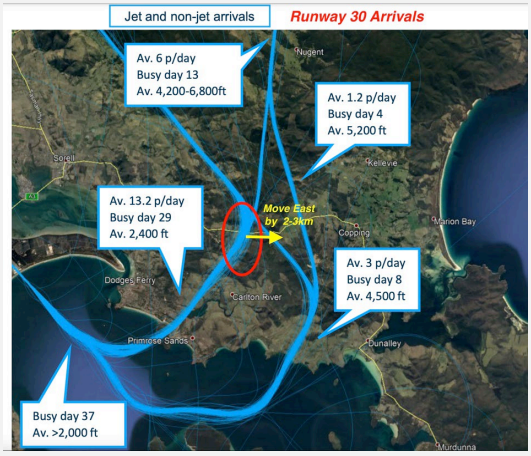
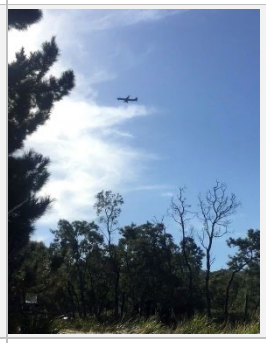
The PIR Section column identifies the section(s) in the PIR Report where the submission has been considered.

Table 57: Community Suggested Alternatives – Full Submissions

Ref	Community Suggested Alternative Submission	PIR Section
1	*I live in [address removed] Carlton. I bought this land 8 years ago and built five years ago. We built here in our retirement for the peace and tranquility. However since the change in flight paths we have experienced anxiety over the aircraft noise and flights that pass over our house numerous times when there are incoming flights. The biggest issue is the heights at which planes fly causing way too much noise pollution . These planes are close enough to read whose aircraft it is (ie Jetstar, virgin, etc)..* *The houses in this vicinity belong to a large proportion of permanent residents of which a proportion are retired and are impacted all day long by these flights.* *There is a bird refuge near Carlton river and the noise pollution could well impact these bird breeding seasons.* *If these planes could take a different route or at the very least fly at 5000 feet rather than the very low altitude they are currently taking over our houses it would make an immense different to our lives.* *My husband suffers with depression and anxiety snd thus is adding to his mental health issues*	*G.2.2* *G.2.3* *G.2.4* *G.2.5*
2	*If this flight path cannot be moved closer to Dunalley then flights should come in at a higher altitude to minimise noise. Noise would be reduced if flights over [address removed] Carlton River were at 5000 ft. I believe previous flights over Dunalley were at 5000 ft. A mixture of incoming flight paths should be used to reduce impacts on same areas.* *It would be great if flight paths favoured areas which are not occupied by permanent residents*	*G.2.2* *G.2.3* *G.2.4* *G.2.5*
3	*Suggested alternative, move jets further east away from higher land and populated areas or increase the clearance to between land and height of aircraft to improve noise abatement eg. 6000 ft-7000 ft height clearance.* *Flight path is too close to the ground with only Av 2400 ft clearance for arriving jets. This is the closest distance between all aircraft and populated areas. These aircraft are also jets rather than small planes and are very disruptive when flying overhead.*	*G.2.2* *G.2.3*
4	*[Names removed] have already submitted suggestions regarding additional flight paths. This is a complaint/observation that the aircraft arriving on the smart track over Carlton/Primrose are too low and therefore too noisy and this issue should be considered during the PIR.* *Please ensure we receive feedback on our suggestions and are kept up to date with the post implementation review.*	*G.2.2*
5	*I live in [address removed] Carlton River directly underneath the flight path used by aircraft approaching Hobart Airport.* *The decision to implement this flight path defied logic.* *Residents of Dunalley complained about the noise of planes flying over their homes at 5,000 ft.* *As a response to their concerns Airservices Australia moved the flight path on 7/11/2019 so that planes would fly over the more populated suburb of Carlton River at a much lower height of only 2,100 ft!* *The people most affected by this decision were not consulted about this sudden change.* *No public meetings were held in Carlton River, Carlton or Dodges Ferry.* *We received no direct notice of the new flight path that was about to impact our lives.* *These are major flaws of the process that was followed prior to Implementation.*	*G.2.3*

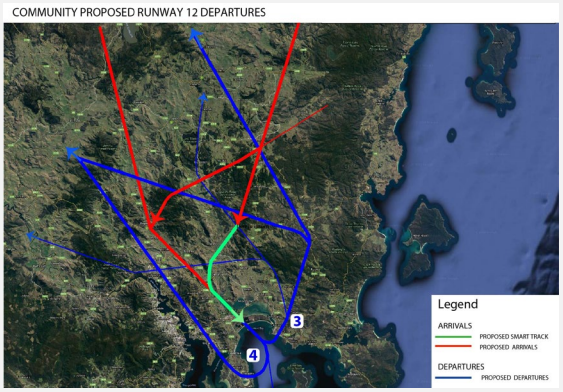
Ref	Community Suggested Alternative Submission	PIR Section
	The area we live in is a beautiful suburb where people pay a premium for waterfront properties and close proximity to lovely beaches. *The constant noise of aircraft flying directly overhead detracts from the value of our properties and disrupts the peaceful environment which attracted many to live here.* *People have complained about being woken by these low flying aircraft both late at night and early in the mornings.* *Others say they cannot hold a conversation or hear their televisions as planes descend above their once quiet homes.* *Why do planes have to fly directly over a residential area when there is plenty of rural land and waterways which could be used with minimal impact on our lives?* *Someone also needs to explain why the current review has not placed any Short Term Noise Monitors directly underneath the flight path that planes are following.* *Hopefully the nearest one in Primrose Sands will detect the unacceptable noise levels suffered by the residents in Carlton River over the past twelve months.* *Many residents also had safety concerns about aircraft above their properties. These concerns were well justified as a number of us witnessed a near miss of two passenger jets only two weeks ago! (This has been reported to Airservices Australia but I have received no reply as yet).* *For all of the reasons mentioned above we believe the Carlton River flight path must be scrapped.* *Use the vacant rural land and waterways that are in the area as an approach to Hobart Airport. Maybe between Dunalley and Connelly's Marsh would be a more suitable path to go from land then out into the middle of Norfolk Bay and Frederick Henry Bay.* *This would mean planes were crossing unoccupied land at 4,000 ft and could then use the waterways as they descend for landing.* *I represent a group of forty families who have great concerns about the current flight path over our properties. I am sure there are many others who feel the same.* *Please keep us informed about what is happening with this review and give us the opportunity for further input.*	
6	*I live at [address removed] Carlton River and would like the arrivals to runway 30 moved so that flights do not go over my property (the flight path is directly over my house). There are a number of issues I have;* *- the noise from these planes un bearable, that loud that I cannot talk on the phone, it wakes me up in the morning and evening, it scares our horses, it disrupts our lifestyle and quality of life* *- we bought this property with no airplane noise - now there is lots. this devalues our property* *- the ambient noise is less than 30 db, when planes pass directly overhead this noise exceeds 90db* *- if this can't be eliminated - can it be reduced by fewer planes, curfews stop early morning and late night flights or higher altitude?* *- the review period is still not valid and flight numbers are not typical due to covid. consultation should continue and PIR extended* *- the consultation does not seem to be effective as none of the concerns raised have been addressed - it seems you have asked for feedback then ignored it and continued to do what you want.* *- the altitude of arriving flights is below 3,000 ft when passing over my house, which is at an elevation of 300 ft, so I get engine noise that is less than 2,700 ft away and it is an environmental nuisance.* *- the frequency of flights is very annoying and disruptive* *Please consider moving the arrivals to RW30 to a location further south east so the noise is not so intrusive and annoying. It's very loud (>90db), low (2,700 ft) frequent (18 per day, less than 10 minutes between flights at times), and it doesn't seem that community concerns (like mine) have been addressed. We used to live very peacefully on our property, now we get interrupted regularly by low flying planes. The PIR period was not valid and flights are still impacted by covid. furthermore - there are growth plans that will exacerbate the issues.*	*G.2.2* *G.2.3* *G.2.4* *G.2.5* *G.2.17*

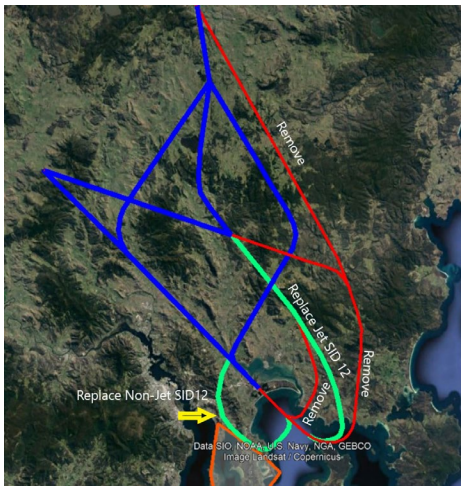
Ref	Community Suggested Alternative Submission	PIR Section
7	*Between conollys marsh and Dunalley*	*G.2.3*
8	*Back out to a seaward approach via Connolly's marsh as it used to be*	*G.2.3*
9	*Move the path further to the south over the water to be further away from the larger populations in dodges ferry and Carlton river*	*G.2.3*
10	*Please stop flying over residential property at Primrose Sands. It is not only deafening but interferes with rest for elderly. It is distressing to have the planes so low going over our homes. People are wanting to move because of it. Not over a popular residential area and beach.*	*G.2.2* *G.2.3* *G.2.4* *G.2.5*
11	*I would like the flight path moved due to the noise of the aircrafts that fly directly over our home at Carlton River. I would like to see it moved towards Marion Bay. I understand it can not be moved closer to the airport but would like to not see the aircrafts flying over my home and scaring my daughter.* *Marion Bay is less populated than Carlton River, Primrose Sands, Carlton. I know there are quite a few residents that would love to see a new flight path due to the noise and closeness of the aircrafts when arriving into Hobart airport.*	*G.2.3*
12	*Move away from residential areas so that people's lifestyle is not adversely affected by excessive noise levels and their property values are not diminished.* *Use rural/forestry land and waterways to minimise noise pollution.* *Engage Airservices should not be asking stakeholders to suggest alternate flight paths before they have properly engaged us and provided relevant information regarding noise levels over various locations, number of flights, height that aircraft will be flying overhead, pros and cons of possible locations etc.* *Everyone who is going to be affected should be notified by mail or a leaflet drop. Why wasn't this done before planes started flying over Carlton River?*	*G.2.3* *G.2.4* *G.2.5*
13	*Remove the flight path above the densely populated areas of Dodges Ferry, Carlton and Carlton River and take the track further to the south towards Connellys Marsh.* *Fly higher and divert the planes towards the south.* *Dodges Ferry, Carlton and Carlton River are densely populated areas with a fast growing population. The noise of the low flying planes has become unbearable. Check the noise level by installing a device at Carlton River to obtain accurate dB level readings. Also the device in Primrose Sands seems to be switched off quite often when I checked the website.*	*G.2.2* *G.2.3*
14	*The current flight path of planes arriving via Carlton River/Primrose sands should be moved further east to a significantly less populated area for between Connolleys Marsh and Dunalley. For example, the flights could fly cross land at Fulham Point and then fly along the water to meet up with the current arrival path. As the winds are predominately north-westerly, particularly in summer, most planes arriving into Hobart airport arrive via Runway 30 and fly over Carlton Beach. This beach, and the area, have become very popular. The frequency of planes flying over the beach negatively impact the coastal experience. Moving the flight path to a less populated location would significantly reduce the number of people impacted by flights.* *The area between Connellys Marsh and Dunalley is predominately farming and an aquaculture.*	*G.2.3*
15	*We are particularly concerned about the negative effects of the current arrival flight path on the [location removed] development residents ([address removed] Carlton River 7173). We have been directly overflown (right above our roof) by up to 40 planes a day (pre-Covid time), which is very disruptive and significantly influences the quality of life of the residents. These properties are not farms, they are lifestyle properties, where people accepted the inconvenience of living far from Hobart in exchange for the beauty, peace and tranquility of the natural environment. Unfortunately, the new arrival flight path to Runway 30 destroyed all that.* *The situation could be significantly improved if the Arrival Path can be moved by 2-3 kilometres to the East. In this case our suggested arrival path will go through unpopulated farmland, a plantation forest, and closer to industrial Copping Tip zone, where nobody resides. This will significantly reduce the nuisance of aircraft noise to more tolerable levels..*	*G.2.2* *G.2.3*

Ref	Community Suggested Alternative Submission	PIR Section
	If the flight path height of the descending aircraft could be raised by just a few hundred feet, this would reduce the noise burden even further. *Yes, the current flight path goes through populated areas, including [location removed] development, Carlton River, Carlton, Primrose Sands and partially Dodges Ferry.* *By moving the flight path even by a few kilometres to the East (please refer to the attached image), it would go through much less populated area, including farmland, plantation forest, and Industrial Copping Tip.* 	
16	*Move the flight path currently near dodges ferry, laterally to the east to approximately half way between current position and primrose sands.* *The population of Dodges Ferry has grown and is continuing to grow with residents now commuting to Hobart for work rather than using it for holiday homes. Moving the flight path laterally east would assist with reducing noise impact currently and in the longer term for permanent residents in the growing community.*	*G.2.3* *G.2.5*
17	*Move flight path 7-9 km east past Connollys Marsh* *Moving the location to less populated areas/more over water following the bay will take it away from the populated areas of Primrose Sands and Carlton River. Use the night time flight route during the day and reduce noise levels over populated areas.*	*G.2.3* *G.2.5*
18	*Flight path to be moved away from town and higher populated areas further east 7-9 km towards Connellys Marsh which has a lower resident population than Primrose Sands.* *Suggested location is further away from higher populated areas. Jets are also the largest and loudest of the aircraft. This flight path is on average 2500 ft above the land at one of the highest land forms along the peninsula. Please consider the day jet flight path to change and follow the night flight path at night which is out over the water.*	*G.2.3* *G.2.5*
19	 *Move to Conelley's Marsh option or an alternative less populated area.* *Away from permanent residential areas (I.e Primrose Sands / Carlton has not been holiday / shacks for decades and instead most properties are homes). The proposed primrose / Carlton flight path is directly overhead of houses where no previous flight path existed creating considerable Noise pollution and will devalue property of existing owners if the proposal becomes permanent.*	*G.2.3*
20	*Immediately implement additional smart track for arrivals into runway 30. The flight path would be over Nugent, slightly west of Kellevie and over Copping and Dunalley, as per attached. As aircraft movement will increase over years to come and more aircraft will take up smart track capability, it is essential that additional smart tracks are created and spread over a wider area to allow for the increased activity and to mitigate the impact on any one community.*	*G.2.4* *G.2.5*

Ref	Community Suggested Alternative Submission	PIR Section
	Although we were not consulted on flight path changes and aren't happy having aircraft arrivals over our house, we understand there must be flight paths and our hope is to share aircraft impact over the widest possible area. We believe that the consultation process held 2018/2019 was flawed and unsuccessful in reaching those residents most affected by the change of flight paths from Dunalley. We don't believe any area should be excluded (including Dunalley) from a potential flight path. If Dunalley residents can get flight paths moved then so can Carlton/Primrose people but we don't want to go down that path yet. Please create more flight paths and spread the impact. Looking forward to a favourable outcome.	
21	*This will be a very basic submission into the 3 FLIGHT PATHS THAT NEGATIVELY, DIRECTLY AFFECT my residence that was NEVER PREVIOUSLY OVERFLOWN. My home is approx. 2 km from the Waypoint BAVUR. THE 3 FLIGHT PATHS ARE:* *1. Smart Track from the south into Hobart.* *2. Incoming flights that fly across my paddocks to Dunalley to approach the airport again from the south who do not have smart tracking technology.* *3. Departures to the south-east from the Airport approx. 300 metres from my home and although at a far higher altitude still have the negative impact of both sight and sound. This path is NOT shown on any map near my home. VERY MISLEADING ON BEHALF OF AS.* *These 3 tracks appear to directly track to/from BAVUR* *There is NEVER a day that passes that I am lucky enough to have respite from the SKY HIGHWAY above my home. On most days I am subjected to either incoming or outgoing flights and when the wind changes to both on the same day.* *Air Services(AS) has decided not to apply their "new principles" to the Hobart flight paths and therefore residents, such as myself, are severely disadvantaged.* *Suggestions to alternate flight paths:* *1 I truly believe AS will NOT make any changes to this track but as traffic is continually increasing a 2nd Smart Track should be implemented to relieve the pressures on the affected local communities - Primrose Sands, Connelly's Marsh and ME. An alternate flight path to this would be to move this track approx. 3 kms to the East of its current position to what is known as the Red Hills by locals and there are very few, if any, residents in this area. Where the Smart Track currently is IT flies over the most populated area on the Tasman Peninsula and it is obvious the community was never given consideration by AS when imposing this track.* *2, The second track with incoming flights across my home should be diverted from where it currently is and follow the coastline to Dunalley or moved to track down the Wielangtra Forest where once again there are very few residents. This area of forest is approx. 6 - 8 kms to the east of my home. This path should never have been imposed on the current area particularly as I am subjected to high traffic on the Smart Track.* *If the above is unsatisfactory then move the planes onto the farthest reach of the track away from my house. Currently the majority of the planes on this path track closest to my home.* *3, Departures should be moved to the west and therefore will have no impact on residents who are negatively impacted by the Smart Track. Another alternative is to move departures from their path to BAVUR and fly to the coast further to the East and track up the coast*	*G.2.4* *G.2.6* *G.2.7* *G.2.12* *G.2.14*

Ref	Community Suggested Alternative Submission	PIR Section
	therefore not impacting anyone. In fact if planes flew directly alongside the coast line this would provide relief for everyone. *In regard to relocating the Smart Track further to the East and across the area known to locals as the Red Hills this will remove the track from the most heavily populated area on the Tasman Peninsula that of Primrose Sands.*	
22	*I am living on [address removed].* *I was not previously overflown prior to the appalling flight paths over Dunalley.* *[sentence with identifying information removed]* *I was given assurances that i would not be overflown and would not be subjected to aircraft noise as I was NOT previously overflown.* *This looked good right up to the last minute where [name removed] casually notified me that the take offs would be moved closer to [address removed] at the 11th hour.* *This is not ok. The noise from takeoffs is just as loud as the arrivals were previously....and it lasts longer.* *Why did Air services do this?* *With smart tracking it brought the flight paths almost back to where they originally were....Which is what the majority of us that WERE NOT PREVIOUSLY OVERFLOWN wanted.* *You people did not listen...you still are not listening.* *[name removed]...do not fly over Dunalley either take offs or landings.* *[name removed]...do not enter Norfolk Bay...it is a pristine peninsula with low ambient noise...we were not overflown prior to sept 2017.* *Re-visit the western approach proposals put forward by the community....why do the communities that least use the airlines bear the brunt of all the noise?* *The population centres have an ambient noise level similar to constant aircraft noise....planes should fly over these areas.* *It was an expectation that Hobart Airport be reclassified to class "C"....why has this not already happened?* *Not happy overall....community hates Air Services and the perception of constant deception as exemplified by take offs over Norfolk Bay.* *Vote of no confidence by the Dunalley community and certainly none from me to date.*	*G.2.8* *G.2.16* *G.2.18*
23	*These documents were submitted to Airservices (AS) approx. 18 months ago and were pages 8 & 9 of a 10 page submission forwarded by [name removed]. As never acknowledged or made reference to these documents & I again forward them for as consideration.* *Implement an additional Runway 12 SID to the West of the airport* *Based on an analysis of curvature of the proposed SIDs, it appears there is an opportunity for jets to turn right on departure, either at the point proposed by Airservices or at the point the community has proposed to the North of Primrose Sands. This does not interact with any other proposed SIDs or STARs and would provide more efficient use of airspace, improve safety by minimising use of the problematic crossing point, and offer the opportunity to share noise with previously overflown communities.* *Some minimal changes to airspace may be required in the vicinity of the D316 flight training area, but far less than what is required for Airservices's proposed Eastern STARs.* *Move the proposed Runway 12 jet SID to the North of Primrose Sands to align with the light aircraft SID* *The current noise level of jet departures is extremely intrusive for residents of Primrose Sands and Connelly's Marsh, and is clearly audible inside houses as far away as Dunalley, Boomer Bay and Murdunna.* *Airservices is proposing to leave jet departures unchanged over the former communities and to move them 1.5 km to the latter. While an Airservices facilitator said removal of an altitude restriction is likely to reduce noise by allowing jets to ascend more rapidly, there does not appear to be an altitude restriction on the current Runway 12 SID.*	*G.2.11* *G.2.12*

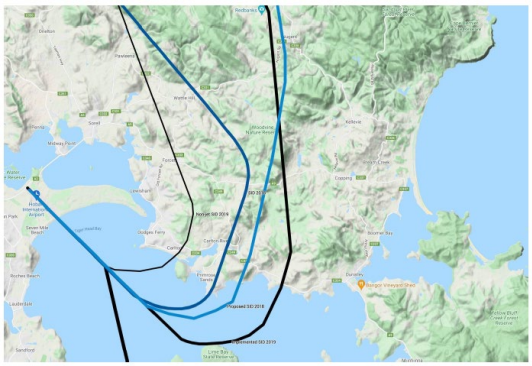
Ref	Community Suggested Alternative Submission	PIR Section
	We understand that jet traffic can turn left closer to the runway than proposed and suggest that jets follow the light aircraft SID, which Airservices's modelling suggests will only be used twice per day - presumably for freight flights and the RFDS, which normally occur in the early morning or late evening when jet traffic is minimal. This would provide shorter mileage for airlines and move departures away from communities which have never been previously overflown.  	
24	*Move jet departures as far as possible back west towards the airport to where they were traditionally routed. A minimum of 10 km from [address removed] and Boomer Bay and the surrounding communities that had not been overflown to minimise noise and visual impact.* *This suggested change is back to an area that has historically had flight paths and previously suggested by air services.*	*G.2.1* *G.2.12*
25	*[sentence with identifying information removed]* *This property is located directly beneath the proposed departure path runway 12 near Connellys Marsh.* *My guests are specifically drawn to the scenic, historic and natural heritage values of this iconic Tasmanian property. Air traffic with its associated noise pollution and visual impact as it travels over Boomer Bay [address removed] will undermine the product and environment that is the basis for my business.* *I appreciate that my clients fly to Tasmania and that we need to accommodate change in the air transport services we rely on. However, this important decision needs to take into consideration the views of the community and the Tasmanian tourism brand values that underpin the unique natural and cultural experiences that Tasmania represents.* *[sentence with identifying information removed], an event that was highlighted in the media as a showcase for the type of tourism that Tasmania can offer the world. Soon after this event [sentence with identifying information removed]. [sentence with identifying information removed] to share with visiting journalists because of the power it holds in the Tasmanian story. We specialise in sharing unique Tasmanian stories through the medium of adventure, and we work closely with high end travel agents that are able to recommend my product because of its high quality and unspoiled nature.* *Bangor is a site of international cultural and natural heritage significance. The unintended consequence of implementing of the air services runway 12 departure route will severely damage the cultural heritage values of the site of first European contact with the East Coast of Australia by Abel Tasman in 1642 and the first point of contact between Aboriginal Tasmanians and Europeans in 1772.* *As a business and member of the Tasmanian tourism community I am seeking a flight departure path that does not impact businesses and communities that depend on the soundscape and natural values of Blackman Bay, Bangor and the Forestier Peninsula.* *Below are testimonials from [name removed] guests that speak to the importance of a natural soundscape in the experience they had whilst on Bangor.* *Please contact me for further discussion* *Bangor and the Forestier Peninsula are a relatively unique opportunity in the modern day world to experience the ambiance of nature's 'acoustic ecology'. The intrusion of the noise of the contemporary world would significantly detract from the chance for visitors to revel in the sounds a day out may bring: the wind in the trees, the rustle of leaves, the waves on the ocean shore, the birds in the trees or all of the above.* *Please reconsider the routes future flights to and from Hobart will take to either track out to sea or further inland away from this location.* *[name removed]* *The Forestier Peninsula is a quality experience for walking, mountain biking, and enjoying [address removed] in a relatively untouched part of the world with strong natural and cultural*	*G.2.12*

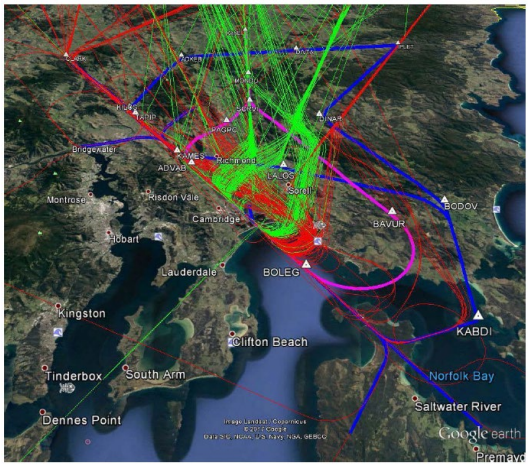
Ref	Community Suggested Alternative Submission	PIR Section
	resonances. It is not the sort of place to be flying jets over. That would be so wrong and out of place in this peaceful part of the world. *[name removed]* *'I recently visited Bangor to experience the pristine nature abounding on the property. I seek remote, quiet places consistently to restore my sense of wellbeing and continued health. I believe it's crucial that we have places we can go with no sight and sound pollution and development.* *Bangor is one of these places and I believe it's vital to preserve the peace and quiet that [address removed] has to offer.* *This way its owners can continue to provide a rich, diverse and relaxing experience to those that seek it.* *In doing so Bangor can confidently provide employment for the Tasmania Tourism industry into the future.'* *[name removed]*	
26	*Remove the non-jet SID 12 to the west, bring the jet SID 12 back towards the airport as close as possible.* *This suggestion enables more sharing of the noise, towards areas and communities that are closer to the airport and should expect more aircraft noise than areas and communities further away.* *Flight paths cannot be moved further east as that is unfair on communities who have chosen to live away from the airport. The impact on these areas is far greater mainly because these areas have low ambient noise.* *Light aircraft to the west, when mirroring the current light aircraft path (non-jet SID12) shows that the 5600 ft altitude can be easily reached, that the restricted airspace zone will not be entered and that the altitude of these aircraft would not impact Cambridge aerodrome.* *Moving the Jet SID 12 turning point closer to the airport moves the noise away from communities that were not previously over-flown. Based on the current departure altitude levels, if the jets on this path crossed land between Primrose Sands and Connellys Marsh, heading in a more westerly direction the altitude would be between approximately 6500-7000 ft. The optimal solution is to have the Jet path depart on the pre September 2017 path, other than that the design should have the 'crossing of land point' as close to the airport as possible.* *These suggestions also make the airspace less complex by removing the limiting light aircraft path placement and by separating Jets and Non-jets (Jets to the east, non-jets to the west).*  	*G.2.1* *G.2.10* *G.2.15*
27	*The Runway 12 Jet SID should be moved much closer to the Hobart Airport - back to what it was prior to the initial change. Or at least back to the location proposed by Air Services in October 2018.*	*G.2.1* *G.2.12*
28	*Runway 12 Jet SID should be moved west closer to Hobart Airport.* *We are the owners and operators of [sentence with identifying information removed].*	*G.2.12*

Ref	Community Suggested Alternative Submission	PIR Section
	We have worked very hard and made a significant investment over the past 7 years to establish a successful tourism business, attracting over 40,000 visitors annually. We currently employ 30 staff, a significant contribution to our local community. *[sentence with identifying information removed]. It is a tranquil place and scenic place. These qualities are a big part of the reason that visitors come to enjoy our venue.* *In September 2017, flightpaths for aircraft to and from Hobart Airport were abruptly introduced over Dunalley, resulting in significant aircraft noise. This was something not previously experienced by us. Since that time, a number of minor changes to flightpaths have been made, but we still have a flight path for departing aircraft very closeby to the west (Runway 12 Jet SID).* *The regular noise created by aircraft using this path remains a significant disturbance to us and guests visiting [name removed], and adversely impacts the quality of their experience. As well, we have a number of business partners, such as [name removed], who use our property to offer additional experiences for visitors. Aircraft noise created by this flightpath is a disturbance to them also.* *We are proposing that Runway 12 Jet SID be relocated further to the west, as close as possible to Hobart Airport. At the very least, it should be moved to the location proposed by Airservices in October 2018.* *It makes no sense to continue to overfly a peaceful rural area that has not been previously overflown. Aircraft flightpaths should be kept in close proximity to the airport.*	
29	*move the current Jet SID to the original path proposed consulted on in Oct 2018 as close as possible to the actual airport* *The current Jet SID 12 has impacted us greatly and [sentence with identifying information removed] costing the community greatly. As we are impacted by this path as well as the arrivals from runway 30 we are unfairly, and unreasonably, affected by noise making it impossible to operate a tourism business of this nature and therefore costing the community 6 full time jobs and many more indirectly. [identifying information removed] that has never been impacted before by aircraft noise I find it hard to believe that ASA can not come up with an alternative route for Jet SID 12 to share some of the noise closer to the airport where businesses and residents are equiped for aircraft noise due to their close proximity to the actual runway. I have never, and do not suggest that we will not agree to share some of the aircraft noise but feel we have been unfairly targeted. Some businesses are more sensitive to noise and physically cannot operate with excess noise. My business is one of those. Prior to Sept 2017 (and not having aircraft noise ever before) we were given no warning AT ALL. Due to the attention that decision created community consultation commenced but by that time the flight paths were obviously set and only altered slightly. By that time the damage to my family and our multi million dollar business had been done. No regard or (on ground) research had been done for business and we now have noise in excess of 70Db on a very regular basis both day and night. In conclusion I believe that if there was ever a case for unreasonable noise levels (both Db and frequency) and ever a case of a location being unreasonably targeted by multiple flight paths then this is it. Im not opposed to change and definately not a NIMBY but when there is opportunity for sharing the load then it should be done.*	*G.2.12*
30	*Please see attached submission, signed by 100+ residents of Dunalley, Murdunna, Boomer Bay, Marion Bay, Bream Creek, Kellevie, Copping and Connelly's Marsh.* *This document provides community suggestions to the post-implementation review of the Hobart Airspace Design Review to reduce the impact of aircraft noise in the areas of Dunalley, Murdunna, Boomer Bay, Marion Bay, Bream Creek, Kellevie, Copping and Connelly's Marsh.* *● The record of the decision to move the originally proposed Runway 12 jet SID closer to Dunalley suggests an incomplete analysis which concentrates rather than distributes noise.* *● Aircraft noise from the current Runway 12 jet SID has a disproportionate impact on Dunalley and surrounding communities, due to a range of factors including the low levels of ambient noise and the area's history of never being previously overflown.* *● There appears to be scope to shorten the Runway 12 jet SID, while leaving all other paths unchanged, which could also provide an efficiency benefit for airline operators.*	*G.2.12* *G.2.18*

Ref	Community Suggested Alternative Submission	PIR Section
	We suggest that the point at which jet aircraft turn left and cross the coast after departing Runway 12 be moved as close as possible to the airport via one or more of the following options: *1. Move the current Runway 12 jet SID to the location originally proposed and consulted on in October 2018 – leaving all other paths unchanged* *2. Add a second Runway 12 jet SID to follow the track of the Runway 12 non-jet SID as closely as possible, to be used when safe to do so – leaving all other paths unchanged* *3. Implement a surveillance service at Hobart as proposed in Airservices Australia's submission to CASA, to reduce lateral separation distances between Runway 12 non-jet and jet SID, or to allow management of occasional non-jet traffic via surveillance-based control.* *[name removed] appreciates the opportunity to lodge community suggestions to Airservices Australia's post-implementation review of changes made as part of its Hobart Airspace Design Review.* *Our suggestions focus on the new Runway 12 jet SID, implemented as part of the review.* *In support of the suggestions, this document provides* • *A brief background to [name removed]* • *Comments on the decision to implement a new iteration of the Runway 12 jet SID without consultation* • *A snapshot of the communities affected by the Runway 12 jet SID implementation* • *A description of its impact on those communities* • *Endorsement of this submission and descriptions of impact from community members* *We have also drawn on publicly available reports and data, including documents made available during the Aircraft Noise Ombudsman's investigation report into Hobart flight path changes in September 2017 which, in part, prompted the design review.* *Yours sincerely,* *[names removed]* *[sentence with identifying information removed]* *Our purpose is 'to preserve and promote the peaceful coastal and rural amenity and brand of Dunalley, Murdunna, Boomer Bay, Marion Bay, Bream Creek, Kellevie, Copping and Connelly's Marsh', i.e. those communities which were affected by the Runway 30 STAR (we refer to these as 'Dunalley and surrounding communities' in our submission). Our activity has primarily been to collate and distribute information about flight path changes in these areas.* *Regarding the extent to which [name removed] 'represents' the views of other community members, it should be noted that, while living in these communities, we have not been formally elected to represent them, nor do we have the resources to convene public meetings or carry out extensive community consultation.* *Since the 2013 Dunalley bushfire disaster (discussed below), there has been no other local community group, such as a progress association, to respond to issues of common interest.* *However, we maintain an extensive community mailing list, and [name removed] is active in the community and regularly discusses flight path matters. To demonstrate local support, over the last week we have obtained endorsement of our submission from over 100 community members.* *View public signature list: [link removed]* *A full list of confidential signee details with comments is provided as an attachment.* *2. Assessing the impact of flight paths* *We accept that it is difficult to objectively gauge the potential impact of aircraft noise on a given community, and understand that the new Flight Path Design Principles are intended as a way to provide guidance in this regard by specifying factors that designers should consider. The main design principle under the heading of Noise and Community is:* *Consider potential impacts on social, economic and cultural values of communities and locations, including Indigenous and other heritage places.*	

Ref	Community Suggested Alternative Submission	PIR Section
	The other Noise and Community principles are presented more as suggestions for how potential impact may be minimised, e.g. by distributing or concentrating aircraft operations, employing noise abatement procedures and considering current and future noise exposure. *However the principles do not provide guidance on how impact should be determined.* *For the purpose of meeting its EPBC obligations, Airservices also uses an internal 'national operating standard' (NOS) to determine whether noise impact is likely to be significant for a given community according to the number of 'noise events' that exceed specific thresholds.* *This is not useful for calculating impact: firstly since the thresholds specified in the NOS are based on AS2021: 2015 Acoustics—Aircraft noise intrusion— Building siting and construction, which, as stated explicitly in the Foreword, is intended for land use planning and applies only to noise-accustomed communities.* *Secondly, the NOS does not provide a graduated measure of impact on communities, only whether impact is significant or not for the purposes of the EPBC Act. Thus, given a choice between two flight path locations where impact is deemed to be 'not significant' for both, Airservices does not have an objective mechanism for determining the outcome which delivers the lowest impact. This puts Airservices decision-makers in the difficult position of having to interpret evidence from community consultation and rely on the opinion of flight path designers who, while expert in technical matters, may not be qualified to comment on community impact.* *2.1 Calculation of impact* *Airservices's new Flight Path Design Principles appear to assume that impact of aircraft noise from a given flight path can be determined solely by the number of people or residences who are located in close proximity. That is, the greater the number of people overflown, the higher the level of impact. This is a simplistic assumption, since it is clearly the case that certain factors can increase the severity of impact on specific individuals or communities, such as:* • *Whether a community has been previously overflown* • *The level of ambient noise relative to aircraft noise* • *Whether local businesses, such as tourism operations, depend on aircraft-noise free environment for viability* • *Recent community history of trauma or disruption* *As [name removed] noted in its submission to the community consultation on the development of Airservices's Flight Path Design Principles, such factors may indicate a greater relative severity of noise impact, compared to communities where these factors are not present.* *We believe it is reasonable that Airservices consider the severity of aircraft noise impact when considering flight path location, not just population size. For example, people living in a busy urban or suburban environment are likely to be less severely affected by aircraft noise than those living in a quiet rural area, with the overall impact potentially greater in the latter case.* *In Section 3 below, we describe why the impact of aircraft noise is more severe in Dunalley and surrounding areas, than in communities closer to the airport.* *2.2 Decision-making about Runway 12 jet SID* *We lodged a complaint with Airservices in March 2019 about its interpretation of community feedback during the Hobart Airspace Design Review regarding the Runway 12 jet SID.* *Airservices's analysis resulted in a decision to move the proposed Runway 12 jet SID closer to Dunalley and surrounding areas, without providing an opportunity for further community consultation. Airservices did not respond to this complaint.* *Airservices' decision-making process was documented in meeting summaries from Hobart Airspace Design Review Workshops 1 and 2, which we obtained under FOI law.* *In workshop 2, community feedback gathered during the design review was interpreted as making it desirable to:* • *Reduce the overflight of both arrivals and departures from Primrose Sands for noise distribution* • *Adjust the SID to track west of Copping and Nugent* • *Reduce noise effects over populated areas, using unpopulated land between Connellys Marsh and Dunalley*	

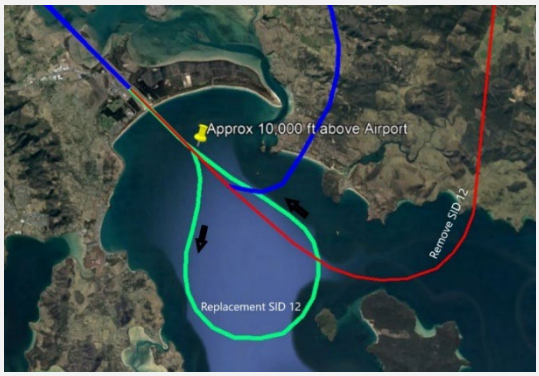
Ref	Community Suggested Alternative Submission	PIR Section
	• *Availability of topography and unpopulated areas to reduce the effect of aircraft noise where possible and safe to do so* *Consequently, members of the workshop decided to move the proposed Runway 12 jet SID location closer to Dunalley and surrounding communities, closely paralleling the proposed Runway 30 RNAV STAR, concluding that it:* • *should provide some requested noise improvement for the Primrose Sands, Connellys Marsh, Copping, and Kellevie communities, when compared to the proposed design (October 2018)* • *is designed to fly on the boundary of a proposed business development so as to minimise encroachment on the property as much as practicable* • *will cross land at a height greater than the current or proposed designs that were consulted*  *Image 2: Previous jet SID implemented in Sep 2017 (dark blue) and proposed jet SID (light blue) consulted on in Oct 2018*  *Image 3: New SIDs implemented in Nov 2019 (black) showing jet SID now crossing the coast approx 3 km closer to Dunalley than the originally proposed SID (light blue), and approx 5 km closer than previous SID (dark blue)* *While we accept that Airservices was well-intentioned, we suggest this decision was not justified for the following reasons.* *1. [name removed] attended every community consultation workshop, and the suggestion that the Runway 12 SID 'fly over Dunalley' was made at only one workshop, by one participant. On the other hand, multiple residents suggested that the Runway 12 SID be located closer to the airport. [name removed] can make audio recordings (collected with the permission of Airservices and workshop participants) available to support this.* *2. While Airservices has decided not to make written submissions public, the thematic analysis it did publish does not support a case for moving the Runway 12 SID closer to Dunalley. [name removed] made a written submission, and is aware of other written submissions, which suggested the Runway 12 jet SID be moved closer to the airport due to the potentially negative impact.* *3. As stated in Airservices's consultation Fact Sheet, the redesigned Runway 12 jet SID canvassed in October 2018 had already addressed concerns that departures were encroaching over Primrose Sands by allowing unrestricted climb and removing speed*	

Ref	Community Suggested Alternative Submission	PIR Section
	restrictions. Community feedback recorded was in response to aircraft departing at low altitude and cutting the corner of the published SID, which the proposed SID corrected. *4. The new Runway 12 jet SID provides a marginal or no noise improvement for Connelly's Marsh, Copping or Kellevie. While jets would be on average only 300m (1000 ft) higher, they would be closer to Copping horizontally by 2-3 km. For Kellevie, Runway 12 jet SID departures actually moved closer by approximately 10 km compared with post-March 2018 departures.* *5. The new Runway 12 jet SID does not achieve the intended 'noise distribution', as it is located close to and approximately parallels the Runway 30 RNAV STAR near the coast. The workshop did not consider that this has the effect of concentrating more noise from both arrivals and departures over Dunalley and surrounding areas.* *6. The claim that the location of the new Runway 12 jet SID on the boundary of the [address removed] 'minimised encroachment on the property as much as practicable' is disingenuous - aircraft noise travels in three dimensions and is not attenuated by property boundaries. The relocation of the SID at 5000 ft directly above the western boundary of [address removed] caused the property owners to cancel development of a $1.5 million agri-tourism development and 300 seat function centre, which would have brought much-needed visitors to the area and provided six local full-time jobs.* *7. Community consultation about the potential impact of the new jet SID on Dunalley and surrounding areas was not undertaken to inform an analysis of the overall impact of the change.* *8. An impact analysis of the new Runway 12 SID on Dunalley was not undertaken, apart from a comment in the supplementary environmental assessment document that:* *The concept design for the jet SID avoids the more densely populated areas of Connelly's Marsh, Primrose Sands and Dunalley. The communities of Primrose Sands, Connelly's Marsh and Dunalley will notice that aircraft on the Runway 12 SID will track nearly 3 km further over water before turning over land at approximately 6,000 ft altitude.* *This is incorrect, as the new jet SID does not avoid Dunalley – it actually crosses the coast 5 km closer to Dunalley than the previous SID.* *3 Impact of Runway 12 jet SID on Dunalley and surrounding communities* *We believe that the impacts outlined below should have been considered in the decision to move the Runway 12 jet SID closer to Dunalley and surrounding communities.* *3.1 Impact of aircraft noise on communities not previously overflown* *Prior to September 2017, Dunalley and surrounding communities had never been previously overflown by RPT jets, apart from occasional use of an RNAV approach over water adjacent to Connelly's Marsh (see map below). To be consistent with Airservices's NOS, we argue that flight path design should recognise that the impact of aircraft noise on a newly overflown community is likely to be comparatively higher.* *Map of flight tracks in Feb 2017 provided by Airservices – arrivals in red, departures green*  *The Aircraft Noise Ombudsman (ANO) documents this impact in detail in her investigation report (Investigation into complaints about the introduction of new flight paths in Hobart – April 2018), noting the additional impact in areas with low background noise, and highlighting the inadequacy of the 60dB threshold for determining significance:* *"The N60/N65/N70 criterion should help to flag potential concerns, but using the cut-off noise level of 60 decibels has proven to be inadequate, given the significant community reaction to the changes in Hobart. The need for an increase of a certain fixed number of flights in a day (as averaged over a year) is also a questionable basis for determining potential significance in some situations. In the case of areas that previously had few or no over flights, particularly in semi-rural settings with low background*	

Ref	Community Suggested Alternative Submission	PIR Section
	noise levels, new noise impacts, even if below 60 decibels, may still be potentially significant as an indicator of social impact and which may need consideration under the EPBC Act. The context in which the noise occurs will affect its degree of significance." (page 15) *As can be seen from the map, and from residents' personal stories, the experience of living in Dunalley and surrounding areas has been greatly altered since September 2017 by the constant presence of aircraft noise events in an otherwise quiet coastal area.* *3.2 Impact of aircraft noise on communities with low background noise levels* *Prior to September 2017, Dunalley and surrounding communities were quiet rural areas. The environmental noise regulations of all Australian states and territories require consideration of average background noise levels when assessing the impact from a source of new noise (e.g. traffic on a new highway) on a community. Our view aligns with that of the ANO; that Airservices must consider ambient noise levels when determining the relative impact of aircraft noise, rather than relying on an arbitrary decibel value which may be out of context with the local noise environment.* *Queensland's Department of Environment and Science, for example, provides guidance on background noise levels for rural areas as falling between 25dBA and 35dBA depending on the time of day for the purposes of assessing noise impact (Guideline Noise Assessment - Prescribing noise conditions for environmental authorities for petroleum activities).* *Background noise in suburban residential areas varies, but is generally considered at least 5-10dBA higher than in rural areas.* *As the ANO noted, the introduction of aircraft noise of 50dBA is experienced as 10 times louder in a quiet rural area with a background noise of 30dBA, whereas a more densely populated suburban area with a background noise level of 45dBA will experience this as approximately 1.5 times as loud.* *3.3 Impact of aircraft noise on amenity* *Dunalley and surrounding areas are known for their quiet and peaceful amenity, with outdoor activities such as sailing, fishing, walking, gardening, and spending time at one of many local beaches. Many areas still contain natural bushland, with bush blocks in areas zoned for rural or environmental living. This amenity is degraded by aircraft noise.* *Dunalley and surrounds are primarily zoned rural residential, with large blocks, large areas of bush and farmland, mostly unpaved roads, and few streetlights. A town water supply is not provided, necessitating rainwater tanks and water delivery. Sewage is mainly disposed of via septic systems.* *Rural and undeveloped areas not previously overflown and with low background noise levels tend to attract and retain residents with a preference for this kind of lifestyle, or an aversion to a noisier suburban or urban environment. Often living in such areas incurs additional costs, such as travel and living expenses. Thus, degradation of these qualities is likely to have a proportionately greater impact on residents in these areas, than those who prefer suburban or urban living.* *[name removed] is aware of several residents who rebuilt houses following the bushfire, who now feel unable to remain because of the impact of aircraft noise.* *3.4 Social impact of aircraft noise* *Given the challenges from bushfire recovery, we argue that the severity of the impact of aircraft noise on Dunalley and surrounding communities is demonstrated by communities' level of engagement with Airservices Australia following the Runway 30 STAR implementation. Aircraft noise from the Runway 12 jet SID has replaced aircraft noise from the Runway 30 STAR.* *In January 2013, Dunalley and its surrounding communities experienced what a subsequent government enquiry described as a 'major community trauma' (Review of Recovery Arrangements - Learnings from the 2013 Tasmanian Bushfire Recovery, Department of Premier and Cabinet, Tasmanian Government).* *With little warning, the fast-moving bushfire destroyed the local primary school, community hall, police station, main employers (timber mill, an oyster processor and abalone processor) and a high proportion of housing stock. 25,000 hectares of bushland and pasture was burnt, causing $89 million damage to business and residential infrastructure.* *The initial experience of the bushfire and recovery effort has been well-documented through government reports and the media (e.g.https://knowledge.aidr.org.au/resources/bushfire-dunalley-tasmania-2013/ and [link removed]*	

Ref	Community Suggested Alternative Submission	PIR Section
	Like many bushfire-affected communities, Dunalley and surrounding communities have faced significant challenges through the recovery period. For example, a prolonged community campaign was undertaken to retain the local primary school, a focal point for community life, which the state government had indicated would not be rebuilt. While ultimately successful, the campaign was exhausting for community members still in recovery, and unexpected and lengthy delays in rebuilding meant that students needed to be home schooled or schooled elsewhere. The school finally opened in March 2017, but the social ties and support offered through the school community have taken longer to recover: https://www.abc.net.au/news/2017-03-22/dunalley-school-reopens-after-mould-removed/8377784 *A government inquiry into causes of the disaster found that poor preparation by emergency services, a breakdown in communication, and lack of adequate warnings increased the severity of the fire, which created bitterness in many residents toward government agencies: (http://www.dpac.tas.gov.au/divisions/osem/2013_tasmanian_bushfires_inquiry_report/2013_tasmanian_bushfires_inquiry_report)* *Eight years after the bushfire, residents are still fighting to achieve a fair outcome, with over 400 people engaged in a class action to recover compensation for damages: https://www.abc.net.au/news/2019-12-16/dunnalley-victims-launch-class-action-on-fires/11804154* *We suggest that these challenges and stresses were both compounded by the unexpected arrival of the Runway 30 STAR over Dunalley and surrounding communities, and made the task of responding more difficult. For example, researchers from the Tasmanian government's Bushfire Recovery Unit noted the reluctance of community members to engage with government consultation processes following the bushfire:* *Community feedback was sought using paper surveys that were widely advertised using social media, local papers, SMS telephone alerts, and word of mouth. These were distributed to all households via an insert in Recovery News, and placed at local community centres, including hubs, shops and service stations. This survey was also available online on Survey Monkey. Despite the wide distribution, the response rate to this traditional style of survey was relatively low.* *At the same time, a telephone survey of the same content was implemented using the services of an external provider, EMRS, to ensure that views were captured from a representative sample of the community. Almost everyone who was contacted was happy to participate and more than 300 people contributed their views (or five per cent of the population of the fire-affected areas).* *This suggests that people were not inclined to fill out a form but were happy to be interviewed and talk about their experience.* *Similarly, in the stakeholder survey, few responses were collected electronically, but stakeholders responded well to interviews and workshops. (page 57, Review of Recovery Arrangements - Learnings from the 2013 Tasmanian Bushfire Recovery, Department of Premier and Cabinet, Tasmanian Government https://knowledge.aidr.org.au/media/3999/bru_-_review_of_recovery_arrangements.pdf)* *Despite this reluctance, the arrival of the Runway 30 STAR over Dunalley in September 2017 led to a proportionately high number of complaints and attendance at Airservices forums (given the relative size of the community), and created a petition with approximately 250 signatures – an indication of the significance of the impact. Despite 'consultation fatigue' throughout the 18 months of the Hobart Airspace Design Review, community engagement remained high.* *Two local businesses also mounted an expensive action in the Federal Court, challenging the validity of the original decision. We suggest that this level of activity from a recently traumatised community, reluctant to trust government, demonstrates a certain courage and also indicates that the impact of aircraft noise on Dunalley and surrounds is significant.* *Unfortunately for those who did engage, the outcome of the Design Review has effectively been to replace aircraft noise from arrivals on Runway 30 with aircraft noise from departures from Runway 12. Nevertheless, private conversations between [name removed] and community members, and the level of community support for this submission gathered within a 1week period, suggests that concerns remain strong - hence our continued efforts.* *3.5 Economic impact of aircraft noise*	

Ref	Community Suggested Alternative Submission	PIR Section
	The quiet coastal and rural environment of Dunalley and surrounding areas is an important asset in rebuilding its economy through tourism, and is strongly aligned with Tasmania's brand. While acknowledging that aircraft movements potentially bring extra tourism to the area, aircraft noise, particular during the summer period, jeopardises this opportunity, undermining the reasons many people chose to travel to this region *Tourists seeking a break from suburban and urban life are also attracted to Dunalley and surrounding areas, especially its natural, recreational and scenic values. Dunalley is the tourist gateway to Tasmania's iconic Tasman Peninsula, and includes wineries, oyster farms, distilleries, visitor hospitality and accommodation businesses, all of which provide local employment, and rely on the area's brand as a peaceful and natural locale.* *For example, the nearby Bream Creek area was recognised as one of 2020's 'top tourist towns' by the Tourism Industry Council Tasmania: https://tict.com.au/awards/tassies-top-tourism-towns/tassies-top-tourist-town-2020/bream-creek/* *To assist with economic recovery from the 2013 bushfire, substantial government support was directed toward the development of new tourism and hospitality business infrastructure to capitalise on the area's natural environmental and outdoor recreation values. This was in line with the Tasmanian's government's visitor economy strategy, designed to exploit the state's growing market for interstate and international tourists.* *The [name removed] at Dunalley emerged, and quickly became an iconic destination for travellers to the Tasman Peninsula, regularly attracting international tour groups: [link removed]* *The Bream Creek Farmers Market was established to provide a focal point for the community, with new wineries, distilleries and farm gate operations also drawing visitors, and establishing the area as known for its natural produce.* *A project to transform the Dunalley marina into a 150 berth marina, with function centre and accommodation, was established by the Tasmanian government and Sorell Council, with the contract recently awarded to a Dunalley-based consortium. https://www.commercialrealestate.com.au/property/dunalley-marina-proposed-dunalley-tas-7177-2015888941* *The new marina development has potential to draw visitors to Dunalley and surrounding areas for water-based recreation activities, events, meals and overnight accommodation for 60 people, providing a significant financial contribution more broadly to the area and building investor confidence.* *The Runway 12 SID in particular is used mainly during late Spring to early Autumn, when Dunalley and surrounds are most appealing to visitors, and thus has most impact on tourism-dependent businesses.* *4 Conclusion* *We have tried to show that aircraft noise from the current Runway 12 SID, combined with noise from the Runway 30 RNAV STAR, has a significant combined impact on Dunalley and surrounding areas. While some aircraft noise from the previous Runway 30 STAR has been alleviated by the new RNP-AR arrivals path, this has in effect been replaced by equivalent aircraft noise from Runway 12 jet departures.* *The information provided by Airservices Australia to inform community suggestions and the record of design workshop 2 appears to indicate there is scope to move the Runway 12 jet SID closer to the airport (i.e. further west).* *To reduce the impact of aircraft noise on Dunalley and surrounding areas, [name removed] suggests the following three options to either shorten the existing SID and/or introduce a second jet SID closer to the airport to be used when safe to do so.* *At the same time, given the impact of current flight paths, [name removed] believes it is critical that no flight paths are moved closer to Dunalley and surrounding areas, and traffic on existing tracks such as the Runway 30 STAR over Dunalley is not further increased.* *4.1 Improve efficiency of Runway 12 jet SID* *We have suggested that the analysis which led to movement of the Runway 12 jet SID closer to Dunalley than originally proposed to the community did not fully consider the impact on Dunalley and surrounding communities.* *It appears that the current Runway 12 jet SID could be re-implemented at the proposed 2018 location which would reduce the impact on Dunalley and surrounding areas, and leave current impact on other communities unchanged. It appears this would also improve efficiency for airline operators.*	

Ref	Community Suggested Alternative Submission	PIR Section
31	*Have the runway SID 12 departure path completely over water and then fly back over the airport. The approximate height of the Jet would be over 10,000 ft, more than acceptable for a safe vertical separation.*  	*G.2.13*
32	*4.2 Establish second Runway 12 jet SID* *We understand that the Runway 12 non-jet SID is used on average 2-3 times per day, whereas the jet SID is used up to 35 times per day. Although not [name removed] area of expertise, it would appear that this arrangement disproportionately disadvantages jet traffic in terms of flight time and distance flown.* *Except for the non-jet SID, it appears that the jet SID could be moved significantly closer to the airport, improving noise outcomes for both Dunalley and surrounding areas, and the suburb of Primrose Sands, as well as increasing efficiency.* *We acknowledge there is some benefit obtained by segregating jets and light air traffic twice a day, and suggest that if a non-jet SID is absolutely necessary to achieve this, then two jet SIDs are employed for Runway 12:* *A short jet SID, positioned as closely as possible to the airport to minimise track miles, to be used when safe to do so (e.g. when the non-jet SID is not in use)* *A long jet SID, to be used when the non-jet SID is required for use* *4.3 Implement Class C approach service separation standards to increase SID efficiency* *Airservices Australia has proposed to CASA that it implement Class C aerodrome and approach services at Hobart Airport to improve safety and efficiency, recognising that Australian Aviation Policy triggers for Class C have been exceeded.* *Cited benefits include 'reduced separation standards for IFR aircraft'. We are not experts, and have been unable to seek clarification from Airservices about the implications of this improvement.* *However, we assume it to mean that horizontal separation standards can be reduced from 5 nautical miles to 3 nautical miles as specified in 10.5.5.2 in the Manual of Standards Part 172 – Air Traffic Services.* *Based on the record of design workshop 2, this would open up a much wider set of positioning options for the Runway 12 jet SID to allow a closer approach to the non-jet SID.* *For example, we presume that the 5nm radius circle which was drawn around the 'point of separation' between jet and non-jet SID could be reduced to 3nm.* *Airservices had intended to introduce the new approach service in 2020, which would have allowed these options to be considered in the current post-implementation review, potentially improving both efficiency and noise outcomes. The delay due to Covid seems difficult to understand, as Hobart traffic is already at or close to pre-Covid levels, now with the addition of international flights. We note that the Airservices CEO at the Additional Estimates hearing on 22 March 2021, agreed that the PIR period would be a perfect time to implement such a service at Hobart Airport.* *[name removed] therefore suggests that Airservices:* • *Immediately seek permission from CASA to implement Class C aerodrome and approach services at Hobart Airport as soon as possible* • *Shorten the Runway 12 jet SID to make use of the more efficient separation minima* *Consider abolishing the non-jet SID and instead use the enhanced surveillance technology to manage non-jet traffic when required.*	*G.2.12* *G.2.18*

Ref	Community Suggested Alternative Submission	PIR Section
33	*Move the flight path, currently near dodges ferry, laterally to the east to approximately half way between current position and primrose sands.* *The population of dodges ferry has grown and is continuing to grow significantly. Dodges Ferry is now considered as a suburb of Hobart with residents commuting to Hobart for work. Home owners are now living in their houses rather than using them as holiday homes as was the case in the past. There is now continuous residential and commercial development. Dodges Ferry is one of the most highly sought after areas in Tasmania as reported in real estate and newspaper articles and it is forecast the population will keep growing and expanding at a higher rate than neighbouring areas. Moving the flight path laterally east would assist with reducing noise impact currently and in the longer term for the permanent residents in this growing community.*	*G.2.3* *G.2.9*
34	*RE - Hobart Airspace Design Review I run a rural retreat on the Tasman Peninsula which was never previously overflown by jets, and my business is negatively affected by aircraft traffic and noise from the new flight paths. The review should look at all options to improve the situation for residents and local businesses, especially now that many more routes have been introduced, including international flights. In its submission to CASA, Airservices said that Class C and radar would make Hobart's airspace safer and allow greater flexibility for aircraft so these options should be in scope for the review.*	*G.2.18*

APPENDIX K – FLIGHT PATH CHANGE PROCESS

The Airservices flight path change process involves several stages that aim to deliver a safe and compliant airspace design that strikes a balance between aviation industry efficiency/emissions, community noise exposure and operational/network performance, by applying *Flight Path Design Principles*. It is recognised that safety of air navigation will always be the most important consideration. Flight path designs must comply with Australian and international design standards and cater for the range of aircraft that will operate on the flight paths. These standards can constrain Airservices' ability to design flight paths that avoid communities, particularly those close to an airport. Figure 109 presents the key steps in the flight path change process.

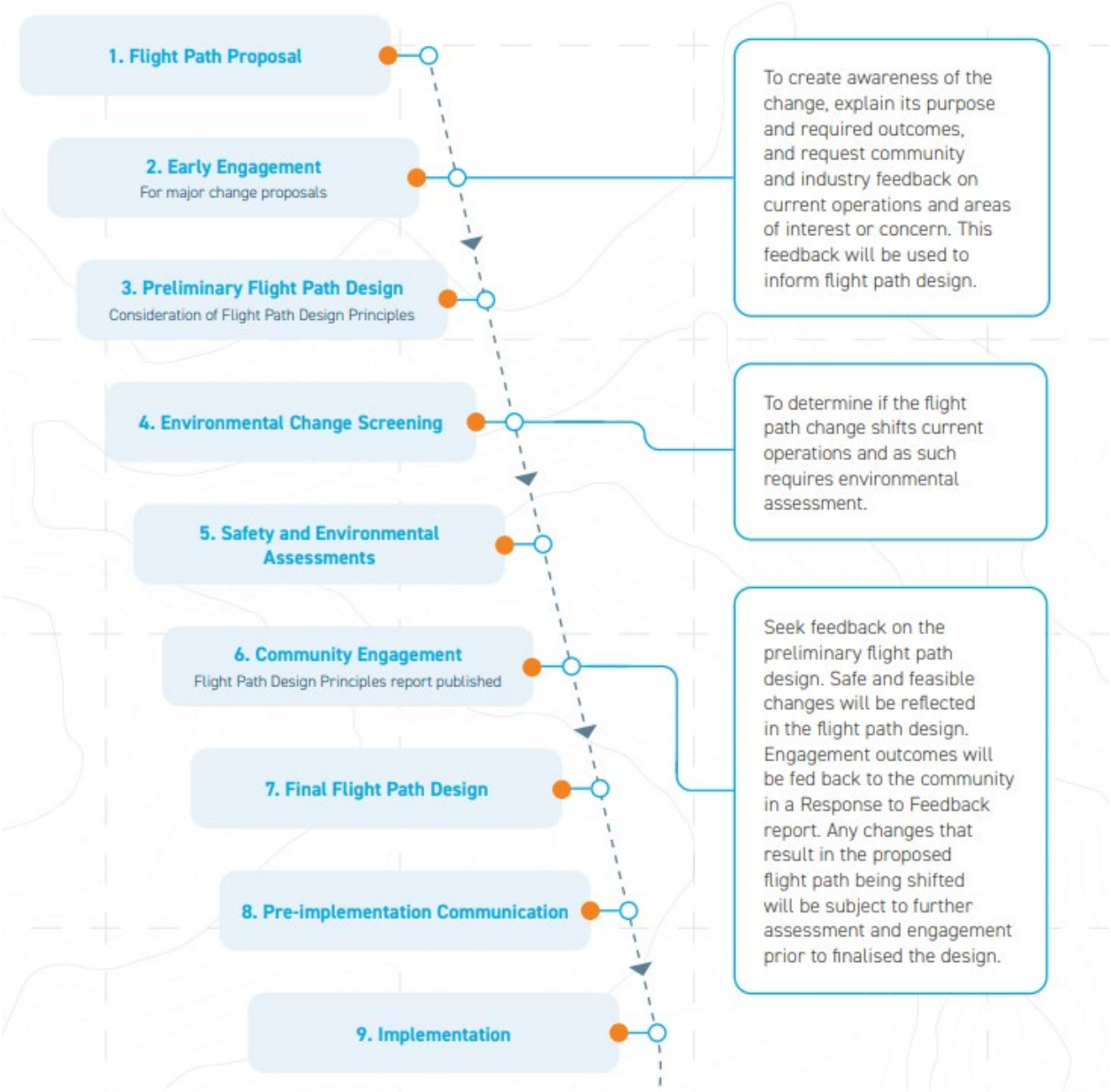


Figure 109: Airservices Flight Path Change Process (*Source: Airservices Commitment to Aircraft Noise Management*)

As part of the Hobart PIR, Airservices sought suggested flight path alternatives from the community and aviation industry. The preliminary assessments of these suggestions are presented in Appendix G and Appendix H. There are seven community and industry suggested flight path alternatives that will now be subject to further assessment.

The flight path design will determine the location for the flight path and detailed safety and environmental assessments (including noise modelling) will be undertaken. These suggested alternatives will also be subject to community and industry engagement prior to a decision on implementation being made.

APPENDIX L – PIR REPORT SUMMARY OF CHANGES

The draft PIR report was released for public comment for a six-week period that commenced on 5 November 2021 and concluded on 17 December 2021. There were 50 submissions, including one submission from a community group representing over 100 members, received during the public comment period on the draft PIR report. Airservices' responses to the comments received is published on *Engage Airservices*.

A community information session was held in Hobart on 13 November 2021 to present the findings of the PIR. A copy of the Airservices presentation, Questions & Answers summary, and video recording of the community session is available to view at *Engage Airservices.*

Table 58 provides a summary of the changes made to draft PIR report is response to the public comment submissions and the actions arising from the community information session.

Table 58: Summary of changes made to draft PIR Report

Section	Change(s) made	Reason for change
2	Timeline of key events for the Hobart Airspace Design Review (Table 1) updated to include hyperlinks for the draft PIR Report and Community Information Session	Update progress to date for completeness
A.8	Additional information to describe how urban and rural environments are considered for aircraft noise monitoring	Action arising from the community information session
A.9.6	New section to describe how noise modelling considers terrain, including the reflection of noise from water bodies New Recommended Action 11 for Airservices to review available software tools to improve the consideration of water bodies in the terrain model	Actions arising from the community information session
A.8 B.1	Text added to clarify how urban and rural environments are considered for environmental assessments of flight path changes	Action arising from the community information session
B.2.1	Newly overflown assessment updated to include analysis of the number of flights, aircraft types, flight altitude, and the size of the geographical land area considered	Action arising from the community information session
B.3	New figure to show the current (as at 28 February 2022) newly overflown assessment criteria	Action arising from the community information session
Appendix G	Description of the process for community suggested alternatives updated to note that one of the public comment submissions received was signed by over 100 community members Text updated to acknowledge that the PIR has assessed suggestions for changes that have been considered and disregarded previously	Responses to community submissions on draft PIR report
G.1.1	Text updated to note the various sources of the images used to show the indicative location of the suggested flight path scenario	Response to community submission on draft PIR report
G.1.2	New section added to address potential future technology improvements that may allow a reduction of the current 5NM aircraft separation standard at Hobart Airport	Response to community submissions on draft PIR report

Section	Change(s) made	Reason for change
G.2.6	Assessment updated to acknowledge previous consultation on over water flights along the east coast	Response to community submission on draft PIR report
Appendix K	New section to describe Airservices' flight path change process and the next steps for the PIR community and industry suggested alternatives that are recommended to progress for further assessment	Response to community submissions on draft PIR report
Appendix L	New section to provide a summary of the changes made to the PIR report as a result of the actions arising from the community information session and the public comment submissions received on the draft PIR report	Summary of changes for transparency and easy reference