Australian Government

Department of Infrastructure, Transport, Regional Development, Communications and the Arts

Western Sydney International (Nancy-Bird Walton) Airport – Airspace and flight path design

Environmental Impact Statement

Technical paper 13: Facilitated changes

October 2024

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Introduction

Background

The Sydney Basin airspace is likely the busiest and most complex airspace in Australia with most areas of the Sydney Basin including Western Sydney currently experiencing a consistent level of daily aircraft overflight activity. It comprises an extensive network of flight paths, operational procedures and airspace structure associated with existing civil airports (Sydney (Kingsford Smith), Bankstown, Camden, Shellharbour); Defence facilities (Royal Australian Air Force (RAAF) Base Richmond, Holsworthy Military Airport; operating restrictions at the Defence Establishment Orchard Hills (DEOH) munitions facility; recreational aviation activities (gliders, ballooning, parachuting); and transiting flights.

WSI operations

Western Sydney International (Nancy-Bird Walton) Airport (WSI), will handle up to 10 million annual passengers and around 81,000 air traffic movements per year by 2033, including freight operations. Single runway operations at WSI are expected to be operating at near capacity at around 37 million annual passengers and 226,000 air traffic movements per year in 2055.

The development of a completely new airport at Badgerys Creek was the subject of an Environmental Impact Statement (2016 EIS). Following the finalisation of the 2016 EIS, the Western Sydney Airport – Airport Plan (Airport Plan) was approved in December 2016. The Airport Plan authorised the construction and operation of the Stage 1 Development. It also set the requirements for the further development and assessment of the preliminary airspace design for WSI.

WSI Airspace approval principles

The project (preliminary flight paths and airspace design) was referred to the Minister for the Environment and Water in 2021 (EPBC 2022/9143) in accordance with Section 161 of the Commonwealth (Cth) *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Condition 16 of the Airport Plan. In response, the delegate for the Minister for the then Environment and Water, determined that an EIS would be required and the EIS Guidelines were issued on 26 April 2022 (EPBC 2022/9143). This EIS has been prepared to address these requirements.

The Australian Government Department of Infrastructure, Regional Development, Communications and the Arts (DITRDCA), Airservices Australia (Airservices) and the Civil Aviation Safety Authority (CASA) each have a role in the development and/or approval of the project. Pursuant to section 161 of the EPBC Act (Cth), the DITRDCA (representing the Australian Government) is nominated as the designated proponent for the project and is responsible for leading the preliminary airspace design for single runway operations at WSI. Once the environmental assessment and community consultation process is complete, the DITRDCA alongside Airservices will be responsible for the detailed design of the flight paths.

Operating the new airport will require adjustments to current Sydney Basin operations, and the introduction of new controlled airspace volumes and flight paths. In developing the preliminary airspace design for WSI, these necessary adjustments to Sydney Basin operations to facilitate WSI's flight paths and airspace structure have been minimised to the extent practical.

To facilitate single runway operations at WSI the DITRDCA commissioned the development of new flight paths and procedures in collaboration with Airservices, who have incorporated modern airspace design principles and standards.

Any changes to the current noise sharing arrangements at Sydney (Kingsford Smith) Airport were to be avoided and would be incompatible with the principles and conditions of the Airport Plan. In developing WSI's preliminary airspace design, operational impacts on Sydney (Kingsford Smith) Airport and other Sydney Basin airports, aerodromes, and airspace users have been minimised to the greatest extent practical.

The resulting flight paths and procedures have been designed to ensure the safety of aircraft operations as the fundamental and primary design outcome. The preliminary airspace design also considered optimal flight path and airspace management efficiency, existing air traffic control restrictions, as well as opportunities to minimise environmental, community and social impacts to the extent practical.

The preliminary airspace design has also sought to minimise to the extent practical the adjustments required to Sydney Basin operations prior to the opening of WSI in 2026 to facilitate its flight paths and airspace structure, and any potential environmental and community impacts.

Safety by Design

The use of a “Safety by Design” approach is internationally accepted best practice in the design and integration of multiple flight paths servicing high density airspace and airports like Singapore Changi Airport or a city airport system comprising multiple airports within proximity to each other like London (e.g., London Heathrow, London Gatwick, London Stansted, London City, London Luton and RAF Northolt).

“Safety by Design” develops Standard Instrument Departures (SIDs) and Standard Terminal Arrival Routes (STARs) in such a way that the safety requirements of either lateral or vertical separation standards needed to ensure collision avoidance, can be programmed into the onboard flight management systems of aircraft flying the procedure tracks so that at critical crossover points any conflicting aircraft will be separated from other aircraft by the required separation distance. The lateral and vertical separation requirements of a SID or STAR are also programmed into the air traffic control software systems providing air traffic controllers and pilots with aligned information.

The preliminary airspace design process has appropriately accorded “safety” as the highest priority to ensure robust operational safety outcomes. Environmental outcomes, with a particular focus on the minimisation of potential community impacts and the operational efficiency of the facilitated changes has also been a key design criterion.

Why some changes are necessary

The preliminary airspace design for WSI was specifically required to avoid any impact on the ability of Sydney (Kingsford Smith) Airport to operate all existing runway modes, particularly those designated modes used for noise sharing. There is to be no impact on the Sydney (Kingsford Smith) Airport curfew between 11 pm and 6 am (local time).

A multitude of design iterations were considered for WSI’s preliminary airspace design. A feasible airspace design concept was identified following aviation industry consultation and detailed technical analysis by the flight path designers. This resulted in a significant number of new flight paths and operating procedures being developed within the constraints of a now fixed single runway (05/23) alignment at WSI. In compliance with international standards and recommended practices, to ensure safety of operations, unavoidable changes to airspace boundaries are required to contain those procedures within controlled airspace.

As each iteration of WSI’s preliminary airspace design was worked through, it became evident that to maintain the safety assurance of flight operations in the Sydney Basin, while also meeting the requirements of efficiency, capacity and environment, some changes generally of a minor nature would be required to some of the existing SIDs and STARs in use at Sydney (Kingsford Smith) Airport, as well as changes to Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) operations at Bankstown and Camden Airports, RAAF Base Richmond Airport, and changes to the Sydney Basin low altitude transit flights.

These changes proposed to the established Sydney Basin airspace system are necessary for safe and efficient WSI operations and have been minimised to the fullest extent practical. Any changes proposed and associated impacts to the flight paths at other aerodromes to accommodate aircraft operations from WSI have been considered in terms of safety, national security (Defence), efficiency, equity of airspace access, existing aircraft operating standards, as well as environmental and community impacts.

Required airspace adjustments and changes

The proposed adjustments and changes required to current Sydney Basin operations have been categorised into 3 groups based on the availability of data, level of change significance, and consideration of the appropriate assessment process:

- **Group A –** where the implications of and/or the significance of a proposed change is expected to be noticeable. Sufficient current and future data exists to allow for a quantitative assessment (such as number above (N-above) contours) to be produced and presented. Most, but not all the proposed changes to Sydney (Kingsford Smith) Airport procedures and flight paths are in this category.
- **Group B –** where the proposed change contains elements that may be noticeable to areas newly overflown at low level. There may be sufficient current and future data available to undertake some quantitative assessment (N-above contours where practical) but the majority of the assessment will be qualitative (L_{Amax} or Noise Power Distance (NPD) data) due to limited data and/or a small amount of expected use of the proposed procedure and flight path.
- **Group C –** where the change is minor in nature or will be used only for a small amount of flight operations and time. The amount of available current and future data due to the small usage of the procedures, is insufficient to support any primary quantitative assessment tools, such as N-above contours. A secondary assessment method of noise using L_{Amax} and NPD data will be provided to inform the community of the noise to be expected under the facilitated airspace changes.

The preliminary airspace design for WSI has identified the following adjustments and changes to Sydney Basin operations as necessary:

- **The Group A changes** to be subjected to a quantitative assessment process are:
  - all changes proposed to Runway 25 and Runway 34L SIDs at Sydney (Kingsford Smith) Airport
  - non-jet SIDs from all Sydney (Kingsford Smith) Airport runways to the west and north-west.
- **The Group B changes** to be subjected to a hybrid quantitative/qualitative assessment (due to a relatively low data sample size) process are:
  - all IFR changes proposed at Bankstown Airport.
- **The Group C changes** to be subjected to a qualitative assessment process are:
  - **RAAF Base Richmond:**
    - departures and arrivals at RAAF Base Richmond Airport
  - **Sydney (Kingsford Smith) Airport:**
    - RIVET and BOREE STARs at Sydney (Kingsford Smith) Airport
    - AKMIR STAR at Sydney (Kingsford Smith) Airport jet and non-jet arrivals to all runways from the south and west

    Another proposed Group C change of a minor nature to Sydney (Kingsford Smith) Airport is:
    - Runway 07 Initial Approach Fix (IAF) operations
  - **Camden Airport:**
    - STARs at Camden Airport
  - **Sydney Basin:**
    - Sydney Basin low altitude transit routes
    - VFR operations in the Sydney Basin airspace.

Assessment of the necessary changes and adjustments

The primary area of concern for communities exposed to aircraft overflight is the resulting potential noise impact. The minimum change in sound level that most people can detect is around 2 to 3 A-weighted decibels (dB(A)), while every 10 dB(A) increase in sound level is perceived as a doubling of loudness.

Group A noise assessments include to the extent practical the presentation of:

- number above (N-above) metrics – N60 and N70 results presented as contours to enable a comparison between existing and proposed areas in which number of movements or range of noise events with a modelled noise level of 60 or 70 dB(A) or louder is expected to occur. These were generated utilising the internationally recognised aircraft noise and emissions calculation program - Aviation Environmental Design Tool (AEDT) Version 3e, developed by the United States Federal Aviation Administration (US FAA)
- flight path corridor dispersion footprints – current versus where the future flight paths are expected to be
- dwelling and population counts under N-above contours – current versus the number of dwellings that can expected to be exposed to future N60 and N70 noise levels
- backbone track positioning – current versus where the nominal future proposed flight path centreline (backbone) is located
- suburb boundaries and suburb names overflown.

The Group B noise assessments will be predominately qualitative, but where sufficient data exists, an element of quantitative assessment will be included.

The Group C noise assessments include to the extent practical the application of qualitative assessments utilising NPD data. This data was also generated utilising the aircraft noise and emissions calculation program – AEDT Version 3e.

To support the qualitative analysis of potential noise from operations of the Group C facilitated airspace changes, the NPD data was developed to provide an indication of what overflight noise from representative aircraft types could be expected on existing flight paths, or on new flight paths or flight paths that have either changed laterally or vertically or both.

The assessment of the adjustments and changes also considers “other environmental factors” including:

- visual amenity
- radar vectoring (off-procedure operations)
- track distance and emissions.

Change implementation

Any change to any part of the airways flight path infrastructure that requires pilots to fly their aircraft differently with respect to changes either laterally, vertically, in speed or acceleration, must be introduced in a structured manner. Air traffic control systems must also be adjusted concurrently to align with the change.

If the change requires an Airspace Change Proposal (ACP), these are robustly controlled, cannot be ad hoc and must be made in a way that aligns detail and timing. Because of the international nature of the commercial aviation industry, sufficient lead time for an introduction or ACP must be allowed to ensure that at a given time, on a given day, all airborne and ground-based data bases will reflect the introduction or change so that a safe transition to the new procedures is affected.

The introduction of single runway operations at WSI and the adjustments required to Sydney Basin operations to facilitate its flight paths and airspace structure, will be introduced in 2026 on a scheduled Aeronautical Information Regulation and Control (AIRAC) date, prior to the official opening of WSI. Introduction of these changes prior to the opening of WSI opening in 2026 will allow pilots and air traffic control to update their systems and become familiar with changes to current procedures before WSI commences operations and will minimise the likelihood of conflicts or incidents in the Sydney Basin airspace.

Assessment response

A suite of Appendices has been developed that addresses the adjustments and changes required to the Sydney Basin airspace system prior to the opening of WSI in 2026 to facilitate its new flight paths and airspace structure. These Appendices include the safety drivers and need for the changes, and presents the track differential (i.e., lateral displacement and distance) where applicable, and the expected environment implications of each proposed facilitated change.

Those Appendices are:

- **Appendix A** – Proposed changes to Sydney (Kingsford Smith) Airport Runway 25 SIDs to west, north-west, north and east
- **Appendix B** – Proposed changes to Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs to south, west, north, and east
- **Appendix C** – Proposed changes to Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID to west and north-west
- **Appendix D** – Proposed changes to Sydney (Kingsford Smith) Airport non-jet SID to west or north-west
- **Appendix E** – Proposed Sydney (Kingsford Smith) Airport AKMIR STAR jet and non-jets from south and west
- **Appendix F** – Royal Australian Air Force (RAAF) Base Richmond proposed SID and STARs
- **Appendix G** – Bankstown Airport proposed new SIDs and STARs
- **Appendix H** – Camden Airport proposed new STARs
- **Appendix I** – Proposed changes to Sydney Basin VFR operations
- **Appendix J** – Proposed miscellaneous and minor procedure adjustments
  - Sydney (Kingsford Smith) Airport BOREE STAR
  - Sydney (Kingsford Smith) Airport RIVET STAR
  - Sydney (Kingsford Smith) Airport Runway 07 IAF
  - Sydney (Kingsford Smith) Airport Runway 07 SID
  - Sydney Basin low altitude transit flight routes.

Appendix A

Proposed changes to Sydney (Kingsford Smith) Airport Runway 25 SIDs to west, north-west, north and east

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Appendix A – Proposed changes to Sydney (Kingsford Smith) Airport Runway 25 SIDs to west, north-west, north and east

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Terms and abbreviations

Term/abbreviation	Definition
ABS	Australian Bureau of Statistics
ACP	Airspace Change Proposal (Airservices)
AEDT	Aviation Environmental Design Tool (US FAA)
AIP	Aeronautical Information Package (Australia)
AIRAC	Aeronautical Information Regulation and Control (Australia)
ARP	Aerodrome Reference Point (ICAO)
CASA	Civil Aviation Safety Authority (Australia)
CO_2	Carbon dioxide (a greenhouse gas)
CTA	Control area (3-dimensional airspace boundary)
CTAF	Common Traffic Area Frequency
Cth	Commonwealth of Australia
CTR	Control zone (3-dimensional airspace boundary)
DAP	Departure and Approach Procedures (Australian AIP)
dB(A)	A-weighted decibel (unit of sound)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Australian Government)
DITRDCA	Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Australian Government)
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation 1999* (Cth)
FAA	Federal Aviation Administration (United States)
ft	feet (unit of distance or height equivalent to 0.3048 m)
GA	General Aviation
GBMA	Greater Blue Mountains Area (World Heritage property)
ICAO	International Civil Aviation Organization
IAF	Initial Approach Fix
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
km	kilometres (unit of distance equivalent to 1,000 m)
km/h	kilometres per hour (unit of speed equivalent to 0.54 kt rounded)

Term/abbreviation	Definition
kt	knot (unit of speed equivalent to 1.852 km/h)
LL	Lowest Level (altitude for transit flights through Sydney Basin airspace)
m	metre (unit of distance or height equivalent to 3.281 ft)
LSALT	Lowest Safe Altitude
MNES	Matters of National Environmental Significance (EPBC Act) (Cth)
N60/N70	Number above (N-above noise metric)
NFPMS	National Flight Path Monitoring System (Airservices database)
nm	nautical mile (unit of distance equivalent of 1.852 km)
NPD	Noise-Power-Distance (aircraft noise curve charts)
NSR	Noise Sensitive Receiver
PAAM	Plan for Aviation Airspace Management
PBN	Performance Based Navigation
PMST	Protected Matters Search Tool (DCCEEW)
RAAF	Royal Australian Air Force
RNP	Required Navigation Performance
RNAV	Area Navigation (air navigation technique)
RPT	Regular Public Transport (air services)
SARP	Standards and Recommended Practices (ICAO)
SID	Standard Instrument Departure
STAR	Standard Instrument Arrival
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WSI	Western Sydney International (Nancy-Bird Walton) Airport

Chapter 1 Introduction

Although aircraft differ in operation, type, altitude, noise level and frequency, most areas of the Sydney Basin are overflown at some stage as shown in Figure 1.1.

The introduction of new flight paths to be used by aircraft into and out of Western Sydney International (Nancy-Bird Walton) Airport (WSI) has considered a multitude of options to minimise any adjustments required to existing flight paths in the Sydney Basin airspace. Single runway operations at WSI require adjustments to Sydney Basin operations prior to opening in 2026 to facilitate its flight paths and airspace structure. Those facilitated airspace changes include the development of, or adjustments to:

- **Sydney (Kingsford Smith) Airport Runway 25 Standard Instrument Departures (SIDs) to west, north-west, north and east – (Appendix A) – this Appendix**
- Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs to south, west, north, and east – (Appendix B)
- Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID to west and north-west – (Appendix C)
- Sydney (Kingsford Smith) Airport non-jet SID to west or north-west – (Appendix D)
- Sydney (Kingsford Smith) Airport AKMIR Standard Instrument Arrival (STAR) jet and non-jets from south and west – (Appendix E)
- Royal Australian Air Force (RAAF) Base Richmond SID and STARs – (Appendix F)
- Bankstown Airport SID and STARs – (Appendix G)
- Camden Airport STARs – (Appendix H)
- Sydney Basin Visual Flight Rules (VFR) operations – (Appendix I)
- Miscellaneous and minor procedure adjustments – (Appendix J)
  - Sydney (Kingsford Smith) Airport BOREE STAR
  - Sydney (Kingsford Smith) Airport RIVET STAR
  - Sydney (Kingsford Smith) Airport Runway 07 Initial Approach Fix (IAF)
  - Sydney (Kingsford Smith) Airport Runway 07 SID
  - Sydney Basin low altitude transit flight routes.

This Appendix – Appendix A, presents an assessment of the proposed adjustments required to the current Runway 25 departure SID procedures from Sydney (Kingsford Smith) Airport for jet departures to western, north-western, northern, and eastern destinations.

The design process for the safe and efficient integration of WSI's new flight paths into the existing Sydney Basin airspace has been one of adopting "Safety by Design" principles to deliver the highest level of safety separation assurance in conformance with rules set by the Civil Aviation Safety Authority (CASA). This is to enable aircraft to operate safely within their performance envelope into an already complex airspace structure. "Safety by Design" ensures that aircraft are separated from each other according to the flight routes and the type of air traffic service being provided. As such, this requires the new or amended SIDs and STARs and altitudes to be published and then downloaded into the cockpit flight management systems of all aircraft. At the same time the same information must be downloaded into the software of the surveillance systems used by air traffic control to manage and monitor the safe separation of all controlled aircraft.

The preliminary airspace design process has appropriately accorded "safety" as the highest priority to ensure robust operational safety outcomes. Environmental outcomes, with a particular focus on the minimisation of potential community impacts and the operational efficiency of the facilitated airspace changes has also been a key design criterion.

Instrument Flight Rules (IFR) are the rules that govern the operation of aircraft in Instrument Meteorological Conditions (IMC) (conditions in which flight In IMC, an aircraft must be flown with reference to its onboard flight instruments.) Two sets of rules, IFR or Visual Flight Rules (VFR) exist to govern flight in either IMC or Visual Meteorological Conditions (VMC).

The proposed changes to the Runway 25 departure procedures and the proposed Runway 25 SIDs at Sydney (Kingsford Smith) Airport presented in this Appendix have been designed to be flown under IFR. This is to ensure “Safety by Design” is embedded in the new procedures and to allow continued operations of these procedure in all weather conditions. Aircraft flying to IFR standards and rules can operate in either IMC or VMC, but aircraft flying to VFR standards and rules can only operate in VMC.

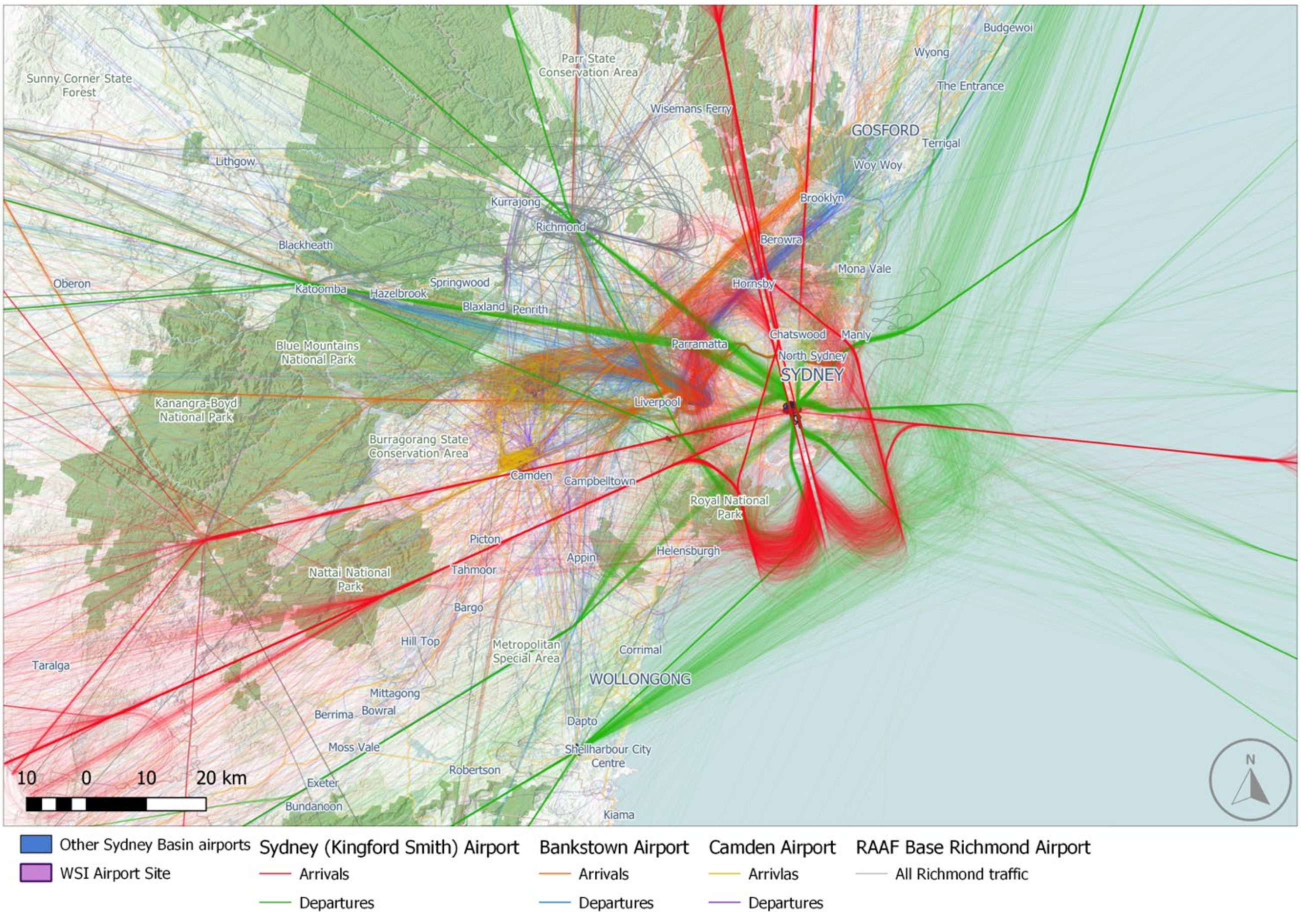


Figure 1.1 Sydney Basin airspace with one-week of flight path movement activity in 2019

Chapter 2 Background

Runway 07/25 at Sydney (Kingsford Smith) Airport is orientated on an east-west axis, and is normally used as part of a noise sharing runway mode or when easterly or westerly winds are of such a strength that the cross-wind on the main runways (Runway 16L/34R and Runway 16R/34L), orientated north-south, is above the 20-knot (kt) or 37 kilometres per hour (km/h) air traffic control runway nomination criteria. For Runway 25 this usage accounts for less than 4 per cent of time annually.

Sydney (Kingsford Smith) Airport and WSI are located approximately 45 kilometres (km) apart, on an east-west axis. Jet aircraft departing from Runway 25, (which is aligned in a direction towards WSI) to western destinations via waypoint KADOM, north-western destinations via waypoint RICHMOND and eastern and northern destinations via waypoint SHORE will be required to now have their track and altitude defined via Performance Based Navigation (PBN) SIDs to ensure a strategic safety by design outcome and the safe separation assurance principles required to integrate WSI flight paths into the Sydney Basin airspace.

Jet departures from Runway 25 to southern destinations are sufficiently clear of WSI flight paths and will be unchanged.

Non-jet aircraft departures from Runway 25 to western, north-western and northern destinations are included in a separate assessment at Appendix D.

The adjustment required to jet aircraft departures on the Runway 25 RICHMOND SID from Sydney (Kingsford Smith) Airport Runway 25 will need to be published and implemented prior to the opening of WSI in 2026 and will not impact the application of noise sharing runway modes at Sydney (Kingsford Smith) Airport. The changes would be introduced in 2026 on a scheduled Aeronautical Information Regulation and Control (AIRAC) date, prior to the opening of WSI. Introducing these changes prior to the opening of WSI will allow pilots and air traffic control to adjust their systems and become familiar with changes to current procedures before single runway operations commence and minimise the likelihood of conflicts or incidents in the airspace.

Figure 2.1 shows the location of WSI, the locations of other key airports in the Sydney Basin and geographic extent of a nominal area radiating 45 nautical miles (nm) (around 83 km) from the Aerodrome Reference Point (ARP) of WSI.

Figure 2.2 is the Aerodrome Chart for Sydney (Kingsford Smith) Airport. The chart has been extracted from the Aeronautical Information Package (AIP) Departure and Approach Procedures (DAP) to assist the interpretation of the information presented in this Appendix. It depicts the general layout of Sydney (Kingsford Smith) Airport including its 3-runway system and orientations, runway headings (34L, 25, etc.) and dimensions (lengths and widths).

Figure 2.1 Location of airports in the Sydney Basin

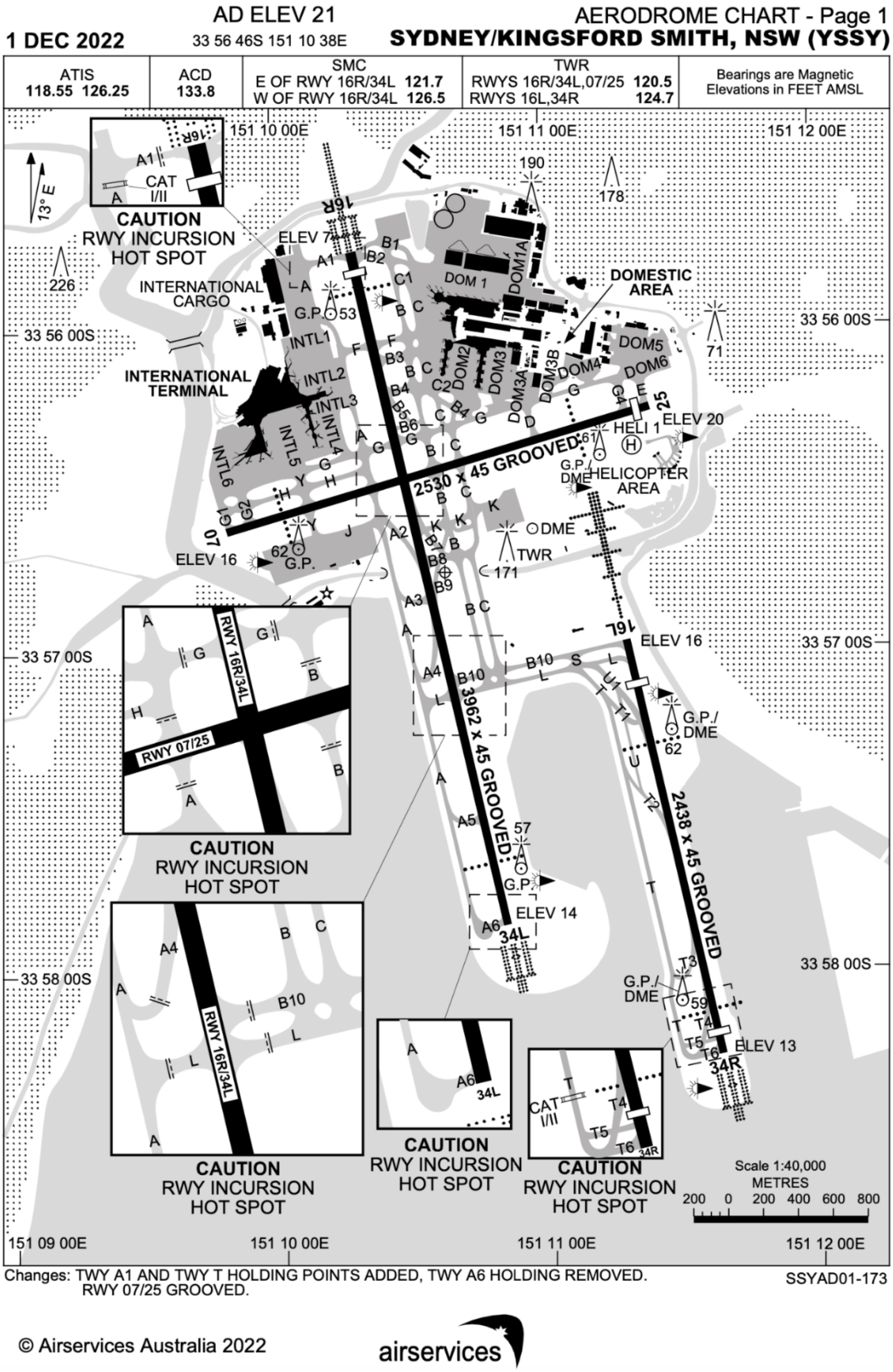


Figure 2.2 Sydney (Kingsford Smith) Airport – Aerodrome Chart (AIP / DAP)

Chapter 3 Purpose

The purpose of this Appendix is to present an environmental assessment of the adjustments required to jet aircraft departures SIDs, off the Sydney (Kingsford Smith) Airport Runway 25 to the west, north-west and east. It includes analysis and an assessment of the noise impacts from aircraft overflights of these proposed facilitated airspace changes.

It describes the reason for the facilitated airspace changes and the associated safety and operational considerations, along with other environmental issues.

Chapter 4 Current Runway 25 departure operations

Figure 4.1 presents the Sydney (Radar) SID for Sydney (Kingsford Smith) Airport published by Airservices Australia in the AIP DAP.

Aircraft departing Runway 25 must follow this procedure as applicable for that runway.

Figure 4.2 presents jet aircraft departure tracks from Sydney (Kingsford Smith) Airport, for the month of October in 2022.

4.1 Western and north-western Destinations via KADOM or RICHMOND

Currently, jet aircraft are issued with the Sydney (Radar) SID, which provides initial tracking and altitude information to be flown after take-off on Runway 25. The initial track for all jet departures is to maintain the Runway 25 track heading until leaving 1,500 feet (ft) on climb. At this point aircraft turn to a heading assigned by air traffic control with the take-off clearance.

In the case of aircraft tracking via waypoints KADOM or RICHMOND, this assigned heading will be to maintain the Runway 25 flight path until advised of a change by air traffic control. A change of heading instruction will normally be issued by air traffic control once the departing aircraft is past 10 nm (around 19 km) from Sydney (Kingsford Smith) Airport and above 3,000 ft on climb. At this point the aircraft will be given either a right turn to a north-westerly heading or depending on separation requirements with other aircraft in the Sydney Basin or may be given clearance to track direct to either waypoints KADOM or RICHMOND, according to its destination.

A military parachute training area exists within the RAAF Base Richmond Restricted Airspace and when activated to high levels, flight paths that track via Richmond are not immediately available to aircraft departing Sydney (Kingsford Smith) Airport. Aircraft are tracked towards waypoint KADOM until either above the parachuting or west of the parachuting areas when they will either continue under radar vectors or be cleared to track directly to an enroute waypoint.

In the case of aircraft departing Runway 25 and tracking to waypoint SHORE, once they reach 1,500 ft they will be assigned a right turn to a north-west heading (refer to Section 4.2 of this Appendix).

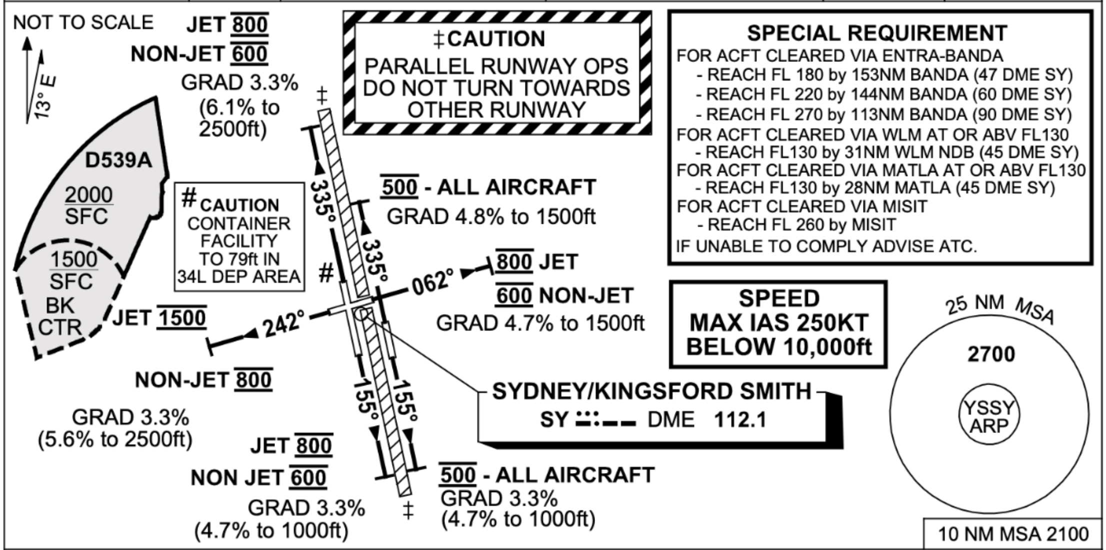
4.2 Northern and eastern destinations

Currently, jet aircraft are issued with the Sydney (Radar) SID, which provides initial tracking and altitude information to be flown after take-off from Runway 25. The initial track for all jet departures is to maintain the Runway 25 track until leaving 1,500 ft on climb. At this point aircraft are to take up the heading assigned by air traffic control with the take-off clearance. In the case of aircraft tracking for northern or eastern destinations this heading will normally be in a north westerly direction.

From a position around 10 nm (19 km) north of Sydney (Kingsford Smith) Airport departing aircraft are either radar vectored to their outbound enroute track or cleared direct to an enroute waypoint. Radar vectoring is employed to provide tactical separation with arriving aircraft to Sydney (Kingsford Smith) Airport from the north. In most instances, the departing aircraft will have climbed above the Sydney (Kingsford Smith) Airport northern STARs.

STANDARD INSTRUMENT DEPARTURES (SID)
SYDNEY TWO DEPARTURE (RADAR)
24 MAR 2022 **SYDNEY/KINGSFORD SMITH, NSW (YSSY)**

ATIS	ACD	SMC	TWR	DEP(N) N&E	DEP(S) S,W&NW
118.55 126.25	133.8	E OF RWY 16R/34L 121.7 W OF RWY 16R/34L 126.5	RWYS 16R/34L,07/25 120.5 RWYS 16L/34R 124.7	123.0	129.7



SYDNEY TWO DEPARTURE (RADAR)

RWY 07
GRAD 4.7% to 1500ft, then 3.3%
- Track 062°
- AT 600ft (800ft **Jet ACFT**) turn to assigned heading or track
- Expect radar vectors
- ACFT cleared via ENTRA, WLM, MATLA or MISIT see SPECIAL REQUIREMENT above

RWY 16R
GRAD 3.3% (4.7% to 1000ft)
- Track 155°
- AT 600ft (800ft **Jet ACFT**) turn to assigned heading or track
- Expect radar vectors
- ACFT cleared via ENTRA, WLM, MATLA or MISIT see SPECIAL REQUIREMENT above

RWY 16L
GRAD 3.3% (4.7% to 1000ft)
- Track 155°
- AT 500ft turn to assigned heading or track
- Expect radar vectors
- ACFT cleared via ENTRA, WLM, MATLA or MISIT see SPECIAL REQUIREMENT above

RWY 25
GRAD 3.3% (5.6% to 2500ft)
- Track 242°
- AT 800ft (NOT BEFORE 1500ft **Jet ACFT**) turn to assigned heading or track
- Expect radar vectors
- ACFT cleared via ENTRA, WLM, MATLA or MISIT see SPECIAL REQUIREMENT above

RWY 34R
GRAD 4.8% to 1500ft, then 3.3%
- Track 335°
- AT 500ft turn to assigned heading or track
- Expect radar vectors
- ACFT cleared via ENTRA, WLM, MATLA or MISIT see SPECIAL REQUIREMENT above

RWY 34L #
GRAD 3.3% (6.1% to 2500ft)
- Track 335°
- AT 600ft (800ft **Jet ACFT**) turn to assigned heading or track (NO RIGHT TURN BLW 1500ft)
- Expect radar vectors
- ACFT cleared via ENTRA, WLM, MATLA or MISIT see SPECIAL REQUIREMENT above

COMMUNICATIONS FAILURE PROCEDURE

On recognition of communication failure.
- Squawk 7600
- Maintain last assigned vector for two minutes and, if necessary, climb to minimum safe altitude to maintain terrain clearance, then
- Proceed in accordance with the latest ATC route clearance acknowledged.

Changes: Editorial. SSYDP12-170

Figure 4.1 Current Sydney (Kingsford Smith) Airport Runway 25 Two Departure (AIP DAP)

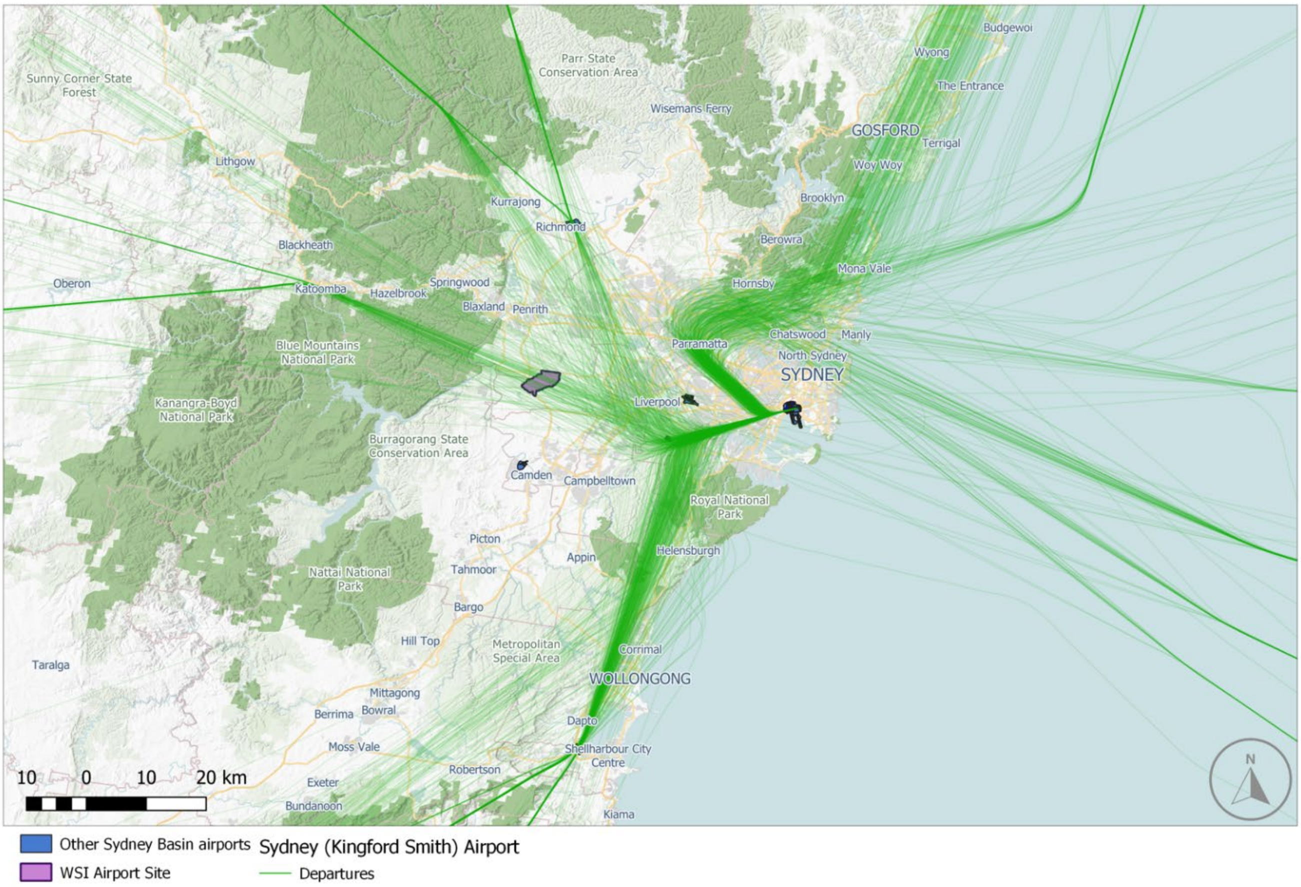


Figure 4.2 Current Sydney (Kingsford Smith) Airport Runway 25 jet departure flight track movement activity October 2022

Chapter 5 Proposed Runway 25 SID operations

5.1 Western and north-western destinations via waypoints KADOM or RICHMOND

The airspace in the west of the Sydney Basin which is currently available to climb and manoeuvre to both waypoints KADOM and RICHMOND will no longer be available to these aircraft as it will be needed for aircraft arriving and departing to/from WSI. Aircraft departing from Runway 25 for KADOM and RICHMOND will require a new PBN SID to ensure "Safety by Design".

The new SID will initially follow the existing SID path and maintain the Runway 25 track until reaching 1,500 ft. At 1,500 ft aircraft will turn right and track direct to the new waypoint NB010. This part of the proposed SID is designed as closely as possible to replicate the existing radar vectoring tracks used for northern and eastern departure tracks and to ensure that departing aircraft from Sydney (Kingsford Smith) Airport are strategically separated from all SID/STAR manoeuvring areas for WSI.

At waypoint NB010 aircraft for RICHMOND will track to a new waypoint (NB013) and then direct to Richmond. An altitude restriction requiring aircraft to be between 6,000 ft and 11,000 ft at waypoint NB013 provides separation assurance with aircraft from the north on STARs tracking to land on either Runway 23 or Runway 05 at WSI.

At waypoint NB010, aircraft for routes via waypoint KADOM will turn left and track via a series of new waypoints (NB011, NB012, NB033) to waypoint KADOM. Whilst almost a direct track from waypoint NB010 to waypoint KADOM, the extra waypoints incorporate altitude restrictions at each of them to provide separation assurance when crossing STARs to WSI.

Figure 5.1 presents the current and change required to the Runway 25 KADOM SID and the proposed new procedure waypoints.

Figure 5.2 depicts the current and change required to the Runway 25 RICHMOND SID and the proposed new procedure waypoints.

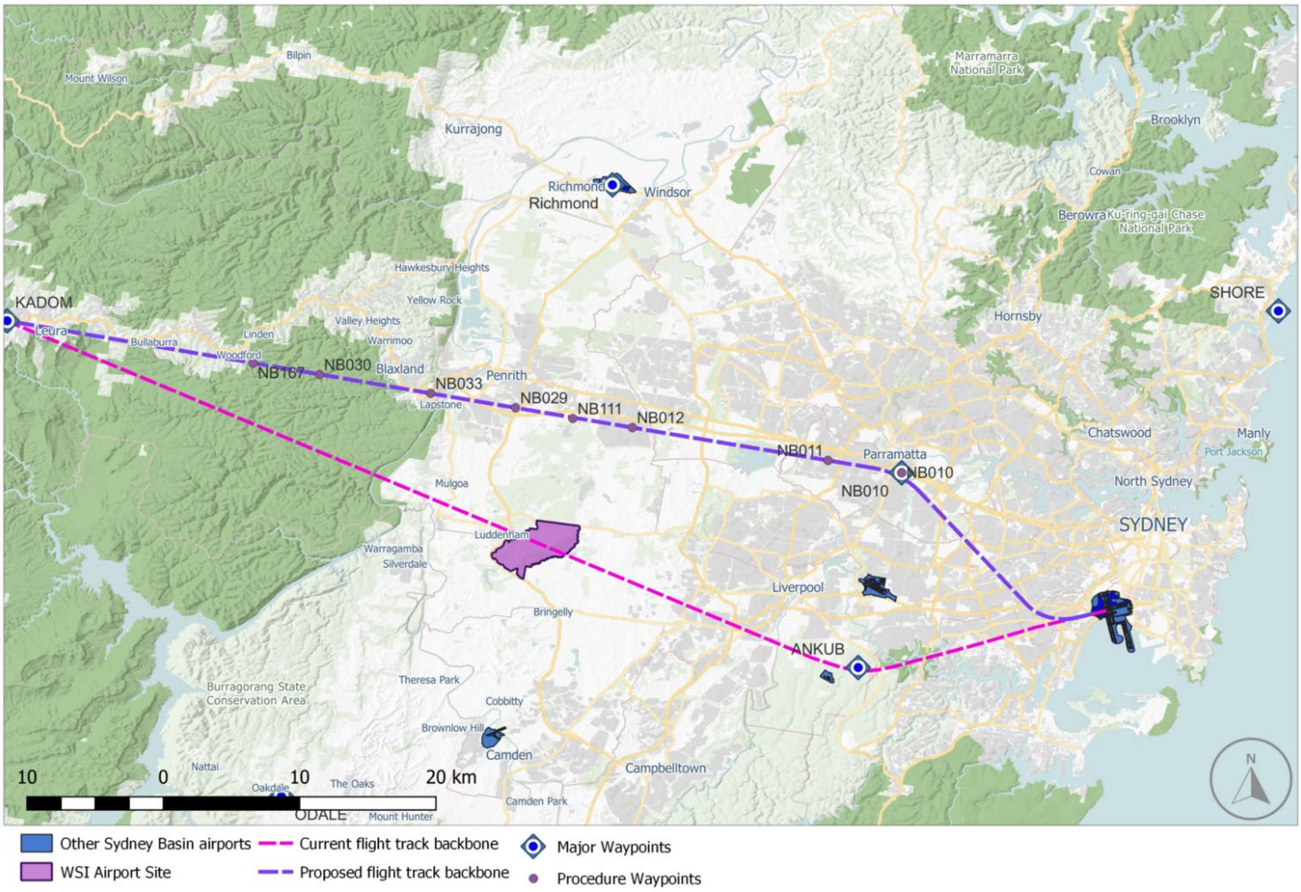


Figure 5.1 Current Runway 25 KADOM Departure and proposed Runway 25 KADOM SID – nominal backbone flight tracks

The nominal backbone flight track is used to identify either the centre of an existing flight path, or the designed nominal backbone flight track of a proposed SID or STAR. In the case of a current nominal backbone flight track, it is based on an average of current radar plotted flight paths. In the case of a proposed new procedure design, the nominal backbone flight track will be primary track used to establish and ensure "Safety by Design" standards are met.

Flight path corridors show the actual or expected variation (dispersion) of flights when flying the procedure.

Flight path corridor dispersion around an actual or proposed nominal backbone flight track will vary considerably where the designed nominal flight paths track via a fly-by waypoint. The amount of variation will depend on the angle of turn that the designed track is required to make at the waypoint.

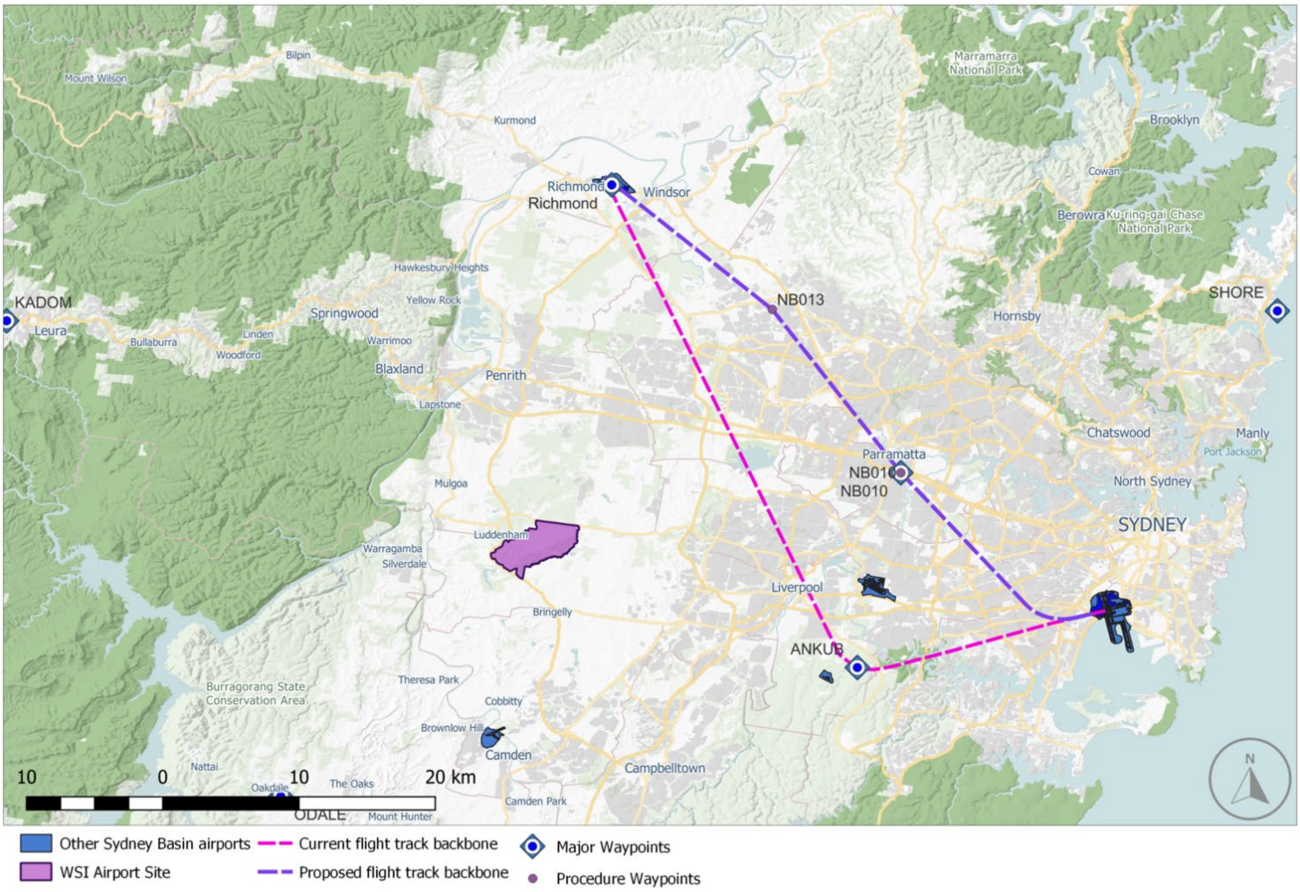


Figure 5.2 Current Runway 25 RICHMOND Departure and proposed Runway 25 RICHMOND SID – nominal backbone flight tracks

5.2 Northern and eastern destinations via waypoint SHORE

The proposed PBN SID will initially follow the existing radar SID path and maintain the Runway 25 track until reaching 1,500 ft. At 1,500 ft, aircraft will turn right and track direct to the new waypoint NB010. This part of the proposed SID is designed as closely as possible to replicate the existing flight paths and to ensure that departing aircraft from Sydney (Kingsford Smith) Airport are strategically separated from all SID/STAR manoeuvring areas for WSI.

A SID will normally end at a waypoint which connects to the enroute phase of flight. In the case of both northern and eastern departures from Runway 25 the existing waypoint SHORE (located on the coast around 16 nm (30 km) north of Sydney (Kingsford Smith) Airport) has been chosen as a point that is common to both northern and eastern enroute segments of flight.

From waypoint NB010 aircraft will track via the new waypoints NB170 and NB065 to waypoint SHORE, where they will transition to their enroute track. Altitude restrictions at both waypoints NB170 and NB065 to ensure strategic separation with northern arrivals for both WSI and Sydney (Kingsford Smith) Airport.

The altitude restrictions on this SID are designed to provide separation assurance with both WSI and Sydney (Kingsford Smith) Airport flight paths when aircraft are on these procedures. The volume of traffic and the limited width of airspace available between military restricted airspace associated with RAAF Base Richmond and RAAF Base Williamtown to the north of Sydney will mean that a large amount of radar vectoring of aircraft on the Runway 25 northern and eastern SIDs will be required to ensure tactical separation of all aircraft. Three arrival flight paths and 3 departure flight paths cross each other in this section of airspace.

While departures off Runway 25 will be cleared on this proposed new SID to ensure initial separation with the WSI manoeuvring area, once these aircraft are north of waypoint NB010 and subject to the disposition of arriving aircraft to Sydney (Kingsford Smith) Airport, a large proportion of them may be radar vectored. This will result in a similar flight path distribution to current operations.

Based on advice provided by Airservices Australia, the adoption of the proposed change to the Runway 25 SHORE SID will undergo a series of utilisation stages:

1. On the design finalisation and publication of the SID as an available procedure in the AIP DAP, its application is expected to be for most flights operating to northern and eastern destinations off Runway 25.
2. Following a short spike of high usage immediately after implementation, decreasing over 6 to 18 months to a point where most aircraft are provided with a more expeditious flight path through radar vectoring and direct tracking. As WSI operations steadily increase over time and contingent on growth in demand within the Sydney Basin, it is expected that application of the SID will increase and likely be adopted for around half of flights departing in that direction at 5 years post WSI operations.

Figure 5.3 shows the current jet departures and the proposed new Runway 25 SHORE SID and the proposed procedure waypoints.

(The proposed new waypoints (NB010, NB013, NB033, etc.) identified in Sections 5.1 and 5.2 of this Appendix have been allocated a temporary identifier which will be replaced by a conforming 5 letter alpha character designator as part of the detailed design phase and implementation of the proposed adjusted procedure.)

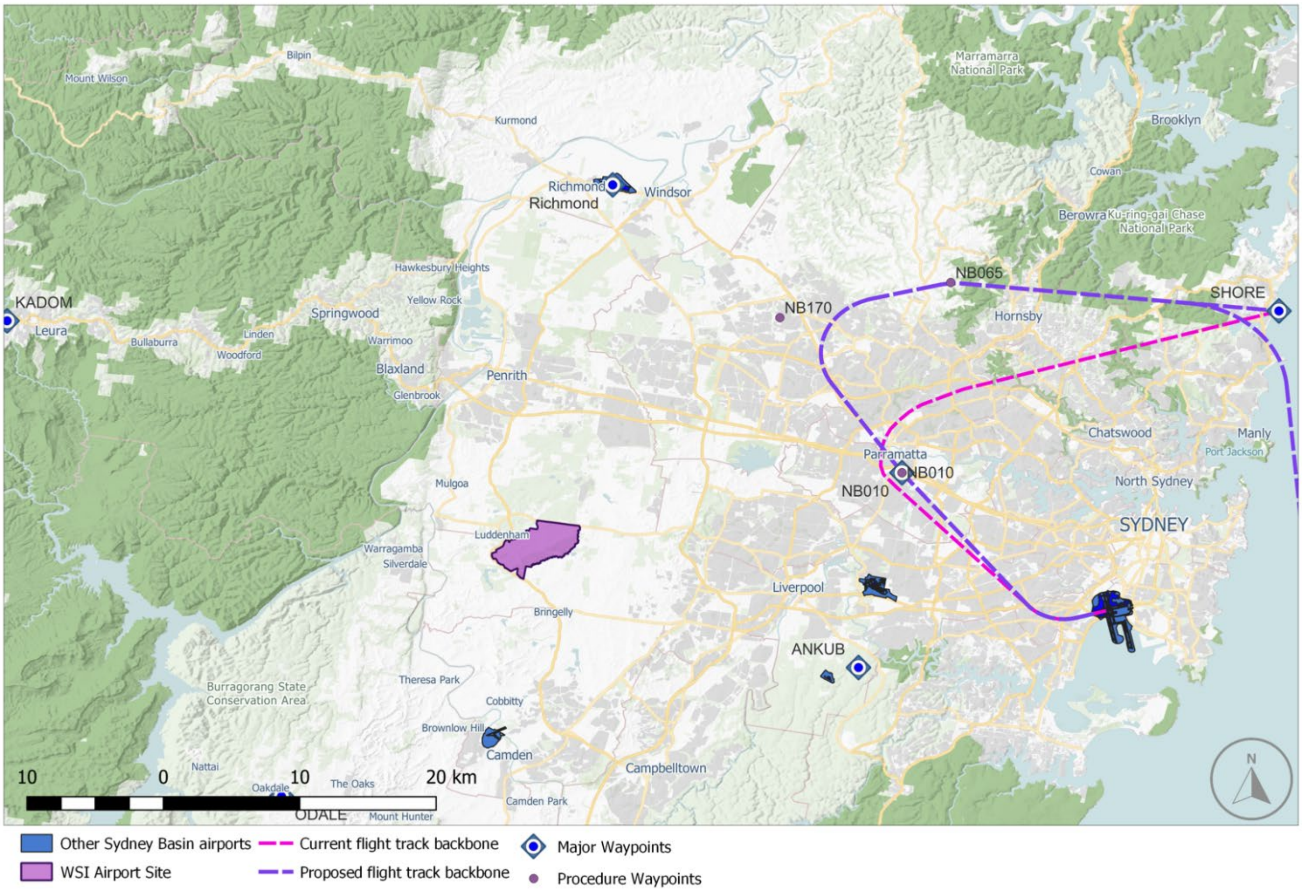


Figure 5.3 Current Runway 25 SHORE Departure and proposed Runway 25 SHORE SID – nominal backbone flight tracks

Chapter 6 Sydney (Kingsford Smith) Airport growth forecasts

Sydney (Kingsford Smith) Airport growth forecasts have been extracted from the current 2019 Airport Master Plan:

The forecasts were independently prepared for Sydney Airport Corporation Limited by a third party in consultation with major international, domestic and regional airlines, and airline associations.

Growth in total aircraft movements is expected to increase by around 17 per cent from 348,520 movements in 2017 to 408,260 in 2039, an annual increase of 0.7 per cent. Of that, Regular Public Transport (RPT) services are projected to be 382,305 in 2039, representing around 94 per cent of total air traffic movements. This reflects airline feedback and expectations on the continued up-gauging of aircraft and increases in seat density and load factors across the Sydney (Kingsford Smith) Airport route network. It is understood that all forecasts assume that from late 2026, the Sydney Basin's aviation demand will be served by two international airports – WSI and Sydney (Kingsford Smith) Airport.

Figure 6.1 shows the projected growth in aircraft movements for Sydney (Kingsford Smith) Airport as adapted from the 2019 Master Plan in the period from 2017 to 2039.

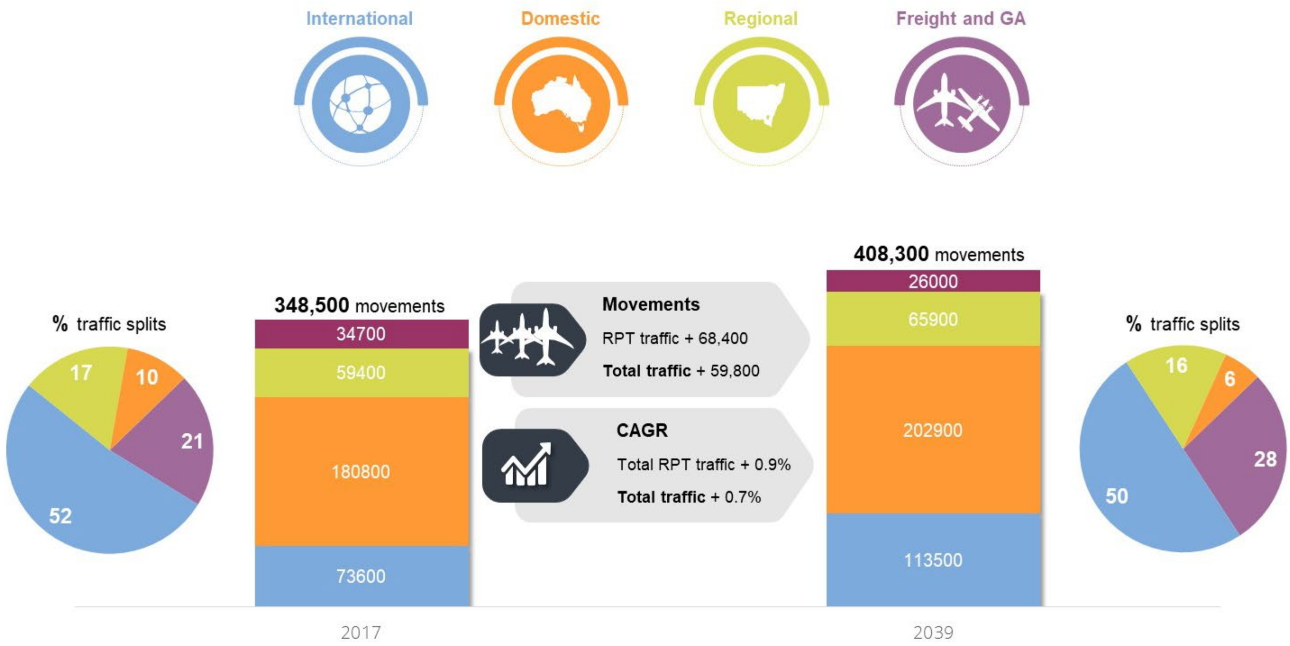


Figure 6.1 Sydney (Kingsford Smith) Airport aircraft movement growth forecast (adapted from the 2039 Master Plan)

In the absence of specific forecast growth data for jet departure operations off Runway 25, the generic annual growth percentages presented in Figure 6.1 above would be assumed to apply evenly across all the various operational sectors at Sydney (Kingsford Smith) Airport.

Chapter 7 Aircraft noise impact assessment

The aircraft noise assessment of the proposed new Runway 25 RICHMOND, KADOM and SHORE SIDs for departures to the north, east, west, and north-west from Sydney (Kingsford Smith) Airport considers those adjustments required in isolation. The information presented in this chapter describes the potential implications facilitated by the proposed individual procedure change only.

The predicted noise information and associated flight path corridors presented below are limited to overflight noise impacts associated with the proposed new Runway 25 KADOM, RICHMOND and SHORE SIDs only. They do not consider a cumulative impact and do not include other operations to or from Sydney (Kingsford Smith) Airport that may overfly that area.

For jet departures, number above (N-above) contours representing the number of events with modelled noise levels of 60 A-weighted decibels (dB(A)) or louder (N60) and 70 dB(A) or louder (N70) are presented in this Appendix.

The aircraft noise modelling and analysis has used the Aviation Environmental Design Tool (AEDT), an internationally recognised aircraft noise and emissions calculation program developed by the United States Federal Aviation Administration (US FAA). (The latest Version 3e of the AEDT software was used for this assessment.)

Noise modelling was based on the flight movements of the busiest day in October 2019 for Runway 25 departure operations and the transitions to waypoints KADOM, RICHMOND, and SHORE. As such, the results generated in the following analysis should be considered a “worst case” scenario, as an average or typical day of operations will have a reduced number of flights.

Based on the analysis of October 2019 aircraft movement data, a representative busy weekday would be expected to have around 168 jet departure flights on the proposed new SIDs – RICHMOND: 25 per day, KADOM: 47 per day, SHORE: 96 per day. The application of the forecast growth rates for movements of around one percent would see only slight increases in these flight numbers over the initial 5 years of WSI operations. (The southern Runway 25 SID to Wollongong remains unchanged and currently has 68 flights on the same representative busy day).

(The current Runway 25 jet departures to the south, of 68 flights on that representative busy day in October 2019, will be unchanged and will continue to track via waypoint ANKUB.)

Historically, Runway 25 at Sydney (Kingsford Smith) Airport is used for departures less than 4 per cent of total time.

7.1 Western and north-western destinations via waypoint KADOM

The aircraft noise assessment of the proposed new Runway 25 KADOM SID from Sydney (Kingsford Smith) Airport to western and north-western destinations is considered in isolation. The information presented in this chapter is targeted to describe the potential implications facilitated by the proposed individual procedure change only.

The N-above contours representing the number of events with modelled noise levels of 60 dB(A) or louder (N60) and 70 dB(A) or louder (N70) contours, and associated dwelling and population counts presented below are limited to aircraft overflight noise impacts associated with the proposed new Runway 25 KADOM SID only. They do not consider a cumulative impact and do not include impacts from other operations to or from Sydney (Kingsford Smith) Airport or operations associated with other Sydney Basin airports or LL transit flights that may overfly that area.

Figure 7.1 below presents the current versus proposed track dispersion for aircraft departing Sydney (Kingsford Smith) Airport via KADOM to western and north-western destinations. It is expected that the current broad dispersion corridor of flights because of the current radar vectoring will be significantly compressed to be closely positioned on the proposed new SID procedure backbone. The grey corridor on Figure 7.1 depicts the current flight path track dispersion of southern departures off Runway 25 which will remain unchanged.

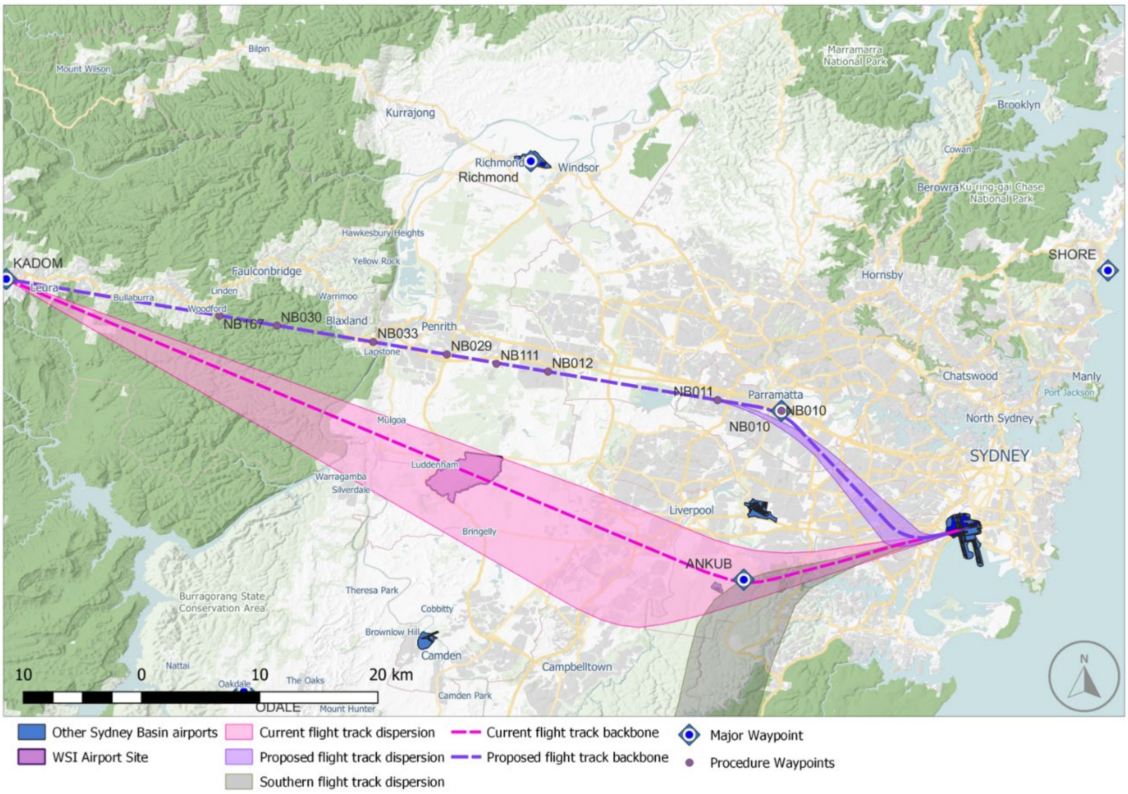


Figure 7.1 Runway 25 KADOM – jet departures flight path track dispersion – current departure versus proposed SID

Figure 7.2 to Figure 7.7 present N-above metrics (contours) for departure operations on the current departures and proposed future Sydney (Kingsford Smith) Airport KADOM SID procedure.

N60 Contours identify by a series of contour extents, areas that will be subjected to a number of overflight events that exceed a noise level of 60 dB(A) – 10 to 20, 20 to 50, and 50 to 100 overflights in a day (N60 24-hours).

Figure 7.2 and Figure 7.3 present the same N60 contours for the current KADOM departures, with Figure 7.3 presenting those contours zoomed in to aid in interpretation of their extents.

Similarly, Figure 7.4 and Figure 7.5 present the same N60 contours for the proposed new KADOM SID, with Figure 7.5 zoomed in to aid in interpretation of their extents.

N70 Contours identify by a series of contour extents, areas that will be subjected to a number of overflight events that exceed a noise level of 60 dB(A) – 5 to 10, 10 to 20, 20 to 50, and 50 to 100 overflights in a day (N70 24-hours).

Figure 7.6 presents the N70 contours for the current KADOM departures.

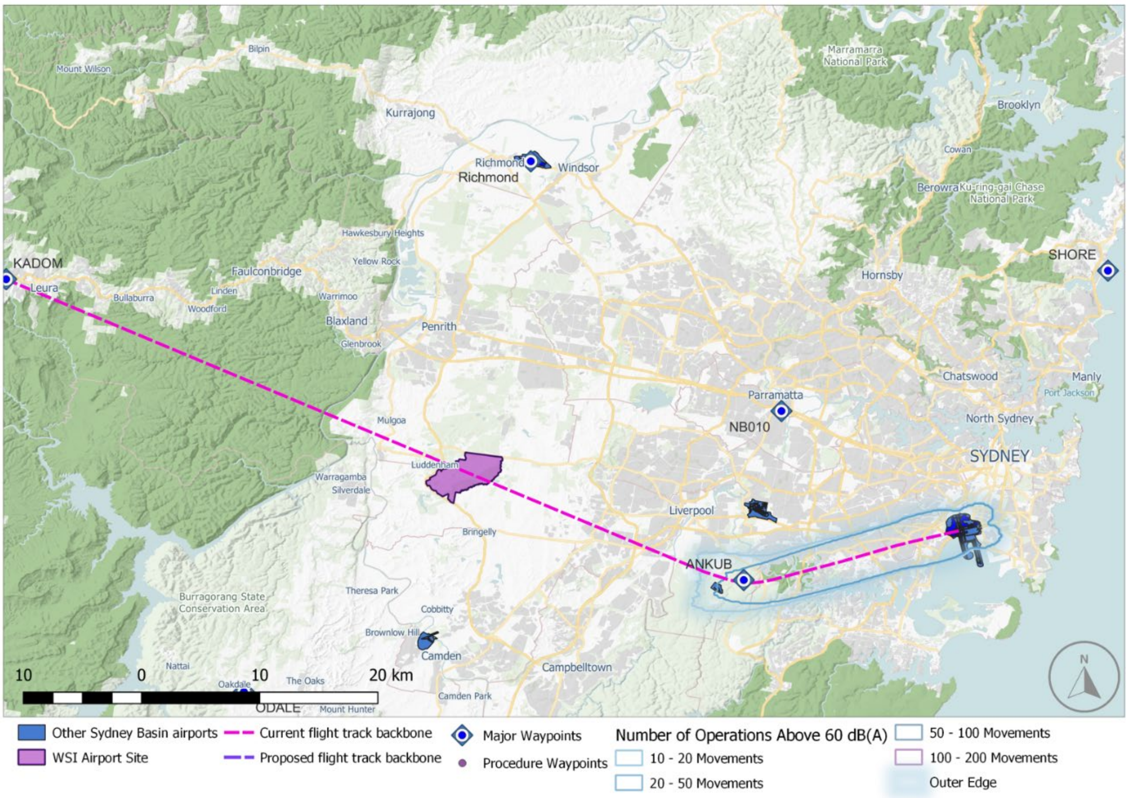


Figure 7.2 Runway 25 KADOM – jet departures – current N60 contours

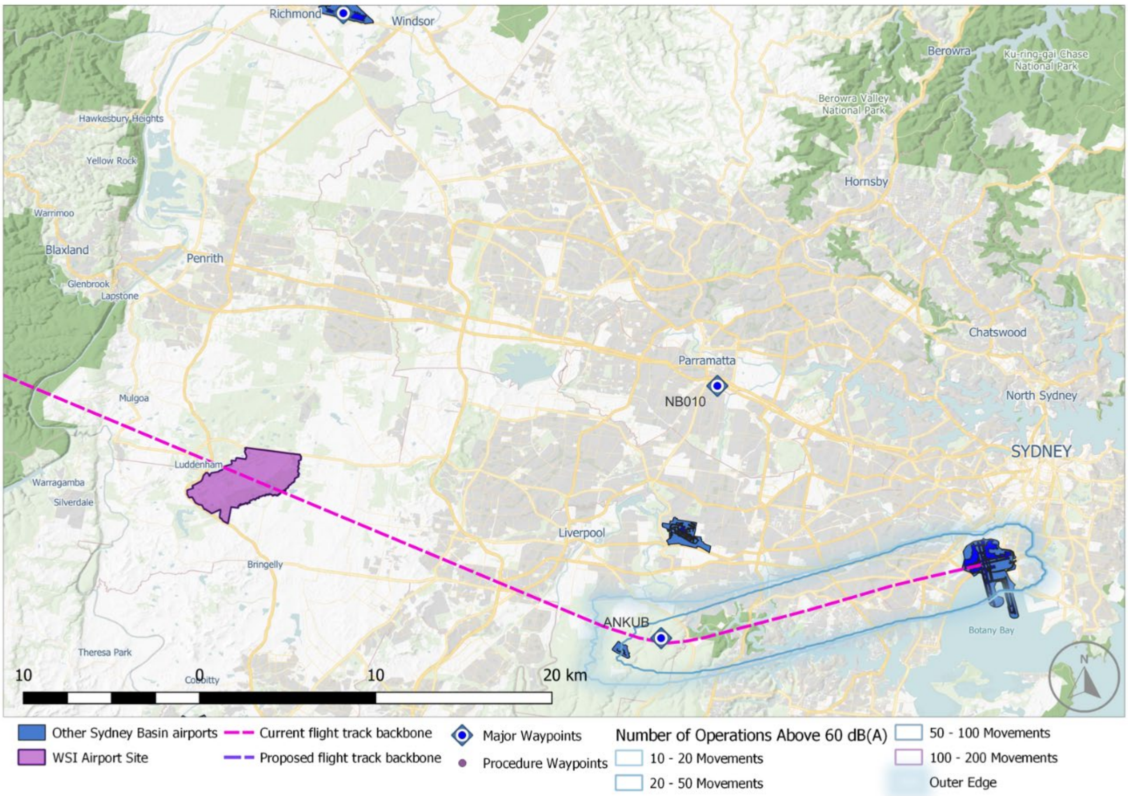


Figure 7.3 Runway 25 KADOM – jet departures – current N60 contours – zoomed in

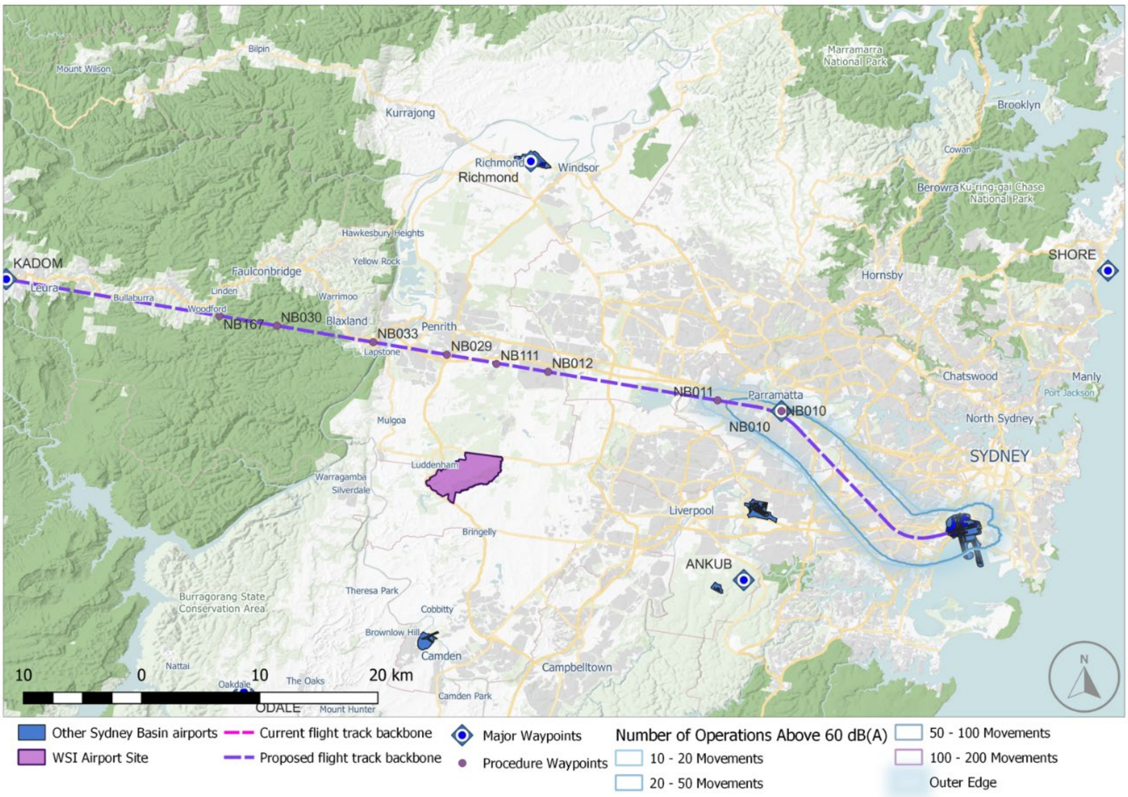


Figure 7.4 Proposed Runway 25 KADOM SID – jet departures – N60 contours

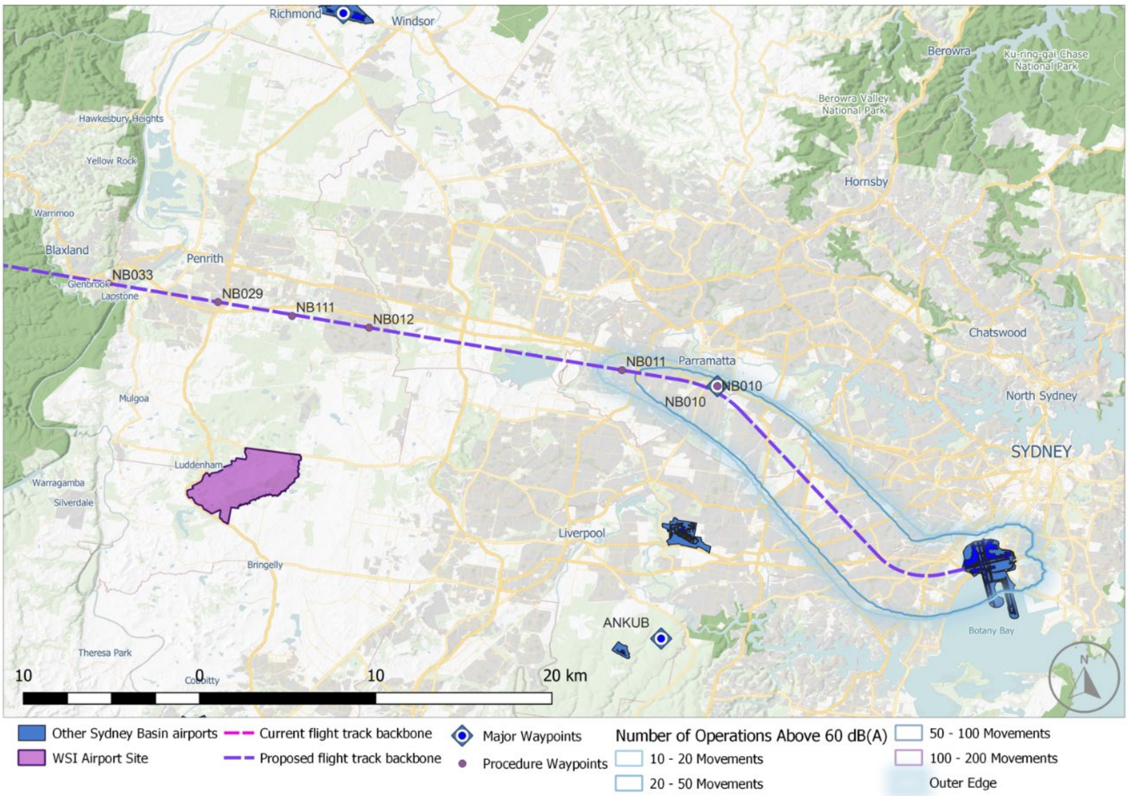


Figure 7.5 Proposed Runway 25 KADOM SID – jet departures – N60 contours – zoomed in

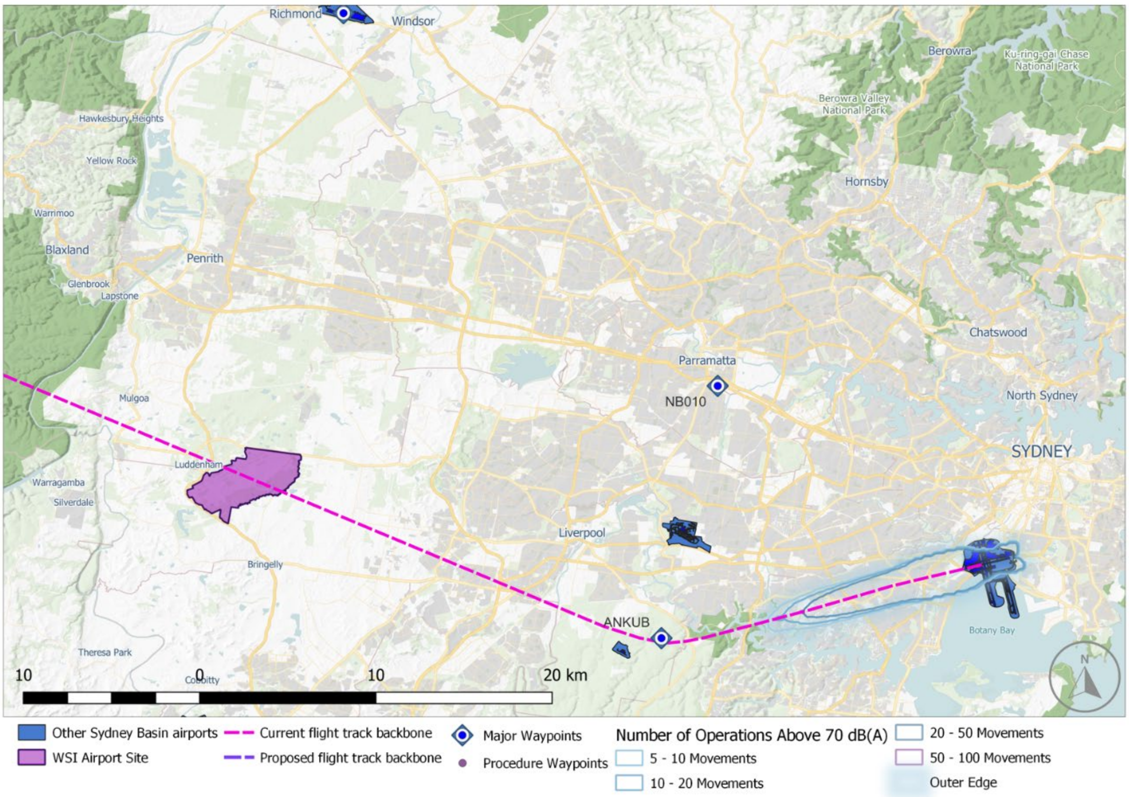


Figure 7.6 Runway 25 KADOM – jet departures – current N70 contours

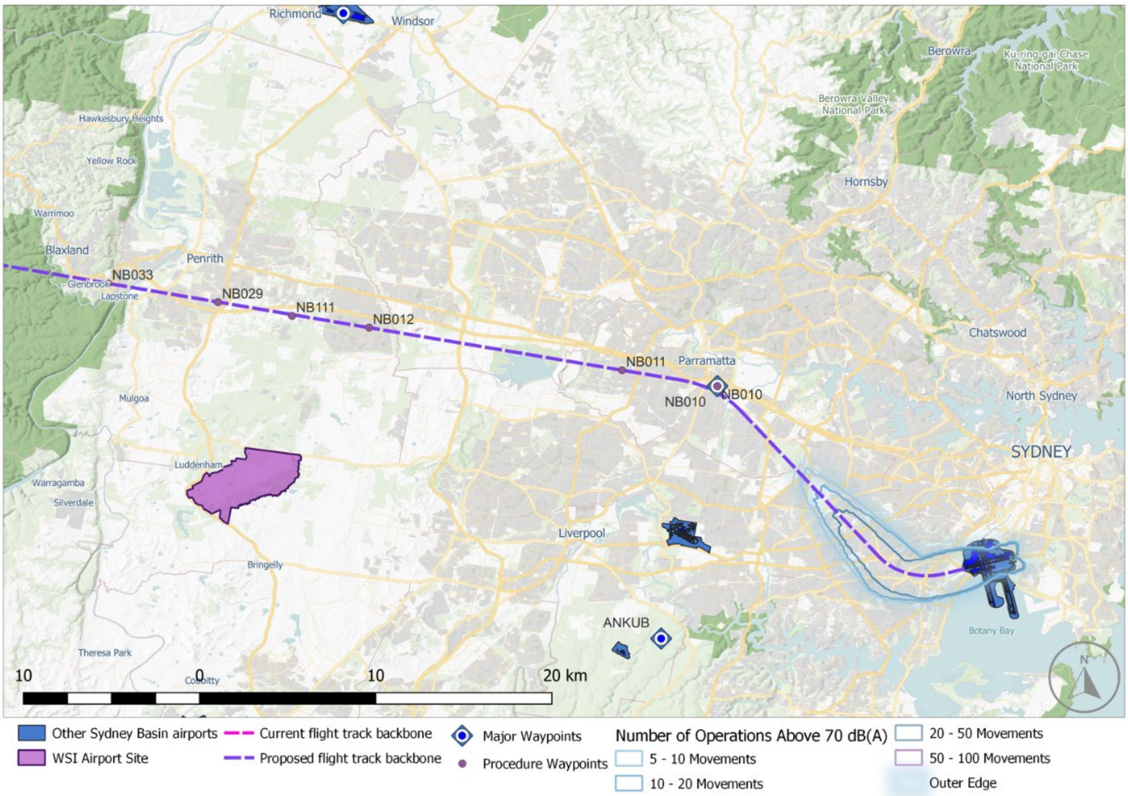


Figure 7.7 Proposed Runway 25 KADOM SID – jet departures – N70 contours

7.2 Northern destinations via waypoint RICHMOND

The N60, N70 contours and associated dwelling and population counts presented below are limited to overflight noise impacts associated with the proposed new Runway 25 RICHMOND SID only, and do not consider a cumulative impact. They do not include impacts from other operations to or from Sydney (Kingsford Smith) Airport or operations associated with other Sydney Basin airports or transit flights that may overfly that area.

Figure 7.8 below presents the current versus proposed flight path track dispersion for aircraft departing Sydney (Kingsford Smith) Airport via Richmond NDB to north-western destinations. It is expected that the current broad dispersion corridor of flights as a result of the current radar vectoring will be significantly compressed to be closely positioned on the procedure backbone.

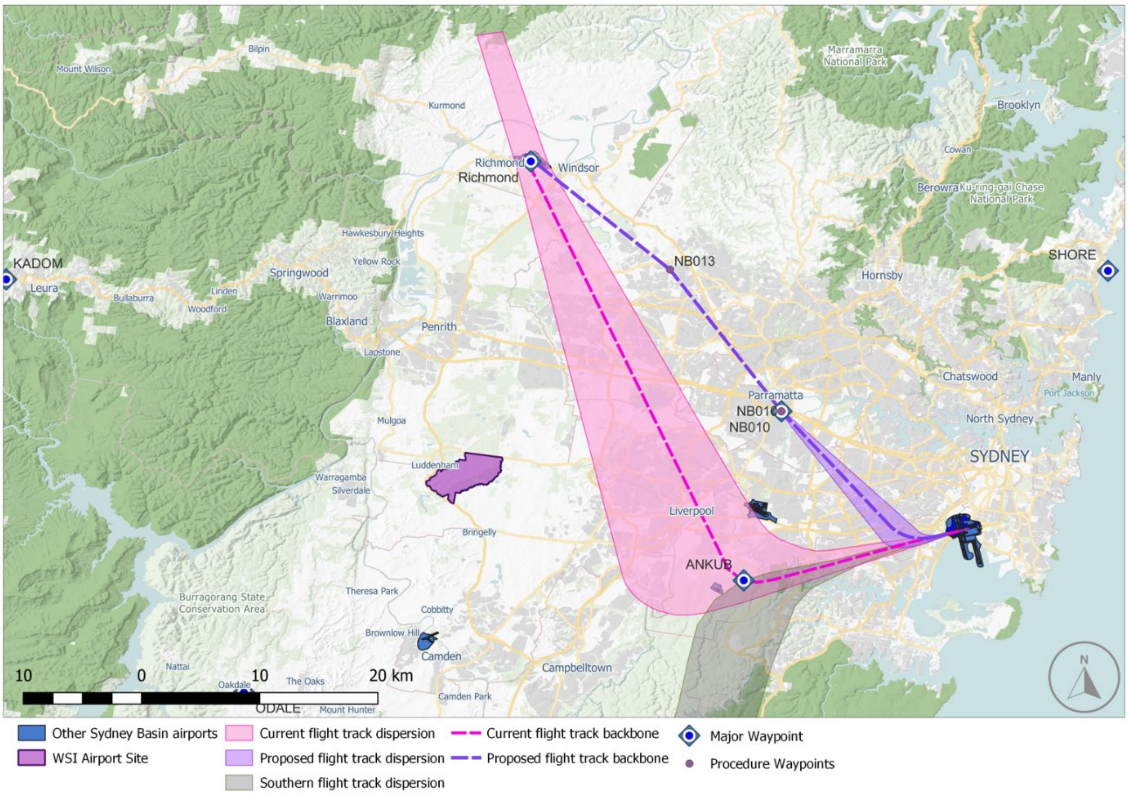


Figure 7.8 Runway 25 Richmond – jet departures flight path track dispersion – current departures versus proposed SID

Figure 7.9 to Figure 7.14 below present N-above metrics (contours) for departure operations on the current departures and proposed future Runway 25 RICHMOND SID procedure at Sydney (Kingsford Smith) Airport.

N60 Contours identify by a series of contour extents, areas that will be subjected to a number of overflight events that exceed a noise level of 60 dB(A) – 10 to 20, 20 to 50, and 50 to 100 overflights in a day (N60 24-hours).

Figure 7.9 and Figure 7.10 present the same N60 contours for the current Runway 25 RICHMOND SID, with Figure 7.10 presenting those contours zoomed in to aid in interpretation of their extents.

Similarly, Figure 7.11 and Figure 7.12 present the same N60 contours for the proposed future Runway 25 RICHMOND SID, with Figure 7.12 zoomed in to aid in interpretation of their extents.

N70 Contours identify by a series of contour extents, areas that will be subjected to a number of overflight events that exceed a noise level of 60 dB(A) – 5 to 10, 10 to 20, 20 to 50, and 50 to 100 overflights in a day (N70 24-hours).

Figure 7.13 presents the N70 contours for the current Runway 25 RICHMOND SIDs.

Figure 7.14 presents the N70 contours for the proposed new Runway 25 RICHMOND SID.

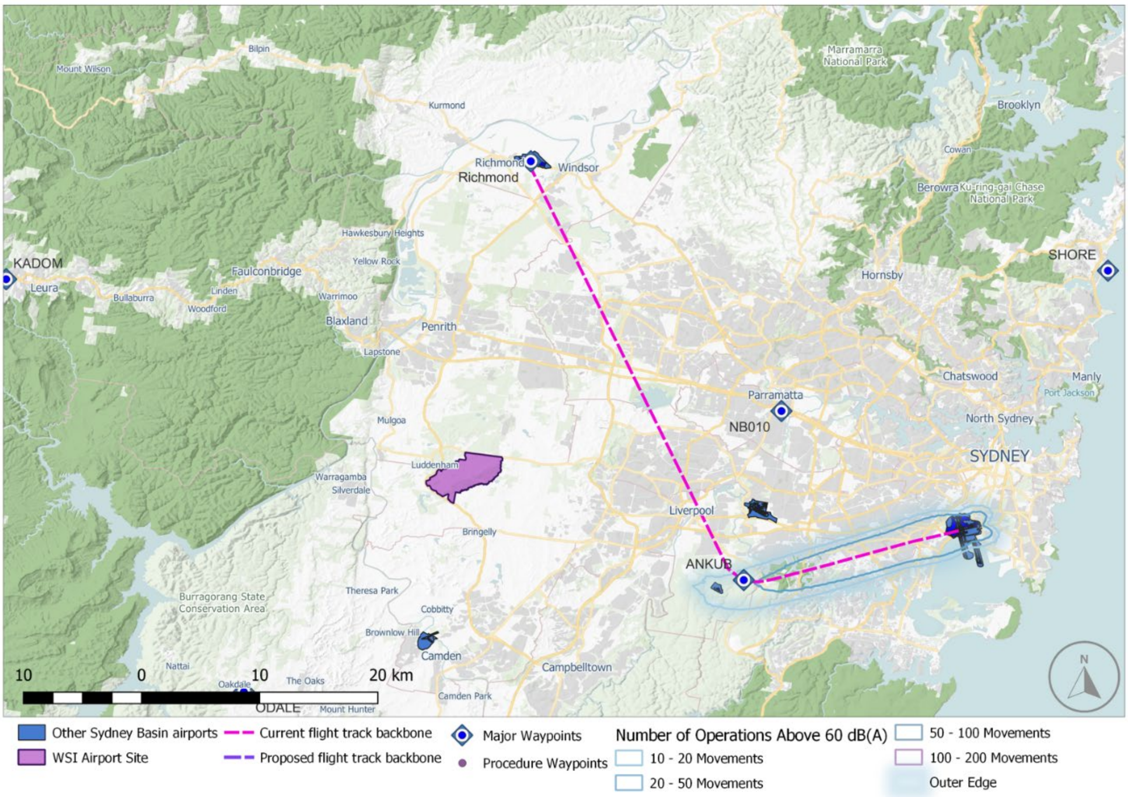


Figure 7.9 Runway 25 RICHMOND departures – current N60 contours

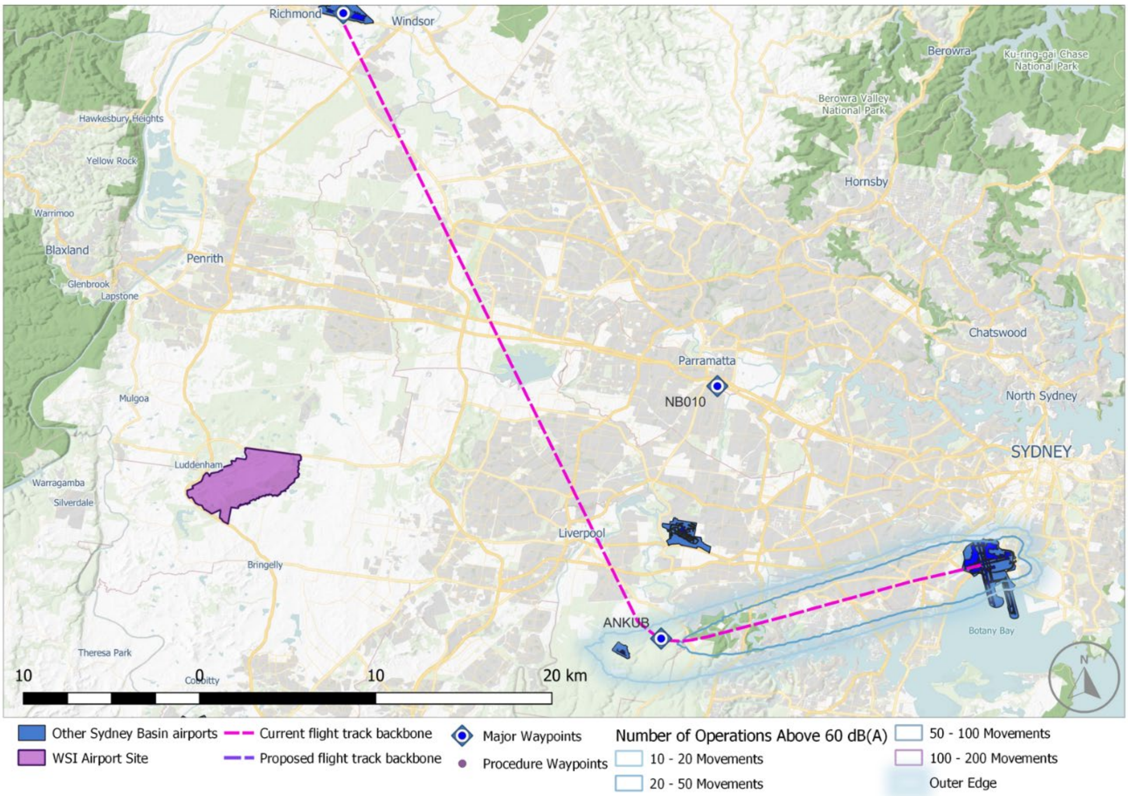


Figure 7.10 Runway 25 RICHMOND departures – current N60 contours – zoomed in

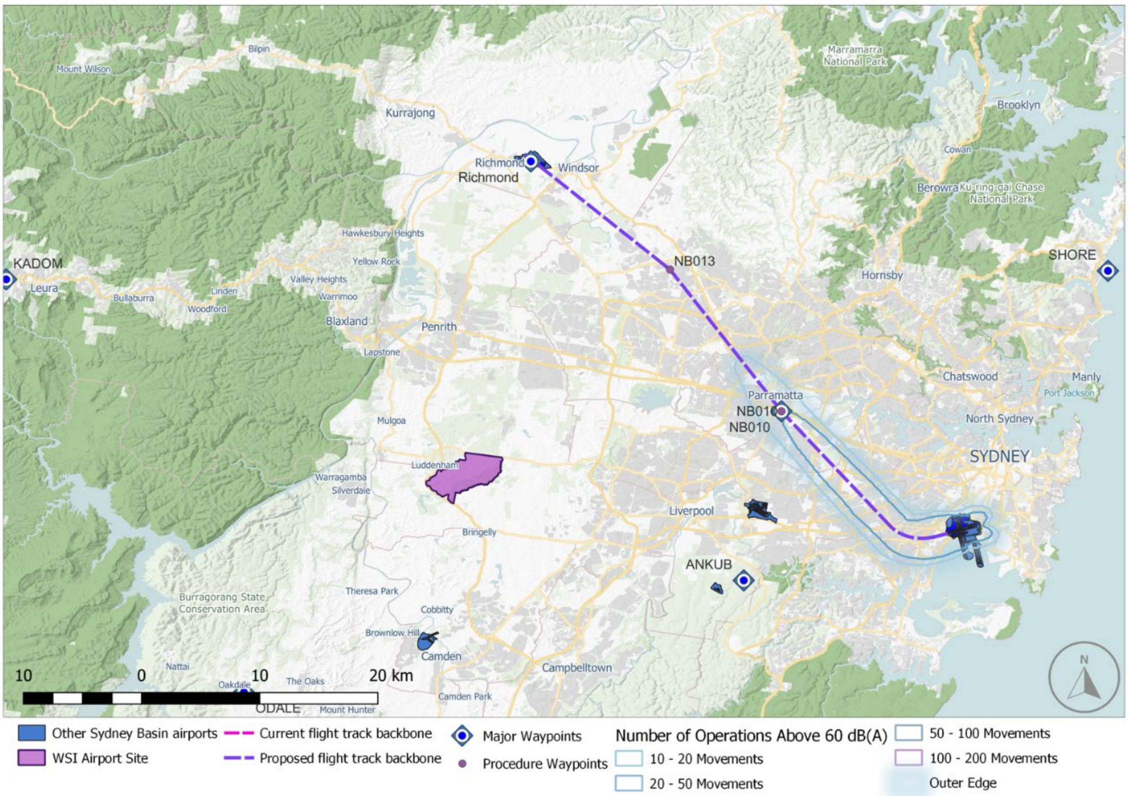


Figure 7.11 Proposed Runway 25 RICHMOND SID – N60 contours

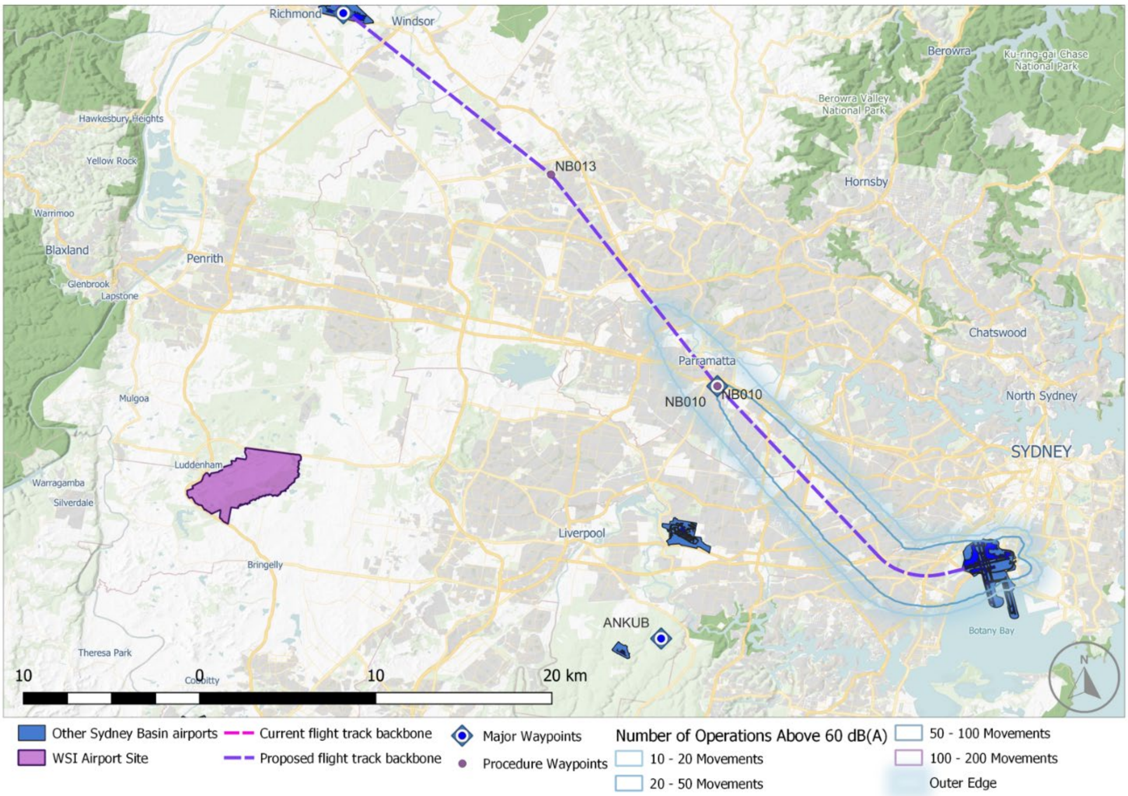


Figure 7.12 Proposed Runway 25 RICHMOND SID – N60 contours – zoomed in

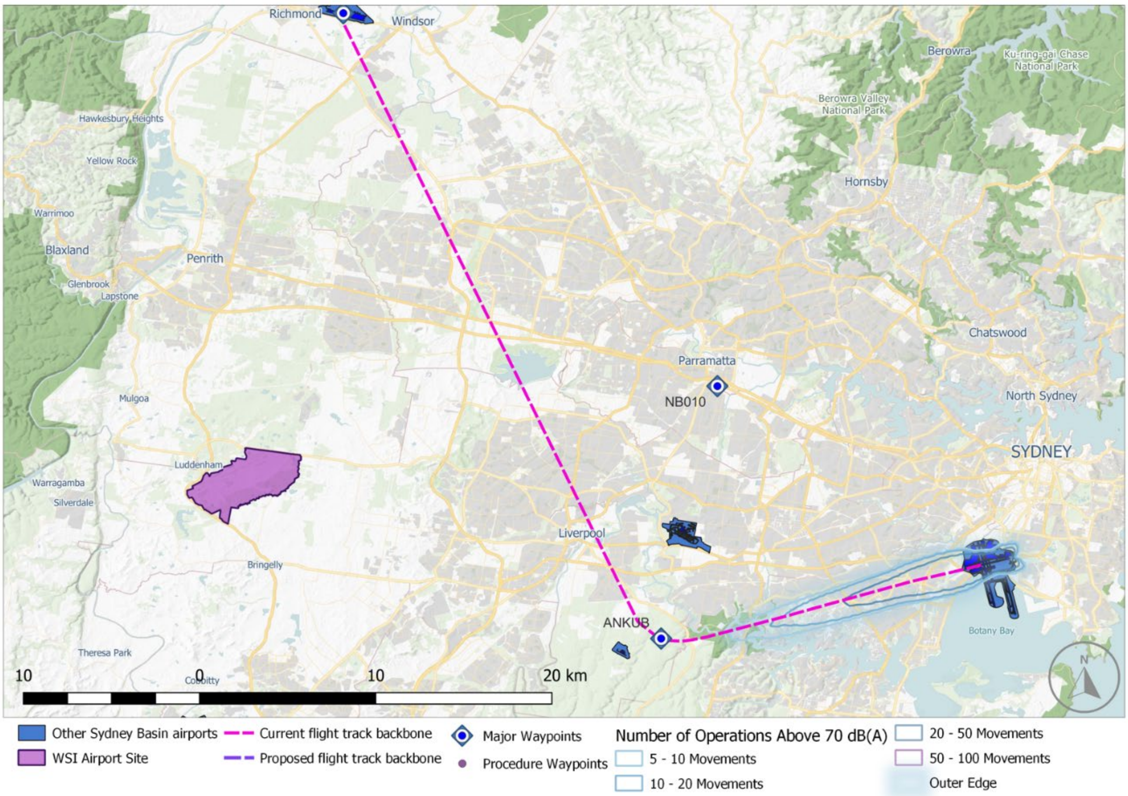


Figure 7.13 Runway 25 RICHMOND departures – current N70 contours

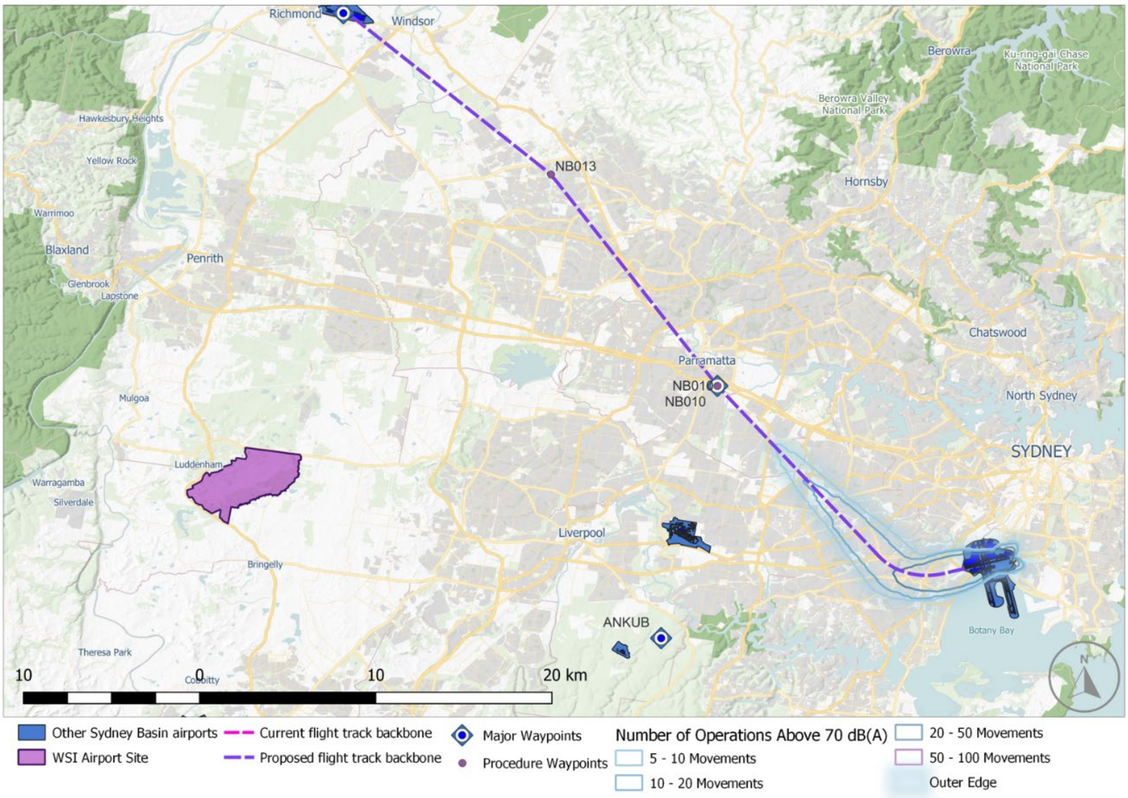


Figure 7.14 Proposed future Runway 25 RICHMOND SID – N70 Contours

7.3 Northern and eastern (oceanic) destinations via waypoint SHORE

The aircraft noise assessment of the adjustments required to northern jet departures off Runway 25 to waypoint SHORE from Sydney (Kingsford Smith) Airport is considered in isolation. The information presented in this section of the Appendix is targeted to describe the potential implications facilitated by the proposed individual procedure change only.

The N60, N70 contours and associated dwelling and population counts presented below are limited to overflight noise impacts associated with the proposed new Runway 25 SHORE SID only, and do not consider a cumulative impact and do not include impacts from other operations to or from Sydney (Kingsford Smith) Airport or operations associated with other Sydney Basin airports or transit flights that may overfly that area.

Figure 7.15 below presents the current versus proposed track dispersion for aircraft departing Sydney (Kingsford Smith) Airport to SHORE to north-eastern destinations. It is expected that the current broad dispersion corridor of flight tracks will be significantly compressed to be closely positioned on the procedure backbone for aircraft flying the procedure.

Based on advice provided by Airservices Australia, the adoption of the proposed change to the Runway 25 SHORE SID will undergo a series of utilisation stages. On the design finalisation and publication of the SID as an available procedure in the AIP DAP, its application is expected to be for most flights operating to north and east destinations off Runway 25.

Following a short spike of high usage immediately after implementation, decreasing over 6–18 months to a point where most aircraft are provided with a more expeditious flight path through radar vectoring and direct tracking. As WSI operations are anticipated to steadily increase over time, it is expected that application of the SID will increase and likely be adopted for around half of flights departing in that direction at 5 years post WSI operations may be radar vectored away from the proposed procedure resulting in a similar track dispersion as currently is experienced over the outer north-eastern suburbs.

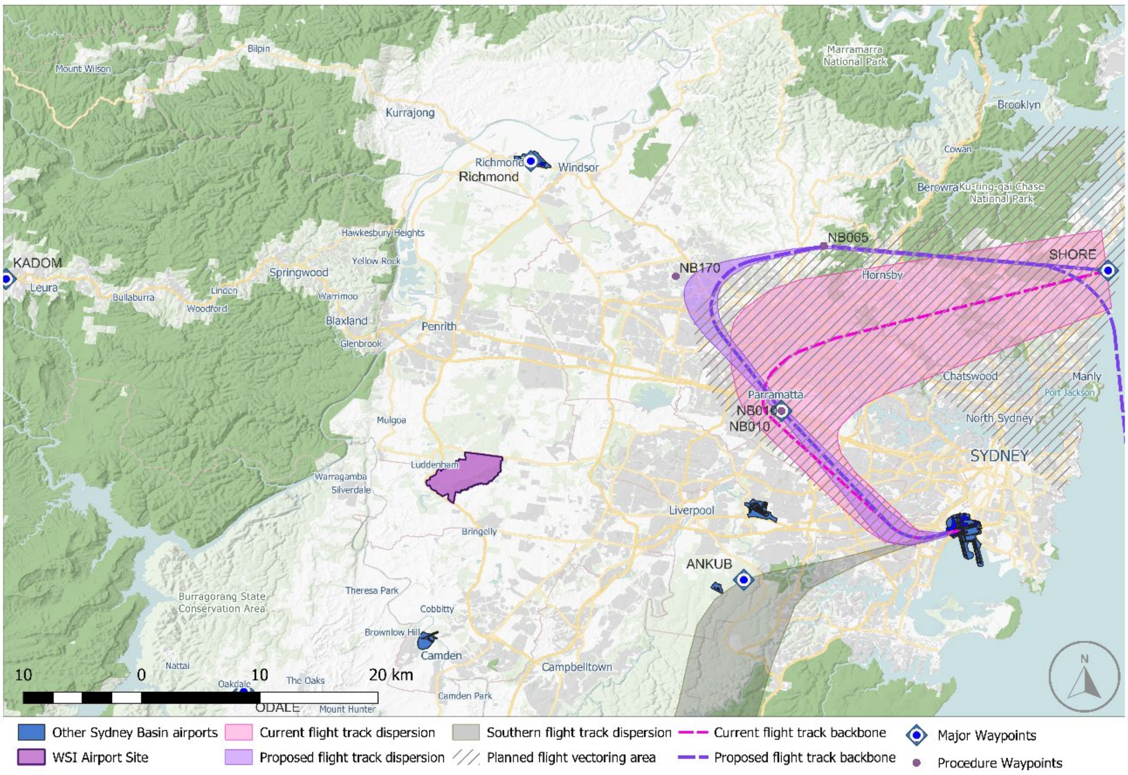


Figure 7.15 Runway 25 SHORE – jet departures flight path track dispersion – current versus proposed SID

Figure 7.16 to Figure 7.21 below present N-above metrics (contours) for departure operations on the current departures and proposed future Runway 25 SHORE SID procedure at Sydney (Kingsford Smith) Airport.

N60 Contours identify by a series of contour extents, areas that will be subjected to a number of overflight events that exceed a noise level of 60 dB(A) – 10 to 20, 20 to 50, and 50 to 100 overflights in a day (N60 24-hours).

Figure 7.16 and Figure 7.17 present the same N60 contours for the current SHORE departures, with Figure 7.10 presenting those contours zoomed in to aid in interpretation of their extents.

Similarly, Figure 7.18 and Figure 7.19 present the same N60 contours for the proposed future Runway 25 SHORE SID at Sydney (Kingsford Smith) Airport, with Figure 7.12 zoomed in to aid in interpretation of their extents.

N70 Contours identify by a series of contour extents, areas that will be subjected to a number of overflight events that exceed a noise level of 60 dB(A) – 5 to 10, 10 to 20, 20 to 50, and 50 to 100 overflights in a day (N70 24-hours).

Figure 7.20 presents the N70 contours for the current Runway 25 SHORE SID.

Figure 7.21 presents the N70 contours for the proposed new Runway 25 SHORE SID.

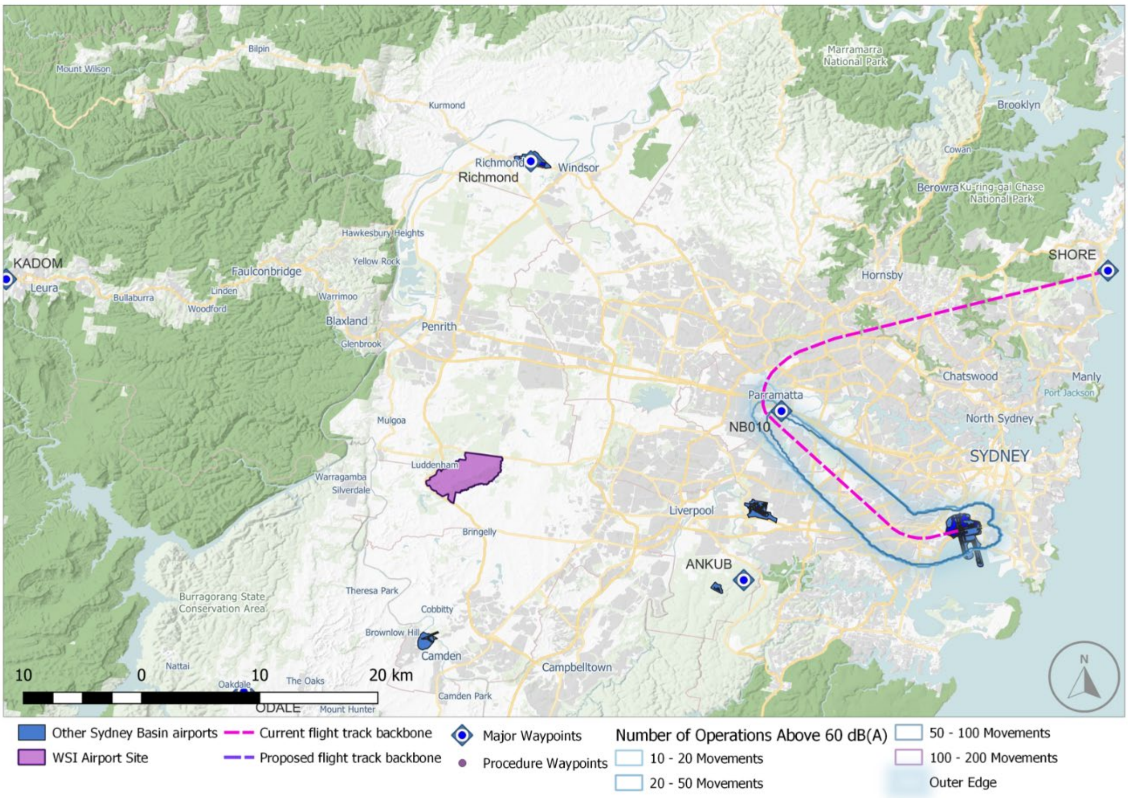


Figure 7.16 Runway 25 SHORE departures – current N60 contours

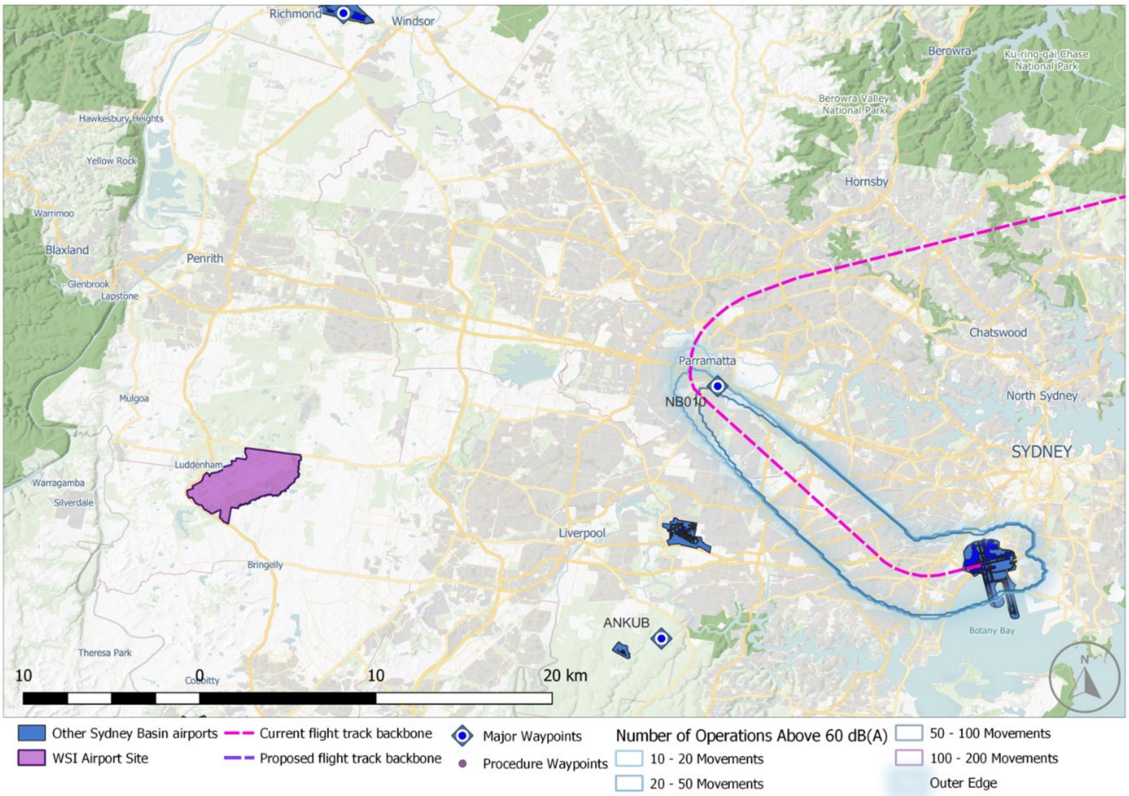


Figure 7.17 Runway 25 SHORE departures – current N60 contours – zoomed in

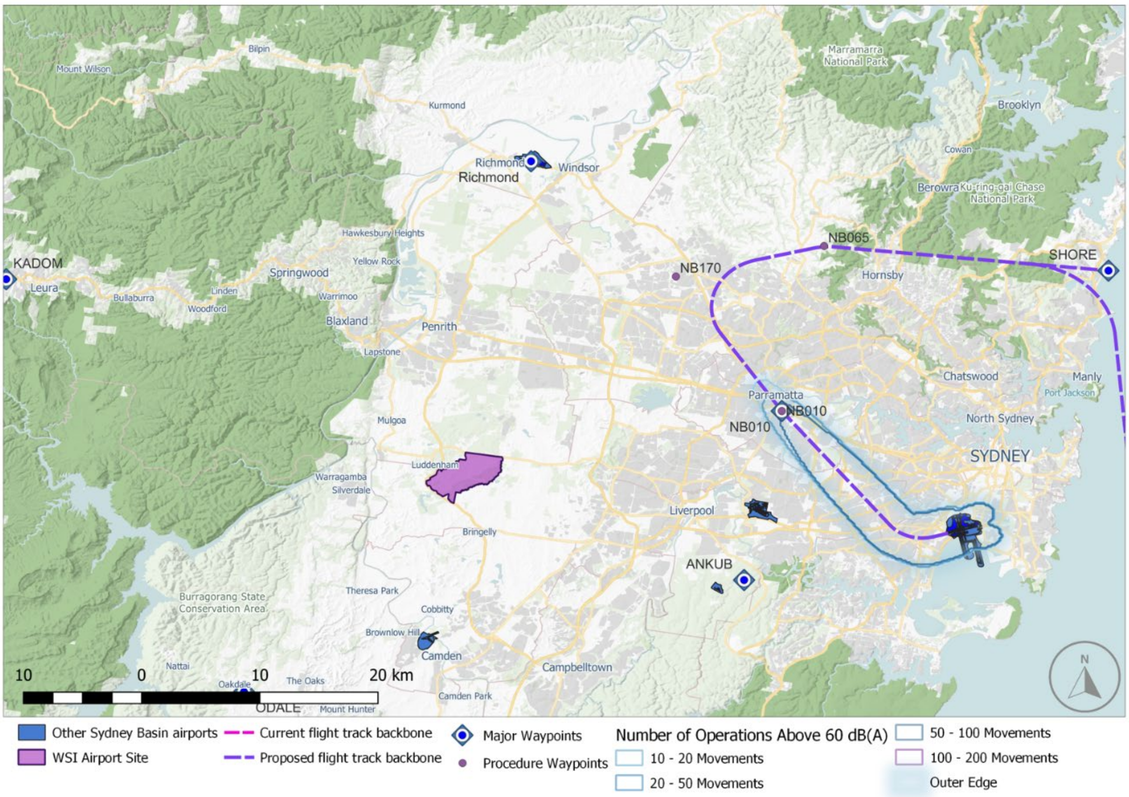


Figure 7.18 Proposed Runway 25 SHORE SID – N60 contours

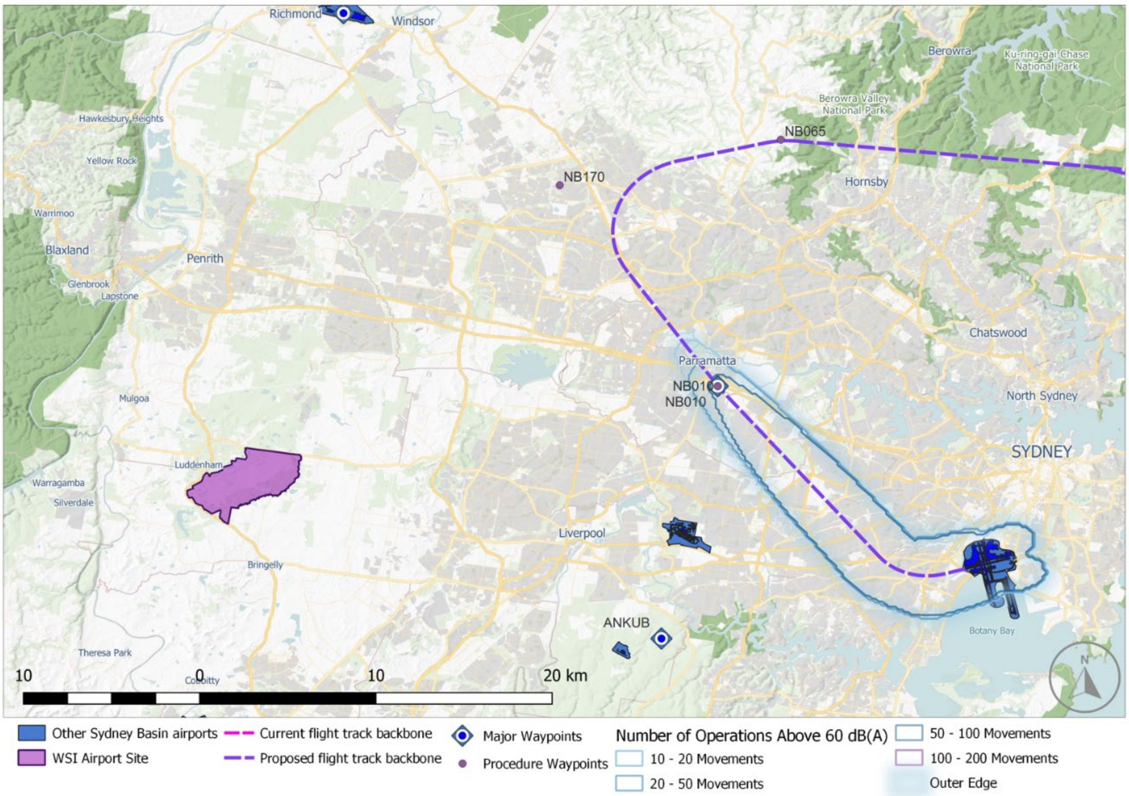


Figure 7.19 Proposed Runway 25 SHORE SID – N60 contours – zoomed in

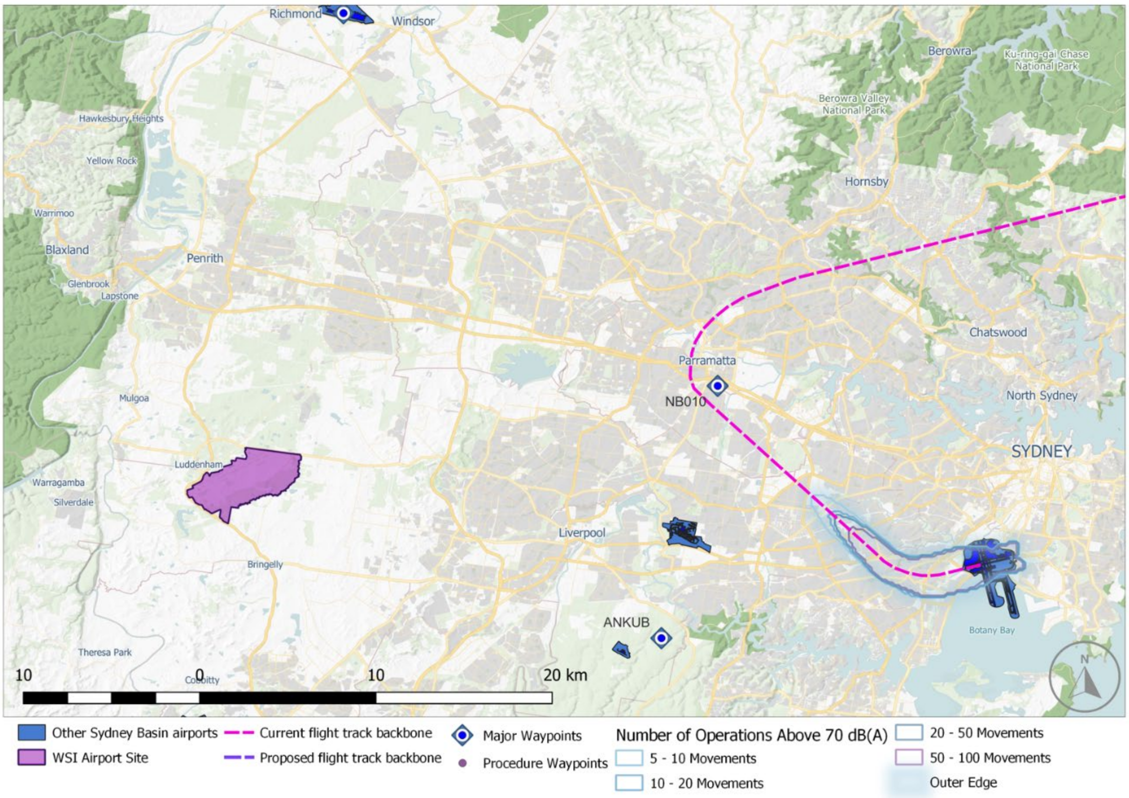


Figure 7.20 Runway 25 SHORE departures – current N70 contours

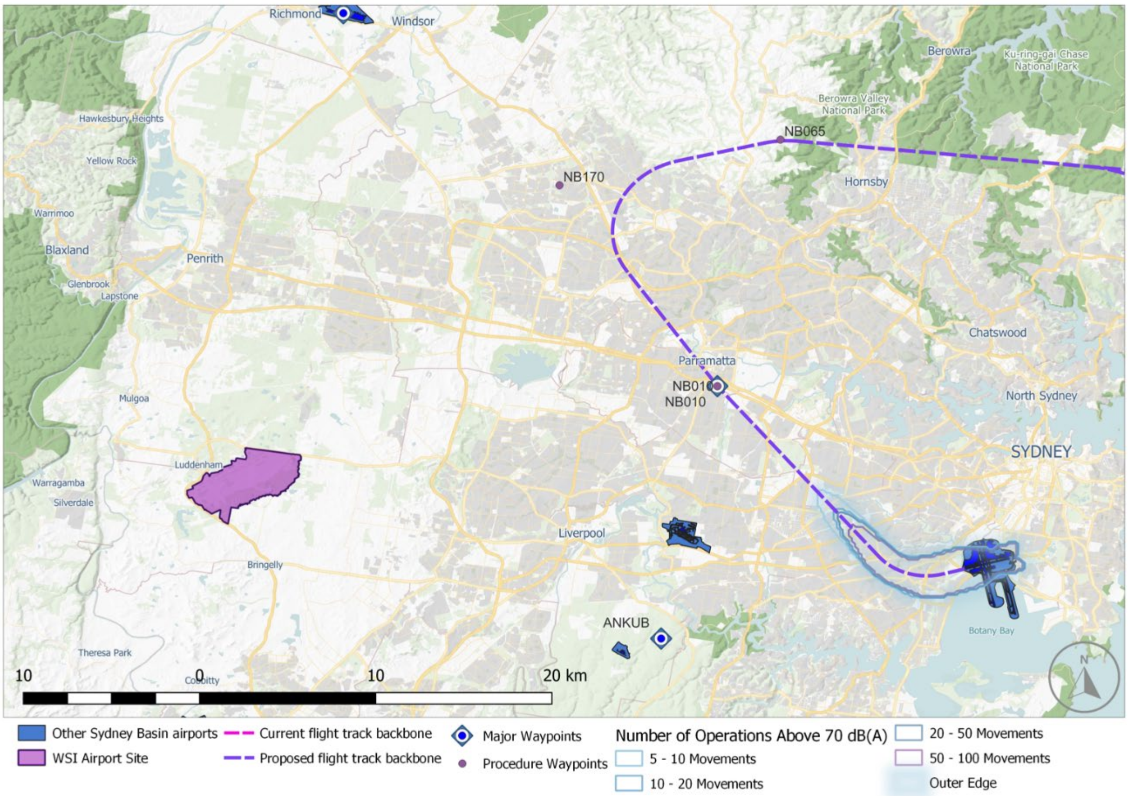


Figure 7.21 Proposed Runway 25 SHORE SID – N70 contours

7.4 Dwelling and population counts within N60 and N70 contours

Table 7.1 presents dwelling and population count estimates for the busiest day, not an average or typical day (refer to Chapter 7 introduction), compiled utilising 2021 census data obtained from the Australian Bureau of Statistics (ABS), within the N60 and N70 contour extents for current jet departures off Runway 25 and the proposed new Runway 25 SIDs to KADOM, RICHMOND, and SHORE from Sydney (Kingsford Smith) Airport. (Dwelling counts are presented for the area defined by the outer contour – N60 for 10 and above overflights, and N70 for 5 and above overflights.)

This increase in expected noise and visual amenity impacts should be tempered by the low average utilisation of Runway 25 departures of around only 4 per cent of annual operations at Sydney (Kingsford Smith) Airport.

As described at the start of Chapter 7 of this Appendix, noise modelling (N60 and N70 contours) was based on the flight movements of the busiest day in October 2019 for Runway 25 departure operations and the transitions to KADOM, RICHMOND, and SHORE. As such, the results generated in the following Tables 7.1 and 7.2 for area, dwelling and population count analysis should be considered a “worst case” scenario, as an average or typical day of operations will have a reduced number of flights.

Table 7.1 Dwelling and population counts within N60 and N70 contours

Noise contour	SID segment	Current			Proposed future		
		Area sq km	Dwelling count	Population count	Area sq km	Dwelling count	Population count
N60 (24-hour) 10 and above movements	**KADOM**	127	126,988	319,821	139	212,882	556,239
N60 (24-hour) 10 and above movements	**SHORE**	117	177,392	460,959	117	181,647	463,177
N60 (24-hour) 10 and above movements	**RICHMOND**	105	114,948	288,179	124	196,031	496,327
N70 (24-hour) 5 and above movements	**KADOM**	36	55,240	138,928	44	64,219	162,663
N70 (24-hour) 5 and above movements	**SHORE**	31	43,525	108,237	31	43,687	108,100
N70 (24-hour) 5 and above movements	**RICHMOND**	37	55,126	138,867	43	57,654	145,167

Table 7.2 Dwelling and population counts within N60 and N70 contours – percentage change

Noise contour	SID segment	Proposed V current future procedure		
		Area sq km Percentage change	Dwelling count Percentage change	Population count Percentage change
N60 (24-hour) 10 and above movements	**KADOM**	+ 9.4 per cent	+ 67.6 per cent	+73.9 per cent
N60 (24-hour) 10 and above movements	**SHORE**	No change	+ 2.4 per cent	+ 0.5 per cent
N60 (24-hour) 10 and above movements	**RICHMOND**	+ 18.1 per cent	+ 70.5 per cent	+ 72.2 per cent
N70 (24-hour) 5 and above movements	**KADOM**	+ 22.2 per cent	+ 16.3 per cent	+ 17.1 per cent
N70 (24-hour) 5 and above movements	**RICHMOND**	No change	+ 0.4 per cent	- 0.1 per cent
N70 (24-hour) 5 and above movements	**SHORE**	+ 16.2 per cent	+ 4.6 per cent	+ 4.5 per cent

Table 7.2 identifies increases in area (square kilometres (km^2)), dwelling counts, and population counts within the outer N60 and N70 contours as a result of the proposed Runway 25 SIDS changes. These increases are attributable to the early initial and immediate turn off the Runway 25 alignment, particularly for the KADOM and Richmond direction SID segments. Despite a general reduction in flight path track dispersion after the initial turn as shown in Figures 7.22 to 7.24 the initial part of the SID procedure is over high-density areas of Sydney.

7.5 Suburb overlays

Figures 7.22 to 7.24 show the current and proposed flight path track dispersion corridors (refer Figures 7.1 and 7.6 of this Appendix) combined with a suburb boundary and suburb name overlay, to aid stakeholders in identifying their location of interest associated with the proposed changes to the Sydney (Kingsford Smith) Runway 25 RICHMOND, KADOM and SHORE SIDs.

(Current dispersion corridor is depicted in pink and proposed future dispersion corridor in purple.)

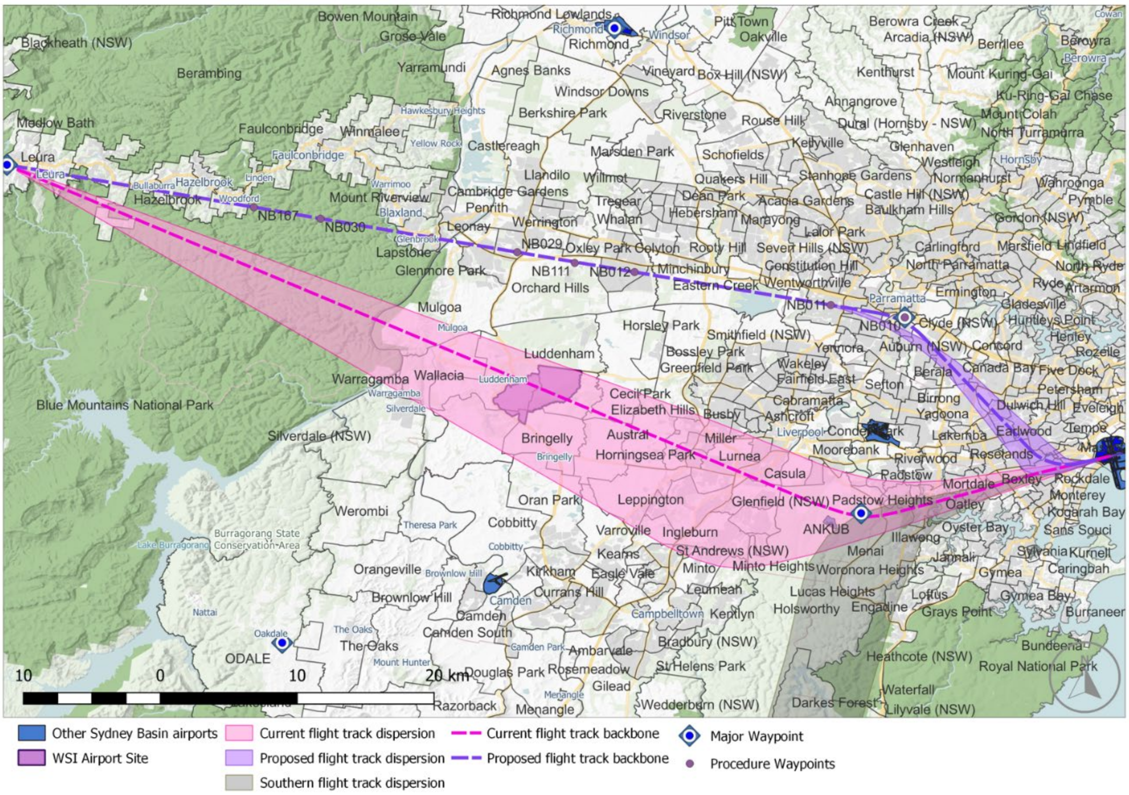


Figure 7.22 Proposed Runway 25 SID to waypoint KADOM – suburb overlay

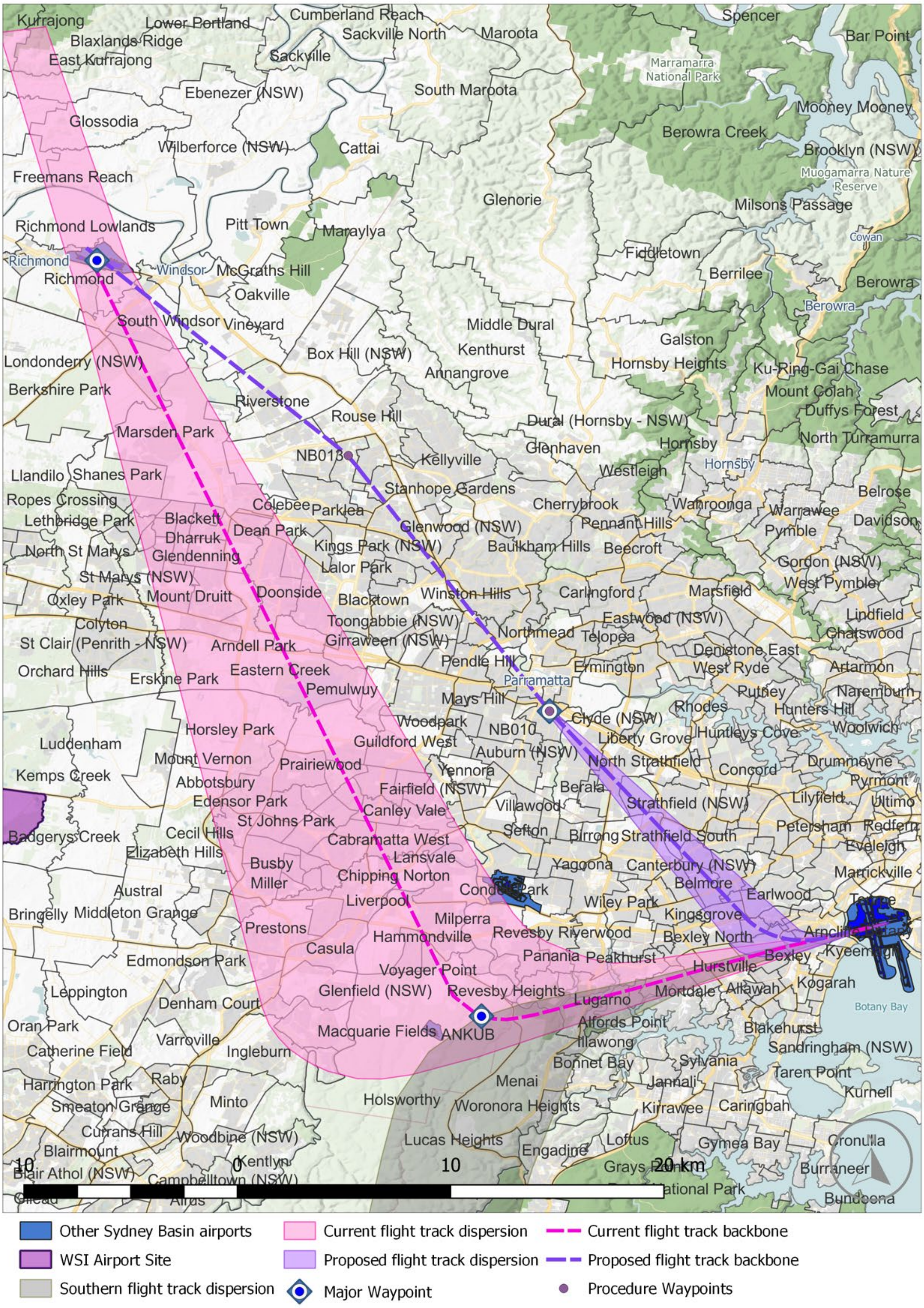


Figure 7.23 Proposed Runway 25 SID to RICHMOND – suburb overlay

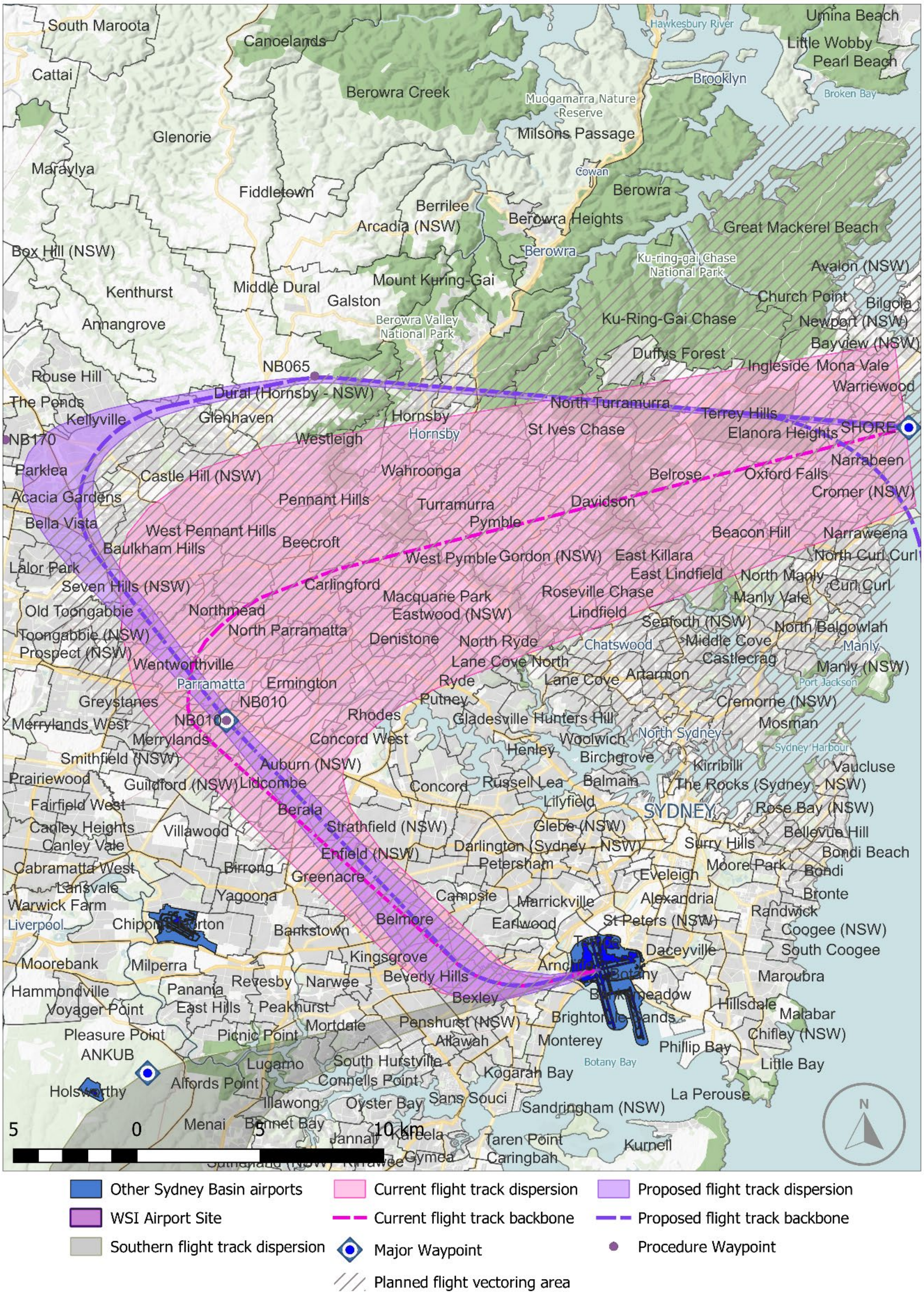


Figure 7.24 Proposed Runway 25 SID to waypoint SHORE – suburb overlay

Chapter 8 Other environmental factors

8.1 Visual amenity

Runway 25 is used as the departure runway at Sydney (Kingsford Smith) Airport less than 4 per cent of the time.

Aircraft for southern destinations will continue to fly the existing departure from Runway 25 (refer to Figure 4.2).

Due to the change to Runway 25 departures and proposed new SIDs at Sydney (Kingsford-Smith) Airport, a substantial area of Western Sydney currently overflown by departing jet aircraft will no longer see aircraft departing Runway 25 for western and north-western destinations. As described in Chapters 6 and 7 of this Appendix, these aircraft will now follow a common SID track to a new waypoint NB010. This nominal backbone track is currently used by all northern and eastern departures from Runway 25 and will continue to be used by them after WSI commences single runway operations.

At the new waypoint NB010 the flight paths split with aircraft following different paths depending on their destination.

For westerly destinations, aircraft will turn westbound on the SID and will track via waypoints NB011 and NB012 to waypoint KADOM. Communities (refer to Figure 7.22) under this proposed new flight track will see aircraft overhead when Runway 25 is the departure runway at Sydney (Kingsford Smith) Airport (less than 4 per cent of the time).

For aircraft tracking to the north-west via waypoint Richmond, at waypoint NB010 they will track directly to waypoint NB013 and then direct to waypoint Richmond. Communities (refer to Figure 7.23) under this proposed new flight track will see aircraft overhead when Runway 25 is the departure runway at Sydney (Kingsford Smith) Airport (less than 4 per cent of the time).

For aircraft departing to waypoint SHORE, whilst a proposed new SID has been designed, the expected continuation of a significant amount of radar vectoring for northern and eastern departures (as described in Section 5.2) is expected to see little variation in the visibility of aircraft over the northern and north-eastern metropolitan area.

8.2 Radar vectoring

In locations where no SIDs or STARs are available for an aircraft's particular operation, or where adverse weather requires the cancellation of a SID or STAR for safety reasons, air traffic control will provide radar vectoring to safely manage those applicable operating aircraft. Radar vectoring involves air traffic control determining a safe path for all aircraft and issuing heading and sometimes altitude and speed instructions to one or more aircraft to avoid any possible conflictions. While the objective of a set of SIDs and STARs in terminal airspace designed under “Safety by Design” principles is for onboard flight management systems monitored by air traffic control to ensure aircraft remain separated, there are occasions where SIDs and STARs are cancelled for varied reasons and aircraft are radar vectored.

A cancellation of a SID or STAR resulting in radar vectoring involving a departure from lateral track, could also involve a variation in vertical profile or speed requirements and may be either at pilot request or initiated by air traffic control.

Pilot requests for departing from a SID may be for:

- route efficiency – where there is a more direct route to the destination than the published procedure allows, saving time, fuel and carbon emissions
- weather avoidance – particularly around turbulence associated with thunderstorms.

Pilot requests in all instances are subject to air traffic control approval. Avoidance of thunderstorms which has a safety priority is readily approved. Direct routing requests will be considered by air traffic control in light of safety and overall management of other aircraft within the vicinity.

Air traffic control-initiated cancellations of SIDs can also be for reasons of route efficiency, better noise outcomes or better emissions outcomes. Separation requirements with other departing, arriving or transiting aircraft can also necessitate the cancellation of a SID.

Any one of the 3 elements (track, vertical profile, speed) of a SID can be cancelled individually or collectively.

Aircraft will eventually either re-join the published procedure at a later waypoint or will connect with the enroute network at a designated waypoint.

Radar vectoring off this proposed new SID track for reasons other than safety and inclement weather avoidance will be largely confined to northern and eastern departures (SHORE) as described in Section 5.2 of this Appendix.

There will be little opportunity and little need for radar vectoring on the western and north-western components of this proposed new SID.

8.3 Track distances and emissions

The track distance for jet aircraft departing off the proposed new Runway 25 KADOM SID compared to the distance for current Runway 25 departures to waypoint KADOM, is only marginally different in distance. (A more precise calculation of this difference cannot be made due to the broad dispersion corridor of current departures associated with variation in assigned track heading on reaching 3,000 ft on departure – refer to Figure 7.1.)

The practice of continuing with radar vectoring for aircraft on the SHORE transition should result in only minimal cumulative change to both track distances and emissions, and as the timing of radar vectoring is a tactical issue it is not possible to measure any quantifiable change either positive or negative. The broad spread of current flight paths of aircraft being radar vectored for northern and eastern departures off Runway 25, makes comparison of track distances with a varying number of aircraft potentially flying the full proposed new Runway 25 SHORE SID procedure impractical.

The track distances for jet aircraft departing off the proposed new Runway 25 RICHMOND SID compared to the distance for current Runway 25 departures to waypoint Richmond is approximately a 6 nm (11 km) reduction.

The potential impact of this track distance reduction on a selection of representative widebody jet aircraft expected to operate on international routes of 3,500 nm (6,482 km) and 6,500 nm (12,038 km) in distance is shown in Figure 8.1.

For the wide-body jet aircraft selected, an Airbus A380-800 and Boeing B787-9, the fuel saved by the 6 nm (11 km) reduction on a 3,500 nm (6,482 km) journey to Singapore is projected to range between approximately 67 and 180 kilograms (kg) emitting between approximately 209 and 567 kg of CO_2 per movement. This represents less than 0.2 per cent of total fuel consumption and associated CO_2 expected to be emitted on a full-flight basis.

Similarly, the fuel consumption required for the same widebody jet aircraft selected to fly a longer 6,500 nm (12,038 km) international route is projected to range between approximately 65 and 178 kg emitting between approximately 206 and 561 kg of CO_2 per movement. This represents around 0.09 per cent of total fuel consumption and associated CO_2 expected to be emitted on a one-way full-flight basis.

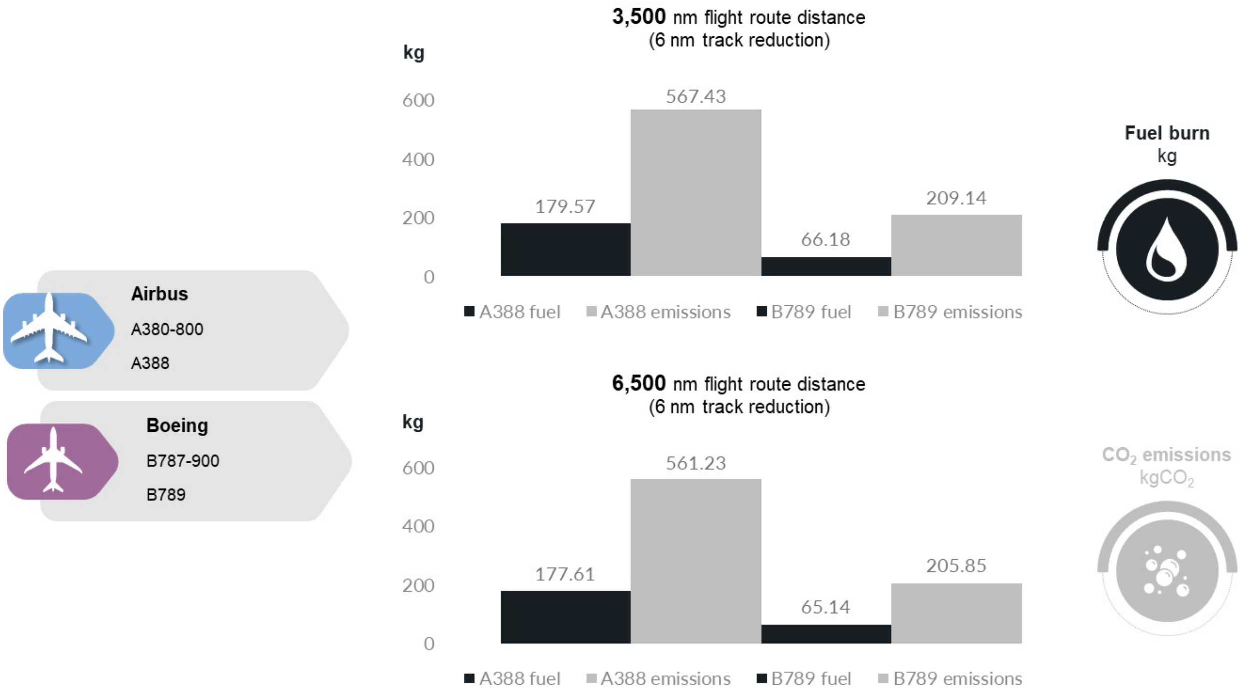


Figure 8.1 Fuel consumption and CO_2 emissions per movement for selected widebody jet aircraft types

Chapter 9 Conclusion

Runway 25 at Sydney (Kingsford Smith) Airport is used around 4 per cent of the time in either a noise sharing mode or as a standalone runway when the weather conditions require it.

Aircraft departing Runway 25 for the south will continue to fly the same flight paths as they currently do.

A new SID is proposed for aircraft departing Runway 25 for northern and eastern destinations via waypoint SHORE. This SID closely replicates the northernmost radar vectored flight track currently in use. Section 5.2 describes the projected use of this SID and the continued use of radar vectoring in line with utilising air traffic control procedures to replicate existing flight path tracks after the opening of WSI.

Due to the location of WSI airport, aircraft departing for the west and northwest need to be re-positioned as their current flight paths, directly to either waypoints KADOM or RICHMOND directly conflict with the proposed WSI operations. The SID tracks for these aircraft are proposed to be the same as for those aircraft tracking to northern and eastern destinations via new waypoint NB010 and then split either via new waypoint NB013 to waypoint Richmond or via new waypoint NB011 to waypoint KADOM.

The initial track of the proposed SID for northern, eastern and now western and north-western destinations, will be over parts of the north-western suburbs that are already overflown by the existing northern and eastern radar vectored departing aircraft. This initial part of the new SID will retain the requirement for jet aircraft to maintain the Runway 25 heading until above 1,500 ft. This will continue to provide the current dispersion of aircraft over the inner north-western suburbs as they turn right onto a track to waypoint NB010.

Aircraft for RICHMOND will continue past waypoint NB010, and their tracks will narrow by waypoint NB013 before tracking direct to waypoint RICHMOND.

Aircraft for waypoint KADOM will continue by waypoint NB010, and their tracks will narrow by waypoint NB011 before tracking to waypoint KADOM.

A new SID is proposed for aircraft to the north and east via new waypoints NB170 and NB065 to existing waypoint SHORE. It is anticipated that around 50 per cent of aircraft to northern and eastern destinations will fly this transition while around half of those flights will continue to be radar vectored, which will continue to provide a dispersion of aircraft over the north-eastern suburbs.

For the proposed new Runway 25 RICHMOND SID, a short reduction to track distances, around 6 nm (11 km) will benefit wide-body jet aircraft using the new SID. Wide-body jet aircraft operating on this SID to destinations of 3,500 (6,482 km) and 6,500 nm (12,038 km) are expected to consume about 0.1–0.2 per cent less fuel on a full-flight basis. This will result in a similar percentage reduction of CO_2 emissions per movement.

Given the areas overflown by the proposed new Runway 25 RICHMOND, KADOM and SHORE SID are relatively close to the area currently overflown with similar aircraft undertaking both IFR and VFR flights, it can be expected that there will be little or no material change to impacts.

Appendix B

Proposed changes to Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs to south, west, north, and east

Western Sydney International (Nancy-Bird Walton) Airport – Airspace and flight path design | Environmental Impact Statement

Technical paper 13: Facilitated changes

Appendix B – Proposed changes to Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs to south, west, north and east

October 2024

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Terms and abbreviations

Term/abbreviation	Definition
ABS	Australian Bureau of Statistics
ACP	Airspace Change Proposal (Airservices)
AEDT	Aviation Environmental Design Tool (US FAA)
AIP	Aeronautical Information Package (Australia)
AIRAC	Aeronautical Information Regulation and Control (Australia)
ARP	Aerodrome Reference Point (ICAO)
CASA	Civil Aviation Safety Authority (Australia)
CO_2	Carbon dioxide (a greenhouse gas)
Cth	Commonwealth of Australia
DAP	Departure and Approach Procedures (Australian AIP)
dB(A)	A-weighted decibel (unit of sound)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Australian Government)
DITRDCA	Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Australian Government)
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation 1999* (Cth)
FAA	Federal Aviation Administration (United States)
ft	feet (unit of distance or height equivalent to 0.3048 m)
GBMA	Greater Blue Mountains Area (World Heritage property)
IAF	Initial Approach Fix
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
km	kilometre (unit of distance equivalent to 1,000 m)
km^2	square kilometre (metric unit of area equal to a square that is one km long on each side)
LL	Lower Level (altitude for transit flights through Sydney Basin))
m	metre (unit of distance or height equivalent to 3.281 ft)
MNES	Matters of National Environmental Significance (EPBC Act) (Cth)
N60/N70	Number above (N-above noise metric)
NFPMS	National Flight Path Monitoring System (Airservices database)
nm	nautical mile (unit of distance equivalent of 1.852 km)

Term/abbreviation	Definition
PBN	Performance Based Navigation
PMST	Protected Matters Search Tool (DCCEEW)
RAAF	Royal Australian Air Force
RNP	Required Navigation Performance
RPT	Regular Public Transport (air services)
SID	Standard Instrument Departure
STAR	Standard Instrument Arrival
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WSI	Western Sydney International (Nancy-Bird Walton) Airport

Chapter 1 Introduction

Although aircraft differ in operation, type, altitude, noise level and frequency, most areas of the Sydney Basin are overflown at some stage as shown in Figure 1.1.

The introduction of new flight paths to be used by aircraft into and out of Western Sydney International (Nancy-Bird Walton) Airport (WSI) has considered a multitude of options to minimise any adjustments required to existing flight paths in the Sydney Basin airspace. Single runway operations at WSI require adjustments to Sydney Basin operations prior to opening in 2026 to facilitate its flight paths and airspace structure. Those facilitated airspace changes include the development of, or adjustments to:

- Sydney (Kingsford Smith) Airport Runway 25 Standard Instrument Departures (SIDs) to west, north-west, north and east – (Appendix A)
- **Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs to south, west, north, and east – (Appendix B) – this Appendix**
- Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID to west and north-west – (Appendix C)
- Sydney (Kingsford Smith) Airport non-jet SID to west or north-west – (Appendix D)
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- Bankstown Airport SID and STARs – (Appendix G)
- Camden Airport STARs – (Appendix H)
- Sydney Basin Visual Flight Rules (VFR) operations – (Appendix I)
- Miscellaneous and Minor procedure adjustments – (Appendix J)
  - Sydney (Kingsford Smith) Airport BOREE STAR
  - Sydney (Kingsford Smith) Airport RIVET STAR
  - Sydney (Kingsford Smith) Airport Runway 07 Initial Approach Fix (IAF)
  - Sydney (Kingsford Smith) Airport Runway 07 SID
  - Sydney Basin low altitude transit flight routes.

This Appendix – Appendix B, presents an assessment of the proposed adjustments required to the current Runway 34L South and West SID from Sydney (Kingsford Smith) Airport for jet departures to western and southern destinations. The proposed facilitated airspace changes also introduce a new transition for north and eastern (oceanic) departures to the SID and adjust the southern transition point.

The design process for the safe and efficient integration of WSI's new flight paths into the existing Sydney Basin airspace has been one of adopting "Safety by Design" principles to deliver the highest level of safety separation assurance in conformance with rules set by the Civil Aviation Safety Authority (CASA). This is to enable aircraft to operate safely within their performance envelope into an already complex airspace structure. "Safety by Design" ensures that aircraft are separated from each other according to the flight routes and the type of air traffic service being provided. As such, this requires the new or amended SIDs and STARs and altitudes to be published and then downloaded into the cockpit flight management systems of all aircraft. At the same time the same information must be downloaded into the software of the surveillance systems used by air traffic control to manage and monitor the safe separation of all controlled aircraft.

The preliminary airspace design process has appropriately accorded "safety" as the highest priority to ensure robust operational safety outcomes. Environmental outcomes, with a particular focus on the minimisation of potential community impacts and the operational efficiency of the facilitated airspace changes has also been a key design criterion.

Instrument Flight Rules (IFR) are the rules that govern the operation of aircraft in [Instrument Meteorological Conditions (IMC)]() (conditions in which flight In IMC, an aircraft must be flown with reference to its onboard flight instruments.) Two sets of rules, IFR or VFR exist to govern flight in either IMC or Visual Meteorological Conditions (VMC).

The adjustments required to the Runway 34L South and West SID at Sydney (Kingsford Smith) Airport presented in this Appendix has been designed to be flown under IFR. This to ensure "Safety by Design" is embedded in the new procedures and to allow continued operations of this high-use procedure in all weather conditions. Aircraft flying to IFR standards and rules can operate in either IMC or VMC, but aircraft flying to VFR standards and rules can only operate in VMC.

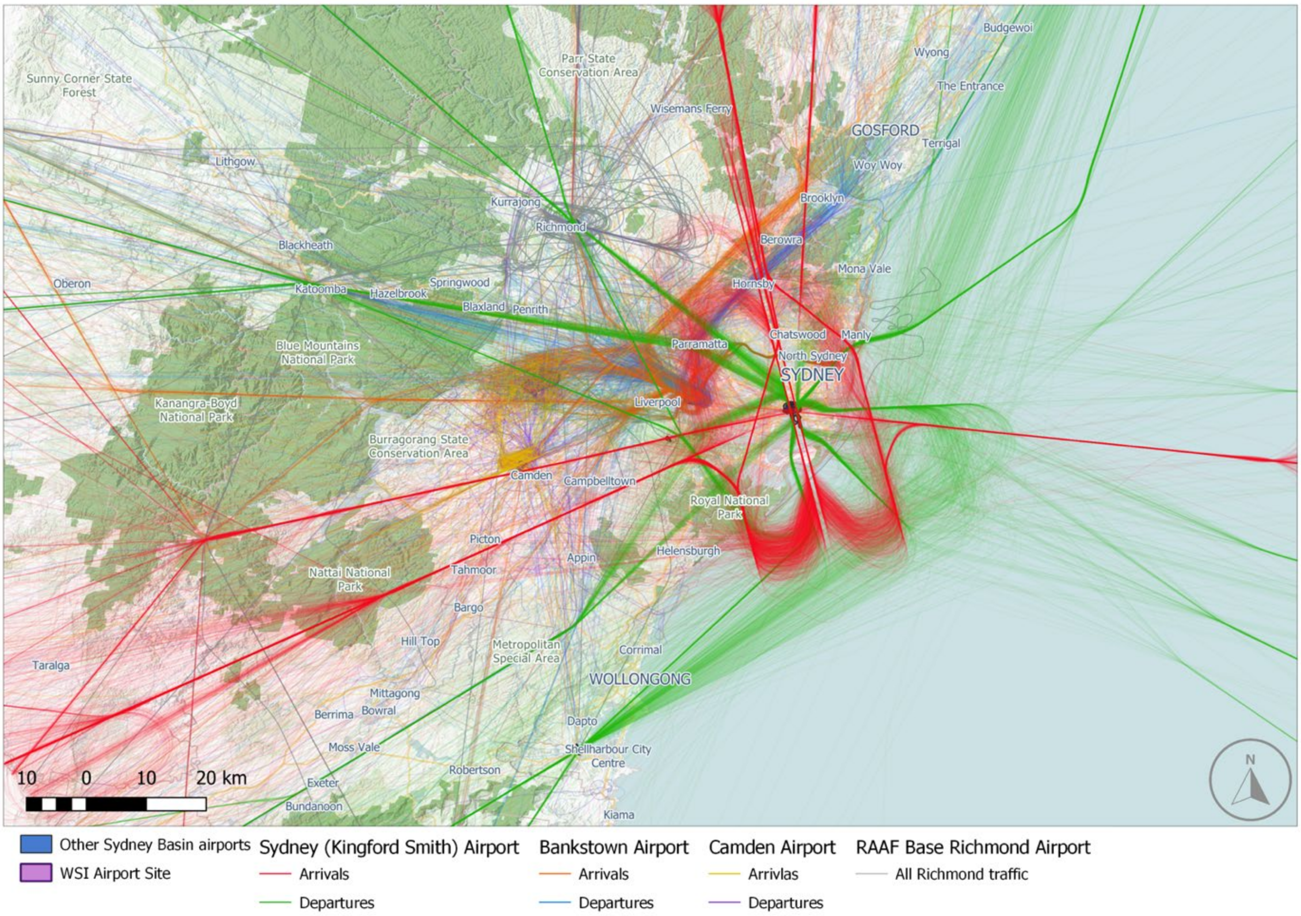


Figure 1.1 One-week of flight track movement activity in the Sydney Basin airspace in March 2019

Chapter 2 Background

The Runway 34L South and West SID from Sydney (Kingsford Smith) Airport follows a westerly track to a waypoint (KADOM) where it connects to one of several enroute tracks to domestic and international destinations. As WSI and Sydney (Kingsford Smith) Airports are located around 45 kilometres (km) apart, this SID will cross the new northern flight paths to and from WSI at relatively low altitudes.

The current Runway 34L South and West SID from Sydney (Kingsford Smith) Airport does not provide any initial specific tracking instructions other than requiring an initial left turn from the Runway 34L heading at 800 feet (ft) onto a track of 290 degrees. At 10 nautical miles (nm) or around 19 kilometres (km) from Sydney (Kingsford Smith) Airport, aircraft are then required to turn left and track directly to waypoint KADOM. To ensure aircraft on this SID remain in controlled airspace they are required to climb on a gradient of 5.9 per cent until reaching 2,500 ft and then adjusting to a climb gradient of 3.3 per cent after the aircraft reaches 2,500 ft (refer to Figure 4.2 in Chapter 4 below for more detail).

Neither the flight path nor the climb gradient requirements of this SID are specific enough to provide a strategic “Safety by Design” outcome to achieve separation assurance with the proposed new WSI inbound and outbound flight paths.

Some minor adjustments to the SID’s alignment and the addition of altitude restrictions at specific waypoints along this flight path are proposed to ensure continued safety of operations once WSI is operational.

This adjustment will need to be published and implemented prior to the operation of WSI in late 2026 and will not impact the application of noise sharing runway modes at Sydney (Kingsford Smith) Airport. The changes would be introduced in 2026 on a scheduled Aeronautical Information Regulation and Control (AIRAC) date, prior to the official opening of WSI. Introducing these changes ahead of WSI's opening will allow pilots and air traffic control to adjust their systems and become familiar with changes to current procedures before single runway operations at WSI commence and will minimise the likelihood of conflicts or incidents in the airspace.

Figure 2.1 shows the location of WSI, the locations of other key airports in the Sydney Basin and geographic extent of a nominal area radiating 45 nm (around 84 km) from the Aerodrome Reference Point (ARP) of WSI.

Figure 2.2 is the Aerodrome Chart for Sydney (Kingsford Smith) Airport. The chart has been extracted from the Aeronautical Information Package (AIP) Departure and Approach Procedures (DAP) to assist the interpretation of the information presented in this Appendix. It depicts the general layout of Sydney (Kingsford Smith) Airport including its 3-runway system and orientations, runway headings (34L, 25, etc.) and dimensions (lengths and widths).

Figure 2.1 Location of airports in the Sydney Basin

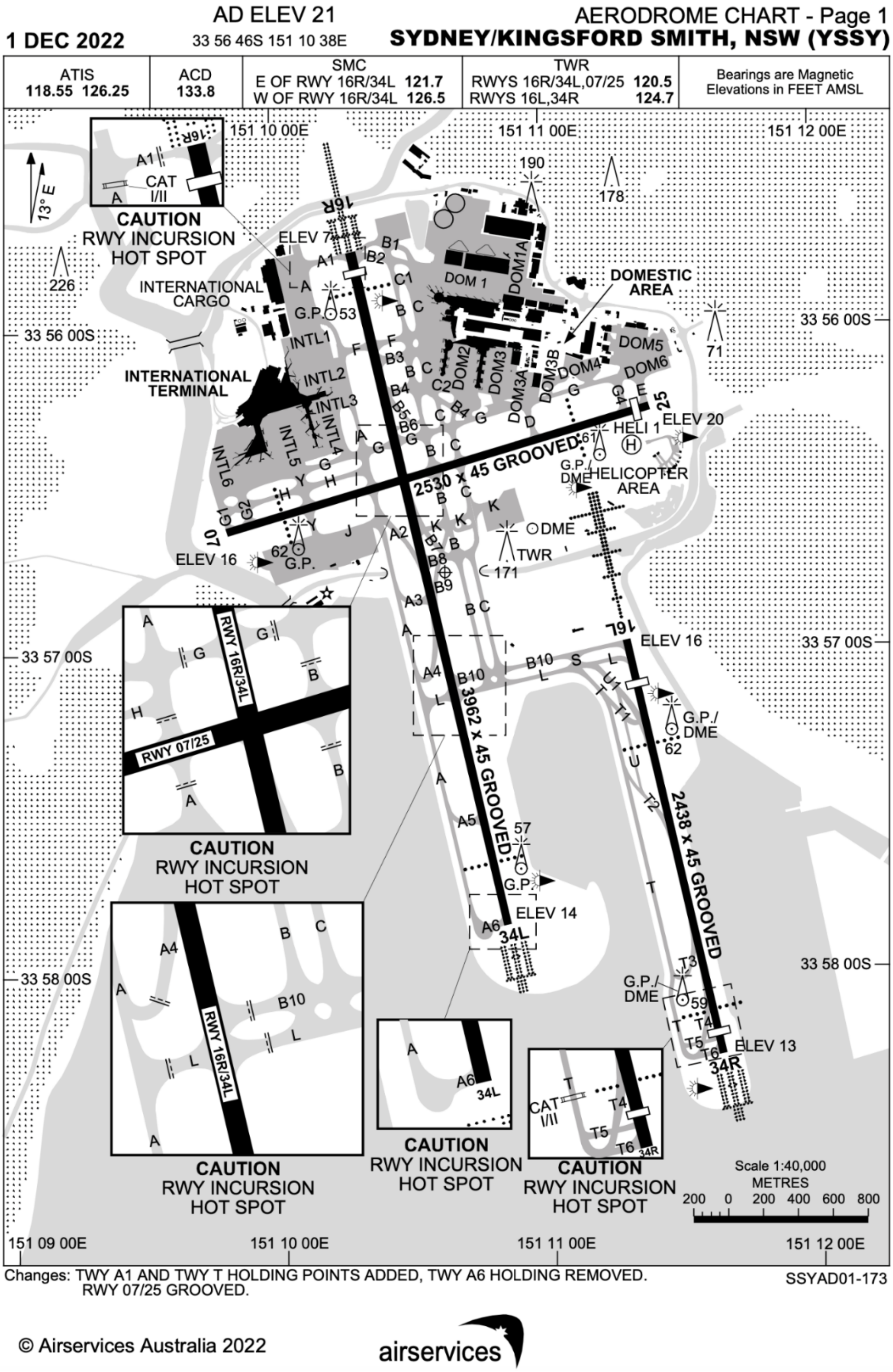


Figure 2.2 Sydney (Kingsford Smith) Airport – Aerodrome Chart (AIP / DAP)

Chapter 3 Purpose

The purpose of this Appendix is to present an environmental assessment of the adjustments required to Runway 34L South and West SIDs at Sydney (Kingsford Smith) Airport (to waypoints KADOM, TONTO and SHORE). It includes an analysis and assessment of potential noise impacts from aircraft overflights of this proposed facilitated airspace change.

It describes the reason for the facilitated airspace changes and the associated safety and operational considerations, along with other environmental issues.

Chapter 4 Current Runway 34L jet departure operations

Figure 4.1 presents the current flight track movement activity for all Sydney (Kingsford Smith) Airport runway operations for a one-week period in March 2019. According to the data obtained from Airservices Australia's Noise Flight Path and Monitoring System (NFPMS), when Sydney (Kingsford Smith) Airport is operating for the entire day in the Runway 34 direction (i.e., northerly operations), there was approximately 164 departure movements on that day departing off Runway 34L and using the current procedures.

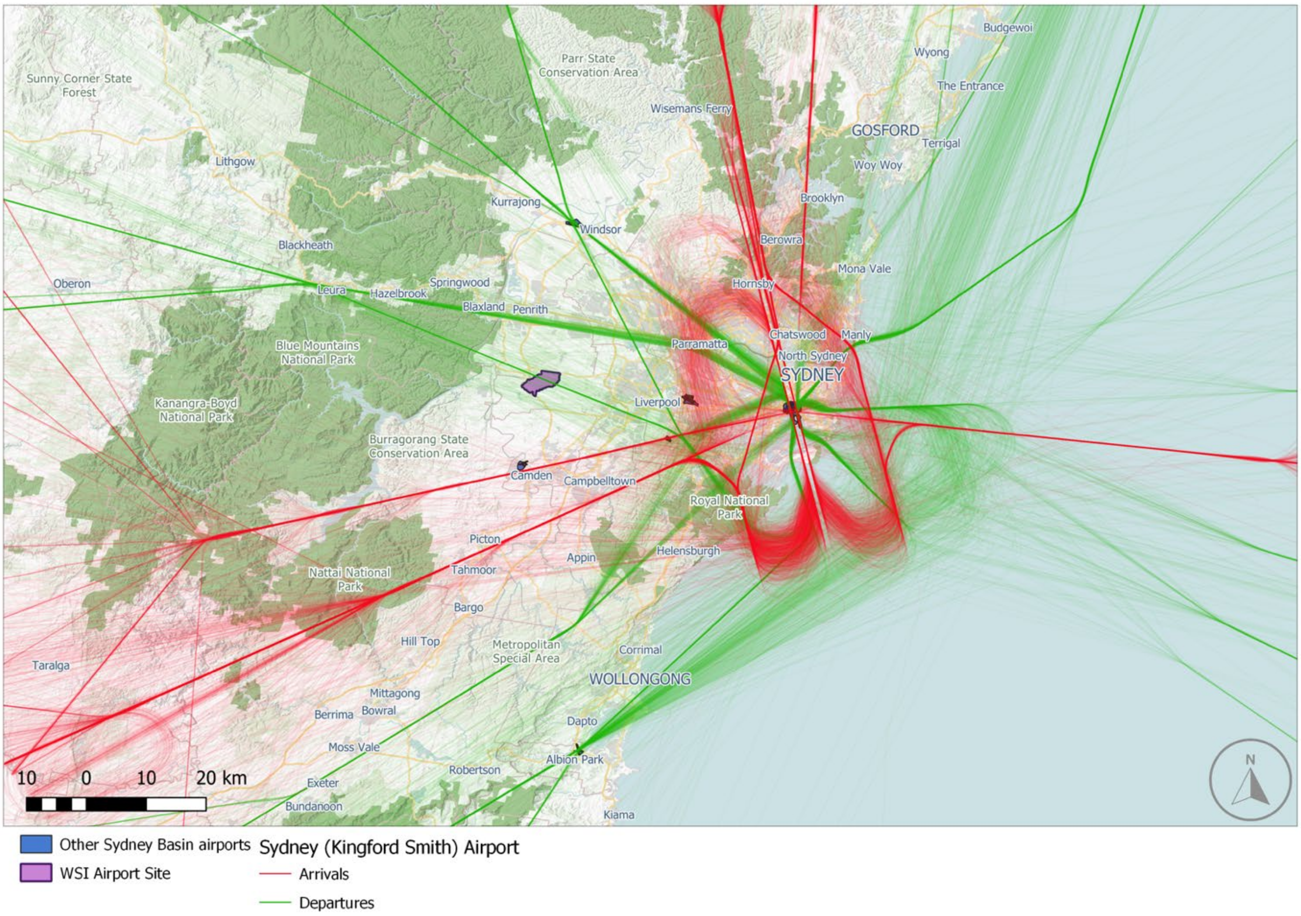


Figure 4.1 Current IFR flight track movement activity for Sydney (Kingsford Smith) Airport runways – one-week period in March 2019

The SID is published as the Runway 34L SOUTH WEST DEPARTURES (JETS) (refer to Figure 4.2) which includes tracking requirements to waypoints KADOM and Wollongong (WOL). The tracking requirements are common until aircraft reach 10 nm (19 km) from Sydney (Kingsford Smith) Airport.

Most aircraft using this SID depart Sydney (Kingsford Smith) Airport to domestic destinations to the west such as Adelaide or Perth or international destinations in Asia or the Middle East. These aircraft use the waypoint KADOM departure component of the SID as described below.

A very small number of aircraft will use this SID when departing Runway 34L for Melbourne or internationally for South Africa (i.e., Johannesburg) when they are unable to use the standard runway for this route (Runway 34R) due to its shorter length.

These aircraft use the waypoint WOL departure component of the SID as described below.

Aircraft departing Runway 34L and cleared via this SID must follow the procedure as published in the Australian AIP DAP. This involves operating on the Runway 34L track (335 degrees) until reaching 800 ft. At 800 ft (244 m) the aircraft must commence a turn to the left and track of 290 degrees.

At 10 nm (around 19 km) from Sydney (Kingsford Smith) Airport, aircraft for waypoint KADOM turn left and track direct to waypoint KADOM.

Both procedures (waypoints KADOM or WOL) require an aircraft to climb on a minimum gradient of 5.9 per cent to remain within controlled airspace until leaving 2,500 ft (760 m) and then continue to climb on a minimum gradient of 3.3 per cent for obstacle clearance and to remain within controlled airspace (refer to Figure 4.2 for more detail).

Also, at 10 nm (19 km) from Sydney (Kingsford Smith) Airport, aircraft for waypoint WOL turn left onto a heading of 260 degrees and once above 7,000 ft (2.2 km) on climb turn left and track to the waypoint ANKUB. From overhead waypoint ANKUB aircraft then track direct to waypoint WOL.

Neither the track nor the current climb gradient requirements of this SID are specific enough to provide a strategic "Safety by Design" outcome to achieve separation assurance with the proposed new WSI inbound and outbound tracks.

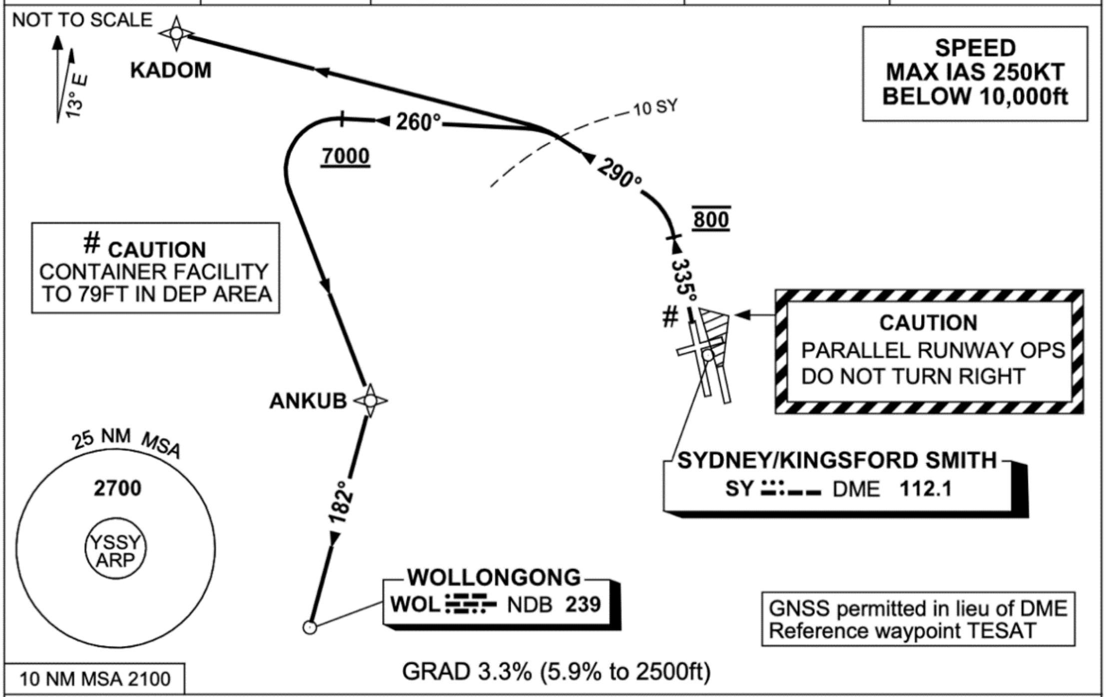
In addition to an adjusted southern transition point at a greater distance along the SID, and a new transition SID leg for eastern (oceanic) departures, some minor adjustments to track alignment and published hard altitude requirement at specific waypoints along this flight path will be required to ensure continued safety of operations once WSI is operational. (Currently eastern (oceanic) departures from Sydney (Kingsford Smith) Airport use the Runway 34L Richmond SID and track via waypoint SHORE.)

This proposed adjusted procedure must be published and implemented prior to the commencement of operations of WSI in 2026.

STANDARD INSTRUMENT DEPARTURES (SID)
RWY 34L SOUTH WEST DEPARTURES (JETS)
SYDNEY/KINGSFORD SMITH, NSW (YSSY)

24 MAR 2022

ATIS	ACD	SMC	TWR	DEP(S)
118.55 126.25	133.8	E OF RWY 16R/34L 121.7 W OF RWY 16R/34L 126.5	120.5	129.7



KADOM ONE DEPARTURE
WOLLONGONG (WOL) TWO

RWY 34L (JET) #

CAUTION: parallel runway operations - DO NOT TURN RIGHT
- GRAD 3.3% (5.9% to 2500ft)
- Track 335°
- AT 800ft turn LEFT
- Track 290° to 10 DME SY
- At 10 DME SY turn LEFT

For: KADOM
- Track DCT to KADOM, thence via cleared route

For: WOL
- Track 260°
- After passing 7000ft, turn LEFT
- Track DCT to ANKUB
- From ANKUB track 182° to WOL NDB, thence via cleared route

Changes: Editorial. SSYDP05-170

airservices

Figure 4.2 Sydney (Kingsford Smith) Airport Runway 34L south and west jet departures – (AIP DAP)

Chapter 5 Sydney (Kingsford Smith) Airport growth forecasts

Sydney (Kingsford Smith) Airport growth forecasts have been extracted from the current 2019 Airport Master Plan:

The forecasts were independently prepared for Sydney Airport Corporation Limited by a third party in consultation with major international, domestic and regional airlines, and airline associations.

Growth in total aircraft movements is expected to increase by around 17 per cent from 348,520 movements in 2017 to 408,260 in 2039, an annual increase of 0.7 per cent. Of that, Regular Public Transport (RPT) services are projected to be 382,305 in 2039, representing around 94 per cent of total air traffic movements. This reflects airline feedback and expectations on the continued up-gauging of aircraft and increases in seat density and load factors across the Sydney (Kingsford Smith) Airport route network. It is understood that all forecasts assume that from late 2026, the Sydney Basin's aviation demand will be served by 2 international airports – WSI and Sydney (Kingsford Smith) Airport.

Figure 5.1 shows the projected growth in aircraft movements for Sydney (Kingsford Smith) Airport as adapted from the 2039 Master Plan in the period from 2017 to 2039.

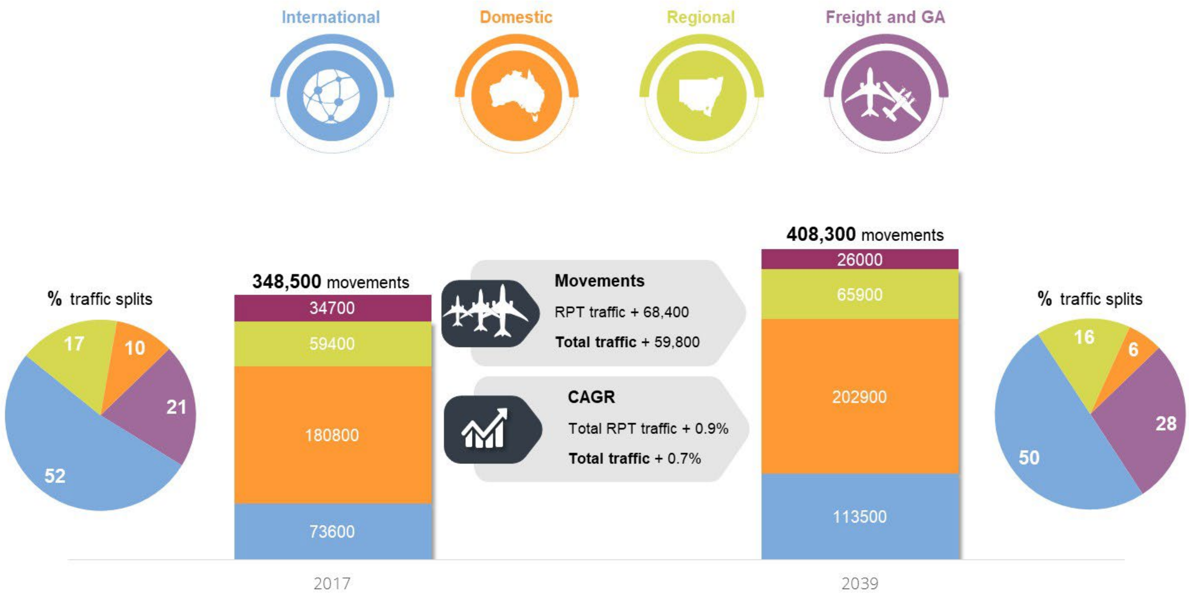


Figure 5.1 Sydney (Kingsford Smith) Airport aircraft movement growth forecast (adapted from 2019 Master Plan)

In the absence of specific forecast growth data for jet departure operations off Runway 34L, the generic annual growth percentages presented in Figure 5.1 above would be assumed to apply evenly across all the various operational sectors at Sydney (Kingsford Smith) Airport.

Chapter 6 Proposed Runway 34L departures

The proposed adjusted Sydney (Kingsford Smith) Airport Runway 34L South West SID will be renamed the Runway 34L KADOM SID and will include minor tracking changes and the inclusion of new waypoints to allow defined altitude climb requirements to be established at known positions to ensure “Safety by Design” separation assurance with both arrivals and departures at WSI. As well as a transition for aircraft tracking west via waypoint KADOM, it will also contain an amended transition to allow the limited number of aircraft needing to track to the south via waypoint TONTO, and a new transition to allow aircraft to track to the east via waypoint SHORE.

All 3 transitions have a common track and altitude requirements until passing the new waypoint NB010. After take-off all aircraft will continue as they do currently by tracking initially on the Runway 34L heading until reaching 1,500 ft (460 m). At 1,500 ft (460 m) they will commence a turn to track directly to waypoint NB010.

At waypoint NB010 aircraft for eastern destinations via waypoint SHORE will track via the new waypoints NB170 and NB065 to waypoint SHORE. From waypoint SHORE a series of oceanic transitions will take aircraft to all eastern destinations. Altitude requirements will exist at proposed new waypoints NB010, NB170 and NB065 to provide separation assurance with WSI traffic.

This flight path design replaces the eastern transition for aircraft departing Runway 34L which currently commences on the Runway 34L RICHMOND SID and involves the aircraft being radar vectored to the east once 10 nm (19 km) north of WSI. This change is required by the Instrument Flight Path Design Standards.

Based on advice provided by Airservices Australia, the adoption of the proposed change to the Runway 34L KADOM SID will undergo a series of utilisation stages:

1. On the design finalisation and publication of the SID as an available procedure in the AIP DAP, its application is expected to be for most flights operating to northern and eastern destinations off Runway 34L.
2. Following a short spike of high usage immediately after implementation, decreasing over 6 to 18 months to a point where most aircraft are provided with a more expeditious flight path through radar vectoring and direct tracking. As WSI operations steadily increase over time and contingent on growth in demand within the Sydney Basin, it is expected that application of the SID will increase and likely be adopted for around half of flights departing in that direction at 5 years post WSI operations.

Aircraft using this SID for either the waypoints KADOM or TONTO transitions will continue past waypoint NB010 on a common flight path via waypoints NB011, NB012 to NB033 where the flight paths will split. Altitude requirements are placed on the proposed new waypoints NB011, NB012 and NB033 to provide separation assurance with WSI aircraft operations.

Aircraft proceeding to the west via waypoint KADOM will continue straight past waypoint NB033 to waypoint KADOM.

Aircraft heading to the south via waypoint TONTO will turn left at waypoint NB033 and track via proposed new waypoints NB030, NB038 and NB003 at which point they join the WSI southern SIDs to waypoint TONTO. Altitude requirements are placed on waypoints NB038 and NB003 to provide separation assurance with WSI aircraft operations. This track is expected to have only very limited use by wide-body jet aircraft departing Sydney (Kingsford Smith) Airport for South African destinations such as Johannesburg.

Figure 6.1 shows the current Sydney (Kingsford Smith) Airport Runway 34L SOUTH WEST SID through waypoint KADOM for departures to the west. The existing procedure backbone track is depicted in “pink” and the proposed adjusted procedure in purple. The current and future procedure backbone tracks to the west are very closely aligned and are basically identical in lateral positioning beyond proposed waypoint NB010.

The current transition leg for the lightly used southern departures (depicted in pink) which is positioned just beyond waypoint NB010 has been moved significantly further along the procedure track in the direction of waypoint KADOM and is now initiated at proposed waypoint NB033 at the base of the Blue Mountains, positioning the initial left-turn manoeuvre and southern leg of the transition (depicted in purple) over parts of GBMA.

Figure 6.2 shows the proposed change to east (oceanic) departures off Sydney (Kingsford Smith) Airport Runway 34L. Currently those departures utilise the Runway 34L RICHMOND SID, tracking initially to the north-west, with the transition point approximately 11 nm (20 km) from Sydney (Kingsford Smith) Airport. At this point aircraft departing to eastern (oceanic) destinations are currently radar vectored by air traffic control to join their enroute flight segment. This results in a level of overflight dispersion between this current point and the coast.

Figure 6.2 shows the proposed change (in purple) reallocating those east-bound (oceanic) flights to the proposed Runway 34L KADOM SID with a transition at waypoint NB010 through waypoints NB170, NB065 and SHORE. As waypoint NB170 is a fly by waypoint, aircraft will normally remain south of the waypoint when making an easterly turn towards waypoint SHORE.

The nominal backbone flight track presented in following figures in this Appendix is used to identify either the centre of an existing flight path, or the designed nominal backbone flight track of a proposed SID or STAR. In the case of a current nominal backbone flight track, it is based on an average of current radar plotted flight paths. In the case of a proposed new procedure design, the nominal backbone flight track will be primary track used to establish and ensure safety by design standards are met.

Flight path dispersion corridors show the actual or expected variation of flights when flying the procedure.

Flight path corridor dispersion around an actual or proposed nominal backbone flight track will vary considerably where the designed nominal tracks track via a fly-by waypoint. The amount of variation will depend on the angle of turn that the designed track is required to make at the waypoint.

(The proposed new waypoints (NB003, NB030, etc.) identified in this Appendix have been allocated a temporary identifier which will be replaced by a conforming 5-letter alpha character designator as part of the detailed design phase and implementation of the proposed adjusted procedure.)

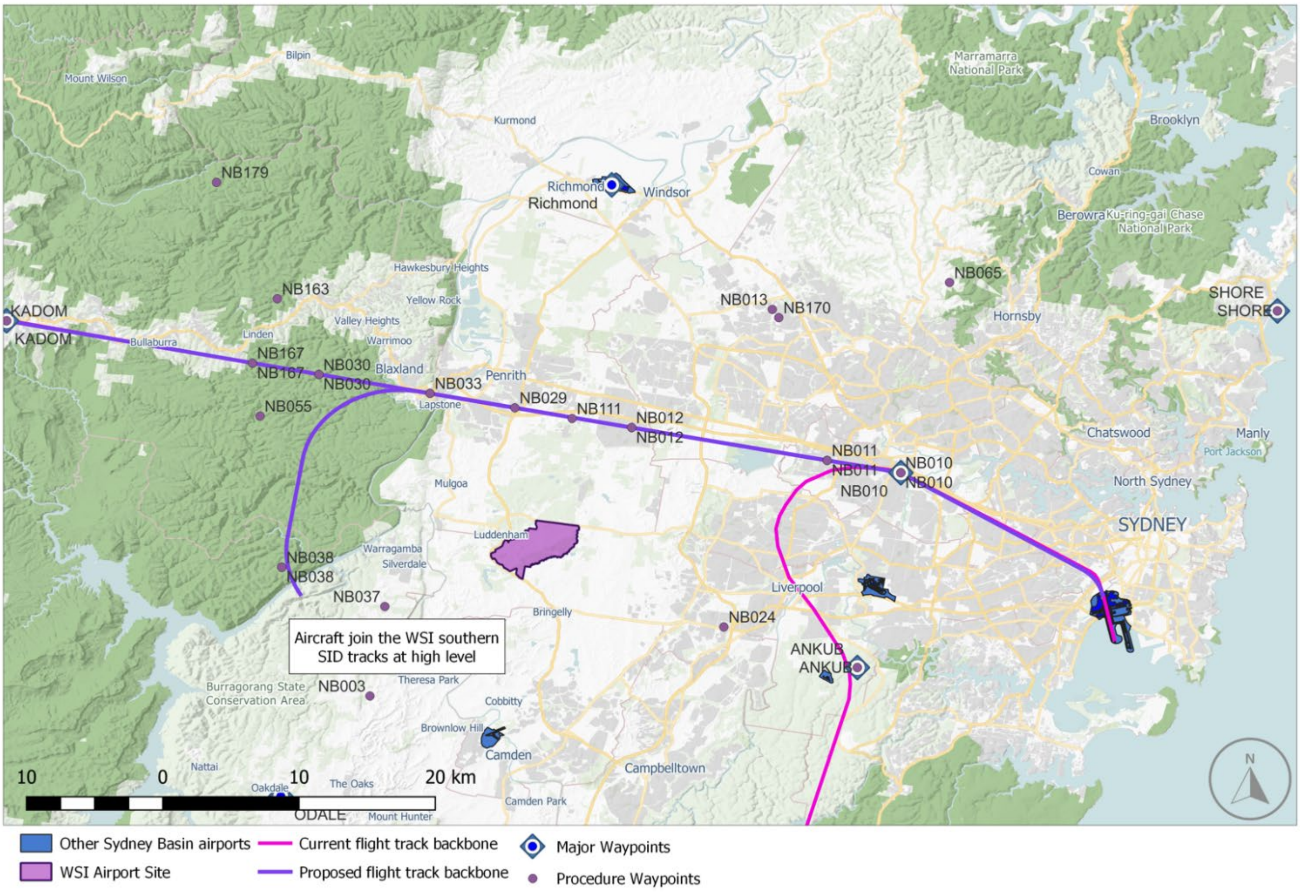


Figure 6.1 Current and proposed Runway 34L KADOM SID nominal backbone flight tracks

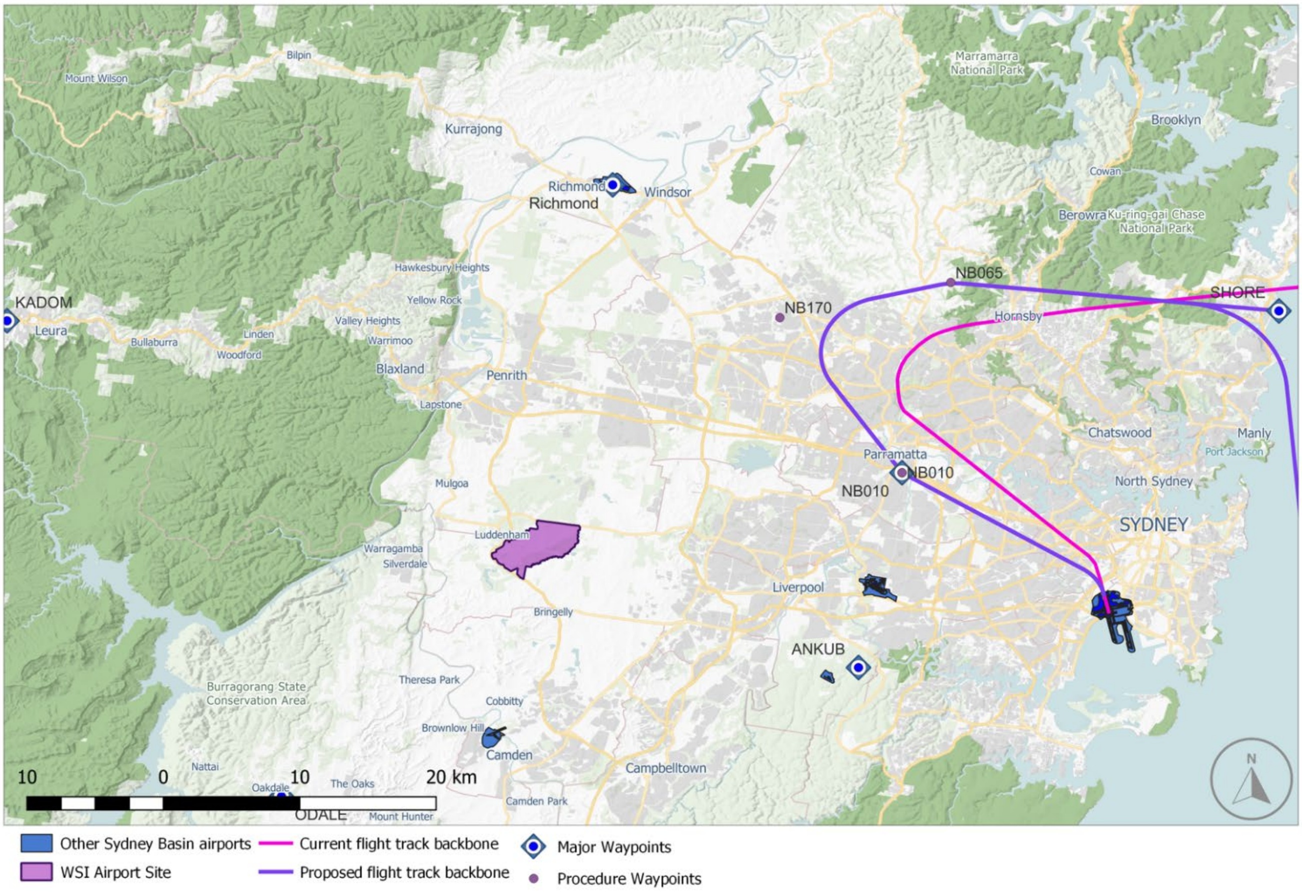


Figure 6.2 Current and proposed Runway 34L KADOM to SHORE SID for eastern destinations – nominal backbone flight tracks

Chapter 7 Aircraft noise impact assessment

The aircraft noise assessment of the adjustments required to all jet departures from Runway 34L KADOM SID (west departures) at Sydney (Kingsford Smith) Airport to north-western destinations has been considered in isolation. The information presented in this chapter is targeted to describe the potential implications facilitated by the proposed individual procedure change only.

The number above (N-above) contours representing the number of events with modelled noise levels of 60 A-weighted decibels (dB(A)) or louder (N60) and 70 dB(A) or louder (N70) contours, and associated dwelling and population counts presented below are limited to overflight noise impacts associated with the proposed changes to the Runway 34L KADOM SID and its transitions only. They do not consider a cumulative impact nor include other operations to or from Sydney (Kingsford Smith) Airport that may overfly that area.

The aircraft noise modelling and analysis has used the Aviation Environmental Design Tool (AEDT), an internationally recognised aircraft noise and emissions calculation program developed by the United States Federal Aviation Administration (US FAA). The latest Version 3e of the AEDT software was used for this assessment.

Noise modelling is based on the flight movements of the busiest day in 2019 for Runway 34L operations. As such, the results generated in the following analysis should be considered a "worst case" scenario, as an average or typical day of operations will have a reduced number of flights on each particular Sydney (Kingsford Smith) Airport runway direction and individual SID procedure utilisation and be subjected to runway direction changes to respond to weather influences.

For Sydney (Kingsford Smith) Airport, there is approximately a 50/50 split between operations in a Runway 16 (southerly) or Runway 34 (northerly) direction. When operations are utilising Runways 16L and 16R, the initial phase of departure operations will be to the south and east over the ocean and the proposed Runway 34L KADOM SID and its transitions will not be utilised.

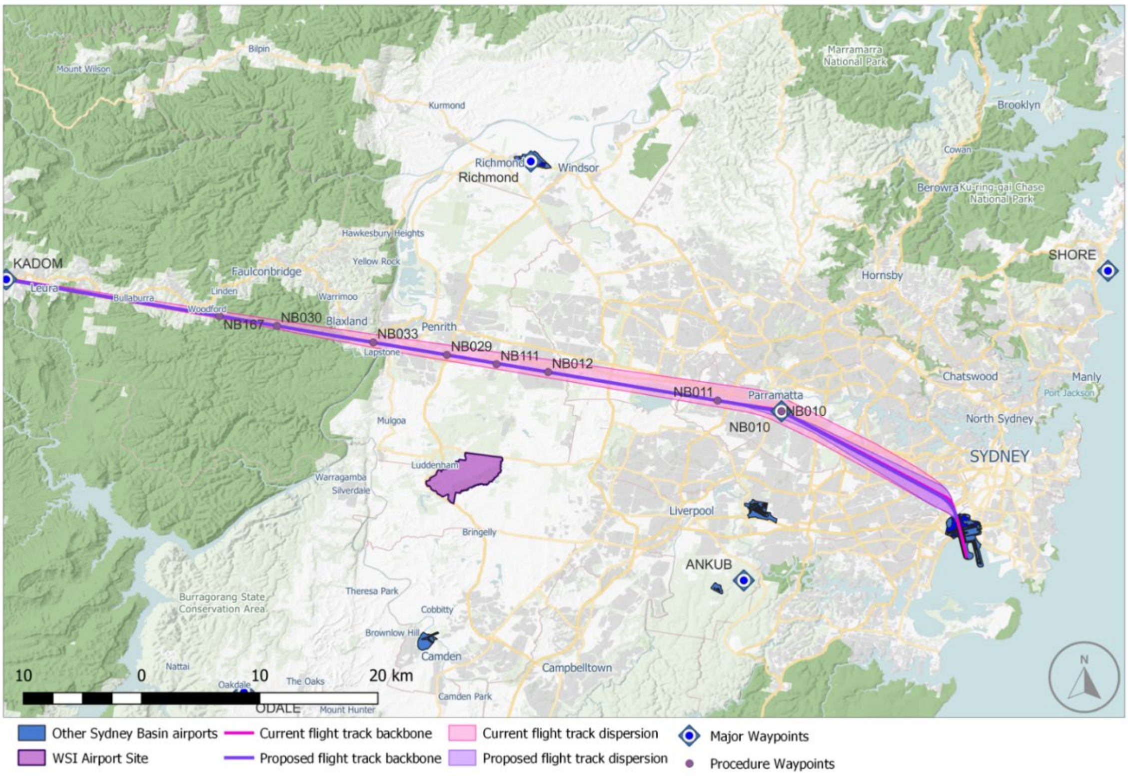


Figure 7.1 Runway 34L Jet departures to the north-west – track dispersion – current versus proposed

7.1 Runway 34L KADOM SID – N60 contours (westerly departures)

Figure 7.2 to Figure 7.5 below present the N60 contours for departures from the Runway 34L SID to western destinations via waypoint KADOM.

N60 contours identify by a series of contour bands, areas that will be subjected to a number of overflight events that exceed a noise level of 60 dB(A) – 10 to 20, 20 to 50, and 50 to 100 overflights in a day (N60 24-hours).

Figure 7.2 to Figure 7.5 present N-above metrics (contours) for departure operations on the current and proposed future Sydney (Kingsford Smith) Airport Runway 34L KADOM SID procedure.

Figure 7.2 and Figure 7.3 present the same N60 (24-hours) contours for the current Runway 34L KADOM SID, with Figure 7.3 presenting those contours zoomed in to aid in interpretation of their geographic extents.

Similarly, Figure 7.4 and Figure 7.5 present the same N60 contours for the proposed future KADOM SID, with Figure 7.5 zoomed in to aid in interpretation of their geographic extents.

The shape of the N60 contours indicate barely discernible differences in the geographic extents of the impact of the current and proposed procedures.

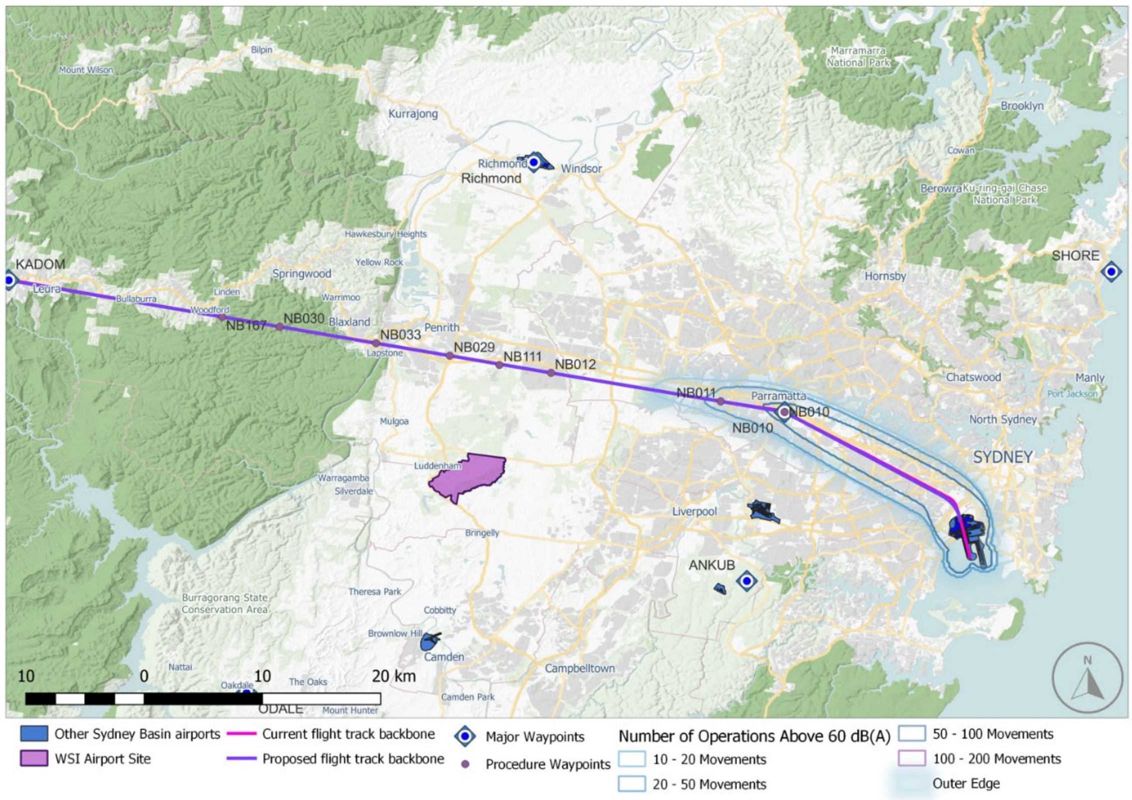


Figure 7.2 Current Runway 34L KADOM SID – N60 contours

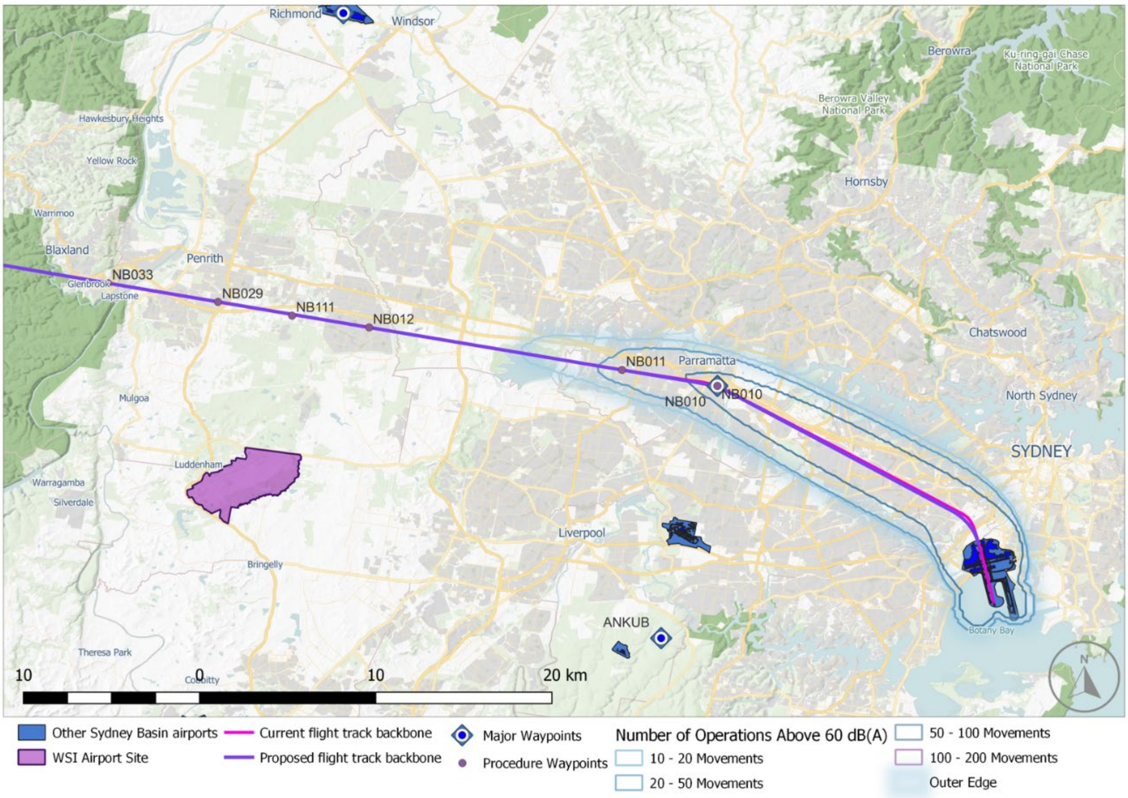


Figure 7.3 Current Runway 34L KADOM SID – N60 contours – zoomed in

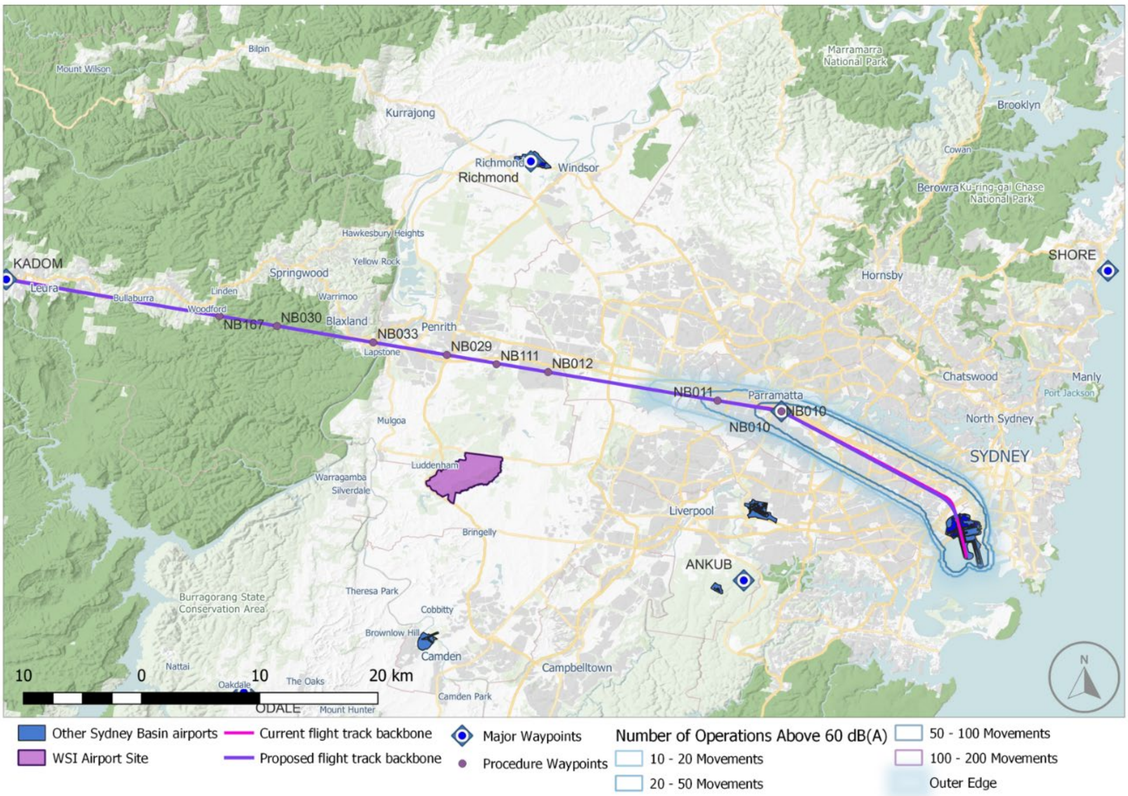


Figure 7.4 Proposed Runway 34L KADOM SID – N60 contours

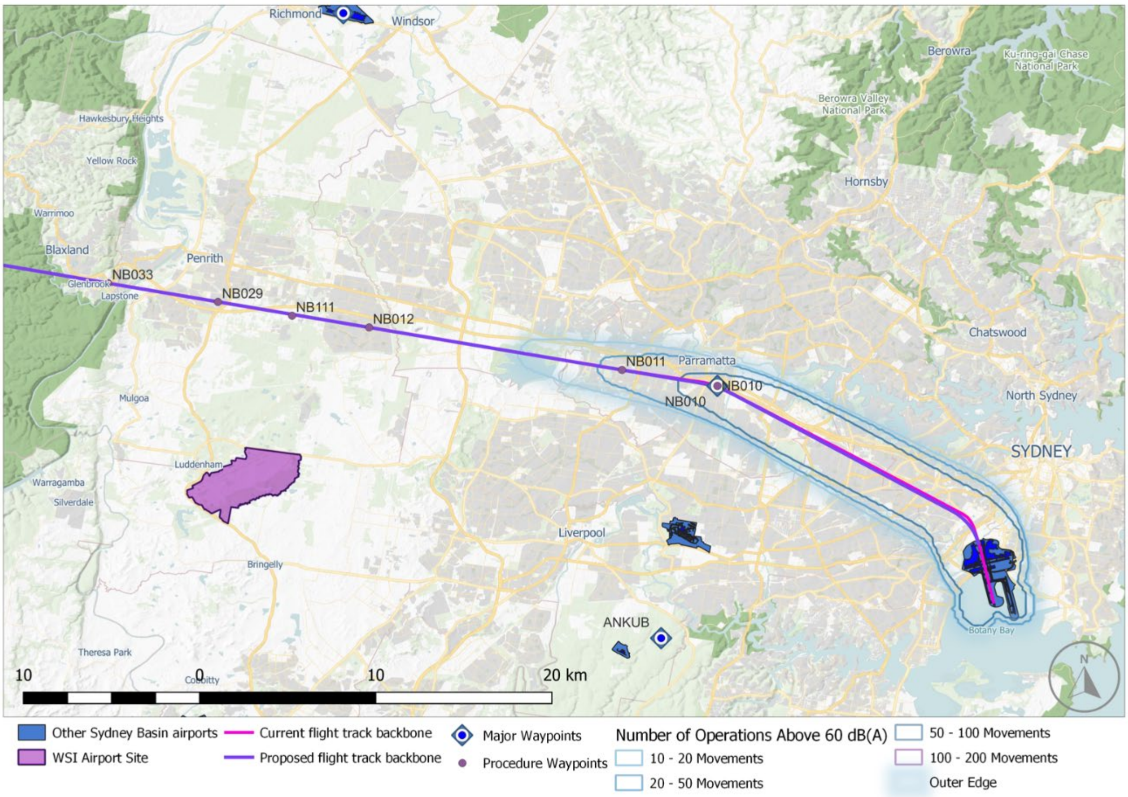
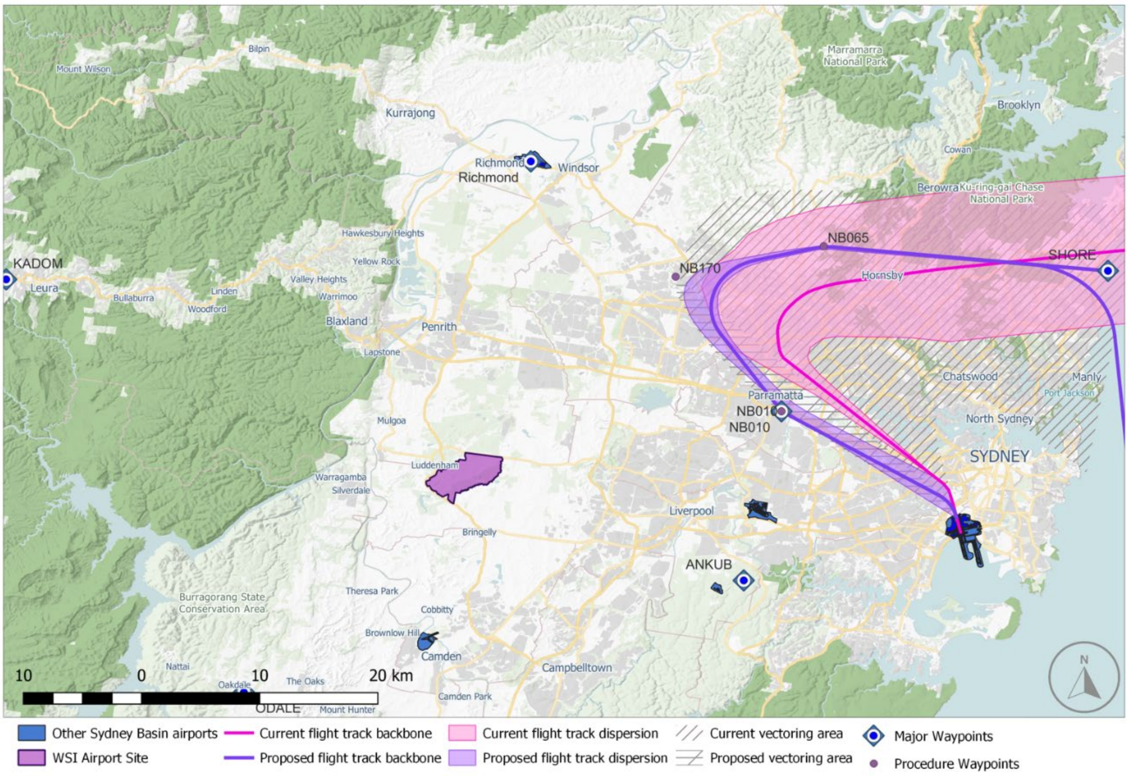


Figure 7.5 Proposed Runway 34L KADOM SID – N60 contours – zoomed in

7.2 Runway 34L KADOM to waypoint SHORE SID (north and east) via waypoint NB010

Figure 7.6 shows the current waypoint SHORE transition flight path corridor dispersion (in pink) versus the proposed future flight path corridor dispersion (in purple). The hatched area on the figure indicates the area that is currently overflown by radar-vectored departing aircraft from Runway 34L at Sydney (Kingsford Smith) Airport that track outside of the higher frequency of aircraft tracking within the pink flight path corridor.

As stated in Chapter 6 of this Appendix, radar vectoring of aircraft departing to eastern destinations off Runway 34L from Sydney (Kingsford Smith) Airport is expected to continue when the reallocation of these departures off the current Runway 34L Richmond SID and the new waypoint SHORE transition procedure is implemented. This will result in the hatched area depicted in Figure 7.6 continuing to have some level of distribution of aircraft overflights. The proposed future N60 and N70 contours shown in Figures 7.9, 7.10 and 7.14 assume all aircraft are flying on the procedure and have not yet been turned to the east under radar vectoring as the resulting N60 and N70 contours do not extend to the typical point of turn that would occur should that departing flight be under radar vectors.



The proposed radar vectoring area in Figure 7.6 depicts an extension to the west. In future operations the radar vectoring area will include the existing area and this extension area.

Figure 7.6 Runway 34L KADOM SID SHORE transition - Jet departures to the east – flight path dispersion – current versus proposed

7.3 Runway 34L KADOM to waypoint SHORE SID (north and east) via waypoint NB010 – N60 Contours

Figure 7.7 to Figure 7.10 present the N60 contours for jet departures to northern and eastern destinations via waypoint SHORE for current Runway 34L departures from Sydney (Kingsford Smith) Airport, and for the proposed future Runway 34L SID procedure for departures via waypoints NB010 and SHORE. Runway 34L departures to northern and eastern destinations were previously allocated the Runway 34L RICHMOND SID (radar transition) as described in Chapter 6 of this Appendix.

N60 contours identify by a series of contour bands, areas that will be subjected to aircraft overflight events that exceed a noise level of 60 dB(A) – 10 to 20, 20 to 50, and 50 to 100 overflights in a day (N60 24-hours).

The figures compare the current versus the proposed future N60 contours. A set of zoomed in contours are provided to aid the interpretation of the contour geographical extents. The N60 contours again indicate barely discernible differences in the current and future geographic extents of the contours.

Figure 7.7 and Figure 7.8 present the same N60 contours for the current waypoint SHORE SID, with Figure 7.8 presenting those contours zoomed in.

Similarly, Figure 7.9 and Figure 7.10 present the N60 24-hour contours for the proposed future waypoints NB010 and SHORE SID, with Figure 7.10 zoomed in.

The shape of the N60 contours indicate a significant shift in the geographic extents of the current and proposed future procedures. This is a result of Runway 34L departures to the east being displaced off the current Richmond SID due to the requirements of instrument flight path design standards. (The current eastern departure operation is based on radar vectoring.)

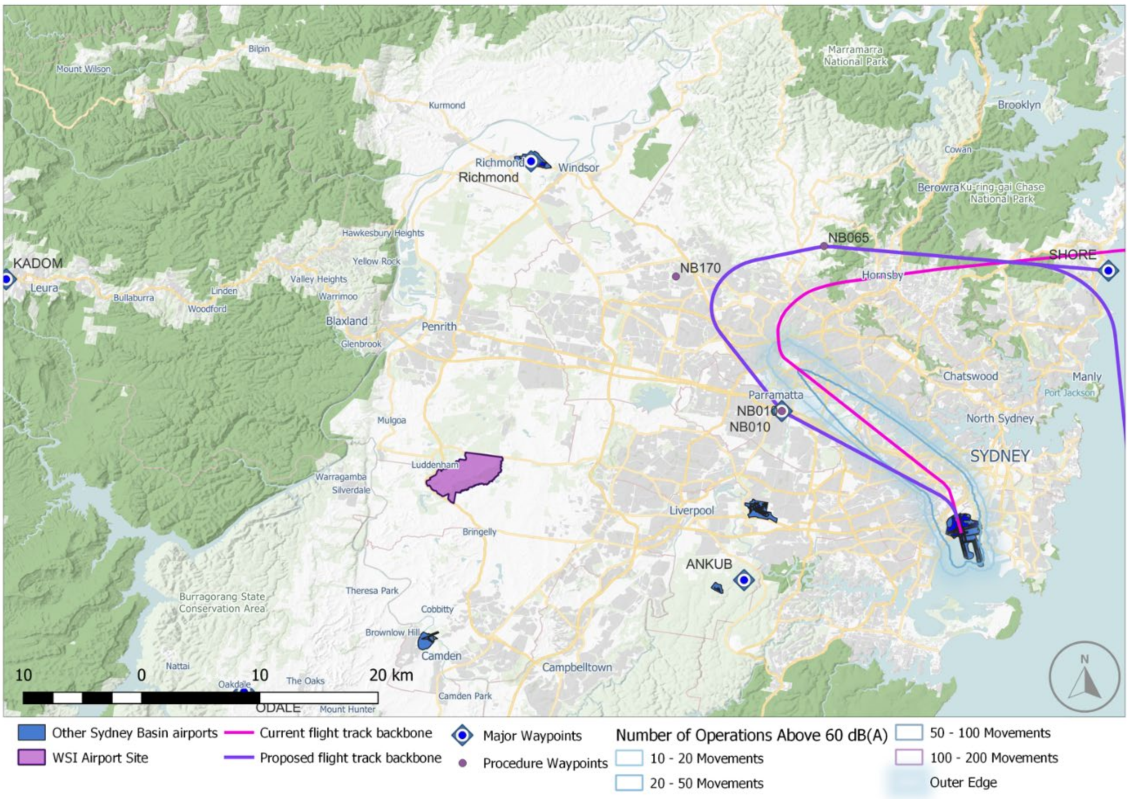


Figure 7.7 Current Runway 34L KADOM to SHORE SID to eastern/oceanic destinations - N60 contours

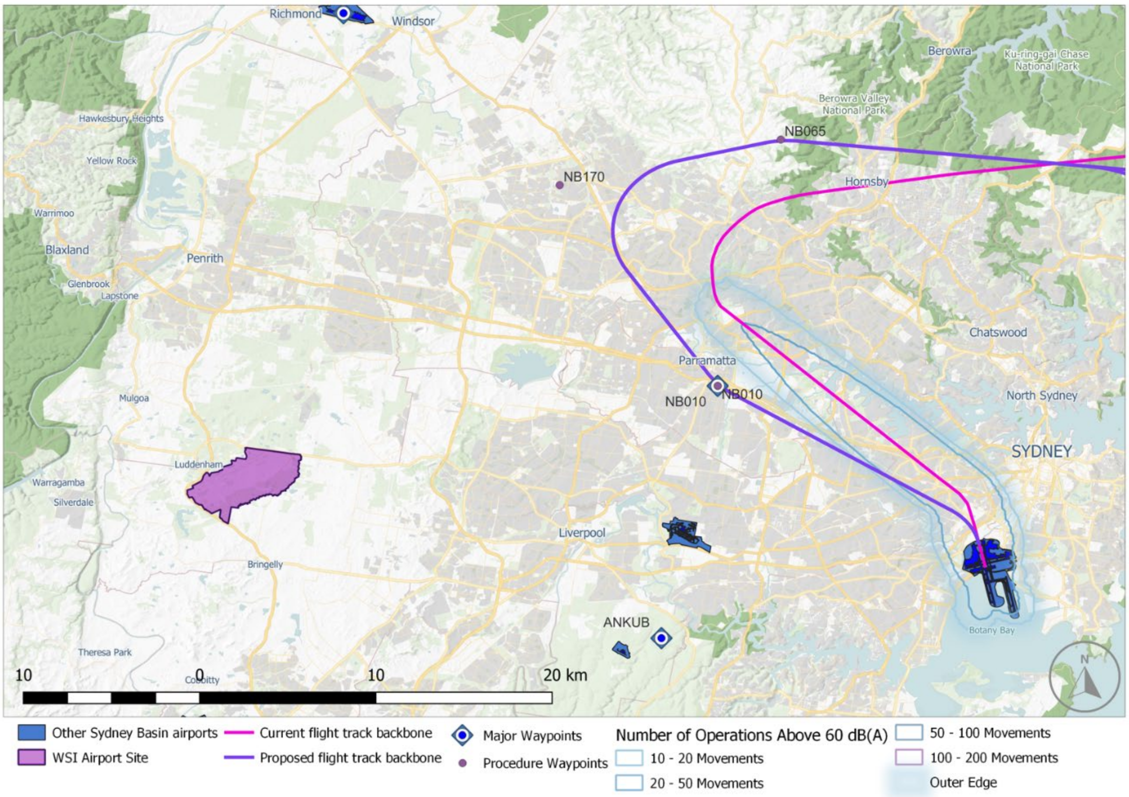


Figure 7.8 Current Runway 34L KADOM to SHORE SID to eastern/oceanic destinations - N60 contours – zoomed in

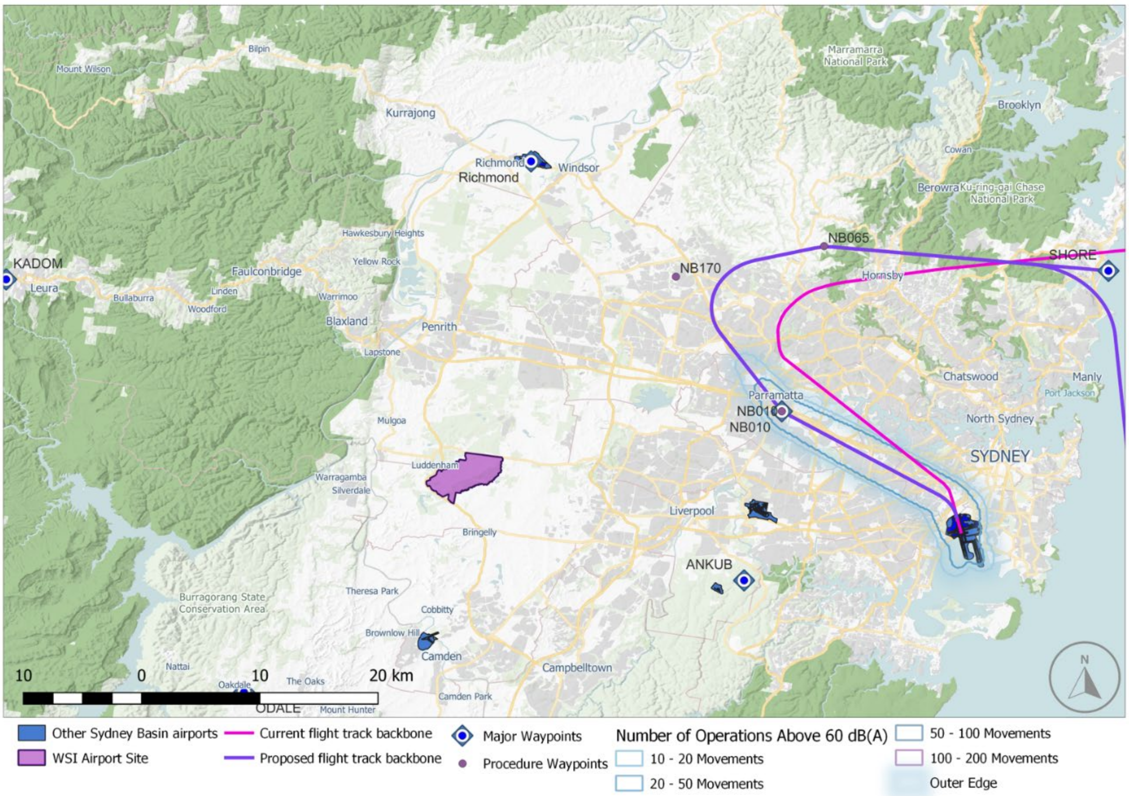


Figure 7.9 Proposed Future Runway 34L KADOM to SHORE SID to eastern/oceanic destinations – N60 contours

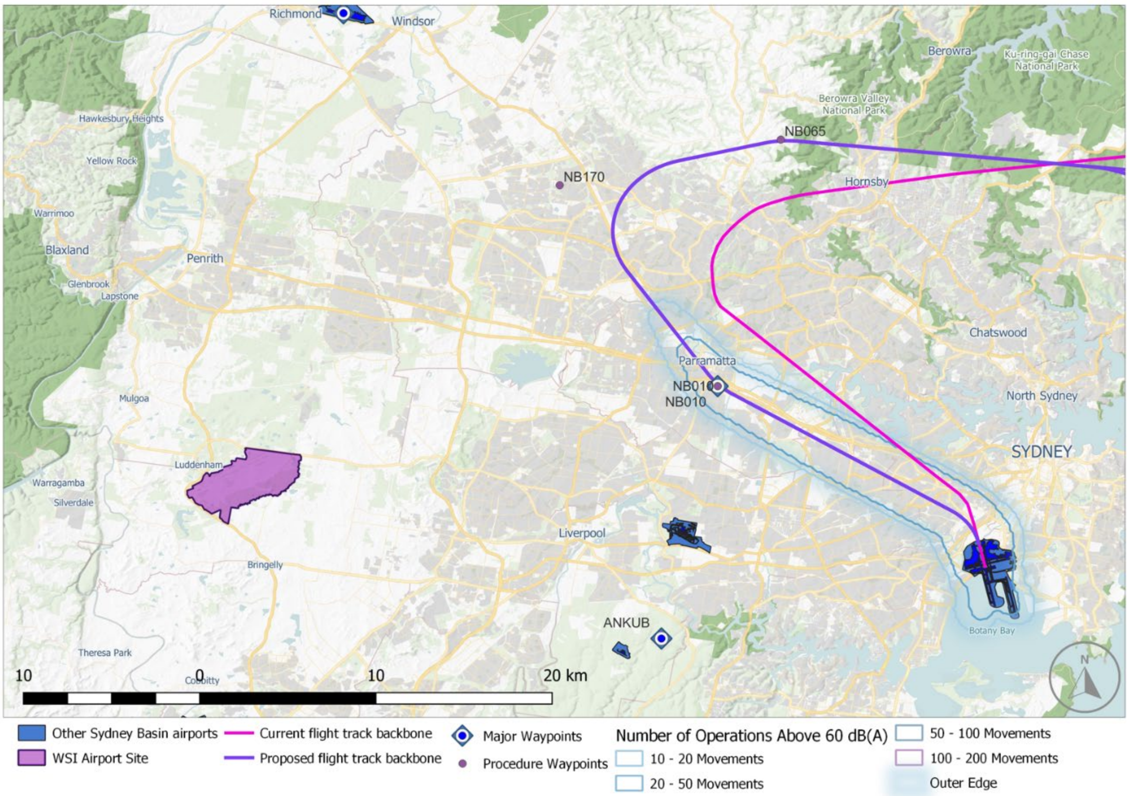


Figure 7.10 Proposed Future Runway 34L KADOM to SHORE SID to eastern/oceanic destinations – N60 contours – zoomed in

7.4 Runway 34L KADOM SID to the west – N70 contours

N70 Contours identify by a series of contour bands, areas that will be subjected to aircraft overflight events that exceed a noise level of 70 dB(A) – 5 to 10, 10 to 20, 20 to 50, and 50 to 100 overflights in a day (N70 24-hours).

Figure 7.11 and Figure 7.12 present N70 contours for jet aircraft departures on the Runway 34L KADOM SID from Sydney (Kingsford Smith) Airport to western destinations via waypoint KADOM. They compare current versus proposed future contour boundaries.

Figure 7.11 presents the N70 contours for the current Runway 34L KADOM SID.

Figure 7.12 presents the N70 contours for the proposed future Runway 34L KADOM SID.

The N70 contours indicate a minor reduction in the width of the N70 envelope and a slight longitudinal extension for the proposed Runway 34L KADOM SID procedure. This change reflects the expected reduction in aircraft dispersion along the flight path centreline (backbone) of the SID procedure.

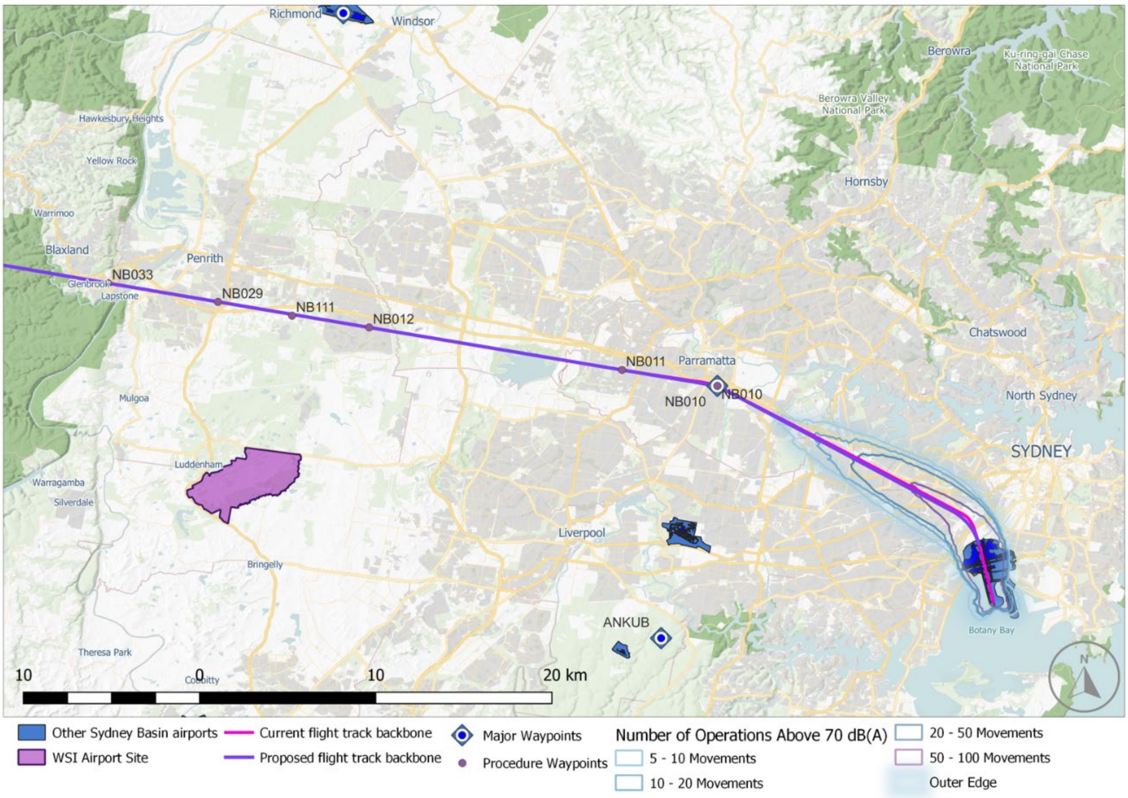


Figure 7.11 Current Runway 34L KADOM SID – N70 contours

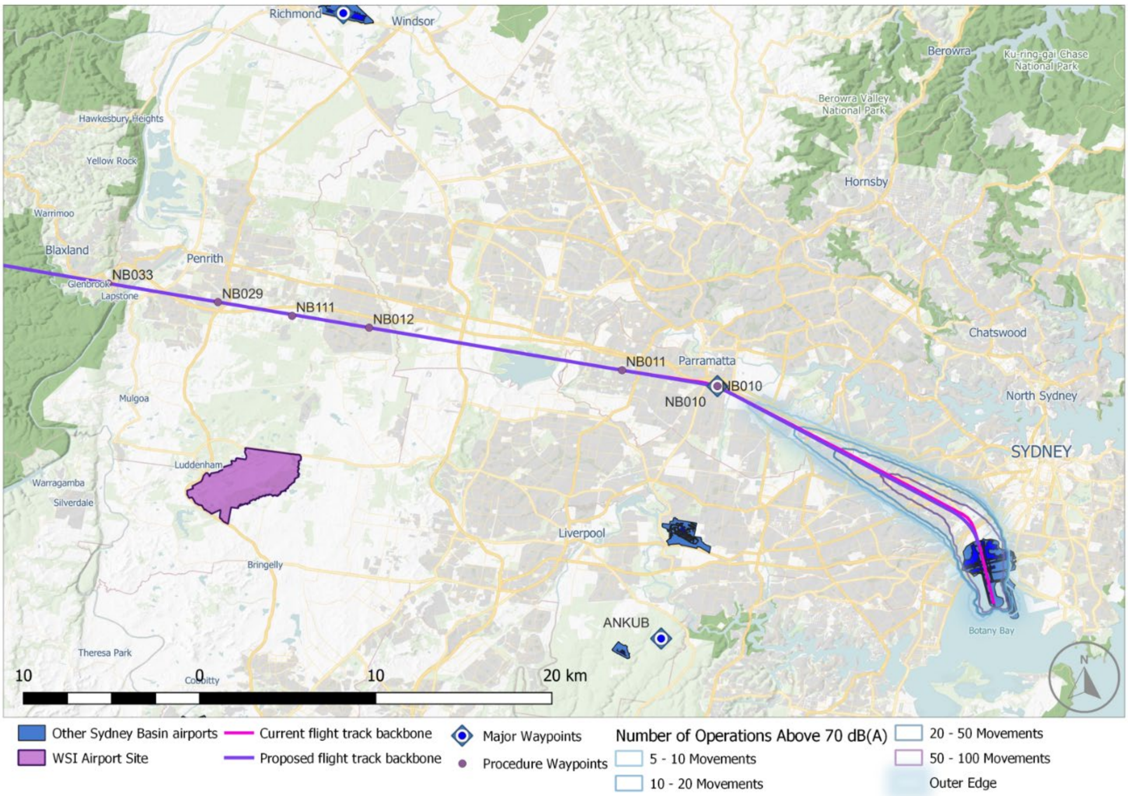


Figure 7.12 Proposed Future Runway 34L KADOM SID – N70 contours

7.5 Runway 34L KADOM to waypoint SHORE SID via waypoint NB010 – N70 contours

Figure 7.13 and Figure 7.14 present N70 contours for jet aircraft departures off the Runway 34L KADOM to waypoint SHORE SID from Sydney (Kingsford Smith) Airport to north-eastern, eastern and oceanic destinations and transitioning north at the proposed new waypoint NB010 to waypoint SHORE. Departures off Runway 34L to northern and eastern (oceanic) destinations were previously allocated the Runway 34L RICHMOND SID (radar) described in Chapter 6 of this Appendix.

The figures compare current versus proposed contours. The N70 contours indicate a significant shift in the geographic extents of the current and proposed future procedures. This is a result of Runway 34L departures to the east being displaced off the current Richmond SID due to the requirements of instrument flight path design standards. (The current eastern departure operation is based on radar vectoring.)

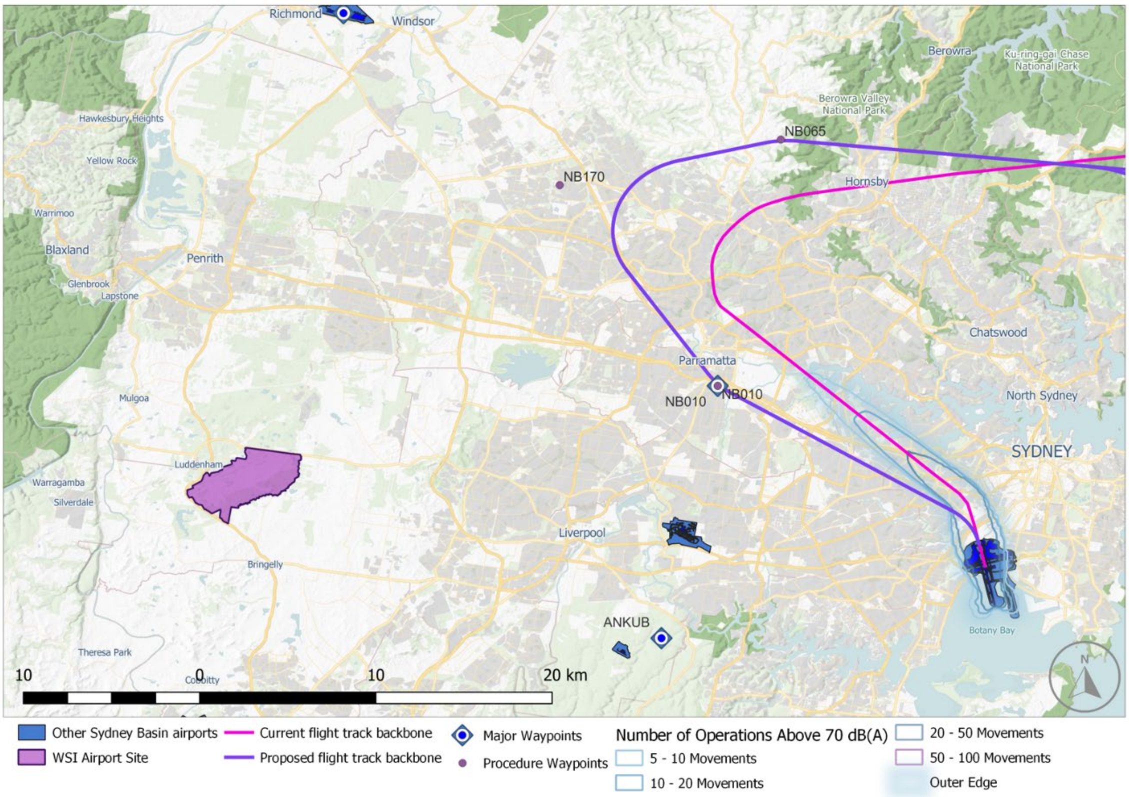


Figure 7.13 Current Runway 34L KADOM to SHORE SID to eastern/oceanic destinations – N70 contours

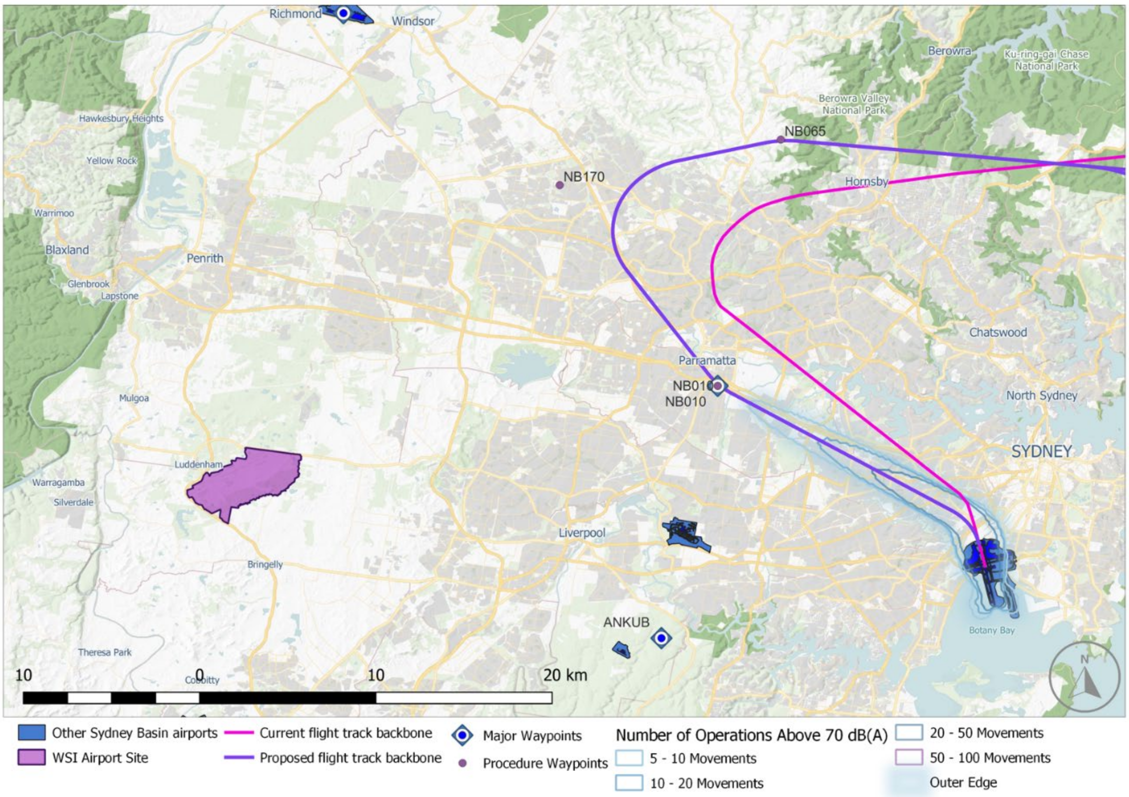


Figure 7.14 Proposed Runway 34L KADOM to SHORE SID to eastern/oceanic destinations – N70 contours

7.6 Runway 34L KADOM to waypoint TONTO SID L_{Amax} contours

As stated in Section 7.5 above, the transition to the south off the Runway 34L KADOM SID from Sydney (Kingsford Smith) Airport SID is expected to continue to be used infrequently. This is consistent with current practice and will continue to result in only one or 2 aircraft per day using the transition. A L_{Amax} single-event contour has been generated (refer to Figure 7.15) for a stage length 9 (more than 6,500 nm (12,000 km) (Sydney to Johannesburg) long haul flight operated by a wide-body Boeing B787-9. This helps demonstrate that the 60 and 70 dB(A) overflight noise levels do not extend as far west along the SID procedure as the proposed new transition for the left-turn to the south at waypoint NB033, which has moved that southern transition point around 19 nm (35 km) further west along the SID procedure in comparison to the current transition at waypoints NB010 to ANKUB.

(L_{Amax} is the measure of the maximum perceived sound from an overflying aircraft. For additional explanation on L_{Amax} contours, refer to Technical paper 1: Aircraft noise).

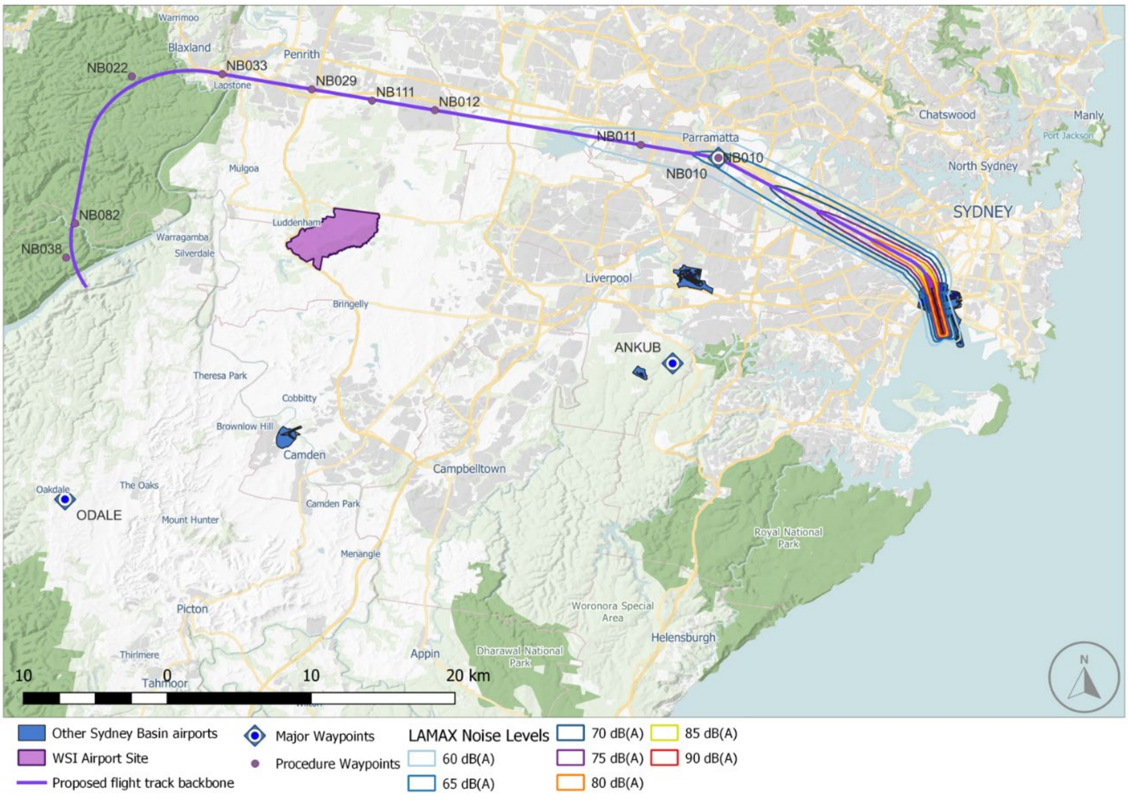


Figure 7.15 Runway 34L KADOM to TONTO SID to southern destinations – L_{Amax} contours

7.7 Dwelling and population counts within N60 and N70 (24-hour) contours

Table 7.1 presents dwelling and population count estimates, compiled utilising 2021 census data obtained from the Australian Bureau of Statistics (ABS), within the N60 and N70 contour extents for jet departures off the current and proposed Runway 34L KADOM SID from Sydney (Kingsford Smith) Airport. (Dwelling counts are presented for the area defined by the outer contour – N60 for 10 and above overflights, and N70 for 5 and above overflights.)

Noise modelling (N60 and N70 contours) is based on the flight movements of the busiest day in 2019 for Runway 34L operations. As such, the results generated in the following analysis should be considered a “worst case” scenario, as an average or typical day of operations will have a reduced number of flights on each particular Sydney (Kingsford Smith) Airport runway direction, and individual SID procedure utilisation and be subjected to runway direction changes to respond to weather influences.

Table 7.1 Dwelling and population counts within N60 (24-hour) and N70 (24-hour) contours

Noise contour	SID segment	Current			Proposed future		
		Area (km^2)	Dwelling count	Population count	Area (km^2)	Dwelling count	Population count
N60 (24-hour) 10 and above movements	**KADOM**	164	259,406	620,442	153	241,878	579,200
N60 (24-hour) 10 and above movements	**SHORE**	111	188,790	421,081	118	204,606	474,033
N70 (24-hour) 5 and above movements	**KADOM**	56	98,660	223,567	50	91,922	207,894
N70 (24-hour) 5 and above movements	**SHORE**	39	58,535	130,547	42	74,334	169,653

Table 7.2 presents a comparison of current versus proposed future - area, dwelling, and population counts for N60 and N70 outer contours, generated by AEDT, (and which are presented in Table 7.1).

The analysis indicates a slight reduction in numbers for the expected noise impacts for departures to the west via the proposed future Runway 34L KADOM SID.

The analysis indicates an increase in area – square kilometres (km^2), dwelling and population numbers for the reallocation of departures to the east off Runway 34L from the RICHMOND to the KADOM SID at Sydney (Kingsford Smith) Airport and the adjustments associated with the new transition through waypoint SHORE. This has resulted from a distinct shift (refer to Figure 7.17) of both the N60 and N70 contours to the south-west associated with that reallocation to the KADOM SID.

Table 7.2 Dwelling and population counts within N60 (24-hour) and N70 (24-hour) contours

Noise contour	SID segment	Current versus proposed future procedure		
		Area (km^2) percentage change	Dwelling count percentage change	Population count percentage change
N60 (24-hour) 10 and above movements	**KADOM**	-6.7 per cent	-6.8 per cent	-6.6 per cent
N60 (24-hour) 10 and above movements	**SHORE**	+6.3 per cent	+8.4 per cent	+12.6 per cent
N70 (24-hour) 5 and above movements	**KADOM**	-10.7 per cent	-6.8 per cent	-7.8 per cent
N70 (24-hour) 5 and above movements	**SHORE**	+7.7 per cent	+29 per cent	+30 per cent

The proposed southern transition off the Runway 34L KADOM SID from Sydney (Kingsford Smith) Airport at waypoint NB033 is not included in Table 7.1 or Table 7.2 due to the continuing expected low daily usage numbers (only one or 2 flights) on that transition. Figure 7.15 presents L_{Amax} contours for a long-haul (Stage 9 – Sydney to Johannesburg) departure by a wide-body Boeing B787-9 aircraft on that transition. The L_{Amax} contour shows the expected noise levels will be less than 50 dB(A) due to the increasing altitude achieved prior to that aircraft reaching the southern transition point at waypoint NB033.

7.8 Suburb overlays

Figures 7.16 and 7.17 show the current and proposed flight path track dispersion corridors (refer to Figures 7.1 and 7.6 of this Appendix) combined with a suburb boundary and suburb name overlay, to aid stakeholders in identifying their location of interest associated with the proposed changes to the Sydney (Kingsford Smith) Runway 34L KADOM SID and its SHORE transition.

Current dispersion corridor is depicted in pink and proposed future dispersion corridor in purple. Grey hatching on Figure 7.17 indicates the extent of the area that departure aircraft off Runway 34L may overfly when under radar vectoring.

Only a backbone track is depicted for the southern transition flight path in Figure 7.16 as this transition is only expected to be flown by one or 2 aircraft daily.

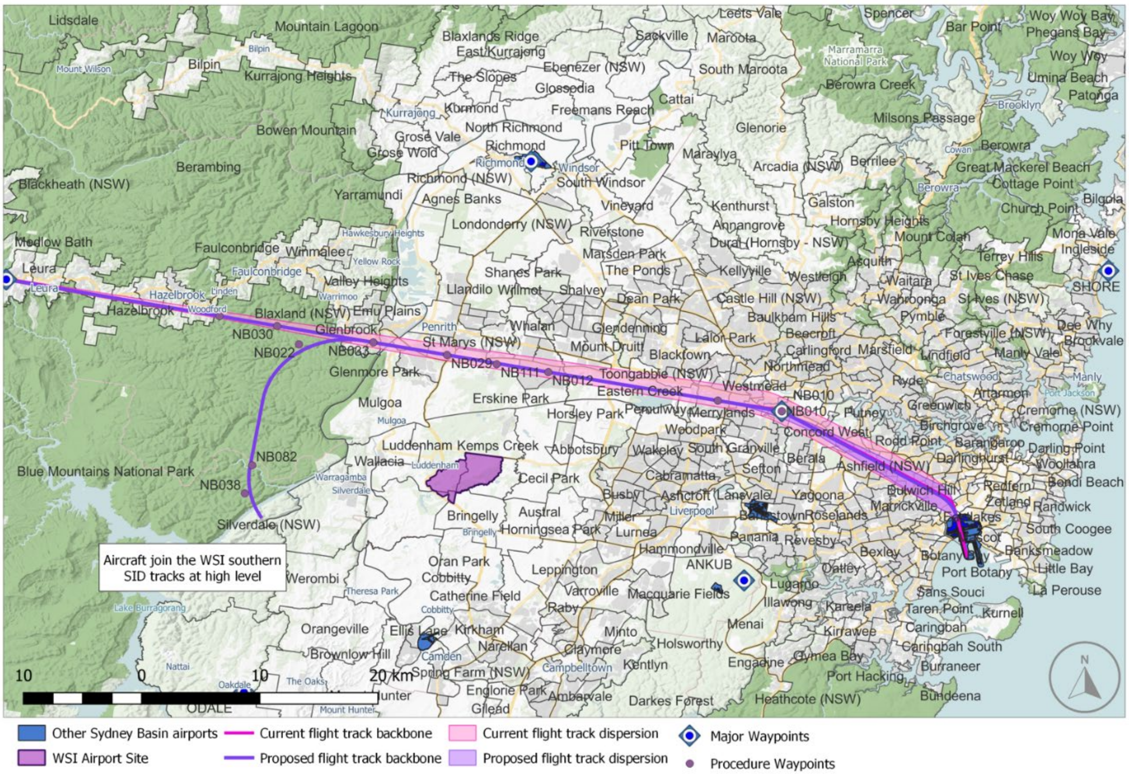
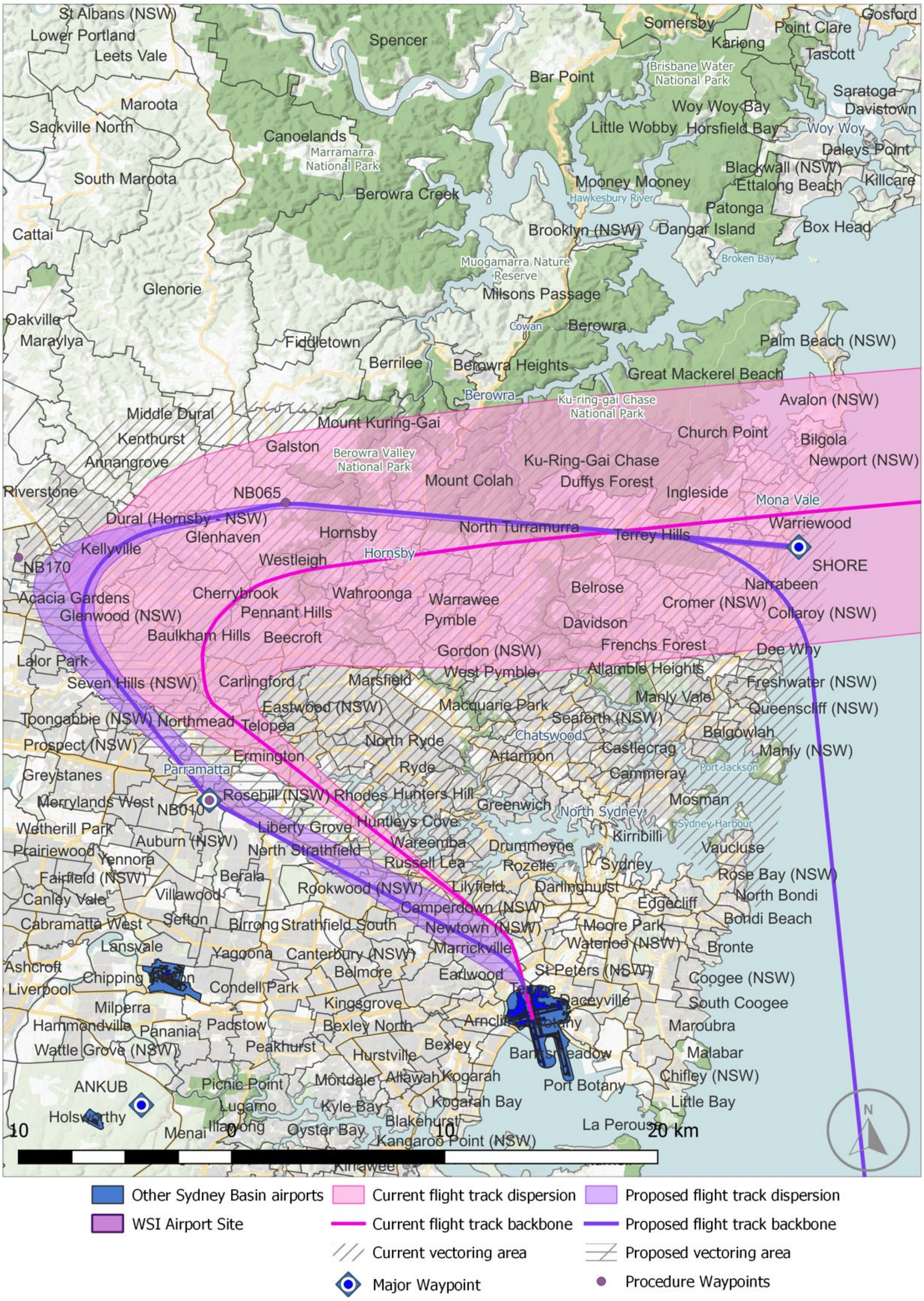


Figure 7.16 Runway 34L KADOM SID - Jet departures to the north-west – flight path dispersion – current versus proposed with suburb overlay



The proposed radar vectoring area in Figure 7.17 depicts an extension to the west. In future operations the radar vectoring area will include the existing area and this extension area.

Figure 7.17 Runway 34L KADOM SID – SHORE Transition - Jet departures to the east – flight path dispersion – current versus proposed with suburb overlay

Chapter 8 Other environmental factors

8.1 Visual amenity

8.1.1 Aircraft continuing west to waypoint KADOM

As described in Chapter 7 there will be a slight decrease in the geographic extents of the N60 and N70 contours (refer to Table 7.2) between the current and proposed SID. This proposed change (refer to Figure 7.16) shows a small amount of change as aircraft approach Waypoint NB010. Aircraft will still be as visible to the communities in this part of Sydney as they are currently, but not necessarily in the quite same location.

As aircraft proceed from waypoint NB010 to waypoint KADOM some may be slightly higher than the current procedure because of the proposed SID's altitude restriction for all aircraft to be 5,000 ft or above by new waypoint NB011. The current SID procedure does not specify this altitude restriction.

Communities between waypoints NB010 and KADOM are currently overflown by the existing departure procedure (refer to Figure 7.16). However due to the introduction of a series of waypoints required for separation and "Safety by Design" with WSI operations, the proposed flight track is expected to reduce the width of dispersion of aircraft on this track. Aircraft will still be visible to the communities in this part of Sydney as they are currently but not necessarily in quite the same location.

8.1.2 Aircraft proceeding south and north-west

The change proposed to the Runway 34L KADOM SID has a southern transition to waypoint TONTO for the small number of aircraft that leave the Sydney Basin airspace in a southerly direction. For example, this is done so wide-body jet aircraft can utilise favourable weather conditions for long distance flights to South Africa. In 2019, this typically represented one wide-body jet aircraft per day.

These flights have been included in the N60 and N70 contours. As described above, these flights leave the KADOM SID by turning left at waypoint NB033 by which time they will be required to be at an altitude of 10,000 ft (3 km) or higher on climb.

There is a short transition leg over the foothills of the Lower Blue Mountains to position the aircraft joining and following the southern SID tracks for jet aircraft departing WSI at a higher altitude. This transition will be visible as a new low usage, high altitude flight path, between leaving the KADOM SID and joining the WSI SIDs. The transition to the south occurs prior to Katoomba over uninhabited areas of the GBMA, west of the Hawkesbury River and above 10,000 ft (3 km).

The suburbs currently overflown by the very small number of flights using the existing SID normally at altitudes below 7000 ft (2.2 km) will no longer be overflown.

Aircraft to the north-west will normally be allocated the Runway 34L RICHMOND SID. However, a military parachute training area exists within the RAAF Base Richmond Restricted Airspace and when activated aircraft to the north-west will be allocated the proposed new Runway 34L KADOM SID which provides an initial flight path south of the parachuting area. Once either above the parachuting or west of the parachuting areas, aircraft heading north-west will be radar vectored to a position where they can track directly to an enroute waypoint. These aircraft will be visible leaving the Runway 34L KADOM SID flight path anywhere between waypoints NB033 and KADOM and will be 10,000 ft (3 km) or higher because of the altitude requirements of the SID.

8.1.3 Aircraft proceeding east and north-east

The change proposed to the Runway 34L KADOM SID has an easterly transition (known as the SHORE transition) for aircraft proceeding either to the east or the north-east. This transition will in part replace the current radar vectoring procedures that are employed for these aircraft that currently use the Runway 34L RICHMOND SID. The need for moving these aircraft from the current Runway 34L RICHMOND SID to the proposed Runway 34L KADOM SID is explained in Chapter 6 (requirement of instrument flight path procedure design standards).

A new transition after the common waypoint of NB010 has been proposed for these aircraft via the new waypoints NB170 and NB065 as described in Chapter 6 of this Appendix. These aircraft have been included in the development of the Oceanic N60 and N70 contours.

As described in Chapter 6, Airservices Australia expect that in the early years of operation of WSI only about half of the eastern and north-eastern departures using the proposed Runway 34L KADOM SID, SHORE transition, will fly the full SID flight path. The others will be radar vectored as is the case currently and will be visible from the ground as the dispersed tracks in use currently.

The reallocation of east (oceanic) departures from the current Runway 34L RICHMOND SID to the proposed Runway 34L KADOM SID and eastern transition involves a maximum lateral shift to the south of approximately 3 nm (5 km). The KADOM procedure segment between Sydney (Kingsford Smith) Airport and waypoint NB010 is already overflown but will be subjected to an increase in frequency of overflights of around 30 flights per day due to the reallocation of those flights off the Runway 34L RICHMOND SID. Beyond waypoint NB010, the proposed new eastern transition segment of the procedure and the areas that will be overflown are shown in Figure 7.17.

8.2 Radar vectoring

In locations where no SIDs or STARs are available for an aircraft's particular operation, or where adverse weather requires the cancellation of a SID or STAR for safety reasons, air traffic control will provide radar vectoring to safely manage those applicable operating aircraft. Radar vectoring involves air traffic control determining a safe path for all aircraft and issuing heading and sometimes altitude and speed instructions to one or more aircraft to avoid any possible conflictions. While the objective of a set of SIDs and STARs in terminal airspace designed under "Safety by Design" principles is for onboard flight management systems monitored by air traffic control to ensure aircraft remain separated, there are occasions where SIDs and STARs are cancelled for varied reasons and aircraft are radar vectored.

A cancellation of a SID or STAR resulting in radar vectoring involving a departure from lateral track, could also involve a variation in vertical profile or speed requirements and may be either at pilot request or initiated by air traffic control.

Pilot requests for departing from a SID may be for:

- route efficiency – where there is a more direct route to the destination than the published procedure allows, saving time, fuel and emissions
- weather avoidance – particularly around turbulence associated with thunderstorms.

Pilot requests in all instances are subject to air traffic control approval. Avoidance of thunderstorms which has a safety priority is readily approved. Direct routing requests will be considered by air traffic control in light of safety and overall management of other aircraft within the vicinity.

Air traffic control-initiated cancellations of SIDs can also be for reasons of route efficiency, better noise outcomes or better emissions outcomes. Separation requirements with other departing, arriving or transiting aircraft can also necessitate the cancellation of a SID.

Any one of the 3 elements (track, vertical profile, speed) of a SID can be cancelled individually or collectively.

Aircraft will eventually either re-join the published procedure at a later waypoint or will connect with the enroute network at a designated waypoint.

In the case of the proposed Runway 34L KADOM SID, air traffic control radar vectoring for safety and track distance savings is likely on the TONTO transition and as explained in Chapter 6 for about 50 per cent of the aircraft on the SHORE transition which replicates current practice.

Radar vectoring will also be used to vector north-western departures around the Richmond parachute jumping area when it is active.

Radar vectoring to assist with the avoidance of inclement weather may take place at any position along the proposed SID flight path.

8.3 Track distance and emissions

Due to the minimal change in track distance (less than 0.3 nm or 0.56 km), there is almost no discernible change in the consumption of fuel and emissions of CO_2 from jet aircraft operating between the current and proposed SID all the way through to waypoint KADOM.

The practice of continuing with radar vectoring for aircraft on the SHORE transition should result in only minimal change to both track distance and emissions, and as the timing of radar vectoring is a tactical issue it is not possible to measure any quantifiable change either positive or negative.

Aircraft on the waypoint TONTO transition (estimated to be one to 2 per day) will be positioned much further west than is currently the case. As a result of possible enroute radar vectoring outside of the Sydney Basin airspace, jet aircraft may reach their enroute phase of flight further west than is currently the case. This could result in track distance and aircraft CO_2 emissions savings but again, due to the radar vectoring taking place in a tactical phase of flight, it is not quantifiable.

Chapter 9 Conclusion

The flight path for the new Runway 34L KADOM SID as designed is predominantly over parts of the north-western suburbs that are already overflown by the existing SID.

The change represents a minimal change from the existing SID for beyond waypoint NB010 around 80 flights per day.

A small adjustment of the SID past new waypoint NB010 will provide a safety enhanced track for around 164 aircraft departing for north-eastern oceanic destinations.

The ongoing requirement for aircraft to turn left off Runway 34L runway heading at an altitude of 800 ft (244 m) will continue to provide the track dispersion over the close in north-western suburbs as it does currently.

The dispersion of aircraft created by the 800 ft (244 m) left turn will narrow where the aircraft fly past new waypoint NB010 at approximately 10 nm (around 19 km) from Sydney (Kingsford Smith) Airport, and aircraft will be within the Required Navigation Performance (RNP) tracking tolerance by the new waypoint NB011 rather than by waypoint KADOM.

The areas overflown by the proposed new Runway 34L KADOM SID from Sydney (Kingsford Smith) Airport and its eastern and southern transitions are currently frequently overflown with similar aircraft and aircraft from other Sydney Basin airports operating both IFR and VFR flights (refer to Figure 1.1). The similarity in areas overflown, coupled with the low growth forecasts of around one per cent or less, result in the expectation that there will be little or no material change over today's operations.

Appendix C

Proposed changes to Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID to west and north-west

Western Sydney International (Nancy-Bird Walton) Airport – Airspace and flight path design | Environmental Impact Statement

Technical paper 13: Facilitated changes

Appendix C – Proposed changes to Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID to west and north-west

October 2024

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Terms and abbreviations

Term/abbreviation	Definition
ABS	Australian Bureau of Statistics
ACP	Airspace Change Proposal (Airservices)
AEDT	Aviation Environmental Design Tool (US FAA)
AIP	Aeronautical Information Package (Australia)
AIRAC	Aeronautical Information Regulation and Control (Australia)
ARP	Aerodrome Reference Point (ICAO)
CASA	Civil Aviation Safety Authority (Australia)
CCO	Continuous Climb Operation
CDO	Continuous Descent Operation
CO_2	Carbon dioxide (a greenhouse gas)
Cth	Commonwealth of Australia
DAP	Departure and Approach Procedures (Australian AIP)
dB(A)	A-weighted decibel (unit of sound)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Australian Government)
DITRDCA	Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Australian Government)
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation 1999* (Cth)
FAA	Federal Aviation Administration (United States)
ft	feet (unit of distance or height equivalent to 0.3048 m)
GA	General Aviation
GBMA	Greater Blue Mountains Area (World Heritage property)
IAF	Initial Approach Fix
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
km	kilometre (unit of distance equivalent to 1,000 m)
km^2	square kilometre (metric unit of area equal to a square that is one km long on each side)

Term/abbreviation	Definition
LL	Lowest Level (altitude for transit flights through Sydney Basin)
LSALT	Lowest Safe Altitude
m	metre (unit of distance or height equivalent to 3.281 ft)
MNES	Matters of National Environmental Significance (EPBC Act) (Cth)
N60/N70	Number above (N-above noise metric)
NDB	Non-Directional Beacon
NFPMS	National Flight Path Monitoring System (Airservices database)
nm	nautical mile (unit of distance equivalent of 1.852 km)
NSR	Noise Sensitive Receiver
PAAM	Plan for Aviation Airspace Management
PBN	Performance Based Navigation
PMST	Protected Matters Search Tool (DCCEEW)
RAAF	Royal Australian Air Force
RNP	Required Navigation Performance
RPT	Regular Public Transport (air services)
SID	Standard Instrument Departure
STAR	Standard Instrument Arrival
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WSI	Western Sydney International (Nancy-Bird Walton) Airport

Chapter 1 Introduction

Although aircraft differ in operation, type, altitude, noise level and frequency, most areas of the Sydney Basin are overflown at some stage as shown in Figure 1.1.

The introduction of new flight paths to be used by aircraft into and out of Western Sydney International (Nancy-Bird Walton) Airport (WSI) has considered a multitude of options to minimise any adjustments required to existing flight paths in the Sydney Basin airspace. Single runway operations at WSI require adjustments to Sydney Basin operations prior to opening in 2026 to facilitate its flight paths and airspace structure. Those facilitated airspace changes include the development of, or adjustments to:

- Sydney (Kingsford Smith) Airport Runway 25 Standard Instrument Departures (SIDs) to the west, north-west, north and east – (Appendix A)
- Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs to the south, west, north, and east – (Appendix B)
- **Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID to the west and north-west – (Appendix C) – this Appendix**
- Sydney (Kingsford Smith) Airport non-jet SID to the west or north-west – (Appendix D)
- Sydney (Kingsford Smith) Airport AKMIR Standard Instrument Arrival (STAR) jet and non-jets from the south and west – (Appendix E)
- Royal Australian Air Force (RAAF) Base Richmond SID and STARs – (Appendix F)
- Bankstown Airport SID and STARs – (Appendix G)
- Camden Airport STARs – (Appendix H)
- Sydney Basin Visual Flight Rules (VFR) operations – (Appendix I)
- Miscellaneous and Minor procedure adjustments – (Appendix J)
  - Sydney (Kingsford Smith) Airport BOREE STAR
  - Sydney (Kingsford Smith) Airport RIVET STAR
  - Sydney (Kingsford Smith) Airport Runway 07 Initial Approach Fix (IAF)
  - Sydney (Kingsford Smith) Airport Runway 07 SID
  - Sydney Basin low altitude transit flight routes.

This Appendix – Appendix C, presents an assessment of the proposed adjustments required to the current Runway 34L RICHMOND SID for departures to north-west destinations from Sydney (Kingsford Smith) Airport.

The design process for the safe and efficient integration of WSI's new flight paths into the existing Sydney Basin airspace has been one of adopting "Safety by Design" principles to deliver the highest level of safety separation assurance in conformance with rules set by the Civil Aviation Safety Authority (CASA). This is to enable aircraft to operate safely within their performance envelope into an already complex airspace structure. "Safety by Design" ensures that aircraft are separated from each other according to the flight routes and the type of air traffic service being provided. As such, this requires the new or amended SIDs and STARs and altitudes to be published and then downloaded into the cockpit flight management systems of all aircraft. At the same time the same information must be downloaded into the software of the surveillance systems used by air traffic control to manage and monitor the safe separation of all controlled aircraft.

The preliminary airspace design process has appropriately accorded "safety" as the highest priority to ensure robust operational safety outcomes. Environmental outcomes, with a particular focus on the minimisation of potential community impacts and the operational efficiency of the facilitated airspace changes has also been a key design criterion.

Instrument Flight Rules (IFR) are the rules that govern the operation of aircraft in Instrument Meteorological Conditions (IMC) (conditions in which flight In IMC, an aircraft must be flown with reference to its on-board flight instruments.) Two sets of rules, IFR or VFR exist to govern flight in either IMC or VMC.

The proposed modified Sydney (Kingsford Smith) Airport Runway 34L Richmond SID presented in this Appendix has been designed to be flown under IFR to ensure safety by design is embedded in the new procedures and to allow continued operations of this high-use procedure in all weather conditions. (Aircraft flying to IFR standards/rules can operate in either IMC or VMC, but aircraft flying to VFR standards/rules can only operate in VMC.)

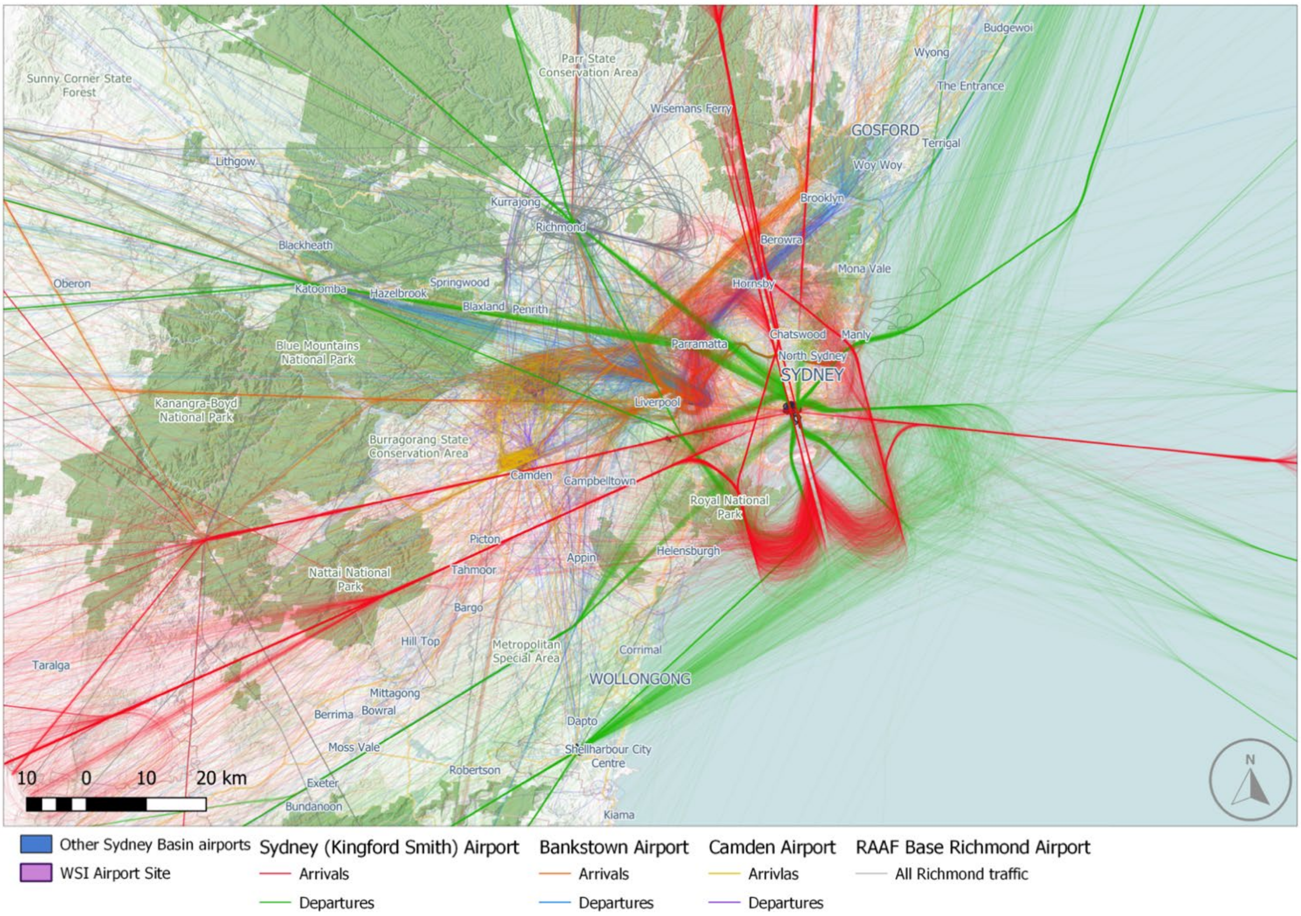


Figure 1.1 Sydney Basin airspace with one-week of flight track movement activity in March 2019

Chapter 2 Background

A high-use departure flight path (SID) off Runway 34L from Sydney (Kingsford Smith) Airport involves a track to the north-west to overhead RAAF Base Richmond before splitting into several enroute tracks to domestic and international destinations. As WSI and Sydney (Kingsford Smith) Airports are located around 45 kilometres (km) apart, this SID will cross the new northern flight paths to and from WSI at relatively low altitudes.

The Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID directs aircraft from Runway 34L to fly runway heading (335 degrees) to 1,500 feet (ft) (460 m). On leaving 1,500 ft (460 m) on climb, aircraft will turn left and track direct to Richmond. A climb gradient of 5.6 per cent is required by aircraft until they reach 2,500 ft (760 m) to ensure separation with aircraft transiting the uncontrolled airspace north of Bankstown Airport. Once above 2,500 ft (760 m), aircraft may reduce their climb gradient to 3.3 per cent (refer to Figure 4.1 in Chapter 4 for more detail).

Neither the track nor the climb gradient current requirements of this SID provide separation assurance with the proposed new WSI inbound and outbound tracks to achieve a strategic “Safety by Design” outcome.

Some minor adjustments to track specifications and a published altitude restriction at a specific point along the Runway 34L RICHMOND SID will be required to ensure safety of operations once WSI is operational.

The adjustment proposed to the Runway 34L RICHMOND SID will need to be published and implemented prior to the commencement of operations at WSI in late 2026. This facilitated airspace change will not impact the application of noise sharing runway modes at Sydney (Kingsford Smith) Airport. The change would be introduced in 2026 on a scheduled Aeronautical Information Regulation and Control (AIRAC) date, prior to the opening of WSI. Introducing these changes ahead of WSI's opening will allow pilots and air traffic control to adjust their systems and become familiar with changes to current procedures before single runway operations at WSI commence and will minimise the likelihood of conflicts or incidents in the airspace.

Figure 2.1 shows the location of WSI, the locations of other key airports in the Sydney Basin and the geographic extent of a nominal area radiating 45 nm (around 83 km) from the Aerodrome Reference Point (ARP) of WSI.

Figure 2.2 is the Aerodrome Chart for Sydney (Kingsford Smith) Airport. The chart has been extracted from the Aeronautical Information Package (AIP) Departure and Approach Procedures (DAP) to assist the interpretation of the information presented in this Appendix. It depicts the general layout of Sydney (Kingsford Smith) Airport including its 3-runway system and orientations, runway headings (34L, 25, etc.) and dimensions (lengths and widths).

Figure 2.1 Location of airports in the Sydney Basin

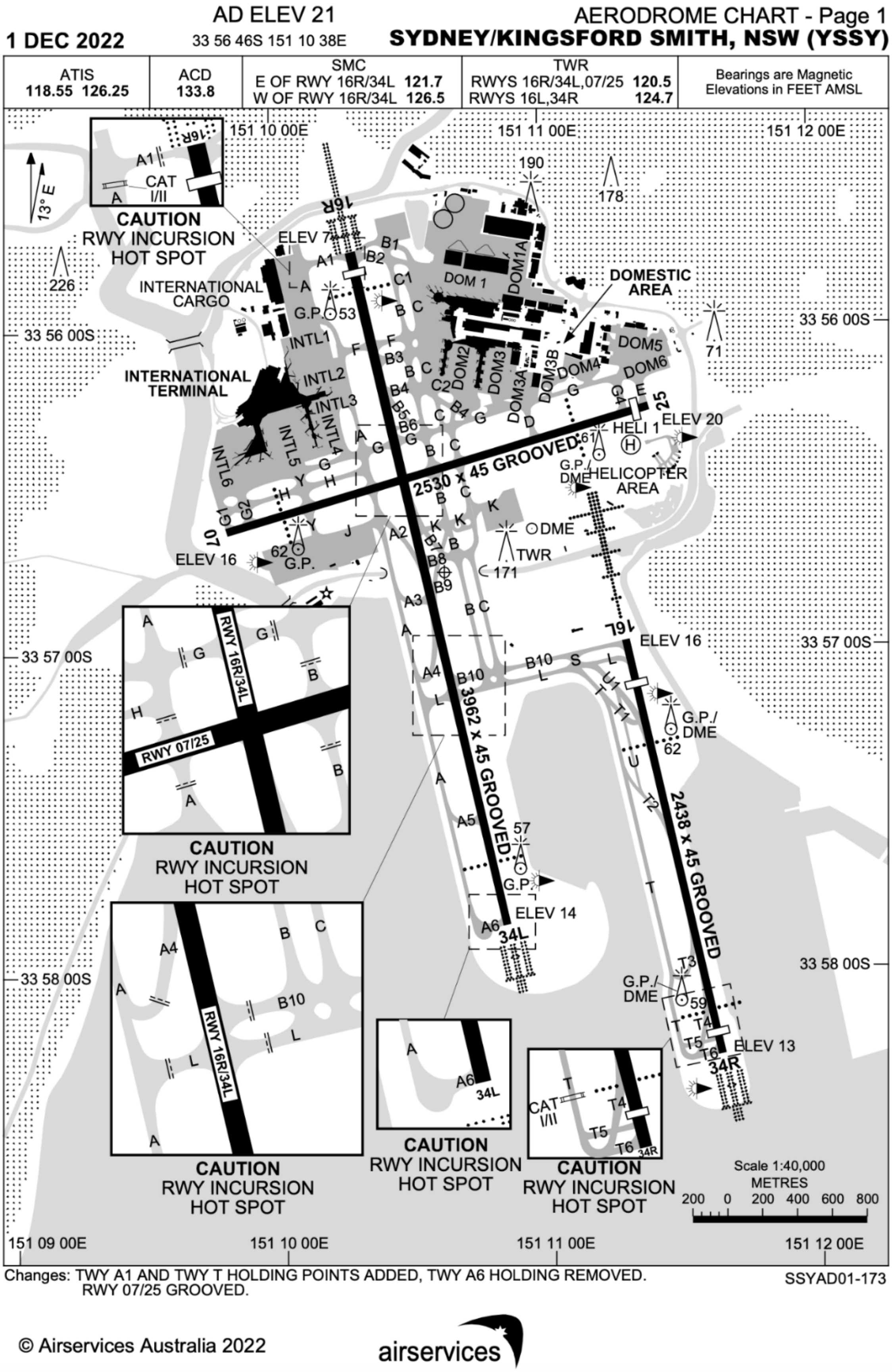


Figure 2.2 Sydney (Kingsford Smith) Airport – Aerodrome Chart (AIP / DAP)

Chapter 3 Purpose

The purpose of this Appendix is to present an environmental assessment of the adjustments proposed to the Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID from. To the extent possible, it includes some analysis and assessment of potential noise impacts from aircraft overflights of this proposed facilitated airspace change.

It describes the reason for the facilitated airspace changes and the associated safety and operational considerations, along with any other environmental issues.

Chapter 4 Current Runway 34L RICHMOND SID operations

Figure 4.1 below presents the current Sydney (Kingsford Smith) Airport Runway 34L Richmond SID Procedure Plate extracted from the AIP DAP.

Aircraft departing via the Runway 34L RICHMOND SID fly heading 335 degrees until reaching 1,500 ft. At 1,500 ft the aircraft turns to track direct to the waypoint at the Richmond Non-Directional Radio Beacon (NDB) ('RIC').

While aircraft must turn at the same altitude (1,500 ft (460 m)), this is not the same point over the ground for all aircraft. The position over the ground where an aircraft reaches 1,500 ft (460 m) will differ based on aircraft type, aircraft weight, varying engine types on similar aircraft types, ambient temperature and prevailing wind speed and direction.

This variability of the point where individual aircraft turn at 1,500 ft (460 m) ensures that once aircraft have completed the turn the tracks taken direct to the Richmond NDB will be dispersed over the ground. This provides a spread of tracks which converge overhead the Richmond NDB (refer to Figure 4.2 below).

There are 2 climb gradients required on this SID. The first requires aircraft to climb at 5.6 per cent until leaving 2,500 ft (760 m). This is to provide separation assurance with airspace to the north-west of Sydney (Kingsford Smith) Airport, which accommodates aircraft operations into and out of Bankstown Airport underneath the controlled airspace. Once an aircraft is above 2,500 ft (760 m), it may reduce its climb gradient to 3.3 per cent. This is a standard gradient and will continue to provide separation assurance with uncontrolled airspace and obstacle clearance for the safe continuation of its climb.

The current SID also provides a transition for aircraft departing to eastern destinations. These aircraft initially follow the SID procedure until at a distance of 12 nm (22 km) along the SID track. At or after this point aircraft are radar vectored by air traffic control to achieve a safe track and climb to intercept one of the eastern enroute flight paths. To ensure safe separation with Sydney (Kingsford Smith) Airport arrivals from the north, aircraft departing for the east may be turned at any point and this results in a large variation of tracks over northern Sydney areas.

As it is currently designed and operated, the Runway 34L RICHMOND SID allows aircraft to operate a Continuous Climb Operation (CCO).

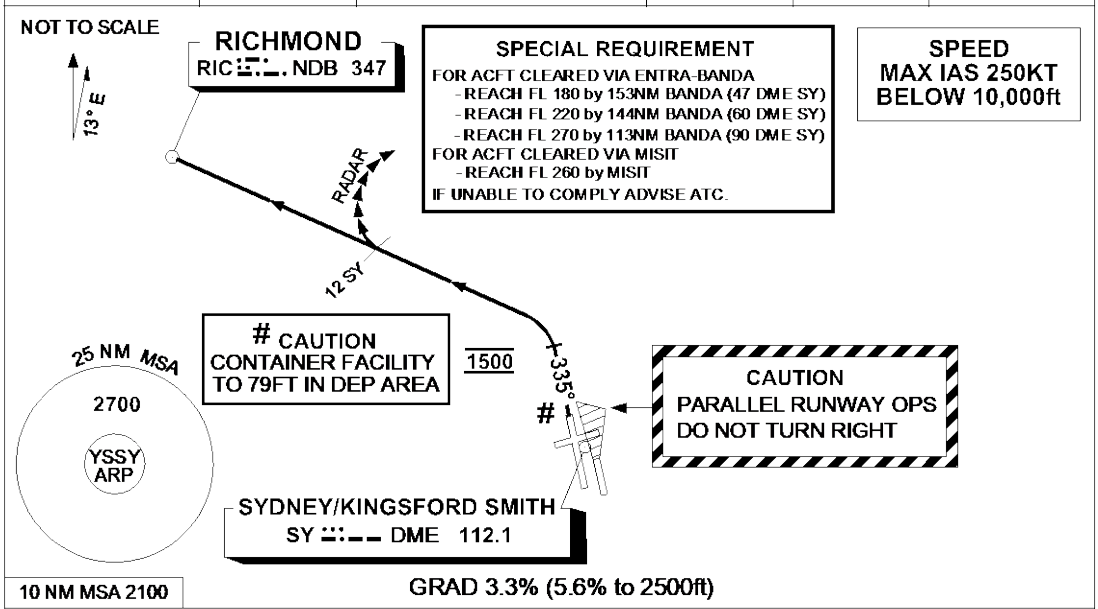
Figure 4.2 below presents the current tracks for Sydney (Kingsford Smith) Airport - all runway operations for a one-week period in 2019. There were approximately 54 departure movements per day operating to the north and west using the current procedure.

The arc off the current Runway 34L Richmond SID at approximately 12 nm (22 km) from Sydney (Kingsford Smith) Airport, (annotated “RADAR” on Figure 4.1) and shown on Figures 5.1, 7.2, 7.3, and 7.6 indicates where radar vectoring for northern and eastern departures commences. These northern and eastern departures will now be reallocated to the Runway 34L KADOM SID with that proposed change addressed in Appendix B – Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs).

STANDARD INSTRUMENT DEPARTURES (SID)
RWY 34L RICHMOND FIVE DEPARTURE (JET)
SYDNEY/KINGSFORD SMITH, NSW (YSSY)

24 MAR 2022

ATIS	ACD	SMC	TWR	DEP(N) N&E	DEP(S) S,W&NW
118.55 126.25	133.8	E OF RWY 16R/34L 121.7 W OF RWY 16R/34L 126.5	120.5	123.0	129.7



RICHMOND (RIC) FIVE DEPARTURE

RWY 34L

CAUTION: parallel runway operations - DO NOT TURN RIGHT
- GRAD 3.3% (5.6% to 2500ft)
- Track 335°
- AT 1500ft turn LEFT, track direct to RIC NDB, then follow transition instruction

TRANSITIONS:

RADAR:
- After passing 12 SY, expect radar vectors to cleared route
- For ACFT cleared via ENTRA see SPECIAL REQUIREMENT above

RICHMOND: (RIC)
- Track to RIC NDB, thence as cleared
- For ACFT cleared via MISIT see SPECIAL REQUIREMENT above

Changes: Editorial. SSYDP09-170

airservices

Figure 4.1 Current Runway 34L RICHMOND FIVE SID (AIP DAP)

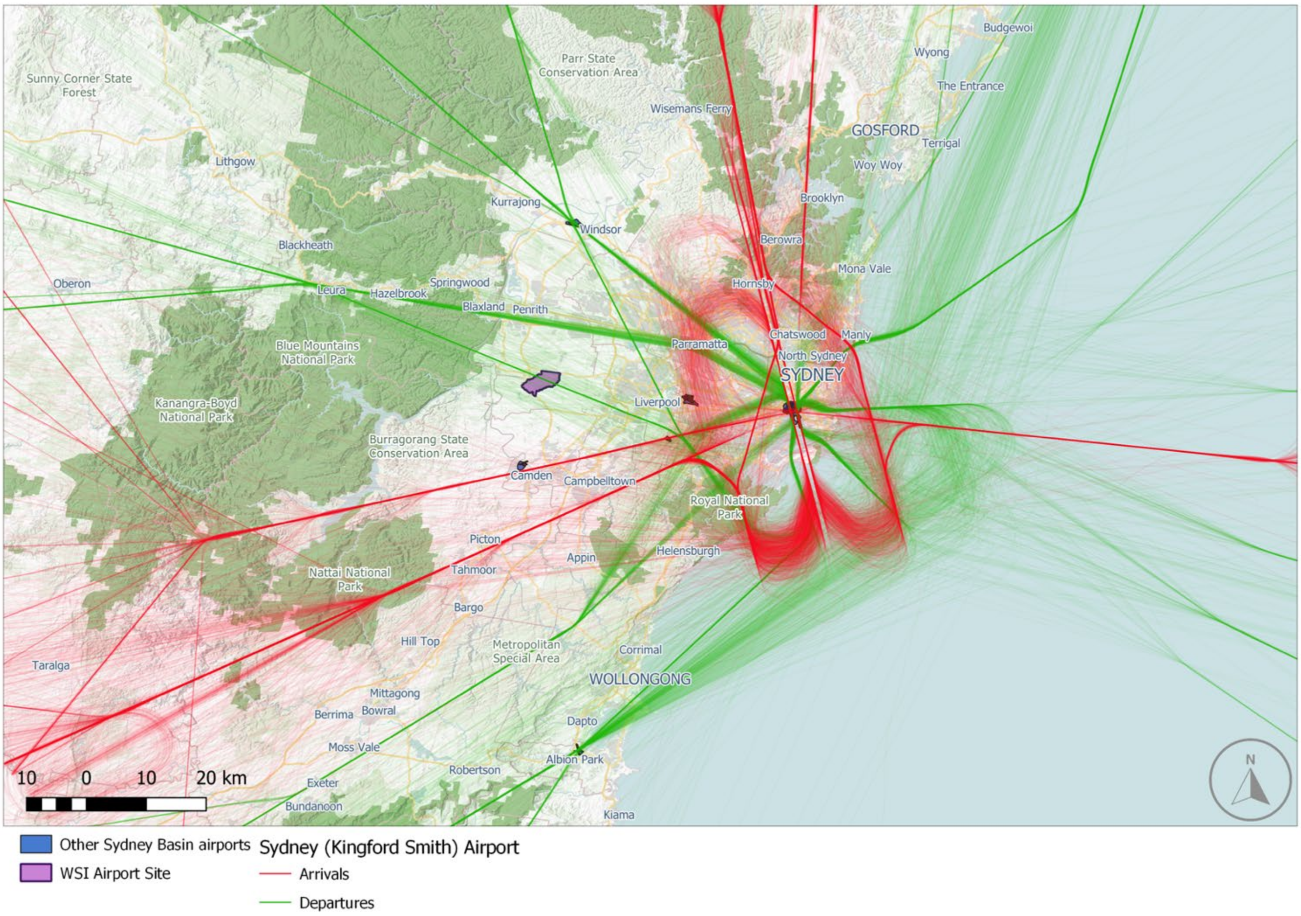


Figure 4.2 Current IFR flight track movement activity for all Sydney (Kingsford Smith) Airport runways – one-week in 2019

Chapter 5 Proposed future 34L Richmond SID Operations

The Runway 34L RICHMOND SID flight path from Sydney (Kingsford Smith) Airport crosses the WSI arrival tracks from the north. Northern arrivals to Runway 23 at WSI will need to pass under aircraft on the Runway 34L RICHMOND SID from Sydney (Kingsford Smith) Airport at an altitude of 5,000 ft (1.5 km). This is to ensure a safe and efficient landing on Runway 23 using the standard Instrument Landing System (ILS) Glide Path angle of 3 degrees.

Arrivals to Runway 05 at WSI from the north will need to cross the Runway 34L RICHMOND SID from Sydney (Kingsford Smith) Airport at a minimum altitude of 12,000 ft (3.7 km) to ensure their altitude is low enough to maintain a Continuous Descent Operation (CDO) on the WSI STAR to land on Runway 05.

The flight paths for proposed WSI operations establish an altitude restriction through which the Runway 34L RICHMOND SID from Sydney (Kingsford Smith) Airport must be managed to ensure that aircraft operating to the 2 airports cross each other's paths safely.

The altitude restriction for aircraft flying the Runway 34L RICHMOND SID from Sydney (Kingsford Smith) Airport is to be above 6,000 ft (1.8 km) but below 11,000 ft (3.4 km) at the crossing point with the WSI arrival track.

The proposed Runway 34L RICHMOND SID from Sydney (Kingsford Smith) Airport has been designed to replicate the existing SID as far as possible while meeting the requirements to safely cross the WSI northern arrivals.

The proposed SID retains the first turn away from the Runway 34L heading at 1,500 ft (460 m). As described above, this turn provides some dispersion of aircraft leaving Sydney (Kingsford Smith) Airport on this SID, based on aircraft type, destination, weight, wind speed and temperature conditions. The new waypoint NB013 (refer to Figure 5.1) has been designed to maintain the dispersion created by aircraft lateral position variation at the 1,500 ft (460 m) left turn for as long as possible.

Utilising historical actual flight tracking information, waypoint NB013 has been placed in the centre of the current lateral track spread at the furthest point from Sydney (Kingsford Smith) Airport possible to ensure the required separation and "Safety by Design" outcome.

The nominal backbone flight track presented in following figures in this Appendix is used to identify either the centre of an existing flight path corridor, or the designed nominal backbone flight track of a proposed SID or STAR. In the case of a current nominal backbone flight track, it is based on an average of current radar plotted flight paths. In the case of a proposed new procedure design, the nominal backbone flight track will be primary track used to establish and ensure safety by design standards are met.

Flight path dispersion corridors show the actual or expected variation of flights when flying the procedure.

Flight path corridor dispersion around an actual or proposed nominal backbone flight track will vary considerably where the designed nominal tracks track via a fly-by waypoint. The amount of variation will depend on the angle of turn that the designed track is required to make at the waypoint.

The proposed new waypoint (NB013) identified in this Appendix has been allocated a temporary identifier which will be replaced by a conforming 5 letter alpha character designator as part of the detailed design phase and implementation of the proposed adjusted procedure.

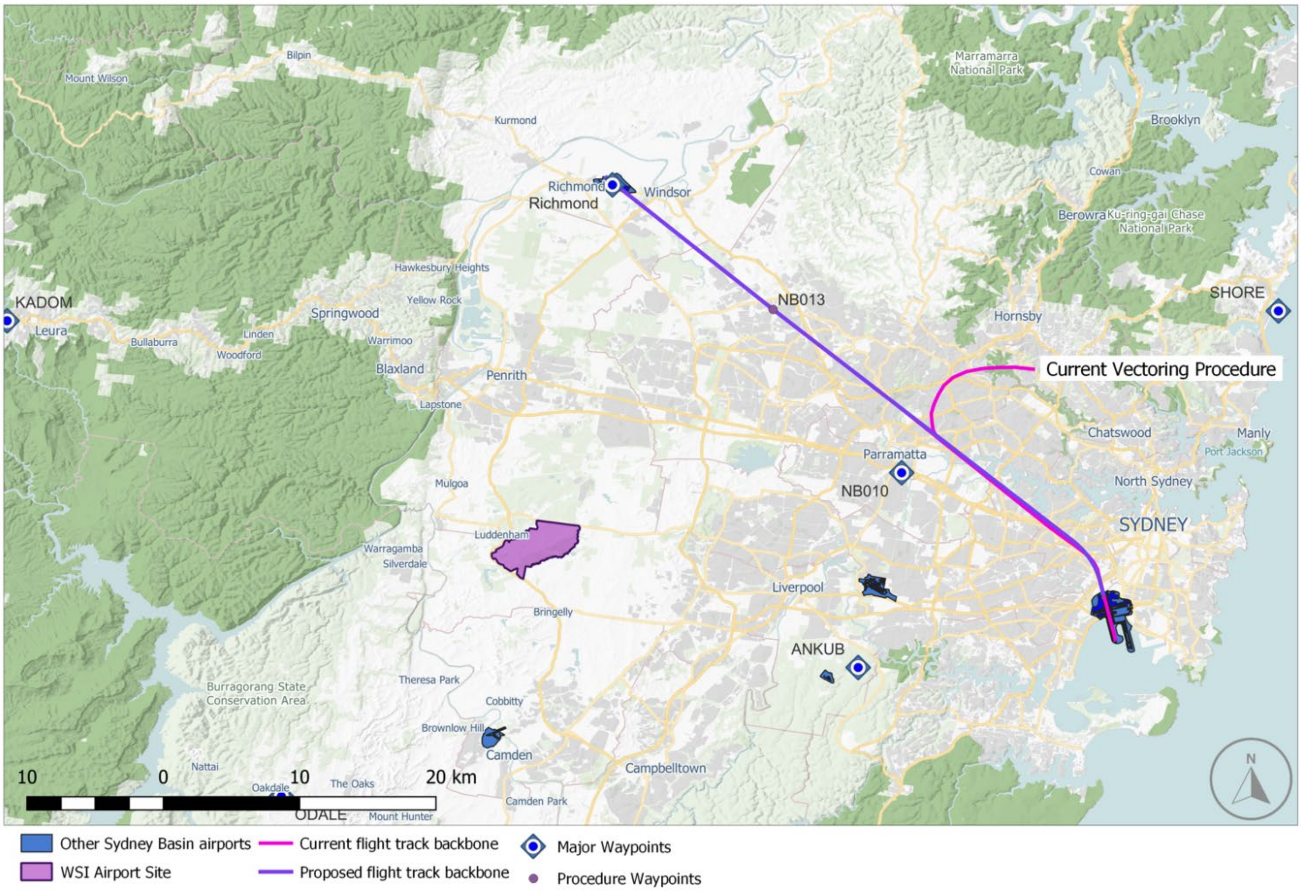


Figure 5.1 Proposed Runway 34L RICHMOND SID (current versus proposed)

Figure 5.1 above confirms consistent lateral positioning of the proposed future adjusted Runway 34L RICHMOND SID.

Chapter 6 Growth forecasts

Sydney (Kingsford Smith) Airport growth forecasts have been extracted from the current 2019 Airport Master Plan:

The forecasts were independently prepared for Sydney Airport Corporation Limited by a third party in consultation with major international, domestic and regional airlines, and airline associations.

Growth in total aircraft movements is expected to increase by around 17 per cent from 348,520 movements in 2017 to 408,260 in 2039, an annual increase of 0.7 per cent. Of that, Regular Passenger Transport services are projected to be 382,305 in 2039, representing around 94 per cent of total air traffic movements. This reflects airline feedback and expectations on the continued up-gauging of aircraft and increases in seat density and load factors across the Sydney (Kingsford Smith) Airport route network. It is understood that all forecasts assume that from late 2026, the Sydney Basin's aviation demand will be served by 2 international airports – WSI and Sydney (Kingsford Smith) Airport.

Figure 6.1 shows the projected growth in aircraft movements for Sydney (Kingsford Smith) Airport as adapted from the 2019 Master Plan in the period from 2017 to 2039.

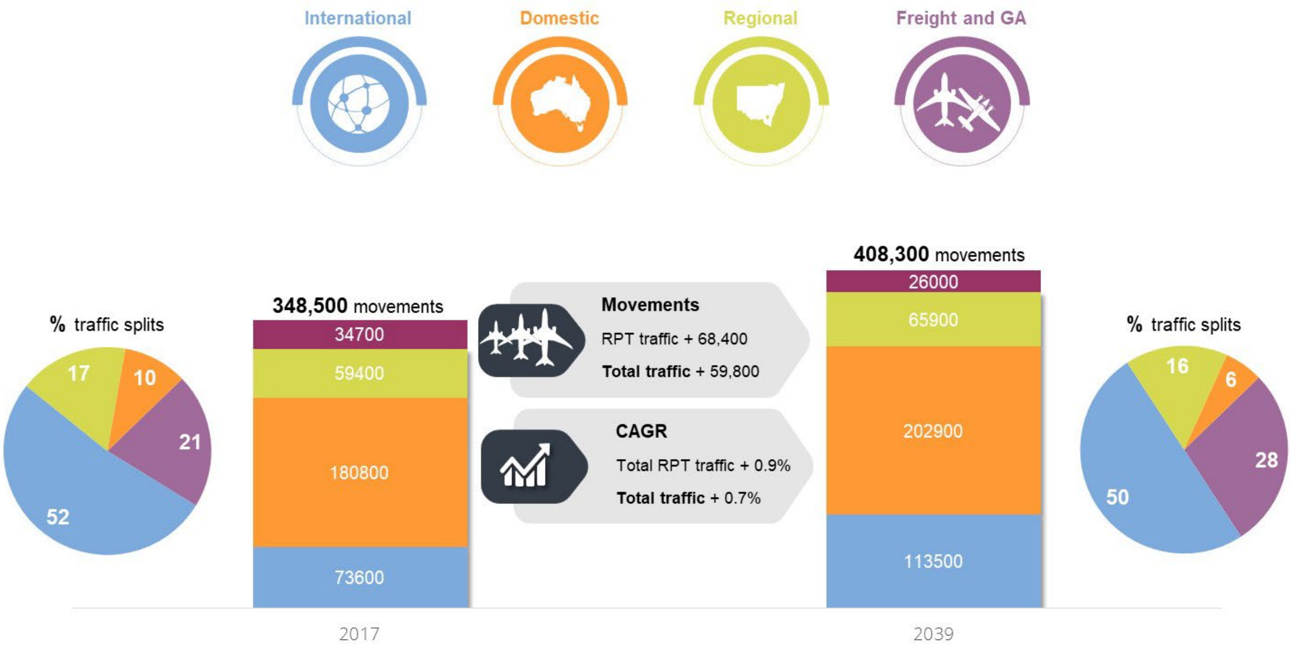


Figure 6.1 Sydney (Kingsford Smith) Airport aircraft movement growth forecast (adapted from 2039 Master Plan)

In the absence of specific forecast growth data for departure operations off Runway 34L, the generic annual growth percentages presented in Figure 6.1 above would be assumed to apply evenly across all the various operational sectors at Sydney (Kingsford Smith) Airport.

Chapter 7 Aircraft noise impact assessment

The aircraft noise assessment of the changes proposed to the Runway 34L RICHMOND SID from Sydney (Kingsford Smith) Airport (north-west departures) has been considered in isolation. The information presented in this chapter is targeted to describe the potential implications facilitated by the proposed individual procedure change only.

The number above (N-above) contours representing the number of events with modelled noise levels of 60 A-weighted decibels (dB(A)) or louder (N60) and 70 dB(A) or louder (N70) contours, overflown suburb names, and associated dwelling and population counts presented below are limited to overflight noise impacts associated with the change proposed to the Runway 34L RICHMOND SID only. They do not consider a cumulative impact nor include other operations to or from Sydney (Kingsford Smith) Airport that may overfly that same area.

The aircraft noise modelling and analysis has used the Aviation Environmental Design Tool (AEDT), an internationally recognised aircraft noise and emissions calculation program developed by the United States Federal Aviation Administration (US FAA). Version 3e of the AEDT software was used for this assessment.

Noise modelling was based on the flight movements of the busiest day in 2019 for Runway 34L operations. As such, the results generated in the following analysis should be considered a “worst case” scenario, as an average or typical day of operations will have a reduced number of flights on each particular runway direction and individual SID procedure utilisation and be subjected to runway direction changes to respond to weather influences.

For Sydney (Kingsford Smith) Airport, there is approximately a 50/50 split between operations in a Runway 16 or Runway 34 direction. When operations are utilising Runways 16L and 16R, the initial phase of departure operations will be to the south and east over the ocean and the proposed Runway 34L KADOM SID and its transitions will not be utilised.

Figure 7.1 presents the expected track dispersion on the Runway 34L RICHMOND SID from Sydney (Kingsford Smith) Airport versus the current track dispersion indicating a slight reduction of aircraft dispersion about the backbone track.

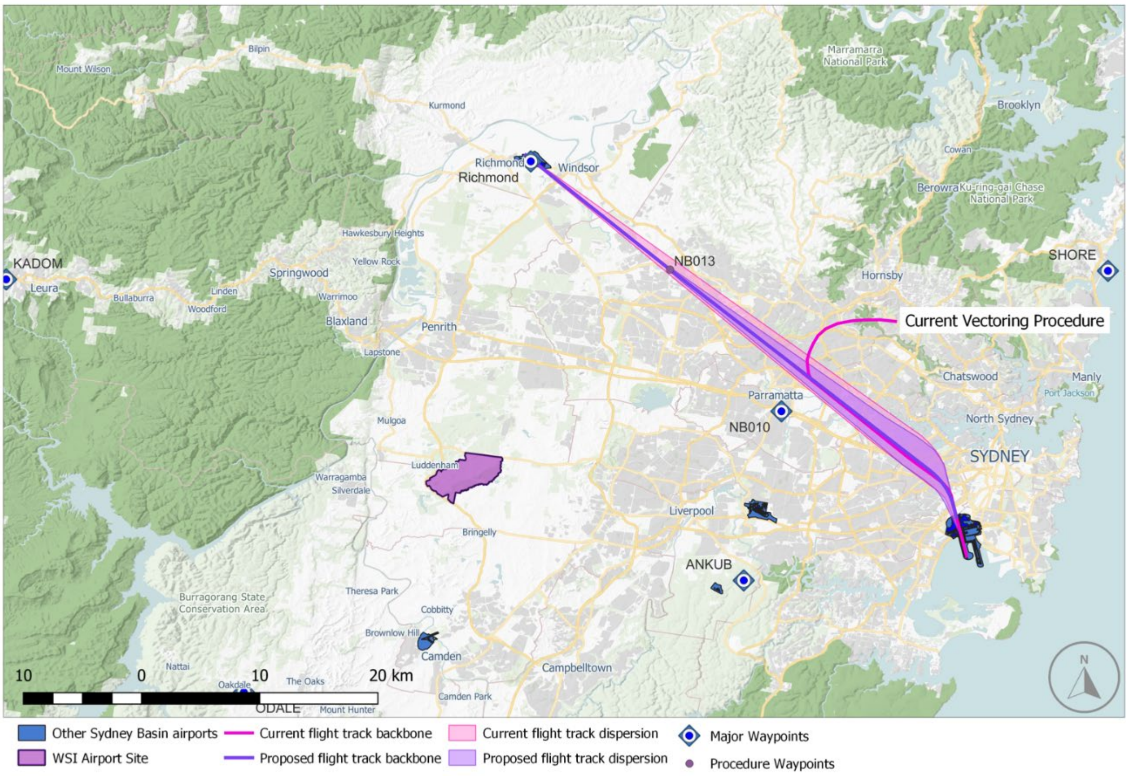


Figure 7.1 Runway 34L RICHMOND SID (Jets) from Sydney (Kingsford Smith) Airport - track dispersion (current versus proposed)

The nominal backbone flight track is used to identify either the centre of an existing flight path, or the designed nominal backbone flight track of a proposed SID or STAR. In the case of a current nominal backbone flight track, it is based on an average of current radar plotted flight paths. In the case of a proposed new procedure design, the nominal backbone flight track will be primary track used to establish and ensure safety by design standards are met.

Flight path dispersion corridors show the actual or expected variation of flights when flying the procedure.

Flight path corridor dispersion around an actual or proposed nominal backbone flight track will vary considerably where the designed nominal tracks track via a fly-by waypoint. The amount of variation will depend on the angle of turn that the designed track is required to make at the waypoint.

7.1 Runway 34L RICHMOND SID N60 contours

Figure 7.2 to Figure 7.5 below present the N60 contours for the Runway 34L RICHMOND SID from Sydney (Kingsford Smith) Airport to western and north-western destinations via waypoint RICHMOND. The figures compare the current and proposed contours at 2 scales of presentation. The N60 contours indicate only marginal and non-material differences in the contour extents between the current and the proposed future SID procedure.

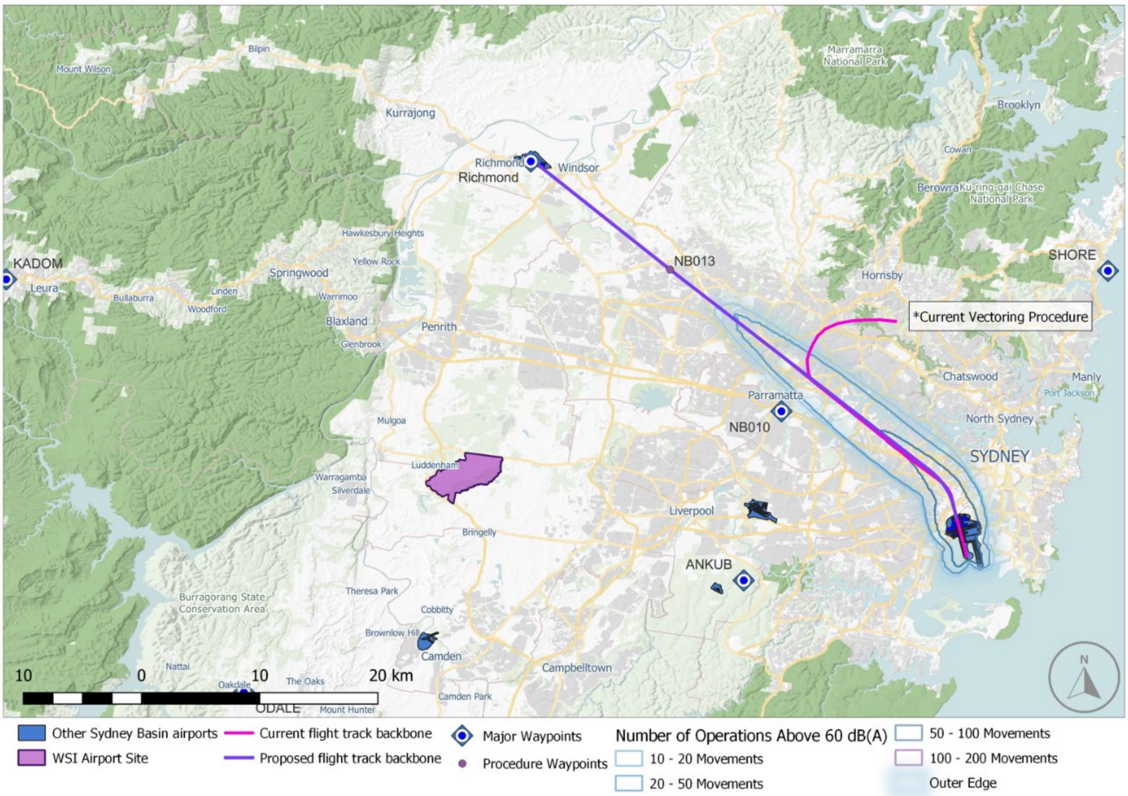


Figure 7.2 Current Runway 34L RICHMOND SID N60 Contour

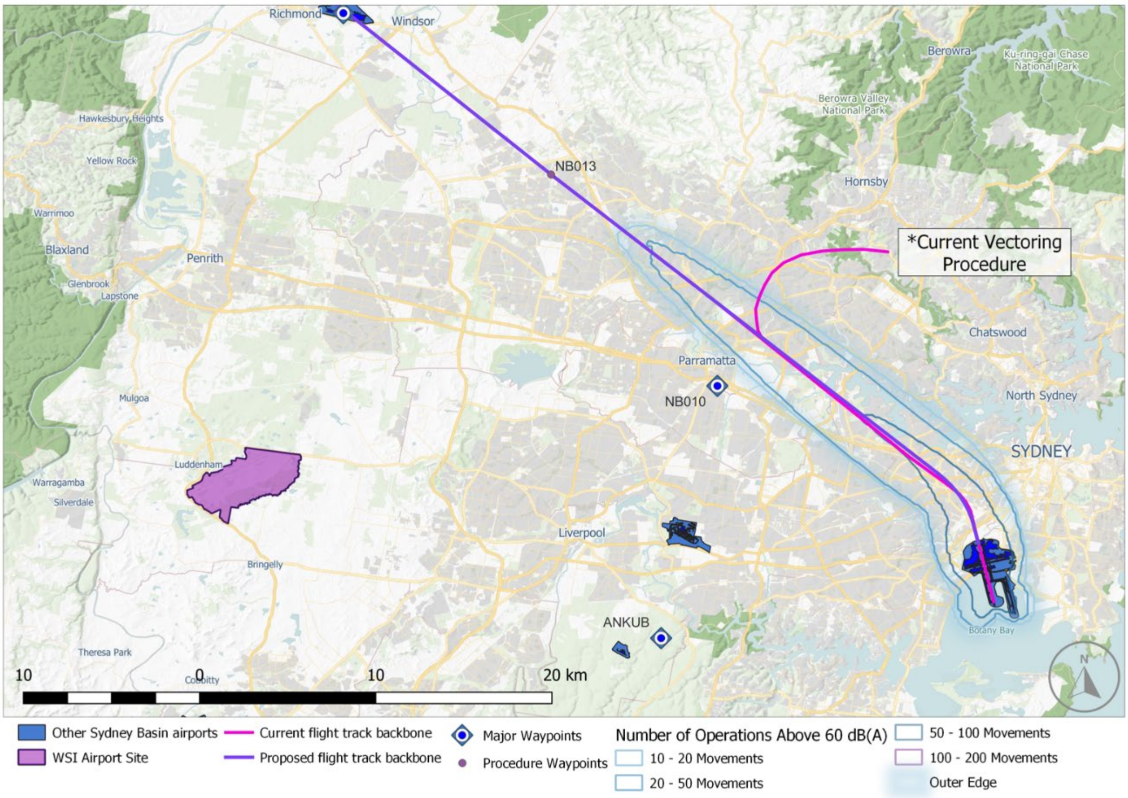


Figure 7.3 Current Runway 34L RICHMOND SID N60 contour – zoomed in

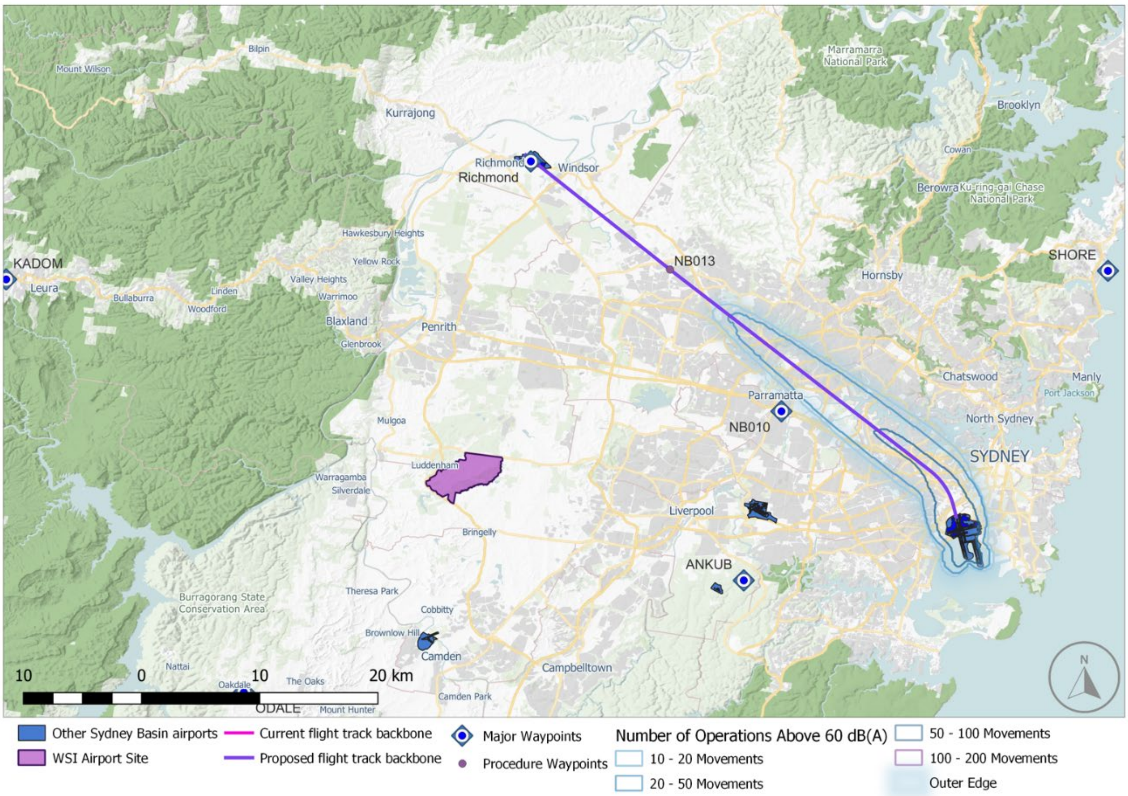


Figure 7.4 Proposed Runway 34L RICHMOND SID – N60 contours

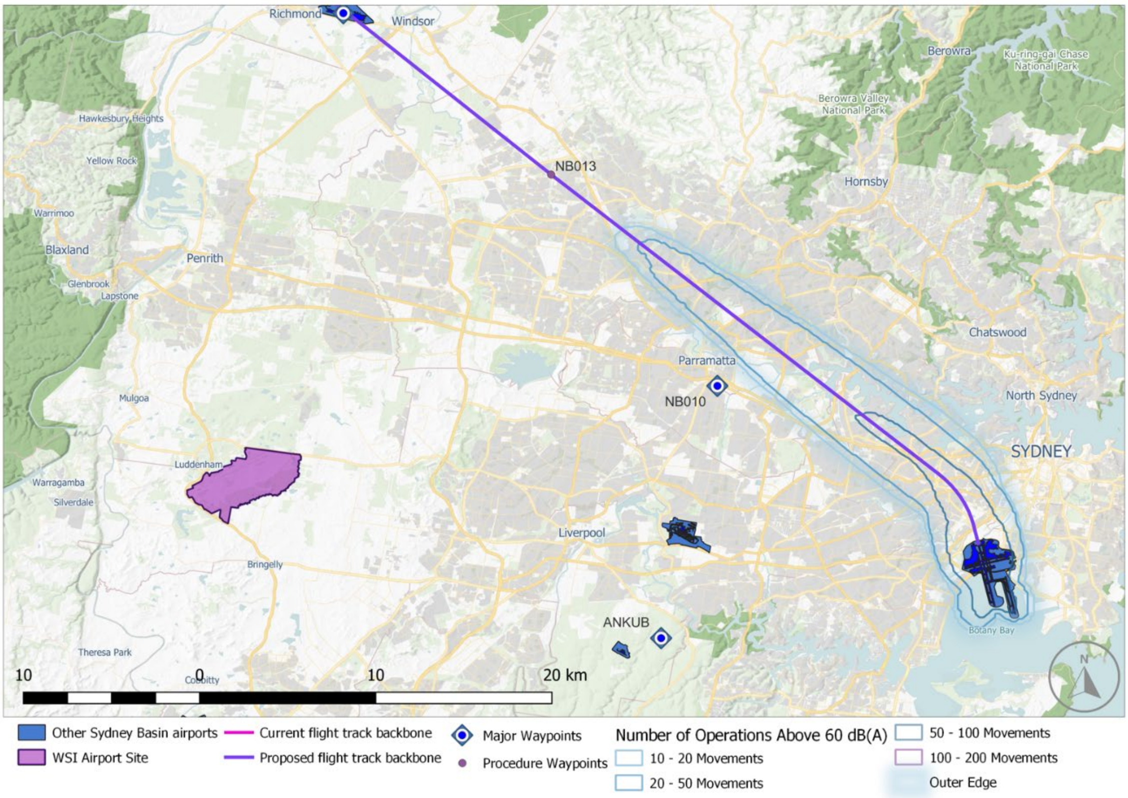


Figure 7.5 Proposed Runway 34L RICHMOND SID – N60 contours – zoomed in

7.2 Runway 34L RICHMOND SID N70 contours

Figure 7.2 to Figure 7.7 below present the N70 contours for the Runway 34L RICHMOND SID from Sydney (Kingsford Smith) Airport to western and north-western destinations via waypoint RICHMOND. They compare the current and proposed N70 contour extents.

The N70 contours indicate only marginal and non-material differences in the contour extents between the current and proposed SID procedure.

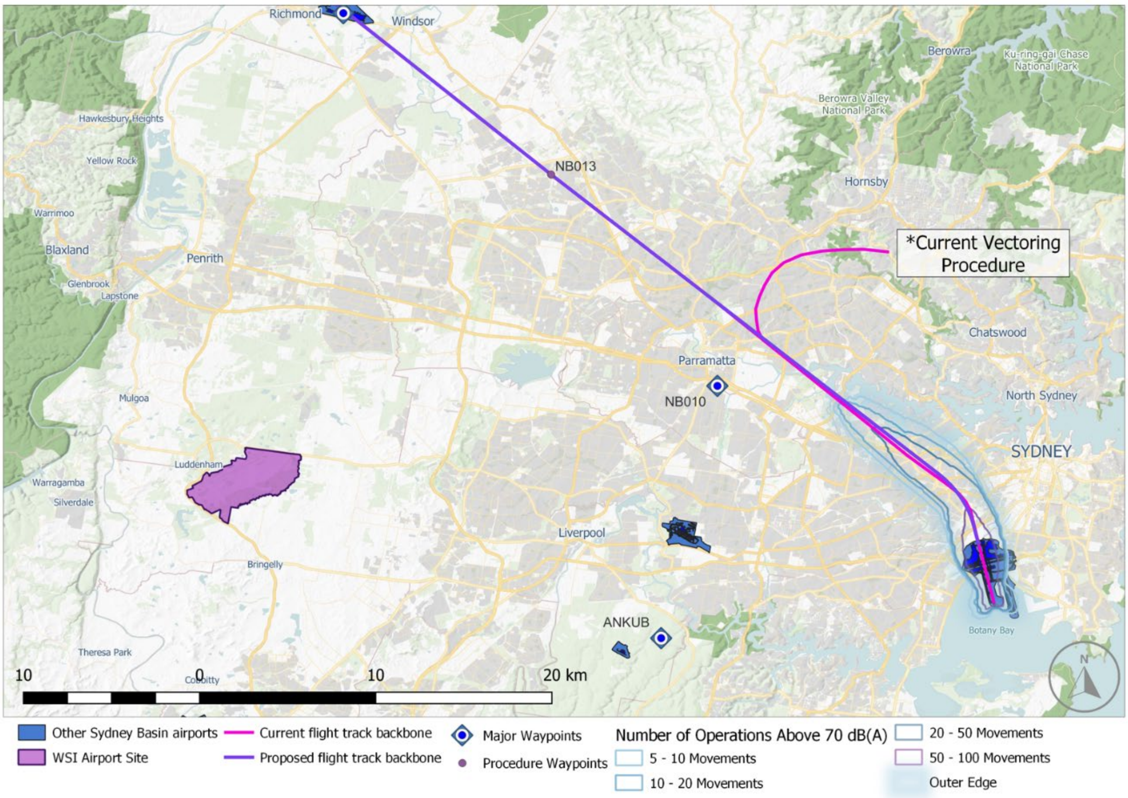


Figure 7.6 Current Runway 34L RICHMOND SID N70 contour

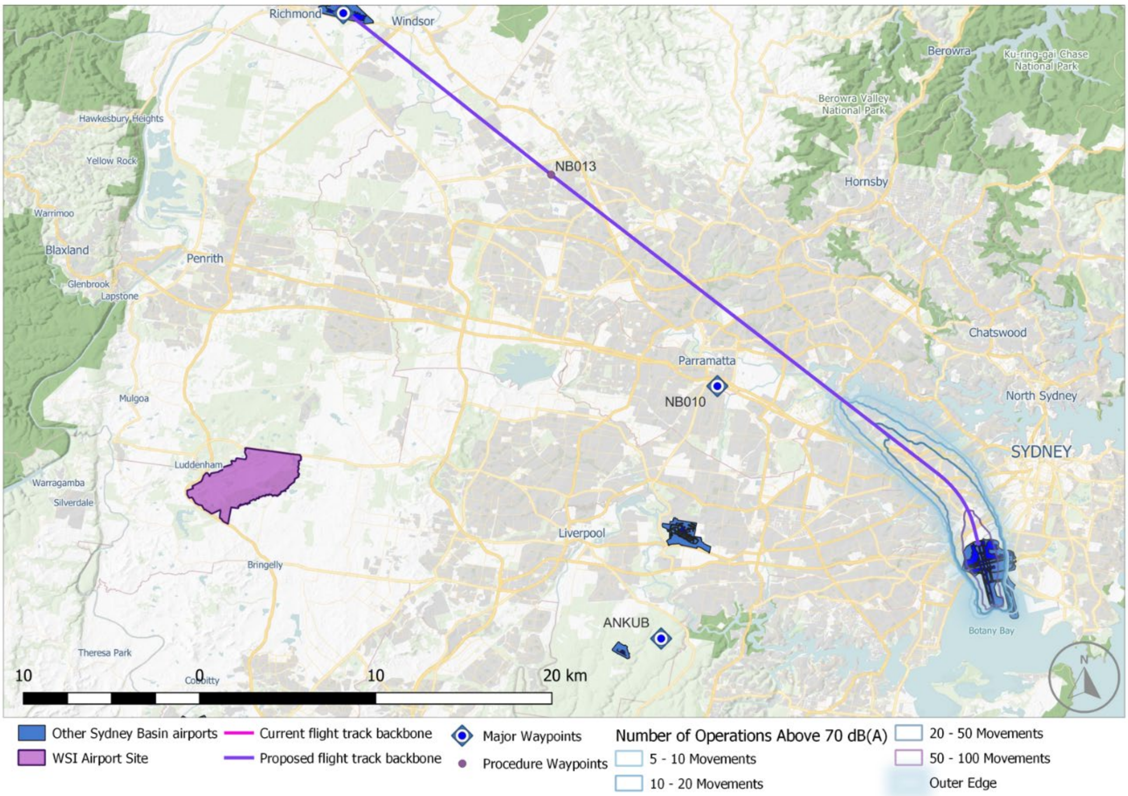


Figure 7.7 Proposed Runway 34L RICHMOND SID N70 contour

7.3 Dwelling and population counts within N60 and N70 contours

Table 7.1 presents dwelling and population count estimates, compiled utilising 2021 census data obtained from the Australian Bureau of Statistics (ABS), within the N60 and N70 contour extents for jet departures off the current and proposed Runway 34L RICHMOND SID from Sydney (Kingsford Smith) Airport. Estimated dwelling counts are presented for the area defined by outer contour – N60 for 10 and above overflights, and N70 for 5 and above overflights.

Noise modelling (N60 and N70 contours) was based on the flight movements of the busiest day in 2019 for Runway 34L operations at Sydney (Kingsford Smith) Airport. The results generated in the following analysis should be considered a “worst case” scenario, as an average or typical day of operations will have a reduced number of flights on each particular runway direction and individual SID procedure utilisation and be subjected to runway direction changes to respond to weather influences.

Table 7.1 Runway 34L RICHMOND SID dwelling and population counts within N60 and N70 contours – current versus proposed

Noise contour	SID segment	Current			Proposed future		
		Area sq (km^2)	Dwelling count	Population count	Area sq (km^2)	Dwelling count	Population count
N60 (24-hour) 10 and above movements	**RICHMOND**	147	236,801	539,659	150	243,949	554,513
N70 (24-hour) 5 and above movements	**RICHMOND**	46	76,569	172,890	47	78,472	176,204

Table 7.2 presents a comparison of current versus proposed future – area, dwelling, and population counts for N60 and N70 outer contours, generated by AEDT, (and which are presented in Table 7.1).

The analysis indicates a very slight increase in area (square kilometres (km^2)), dwelling, and population numbers within the N60 and N70 contour extents – current versus future, for departures off the proposed adjusted Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID. This increase is associated with a slight shift and increase in the dispersion of overflights immediately after the departing aircraft clear the runway. In general, the dispersion of aircraft flying the procedure reduces as those aircraft complete the initial turn and line up on the long straight RICHMOND leg of the procedure.

Table 7.2 Runway 34L RICHMOND SID dwelling and population counts within N60 and N70 contours – current versus proposed – percentage change

Noise contour	SID segment	Current versus proposed future procedure		
		Area (km^2) Percentage change	Dwelling count Percentage change	Population count Percentage change
N60 (24-hour) 10 and above movements	**Richmond**	+2.0 per cent	+3.0 per cent	+2.8 per cent
N70 (24-hour) 5 and above movements	**Richmond**	+2.2 per cent	+2.5 per cent	+1.9 per cent

Figure 7.8 presents the current and proposed adjusted Runway 34L Richmond SID flight path corridor dispersion with a suburb overlay. Consistent with Figure 7.1, current flight path corridor dispersion is shown in pink and the corridor associated with the adjusted SID in purple.

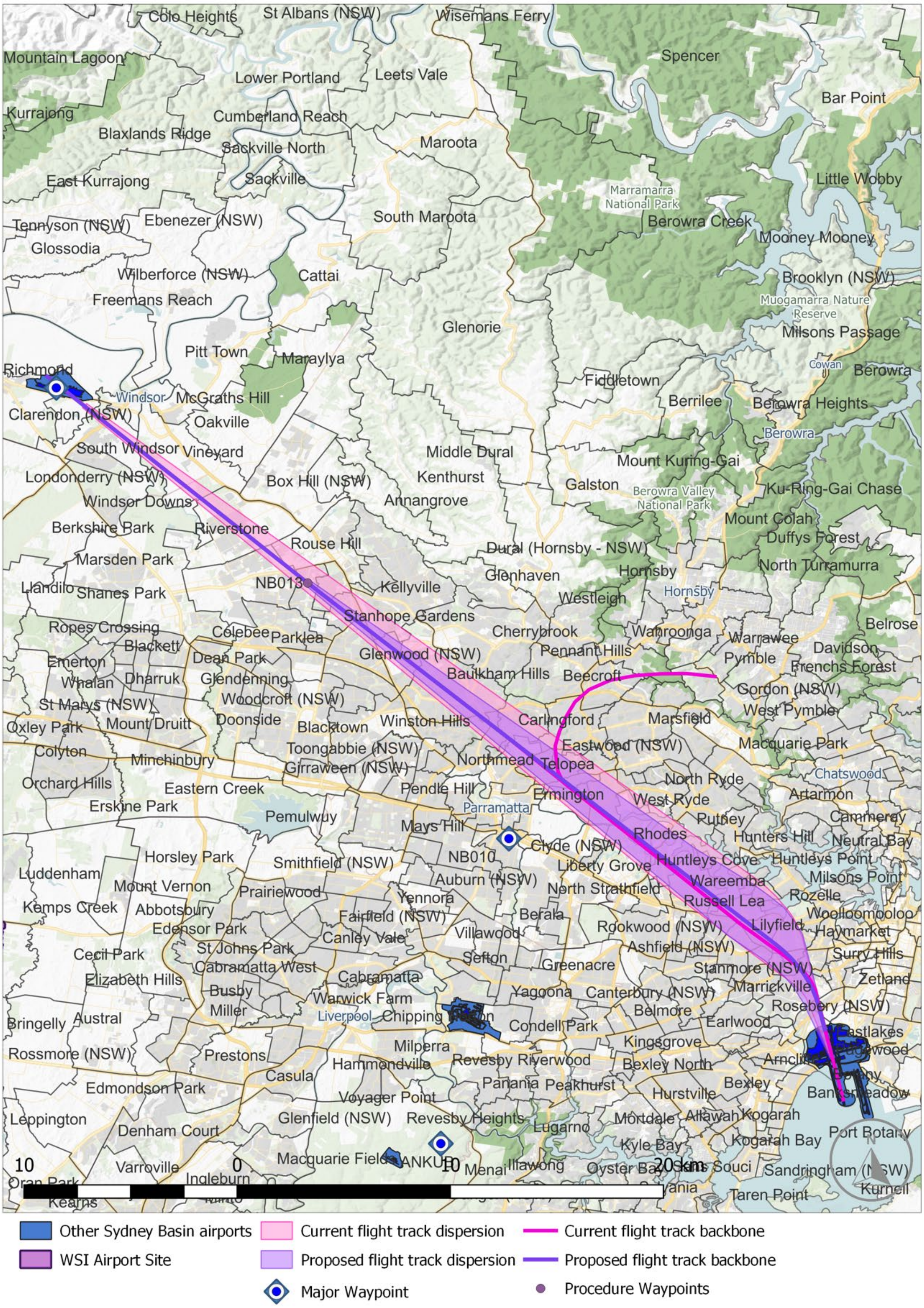


Figure 7.8 Current versus proposed Runway 34L RICHMOND SID – suburb overlay of flight path corridor dispersion

Chapter 8 Other environmental factors

8.1 Visual amenity

As shown in Figure 7.8, the proposed new flight path for the Runway 34L RICHMOND SID is well within the existing dispersion of the current SID flight tracks. The introduction on safety grounds of the new waypoint NB013 will involve aircraft flying the proposed new procedure with less dispersion about the nominal backbone track 8 nm (15 km) south-east of Richmond, rather than on reaching Richmond as is currently the case. This narrowing of the flight path does not affect the noise contours and due to the aircraft system's navigational tolerances, aircraft will still be visible to communities as they are currently, although not necessarily in the same location.

8.2 Radar vectoring

In locations where no SIDs or STARs are available for an aircraft's particular operation, or where adverse weather requires the cancellation of a SID or STAR for safety reasons, air traffic control will provide radar vectoring to safely manage those applicable operating aircraft. Radar vectoring involves air traffic control determining a safe path for all aircraft and issuing heading and sometimes altitude and speed instructions to one or more aircraft to avoid any possible conflictions. While the objective of a set of SIDs and STARs in terminal airspace designed under "Safety by Design" principles is for onboard flight management systems monitored by air traffic control to ensure aircraft remain separated, there are occasions where SIDs and STARs are cancelled for varied reasons and aircraft are radar vectored.

A cancellation of a SID or STAR resulting in radar vectoring involving a departure from the lateral track, could also involve a variation in vertical profile or speed requirements and may be either at pilot request or initiated by air traffic control.

Pilot requests for departing from a SID may be for:

- route efficiency – where there is a more direct route to the destination than the published procedure allows, saving time, fuel and emissions
- weather avoidance – particularly around turbulence associated with thunderstorms.

Pilot requests in all instances are subject to air traffic control approval. Avoidance of thunderstorms which has a safety priority is readily approved. Direct routing requests will be considered by air traffic control in light of safety and overall management of other aircraft within the vicinity.

Air traffic control-initiated cancellations of SIDs can also be for reasons of route efficiency, better noise outcomes or better emissions outcomes. Separation requirements with other departing, arriving or transiting aircraft can also necessitate the cancellation of a SID.

Any one of the 3 elements (track, vertical profile, speed) of a SID can be cancelled individually or collectively.

Aircraft will eventually either re-join the published procedure at a later waypoint or will connect with the enroute network at a designated waypoint.

As the proposed new SID flight path effectively replicates the current SID flight path and is the most direct path to Richmond it can be expected that minimal radar vectoring involving track shortening will take place on this SID. Radar vectors for safety and hazardous weather avoidance will still be possible.

8.3 Track distance and emissions

There is no discernible difference between track distance on the current and new SIDs. Aircraft using the proposed Runway 34L RICHMOND SID will not be required to use any additional fuel resulting in no additional CO_2 emissions.

Chapter 9 Conclusion

The proposed adjusted Runway 34L RICHMOND SID from Sydney (Kingsford Smith) Airport represents a minimal change from the existing SID.

The track for the new SID flight path as designed is over parts of the north-western suburbs that are already overflown by the existing SID.

The continuing requirement for aircraft to turn left off the Runway 34L runway heading at an altitude of 1,500 ft (460 m) will continue to provide the flight path corridor dispersion over the close in north-western suburbs as it does currently.

The dispersion of aircraft created by the 1,500 ft (460 m) left turn will now narrow by the new waypoint NB013 rather than at the Richmond NDB.

There will be no discernible change to the current track distance and, therefore, no additional fuel burn required by aircraft using the proposed Runway 34L RICHMOND SID or associated CO_2 emissions.

Given that in general, the areas overflown by the proposed new Sydney (Kingsford Smith) Airport Runway 34L RICHMOND are currently frequently overflown with similar aircraft and other Sydney Basin airports aircraft undertaking both IFR and VFR flights (refer to Figure 1.1) coupled with the low growth forecasts of around one per cent or less, it can be expected that there will be little or no material change over today's operations.

Appendix D

Proposed changes to Sydney (Kingsford Smith) Airport non-jet SID to west or north-west

Western Sydney International (Nancy-Bird Walton) Airport – Airspace and flight path design | Environmental Impact Statement

Technical paper 13: Facilitated changes

Appendix D – Proposed changes to Sydney (Kingsford Smith) Airport non-jet SID to west or north-west

October 2024

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Terms and abbreviations

Term/abbreviation	Definition
AC	Advisory Circular (CASA)
AIP	Aeronautical Information Package (Australia)
AIRAC	Aeronautical Information Regulation and Control (Australia)
ARP	Aerodrome reference Point (ICAO)
CASA	Civil Aviation Safety Authority (Australia)
CO_2	Carbon dioxide (a greenhouse gas)
Cth	Commonwealth of Australia
DAP	Departure and Approach Procedures (Australian AIP)
dB(A)	A-weighted decibel (unit of sound)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Australian Government)
DITRDCA	Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Australian Government)
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation 1999* (Cth)
ft	feet (unit of distance or height equivalent to 0.3048 m)
GBMA	Greater Blue Mountains Area (World Heritage property)
IAF	Initial Approach Fix
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
km	kilometres (unit of distance equivalent to 1,000 m)
LL	Lower Level (altitude for transit flights through Sydney Basin airspace)
m	metre (unit of distance or height equivalent to 3.281 ft)
MNES	Matters of National Environmental Significance (EPCB Act) (Cth)
N60/N70	Number above (N-above noise metric)
NFPMS	National Flight Path Monitoring System (Airservices database)
nm	nautical mile (unit of distance equivalent of 1.852 km)
NPD	Noise-Power-Distance (aircraft noise curve charts)
NSR	Noise Sensitive Receiver

Term/abbreviation	Definition
NSW	New South Wales (state of Australia)
PAAM	Plan for Aviation Airspace Management
PBN	Performance Based Navigation
PMST	Protected Matters Search Tool (DCCEEW)
RNP	Required Navigation Performance
RPT	Regular Public Transport (air service)
SID	Standard Instrument Departure
STAR	Standard Instrument Arrival
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WSI	Western Sydney International (Nancy-Bird Walton) Airport

Chapter 1 Introduction

Although aircraft differ in operation, type, altitude, noise level and frequency, most areas of the Sydney Basin are overflown at some stage as shown in Figure 1.1.

The introduction of new flight paths to be used by aircraft into and out of Western Sydney International (Nancy-Bird Walton) Airport (WSI) has considered a multitude of options to minimise any adjustments required to existing flight paths in the Sydney Basin airspace. Single runway operations at WSI require adjustments to Sydney Basin operations prior to opening in 2026 to facilitate its flight paths and airspace structure. Those facilitated airspace changes include the development of, or adjustments to:

- Sydney (Kingsford Smith) Airport Runway 25 Standard Instrument Departures (SIDs) to west, north-west, north and east – (Appendix A)
- Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs to south, west, north, and east – (Appendix B)
- Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID to west and north-west – (Appendix C)
- **Sydney (Kingsford Smith) Airport non-jet SID to west or north-west – (Appendix D) – this Appendix**
- Sydney (Kingsford Smith) Airport AKMIR Standard Instrument Arrival (STAR) jet and non-jets from south and west – (Appendix E)
- Royal Australian Air Force (RAAF) Base Richmond SID and STARs – (Appendix F)
- Bankstown Airport SID and STARs – (Appendix G)
- Camden Airport STARs – (Appendix H)
- Sydney Basin Visual Flight Rules (VFR) operations – (Appendix I)
- Miscellaneous and Minor procedure adjustments – (Appendix J)
  - Sydney (Kingsford Smith) Airport BOREE STAR
  - Sydney (Kingsford Smith) Airport RIVET STAR
  - Sydney (Kingsford Smith) Airport Runway 07 Initial Approach Fix (IAF)
  - Sydney (Kingsford Smith) Airport Runway 07 SID
  - Sydney Basin low altitude transit flight routes.

This Appendix – Appendix D, presents an assessment of the proposed adjustments required to current procedures for non-jet departures to western and north-western destinations at Sydney (Kingsford Smith) Airport.

The design process for the safe and efficient integration of WSI's new flight paths into the existing Sydney Basin airspace has been one of adopting "Safety by Design" principles to deliver the highest level of safety separation assurance in conformance with rules set by the Civil Aviation Safety Authority (CASA). This is to enable aircraft to operate safely within their performance envelope into an already complex airspace structure. "Safety by Design" ensures that aircraft are separated from each other according to the flight routes and the type of air traffic service being provided. As such, this requires the new or amended SIDs and STARs and altitudes to be published and then downloaded into the cockpit flight management systems of all aircraft. At the same time the same information must be downloaded into the software of the surveillance systems used by air traffic control to manage and monitor the safe separation of all controlled aircraft.

The preliminary airspace design process has appropriately accorded "safety" as the highest priority to ensure robust operational safety outcomes. Environmental outcomes, with a particular focus on the minimisation of potential community impacts from aircraft overflights and the operational efficiency of the facilitated airspace changes have also been key criterion.

Instrument Flight Rules (IFR) are the rules that govern the operation of aircraft in Instrument Meteorological Conditions (IMC) (conditions in which flight In IMC, an aircraft must be flown with reference to its onboard flight instruments.) Two sets of rules, IFR or Visual Flight Rules (VFR) exist to govern flight in either IMC or Visual Meteorological Conditions (VMC).

The adjustments required to non-jet departures from Sydney (Kingsford Smith) Airport presented in this Appendix have been designed to be flown under IFR. This is to ensure "Safety by Design" is embedded in the new procedures and to allow continued operations in all weather conditions. Aircraft flying to IFR standards and rules can operate in either IMC or VMC, but aircraft flying to VFR standards and rules can only operate in VMC.

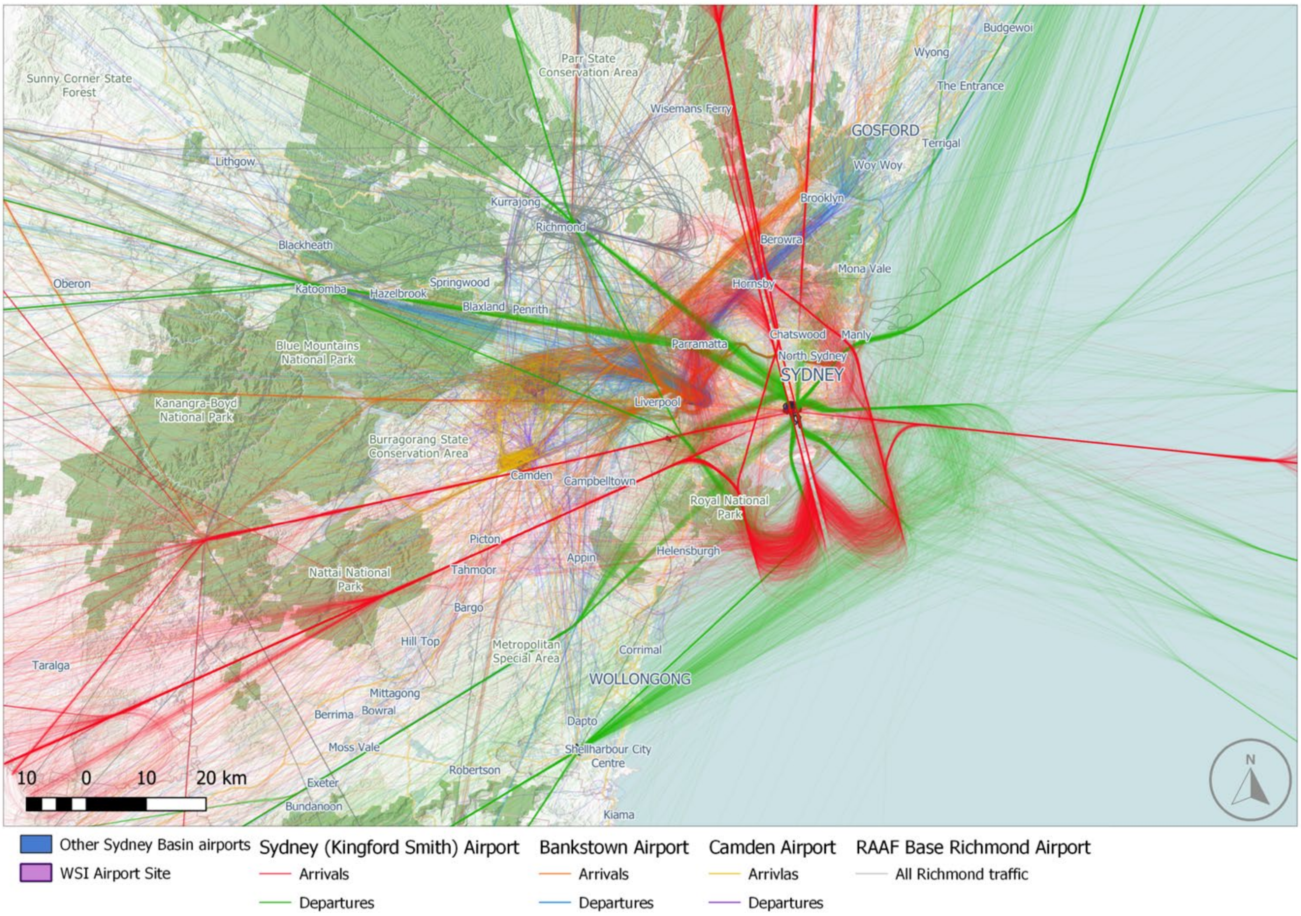


Figure 1.1 Sydney Basin airspace with one-week of flight track movement activity in 2019

Chapter 2 Background

Several airlines operate non-jet services from Sydney (Kingsford Smith) Airport to various interstate, and intrastate destinations within New South Wales (NSW). Most of the aircraft operating these services are medium to large twin engine turbo-prop airframes.

The complexity of the airspace required to safely separate arrivals and departures at WSI with each other, requires that "Safety by Design" standards are incorporated into the proposed new flight paths and procedures for non-jet departures from Sydney (Kingsford Smith) Airport to operate through this airspace.

Sydney (Kingsford Smith) Airport non-jet aircraft operating to northern and southern destinations will not be affected by the introduction of WSI flight paths into the Sydney Basin airspace. However, changes to existing Sydney (Kingsford Smith) Airport non-jet flight paths for aircraft operating to western and north-western destinations are required in order to segregate these aircraft from airspace which will be required for WSI arrivals and departures.

Non-jet departure flight paths to western and north-western destinations from Sydney (Kingsford Smith) Airport have been designed to remain south of the airspace required for WSI operations until approximately 15 kilometres (km) west of WSI, where a turn can be made to join the enroute flight path segments for western or north-western destinations.

The proposed new SIDs must be published and implemented prior to the operation of WSI in late 2026 and will not impact the application of noise sharing runway modes at Sydney (Kingsford Smith) Airport. The changes would be introduced in 2026 on a scheduled Aeronautical Information Regulation and Control (AIRAC) date, prior to the official opening of WSI. Introducing these changes ahead of WSI's opening will allow pilots and air traffic control to adjust their systems and become familiar with changes to current procedures before single runway operations at WSI commence and will minimise the likelihood of conflicts or incidents in the airspace.

Figure 2.1 shows the location of WSI, the locations of other key airports in the Sydney Basin and geographic extent of a nominal area radiating 45 nautical miles (nm) (around 83 km) from the Aerodrome Reference Point (ARP) of WSI.

Figure 2.2 is the Aerodrome Chart for Sydney (Kingsford Smith) Airport. The chart has been extracted from the Aeronautical Information Package (AIP) Departure and Approach Procedures (DAP) to assist the interpretation of the information presented in this Appendix. It depicts the general layout of Sydney (Kingsford Smith) Airport including its 3-runway system and orientations, runway headings (34L, 25, etc.) and dimensions (lengths and widths).

Figure 2.1 Location of airports in the Sydney Basin

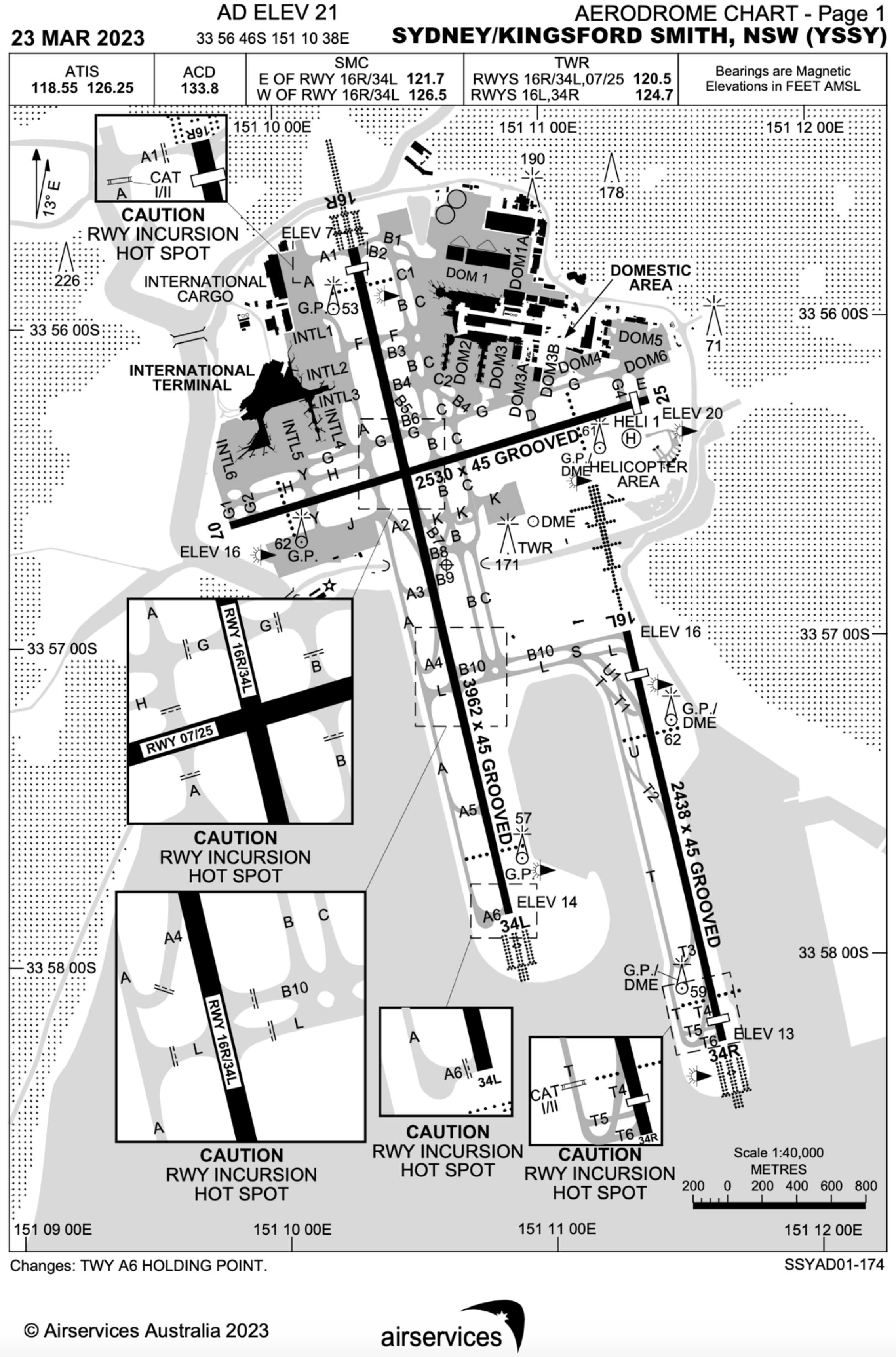


Figure 2.2 Sydney (Kingsford Smith) Airport – Aerodrome Chart (AIP / DAP)

Chapter 3 Purpose

The purpose of this document is to present an environmental assessment of the proposed introduction of new non-jet SIDs to western and north-western destinations out of Sydney (Kingsford Smith) Airport from all runways as part of the introduction of WSI's new flight paths and airspace containment requirements. It includes analysis and assessment of potential the noise impacts from aircraft overflights of these proposed facilitated airspace changes.

It describes the reason for the facilitated airspace changes and the associated safety and operational considerations, along with other environmental issues.

Chapter 4 Current non-jet departures to western and north-western destinations

All current non-jet departures from Sydney (Kingsford Smith) Airport are assigned the Sydney Radar SID as shown in Figure 4.1. This requires aircraft after take-off to maintain the departure runway heading until reaching a minimum altitude between 500 feet (ft) (150 m) and 800 ft (244 m) (depending on the departure runway). From this point aircraft then turn to the heading assigned by air traffic control with their take-off clearance (refer to Figure 4.1). In accordance with the separation required to avoid other aircraft within the Sydney Basin area, air traffic control will then radar vector non-jet aircraft to a position where they can be cleared to track directly to their first enroute waypoint or fix.

For aircraft proceeding to western or north-western destinations the first waypoint will be one of the existing waypoints, KADOM, SOFAL or RIC. The normal departure runway for these aircraft is 34L, 16R, 25 or 07 (in order of use). Runways 16L and 34R are not used for non-jet departures to the west and north-west.

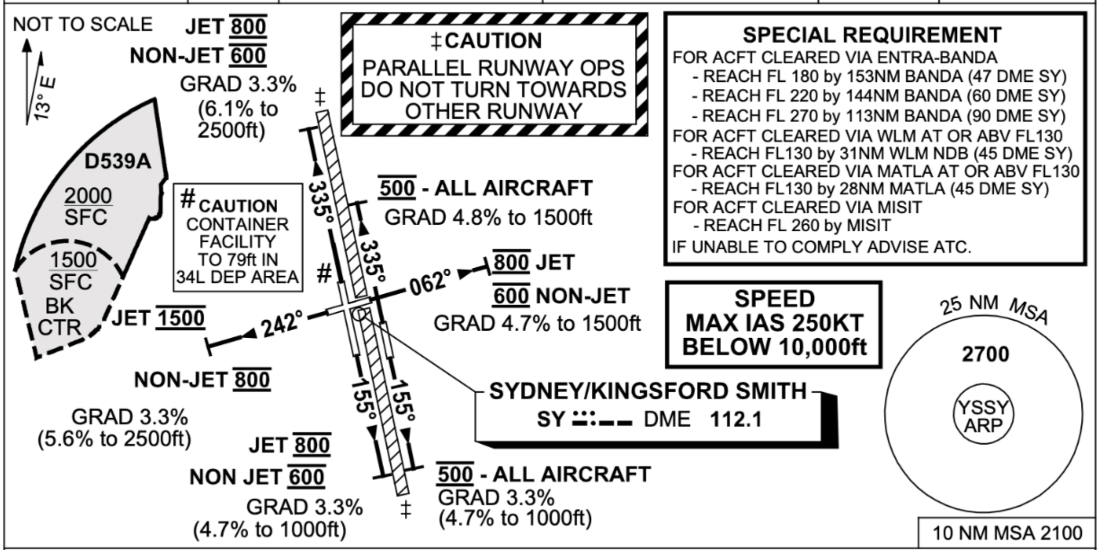
Depending on the departure runway, radar vectors to waypoints KADOM, SOFAL or RIC are variable and cover a large portion of the north-west quadrant of the Sydney Basin airspace (refer to Figure 4.2).

Figure 4.2 presents radar tracks for a one-week period of March 2019 of non-jet operations. It illustrates the current spread of tracks used for westerly non-jet operations out of Sydney (Kingsford Smith) Airport. They show a significant area that is already frequently overflown.

Continuing to process these aircraft by tactical radar vectoring through this part of the airspace after the introduction of WSI operations will not provide the level of strategic separation assurance required of “Safety by Design” in such a complex piece of airspace.

STANDARD INSTRUMENT DEPARTURES (SID)
SYDNEY TWO DEPARTURE (RADAR)
24 MAR 2022 **SYDNEY/KINGSFORD SMITH, NSW (YSSY)**

ATIS	ACD	SMC	TWR	DEP(N) N&E	DEP(S) S,W&NW
118.55 126.25	133.8	E OF RWY 16R/34L 121.7 W OF RWY 16R/34L 126.5	RWYS 16R/34L,07/25 120.5 RWYS 16L/34R 124.7	123.0	129.7



SYDNEY TWO DEPARTURE (RADAR)

RWY 07
GRAD 4.7% to 1500ft, then 3.3%
- Track 062°
- AT 600ft (800ft **Jet ACFT**) turn to assigned heading or track
- Expect radar vectors
- ACFT cleared via ENTRA, WLM, MATLA or MISIT see SPECIAL REQUIREMENT above

RWY 16R
GRAD 3.3% (4.7% to 1000ft)
- Track 155°
- AT 600ft (800ft **Jet ACFT**) turn to assigned heading or track
- Expect radar vectors
- ACFT cleared via ENTRA, WLM, MATLA or MISIT see SPECIAL REQUIREMENT above

RWY 16L
GRAD 3.3% (4.7% to 1000ft)
- Track 155°
- AT 500ft turn to assigned heading or track
- Expect radar vectors
- ACFT cleared via ENTRA, WLM, MATLA or MISIT see SPECIAL REQUIREMENT above

RWY 25
GRAD 3.3% (5.6% to 2500ft)
- Track 242°
- AT 800ft (NOT BEFORE 1500ft **Jet ACFT**) turn to assigned heading or track
- Expect radar vectors
- ACFT cleared via ENTRA, WLM, MATLA or MISIT see SPECIAL REQUIREMENT above

RWY 34R
GRAD 4.8% to 1500ft, then 3.3%
- Track 335°
- AT 500ft turn to assigned heading or track
- Expect radar vectors
- ACFT cleared via ENTRA, WLM, MATLA or MISIT see SPECIAL REQUIREMENT above

RWY 34L #
GRAD 3.3% (6.1% to 2500ft)
- Track 335°
- AT 600ft (800ft **Jet ACFT**) turn to assigned heading or track (NO RIGHT TURN BLW 1500ft)
- Expect radar vectors
- ACFT cleared via ENTRA, WLM, MATLA or MISIT see SPECIAL REQUIREMENT above

COMMUNICATIONS FAILURE PROCEDURE

On recognition of communication failure.
- Squawk 7600
- Maintain last assigned vector for two minutes and, if necessary, climb to minimum safe altitude to maintain terrain clearance, then
- Proceed in accordance with the latest ATC route clearance acknowledged.

Changes: Editorial. SSYDP12-170

airservices

Figure 4.1 Current SYDNEY (Kingsford Smith) Airport TWO DEPARTURE (RADAR) procedure – (AIP DAP)

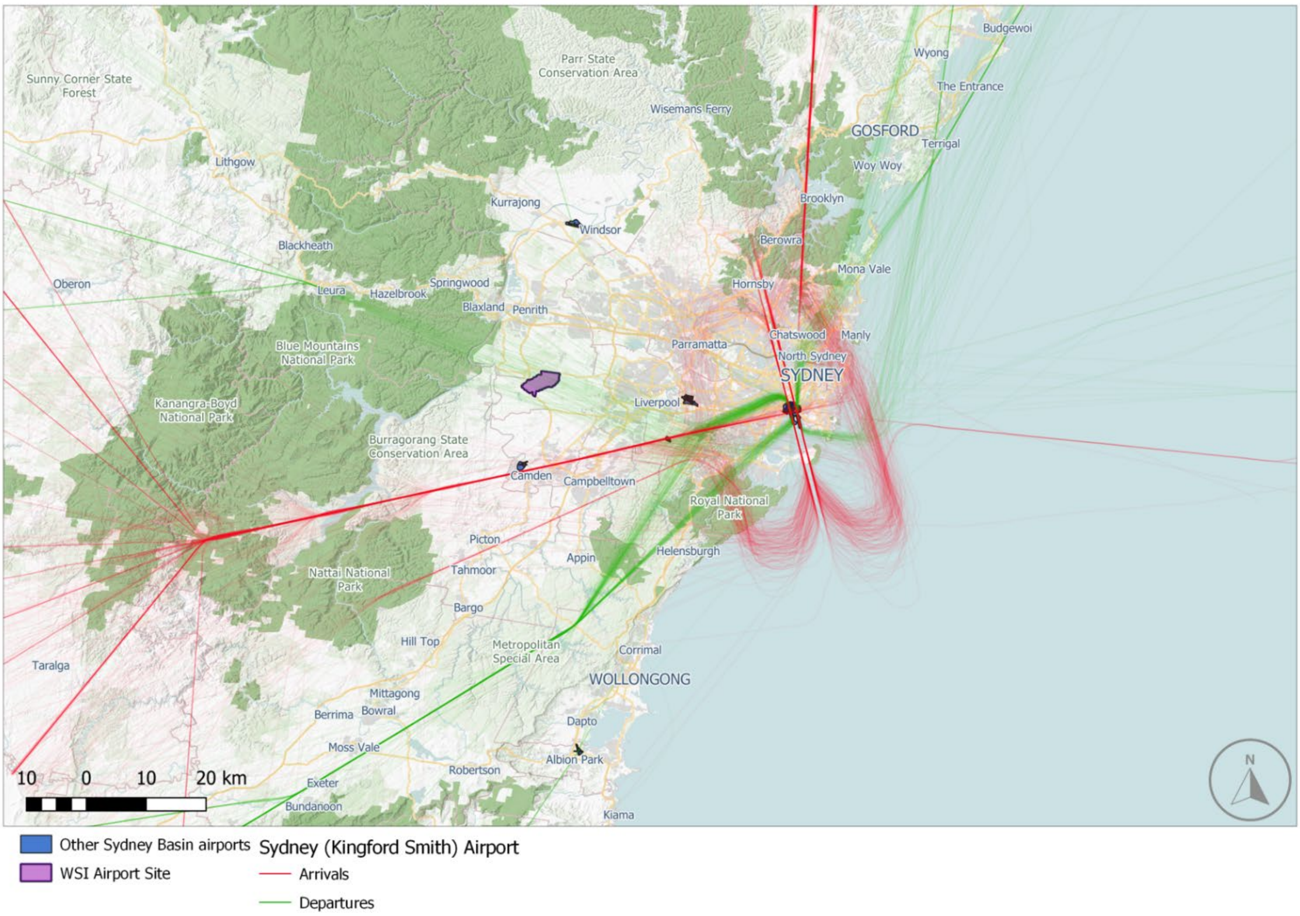


Figure 4.2 Current Sydney (Kingsford Smith) Airport non-jet IFR departure flight track movement activity (in green) to western and north-western destinations

Chapter 5 Proposed non-jet departures to western and north-western destinations

Non-jet procedures at Sydney (Kingsford Smith) Airport including initial turn altitudes, and standard take-off headings will remain in place to all destinations. There are no planned changes to existing non-jet SIDs and subsequent radar vectoring for northern and southern destination aircraft which are expected to replicate the current procedures and present consistency with current operations in lateral dispersion and altitudes flown.

For non-jet departures tracking to western or north-western destinations, a new SID has been designed from overhead the existing waypoint ANKUB. This waypoint is located around 10 nm (19 km) to the south-west of Sydney (Kingsford Smith) Airport as shown in Figure 5.1. The operation by non-jet departures to as far as ANKUB remains the same as the current operation from all Sydney (Kingsford Smith) Airport runways.

After flying their initial take-off assigned heading, all non-jet departures from Sydney (Kingsford Smith) Airport runways to the west and north-west will be radar vectored. This is subject to separation with other aircraft, to a position where they can track directly to waypoint ANKUB.

From ANKUB, all non-jet aircraft bound for western and north-western destinations will follow a common track via the proposed new waypoints NB024, NB037, and NB038. To provide separation assurance with WSI aircraft operations, aircraft will be required to reach specific altitudes at NB024 and NB037. At waypoint NB024, aircraft are required to be below 5,000 ft (1.5 km) and at waypoint NB037 aircraft are required to be above 9,000 ft (2.7 km). The proposed new waypoints and altitude requirements will result in less lateral dispersion and increased concentration of non-jet departure operations over parts of the Sydney Basin. The altitude requirements associated with the proposed new waypoints will result in non-jet aircraft flying a similar vertical profile compared with typical current operations.

At waypoint NB038 those aircraft for western destinations will track via waypoint NB167 and then direct to KADOM and aircraft for north-western destinations will track via the new waypoints NB055, NB163 and NB179 to the existing waypoint BENBU.

Based on advice provided by Airservices Australia, the adoption of the proposed future non-jet SID from all Sydney (Kingsford Smith) Airport runway directions to western and north-western destinations will undergo a series of utilisation stages:

1. On the design finalisation and publication of the SID as an available procedure in the AIP DAP, its application is expected to be for most flights operating to western and north-west destinations off all Sydney (Kingsford Smith) Airport runways.
2. Following a short spike of high usage immediately after implementation, decreasing over 6–18 months to a point where most aircraft are provided with a more expeditious flight path through radar vectoring and direct tracking. As WSI operations steadily increase over time and contingent on growth in demand within the Sydney Basin, it is expected that application of the SID will increase and likely be adopted for around half of flights departing in that direction at 5 years post WSI operations.

The analysis of historic flight path movement data for a suitable representative one-week period in 2019 (prior to the coronavirus (COVID-19) pandemic), identified an average of 30 non-jet flights daily to western and north-western destinations. Based on the above procedure adoption criteria, and the application of a generic movement growth percentage of only one per cent (refer to Chapter 6). Based on the above radar vectoring application, it is estimated that around 20 of the total 35 daily non-jet departures to the western and north-western destinations, could utilise the proposed new SID procedure in 2030. The rest will continue to be radar vectored.

(The proposed new waypoints (NB055, NB163, etc.) identified above have been allocated a temporary identifier which will be replaced by a conforming 5 letter alpha character designator as part of the detailed design phase and implementation of the proposed adjusted procedure.

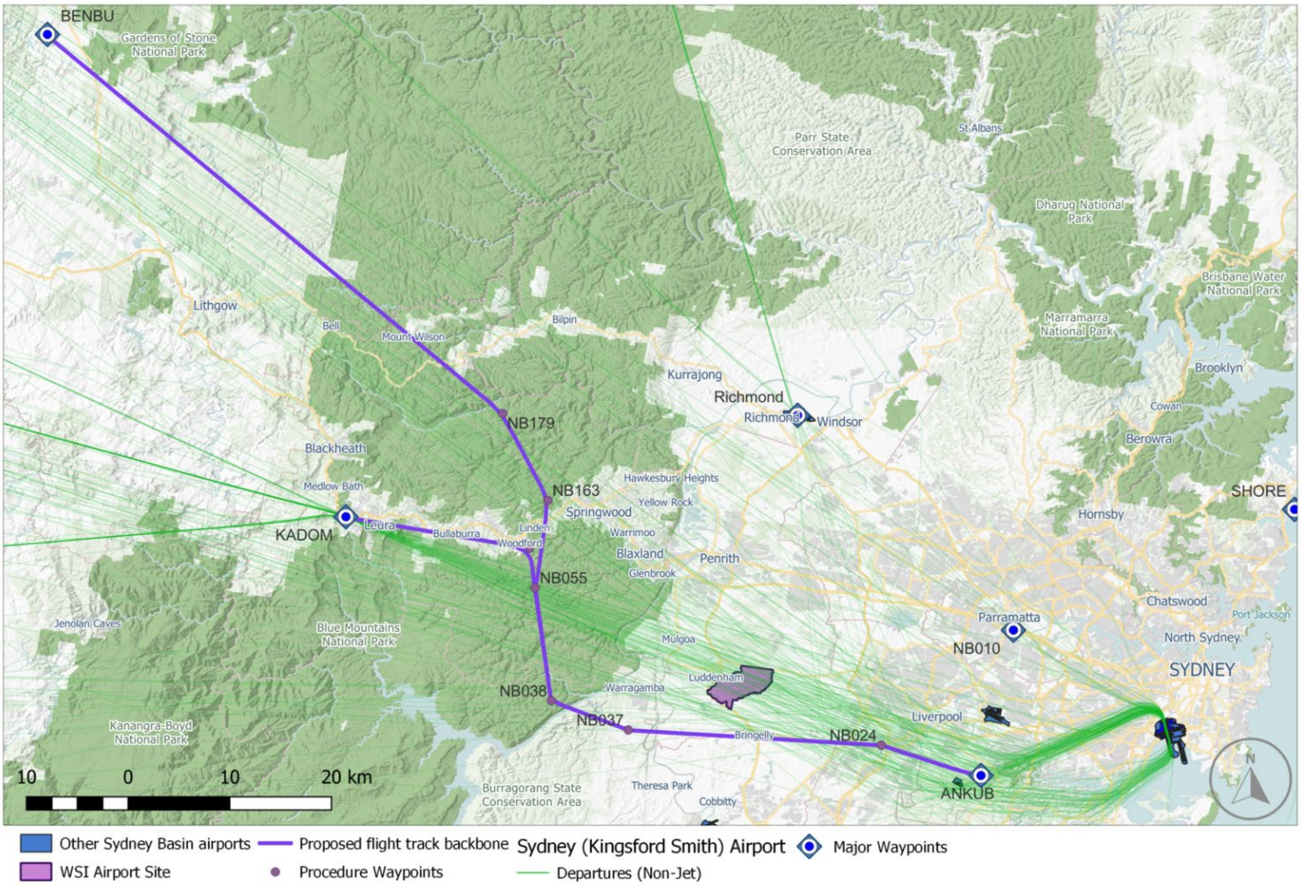


Figure 5.1 Proposed non-jet ANKUB SID nominal backbone flight track compared with existing non-jet departure radar tracks

The nominal backbone flight track is used to identify either the centre of an existing flight path, or the designed nominal backbone flight track of a proposed SID or STAR. In the case of a current nominal backbone flight track, it is based on an average of current radar plotted flight tracks. In the case of a proposed new procedure design, the nominal backbone flight track will be primary track used to establish and ensure "Safety by Design" standards are met.

Flight path dispersion swathes show the actual or expected variation of flights when flying the procedure.

Flight path dispersion around an actual or proposed nominal backbone flight track will vary considerably where the designed nominal flight paths track via a fly-by waypoint. The amount of variation will depend on the angle of turn that the designed track is required to make at the waypoint.

Chapter 6 Sydney (Kingsford Smith) Airport growth forecasts

Sydney (Kingsford Smith) Airport growth forecasts have been extracted from the current 2019 Airport Master Plan:

The forecasts were independently prepared for Sydney Airport Corporation Limited by a third party in consultation with major international, domestic and regional airlines, and airline associations.

Growth in total aircraft movements is expected to increase by around 17 per cent from 348,520 movements in 2017 to 408,260 in 2039, an annual increase of 0.7 per cent. Of that, Regular Public Transport (RPT) services are projected to be 382,305 in 2039, representing around 94 per cent of total air traffic movements. This reflects airline feedback and expectations on the continued up-gauging of aircraft and increases in seat density and load factors across the Sydney (Kingsford Smith) Airport route network. It is understood that all forecasts assume that from late 2026, the Sydney Basin's aviation demand will be served by two international airports – WSI and Sydney (Kingsford Smith) Airport.

Figure 6.1 shows the projected growth in aircraft movements for Sydney (Kingsford Smith) Airport as adapted from the 2019 Master Plan in the period from 2017 to 2039.

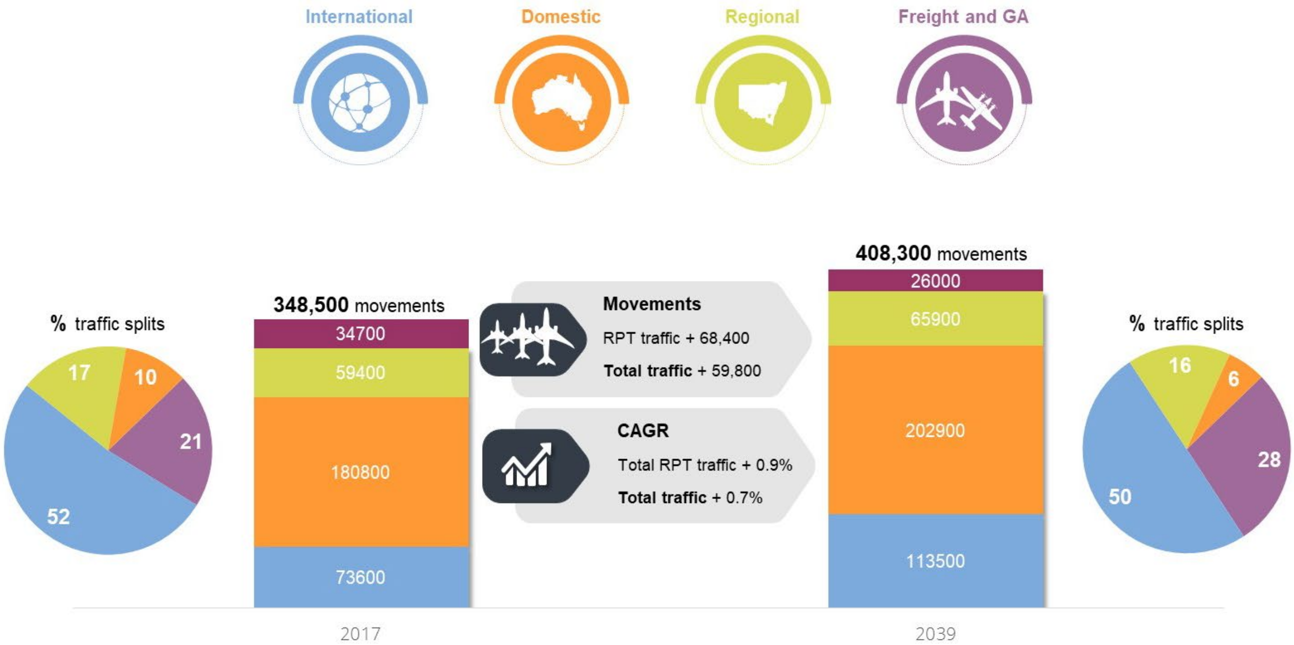


Figure 6.1 Sydney (Kingsford Smith) Airport aircraft movement growth forecast (adapted from the 2039 Master Plan)

In the absence of specific forecast growth data for non-jet departure operations off all Sydney (Kingsford Smith) Airport runways to western and north-western destinations, the generic annual growth percentages of less than one per cent presented in Figure 6.1 would be assumed to apply evenly across all the various operational sectors at Sydney (Kingsford Smith) Airport.

Chapter 7 Aircraft noise impact assessment

The aircraft noise assessment of the changes proposed to all non-jet departures from Sydney (Kingsford Smith) Airport runways to western and north-western destinations has been considered in isolation. The information presented in this chapter is targeted to describe the potential implications facilitated by the proposed individual procedure change only. The overflight noise impact assessment presented below for the proposed SID is limited to overflight noise impacts associated with the proposed change to the non-jet SID for western and north-western departures only. It does not consider a cumulative impact nor include other operations to or from Sydney (Kingsford Smith) Airport that may overfly that same area.

Figure 7.1 presents the flight path corridor dispersion and the proposed non-jet SID procedure nominal backbone flight tracks.

There are no changes proposed for non-jet west and north-west departures off all Sydney (Kingsford Smith) Airport runway directions between the departure runways and waypoint ANKUB. The proposed non-jet SID between Sydney (Kingsford Smith) Airport and waypoint NB024 located approximately 16 nm (30 km) from Sydney (Kingsford Smith) Airport remains largely consistent in operation to current practice.

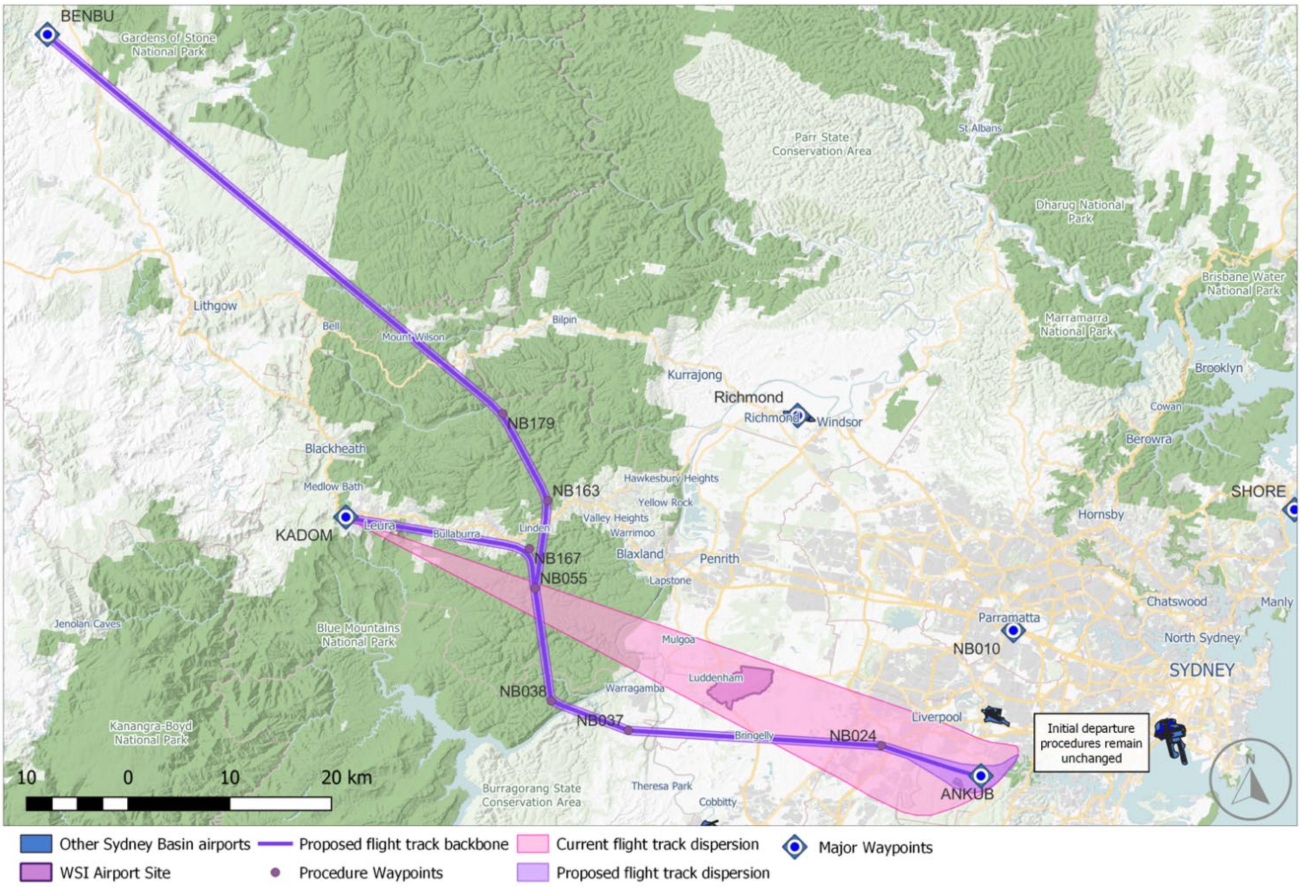


Figure 7.1 Flight path corridor comparison current non-jet departures versus proposed non-jet SID

Figure 7.2 presents the L_{Amax} contours (60 to 90 dB(A)) for a SAAB 340 regional turbo-prop aircraft departing either Runway 25 or Runway 34L from Sydney (Kingsford Smith) Airport to a nominal north-western destination. Figure 7.2 is presented to demonstrate that the resulting 60 dB(A) contour generated by this representative operation does not extend to waypoint ANKUB, the point on the non-jet departure where the proposed new SID commences. Number above (N-above) metrics have not been developed as they are irrelevant for the extent of the adjustment required (beyond waypoint ANKUB) as overflight noise levels are expected to be below 60 dB(A).

Based on advice provided by Airservices, when the proposed new non-jet SID is implemented, it will undergo 2 utilisation stages:

1. On airspace design finalisation and publication of the SID as an available procedure in the AIP DAP, its application and use is expected to be for most non-jet flights departing all Sydney (Kingsford Smith) Airport runways to western and north-western destinations.
2. Following a short period of high usage immediately after SID implementation, most aircraft will be provided with a more expeditious flight path through radar vectoring and direct tracking. As WSI operations steadily increase over time and contingent on growth in demand within the Sydney Basin, it is expected that application of the SID will increase and likely be adopted for around half of flights departing in that direction at 5 years post WSI operations.

This will result in the extensive area to the west and north-west of waypoint ANKUB currently subjected to radar-vectored non-jet overflights continuing to be overflown at similar altitudes and variable lateral positioning by the expected half of the total non-jet departures to western and north-western destinations.

The aircraft noise assessment of the changes proposed to non-jet western and north-western departures off all Sydney (Kingsford Smith) Airport runway directions in this Appendix is both quantitative and qualitative in nature. This is due to the many uncertainties in actual tracking of non-jet aircraft created by radar vectoring by air traffic control of around 50 per cent of those operations and the relatively low number of aircraft operating on the route (less than 40 total movements per day after 5 years of operation at WSI and around 20 of those operations flying the SID procedure). While the proposed adjustment to the non-jet SID will result in a number of new suburbs and communities being overflown, there may be some benefit to those currently overflown communities by the lateral displacement of up to half the non-jet departure overflights to the south.

For approximately half of the total non-jet departures to the western and north-western destinations (around 20 movements per day to 2030) that fly the proposed ANKUB non-jet SID procedure they are expected to be closely aligned with the proposed backbone track as presented in Figure 7.1.

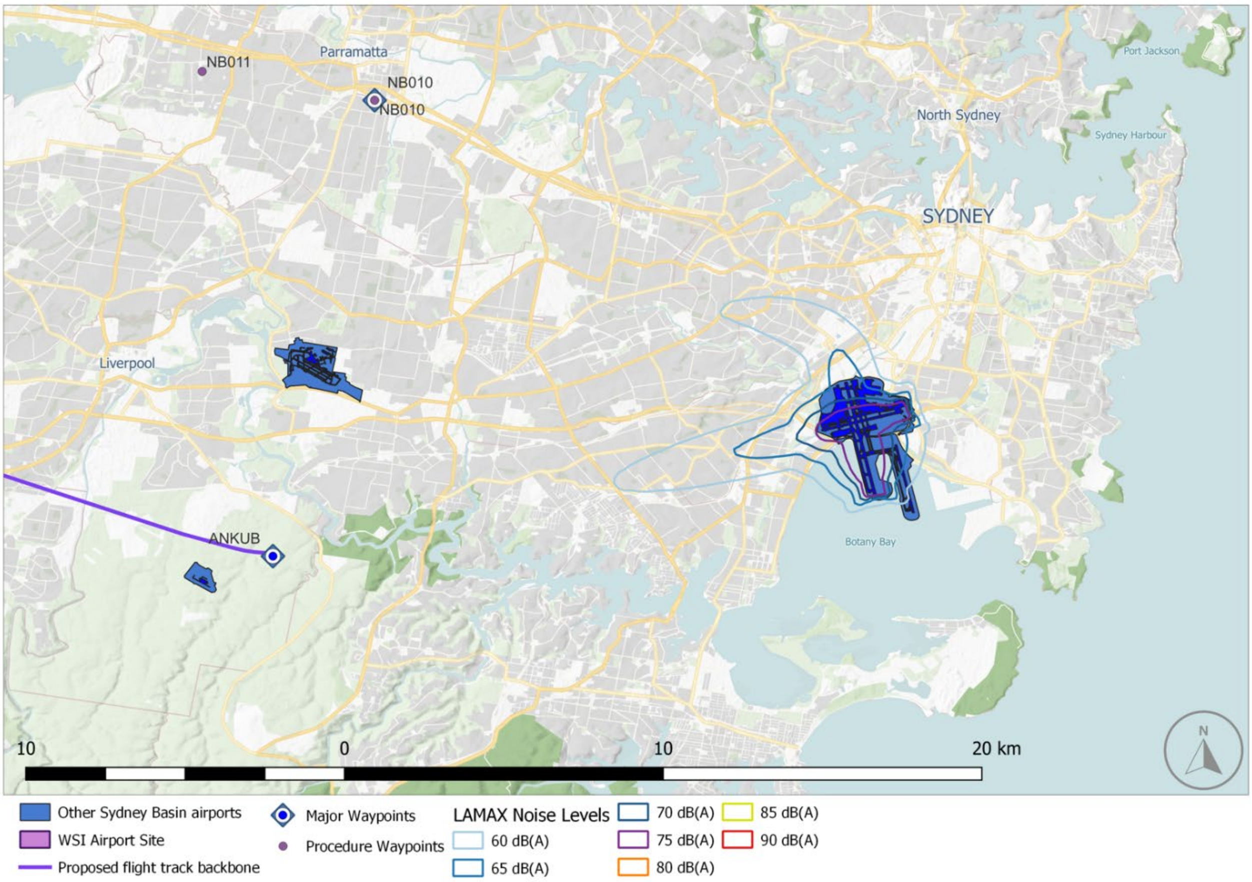


Figure 7.2 L_{Amax} contours – Saab 340 regional turbo-prop departure – 60 to 90 dB(A) contours

Table 7.1 shows the results of application of Noise-Power-Distance (NPD) data interpolated from charts generated by the Aviation Environment Design Tool (AEDT) and used to estimate the expected overflight noise levels below proposed waypoints that define the procedure and for a suitable representative non-jet aircraft type – the Saab 340.

Table 7.1 Predicted average overflight noise levels in dB(A) at proposed waypoints

Aircraft	Waypoint	ANKUB	NB024	NB037	NB038	NB055
Altitude		5,000 ft	5,000 ft	9,000 ft	11,000 ft	13,000
Saab 340 – Regional twin turbo-prop (climb profile)		60 dB(A) (climb)* 58 dB(A) (cruise)	58 dB(A)**	56 dB(A)	54 dB(A)	52 dB(A)

**The proposed new non-jet SID restricts aircraft to not climb above 5,000 ft until west of waypoint NB024. Due to climb performance it is expected that the majority of aircraft using this SID will reach 5,000 ft close to ANKUB. At which point they will reduce engine power (thrust) settings and fly in level flight (cruise) until passing waypoint NB024. Table 7.1 provides 2 noise levels at ANKUB to illustrate this possibility.*

*** The dB(A) values presented in Table 7.1 should be considered as a median value of a range of plus or minus 3 dB(A) – i.e., 50 dB(A) would indicate potential overflight noise of between 47 and 53 dB(A).*

A number of outer suburbs of the Sydney Basin currently overflown by non-concentrated radar vectored non-jet flights will be subjected to a minor concentration of non-jet overflights. These are estimated to be up to 20 movements per day in 2030, assuming that at 2030 around half of the of non-jet departure flights to western and north-western destinations out of Sydney (Kingsford Smith) Airport will be radar-vectored as depicted by the pink dispersion swathe in Figure 7.3.

Accordingly, Figure 7.3 depicts only the areas associated with impacts of the change resulting from the introduction of the proposed new non-jet SID procedure.

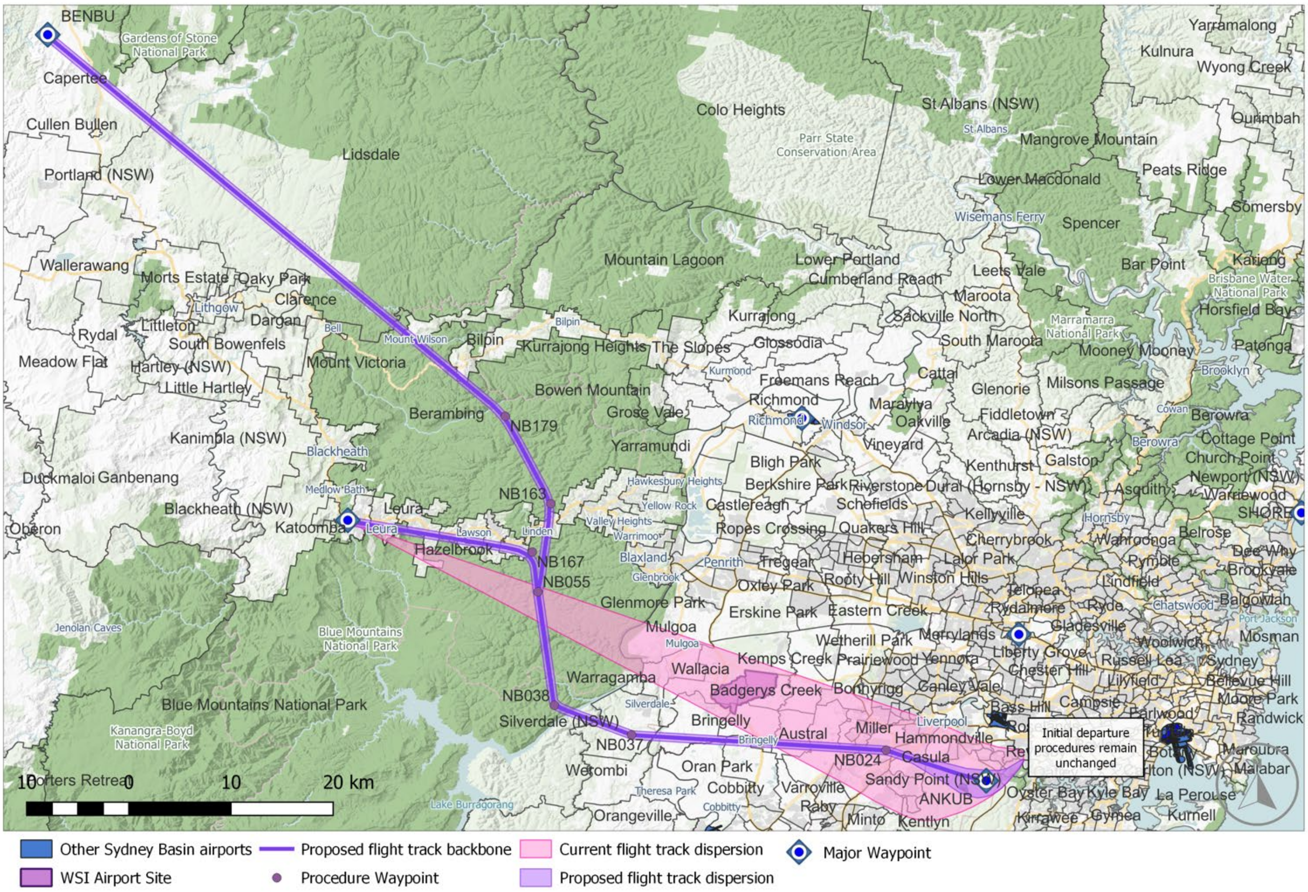


Figure 7.3 Proposed non-jet ANKUB SID – overflown suburbs

(For current non-jet flight path corridor dispersion refer to Figure 5.1).

Chapter 8 Other environmental factors

8.1 Visual amenity

Currently non-jet aircraft departing Sydney (Kingsford Smith) Airport from any runway to a westerly or north-westerly destination fly on a widely dispersed set of flight paths, either under radar vectors or directly to an enroute waypoint (refer to Figure 5.1). These aircraft are visible to a large part of Western Sydney.

With the introduction of WSI operations a proposed new “Safety by Design” non-jet aircraft SID starting at waypoint ANKUB Is required to ensure that non-jet aircraft flying to the west and north-west are strategically separated with all WSI operations. This proposed new SID path has been able to be designed such that it nearly replicates the current southernmost radar vectored flight track. Communities under this flight track see non-jet departures currently (refer to Figures 5.1 and 7.3). As a reduced amount of radar vectoring of departures is expected in the future (refer to Chapter 7) more aircraft will be visible on the proposed new SID track.

The change from a wide radar vectored/direct tracking dispersion of tracks to a track with reduced flight track dispersion, to the west and north-west, will have differing visual impacts depending on a community's location in the Sydney Basin. A combination of Figures 5.1 and 7.3 illustrate where the changes in overflight frequency and dispersion will take place.

8.2 Radar vectoring

In locations where no SIDs or STARs are available for an aircraft's particular operation, or where adverse weather requires the cancellation of a SID or STAR for safety reasons, air traffic control will provide radar vectoring to safely manage those applicable operating aircraft. Radar vectoring involves air traffic control determining a safe path for all aircraft and issuing heading and sometimes altitude and speed instructions to one or more aircraft to avoid any possible conflictions. While the objective of a set of SIDs and STARs in terminal airspace designed under “Safety by Design” principles is for onboard flight management systems monitored by air traffic control to ensure aircraft remain separated, there are occasions where SIDs and STARs are cancelled for varied reasons and aircraft are radar vectored.

A cancellation of a SID or STAR resulting in radar vectoring involving a departure from lateral track, could also involve a variation in vertical profile or speed requirements and may be either at pilot request or initiated by air traffic control.

Pilot requests for departing from a SID may be for:

- route efficiency – where there is a more direct route to the destination than the published procedure allows, saving time, fuel and emissions
- weather avoidance – particularly around turbulence associated with thunderstorms.

Pilot requests in all instances are subject to air traffic control approval. Avoidance of thunderstorms which has a safety priority is readily approved. Direct routing requests will be considered by air traffic control in light of safety and overall management of other aircraft within the vicinity.

Air traffic control-initiated cancellations of SIDs can also be for reasons of route efficiency, better noise outcomes or better emissions outcomes. Separation requirements with other departing, arriving or transiting aircraft can also necessitate the cancellation of a SID.

Any one of the 3 elements (track, vertical profile, speed) of a SID can be cancelled individually or collectively.

Aircraft will eventually either re-join the published procedure at a later waypoint or will connect with the enroute network at a designated waypoint.

In the case of non-jet traffic departures for western and north-western destinations out of Sydney (Kingsford Smith) Airport, Airservices advise that after the introduction of the proposed new non-jet SID this variable radar vectoring tracking will continue to be employed when traffic conditions permit, and aircraft will still be visible in the current radar vectored areas as well as on the new SID.

8.3 Track distances and emissions

The track distance to be flown by non-jet aircraft on the proposed change to the ANKUB SID will increase. The increase is anticipated to be approximately 5.5 nm (10 km) for the procedure legs between waypoints ANKUB and KADOM and approximately 10 nm (19 km) between waypoints ANKUB and BENBU.

The potential impact of this additional track distance on a selection of representative non-jet (turbo-prop) aircraft expected to operate on intrastate routes (within NSW) ranging between 250 nm (463 km) and 500 nm (926 km) in distance is shown in Figure 8.1.

For the non-jet aircraft selected, De Havilland Dash8-400 and Saab 340, the fuel required to fly the additional 5.5 nm (10 km) on a 250 nm (463 km) flight is projected to range between approximately 16 and 23 kilograms (kg) emitting between approximately 50 and 72 kg of CO_2 per flight. This represents less than 2.2 per cent of total fuel consumption and associated CO_2 expected to be emitted on a full-flight basis. To fly an extra 10 nm (18 km) on the same 250 nm (463 km) flight route, fuel consumption is projected to range between approximately 29 and 41 kg emitting between approximately 90 and 131 kg of CO_2 per movement. This is anticipated to represent around 4 per cent of total flight fuel consumption and CO_2 emissions.

Similarly, the fuel consumption required for these 2 non-jet aircraft to fly an additional 5.5 nm (10 km) on a 500 nm (926 km) flight is projected to range between approximately 10 and 17 kg emitting between approximately 33 and 54 kg of CO_2 per movement. This represents less than 1.1 per cent of total fuel consumption and associated CO_2 expected to be emitted on a full-flight basis. To fly an extra 10 nm (around 19 km) on the same 500 nm (926 km) flight route, both aircraft are projected to consume between approximately 19 and 31 kg emitting between approximately 60 and 98 kg of CO_2 per movement. This represents around 2 per cent of total fuel consumption and CO_2 emissions on a full-flight basis.

In accordance with CASA Advisory Circular (AC) 91-15 v1.1, the fuel required to fly the extended track distance proposed by the non-departure change would be well within the total amount of useable fuel and recommended minimum contingency fuel to be carried onboard to allow both aircraft to safely complete (i.e., within safety margins for deviations, enroute air traffic management, technical issues and weather) their respective flights on these routes.

As aircraft operate longer flight routes, fuel economy will improve as the aircraft will operate longer in an optimal state during the cruise phase of flight. However, in absolute terms, more fuel will be used emitting more CO_2.

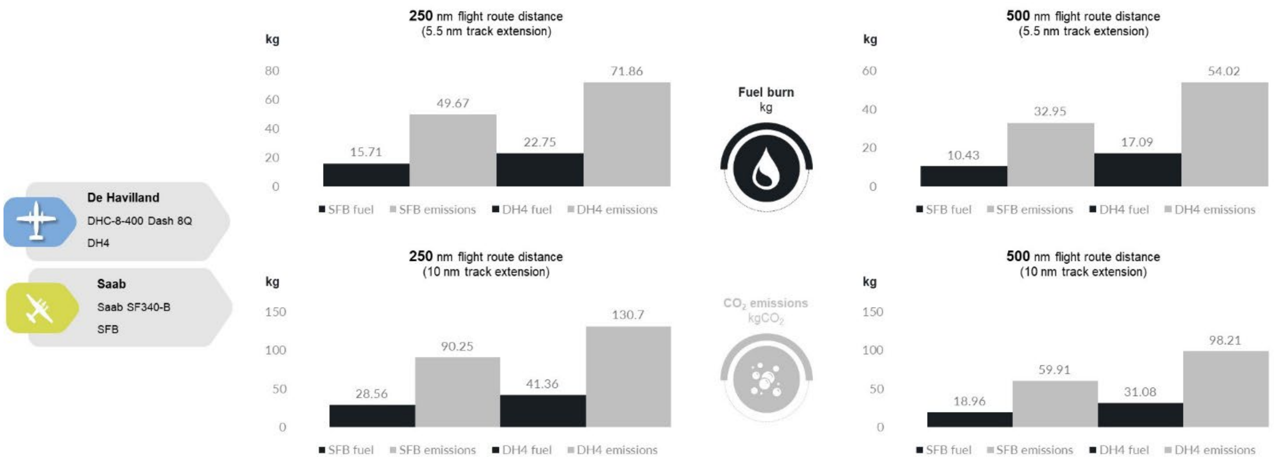


Figure 8.1 Fuel consumption and CO_2 emissions per movement for selected non-jet aircraft types

Chapter 9 Conclusion

All current procedures from Sydney (Kingsford Smith) Airport including initial turn altitudes, and standard take-off headings will remain in place for all non-jets to all destinations. Once the new SID is in place then after the initial turn on take-off, air traffic control will then radar vector aircraft either directly to waypoint ANKUB to pick up the new SID flight path, or, depending on other aircraft in the Sydney Basin they will continue to use radar vectoring towards the first enroute waypoint (refer to the explanation of the assumed traffic split on SID or radar vectors in Chapter 5).

An indicative non-jet 60 dB(A) contour has been produced for Runway 34L departures (refer to Figure 7.1 above) that turn towards waypoint ANKUB. As this contour goes no further than 7 nm (13 km) west of Sydney (Kingsford Smith) Airport, to give some indication of possible noise beyond waypoint ANKUB a NPD chart has been used to provide information based on a suitable representative non-jet aircraft.

As shown in Figure 4.2 a significant number of aircraft already track close to waypoint ANKUB and then following radar vectors, are cleared to track under pilot navigation to waypoint KADOM of beyond. This current tracking takes them nearby the new waypoint NB024. The old and new tracks will **only** vary onwards from the position of this waypoint.

For the 50 per cent of aircraft (up to 20 movements per day in 2030) that are expected to track along the new SID, there will be a marginal increase in track miles. An increase of 5.5 nm (10 km) for aircraft departing to waypoint KADOM and 10 nm (19 km) for aircraft departing to waypoint BENBU is expected.

Due to the relative short extension to track miles, non-jet aircraft using the new SID are expected to consume fuel that ranges between 2.2 and 4 per cent of total fuel consumptions for flights operating on 250 nm (463 km) routes and between 1.1 and 2 per cent for flights operating longer 500 nm (926 km) routes. The fuel required by non-jet aircraft to fly the proposed 5.5 nm (10 km) and 10 nm (19 km) track mile extensions is well within typical useable and minimum contingency requirements for both aircraft to safely operate these routes.

Given that the area overflown by the proposed new non-jet SID is currently frequently overflown with similar non-jet aircraft undertaking both IFR and VFR flights, it can be expected that there will be little or no material change over today's operations.

Appendix E

Proposed Sydney (Kingsford Smith) Airport AKMIR STAR jet and non-jets from south and west

Western Sydney International (Nancy-Bird Walton) Airport – Airspace and flight path design | Environmental Impact Statement

Technical paper 13: Facilitated changes

Appendix E – Proposed Sydney (Kingsford Smith) Airport AKMIR Standard Instrument Arrival (STAR) jet and non-jets from south and west

October 2024

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Terms and abbreviations

Term/abbreviation	Definition
AEDT	Aviation Environmental Design Tool (US FAA)
AIP	Aeronautical Information Package (Australia)
AIRAC	Aeronautical Information Regulation and Control (Australia)
ARP	Aerodrome Reference Point
CASA	Civil Aviation Safety Authority (Australia)
CCO	Continuous climb operation
CDO	Continuous descent operation
CO_2	Carbon dioxide (a greenhouse gas)
DAP	Departure and Approach Procedures (Australian AIP)
dB(A)	A-weighted decibel
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Australian Government)
DITRDCA	Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Australian Government)
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation 1999* (Cth)
FAA	Federal Aviation Administration (United States)
ft	feet (a unit of distance or height equivalent to 0.3048 m)
IAF	Initial Approach Fix
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
km	kilometres (a unit of distance equivalent to 1,000 metres)
LL	Lower Level (altitude)
m	metre (a unit of distance or height equivalent to 3.281 ft)
MNES	Matters of National Environmental Significance (EPBC Act) (Cth)
N60/N70	Number above (noise metric)
nm	nautical mile (unit of distance equivalent of 1.852 km)
NPD	Noise-Power-Distance (aircraft noise curve charts)
PMST	Protected Matters Search Tool (DCCEEW)
RPT	Regular Public Transport (air services)

Term/abbreviation	Definition
SID	Standard Instrument Departure (flight path)
STAR	Standard Instrument Arrival (flight path)
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WSI	Western Sydney International (Nancy-Bird Walton) Airport

Chapter 1 Introduction

Although aircraft differ in operation, type, altitude, noise level and frequency, most areas of the Sydney Basin are overflown at some stage as shown in Figure 1.1.

The introduction of new flight paths to be used by aircraft into and out of Western Sydney International (Nancy-Bird Walton) Airport (WSI) has considered a multitude of options to minimise any adjustments required to existing flight paths in the Sydney Basin airspace. To facilitate the use of new flight paths at WSI, there are adjustments required to Sydney Basin operations prior to the opening of WSI in 2026 to facilitate its flight paths and airspace structure. Those facilitated changes include the development of, or adjustments to:

- Sydney (Kingsford Smith) Airport Runway 25 Standard Instrument Departures (SIDs) to the west, north-west, north and east – (Appendix A)
- Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs to the south, west, north, and east – (Appendix B)
- Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID to the west and north-west – (Appendix C)
- Sydney (Kingsford Smith) Airport non-jet SID to the west or north-west – (Appendix D)
- **Sydney (Kingsford Smith) Airport AKMIR Standard Instrument Arrival (STAR) jet and non-jets from the south and west – (Appendix E)**
- Royal Australian Air Force (RAAF) Base Richmond SID and STARs – (Appendix F)
- Bankstown Airport SID and STARs – (Appendix G)
- Camden Airport STARs – (Appendix H)
- Sydney Basin Visual Flight Rules (VFR) operations – (Appendix I)
- Miscellaneous and Minor procedure adjustments – (Appendix J)
  - Sydney (Kingsford Smith) Airport BOREE STAR
  - Sydney (Kingsford Smith) Airport RIVET STAR
  - Sydney (Kingsford Smith) Airport Runway 07 Initial Approach Fix (IAF)
  - Sydney (Kingsford Smith) Airport Runway 07 SID
  - Sydney Basin low altitude transit flight routes.

This Appendix – Appendix E presents an assessment of the changes proposed to Sydney (Kingsford Smith) Airport for non-jet and occasional jet arrivals from the south and west. While the existing STAR procedure (the ODALE SEVEN ARRIVAL) is available for all IFR aircraft, it is predominately used by non-jet aircraft.

The design process for the safe and efficient integration of WSI's new flight paths into the existing Sydney Basin airspace has been one of adopting "Safety by Design" principles to deliver the highest level of safety separation assurance in conformance with rules set by the Civil Aviation Safety Authority (CASA). This is to enable aircraft to operate safely within their performance envelope into an already complex airspace structure. "Safety by Design" ensures that aircraft are separated from each other according to the flight routes and the type of air traffic service being provided. As such, this requires the new or amended SIDs and STARs and altitudes to be published and then downloaded into the cockpit flight management systems of all aircraft. At the same time the same information must be downloaded into the software of the surveillance systems used by air traffic control to manage and monitor the safe separation of all controlled aircraft.

The preliminary airspace design process has appropriately accorded "safety" as the highest priority to ensure robust operational safety outcomes. Environmental outcomes, with a particular focus on the minimisation of potential community impacts and the operational efficiency of the facilitated airspace changes has also been a key design criterion.

Instrument Flight Rules (IFR) are the rules that govern the operation of aircraft in Instrument Meteorological Conditions (IMC) (conditions in which flight In IMC, an aircraft must be flown with reference to its onboard flight instruments.) Two sets of rules, IFR or Visual Flight Rules (VFR) exist to govern flight in either IMC or Visual Meteorological Conditions (VMC).

The proposed change to the ODALE (to be renamed AKMIR) arrival STAR to Sydney (Kingsford Smith) Airport presented in this Appendix has been designed to be flown under IFR. This to ensure "Safety by Design" is embedded in the new procedures and to allow continued operations of this high-use procedure in all weather conditions. Aircraft flying to IFR standards and rules can operate in either IMC or VMC, but aircraft flying to VFR standards and rules can only operate in VMC.

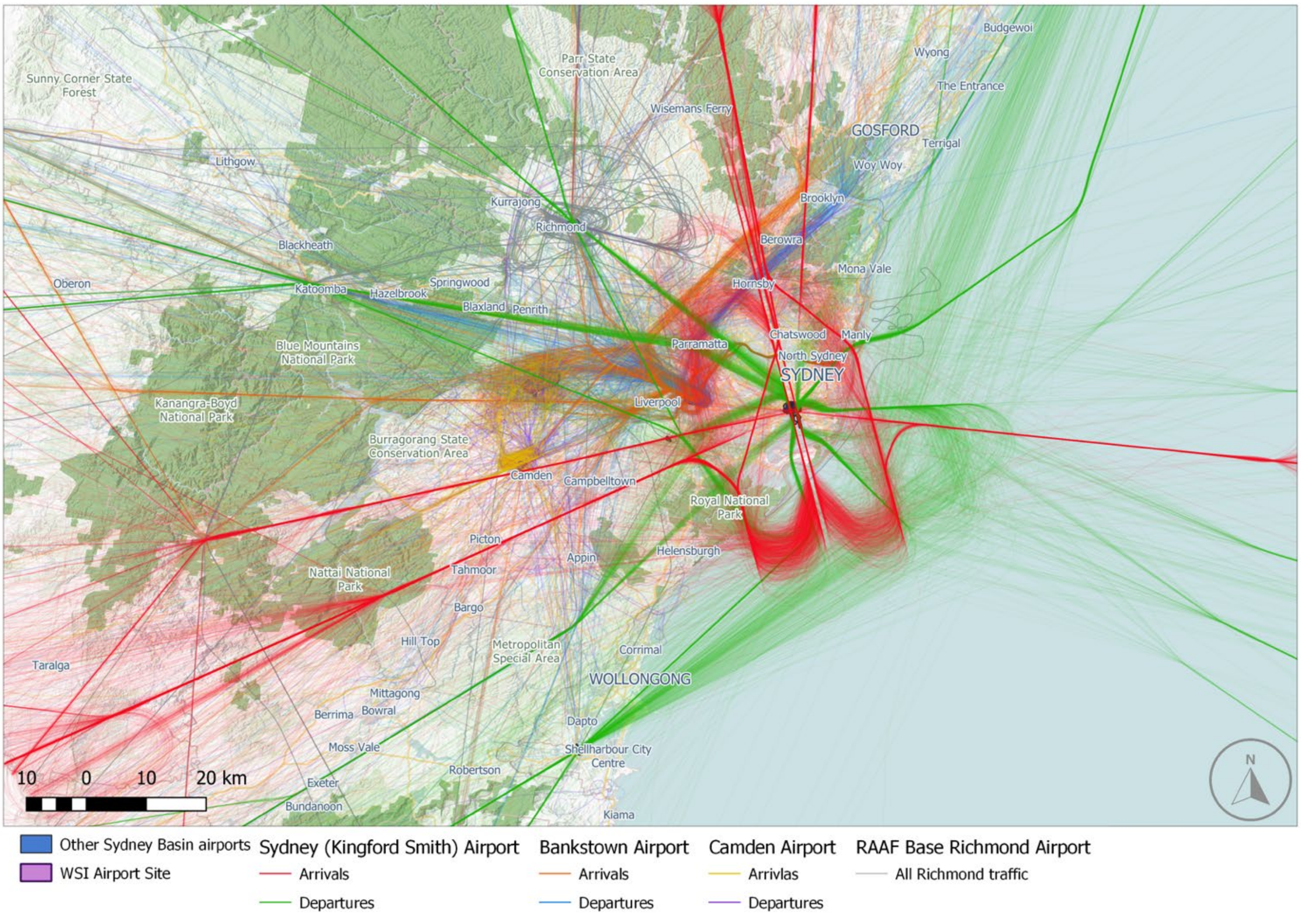

Figure 1.1 Sydney Basin airspace with one-week of flight track movement activity in March 2019

Chapter 2 Background

A significant and high-use arrival procedure (STAR) to all Sydney (Kingsford Smith) Airport runways from the west, predominately used by non-jet aircraft requires redesign and implementation to ensure "Safety by Design" outcomes for Sydney Basin airspace operations. WSI and Sydney (Kingsford Smith) Airports are located around 45 kilometres (km) apart on an approximate east-west axis. This proposed adjusted STAR (to be named AKMIR STAR) will cross the proposed new northern flight paths to and from WSI at approximately 8,000 ft (2.4 km).

Non-jet aircraft currently arrive at Sydney (Kingsford Smith) Airport from the south and west, and track from their enroute flight paths to join the current ODALE STAR. The ODALE STAR provides lateral and vertical guidance to pilots to allow air traffic control to safely integrate these aircraft into the Sydney (Kingsford Smith) Airport arrival sequence. On occasion during peak traffic periods, when there is an overload of jet aircraft from the south and west, some jet aircraft may be re-routed via the ODALE STAR. Jets are not permitted to plan via ODALE.

Outbound aircraft from WSI on SIDs to southern destinations must cross the current ODALE STAR to join the main outbound traffic stream from the Sydney Basin. The objective of "Safety by Design" is to ensure that where this crossing takes place, it does so while aircraft are flying SIDS and STARS within approximately 45 nautical miles (nm) or around 83 km of WSI or Sydney (Kingsford Smith) Airport. To achieve this within the constrained airspace in this part of the Sydney Basin, the ODALE STAR procedure to Sydney (Kingsford Smith) Airport will need to move laterally to the southeast to facilitate the climb and radius of turn capability of aircraft departing WSI off both runways (Runway 05 and Runway 23) and heading to southern destinations.

This redesign of the ODALE STAR to Sydney (Kingsford Smith) Airport which for safety reasons will be renamed the AKMIR STAR will be published and implemented prior to the opening of WSI in 2026. This facilitated airspace change will not impact the application of noise sharing runway modes at Sydney (Kingsford Smith) Airport. The change would be introduced in 2026 on a scheduled Aeronautical Information Regulation and Control (AIRAC) date, prior to the opening of WSI. Introducing these changes ahead of WSI's opening will allow pilots and air traffic control to adjust their systems and become familiar with changes to current procedures before single runway operations at WSI commence and will minimise the likelihood of conflicts or incidents in the airspace.

Figure 2.1 shows the location of WSI, the locations of other key airports in the Sydney Basin and geographic extent of a nominal area radiating 45 nm (83 km) from the Aerodrome Reference Point (ARP) of WSI.

Figure 2.2 is the Aerodrome Chart for Sydney (Kingsford Smith) Airport. The chart has been extracted from the Aeronautical Information Package (AIP) Departure and Approach Procedures (DAP) to assist the interpretation of the information presented in this Appendix. It depicts the general layout of Sydney (Kingsford Smith) Airport including its 3-runway system and orientations, runway headings (34L, 25, etc.) and dimensions (lengths and widths).

Figure 2.1 Location of airports in the Sydney Basin

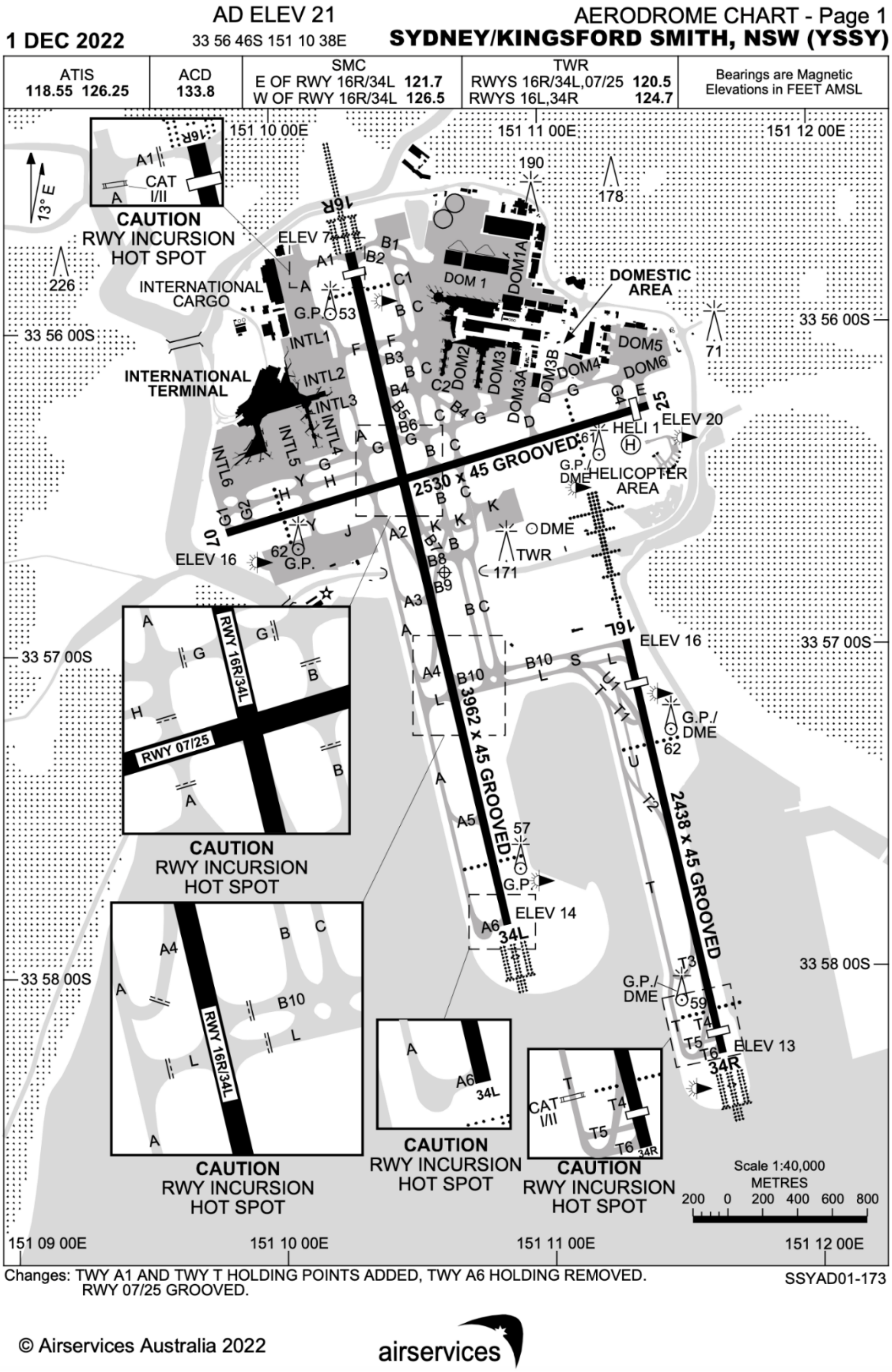

Figure 2.2 Sydney (Kingsford Smith) Airport – Aerodrome Chart (AIP / DAP)

Chapter 3 Purpose

The purpose of this Appendix is to present an environmental assessment of the proposed redesigned and renamed former ODALE STAR, now the proposed AKMIR STAR to all runways at Sydney (Kingsford Smith) Airport for arrivals by non-jet aircraft from the south and west. It includes analysis and assessment of potential noise impacts from aircraft overflights of these proposed facilitated airspace changes.

It describes the reason for the facilitated airspace changes and the associated safety and operational considerations, along with other environmental issues.

Chapter 4 Current non-jet arrival operations from the south and west

Figure 4.1 presents the current flight tracks of non-jet arrivals and departures to Sydney (Kingsford Smith) Airport from origins to the south and west. There were an average of 55 non-jet arrival flights and 3 jet arrival flights per day from the south and west during 2019, using the current procedure – the ODALE STAR. On occasion during peak traffic periods, when there is an overload of jet aircraft from the south and west, some jets may be re-routed via the ODALE STAR. Similarly, non-jet aircraft from the south and west may on occasion be re-routed via the RIVET STAR, located immediately to the south of the ODALE STAR. Jets are not permitted to plan via ODALE; air traffic control in Sydney or Melbourne may initiate this tactically.

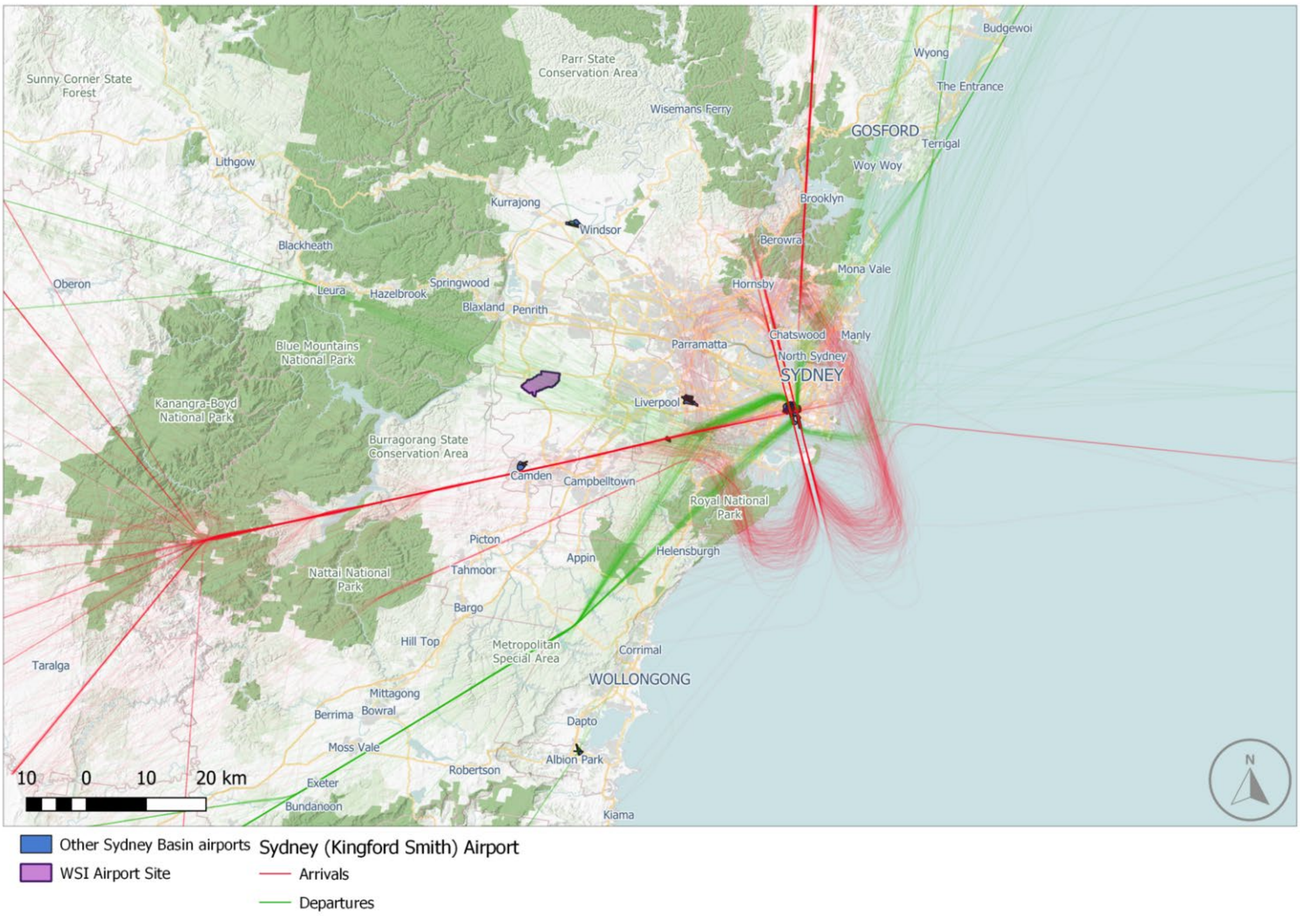

Figure 4.1 Current IFR flight track movement activity for non-jet arrivals and departures to/from Sydney (Kingsford Smith) Airport runways

4.1 Current jet and non-jet arrivals using the ODALE STAR

The current ODALE STAR to Sydney (Kingsford Smith) Airport is effectively a straight line from waypoint ODALE located approximately 33 nm (around 61 km) south-west of the centre of Sydney (Kingsford Smith) Airport. This is shown in Figure 4.2.

There is a vertical requirement for aircraft to be below 7,000 ft (2.2 km) by waypoint MITSA which is around 20 nm (37 km) from Sydney (Kingsford Smith) Airport. This is a target altitude which allows pilots to plan a constant descent from cruise altitude to 7,000 ft (2.2 km). Beyond that the lateral track and further descent profile is subject to air traffic control clearance and radar vectoring to the Sydney (Kingsford Smith) Airport runway in use for landing.

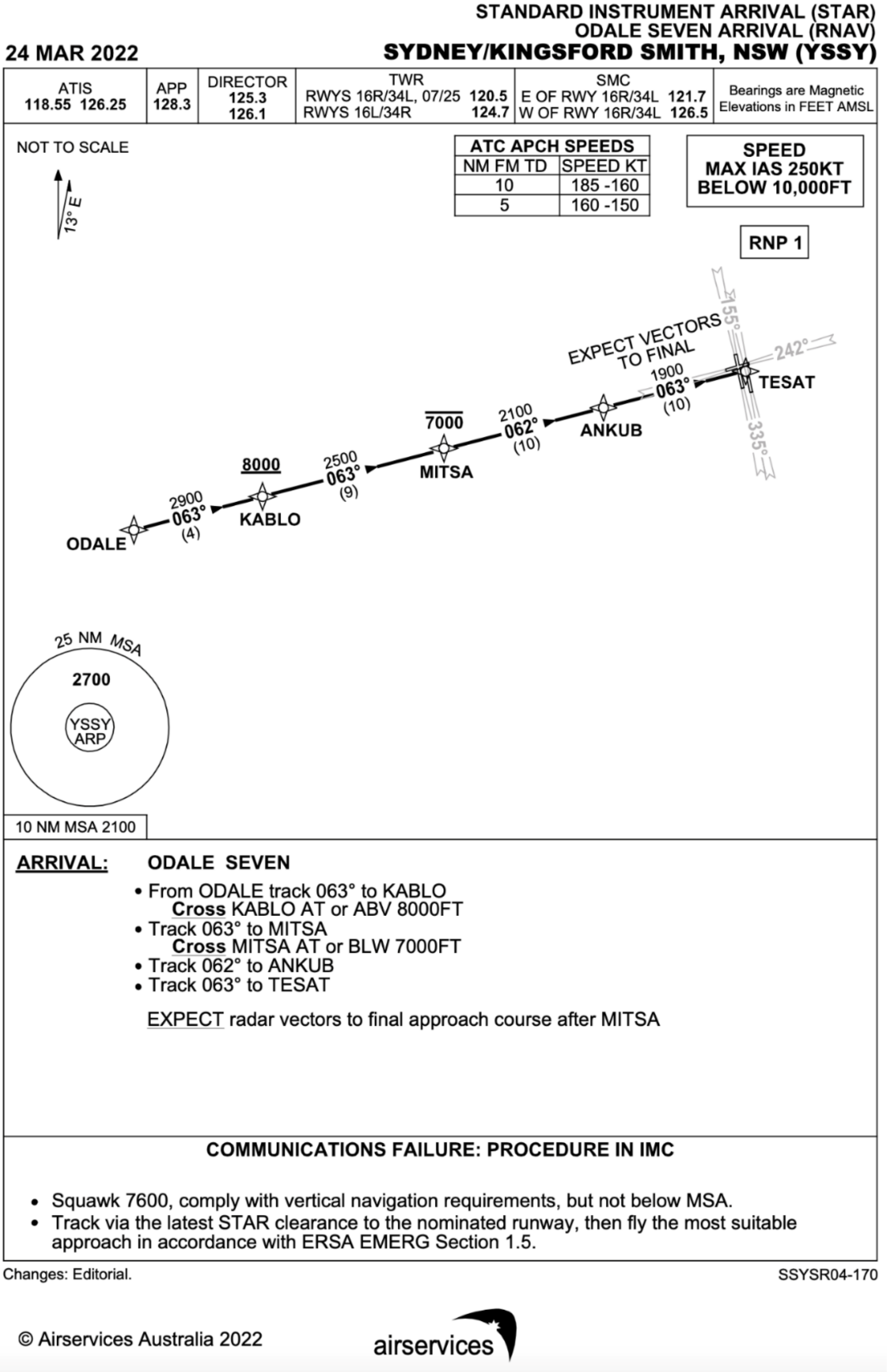

Figure 4.2 Current ODALE STAR – (AIP DAP)

Chapter 5 Sydney (Kingsford Smith) Airport growth forecasts

Sydney (Kingsford Smith) Airport growth forecasts have been extracted from the current 2019 Airport Master Plan:

The forecasts were independently prepared for Sydney Airport Corporation Limited by a third party in consultation with major international, domestic and regional airlines, and airline associations.

Growth in total aircraft movements is expected to increase by around 17 per cent from 348,520 movements in 2017 to 408,260 in 2039, an annual increase of 0.7 per cent. Of that, Regular Public Transport (RPT) services are projected to be 382,305 in 2039, representing around 94 per cent of total air traffic movements. This reflects airline feedback and expectations on the continued up-gauging of aircraft and increases in seat density and load factors across the Sydney (Kingsford Smith) Airport route network. It is understood that all forecasts assume that from late 2026, the Sydney Basin's aviation demand will be served by 2 international airports – WSI and Sydney (Kingsford Smith) Airport.

Figure 5.1 shows the projected growth in aircraft movements for Sydney (Kingsford Smith) Airport as adapted from the 2019 Master Plan in the period from 2017 to 2039.

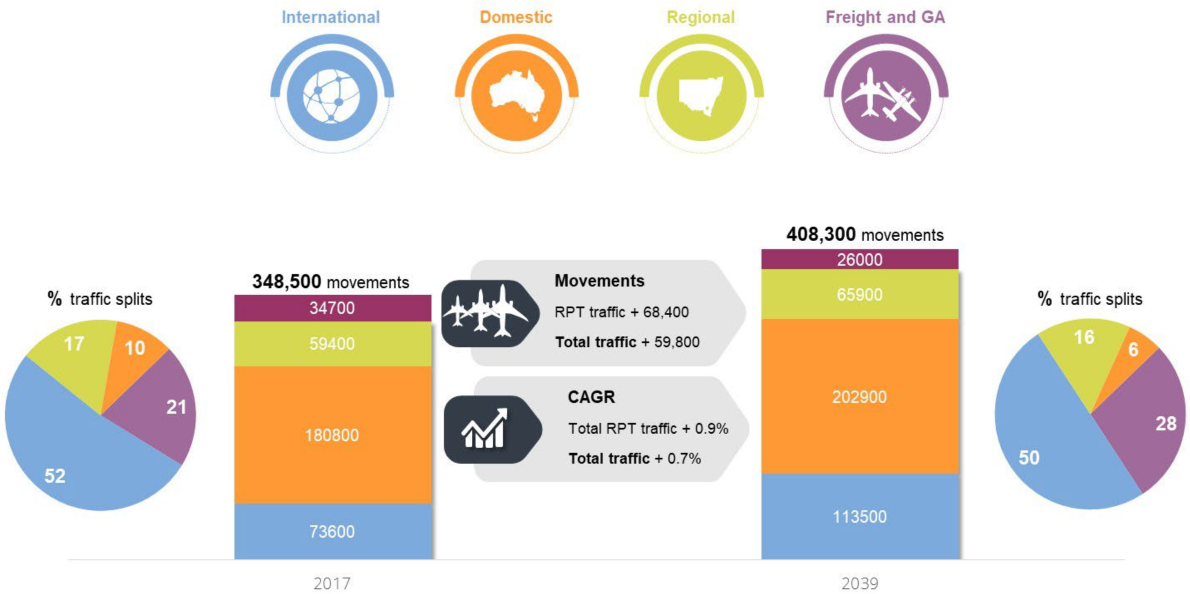

Figure 5.1 Sydney (Kingsford Smith) Airport aircraft movement growth forecast *(adapted from the 2019 Master Plan)*

In the absence of specific forecast growth data for arrival operations from the south and west to Sydney (Kingsford Smith) Airport, the generic annual growth percentages of less than one per cent presented in Figure 5.1 would be assumed to apply evenly across all the various operational sectors of at Sydney (Kingsford Smith) Airport.

Chapter 6 Proposed change to non-jet arrivals from the south and west – AKMIR STAR

Once introduced the AKMIR STAR to Sydney (Kingsford Smith) Airport will replace the current ODALE STAR with a similar aircraft mix and frequency as the current ODALE STAR. Enroute tracks will continue to connect to the STAR at waypoint AKMIR and aircraft will be required to maintain the lateral and vertical constraints of the STAR, except during hazardous weather (such as thunderstorms) or when the STAR is cancelled by air traffic control and aircraft are radar vectored.

To ensure safety assurance design principles are met on the southern departure SIDs from WSI, the AKMIR STAR to Sydney (Kingsford Smith) Airport can no longer be a straight line to the airport (like the existing ODALE STAR). It needs to be designed with a deviation to the south from the former ODALE flight path which at its extremity is around 3.2 nm (5.9 km) south of the existing ODALE STAR flight path.

This STAR procedure is described via a series of waypoints (refer to Figure 6.1). Several of these have new or amended vertical constraints.

New waypoint NB285 has a requirement for aircraft to be above 9,000 ft (2.7 km) but below 13,000 ft (4 km). This defined altitude window allows WSI southern departures to cross either under the AKMIR STAR arrivals at 8,000 ft or below, or over it by reaching 14,000 ft (4.3 km) or above before crossing the AKMIR STAR. NB279 will be a new waypoint on the southern SIDs from WSI and will have crossing altitude requirements as defined above as part of the WSI SID design.

Existing waypoint MITSA which is part of the new AKMIR STAR has a requirement for aircraft to be below 9,000 ft (2.7 km) as they cross it. This is 2,000 ft (610 m) higher than the current altitude requirement at MITSA on the ODALE STAR (refer to Figure 4.2) and represents a potential noise reduction on this proposed new STAR (the segment between waypoints AKMIR and MITSA) to Sydney (Kingsford Smith) Airport as this restriction now becomes the target altitude for pilots to plan a continuous descent from cruising level. The altitude window at waypoint NB285 is consistent with the altitude that will be flown at that point to allow a continuous descent to reach 9,000 ft (2.7 km) or below by waypoint MITSA. The new STAR will require aircraft to cross NB253 (a new waypoint near Long Point, after MITSA) at or below 7,000 ft to provide separation assurance with other converging arrivals to Sydney (Kingsford Smith) Airport.

From waypoint MITSA the AKMIR STAR re-joins the track alignment of the current ODALE STAR to Sydney (Kingsford Smith) Airport. The procedures of lateral tracking will be the same, and vertical profile under air traffic control direction will be similar as today for this section of the arrival procedure. After waypoint MITSA, arrival aircraft may be at a slightly higher altitude. Consistent with current arrivals on the ODALE STAR, after waypoint MITSA, air traffic control will provide descent clearance and radar vectoring to the Sydney (Kingsford Smith) Airport runway in use.

The proposed new waypoints (NB285, NB253, etc.) identified above have been allocated a temporary identifier which will be replaced by a conforming 5 letter alpha character designator as part of the detailed design phase and implementation of the proposed adjusted procedure.

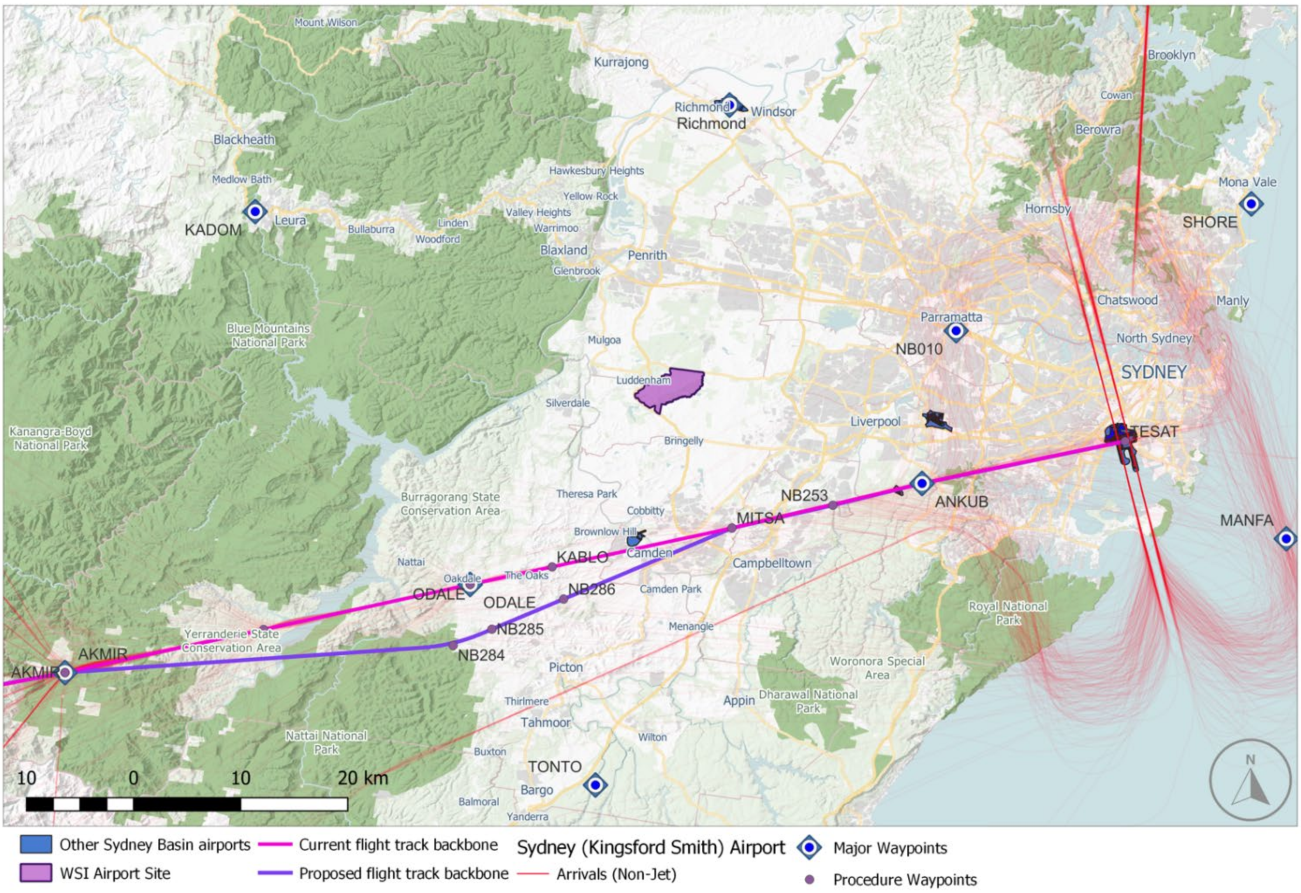

Figure 6.1 Current ODALE STAR and proposed AKMIR STAR backbone flight tracks to Sydney (Kingsford Smith) Airport – showing current arrival radar flight tracks

The nominal backbone flight track is used to identify either the centre of an existing flight path, or the designed nominal backbone flight track of a proposed SID or STAR. In the case of a current nominal backbone flight track, it is based on an average of current radar plotted flight tracks. In the case of a proposed new procedure design, the nominal backbone flight track will be primary track used to establish and ensure “Safety by Design” standards are met.

Flight path dispersion swathes show the actual or expected variation of flights when flying the procedure.

Flight path dispersion around an actual or proposed nominal backbone flight track will vary considerably where the designed nominal flight paths track via a fly-by waypoint. The amount of variation will depend on the angle of turn that the designed track is required to make at the waypoint.

Chapter 7 Aircraft noise impact assessment

The adjustment required to the current ODALE STAR is for a deviation to the south only for the segment between waypoints AKMIR (around 56 nm (104 km) to touchdown) and MITSA (around 21 nm (39 km) to touchdown). Arrival aircraft on this STAR prior to waypoint AKMIR and after waypoint MITSA and through to Sydney (Kingsford Smith) Airport will be consistent in lateral and vertical positioning with current operations for the same procedure segments on the ODALE STAR.

The aircraft noise assessment of the proposed changes to the ODALE / AKMIR STAR for arrivals from the south and west to all Sydney (Kingsford Smith) Airport runways considers that proposed change in isolation. The information presented in this chapter is targeted to describe the potential implications facilitated by the proposed individual procedure change only.

The predicted noise information and associated flight path corridors presented in Figures 7.1 to 7.3 are limited to overflight noise impacts associated with the adjustment required to the ODALE / AKMIR STAR only, and do not consider a cumulative impact and do not include other operations to or from Sydney (Kingsford Smith) Airport that may overfly that area.

For jet and non-jet arrivals, number above (N-above) contours representing the number of events with modelled noise levels of 60 A-weighted decibels (dB(A)) or louder (N60) and 70 dB(A) or louder (N70) do not extend from Sydney (Kingsford Smith) Airport to near waypoint MITSA and therefore have not been developed.

The aircraft noise assessment of the proposed changes to the current ODALE STAR and its proposed redesignation as the AKMIR STAR, to be used for both jet and non-jet arrivals (predominately non-jet) from southern and western origins to all Sydney (Kingsford Smith) Airport runways is therefore based on extracting expected overflight noise levels from a suitable representative selection of jet and non-jet Noise-Power-Distance (NPD) data interpolated from NPD curves developed utilising the Aviation Environment Design Tool (AEDT). Waypoint ODALE will no longer be on the adjusted procedure.

The aircraft noise modelling and analysis has used the AEDT, an internationally recognised aircraft noise and emissions calculation program developed by the United States Federal Aviation Administration (US FAA). Version 3e of the AEDT software was used for this assessment.

Noise modelling was based on the flight movements of the busiest day in 2019 for Runway 34L operations. As such, the results generated in the following analysis should be considered a “worst case” scenario, as an average or typical day of operations will have a reduced number of flights on each particular runway direction and individual STAR procedure utilisation and be subjected to runway direction changes to respond to weather influences.

Based on the analysis of 2019 aircraft movement data, a representative busy weekday would be expected to have around 60 non-jet and 3 jet arrival flights on the adjusted STAR. The application of the forecast growth rates for movements of around one percent would see only slight increases in these flight numbers over the initial 5 years of WSI operations.

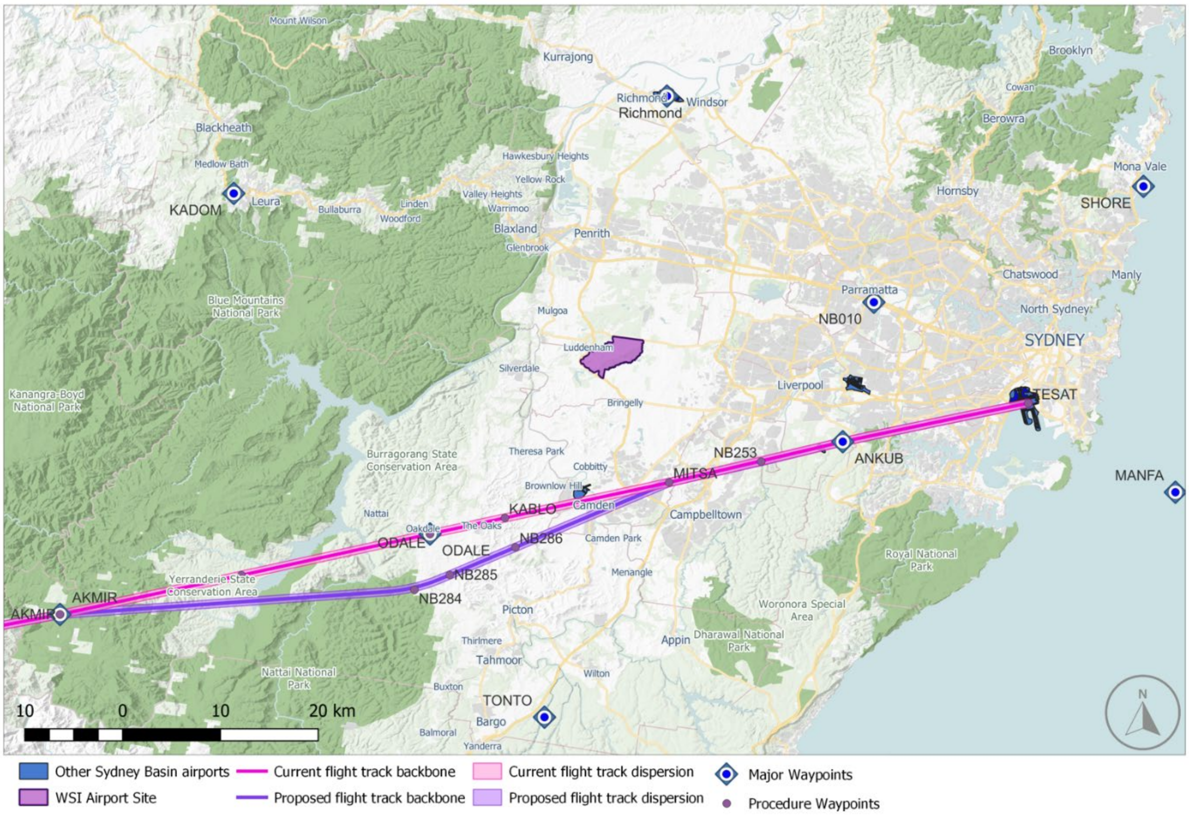

Figure 7.1 Current ODALE STAR and proposed AKMIR STAR – current and proposed flight track dispersion

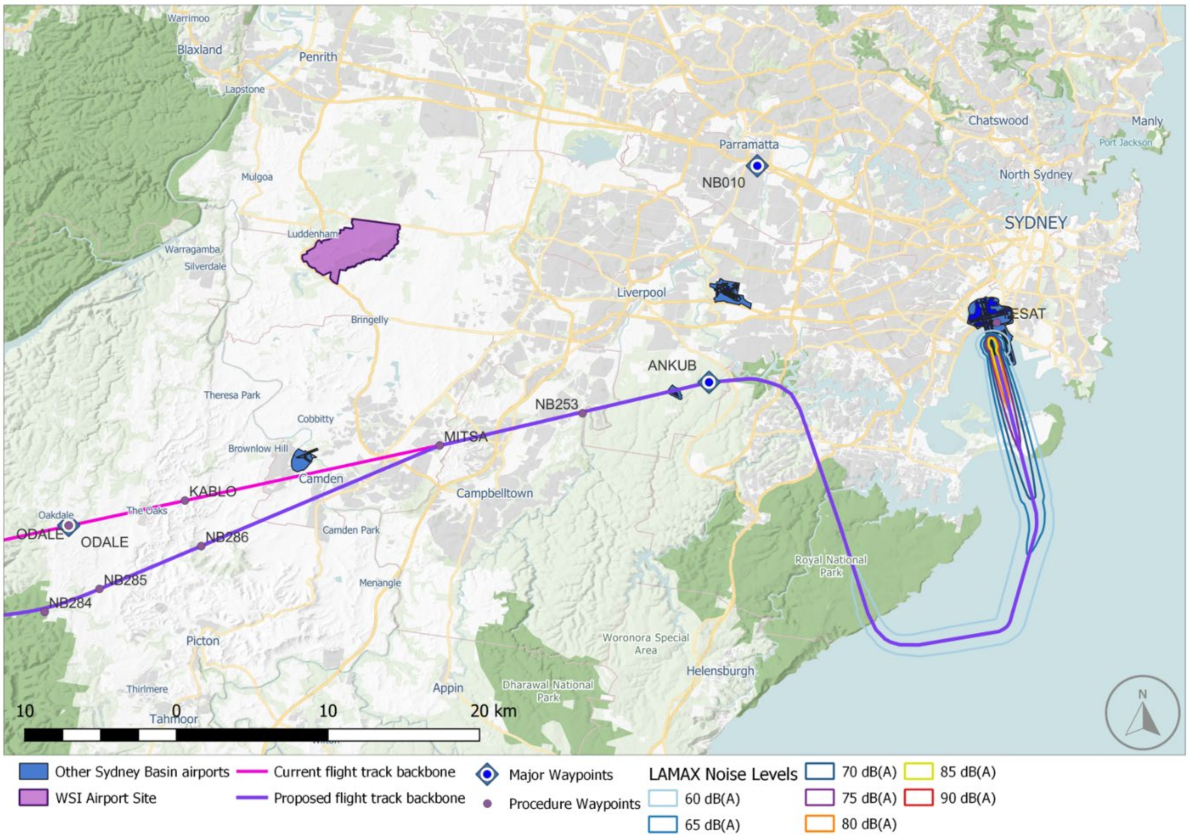

Figure 7.2 Proposed AKMIR STAR – L_{Amax} contours for an Airbus A330-300 arrival

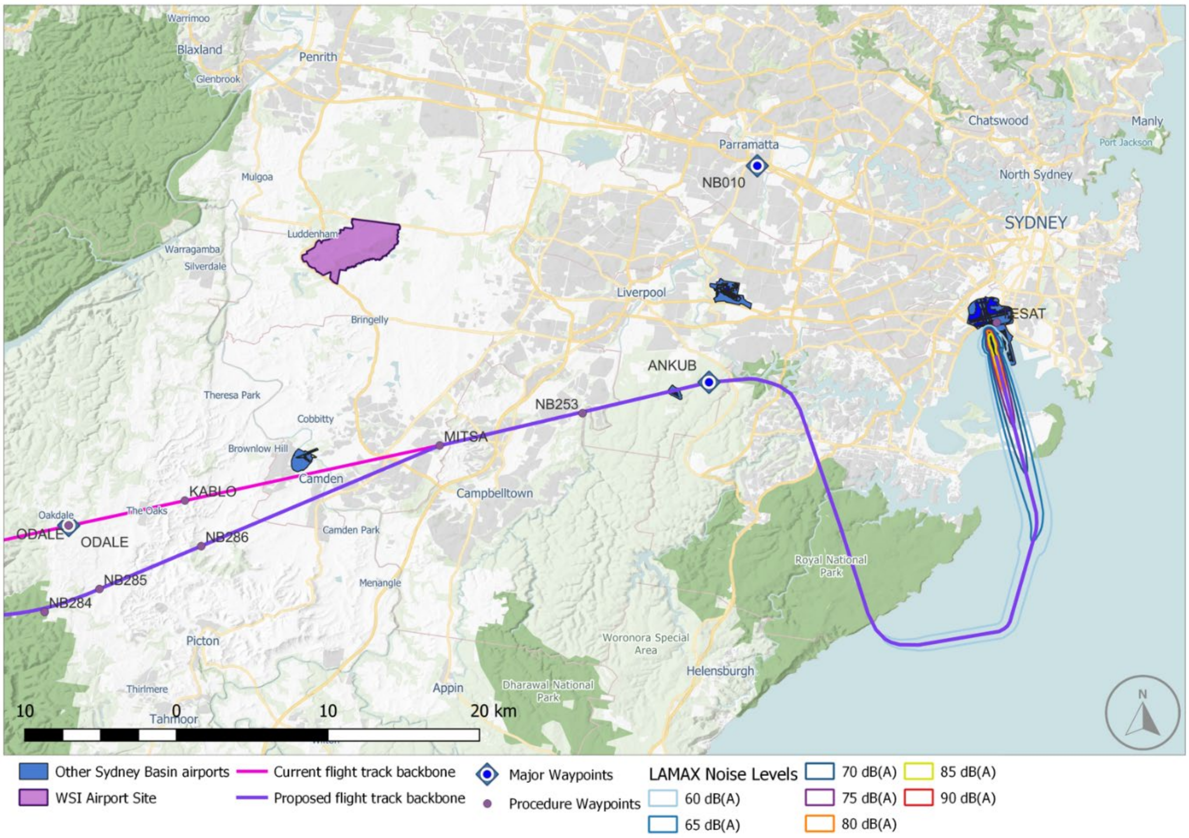

Figure 7.3 Proposed AKMIR STAR – L_{Amax} contours for Boeing 737-800 arrival

Figures 7.2 and 7.3 are single event L_{Amax} contours for a representative wide-body and narrow-body jet arrival on the proposed AKMIR STAR. They are presented in this Appendix to confirm that the 60 dB(A) overflight noise levels fall well past of the proposed adjusted segment of the procedure – flights over the areas within the extent of the 60 dB(A) L_{Amax} contour will be consistent with the current STAR procedure. This negates the application of N-above metrics to assess the noise implications of the change to the STAR procedure.

L_{Amax} is the measure of the maximum perceived sound from an overflying aircraft. For further explanation on L_{Amax} contours refer to Technical paper 1: Aircraft noise.

The application of NPD data for the analysis of the proposed changes to the AKMIR STAR for jet and non-jet arrivals from the south and west to Sydney (Kingsford Smith) Airport is considered the best available representation of potential impacts. Table 7.1 presents the expected overflight noise levels at the start, mid-point, and end of the adjusted STAR segment in dB(A). Outcomes of this analysis must be heavily qualified due to the variability associated with noise generation from variations of even the same aircraft type, varying pilot technique and variations in meteorological conditions. Overflight noise levels will also vary with respect to the lateral offset positioning of the at-ground receptor to the aircraft operating above.

Table 7.1 Predicted average overflight noise levels in dB(A) for Arrival Descent

Aircraft	Waypoint AKMIR	Waypoint NB285	Waypoint MITSA
Altitude	Jets/turbo-prop 19,000 ft (descent) Turbo-prop - 16,000 ft (cruise)	11,000 ft	9,000 ft
B777-300 – Wide-body twin-jet	47 dB(A)	53 dB(A)	57 dB(A)
Boeing 737-800 – Narrow-body twin-jet	43 dB(A)	46 dB(A)	49 dB(A)
Saab 340 – Regional twin turbo-prop	39 dB(A)	44 dB(A)	47 dB(A)

The dB(A) values presented in Table 7.1 should be considered as a median value of a range of plus or minus 3 dB(A) – i.e., 50 dB(A) would indicate potential overflight noise of between 47 and 53 dB(A).

The limited number of jet aircraft (around 3 per day) arriving to Sydney (Kingsford Smith) Airport via the AKMIR STAR are expected to be at a similar altitude as non-jet aircraft when overhead waypoint AKMIR.

Figure 7.4 presents the current and adjusted AKMIR STAR with the expected flight track dispersion with a suburb name and boundary overlay.

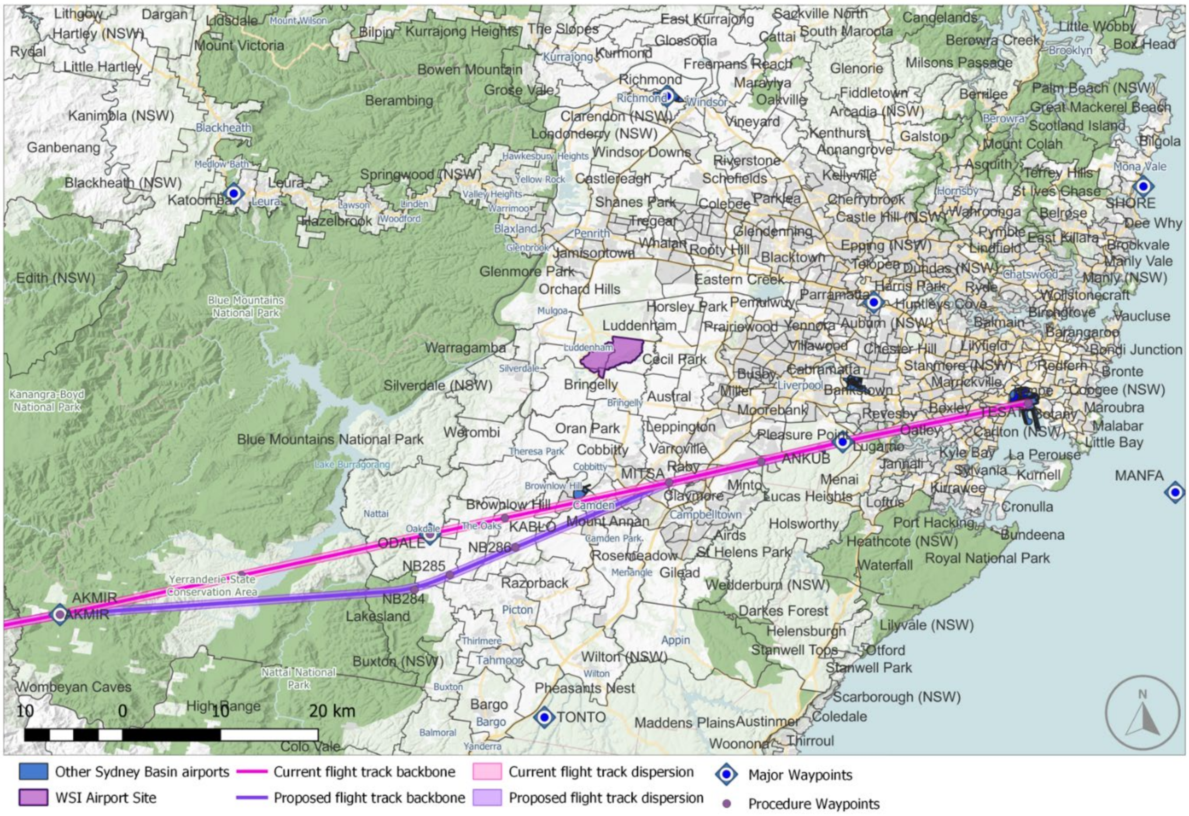

Figure 7.4 Suburb overlay – current ODALE STAR and proposed AKMIR STAR

Chapter 8 Other environmental factors

8.1 Visual amenity

As a “Safety by Design” replacement for the current ODALE STAR, the proposed new AKMIR STAR flight path and altitude requirements are described in Chapter 6. The noise assessment of the proposed new AKMIR STAR is detailed in Chapter 7.

The proposed new AKMIR STAR is used only by non-jet aircraft for arrivals from the south and west to all Sydney (Kingsford Smith) Airport runway modes during normal operations between 6 am and 11 pm (local time).

Due to the lateral difference between the current ODALE STAR and the proposed AKMIR STAR, (refer to Figure 6.1) the non-jet aircraft (predominantly turbo-prop aircraft) that are currently visible between waypoints AKMIR and MITSA on the ODALE STAR flight path will no longer be as visible in that piece of airspace. Aircraft operating to and from Bankstown and Camden Airports will still be visible in this area.

The proposed AKMIR STAR has a flight path corridor between waypoints AKMIR and MITSA which at its maximum is around 3.2 nm (5.9 km) south of the current ODALE STAR flight path. Non-jet aircraft on descent above 9,000 ft using this flight path will be newly visible from the ground. Due to a lifting of the altitude requirement on the AKMIR STAR by 2,000 ft (refer to Chapter 6) while visible, aircraft will be perceptibly higher than non-jet aircraft at a similar distance from Sydney (Kingsford Smith) Airport on the current ODALE STAR.

8.2 Radar vectoring

In locations where no SIDs or STARs are available for an aircraft's particular operation, or where adverse weather requires the cancellation of a SID or STAR for safety reasons, air traffic control will provide radar vectoring to safely manage those applicable operating aircraft. Radar vectoring involves air traffic control determining a safe path for all aircraft and issuing heading and sometimes altitude and speed instructions to one or more aircraft to avoid any possible conflictions. While the objective of a set of SIDs and STARs in terminal airspace designed under “Safety by Design” principles is for onboard flight management systems monitored by air traffic control to ensure aircraft remain separated, there are occasions where SIDs and STARs are cancelled for varied reasons and aircraft are radar vectored.

A cancellation of a SID or STAR resulting in radar vectoring involving a departure from lateral track, could also involve a variation in vertical profile or speed requirements and may be either at pilot request or initiated by air traffic control.

Pilot requests in all instances are subject to air traffic control approval. Avoidance of thunderstorms which has a safety priority is readily approved. Direct routing requests will be considered by air traffic control in light of safety and overall management of other aircraft within the vicinity.

A pilot can request cancellation of a STAR for reasons of weather avoidance or to enter a holding pattern to address an equipment malfunction.

Air traffic control will cancel a STAR when an alternate track or vertical profile is required by one or more aircraft to maintain the optimum landing sequence at the airport. Up to a point, speed adjustment can also be made within the lateral or vertical profile of a STAR.

In low arrival demand conditions air traffic control will occasionally cancel a STAR to reduce track miles and CO_2 emissions if a shorter arrival route is available.

In the case of the proposed AKMIR STAR the main reason for radar vectoring off the STAR will be to ensure that the arrival sequence to Sydney (Kingsford Smith) Airport is optimised to meet the available runway operating mode capacity. As is the case with the current ODALE STAR, all aircraft arriving via the AKMIR STAR will be radar vectored to their final approach. This vectoring normally commences after waypoint MITSA.

Aircraft may also be radar vectored for safety and hazardous weather (such as thunderstorms) avoidance reasons but vectoring for track shortening other than to optimise an arrival sequence is less likely.

8.3 Track distances and emissions

The proposed "Safety by Design" deviation of the proposed AKMIR STAR from the current ODALE STAR represents an increased arrival distance of approximately 1 nm or 2 km. A representative non-jet aircraft type, the Dash-8 400 operating a 250 nm (463 km) regional route – Coffs Harbour to Sydney, is projected to use an extra 5.5 kilograms (kg) of fuel emitting approximately 17.3 kg of CO_2 per movement.

A representative jet aircraft type, the Boeing 737-800 operating on an 1,800 nm (3,300 km) interstate route – Perth to Sydney, is projected to use an extra 7 kg of fuel emitting approximately 22 kg of CO_2 per movement.

Chapter 9 Conclusion

The proposed adjustment of the ODALE Star and its replacement with the AKMIR STAR is required to provide "Safety by Design" separation between WSI southern departures and jet and non-jet arrivals to all Sydney (Kingsford Smith) Airport runways from the south and west. The existing ODALE STAR flight path does not provide sufficient space for jet aircraft departing WSI to climb above the jet and non-jet arrivals to Sydney (Kingsford Smith) Airport. Providing space for WSI departures to climb above the jet and non-jets arriving at Sydney (Kingsford Smith) Airport from the south and west and allows those WSI jet operations to maintain a fuel-efficient continuous climb operation (CCO) on the southern WSI SID.

By displacing the AKMIR STAR flight path up to 3.2 nm (5.9 km) south of the existing ODALE STAR a new area will be overflown by non-jet aircraft and the very limited number of jets that utilise the STAR. The new AKMIR STAR flight path re-joins the existing ODALE STAR flight path at waypoint MITSA, from where current procedures will be maintained to land on all the Sydney (Kingsford Smith) Airport runways.

The proposed AKMIR STAR is designed to allow both jet and non-jet aircraft to undertake a fuel-efficient continuous descent operation (CDO) from cruise level to the new 2,000 ft (610 m) higher target descent altitude of 9,000 ft (2.7 km) at waypoint MITSA.

N-above noise contours (N60 and N70) are not meaningful at altitudes above 9,000 ft for jet and non-jet aircraft as the noise levels associated with overflight at these altitudes are well below 60 and 70 dB(A). To give some indication of expected noise levels on this proposed modified STAR, NPD curve information is provided for an indicative jet and non-jet turbo-prop aircraft.

Given the area overflown by the proposed adjusted STAR is relatively close to the area currently frequently overflown with similar aircraft undertaking both IFR and VFR flights, and the predicted utilisation of the AKMIR STAR by up to 60 flights/day, it can be expected that there will be little or no material change over today’s operations.

Appendix F

Royal Australian Air Force (RAAF) Base Richmond proposed SID and STARs

Western Sydney International (Nancy-Bird Walton) Airport – Airspace and flight path design | Environmental Impact Statement

Technical paper 13: Facilitated changes

Appendix F – Royal Australian Air Force (RAAF) Base Richmond Proposed SID and STARs

October 2024


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Terms and abbreviations

Terms/abbreviation	Definition
ACP	Airspace Change Proposal
AEDT	Aviation Environmental Design Tool (US FAA)
AIP	Aeronautical Information Package (Australia)
AIRAC	Aeronautical Information Regulation and Control (Australian AIP)
ARP	Aerodrome Reference Point (ICAO)
BANMP	Base Aircraft Noise Management Plan (RAAF Base Richmond Airport)
CASA	Civil Aviation Safety Authority (Australia)
CDO	Continuous Descent Operation
CO_2	Carbon dioxide (a greenhouse gas)
CTA	Control area (3-dimensional airspace boundary)
CTAF	Common Traffic Area Frequency
CTR	Control zone (3-dimensional airspace boundary)
DAP	Departure and Approach Procedures (Australia AIP)
dB(A)	A-weighted decibel (noise level)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Australian Government)
DITRDCA	Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Australian Government)
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation 1999* (Cth)
FAA	Federal Aviation Administration (United States)
ft	Feet (unit of distance or height equivalent to 0.3048 m)
GA	General Aviation
IAF	Initial Approach Fix
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
km	kilometres (unit of distance equivalent to 1,000 m)
LL	Lower Level (altitude for transit flights through Sydney Basin airspace)
LSALT	Lowest Safe Altitude

Terms/abbreviation	Definition
m	metre (unit of distance or height equivalent to 3.281 ft)
MNES	Matters of National Environmental Significance (EPBC Act) (Cth)
N60/N70	Number above (N-above noise metric)
NDB	Non-Directional Beacon
NFPMS	National Flight Path Monitoring System (Airservices database)
nm	nautical mile (unit of distance equivalent of 1.852 km)
NPD	Noise-Power-Distance (noise curve charts)
NSR	Noise Sensitive Receiver
NSW	New South Wales (state of Australia)
PAAM	Plan for Aviation Airspace Management
PBN	Performance Based Navigation
PMST	Protected Matters Search Tool (DCCEEW)
RAAF	Royal Australian Air Force
RNP	Required Navigation Performance
SARP	Standards and Recommended Practices (ICAO)
SID	Standard Instrument Departure
STAR	Standard Instrument Arrival
TCU	Terminal Control Unit (Sydney Basin air traffic control, Airservices)
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WSI	Western Sydney International (Nancy-Bird Walton) Airport

Chapter 1 Introduction

Although aircraft differ in operation, type, altitude, noise level and frequency, most areas of the Sydney Basin are overflown at some stage as shown in Figure 1.1.

The introduction of new flight paths to be used by aircraft into and out of Western Sydney International (Nancy-Bird Walton) Airport (WSI) has considered a multitude of options to minimise any adjustments required to existing flight paths in the Sydney Basin airspace. Single runway operations at WSI require adjustments to Sydney Basin operations prior to opening in 2026 to facilitate its flight paths and airspace structure. Those facilitated airspace changes include the development of, or adjustments to:

- Sydney (Kingsford Smith) Airport Runway 25 Standard Instrument Departures (SIDs) to the west, north-west, north and east – (Appendix A)
- Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs to the south, west, north, and east – (Appendix B)
- Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID to the west and north-west – (Appendix C)
- Sydney (Kingsford Smith) Airport non-jet SID to the west or north-west – (Appendix D)
- Sydney (Kingsford Smith) Airport AKMIR Standard Instrument Arrival (STAR) jet and non-jets from the south and west – (Appendix E)
- **Royal Australian Air Force (RAAF) Base Richmond SID and STARs – (Appendix F) – this Appendix**
- Bankstown Airport SID and STARs – (Appendix G)
- Camden Airport STARs – (Appendix H)
- Sydney Basin Visual Flight Rules (VFR) operations – (Appendix I)
- Miscellaneous and Minor procedure adjustments – (Appendix J)
  - Sydney (Kingsford Smith) Airport BOREE STAR
  - Sydney (Kingsford Smith) Airport RIVET STAR
  - Sydney (Kingsford Smith) Airport Runway 07 Initial Approach Fix (IAF)
  - Sydney (Kingsford Smith) Airport Runway 07 SID
  - Sydney Basin low altitude transit flight routes.

This Appendix – Appendix F, presents an assessment of the proposed introduction at RAAF Base Richmond of a new SID and new STARs prior to the opening of WSI in 2026 to facilitate its flight paths and airspace structure.

The design process for the safe and efficient integration of WSI's new flight paths into the existing Sydney Basin airspace has been one of adopting "Safety by Design" principles to deliver the highest level of safety separation assurance in conformance with rules set by the Civil Aviation Safety Authority (CASA). This is to enable aircraft to operate safely within their performance envelope into an already complex airspace structure. "Safety by Design" ensures that aircraft are separated from each other according to the flight routes and the type of air traffic service being provided. As such, this requires the new or amended SIDs and STARs and altitudes to be published and then downloaded into the cockpit flight management systems of all aircraft. At the same time the same information must be downloaded into the software of the surveillance systems used by air traffic control to manage and monitor the safe separation of all controlled aircraft.

The preliminary airspace design process has appropriately accorded "safety" as the highest priority to ensure robust operational safety outcomes. Environmental outcomes, with a particular focus on the minimisation of potential community impacts and the operational efficiency of the facilitated airspace changes has also been a key design criterion.

Instrument Flight Rules (IFR) are the rules that govern the operation of aircraft in Instrument Meteorological Conditions (IMC) (conditions in which flight In IMC, an aircraft must be flown with reference to its onboard flight instruments.) Two sets of rules, IFR or Visual Flight Rules (VFR) exist to govern flight in either IMC or Visual Meteorological Conditions (VMC).

The proposed new SID and STARs at RAAF Base Richmond presented in this Appendix have been designed to be flown under IFR to ensure "Safety by Design" is embedded in these proposed new procedures and to allow continued operations in all weather conditions. Aircraft flying to IFR standards and rules can operate in either IMC or VMC, but aircraft flying to VFR standards and rules can only operate in VMC.

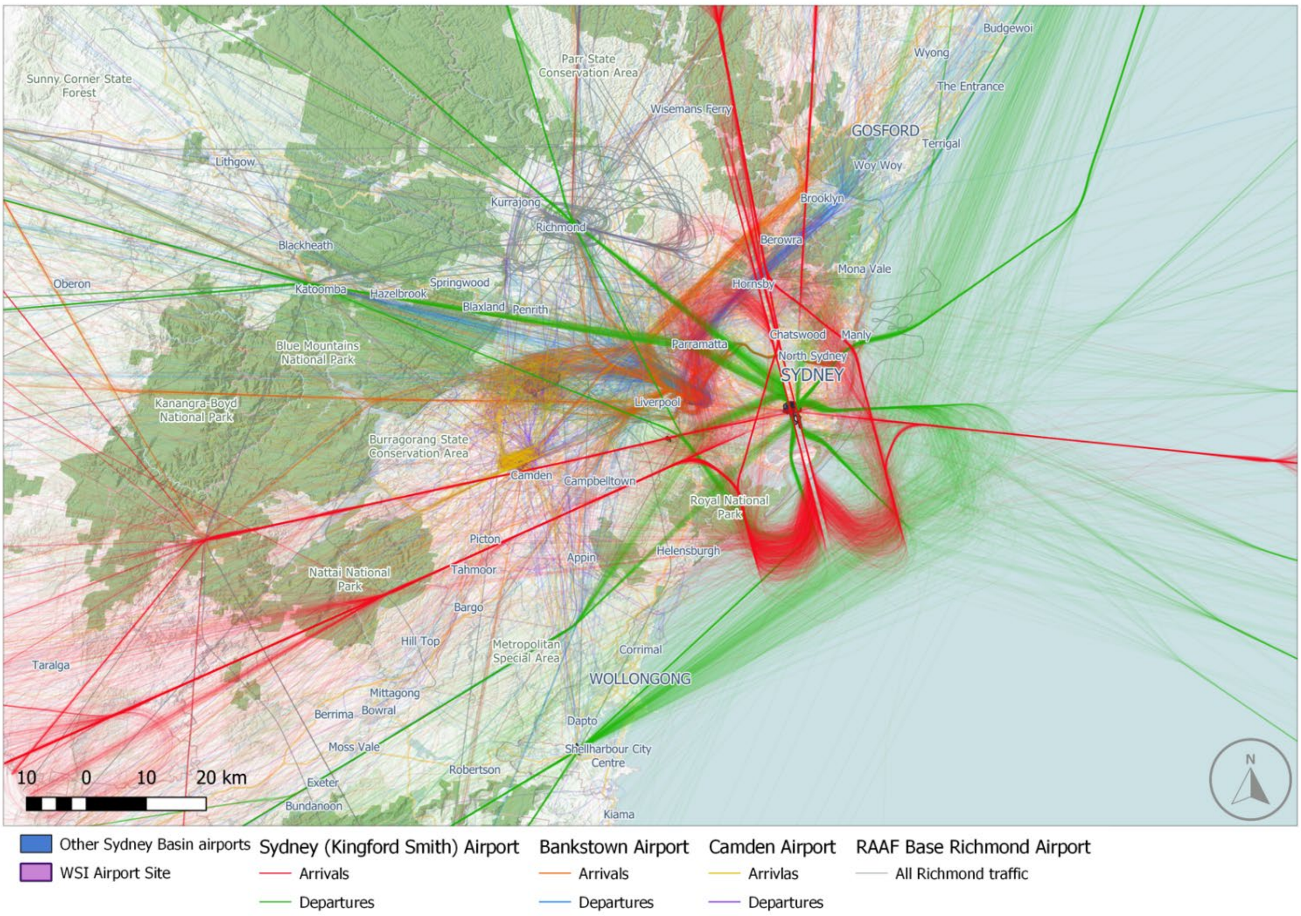


Figure 1.1 Sydney Basin airspace with one-week of flight track movement activity in March 2019

Chapter 2 Background

RAAF Base Richmond is a defence force facility situated 34 kilometres (km) north of WSI. It is the home of the Air Mobility Group and supports locally based C130J and C27J aircraft as well as visiting aircraft. RAAF Base Richmond's runway is available 24-hours, 7 days a week (24/7). Wherever possible, subject to operational necessity, RAAF Base Richmond observes a local noise curfew period between 11 pm and 7 am (local time).

Aircraft arrive from and depart to many Australian military bases and also civil domestic and international destinations. Some of these aircraft are currently processed by air traffic control through the airspace soon to be required for WSI operations. To ensure future separation between RAAF Base Richmond operations and WSI operations and operations in the Sydney Basin airspace a proposed new SID that caters for eastern and some southern departures will be introduced. Several proposed new STARs specific to RAAF Base Richmond operations have also been designed for implementation.

The new SID and STARS required for RAAF Base Richmond will need to be published and implemented prior to the operation of WSI in 2026. The proposed new SID and STARs would be introduced in 2026 on a scheduled Aeronautical Information Regulation and Control (AIRAC) date, prior to the opening of WSI. Introducing these changes ahead of WSI's opening will allow pilots and air traffic control to adjust their systems and become familiar with changes to current procedures before single runway operations at WSI commence and will minimise the likelihood of conflicts or incidents in the airspace.

Figure 2.1 shows the location of WSI, the locations of other key airports in the Sydney Basin and the geographic extent of a nominal area radiating 45 nautical miles (nm) or around 83 km from the Aerodrome Reference Point (ARP) of WSI.

Figure 2.2 is the Aerodrome Chart for RAAF Base Richmond. The chart has been extracted from the Aeronautical Information Package (AIP) Departure and Approach Procedures (DAP) to assist the interpretation of the information presented in this Appendix. It depicts the general layout of RAAF Base Richmond including its runway system and orientation, runway headings (10 and 28) and dimensions (length and width).

Figure 2.1 Location of airports in the Sydney Basin

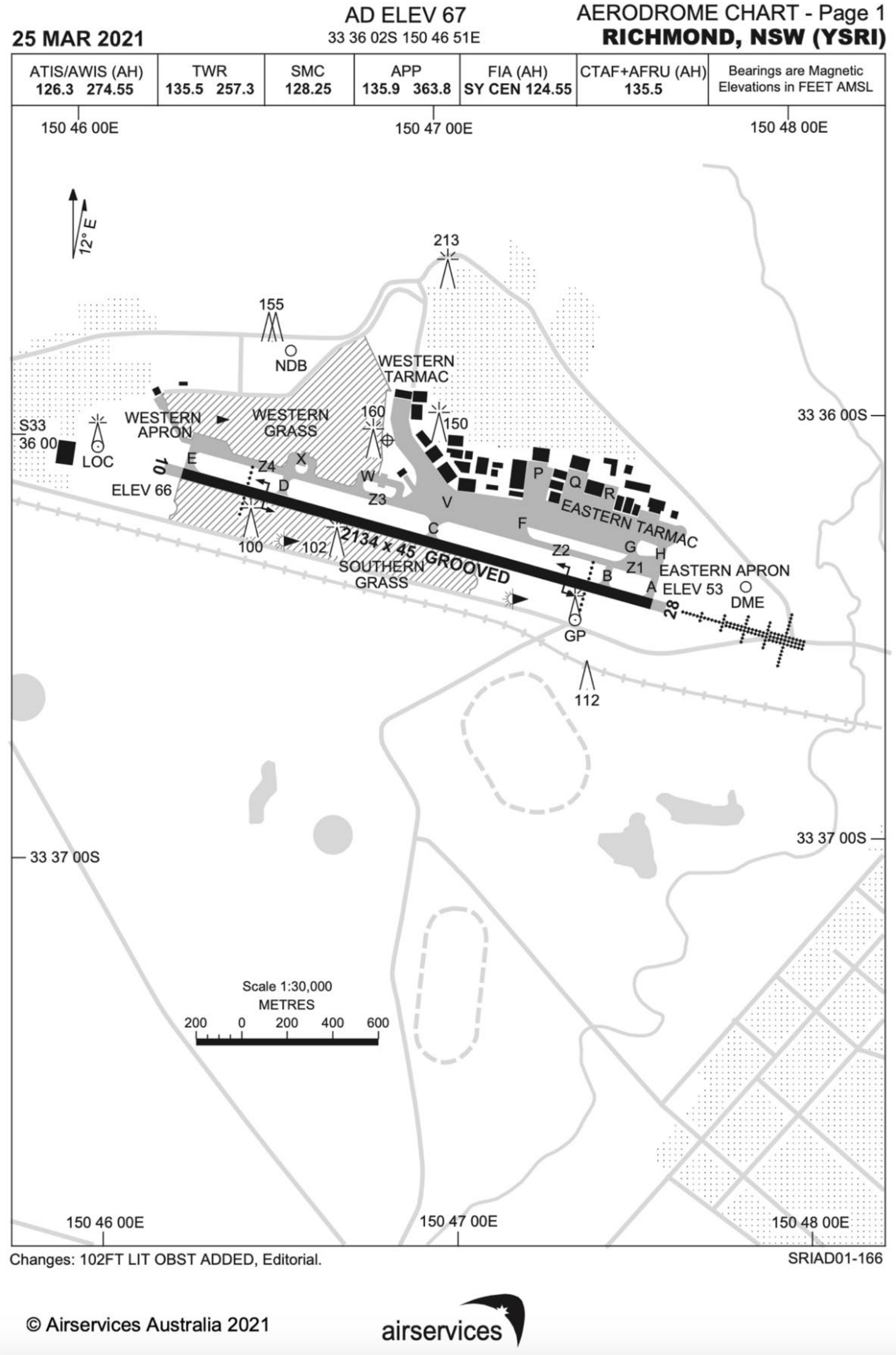


Figure 2.2 RAAF Base Richmond – Aerodrome Chart (AIP / DAP)

Chapter 3 Purpose

The purpose of this Appendix is to present an environmental assessment of the proposed introduction of a SID and STARs to RAAF Base Richmond as part of the introduction of WSI's new flight paths and airspace containment requirements. It includes analysis and an assessment of potential noise impacts from aircraft overflights of these facilitated airspace changes.

It describes the reason for the facilitated airspace changes and the associated safety and operational considerations, along with other environmental issues.

Chapter 4 Current operations at RAAF Base Richmond

The average number of military aircraft movements at RAAF Base Richmond is approximately 100 per week.
The New South Wales (NSW) Rural Fire Service which also operates out of RAAF Base Richmond is under heightened operations during the Bush Fire Danger Period between 1 October and 31 March each year, with reduced operations during the April to September period.

Air Force aircraft permanently based at RAAF Base Richmond include:

- Lockheed C-130J-30, 4 engine turboprop transport aircraft (37SQN)
- Diamond DA40NG single engine propeller aircraft (AAFC).

Non-Air Force aircraft permanently based at RAAF Base Richmond are:

- one NSW RFS B737 LAT
- 2 NSW RFS Cessna Citation.

The most likely variation to standard flying operations at RAAF Base Richmond is visiting aircraft from other bases. The Department of Defence (Defence) has an extensive range of aircraft with differing engine configurations including:

- KC-30A – 2 turbofan engines
- F-35A – single jet engine
- F/A-18F Super Hornet – twin jet engine
- EA-18G Growler – twin jet engine
- C-17A Globemaster III – 4 turbofan engines
- B737 Boeing Business Jet – 2 turbofan engines
- C-27J Spartan – 2 turbo-prop engines
- Falcon 7X – 3 turbofan engines
- P-8A Poseidon – 2 turbofan engines
- B350 King Air – 2 turbo-prop engines
- Various single and multi-rotor aircraft (helicopters) – single and twin turboshaft engines
- Visiting aircraft types from international Defence Forces.

No growth and fleet mix projections for operations at RAAF Base Richmond have been made available to incorporate into this assessment.

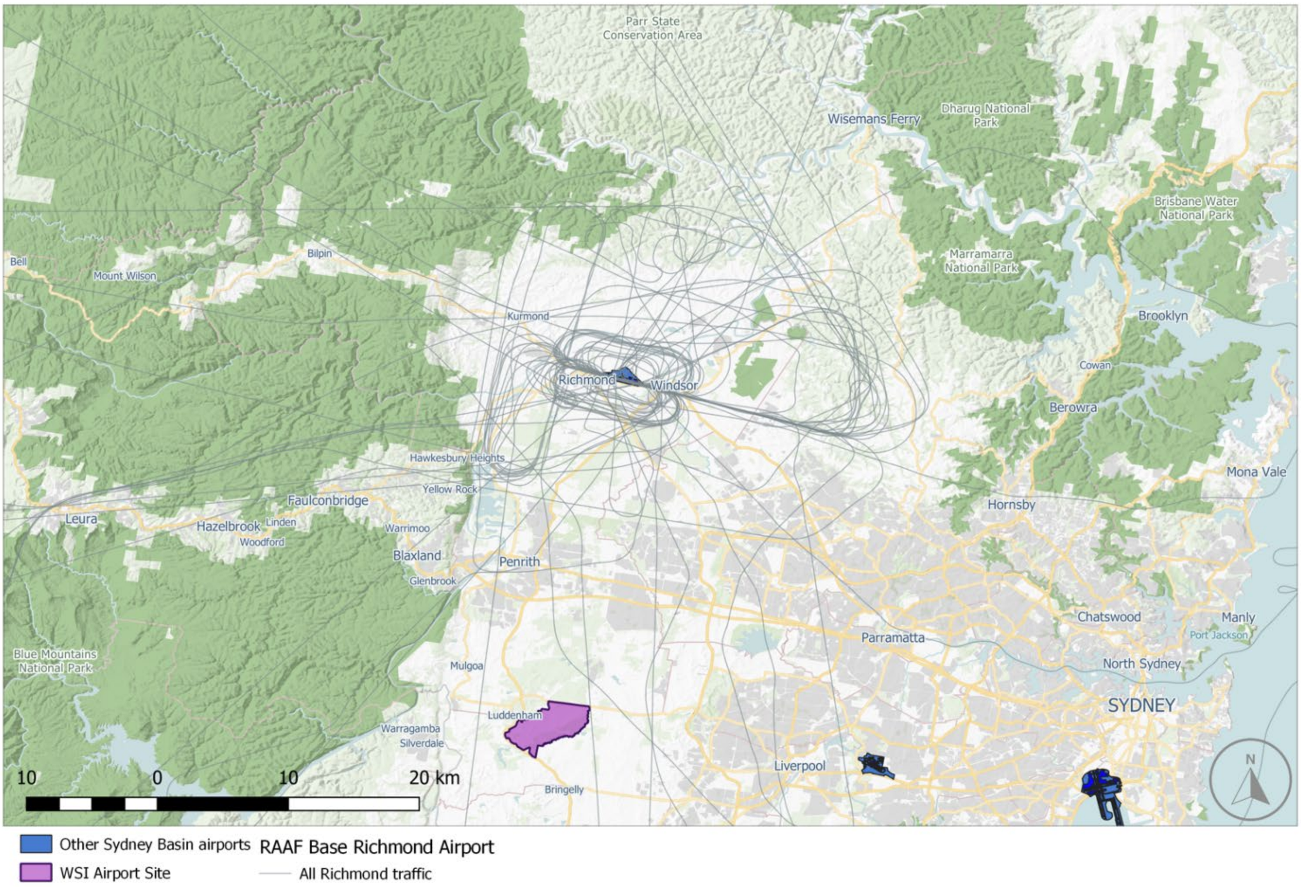


Figure 4.1 Current IFR flight path movement activity for RAAF Base Richmond airspace for one-week in 2019

4.1 Current departure operations

Departures and local circuit training flights are initially controlled by RAAF air traffic control at RAAF Base Richmond. If a departing aircraft plans to remain at low altitude in the airport circuit or directly to the surrounding uncontrolled airspace, RAAF air traffic control will manage the VFR clearance in accordance with the pilot's requirements. These flights are tactical in nature and have no published flight paths.

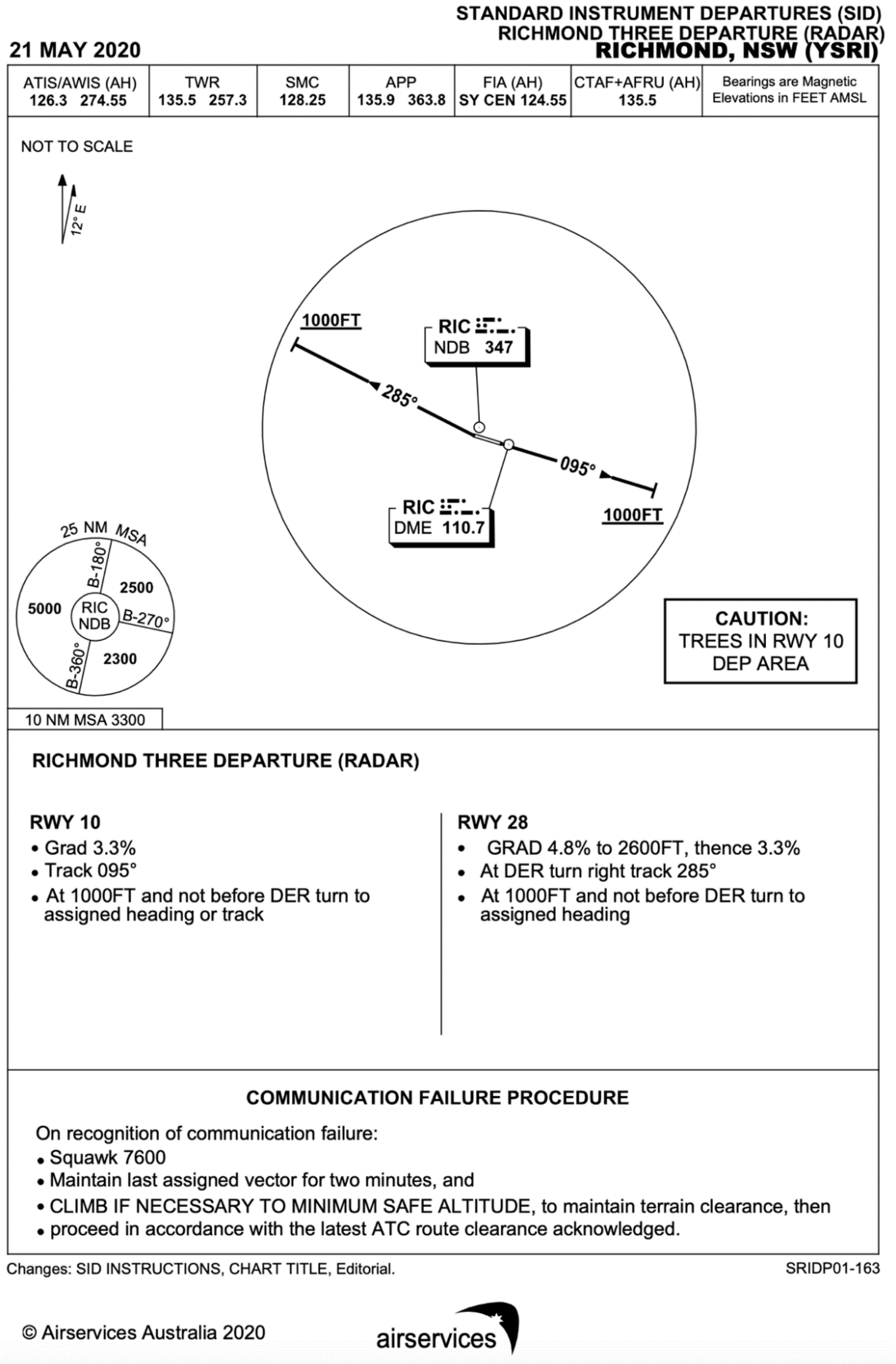
If the aircraft plans to operate its flight in the controlled airspace above the aerodrome circuit altitude, then a departure clearance will be coordinated by RAAF Base Richmond air traffic control with Sydney Terminal Control Unit (TCU) air traffic control (Airservices Australia).

Normally, aircraft operating under IFR will be allocated the Richmond Departure (Radar) SID (refer to Figure 4.2 below). This SID stipulates a track to be flown from either end of Runway 10/28, which is basically the extended runway alignment, until the aircraft reaches 1,000 feet (ft) (300 m), at which point it will turn to its assigned heading. It will then subsequently either be cleared to track directly to an enroute waypoint or be safely separated with other Sydney Basin aircraft by radar vectoring until a clearance to an enroute waypoint is possible.

Outside of the hours of operation of RAAF Base Richmond air traffic control, departing aircraft will directly contact Sydney TCU air traffic control to arrange a clearance into the overlying controlled airspace. These flights normally position close to the aerodrome to intercept a route directly from RIC (Richmond Non-Directional Beacon (NDB)) to their enroute waypoint.

Defence publish a number of legacy (pre-Performance Based Navigation (PBN)) procedural SIDs that are very occasionally used on pilot request for military destinations to the north, south-west and north-west.

Additional departure procedures are used for tactical formation flights. These are practically identical to radar vectored departures.


STANDARD INSTRUMENT DEPARTURES (SID)
RICHMOND THREE DEPARTURE (RADAR)
RICHMOND, NSW (YSRI)

21 MAY 2020

ATIS/AWIS (AH)	TWR	SMC	APP	FIA (AH)	CTAF+AFRU (AH)	Bearings are Magnetic Elevations in FEET AMSL
126.3 274.55	135.5 257.3	128.25	135.9 363.8	SY CEN 124.55	135.5	

RICHMOND THREE DEPARTURE (RADAR)

RWY 10
- Grad 3.3%
- Track 095°
- At 1000FT and not before DER turn to assigned heading or track

RWY 28
- GRAD 4.8% to 2600FT, thence 3.3%
- At DER turn right track 285°
- At 1000FT and not before DER turn to assigned heading

COMMUNICATION FAILURE PROCEDURE

On recognition of communication failure:
- Squawk 7600
- Maintain last assigned vector for two minutes, and
- CLIMB IF NECESSARY TO MINIMUM SAFE ALTITUDE, to maintain terrain clearance, then
- proceed in accordance with the latest ATC route clearance acknowledged.

Changes: SID INSTRUCTIONS, CHART TITLE, Editorial.   SRIDP01-163

Figure 4.2 RAAF Base Richmond – current SID procedure (AIP DAP)

4.2 Current arrival operations

IFR arrivals from all directions currently flight plan to fly directly to the Richmond NDB – RIC. Several options are then available to make an approach to either runway threshold.

In visual conditions, aircraft may opt for a visual approach subject to air traffic control approval.

In IMC conditions, aircraft operating under the IFR will be radar vectored to the following approach options:

- Runway 10 – TACAN Runway 10 (available to military aircraft only) (refer to Figure 4.5)
- Runway 10 - RNP (available to military aircraft only) (refer to Figure 4.7)
- Runway 28 - TACAN Runway 28 (available to military aircraft only) (refer to Figure 4.4)
- Runway 28 - RNP (available to military aircraft only) (refer to Figure 4.6)
- Runway 28 – ILS (available to military and civil aircraft) (refer to Figure 4.3 and Figure 4.8).

To enable aircraft to undertake any of the above approaches air traffic control will radar vector the aircraft from a position on its descent track to the starting point required by the appropriate approach requirement. Subject to local traffic requirements and pilot requests for training purposes, holding patterns associated with these approaches can also be used at levels above 2,500 ft (760 m).

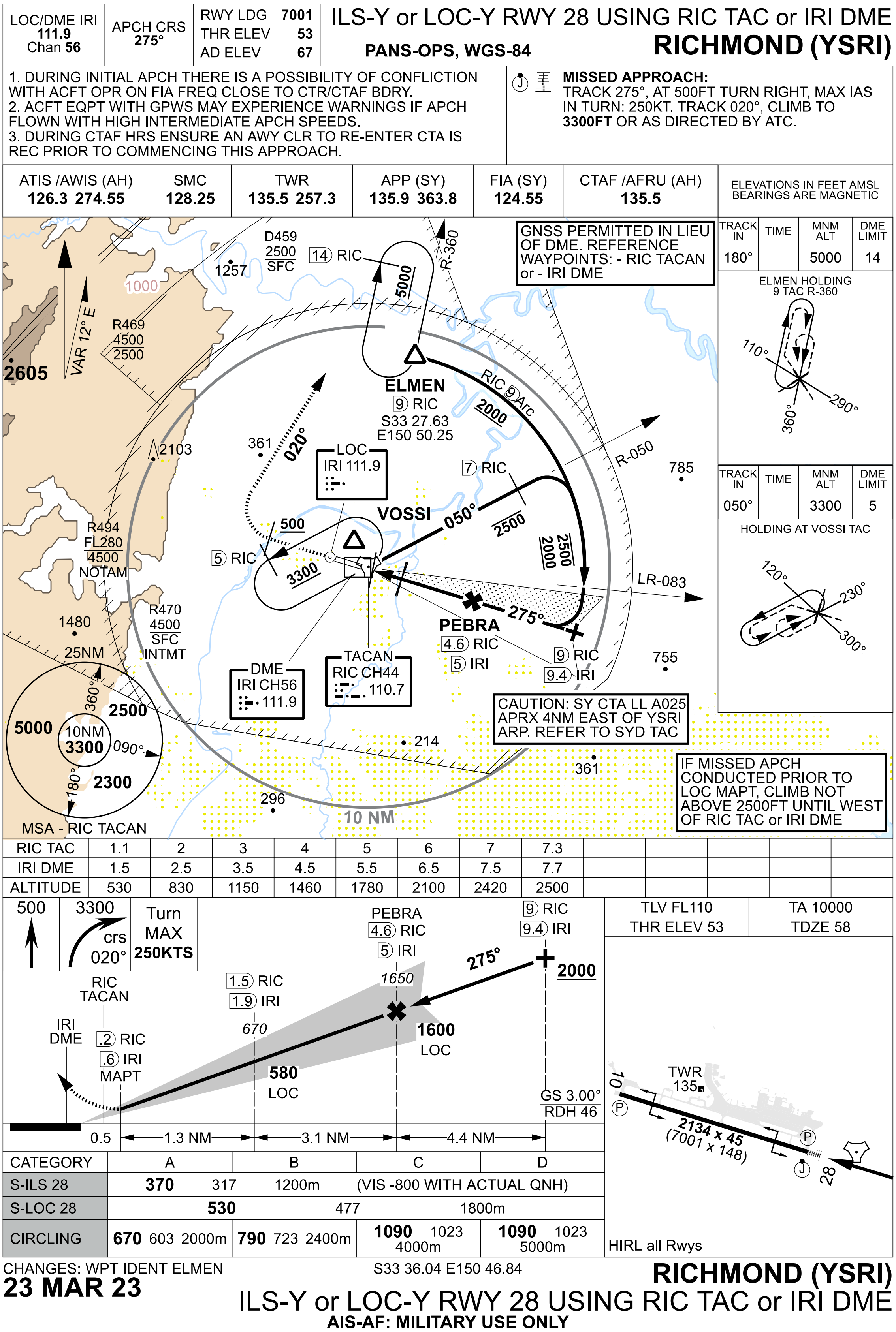


Figure 4.3 RAAF Base Richmond – current ILS-Y or LOC-Y Runway 28 using RIC TAC or IRI DME (AIS-AF)

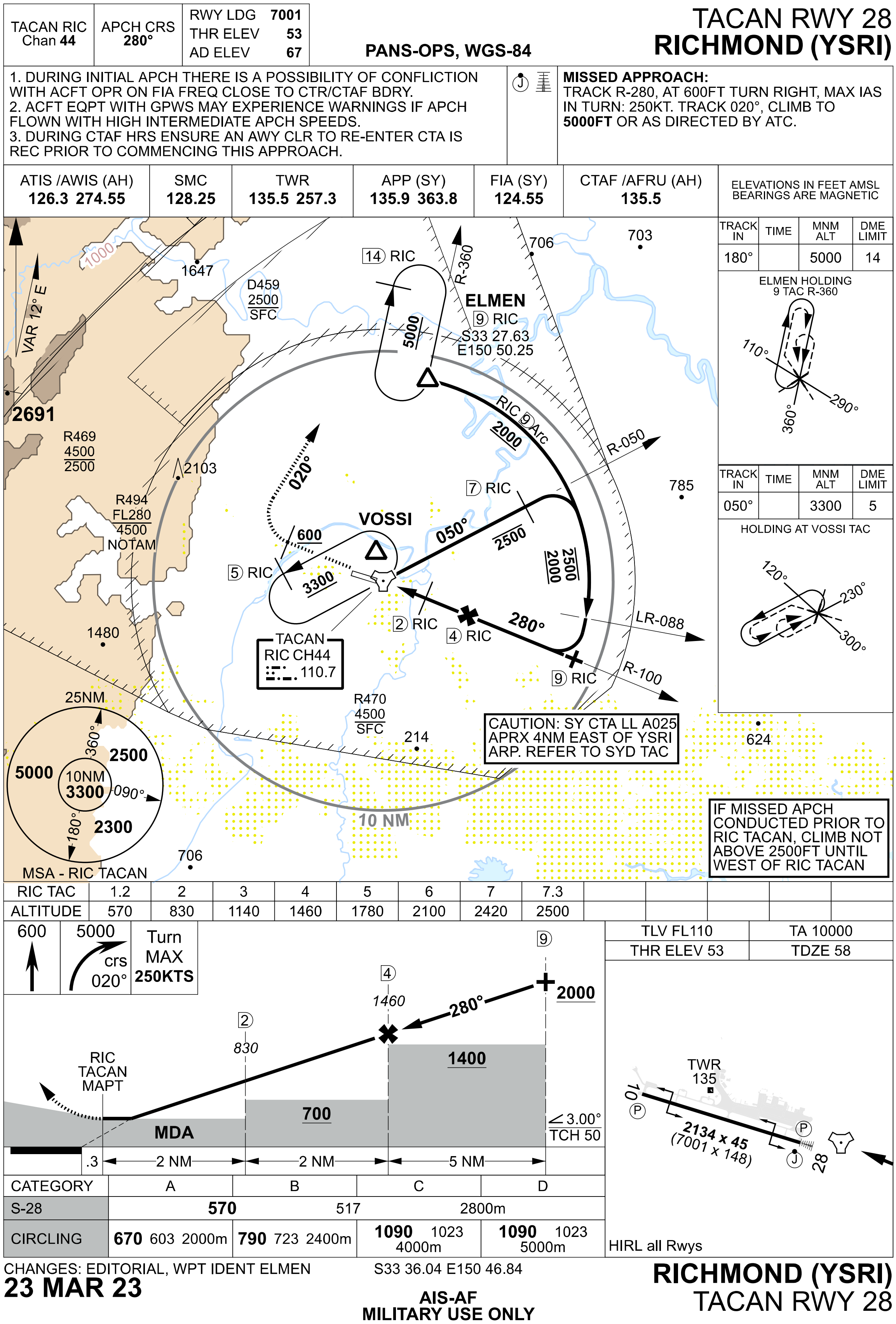


Figure 4.4 RAAF Base Richmond – TACAN Runway 28 (AIS-AF)

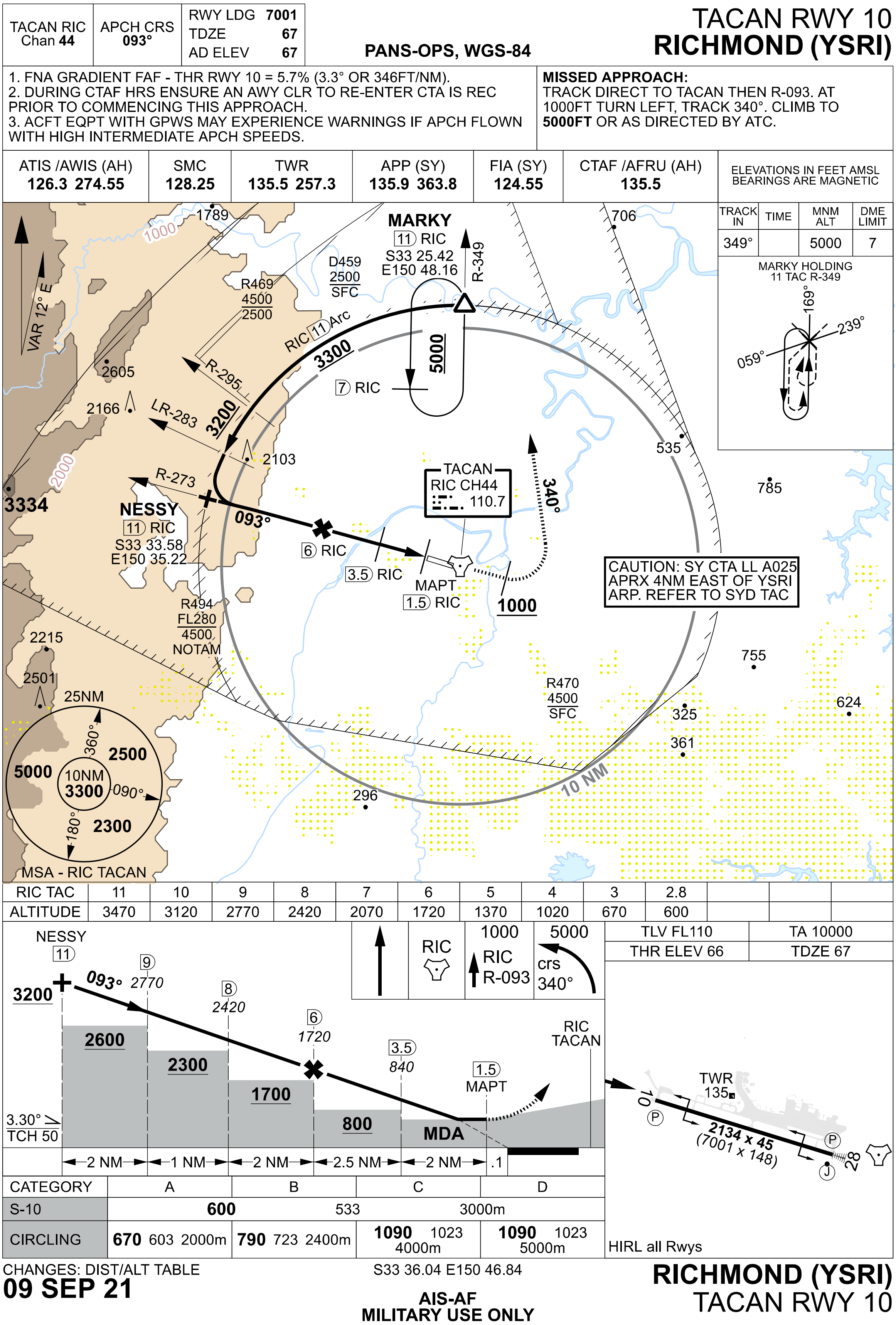


Figure 4.5 **RAAF Base Richmond – TACAN Runway 10 (AIS-AF)**

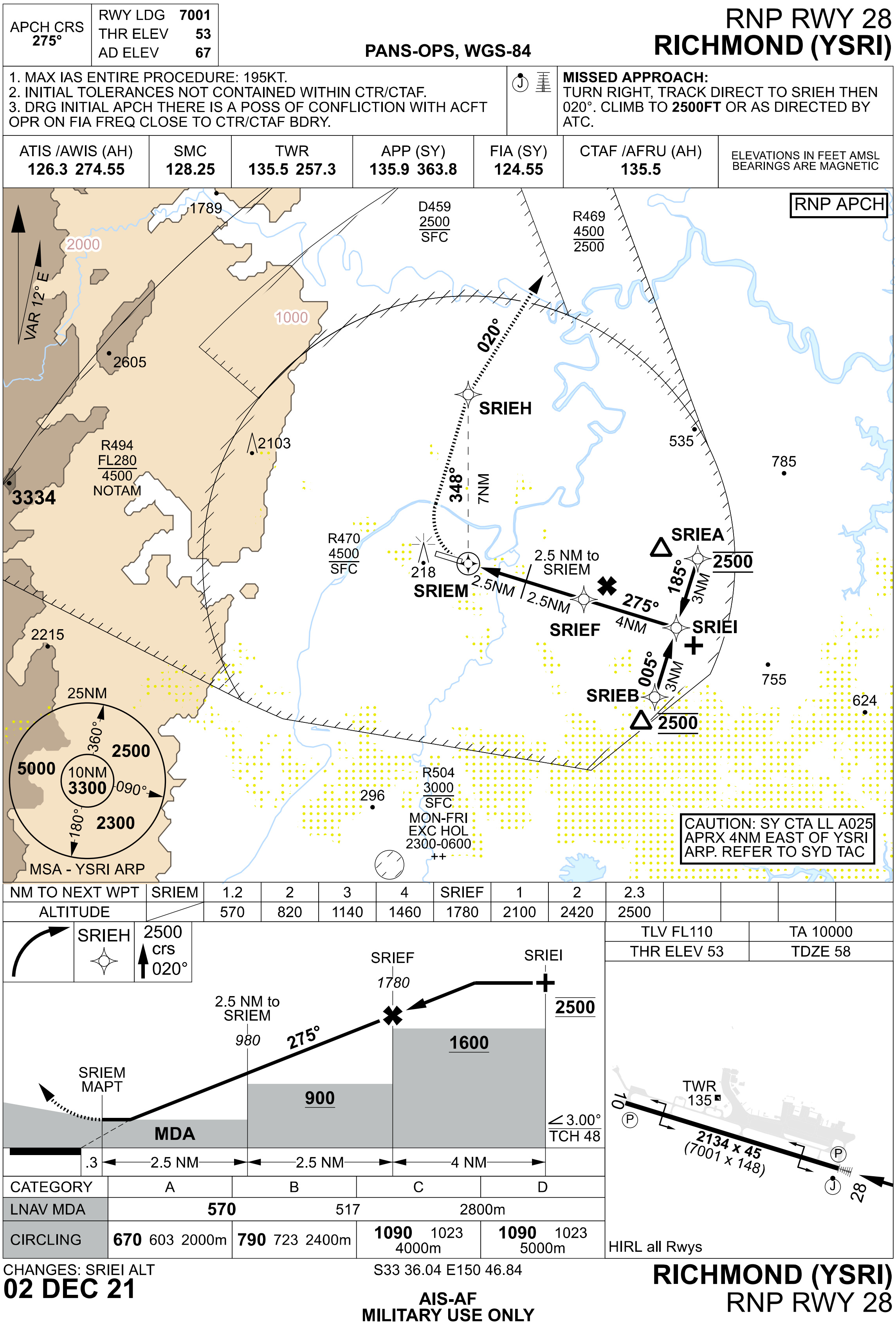


Figure 4.6 RAAF Base Richmond – RNP Runway 28 (AIS-AF)

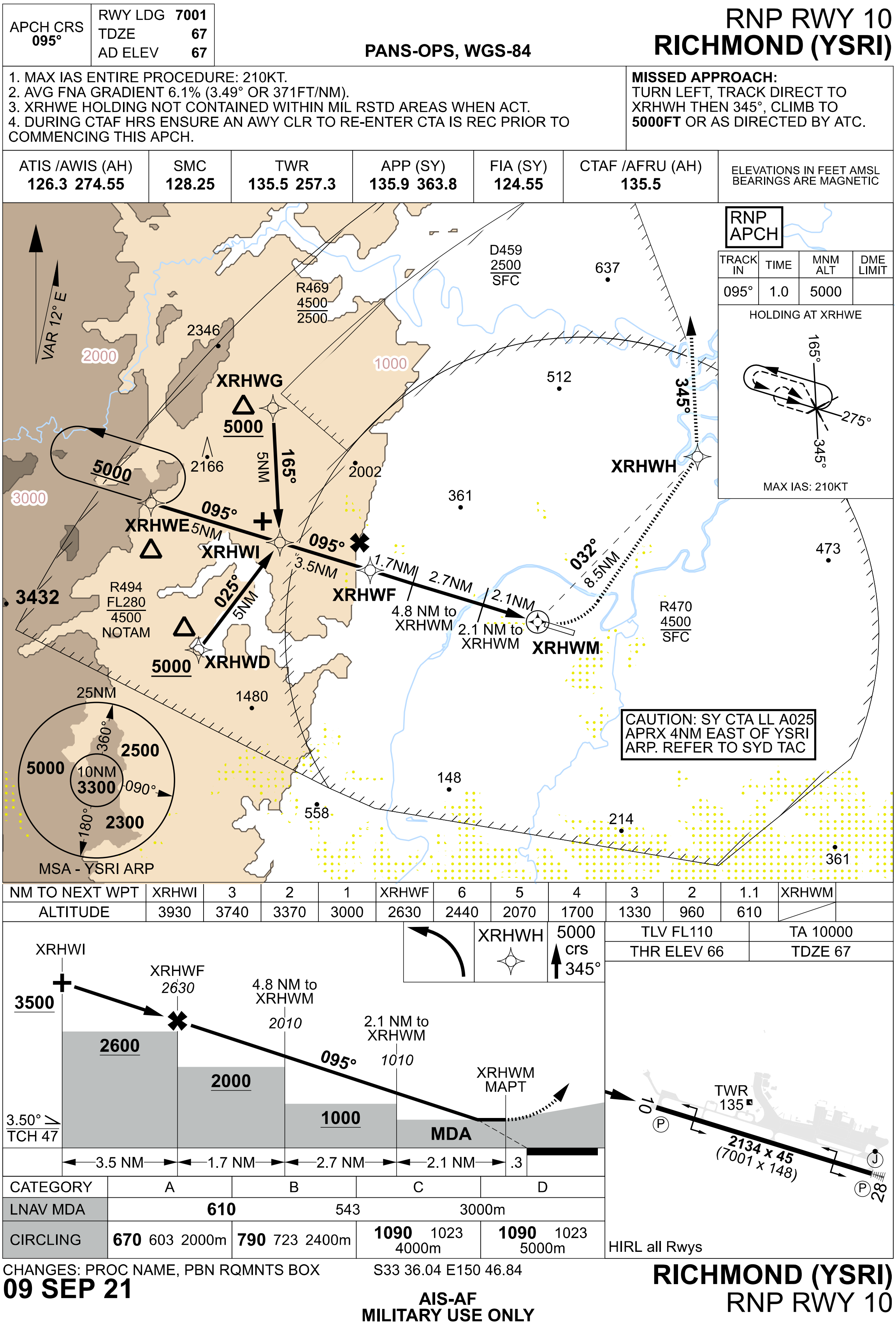


Figure 4.7 RAAF Base Richmond – RNP Runway 10 (AIS-AF)

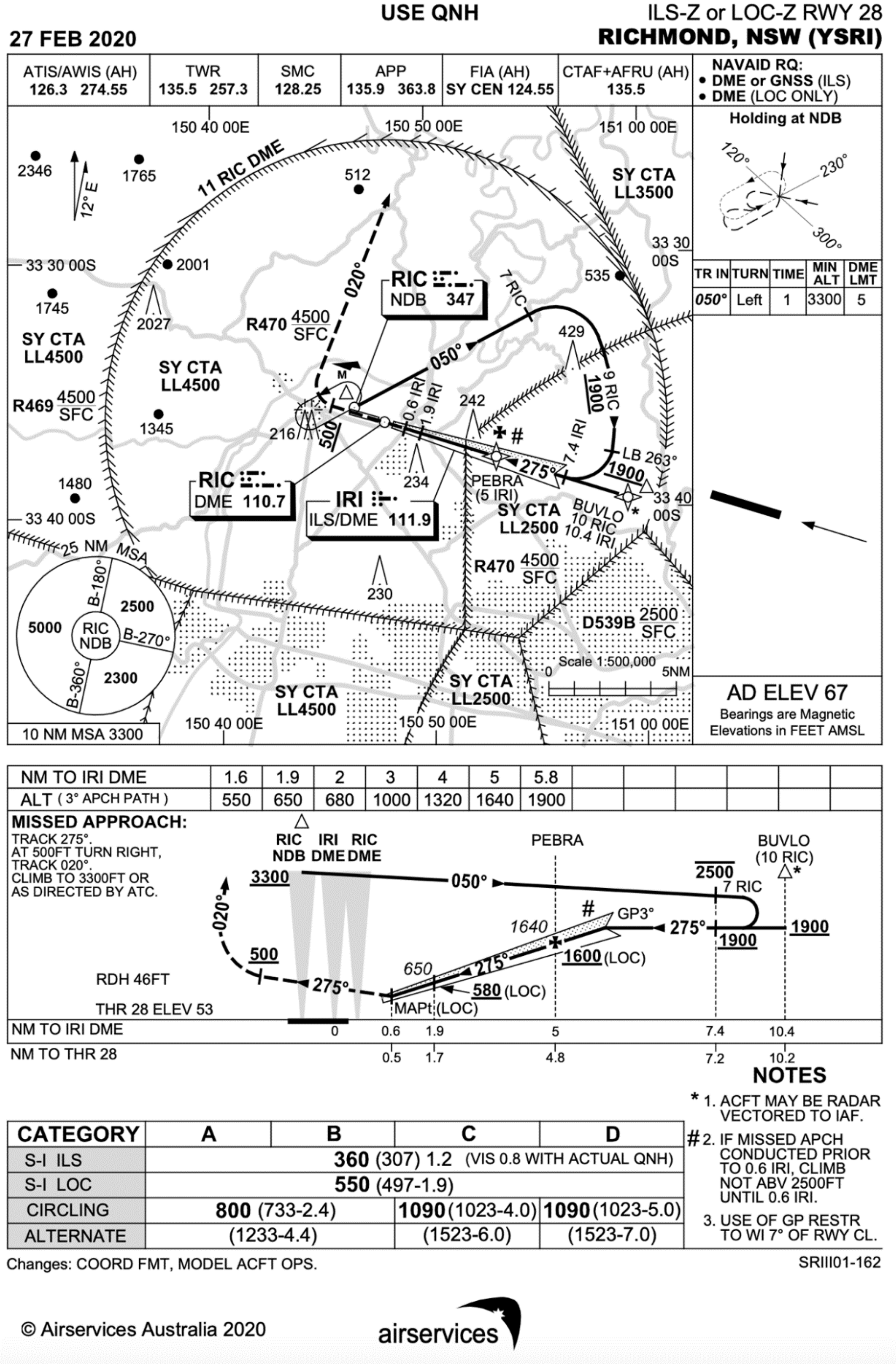


Figure 4.8 RAAF Base Richmond – ILS-Z or LOC-Z Runway 28 (AIP DAP)

4.3 RAAF Base Richmond – noise management plan

All military aircraft at RAAF Base Richmond are required to operate in conformance with the Base Aircraft Noise Management Plan (BANMP). The BANMP was most recently updated in July 2021. It is too large to include in this assessment; it covers such areas as aircraft standard operating procedures, noise minimisation strategies, a communications process with local communities and a noise information and complaints handling process.

The BANMP states:

Aircraft noise is an unavoidable consequence of Air Force operations and training. The impact of aircraft noise is subjective and affects communities in different ways. Air Force has an obligation to reduce the effects of aircraft noise on local communities to the maximum extent possible, without affecting operational or training outcomes. Consequently, aircraft noise is managed locally by personnel who know and understand community concerns.

The majority of RAAF Richmond flying training occurs in designated training areas situated over farming, rural and over-water areas. This is designed to reduce the time aircraft spend over residential areas.

The proximity and orientation of RAAF Richmond's runway means that aircraft are required to take off and land directly over the townships of Richmond and Windsor. The introduction of aircraft simulators, allowing aircrew to practice flying in ground-based training devices, has significantly reduced the number of training aircraft movements over the Hawkesbury.

Normal flying operations for military aircraft are from 0800-2300 Monday to Thursday and 0800-1830 Friday to Sunday Australian Eastern Standard Time (AEST) and is adjusted for Australian Eastern Daylight Savings Time (AEDT). Flying conducted over drop zones and night flying outside of normal flying operations hours are restricted to the minimum required to achieve training targets and operational requirements.

There may be occasions, although seldom, in which F-35A aircraft operate at RAAF Richmond.

(ANNEX C TO RAAF RIC BANMP 31 JUL 21)

RICHMOND NOISE ABATEMENT PROCEDURES

1. The RAAF has an honest and open approach towards the management of aircraft noise experienced by residents living near RAAF Bases. Aircraft noise will never be eliminated, however the RAAF is committed to working with the community and local Councils to reduce aircraft noise impact. In this regard, the RAAF has developed a public access online resource relating to Defence Aircraft Noise which is found at http://www.defence.gov.au/aircraftnoise.

2. The following programs are available to further mitigate aircraft noise impacts upon communities adjacent to RAAF Base Richmond:

1. ***Air Force – Aircraft Noise Communication Strategy (ANCS).*** *A strategy outlining how the RAAF communicates with the community in balancing operational priorities with community needs.*
2. ***Air Force – Media Awareness Strategy (MAS).*** *A strategy on how the RAAF is to utilise media to provide the local and broader civil community advance notice of irregular planned aircraft flypasts, displays or other activities which are likely to generate excessive aircraft noise.*
3. ***Air Force – Aircraft Noise Management Strategy (ANMS).*** *A strategy outlining how the RAAF considers the local community by reducing noise impact whilst maintaining the safe operation of aircraft in balancing operational and training requirements. The ANMS is available at http://www.defence.gov.au/aircraftnoise.*
4. ***Air Force – Fly Neighbourly Policy (FNP)****. A practical guideline of principles exercised by aircraft during the course of RAAF Base operations. The FNP is available at http://www.defence.gov.au/aircraftnoise and further details are presented in Annex D.*

3. RAAF Base Richmond also adheres to operational guidelines including being committed to:

1. *undertaking flying operations in a manner which is considerate of our local community, whilst maintaining the safe operation of the aircraft.*
2. *adhering to all Commonwealth legislation and Civil Aviation Safety Authority (CASA) regulations and guidelines.*
3. *notifying local communities of major operations, exercises or other non-routine training and aircraft flying activities such as flying displays.*

AIR FORCE FLY NEIGHBOURLY POLICY

1. Air Force is working with local communities near airbases, training areas and air weapons ranges to reduce noise impacts whilst balancing operational and training requirements. Consequently Air Force has developed a Fly Neighbourly Policy (FNP) which can be found online at http://www.defence.gov.au/aircraftnoise.

2. Air Force is committed to undertake flying operations in a manner which is considerate of our local communities, whilst maintaining safe operation of our aircraft and achieving the required levels of capability. Guided by these principles RAAF Richmond will:

1. *comply with published airfield noise abatement procedures*
2. *use appropriate runway length for departures to maximise height over local communities*
3. *minimise the use of afterburner on fast jets during take-off and minimise noise during climb out on the occasions fast jets visit RAAF Richmond*
4. *limit the speed of aircraft over populated areas*
5. *minimise flight over residential areas and other noise sensitive buildings such as hospitals, schools and farming communities*
6. *avoid low flying over known noise sensitive areas*
7. *minimise flying late at night or early in the morning*
8. *include aircraft noise awareness in pilot training and familiarisation*
9. *notify local communities of major exercises or other non-routine training and flying activities such as flying displays.*

3. To further minimise noise RAAF Richmond may:

1. *limit continuous circuit training at night and on weekends and public holidays*
2. *use satellite airfields for repetitive aircraft circuits*
3. *vary flight paths to share noise*
4. *consider continuous descents to reduce noise*
5. *implement local engine run-up procedures*
6. *minimise jet or turbo prop engine testing at night.*

Chapter 5 RAAF Base Richmond – proposed IFR operations

There is no proposed change to the RAAF Base Richmond Restricted Airspace. Figure 5.1 and Figure 5.2 present the current and proposed Sydney Basin area airspace boundaries.

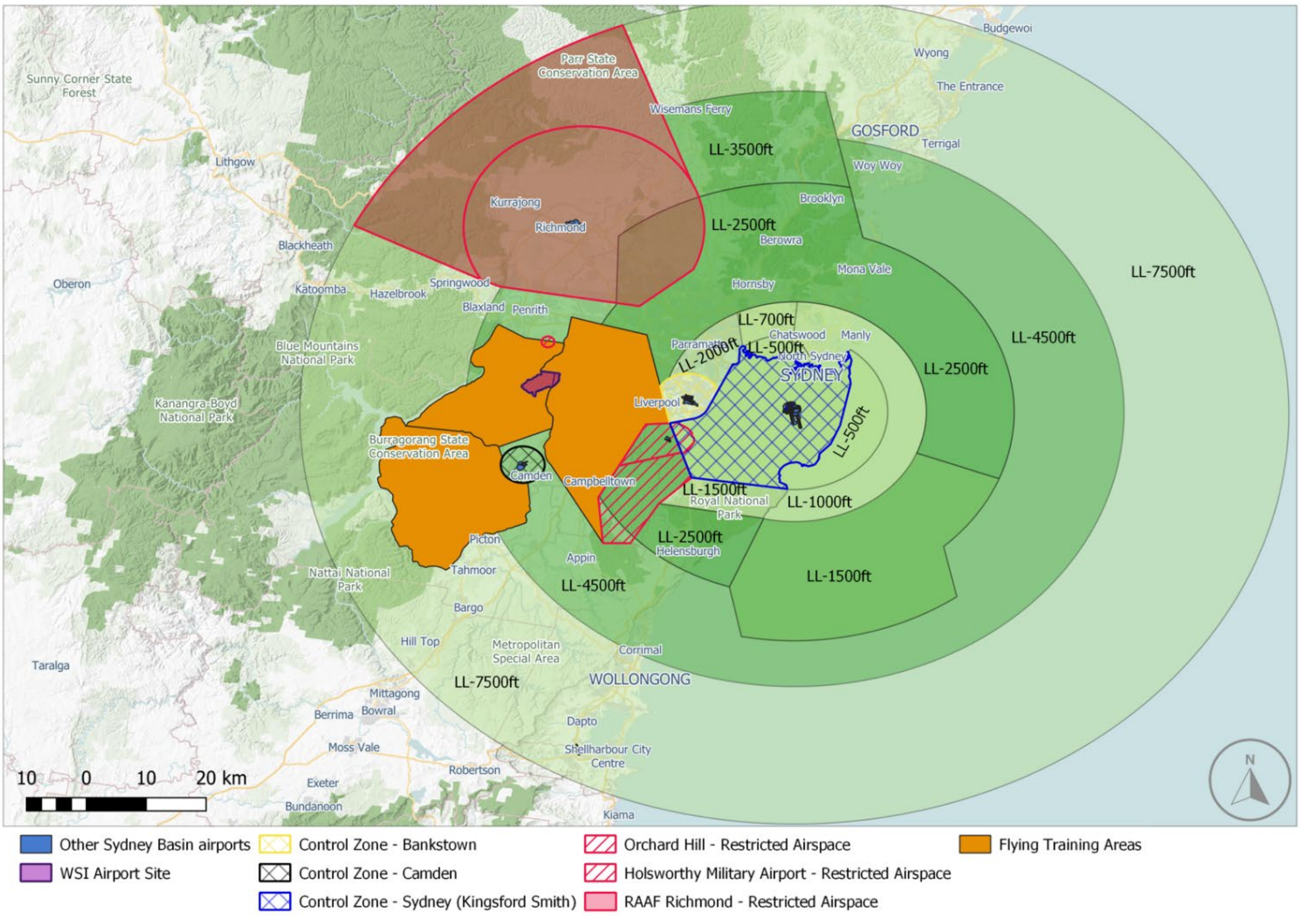


Figure 5.1 Current Sydney Basin Airspace Control Area (CTA) and Control Zone (CTR) boundaries including the Lower Level (LL) of controlled airspace

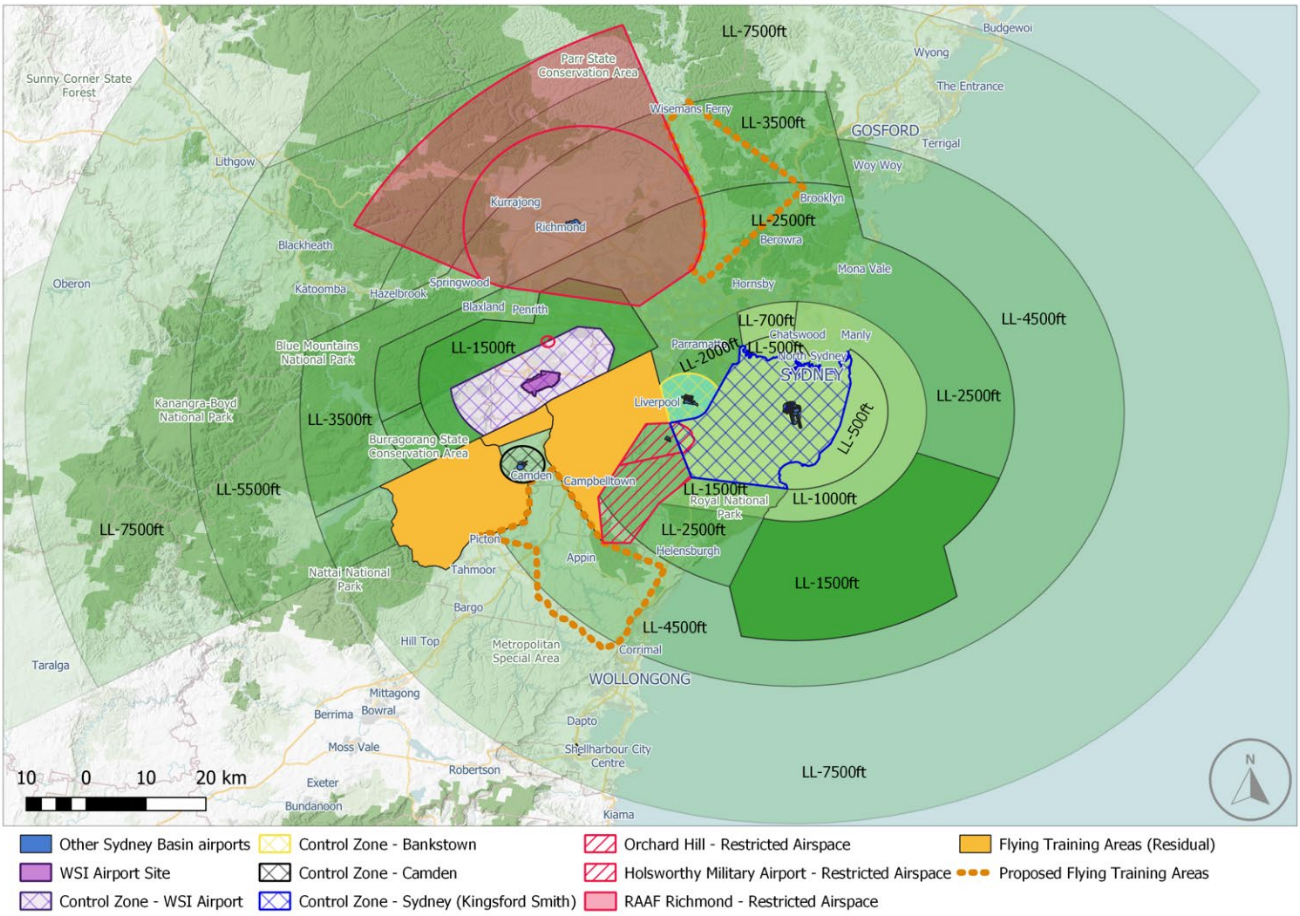


Figure 5.2 Proposed Sydney Basin Airspace Control Area (CTA) and Control Zone (CTR) boundaries including the Lower Level (LL) of controlled airspace

5.1 Proposed IFR departures

The RAAF Base Richmond Departure (Radar) SID will still be used. The procedures currently in place for an aircraft to receive a departure clearance from RAAF Base Richmond will not change.

Aircraft operating under IFR will be allocated the Richmond Departure (Radar) SID (refer to Figure 4.2). This SID stipulates a track to be flown from either end of Runway 10/28, which is basically the extended runway alignment, until the aircraft reaches 1,000 ft (300 m), at which point it will fly the proposed new SID.

After take-off in the Runway 10 direction an aircraft will be required to turn left and track via waypoint NB219 to waypoint NB249. Aircraft departing from Runway 28 will track directly to waypoint NB249 after leaving 1,000 ft (300 m).

To ensure aircraft departing for southern destinations (e.g., Royal Australian Navy Base Albatross near Nowra) or eastern destinations (e.g., New Zealand), have separation assurance – “Safety by Design” with WSI and other Sydney Basin airspace aircraft operations, a proposed new SID has been designed for these aircraft (refer to Figure 5.3).

This SID, from both Runway 10 and Runway 28 directions is common from proposed waypoint NB249, ultimately arriving overhead waypoint TESAT, at which point aircraft departing for the south will continue in a southerly direction and those departing for the east will turn left and track to their enroute waypoint. Aircraft on this SID will have an altitude restriction to be above 13,000 ft (4 km) by waypoint NB251. It is expected most east-bound aircraft will be cleared direct to their enroute waypoint prior to waypoint TESAT once separation has been assured with Sydney (Kingsford Smith) arrivals from the north, resulting in a similar track spread to current operations but at higher altitude.

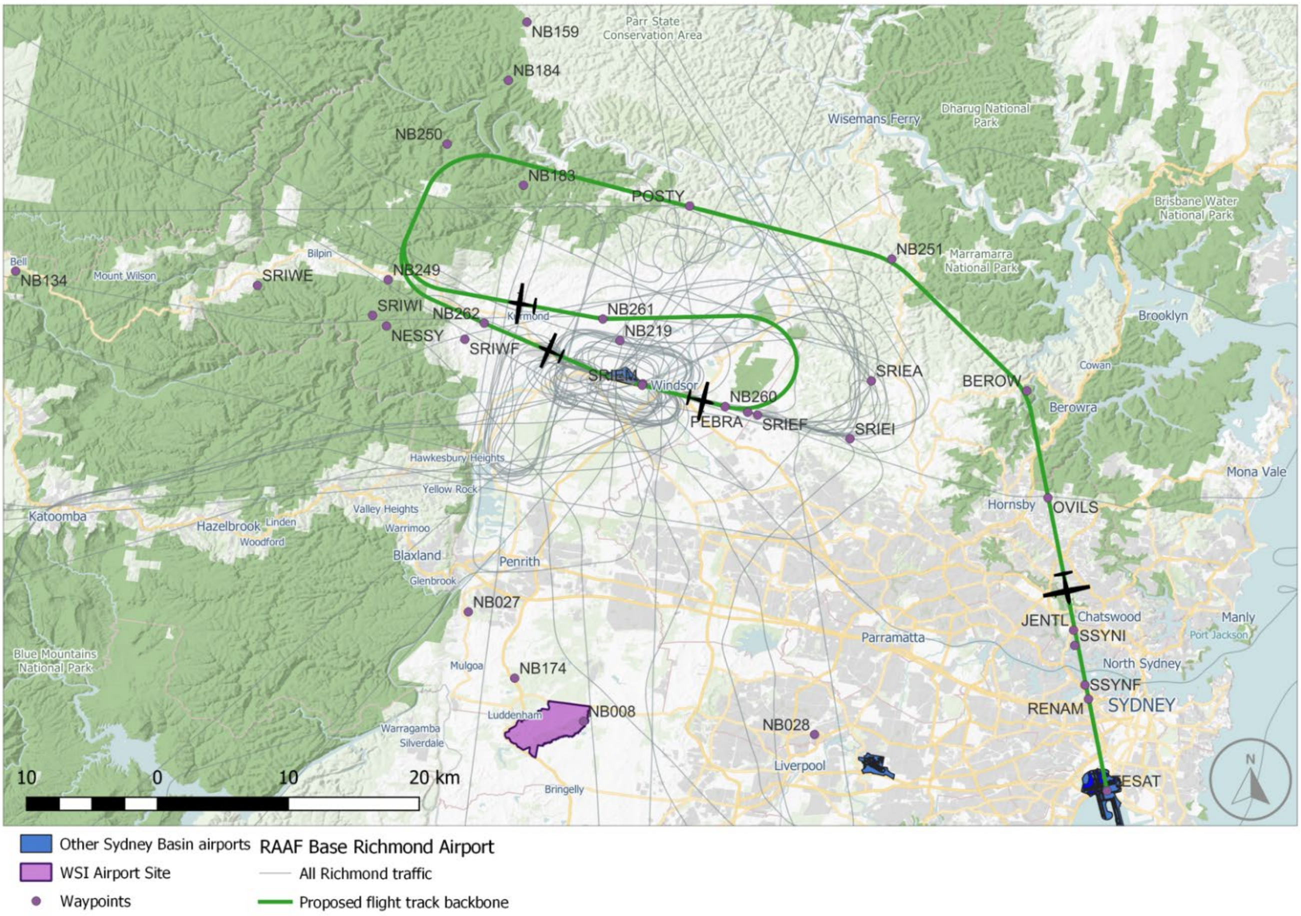


Figure 5.3 RAAF Base Richmond – proposed eastern departures

5.2 Proposed IFR arrivals

Three STARs have been required to be designed to provide separation assurance with proposed WSI operations and other aircraft operating within the Sydney Basin airspace. The proposed 3 new STARs connect to the existing final approach procedures (refer to Figures 4.3 to 4.8).

From the east a proposed STAR has been designed to overfly waypoint TESAT and then a series of waypoints (refer to Figure 5.4) to overfly RAAF Base Richmond then via radar vectors to intercept the approach legs of one of the existing IFR approaches described above. This STAR will also be used by southern arrivals to RAAF Base Richmond (e.g., Nowra). A series of vertical restrictions are included at various waypoints on this proposed STAR to provide separation assurance with WSI operations and all other Sydney Basin airspace operations.

From the south-west and west a proposed STAR has been designed to provide separation assurance with all WSI aircraft operations. Aircraft from the south-west will track via a new route from waypoint RUPEM where it will join the current route used by arrivals from the west (i.e., from Bathurst), to RAAF Base Richmond and then radar vectors to the appropriate approach procedure. This STAR will also be used by aircraft from western and south-western directions (refer to Figure 5.4). Aircraft currently arriving from the south-west track overhead Katoomba, and these will now arrive via the new STAR near Mount Wilson. There are no vertical restrictions placed on this STAR as the lateral track provides separation assurance with all other Sydney Basin tracks. This allows aircraft to program a Continuous Descent Operation (CDO) based on the nominated landing runway.

To provide separation assurance on descent from the north to all 3 airports, 2 proposed STARs have been designed. One from the north and one specifically from RAAF Base Williamtown (a commonly used military route). The tracks remain segregated until waypoint NB184, are common till waypoint NB183 and then separate again (refer to Figure 5.4) to position aircraft for the appropriate approach to either runway direction as described above. There are no vertical restrictions placed on this STAR as the track provides lateral separation assurance with all other Sydney Basin airspace flight paths. This allows aircraft to program a CDO based on the nominated landing runway. These STARS will include transitions to existing and modified instrument flight procedures as defined by military requirements.

The proposed new waypoints (NB249, NB251, etc.) identified above have been allocated a temporary identifier which will be replaced by a conforming 5 letter alpha character designator as part of the detailed design phase and implementation of the proposed adjusted procedure.

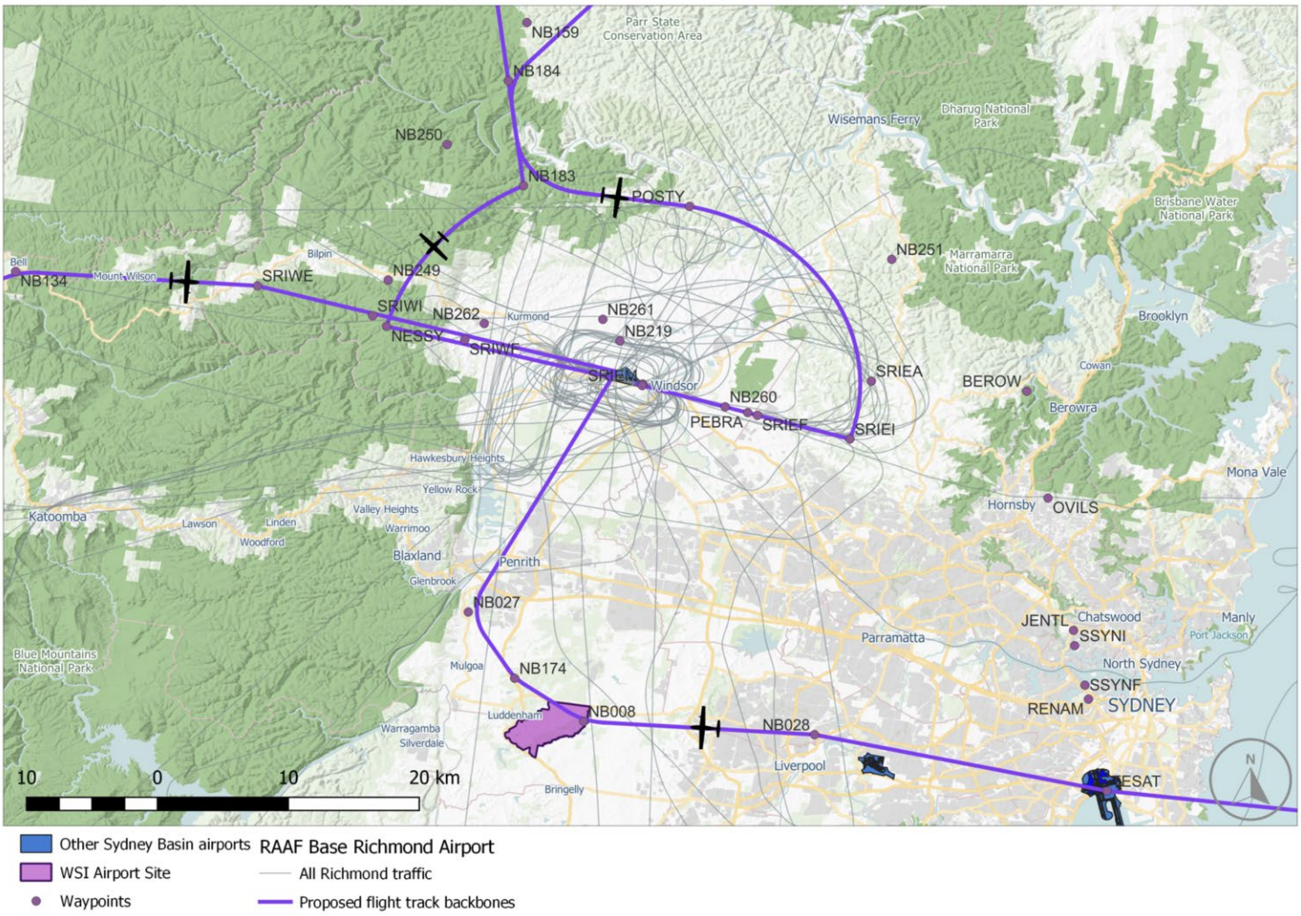


Figure 5.4 RAAF Base Richmond – proposed IFR STARs nominal backbone flight tracks and existing radar flight paths

The nominal backbone flight track is used to identify either the centre of an existing flight path, or the designed nominal backbone flight track of a proposed SID or STAR. In the case of a current nominal backbone flight track, it is based on an average of current radar plotted flight tracks. In the case of a proposed new procedure design, the nominal backbone flight track will be primary track used to establish and ensure “Safety by Design” standards are met.

Flight path dispersion swathes show the actual or expected variation of flights when flying the procedure.

Flight path dispersion around an actual or proposed nominal backbone flight track will vary considerably where the designed nominal flight paths track via a fly-by waypoint. The amount of variation will depend on the angle of turn that the designed track is required to make at the waypoint.

Chapter 6 Aircraft noise impact assessment

The aircraft noise assessment of the changes proposed to IFR operations at RAAF Base Richmond is qualitative in nature due to the many uncertainties in current and future IFR movement numbers. The extent of these impacts is partially dependent on projected demand schedules and mix of aircraft expected to operate at RAAF Base Richmond.

Based on the best information currently available, a qualitative assessment of aircraft noise impacts relating to IFR operations at RAAF Base Richmond is included in Chapter 21 (Facilitated impacts).

To support a qualitative analysis of potential noise from operations, noise data interpolated from Noise-Power-Distance (NPD) curves developed utilising the Aviation Environment Design Tool (AEDT) has provided an indication of what overflight noise from suitable representative aircraft types expected to operate at RAAF Base Richmond and could be expected on existing tracks, or on tracks that are proposed to have either changed laterally or vertically or both.

Average expected overflight noise levels in A-weighted decibels (dB(A)) can be determined from NPD data by selecting the most suitable aircraft type, subtracting the ground level at a location from the expected operating level of the IFR flight, and intersecting this distance with the line representing a particular phase of flight – climb, level flight, or descent. Informed by typical operating techniques, it has been assumed that for operating aircraft, the engine power (thrust) settings adopted are:

- climb – 100 per cent (considered worst case – typically take-off will be at a de-rated engine power (thrust) setting)
- cruise (level flight) – 80 per cent
- descent – 50 per cent.

Due to the low movement numbers expected to adopt the proposed IFR procedures and the high variability in potential noise variation from the different operating aircraft types, no attempt is made to provide cumulative noise impacts on the proposed new IFR tracks.

Table 6.1 to Table 6.3 below present predicted average overflight noise levels in dB(A) for the 3 broadly representative phases of flight. This data has been extracted from relevant airframe NPD data generated utilising the internationally recognised aircraft noise and emissions calculation program – AEDT, developed by the United States Federal Aviation Administration (US FAA).

Table 6.1 Predicted average overflight noise levels in dB(A) for Departure Climb

Aircraft	400 ft	1,000 ft	2,000 ft	4,000 ft	10,000 ft
B737-800 – Boeing Business Jet	102	93	87	79	67
C-130J-30 – Lockheed Super Hercules	99	90	82	74	61
C-17A – Globemaster III – heavy transport (Jet)	105	95	87	79	67
KC-30A – Tanker – modified Airbus A330	106	96	88	79	67
C510 – Cessna Citation Business Jet	95	85	77	67	52

Table 6.2 Predicted average overflight noise levels in dB(A) for Cruise

Aircraft	400 ft	1,000 ft	2,000 ft	4,000 ft	10,000 ft
B737-800 – Boeing Business Jet	N/A	N/A	N/A	74	62
C-130J-30 – Lockheed Super Hercules	N/A	N/A	N/A	71	58
C-17A – Globemaster III – heavy transport (Jet)	N/A	N/A	N/A	75	54
KC-30A – Tanker – modified Airbus A330	N/A	N/A	N/A	75	54
C510 – Cessna Citation Business Jet	N/A	N/A	N/A	62	38

Table 6.3 Predicted average overflight noise levels in dB(A) for Arrival Descent

Aircraft	400 ft	1,000 ft	2,000 ft	4,000 ft	10,000 ft
B737-800 – Boeing Business Jet	92	83	75	67	54
C-130J-30 – Lockheed Super Hercules	93	83	75	67	54
C-17A – Globemaster III – heavy transport (Jet)	95	85	78	69	56
KC-30A – Tanker – modified Airbus A330	96	86	78	69	56
C510 – Cessna Citation Business Jet	84	73	64	54	39

The dB(A) values presented in Tables 6.1 to 6.3 should be considered as a median value of a range of plus or minus 3 dB(A) – i.e., 50 dB(A) would indicate potential overflight noise of between 47 and 53 dB(A).

The qualitative analysis of the proposed changes to IFR operations at RAAF Base Richmond is considered the best available representation of potential overflight noise impacts for operations on the proposed new RAAF Base Richmond IFR procedures. This must be heavily qualified due to the variability associated with noise generation from variations of even the same aircraft type, varying pilot technique and variations in meteorological conditions.

Overflight noise levels will also vary with respect to the lateral offset positioning of the at-ground receptor to the aircraft operating above.

Figure 6.1 presents the proposed SID and STARs for RAAF Base Richmond with a suburb overlay. The proposed SID is shown in green and the proposed STARs in purple. Only the procedure backbone track is depicted due to the relatively low daily numbers of flight operations expected for these procedures.

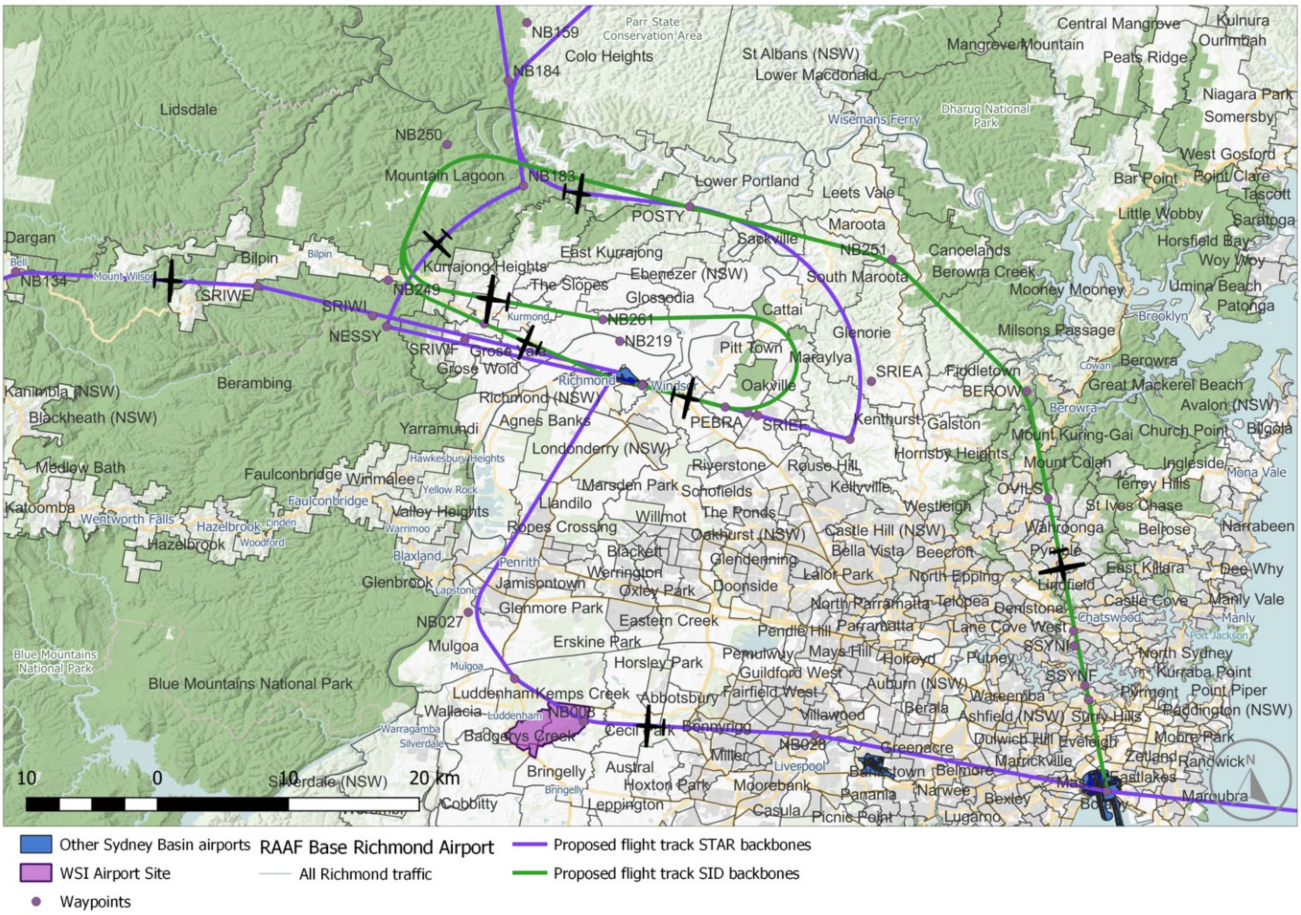


Figure 6.1 Proposed SID and STARs with suburb overlay

Chapter 7 Other environmental factors

7.1 Visual amenity

7.1.1 SID

A proposed "Safety by Design" SID has been designed for eastern and some southern coastal destinations. From both ends of Runway 10/28 this SID stays north of RAAF Base Richmond and aircraft climb largely in the RAAF Base Richmond Restricted Airspace to a high-level north and west of the Hawkesbury River. Once above 13,000 ft (4 km), aircraft will turn south and fly directly over Sydney (Kingsford Smith) Airport before either continuing south or turning east for their enroute track to destination. This high-altitude low use SID will be visible to suburbs in proximity to its overflight flight path corridor when in use.

7.1.2 STARs

As described in Chapter 5 of this Appendix, there will be no change to the existing final approaches at RAAF Base Richmond. Aircraft will still be visible in the same locations on approach as in the current operation.

Three "Safety by Design" STARs are proposed for aircraft arriving from the north and west to position aircraft at the commencement of the existing instrument approaches. These STARS in broad terms replicate the radar vectoring currently employed and are all well north and west of the Sydney metropolitan area.

A STAR from the east has been proposed to bring aircraft at high altitude levels from the oceanic enroute airspace route structure across the southern part of the Sydney metropolitan area and into the RAAF Base Richmond airspace from the south at high level, prior to joining an existing approach to either end of the runway. This high-altitude low use STAR will be visible when in use.

7.2 Radar vectoring

In locations where no SIDs or STARs are available for an aircraft's particular operation, or where adverse weather requires the cancellation of a SID or STAR for safety reasons, air traffic control will provide radar vectoring to safely manage those applicable operating aircraft. Radar vectoring involves air traffic control determining a safe path for all aircraft and issuing heading and sometimes altitude and speed instructions to one or more aircraft to avoid any possible conflictions. While the objective of a set of SIDs and STARs in terminal airspace designed under "Safety by Design" principles is for onboard flight management systems monitored by air traffic control to ensure aircraft remain separated, there are occasions where SIDs and STARs are cancelled for varied reasons and aircraft are radar vectored.

A cancellation of a SID or STAR resulting in radar vectoring involving a departure from lateral track, could also involve a variation in vertical profile or speed requirements and may be either at pilot request or initiated by air traffic control.

Pilot requests for departing from a SID may be for:

- route efficiency – where there is a more direct route to the destination than the published procedure allows, saving time, fuel and emissions,
- weather avoidance – particularly around turbulence associated with thunderstorms.

Pilot requests in all instances are subject to air traffic control approval. Avoidance of thunderstorms which has a safety priority is readily approved. Direct routing requests will be considered by air traffic control in light of safety and overall management of other aircraft within the vicinity.

Air traffic control-initiated cancellations of SIDs can also be for reasons of route efficiency, better noise outcomes or better emissions outcomes. Separation requirements with other departing, arriving or transiting aircraft can also necessitate the cancellation of a SID.

Any one of the 3 elements (track, vertical profile, speed) of a SID can be cancelled individually or collectively.

Aircraft will eventually either re-join the published procedure at a later waypoint or will connect with the enroute network at a designated waypoint.

A pilot can request cancellation of a STAR for reasons of weather avoidance or to enter a holding pattern to address an equipment malfunction.

Air traffic control will cancel a STAR when an alternate track or vertical profile is required by one or more aircraft to maintain the optimum landing sequence at the airport. Up to a point, speed adjustment can also be made within the lateral or vertical profile of a STAR.

In low arrival demand conditions air traffic control will occasionally cancel a STAR to reduce track miles and CO_2 emissions if a shorter arrival route is available.

All flights into and out of civil controlled airspace from RAAF Base Richmond are currently subject to radar vectoring to position them clear of all other Sydney Basin air traffic. As the STARS to RAAF Base Richmond are principally to provide procedural separation with both Sydney (Kingsford Smith) Airport and WSI aircraft in what will become a very complex volume of airspace, once the RAAF Base Richmond arriving traffic is separated with all other conflicting aircraft it is expected that these aircraft may be radar vectored to join the end of the relative instrument approach to the runway in use at RAAF Base Richmond as they are currently.

While the combined eastern and southern SID is a “Safety by Design” SID designed to process these aircraft safely through the complex airspace just north of Sydney (Kingsford Smith) Airport, when the opportunity exists to provide all aircraft with the same level of safety but a more direct route to destination, departing aircraft from RAAF Base Richmond can expect to be radar vectored.

The military restricted airspace that is associated with RAAF Base Richmond facilitates military training flights on a regular basis. For training purposes military pilots may operate on random tracks not associated with any SID/STAR or flight planned route, and not under any radar vectors by air traffic control.

7.3 Track distance and emissions

7.3.1 SID

Currently aircraft departing RAAF Base Richmond to the east or south are managed by radar vectors and fly a much more direct route to the coast than that proposed. It is possible that the proposed new SID will increase track distances by 51 nm (95 km) for an eastern destination and 55 nm (102 km) for a southern destination.

The potential impact of this additional track distance on the fuel required for a Lockheed Super Hercules C130J-30 to fly an extra 51 to 55 nm (95–102 km) is projected to range between approximately 900 and 950 kilograms (kg). This would result in approximately 2.8 to 3 tCO_2 emitted per departure flight by this aircraft type on this SID.

Air traffic control expect to radar vector aircraft on the TESAT SID to save track miles and fuel.

Airservices advise that whenever aircraft traffic disposition safely allows, flights from RAAF Base Richmond using the SID via waypoint TESAT will be provided with track shortening to reduce track distance and fuel burn and emissions.

7.3.2 STARs

It is not possible to predict how often aircraft from the north will be required to fly the full proposed STARs. Therefore, it is problematic to assess any track mile or CO_2 emission changes between the current and proposed future operations.

Chapter 8 Conclusion

The qualitative analysis of the changes proposed to IFR operations at RAAF Base Richmond is considered the best available representation of potential impacts of the proposed procedure changes for RAAF Base Richmond.

There will be no change to the final approach paths to either end of Runway 10/28 at RAAF Base Richmond. There will also be no change to the existing initial departure track or the local noise preferred procedures for aircraft flying the SID.

A small number of STARs are proposed to provide "Safety by Design" to separate RAAF Base Richmond operations from WSI operations. The STARs from the north and west have been designed to closely replicate the existing radar vectoring that aircraft from these directions are subject to currently when being processed for an approach and landing at RAAF Base Richmond. These STARs are well north of the Sydney Basin.

The proposed STAR from the east has been designed to overfly the Sydney Basin at high level to achieve "Safety by Design" with all WSI, Sydney (Kingsford Smith) Airport and Bankstown Airport operations. Once aircraft on this STAR enter the RAAF Base Richmond Restricted Airspace, still at a high altitude, the proposed STAR replicates the current radar vectoring tracks as closely as possible to intercept the instrument approaches to either end of Runway 10/28.

A newly proposed eastern SID will see aircraft manoeuvre to the north of the RAAF Base Richmond runway and climb within the RAAF Base Richmond Restricted Airspace. Once above 10,000 ft (3 km), aircraft leave the RAAF Base Richmond Airport restricted airspace and track above all proposed WSI and Sydney (Kingsford Smith) Airport operations within the Sydney Basin airspace and then track to overfly Sydney (Kingsford Smith) Airport at 13,000 ft (4 km) or above.

Given that the area overflown by the proposed new SID and STARs is currently frequently overflown with similar aircraft undertaking both IFR and VFR flights, and the predicted low utilisation of the proposed new SID and STARs by up to 15 flights/day, it can be expected that there will be little or no material change over today’s operations.

Appendix G

Bankstown Airport proposed new SIDs and STARs

Western Sydney International (Nancy-Bird Walton) Airport – Airspace and flight path design | Environmental Impact Statement

Technical paper 13: Facilitated changes

Appendix G – Bankstown Airport proposed new SIDs and STARs

October 2024

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Terms and abbreviations

Term/abbreviation	Definition
ACP	Airspace Change Proposal (Airservices)
AEDT	Aviation Environmental Design Tool (US FAA)
AIP	Aeronautical Information Package (Australia)
AIRAC	Aeronautical Information Regulation and Control (Australia)
ARP	Aerodrome Reference Point (ICAO)
CASA	Civil Aviation Safety Authority (Australia)
CO_2	Carbon dioxide (a greenhouse gas)
CTA	Control area (3-dimensional airspace boundary)
CTAF	Common Traffic Area Frequency
Cth	Commonwealth of Australia
CTR	Control zone (3-dimensional airspace boundary)
DAP	Departure and Approach Procedures
dB(A)	A-weighted decibel (unit of sound)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Australian Government)
DITRDCA	Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Australian Government)
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation 1999* (Cth)
FAA	Federal Aviation Administration (United States)
ft	feet (unit of distance or height equivalent to 0.3048 m)
GA	General Aviation
IAF	Initial Approach Fix
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
km	kilometres (unit of distance equivalent to 1,000 m)
LL	Lowest Level (altitude for transit flights through the Sydney Basin)
LSALT	Lowest Safe Altitude
m	metre (unit of distance or height equivalent to 3.281 ft)

Term/abbreviation	Definition
MNES	Matters of National Environmental Significance (EPBC Act) (Cth)
N60/N70	Number above (N-above noise metric)
NFPMS	National Flight Path Monitoring System (Airservices Australia database)
nm	nautical mile (unit of distance equivalent of 1.852 k)
NPD	Noise-Power-Distance (aircraft noise curve charts)
NSR	Noise Sensitive Receiver
PAAM	Plan for Aviation Airspace Management
PBN	Performance Based Navigation
PMST	Protected Matters Search Tool (DCCEEW)
RAAF	Royal Australian Air Force
RNP	Required Navigation Performance
RNAV	Area Navigation (air navigation technique)
SARP	Standards and Recommended Practices (ICAO)
SID	Standard Instrument Departure
STAR	Standard Instrument Arrival
TMA	Terminal Area
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WSI	Western Sydney International (Nancy-Bird Walton) Airport

Chapter 1 Introduction

Although aircraft differ in operation, type, altitude, noise level and frequency, most areas of the Sydney Basin are overflown at some stage as shown in Figure 1.1.

The introduction of new flight paths to be used by aircraft into and out of Western Sydney International (Nancy-Bird Walton) Airport (WSI) has considered a multitude of options to minimise any adjustments required to existing flight paths in the Sydney Basin airspace. Single runway operations at WSI require adjustments to Sydney Basin operations prior to opening in 2026 to facilitate its flight paths and airspace structure. Those proposed facilitated airspace changes include the development of, or adjustments to:

- Sydney (Kingsford Smith) Airport Runway 25 Standard Instrument Departures (SIDs) to the west, north-west, north and east – (Appendix A)
- Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs to the south, west, north, and east – (Appendix B)
- Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID to the west and north-west – (Appendix C)
- Sydney (Kingsford Smith) Airport non-jet SID to the west or north-west – (Appendix D)
- Sydney (Kingsford Smith) Airport AKMIR Standard Instrument Arrival (STAR) jet and non-jets from the south and west – (Appendix E)
- Royal Australian Air Force (RAAF) Base Richmond SID and STARs – (Appendix F)
- **Bankstown Airport SID and STARs – (Appendix G) – this Appendix**
- Camden Airport STARs – (Appendix H)
- Sydney Basin Visual Flight Rules (VFR) operations – (Appendix I)
- Miscellaneous and Minor procedure adjustments – (Appendix J)
  - Sydney (Kingsford Smith) Airport BOREE STAR
  - Sydney (Kingsford Smith) Airport RIVET STAR
  - Sydney (Kingsford Smith) Airport Runway 07 Initial Approach Fix (IAF)
  - Sydney (Kingsford Smith) Airport Runway 07 SID
  - Sydney Basin low altitude transit flight routes.

This Appendix – Appendix G, presents an assessment of the proposed extensions to the current SID and proposed new STAR procedures at Bankstown Airport.

The design process for the safe and efficient integration of WSI's new flight paths into the existing Sydney Basin airspace has been one of adopting "Safety by Design" principles to deliver the highest level of safety separation assurance in conformance with rules set by the Civil Aviation Safety Authority (CASA). This is to enable aircraft to operate safely within their performance envelope into an already complex airspace structure. "Safety by Design" ensures that aircraft are separated from each other according to the flight routes and the type of air traffic service being provided. As such, this requires the new or amended SIDs and STARs and altitudes to be published and then downloaded into the cockpit flight management systems of all aircraft. At the same time the same information must be downloaded into the software of the surveillance systems used by air traffic control to manage and monitor the safe separation of all controlled aircraft.

The preliminary airspace design process has appropriately accorded "safety" as the highest priority to ensure robust operational safety outcomes. Environmental outcomes, with a particular focus on the minimisation of potential community impacts and the operational efficiency of the facilitated airspace changes has also been a key design criterion.

Instrument Flight Rules (IFR) are the rules that govern the operation of aircraft in Instrument Meteorological Conditions (IMC) (conditions in which flight In IMC, an aircraft must be flown with reference to its onboard flight instruments.) Two sets of rules, IFR or Visual Flight Rules (VFR) exist to govern flight in either IMC or Visual Meteorological Conditions (VMC).

The proposed adjusted SID and new STAR procedures required for Bankstown Airport are designed to be operated under IFR.

Proposed changes to Sydney Basin VFR operations, including some VFR operations associated with Bankstown Airport, are also required to address the introduction of a large Controlled Airspace Volume and a suite of procedures for the commencement of operations at WSI and are considered in a separate Paper – Appendix I (Sydney Basin VFR operations).

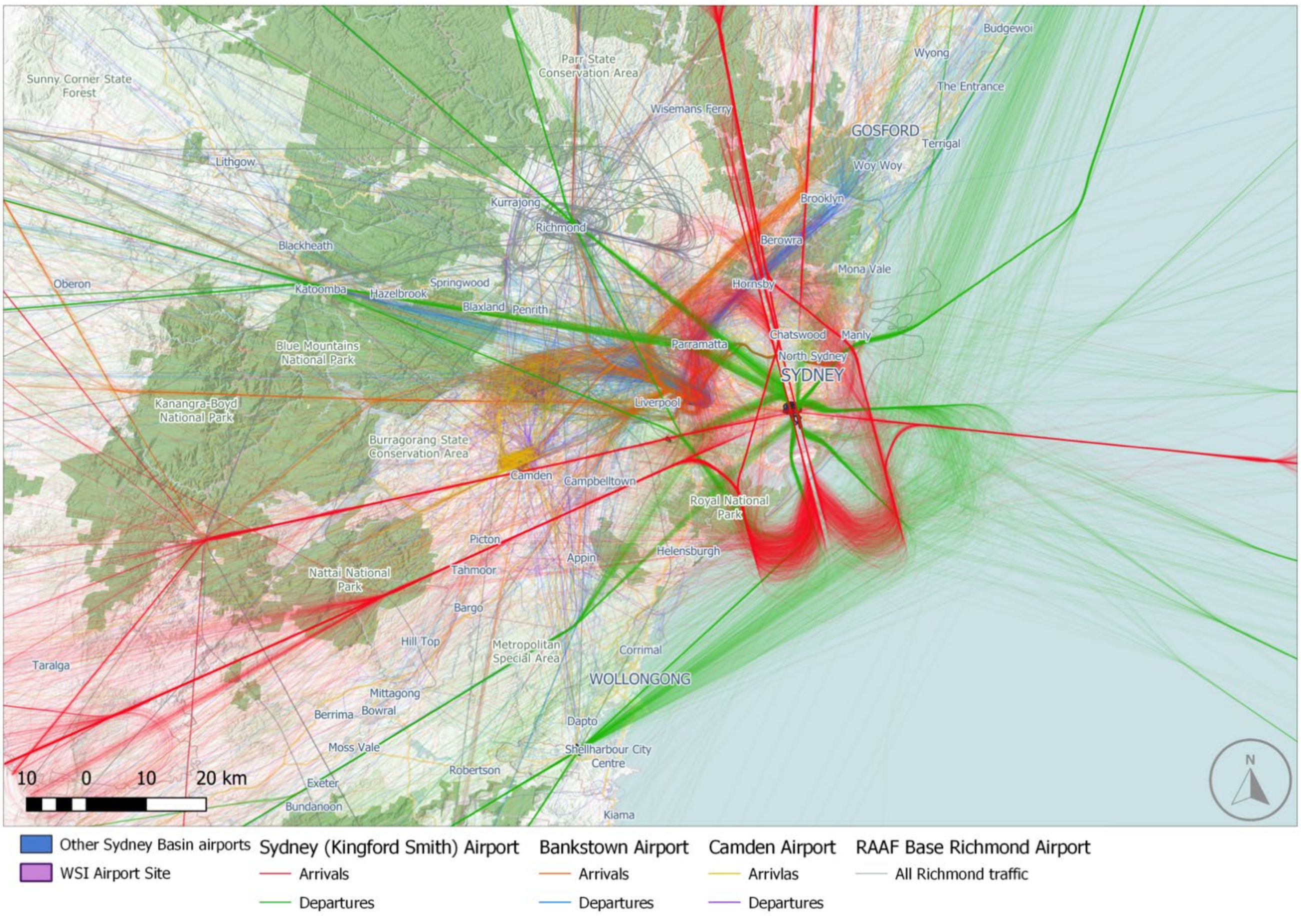


Figure 1.1 Sydney Basin airspace with one-week of flight track movement activity in March 2019

Chapter 2 Background

Bankstown Airport is located approximately midway between Sydney (Kingsford Smith) Airport and WSI (17 kilometres (km) from Sydney (Kingsford Smith) Airport and 24 km from WSI). It caters for a wide range of General Aviation (GA) (both fixed wing and helicopter) activities including flight training, charter flights, aircraft sales and maintenance, air freight and emergency services.

Bankstown Airport operates on a 24-hour, 7 days a week (24/7) basis, handling on average around 700 aircraft flight movements per day. The majority, around 80 per cent of aircraft operating at the airport, are single or twin-engine piston aircraft typically engaged in flight training, private flying and related activities and mostly operating under VFR.

Approximately 4 per cent of the aircraft are turbo-props, which are typically involved in charter, business, corporate and other aerial work activities. Jet aircraft account for only one per cent of operations at Bankstown Airport and typically include business and private activities. These aircraft mostly operate under IFR.

Rotary aircraft (helicopters) represent around 16 per cent of aircraft activity and are typically involved in emergency services and government agency operations, flight training, charter or freight activity. Most helicopters operate under VFR.

The safe introduction of WSI flight paths (SIDs/STARs) into the Sydney Basin airspace will result in a change in the way aircraft operating in controlled and uncontrolled airspace will be required to fly in the future.

With the commencement of operations at WSI in 2026 aircraft operating to and from Bankstown Airport under IFR, particularly to and from the north, northwest, west and southwest, will need to operate on specifically designed SIDs and STARs to provide separation assurance with the newly introduced flight paths for WSI operations.

The proposed SID change and new STARs for IFR operations to and from Bankstown Airport will be published and implemented prior to the opening of WSI in 2026. The changes would be introduced on a scheduled Aeronautical Information Regulation and Control (AIRAC) date, prior to the opening of WSI. Introducing these changes ahead of WSI's opening will allow pilots and air traffic control to adjust their systems and become familiar with changes to current procedures before single runway operations at WSI commence and will minimise the likelihood of conflicts or incidents in the airspace.

Figure 2.1 shows the location of WSI, the locations of other key airports in the Sydney Basin and geographic extent of a nominal area radiating 45 nautical miles (nm) (around 83 km) from the Aerodrome Reference Point (ARP) of WSI.

Figure 2.2 is the Aerodrome Chart for Bankstown Airport. The chart has been extracted from the Aeronautical Information Package (AIP) Departure and Approach Procedures (DAP) to assist the interpretation of the information presented in this Paper. It depicts the general layout of Bankstown Airport including its 3-runway system and orientations, runway headings (11R, 29L, etc.) and dimensions (lengths and widths).

Figure 2.1 Location of airports in the Sydney Basin

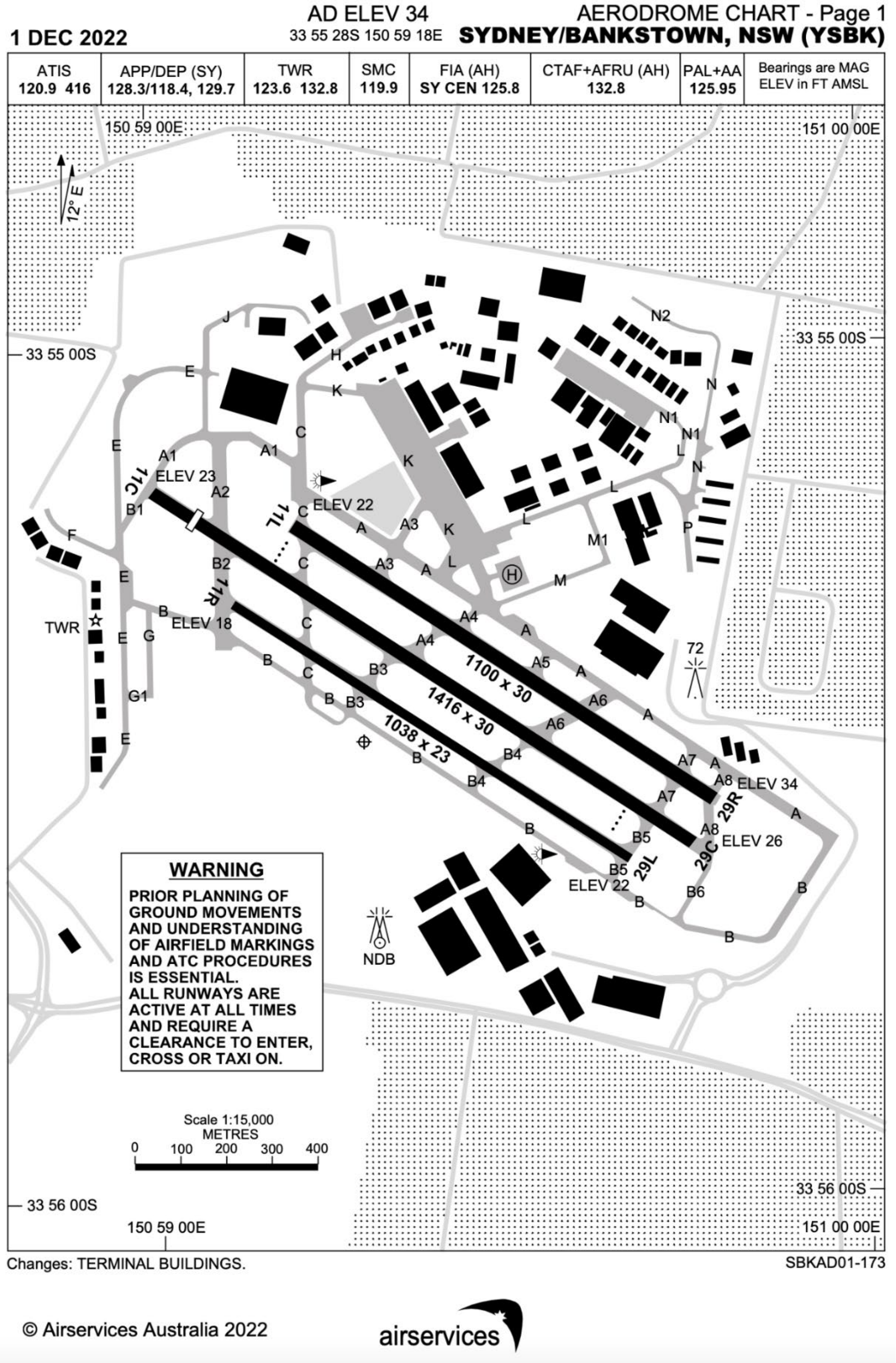


Figure 2.2 Bankstown Airport – Aerodrome Chart – (AIP / DAP)

Chapter 3 Purpose

The purpose of this document is to present an assessment of the proposed redesigned SID and new STAR procedures required for IFR operations at Bankstown Airport. It includes an analysis and assessment of potential noise impacts from aircraft overflights of these proposed facilitated airspace changes.

It describes the reason for the facilitated airspace changes and the associated safety and operational considerations, along with other environmental issues.

Chapter 4 Current operations at Bankstown Airport

Figure 4.1 presents the aircraft mix operating at Bankstown Airport in the 2019 financial year. This information was extracted from the 2019 Bankstown Airport Master Plan.

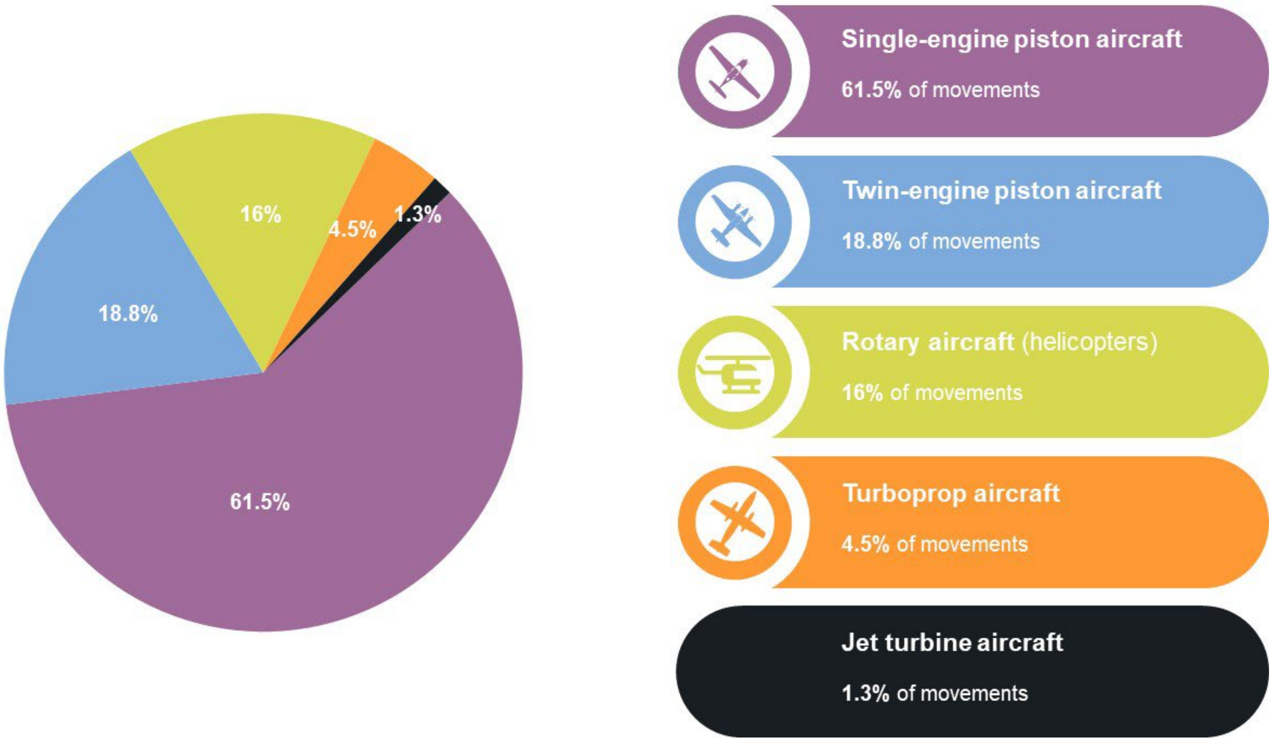


Figure 4.1 Bankstown Airport aircraft fleet mix in 2019 financial year

4.1 Current Bankstown Airport IFR flight paths

Figure 4.2, presents the current IFR flight paths at Bankstown Airport for the month of March in 2019. In 2019 there were approximately 642 fixed-wing flight movements per day operating to and from Bankstown Airport. Of these approximately 38 per day were flights operated by jet and turbo-prop aircraft which could be expected to consistently operate under IFR. It is also expected that a number of travel and training flights by single and twin-engine aircraft will operate under IFR.

Nearly 100 percent of the twin-engine aircraft fleet would be expected to be capable of operating IFR and a small proportion (around 10 per cent) of single-engine aircraft would also operate and train under IFR.

Applying broad IFR percentages to the average daily movements and aircraft types operating at Bankstown Airport suggests around 145 IFR flight movements per day.

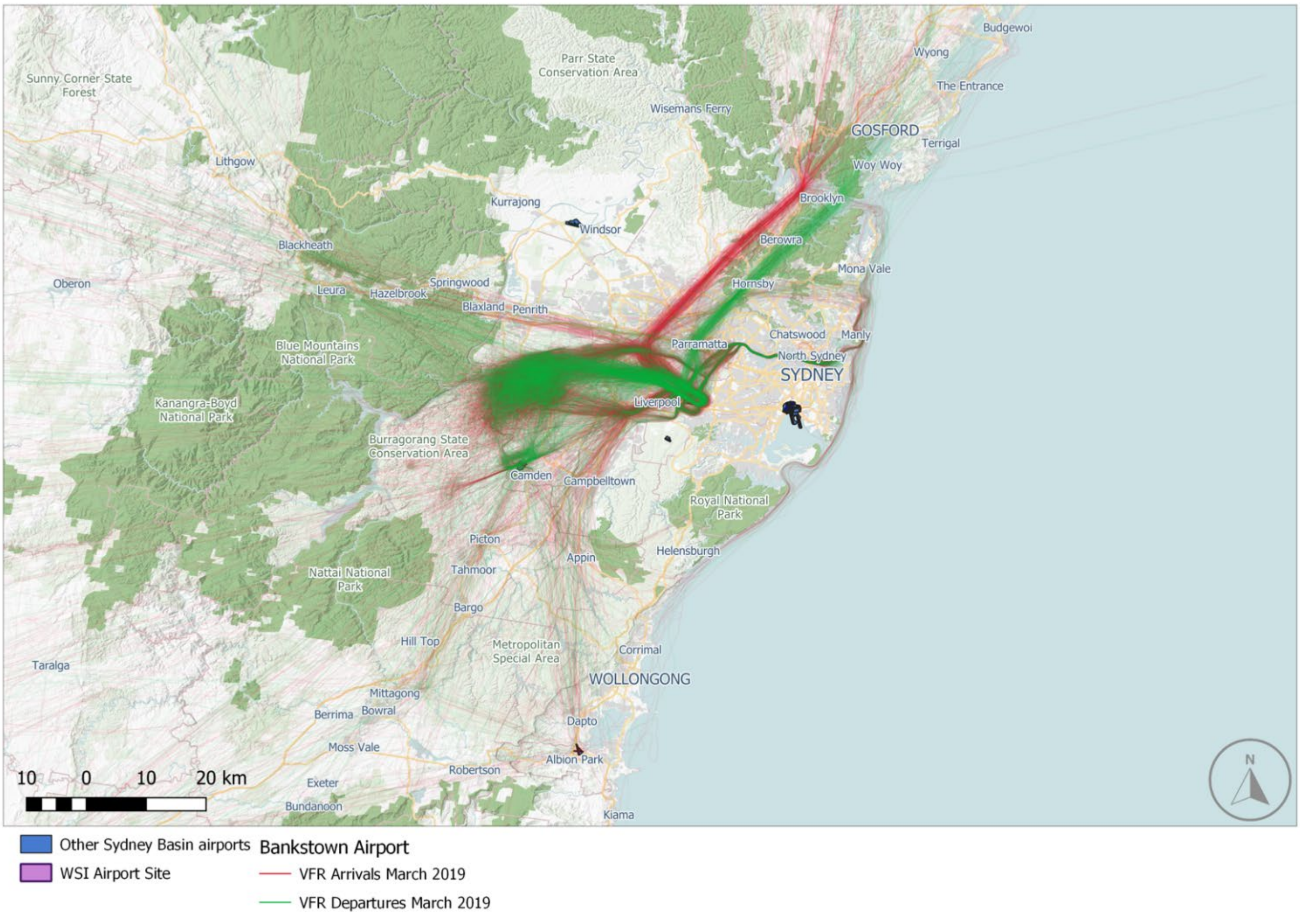


Figure 4.2 Current IFR flight path movement activity for Bankstown Airport for the month of March 2019

4.1.1 Current Bankstown Airport IFR departures

A single SID currently exists for use by IFR aircraft departing from Bankstown Airport to all destinations as depicted in Figure 4.3. It is only applicable to aircraft departing from either Runway 11C or Runway 29C. Bankstown Airport operates a 3-runway system as depicted in Figure 2.2.

In the Runway 29 direction, the initial SID flight path extends along the runway centreline broadly on a track of 290 degrees.

In the Runway 11 direction aircraft are required to maintain the runway alignment until climbing through 500 feet (ft) when they must turn left and take up a track of 290 degrees.

Aircraft departing from either Runway 11C or Runway 29C leave the Bankstown Airport Control Zone (CTR) approximately 2 nm (3.7 km) from the airport on the same westerly heading of 290 degrees. Their tracks over the ground are located differently because of the left turn required by aircraft departing Runway 11C (refer to Figure 4.3).

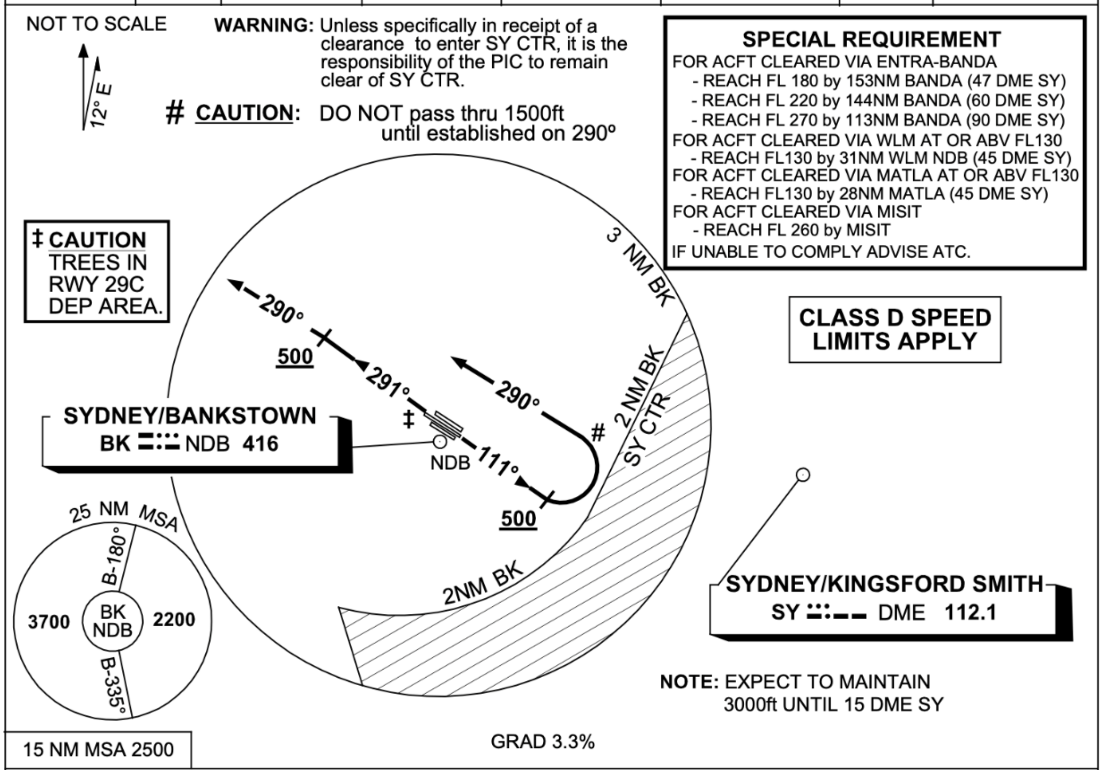
Once established on a heading of 290 degrees, aircraft will climb to the air traffic control cleared altitude, initially 3,000 ft (1 km), and once clear of the Bankstown Airport CTR, aircraft will be instructed by Bankstown Airport Tower air traffic control to contact Sydney Terminal Area (TMA) Control for onwards clearance. Figure 4.4 shows the current Sydney Basin airspace boundaries.

Onward clearance will either be a clearance for aircraft to track direct to the first enroute waypoint, subject to separation with other aircraft in the Sydney Basin airspace, or a series of radar vectors and progressive climb instructions until the aircraft is safely able to be cleared direct to an enroute waypoint.

24 MAR 2022

STANDARD INSTRUMENT DEPARTURES (SID)
BANKSTOWN EIGHT DEPARTURE RWY 11C/29C
SYDNEY/BANKSTOWN, NSW (YSBK)

ATIS	SMC	TWR	DEP	FIA (AH)	CTAF+AFRU (AH)	PAL+AA	Bearings are MAG
120.9 416	119.9	123.6 132.8	AS ADVISED	SY CEN 125.8	132.8	125.95	ELEV in FT AMSL



BANKSTOWN EIGHT DEPARTURE

PROC NOT AVBL FROM RWYS 11L/29R AND 11R/29L

WARNING: Unless specifically in receipt of a clearance to enter SY CTR, it is the responsibility of the PIC to remain clear of SY CTR.

RWY 11C

- Track 111°
- AT 500ft, turn LEFT track 290º
- Contact Departures when advised by Tower, or approaching controlled airspace

CAUTION: DO NOT pass thru 1500ft until established on 290º

RWY 29C

- Track 291°
- AT 500ft, turn LEFT track 290º
- Contact Departures when advised by Tower, or approaching controlled airspace

COMMUNICATIONS FAILURE PROCEDURE

On recognition of communications failure

- Squawk 7600
- Maintain last procedure track for two minutes, and
- CLIMB IF NECESSARY TO MINIMUM SAFE ALTITUDE, to maintain terrain clearance, then
- proceed in accordance with the latest ATC route clearance acknowledged.

Changes: PAL+AA, Editorial.

SBKDP01-170

airservices

Figure 4.3 Runway 11C/29C SID at Bankstown Airport – (AIP DAP)

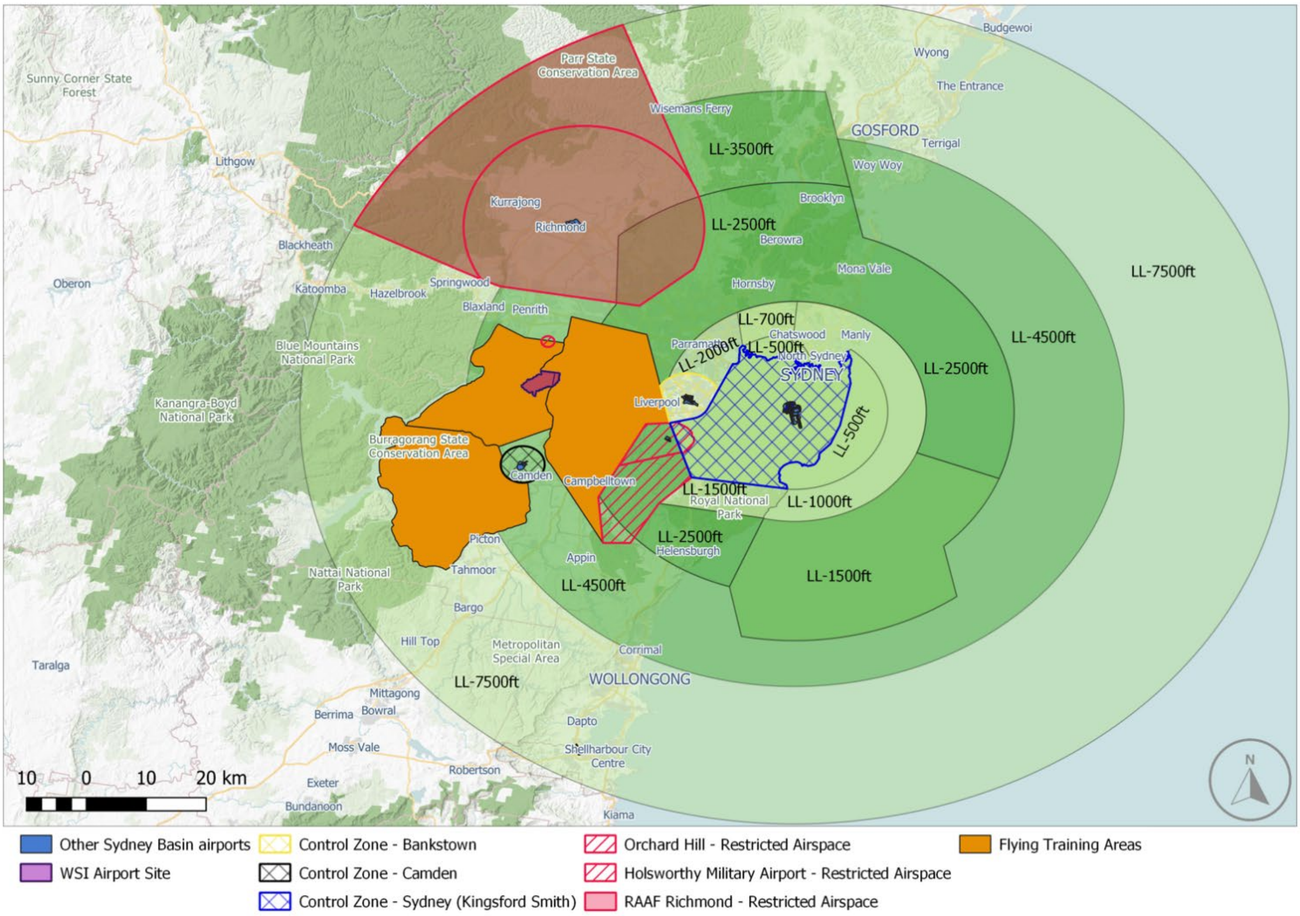


Figure 4.4 Current Sydney Basin Airspace Control Area (CTA) and Control Zone (CTR) boundaries including the Lower Level (LL) of controlled airspace

4.1.2 Current Bankstown Airport arrivals

IFR arrivals to Bankstown Airport plan to fly directly from their last enroute waypoint or via one of the 2 published routes that terminate at Bankstown Airport.

Once the flight is established in visual conditions above the lowest safe altitude (LSALT) for the rest of the track to be flown to Bankstown Airport, Sydney TMA air traffic control will, subject to separation with other Sydney Basin aircraft, provide the aircraft with a direct track to Bankstown Airport. This will include a clearance to leave the controlled airspace on descent, either into the surrounding uncontrolled airspace or directly into the Bankstown CTR, depending on the descent profile of the aircraft.

If it is expected that aircraft will not encounter visual conditions before reaching the LSALT for the route segment to be flown, then aircraft will be radar vectored into a position where an instrument approach can be conducted (refer to Section 4.1.3).

4.1.3 Bankstown Airport Instrument approaches

Three non-precision approach procedures exist for Bankstown Airport (refer to Figures 4.6, 4.7 and 4.8). Two procedures, (RNP 11C and NDB 11C) provide approaches for aircraft from westerly and southerly directions while one (NDB-A) procedure provides approaches from the north and east. The NDB 11 C and the NDB A procedures are rarely flown. The RNP 11C also shares much of its route with the Westmead Hospital Required Navigation Performance (RNP) approach from the same direction.

As well as providing a procedure for an IFR aircraft in poor weather to complete its flight to Bankstown, the 2 procedures from the west are also used by IFR capable aircraft for the purpose of training and practicing for IFR pilot qualifications, or for pilots ensuring CASA recency requirements are met for existing IFR licence qualifications.

4.2 Night operations – 11 pm to 6 am

Bankstown Airport operates on a 24/7 basis. Figure 4.5 presents current aircraft flights in the Sydney Basin airspace for the night period between 11 pm to 6 am. The majority of the 98 flights in the sample one-week period for March 2019 are associated with Bankstown Airport operations. With Sydney (Kingsford Smith) Airport subjected to restricted night operations due to its 11 pm to 6 am curfew, the Sydney Basin airspace has increased flexibility for operations. WSI will also operate on a 24/7 basis, and when its operations commence and due to the proximity of those operations and flight paths to Bankstown Airport, it is expected that the majority of IFR night operations out of Bankstown Airport will utilise the proposed new IFR procedures.

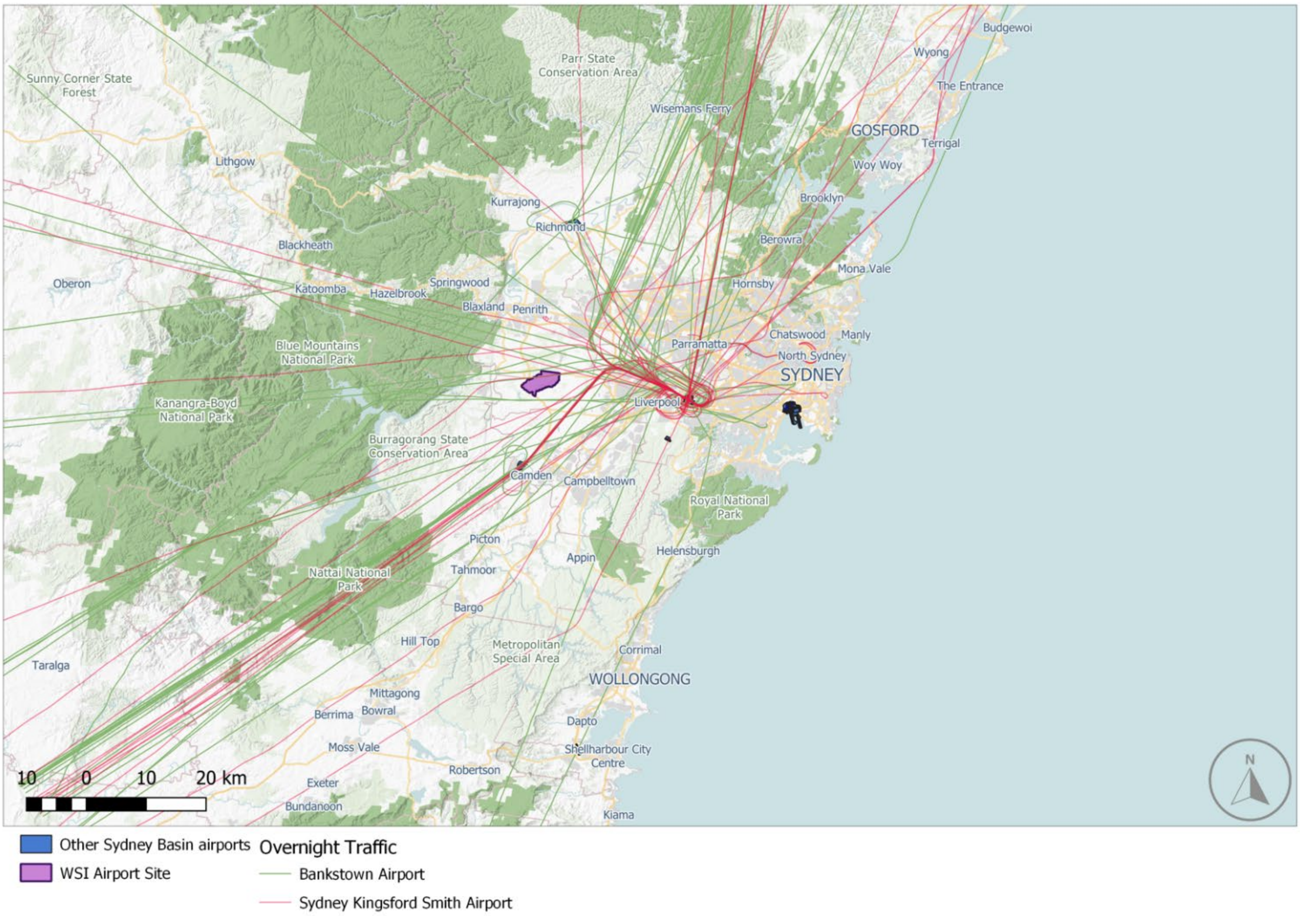


Figure 4.5 Current Sydney Basin night flights exluding Sydney (Kingsford Smith) Airport – 11 pm to 6 am (one week)

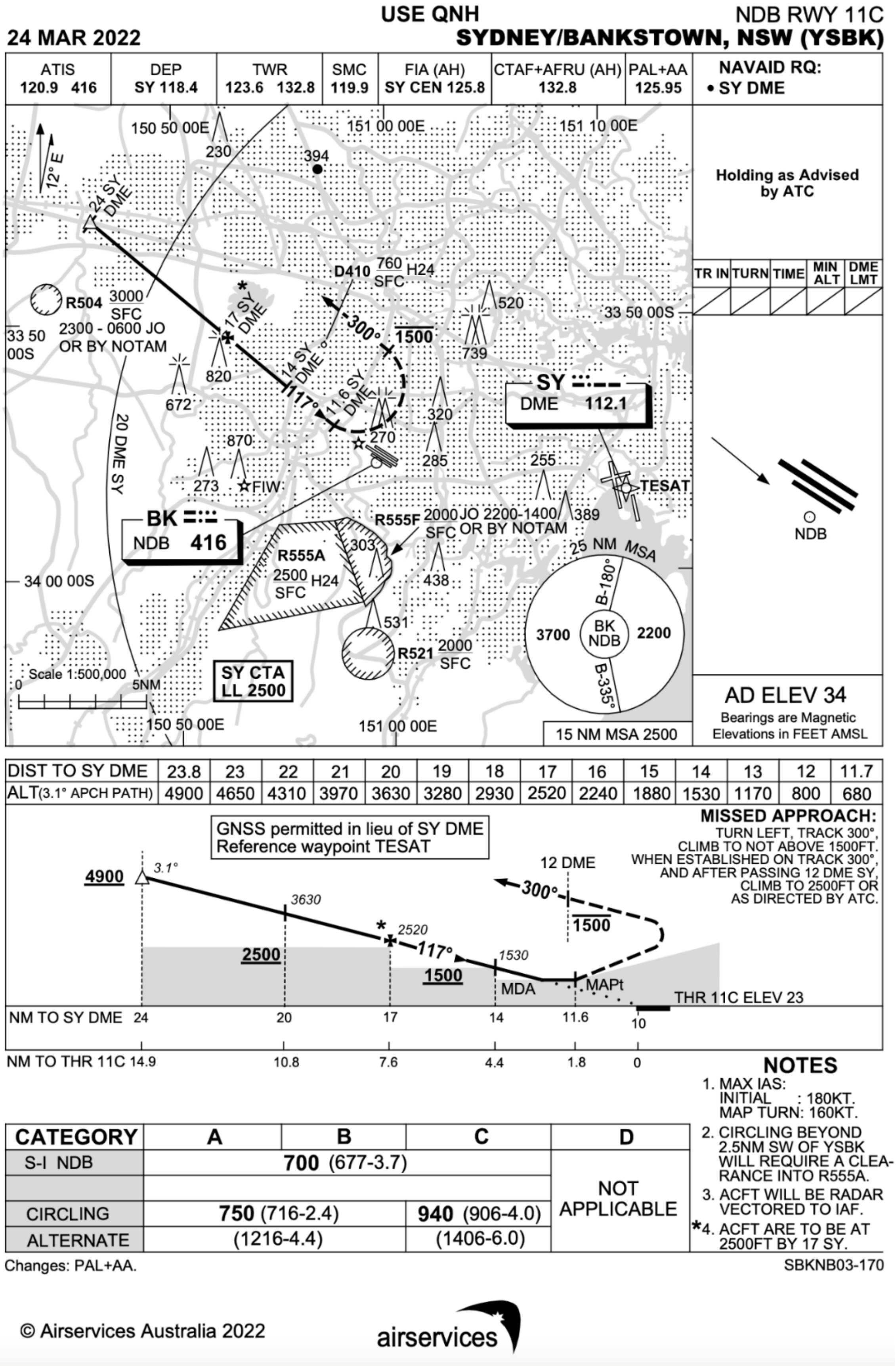


Figure 4.6 NDB approach – Runway 11C – (AIP DAP)

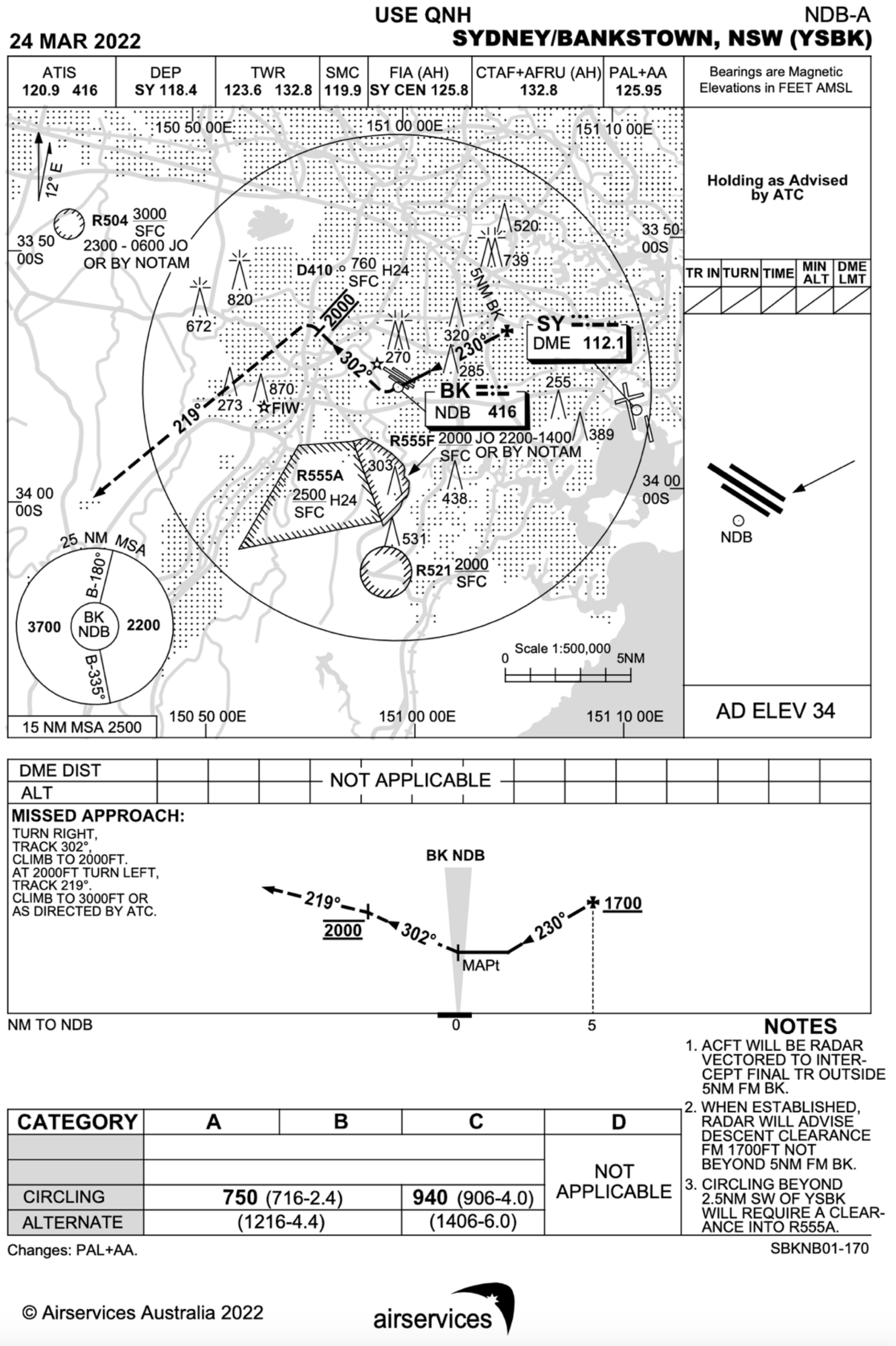


Figure 4.7 NDB A – (AIP DAP)

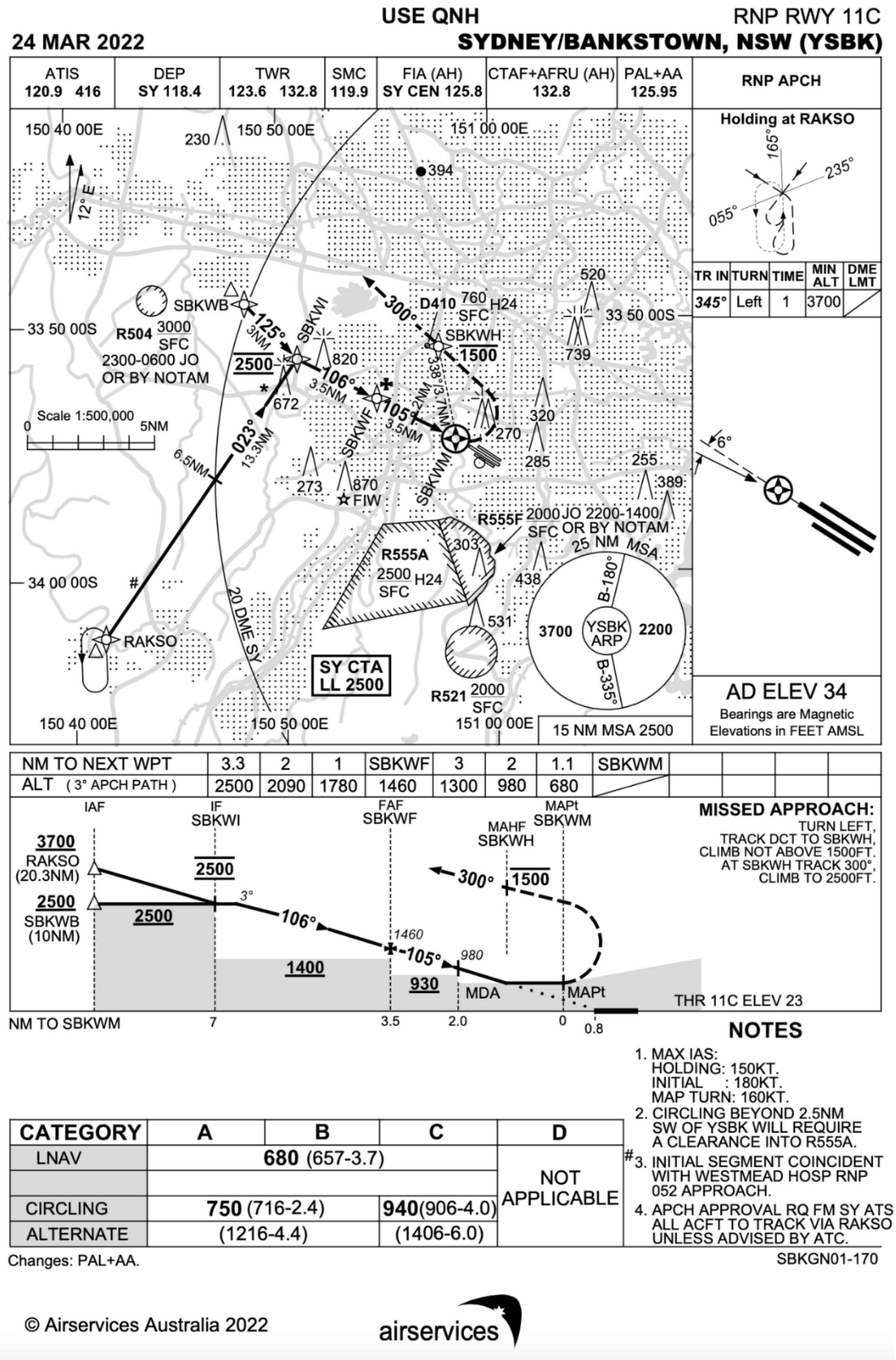


Figure 4.8 RNP Runway 11C – (AIP DAP)

Chapter 5 Bankstown Airport noise management

Aircraft noise is complex and varies according to a range of factors, including:

- aircraft type (including age of the aircraft, number and type of engines, weight)
- aircraft altitude
- engine power (thrust) settings and speed
- pilot technique
- meteorological conditions.

Aircraft noise is present during all phases of flight but is most significant during take-off and landing, due to the aircraft's proximity to the ground. During take-off, the weight and throttle settings are at their highest point, and therefore the noise generated is principally engine noise. In contrast, during landing, throttle settings are varied, and landing gear and control surfaces are extended, with greater noise being generated by the airframe.

Bankstown Airport is not under curfew. However, circuit training is restricted to the following hours:

- Monday to Friday from 6 am until 10 pm (10:30 pm during daylight savings)
- Saturdays and Sundays from 7 am until last light.

These procedures are designed to reduce the impact of night-time aircraft noise on the surrounding community.

For operational and safety reasons, aircraft prefer to land and take-off into the wind, or with a minimal tailwind (typically less than 5 knots (kt) or around 9 kilometres per hour (km/h). The wind direction determines the mode of runway operation (i.e., runway direction) in use and flight path designation. At Bankstown Airport, air traffic control assigns the runway direction and flight route depending on the wind direction and speed, runway conditions and visibility.

A set of noise abatement procedures are in place at Bankstown Airport. They detail the preferred runway and circuit directions to be flown and limitations during prescribed hours of the day and night. The noise abatement procedures are published in the Australian AIP and are applicable to all aircraft operations at Bankstown Airport.

Bankstown Airport has also an established a voluntary Fly Neighbourly Procedures Program. It was established in 2018 and is a joint program between the airport operator, Aeria Management Group and the aviation community (i.e., operators, tenants and flight training schools) based at the airport.

The Fly Neighbourly Procedures Program contains neighbourly procedures for pilots to consider (refer to Figure 5.1). It outlines flight procedures for fixed-wing aircraft and helicopters that will assist with noise-related airport issues. This includes noise from aircraft operations on the ground (i.e., taxiing, engine testing and maintenance) and in the air.

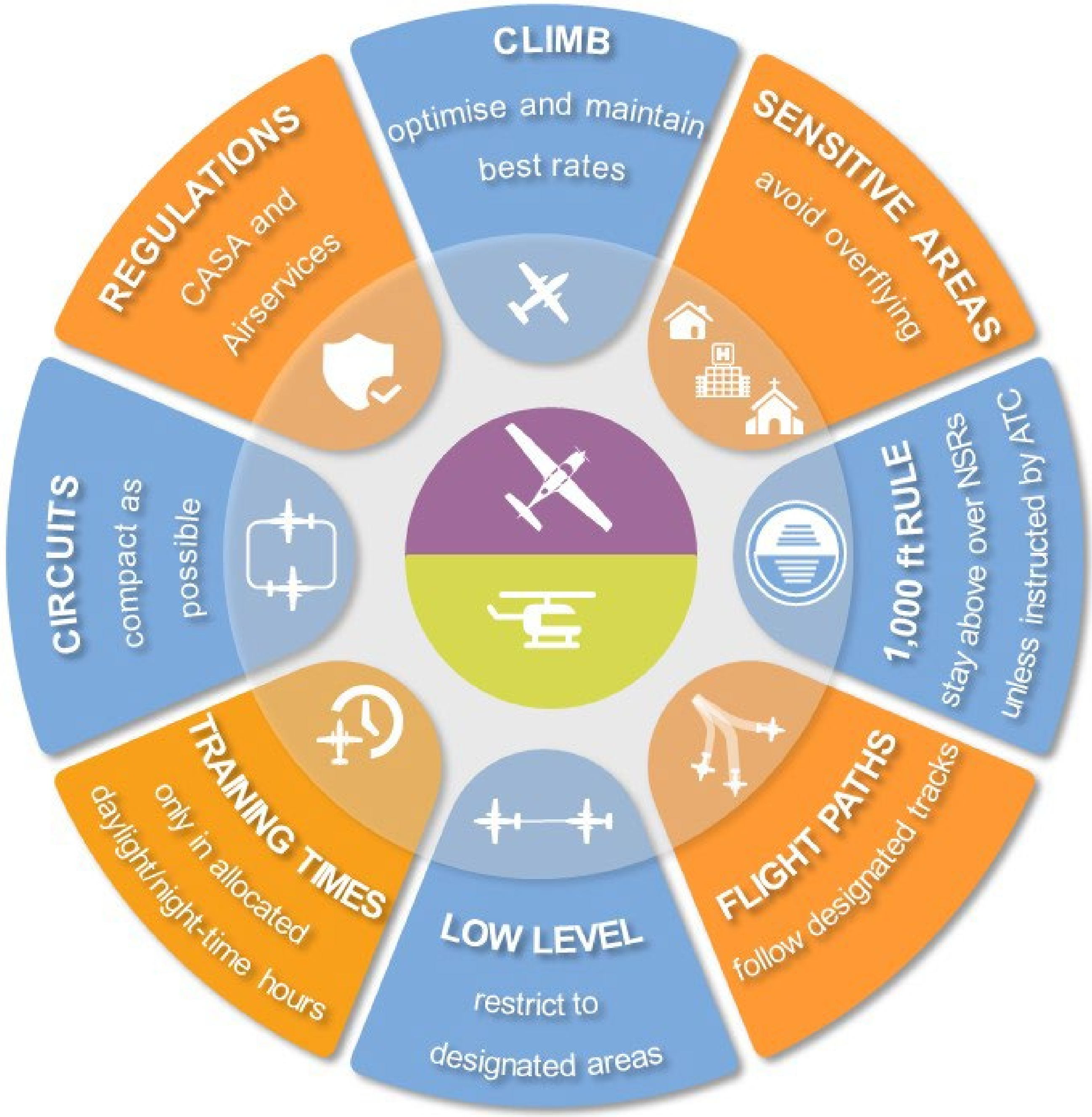


Figure 5.1 Fly neighbourly procedures program selected procedures

Chapter 6 Bankstown Airport post WSI commencement of operations

Figure 6.1 presents the proposed airspace boundary extents across the Sydney Basin airspace after the opening of WSI in 2026.

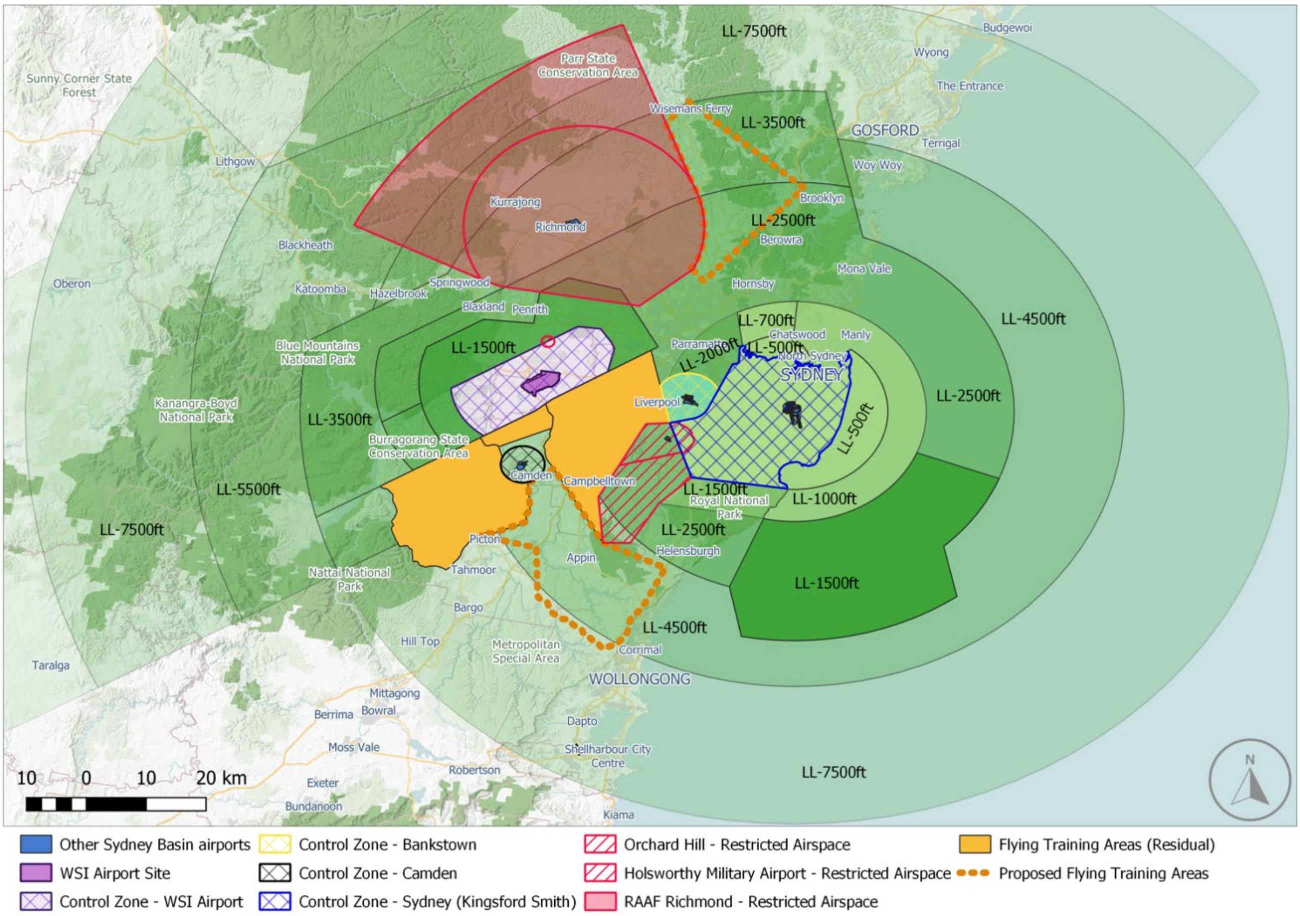


Figure 6.1 Proposed Sydney Basin Airspace Control Area (CTA) and Control Zone (CTR) boundaries including the Lower Level (LL) of controlled airspace

After the opening of WSI the lateral and vertical dimensions of the Bankstown CTR may change.

6.1 Proposed Bankstown Airport IFR departures

Proposed SIDs have been designed from both Runway 11C and Runway 29C, to take aircraft in a northerly or southerly direction safely around the WSI aircraft manoeuvring area. The proposed northerly SID will be used for aircraft departing to the north, east and north-east, and could also be used by aircraft departing to the north-west and west in some circumstances. The proposed southern SID will be used for west and north-western departures as well as those to the south.

The basic initial tracking requirements of the current Runway 11C and Runway 29 C SID at Bankstown have been retained, (refer to Figure 4.3 and Figure 6.2). New outer flight paths have been designed to ensure safety by design outcomes will exist between WSI operations and aircraft departing Bankstown Airport (refer to Figure 6.3).

Aircraft will be tactically radar vectored from the last SID waypoint (waypoint NB013 to the north and waypoint NB148 to the south) to their first enroute waypoint.

However, subject to separation with other aircraft in the Sydney Basin, aircraft on these SIDs may be radar vectored from any point along the SID track to their first enroute waypoint.

Where the level of air traffic control workload proves to be too high in managing this radar vectoring, the nominal SID path may be altered to reflect the air traffic control standard vectoring path.

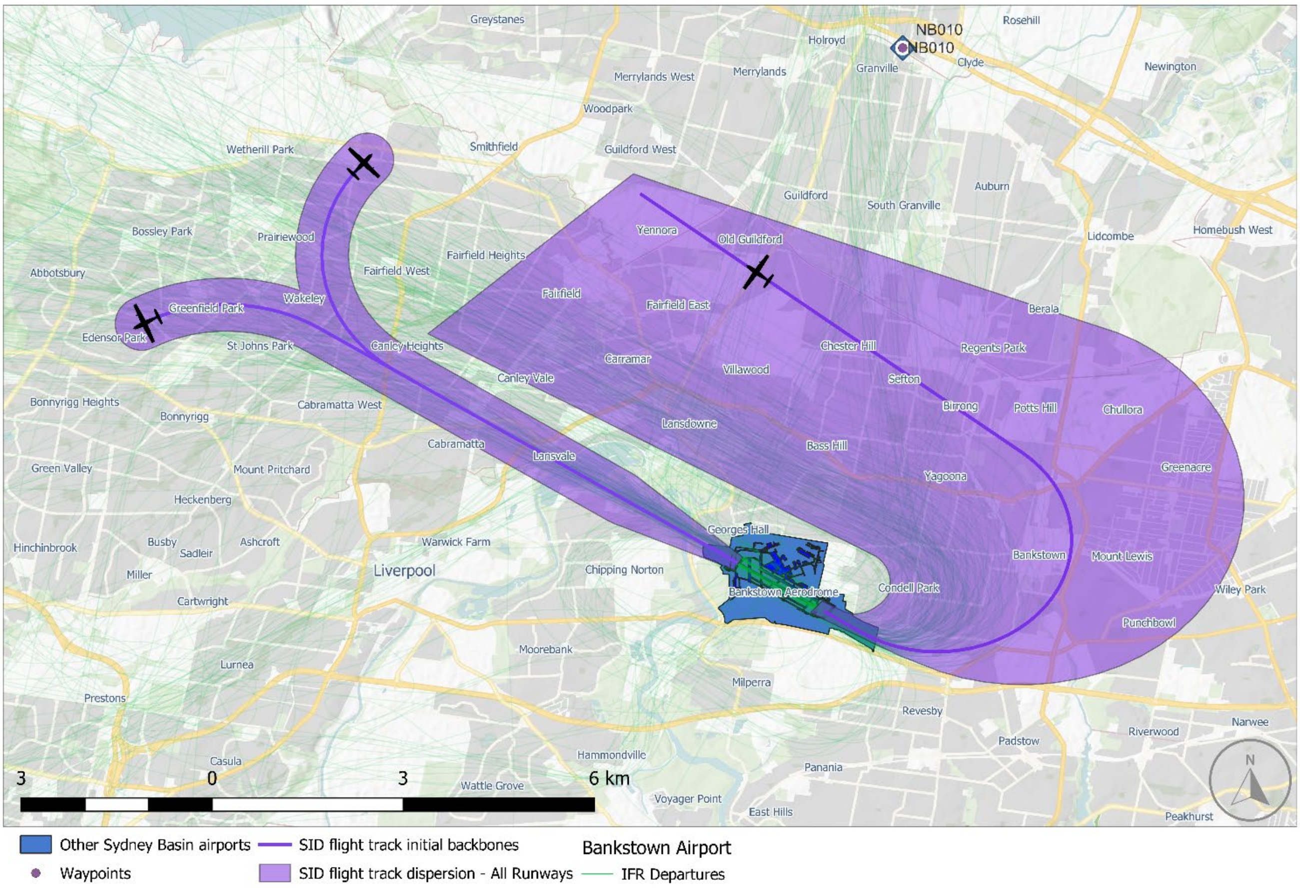


Figure 6.2 Bankstown Airport – current departures and future initial SID flight paths

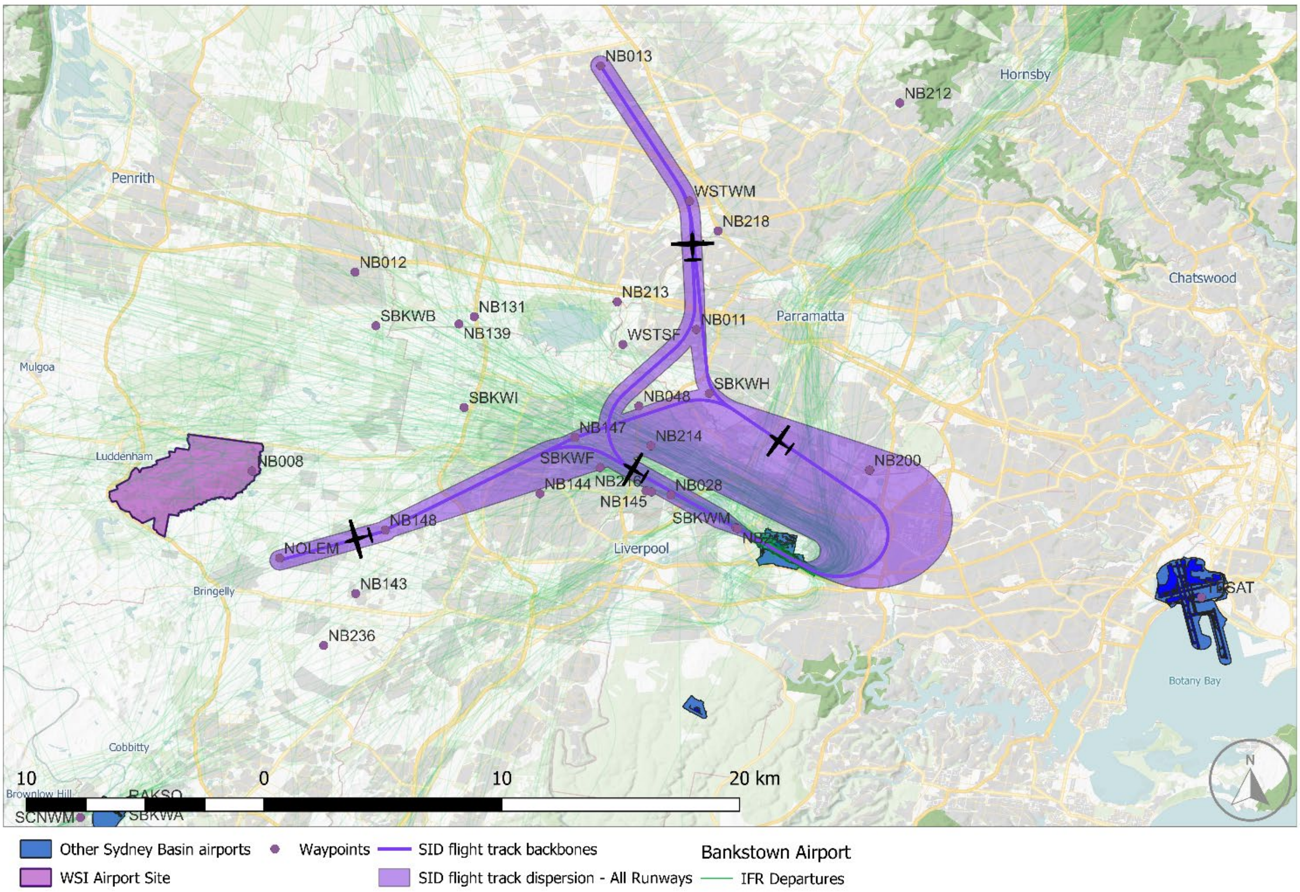


Figure 6.3 Bankstown Airport – proposed outer SID flight paths

Table 6.1 Proposed SIDs – Waypoints and flying heights

Waypoint Identifier	Typical aircraft height above terrain
SID 11C NORTH	
SBKWH	1,450 ft
WSTWM	1,450 ft
NB013	1,450 ft
SID 11C SOUTH	
SBKWH	1,450 ft
NB147	2,450 ft
NB148	2,450 ft

Waypoint Identifier	Typical aircraft height above terrain
SID 29C NORTH	
NB147	1,450 ft
NB011	1,450 ft
WSTM	1,450 ft
NB013	1,450 ft
SID 29C SOUTH	
NB147	2,450 ft
NB148	2,450 ft

The proposed new waypoints (NB013, NB147, etc.) identified in Table 6.1 have been allocated a temporary identifier which will be replaced by a conforming 5 letter alpha character designator as part of the detailed design phase and implementation of the proposed adjusted procedure.

6.2 Proposed Bankstown Airport IFR arrivals

Four proposed STARs to Bankstown Airport have been designed to provide safety assurance with the new WSI flight paths. Those from the north, west and south-west connect directly to an RNP approach. From the east aircraft will be radar vectored to intercept an RNP approach.

There are 2 proposed RNP approaches. One from the north and one from the south-west, shown in red in Figure 6.4. While each can be flown as an independent procedure they also are included as the last segment of the northern, western and south-western STARS. The initial part of each proposed STAR is shown in purple in Figure 6.4. Each complete STAR consists of the initial section (purple) and the RNP approach (red) (refer to Figure 6.4).

The proposed STAR from the east (purple) is linked to an RNP approach by radar vectoring which could take place at any point along the track after the aircraft crosses waypoint TESAT. This is a very infrequently used flight path.

To ensure separation with WSI and other Sydney Basin airspace traffic, altitude requirements have been placed at appropriate waypoints on each STAR and RNP approach procedure.

Aircraft flying the northern STAR/RNP approach will have a requirement to be below 8,000 ft (2.4 km) at waypoint NB258, below 2,000 ft (610 m) at waypoint NB217, and below 1,500 ft (460 m) at waypoint NB218.

Aircraft flying the proposed western STAR/RNP approach will be required to be below 9,000 ft (2.7 km) at waypoint WYATT, below 6,000 ft (1.8 km) at waypoint NB234, and below 5,000 ft (1.5 km) at waypoint NB235. At waypoint NB235 the track becomes common with the southwestern STAR/RNP approach.

Aircraft flying the south-western STAR/RNP approach will need to be below 9,000 ft (2.7 km) at waypoint AKMIR, below 6,000 ft (1.8 km) at waypoint WELSH and below 5,000 ft (1.5 km) at waypoint NB235 where the flight path becomes common with the western STAR/RNP approach. Aircraft may be below 2,500 ft (760 m) from waypoint RAKSO which is located overhead Camden Airport.

IFR aircraft flight planning to Bankstown Airport must include the appropriate STAR commencement waypoint as part of their flight planned route.

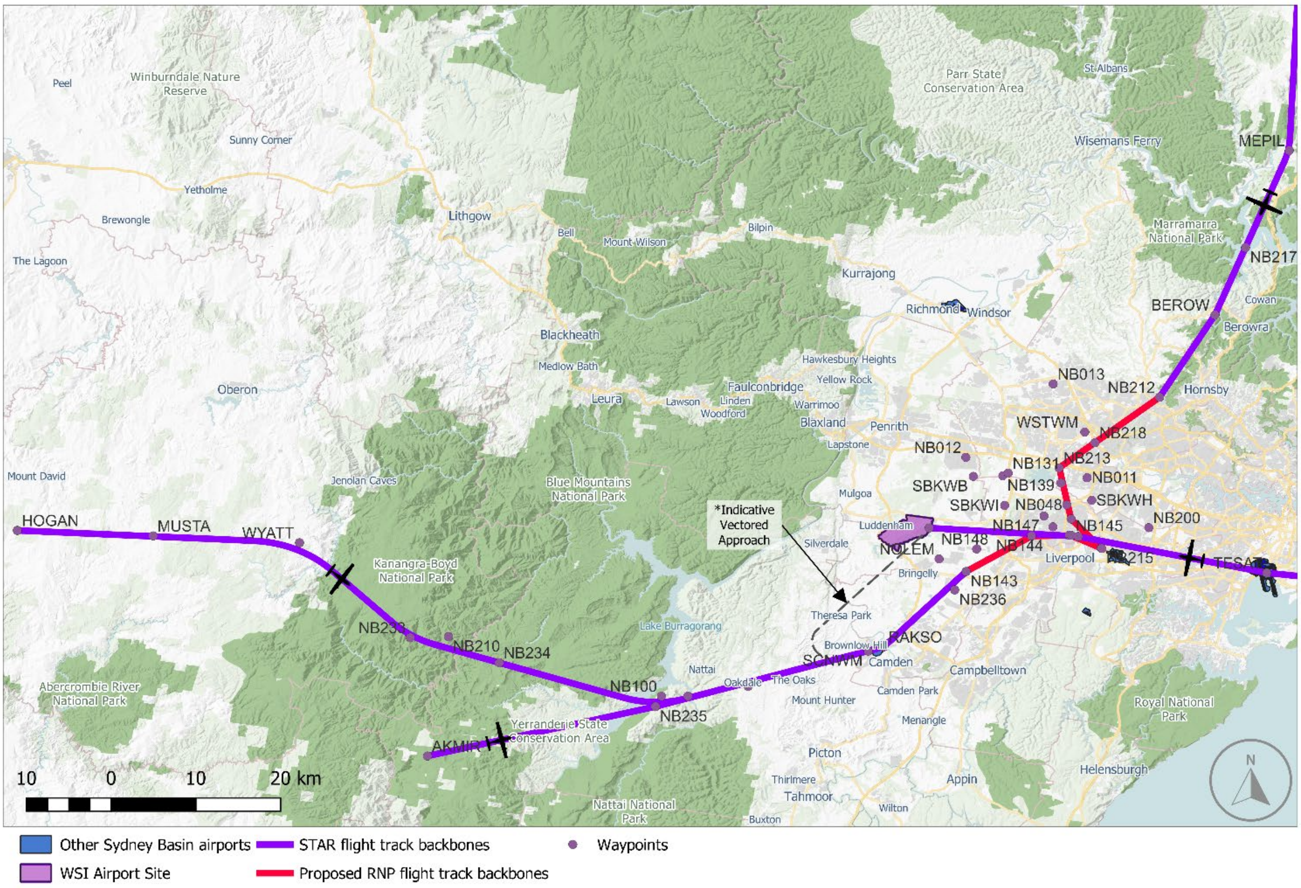


Figure 6.4 Bankstown Airport – proposed STARs and integrated RNP approaches – backbone tracks*

*Nominal backbone flight tracks are used to identify either the centre of an existing flight path, or the designed nominal backbone flight track of a proposed SID or STAR. In the case of a current nominal backbone flight track, it is based on an average of current radar plotted flight tracks. In the case of a proposed new procedure design, the nominal backbone flight track will be primary track used to establish and ensure safety by design standards are met.

Flight dispersion around an actual or proposed nominal backbone flight track will vary considerably where the designed nominal flight path proceeds via a fly-by waypoint. The amount of variation will depend on the angle of turn that the designed flight path is required to make at the waypoint.

6.3 Proposed Bankstown Airport RNP approaches

The current IFR approaches to Bankstown Airport from the west (RNP RWY 11C and NDB RWY 11C) do not provide separation assurance with aircraft operating at WSI. To ensure access to Bankstown Airport for IFR aircraft in weather conditions that require an instrument approach, the 2 proposed new RNP approaches have been designed with shorter segments slightly offset from the Runway 11/29C centreline. This offset and lateral difference from the current IMC approaches is shown in Figure 6.5.

The waypoints associated with the proposed new RNP approaches and the new STAR procedures including the altitude restrictions at those waypoints are presented in Table 6.2.

When traffic levels, weather, or other factors dictate, aircraft may hold on the STARs prior to the commencement point of the approaches.

The final alignment of the RNP approaches from the north and south may move further east to comply with flight procedure design standards but will retain similar architecture.

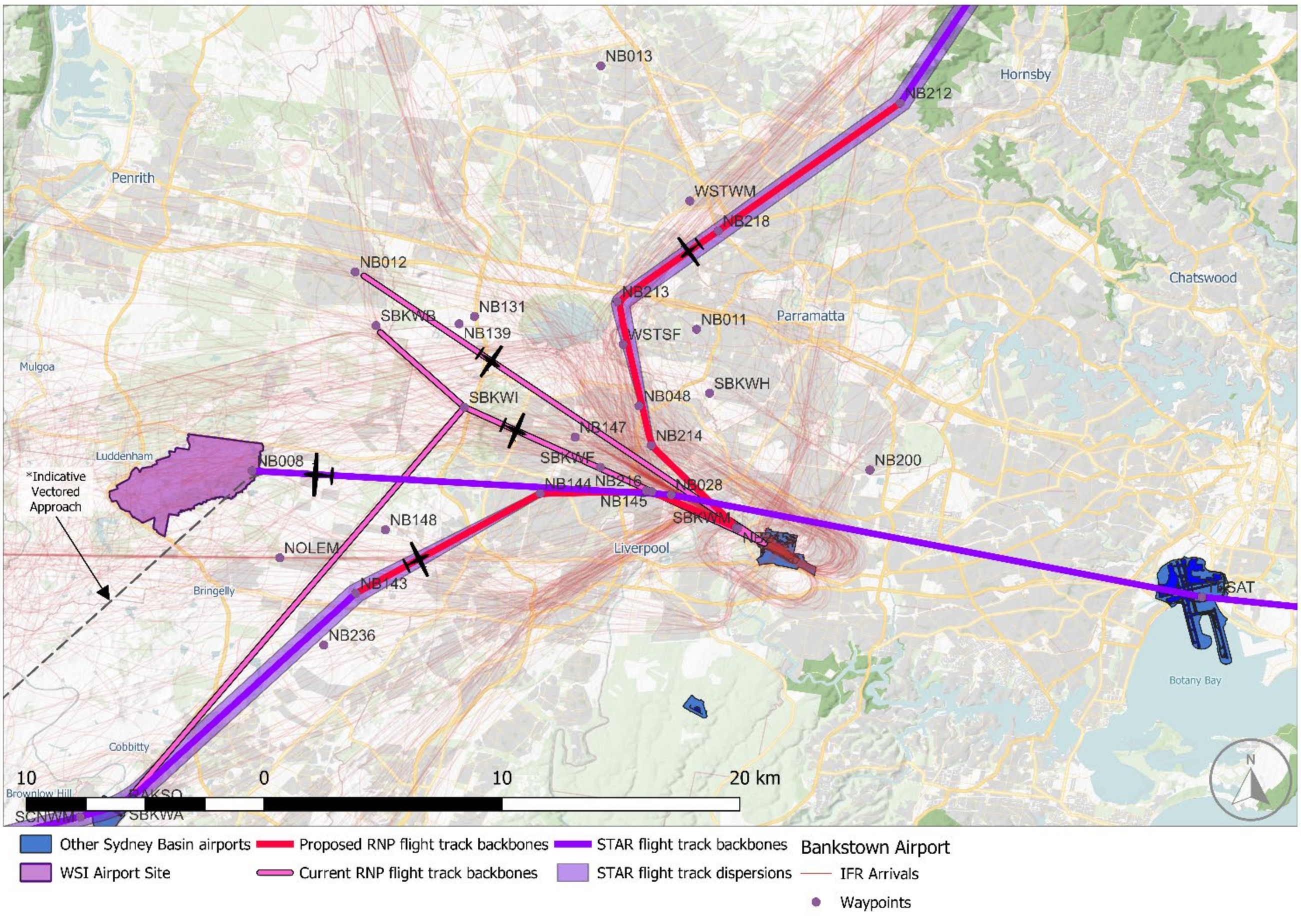


Figure 6.5 Bankstown Airport - current RNP and NDB approaches backbone tracks (with current IFR arrival tracks) versus proposed RNP approaches backbone tracks

Table 6.2 Proposed STARs – Waypoint altitude requirements

Waypoint Identifier	Typical aircraft height above terrain	Waypoint altitude requirement
	NORTH STAR	
MEPIL	3,000 ft	Not specified
NB217	1,500 ft	2,000 ft or below
BEROW	1,500 ft	Not specified
NB212	1,500 ft	Not specified
NB218	1,450 ft	1,500 ft or below
NB213	1,450 ft	Not specified
NB214	1,350 ft	Not specified

Waypoint Identifier	Typical aircraft height above terrain	Waypoint altitude requirement
	SOUTH STAR	
NB235	2,280 ft	5,000 ft or below (over GBM foothills)
RAKSO	2,250 ft	2,500 ft
NB143	1,800 ft	Not specified
NB144	1,500 ft	Not specified
NB145	1,250 ft	Not specified

The proposed new waypoints (NB214, NB235, etc.) identified in Table 6.2 have been allocated a temporary identifier which will be replaced by a conforming 5 letter alpha character designator as part of the detailed design phase and implementation of the proposed adjusted procedure.

6.4 Bankstown Airport proposed IFR transit flights overhead WSI

Flight paths will be designed to enable IFR general aviation aircraft to transit overhead WSI to and from Bankstown Airport. The precise final location of these flight paths will be finalised following an evaluation of the final detailed design of WSI flight paths. This work will primarily take into account safety and environmental considerations.

The proposed transit flight paths will be able to be flown in either direction and are expected to be operated at altitudes above 4,000 ft (1.2 km).

This proposed transit flight paths are expected to be flown infrequently when WSI traffic levels permit and will primarily be flown by aircraft associated with emergency response operations.

These proposed transit flight paths overhead WSI are included in this Appendix as it is expected that they will be flown by a limited number of operations associated with Bankstown Airport. They are further addressed and assessed in Appendix J.

Figure 6.6 depicts the potential IFR transit flight paths overhead WSI and Figure 6.7 includes a suburb overlay.

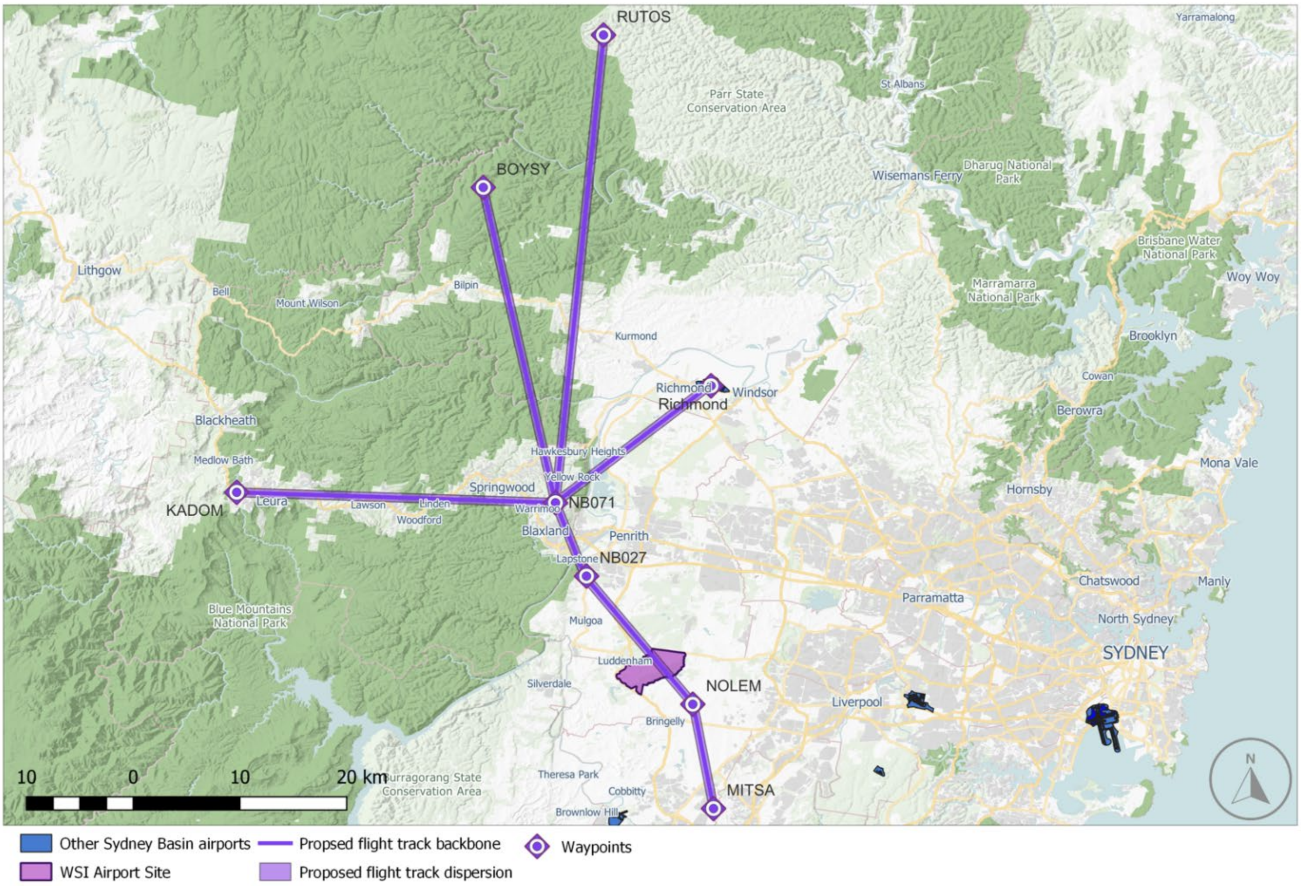


Figure 6.6 Proposed IFR transit flight paths overhead WSI

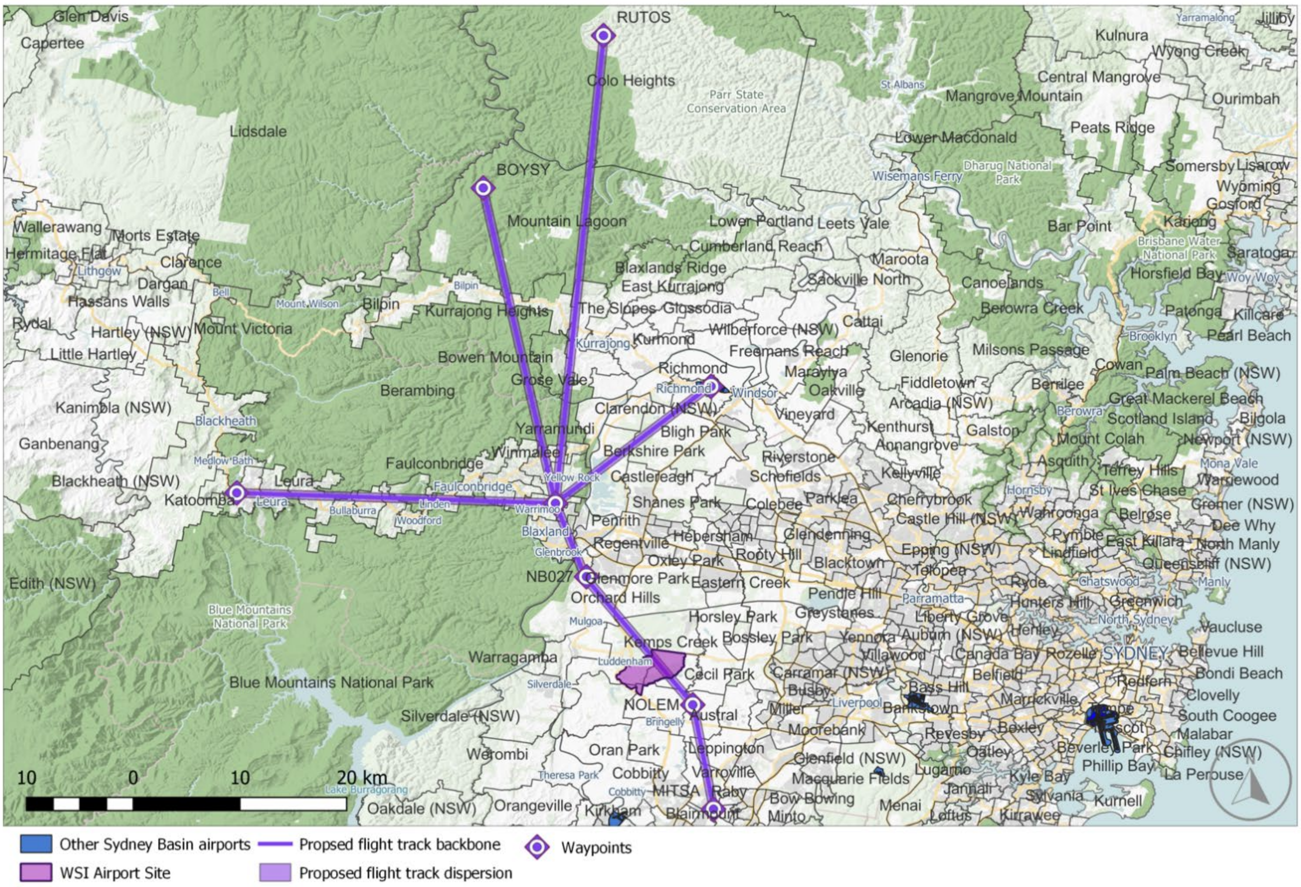


Figure 6.7 Proposed IFR transit flight paths overhead WSI with suburb overlay

6.5 Bankstown Airport traffic projections

The expected aircraft movement projection for Bankstown Airport was extracted from the 2019 Bankstown Airport Master Plan. Figure 6.8 shows an adaptation of this projection out to 2039 prepared by Tourism Futures International.

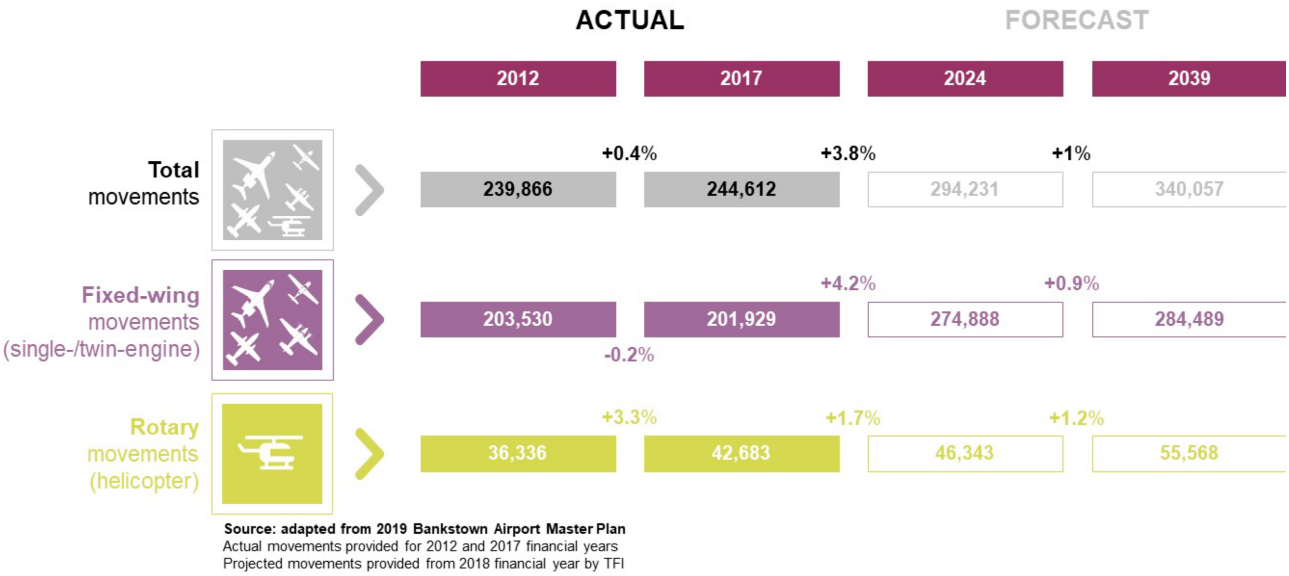


Figure 6.8 Bankstown Airport aircraft movement projection to 2039

In the absence of specific forecast growth data for IFR training and travel flights, the generic annual growth percentages presented in Figure 6.8 would apply evenly across all the various operational sectors of at Bankstown Airport.

Table 6.3 shows the expected fleet mix and projected annual movements for each aircraft type at Bankstown Airport in 2039. This information has been adapted from the 2019 Bankstown Airport Master Plan. The fleet mix generally reflects the types of aircraft currently using the airport. It is not anticipated to change significantly in the future.

Table 6.3 Bankstown Airport aircraft fleet mix projection in 2039

INM code	Aircraft types	Total annual movements	% of total aircraft
Fixed-wing aircraft			
CNA182	General Aviation	8,626	3
BEC58P		64,690	22.7
GASEPF		195,733	68.8
CNA404	Large Piston	125	0
BN2A		175	0.1
BEC300	Small turboprop	3,612	1.3
CNA208		5,188	1.8
PA60		313	0.1
ATR42	Large turboprop	1,000	0.4
DHC830		40	0
SA227		1,754	0.6
CNA750	Small turbofan	250	0.1
CNA510		2,922	1
GV		52	0
BAE146	Large turbofan	10	0
	Total fixed-wing aircraft	**284,489**	**100**
Helicopters			
B427	General Aviation	2,182	3.9
B407		4,160	7.5
R44		17,514	31.5
R430		9,428	17
R44	Training	22,284	40.1
	Total helicopters	**55,568**	**100**
	TOTAL ALL AIRCRAFT	**340,057**	**100**

Chapter 7 Aircraft noise impact assessment

The aircraft noise assessment of the proposed changes to procedures for IFR operations at Bankstown Airport is qualitative in nature due to the many uncertainties in current and future IFR movement numbers. The extent of these impacts is partially dependent on projected demand schedules and the mix of aircraft expected to operate at Bankstown Airport.

Based on the best information currently available, a qualitative assessment of aircraft noise impacts relating to IFR operations at Bankstown Airport is included in Chapter 21 (Facilitated impacts).

7.1 Estimated overflight noise levels

To support a qualitative analysis of potential noise from operations, noise data was interpolated from a series of Noise-Power-Distance (NPD) curves generated utilising the Aviation Environment Design Tool (AEDT) to provide an indication of what overflight noise from suitable representative aircraft types expected to operate at Bankstown Airport and could be expected on existing tracks, or on tracks that are proposed to have either changed laterally or vertically or both. The generic NPD charts are contained in Technical paper 13: Facilitated changes.

Average expected overflight noise levels in A-weighted decibels (dB(A)) can be determined from the NPD data by selecting the most suitable aircraft type, subtracting the ground level at a location from the expected operating level of the IFR flight, and interrogating the appropriate table below (refer to Tables 7.1 to 7.3) representing a particular phase of flight – climb, level flight, or descent. Informed by typical operating techniques, it has been assumed that for aircraft in flight, the engine power (thrust) settings adopted are:

- climb – 100 per cent (considered worst case – typically take-off will be at a de-rated engine power (thrust) setting)
- cruise (level flight) – 80 per cent
- descent – 50 per cent.

Due to the low movement numbers expected to adopt the proposed future IFR procedures and the high variability in potential noise variation from the different operating aircraft types, no attempt is made to provide cumulative noise impacts on the proposed new IFR tracks.

Table 7.1 to Table 7.3 present predicted average overflight noise levels in dB(A) for the 3 broadly representative phases of flight. This data has been extracted from relevant airframe NPD curves generated utilising the internationally recognised aircraft noise and emissions calculation program – Aviation Environmental Design Tool (AEDT), developed by the United States Federal Aviation Administration (US FAA).

Table 7.1 Predicted average overflight noise levels in dB(A) for Departure Climb

Aircraft	400 ft	1,000 ft	2,000 ft	4,000 ft	10,000 ft
Saab 340 – Twin turboprop	87	78	71	64	53
B 58 – Beechcraft Baron – Twin-engine prop	89	81	74	66	55
C 172 – Cessna Skyhawk – Single-engine prop	80	70	62	54	41
C510 – Cessna Citation Business Jet	95	85	77	67	52

Table 7.2 Predicted average overflight noise levels in dB(A) for Cruise

Aircraft	400 ft	1,000 ft	2,000 ft	4,000 ft	10,000 ft
Saab 340 – Twin turboprop	N/A	76	69	62	51
B 58 – Beechcraft Baron – Twin-engine prop	N/A	77	71	63	52
C 172 – Cessna Skyhawk – Single-engine prop	N/A	66	59	51	38
C510 – Cessna Citation Business Jet	N/A	73	64	62	38

Table 7.3 Predicted average overflight noise levels in dB(A) for Arrival Descent

Aircraft	400 ft	1,000 ft	2,000 ft	4,000 ft	10,000 ft
Saab 340 – Twin turboprop	82	73	66	59	48
B 58 – Beechcraft Baron – Twin-engine prop	80	72	65	57	46
C 172 – Cessna Skyhawk – Single-engine prop	70	61	54	46	34
C510 – Cessna Citation Business Jet	84	73	64	54	39

The dB(A) values presented in Tables 7.1 to 7.3 should be considered as a median value of a range of plus or minus 3 dB(A) – i.e. 50 dB(A) would indicate potential overflight noise of between 47 and 53 dB(A).

The qualitative analysis of the proposed changes to IFR operations at Bankstown Airport is considered the best available representation of potential overflight noise impacts for operations on the new IFR procedures proposed at Bankstown Airport. These must be heavily qualified due to the variability associated with noise generation from variations of even the same aircraft type, varying pilot technique and variations in meteorological conditions.

Overflight noise levels will also vary with respect to the lateral offset positioning of the at-ground receptor to the aircraft operating above.

Table 7.4 and Table 7.5 present the predicted overflight noise levels in dB(A) at the locations of the proposed new STAR and SID procedure waypoints.

Table 7.4 Predicted average overflight noise levels in dB(A) at SID waypoints

Aircraft	Waypoint identifier (Refer Figures 6.2 to 6.3)	Flight altitude less terrain height	Noise level dB(A)	
			Level flight	Climb flight
CNA172 – Cessna Skyhawk single-engine propeller	SBKW, WSTWM, NB013, SBKWH, NB147, NB011	1,450 ft	63 dB(A)	66 dB(A)
	NB147, NB148	2,450 ft	56 dB(A)	60 dB(A)
BEC58P – Beechcraft Baron Twin-engine propeller	SBKW, WSTWM, NB013, SBKWH, NB147, NB011	1,450 ft	74 dB(A)	77 dB(A)
	NB147, NB148	2,450 ft	68 dB(A)	71 dB(A)
Saab 340 – Twin turbo-prop	SBKW, WSTWM, NB013, SBKWH, NB147, NB011	1,450 ft	73 dB(A)	75 dB(A)
	NB147, NB148	2,450 ft	67 dB(A)	69 dB(A)
C510 – Cessna Business Jet	SBKW, WSTWM, NB013, SBKWH, NB147, NB011	1,450 ft	76 dB(A)	80 dB(A)
	NB147, NB148	2,450 ft	68 dB(A)	73 dB(A)

Table 7.5 Predicted average overflight noise levels in dB(A) at STAR waypoints

Aircraft	Waypoint identifier (Refer Figures 6.4 and 6.5)	Flight altitude less terrain height	Noise level dB(A)	
			Level flight	Descent flight
CNA172 – Cessna Skyhawk single-engine propeller	RAKSO	2,250 ft	57 dB(A)	52 dB(A)
	MEPIL	3,000 ft	54 dB(A)	49 dB(A)
	NB235	2,280 ft	57 dB(A)	52 dB(A)
	NB143	1,800 ft	60 dB(A)	55 dB(A)
	NB217, BEROW, NB212, NB144	1,500 ft	62 dB(A)	57 dB(A)
	NB218, NB213	1,450 ft	63 dB(A)	57 dB(A)
	NB214	1,350 ft	64 dB(A)	58 dB(A)
	NB145	1,250 ft	65 dB(A)	59 dB(A)

Aircraft	Waypoint identifier (Refer Figures 6.4 and 6.5)	Flight altitude less terrain height	Noise level dB(A)	
			Level flight	Descent flight
BEC58P – Beechcraft Baron Twin-engine propeller	RAKSO	2,250 ft	68 dB(A)	64 dB(A)
	MEPIL	3,000 ft	66 dB(A)	60 dB(A)
	NB235	2,280 ft	68 dB(A)	64 dB(A)
	NB143	1,800 ft	72 dB(A)	66 dB(A)
	NB217, BEROW, NB212, NB144	1,500 ft	73 dB(A)	68 dB(A)
	NB218, NB213	1,450 ft	74 dB(A)	69 dB(A)
	NB214	1,350 ft	75 dB(A)	70 dB(A)
	NB145	1,250 ft	76 dB(A)	71 dB(A)
Saab 340 – Twin turbo-prop	RAKSO	2,250 ft	67 dB(A)	64 dB(A)
	MEPIL	3,000 ft	65 dB(A)	60 dB(A)
	NB235	2,280 ft	67 dB(A)	64 dB(A)
	NB143	1,800 ft	71 dB(A)	68 dB(A)
	NB217, BEROW, NB212, NB144	1,500 ft	72 dB(A)	69 dB(A)
	NB218, NB213	1,450 ft	72 dB(A)	69 dB(A)
	NB214	1,350 ft	74 dB(A)	72 dB(A)
	NB145	1,250 ft	75 dB(A)	72 dB(A)
C510 – Cessna Business Jet	RAKSO	2,250 ft	69 dB(A)	62 dB(A)
	MEPIL	3,000 ft	66 dB(A)	58 dB(A)
	NB235	2,280 ft	69 dB(A)	62 dB(A)
	NB143	1,800 ft	73 dB(A)	66 dB(A)
	NB217, BEROW, NB212, NB144	1,500 ft	75 dB(A)	68 dB(A)
	NB218, NB213	1,450 ft	76 dB(A)	69 dB(A)
	NB214	1,350 ft	78 dB(A)	70 dB(A)
	NB145	1,250 ft	79 dB(A)	71 dB(A)

The dB(A) values presented in Tables 7.4 and 7.5 should be considered as a median value of a range of plus or minus 3 dB(A) – i.e., 50 dB(A) would indicate potential overflight noise of between 47 and 53 dB(A).

7.2 Area subjected to overflight by proposed future Bankstown Airport IFR procedures

The proposed changes to Bankstown Airport IFR procedures required for the introduction of WSI operations will result in new areas close to Bankstown Airport being subjected to overflight by aircraft undertaking IFR operations and flying at relatively low altitudes.

Figure 7.1 presents the expected aircraft dispersion extents associated with the proposed SIDs described in Chapter 6 of this Appendix. It presents current versus proposed flight path corridor dispersion with a suburb overlay.

Figure 7.2 presents the expected aircraft dispersion extents associated with the proposed STARs and RNP final approach segments described in Chapter 6. It presents current versus proposed flight path corridor dispersion with a suburb overlay.

Figure 7.3 presents the expected aircraft dispersion extents associated with the proposed IFR transit overflight corridors over WSI (refer to Section 6.4 and Figure 6.6) with a suburb overlay.

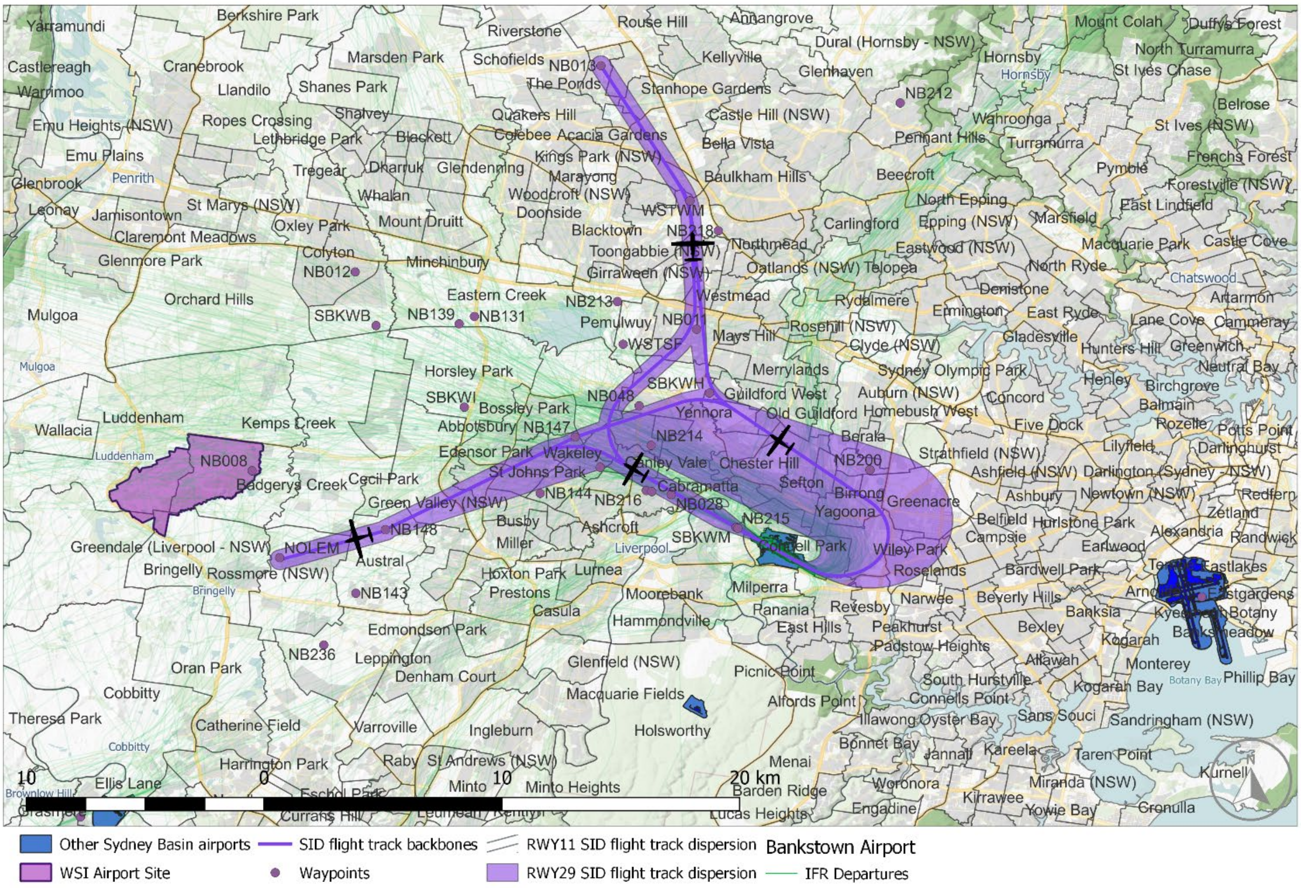


Figure 7.1 Proposed SIDs at Bankstown Airport – current versus future flight path corridor dispersion and suburb overlay

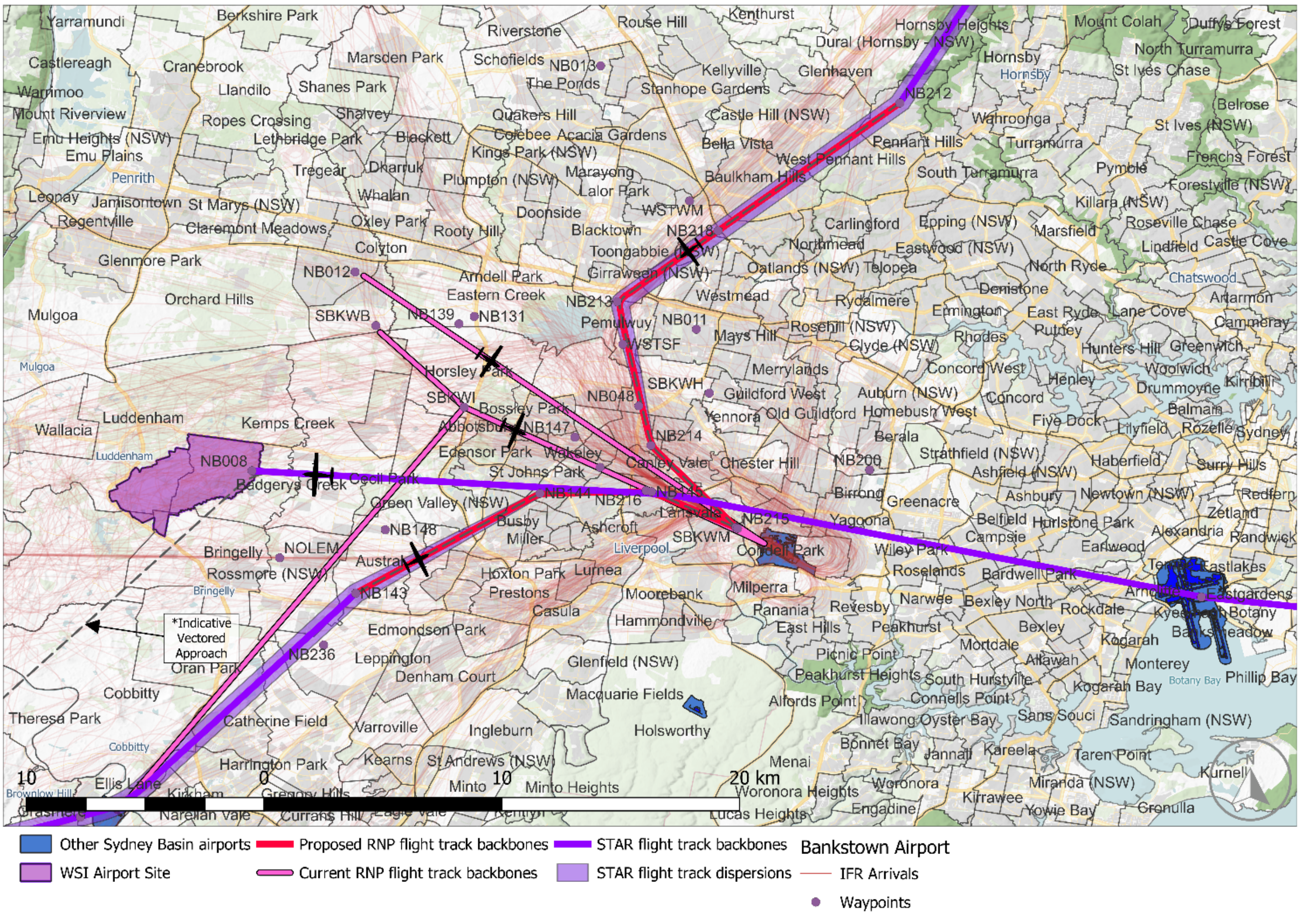


Figure 7.2 Proposed STARs at Bankstown Airport – final RNP approach segments – current versus future flight path corridor dispersion and suburb overlay (with current IFR arrival radar tracks)

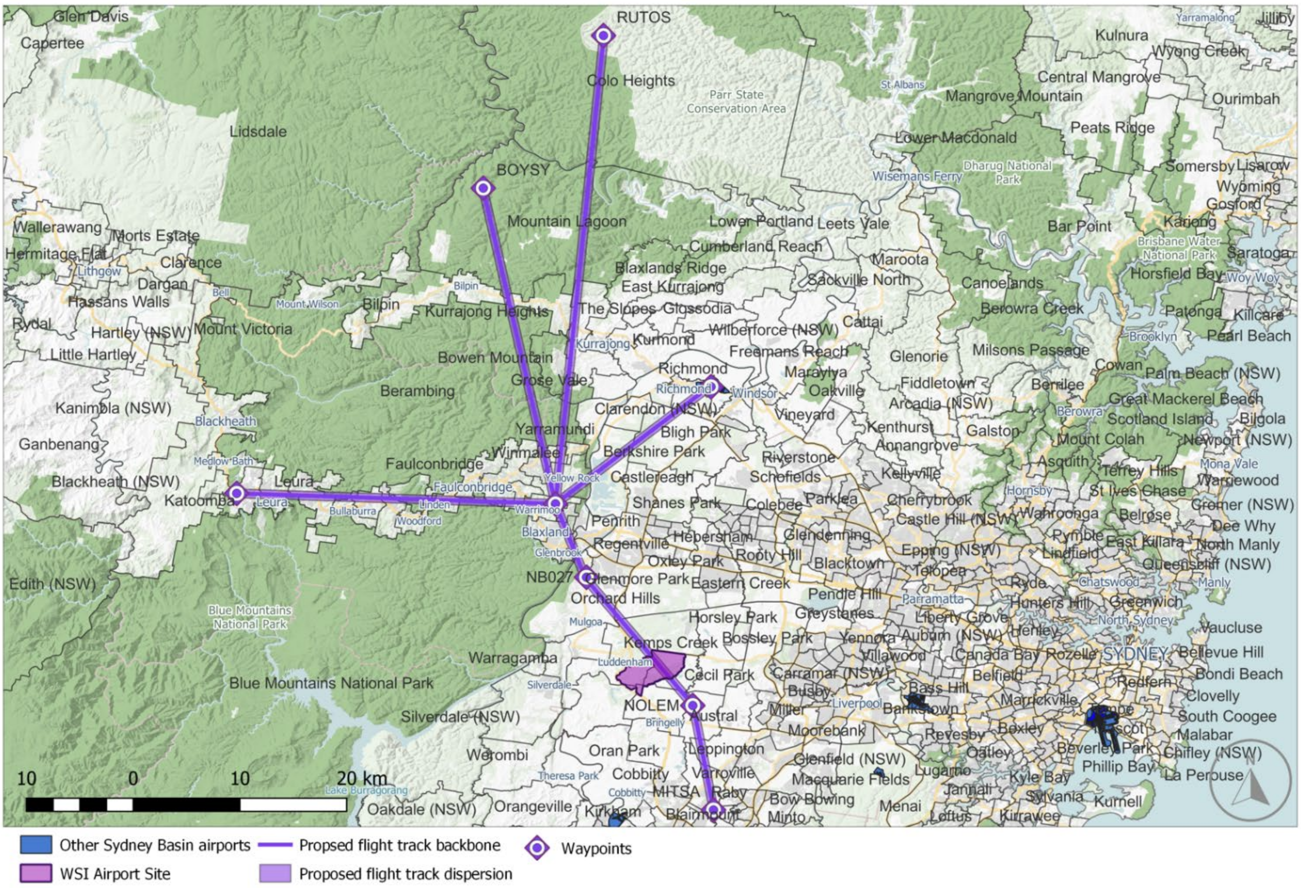


Figure 7.3 Proposed IFR transit of WSI flight paths – suburb overlay

Chapter 8 Other environmental factors

8.1 Visual amenity

Figure 8.1 presents current flight radar tracks (IFR and VFR) for aircraft operations related to Bankstown and Camden Airports and RAAF Base Richmond, for a one-week period of 2019. In general, aircraft types undertaking IFR and VFR operations and flying training activity out of Bankstown and Camden Airports will be similar. The “blanketing” and quite random outcome of this very significant number of flight operations as depicted, particularly in the vicinity of Bankstown Airport, would result in difficulty by observers on the ground to distinguish from a visual perspective, their origin or destination airport.

8.1.1 SIDs

The new initial SID flight paths for the 2 new Bankstown Airport SIDs will remain very close to the paths flown by aircraft on the existing SID. This ensures that IFR departure operations within the Bankstown CTR will remain the same.

The 2 new SID transitions to the north and south are "Safety by Design" procedures intended to separate Bankstown Airport IFR departures from WSI operations. They replace the current option for pilots to either choose their own track or be radar vectored by air traffic control to their first enroute waypoint. This is expected to result in increased visibility of aircraft on the 2 SID transitions, north-west and south-west.

8.1.2 STARs

As none of the existing instrument approaches are separated with WSI operations, 2 new instrument approaches have been proposed. These 2 proposed STARs have been designed to connect aircraft seamlessly to the start point of the RNP approaches. The transition from an enroute flight path via the STAR transition to the RNP approach, either through controlled or uncontrolled airspace, will be a new flight path and as such aircraft will be visible on these new STARs. However as described in "Radar Vectoring" (refer to Section 8.2), not all aircraft will fly the relevant STAR and RNP approach. These aircraft, not on a STAR, will be visible in the areas that are currently overflown by arriving IFR aircraft to Bankstown Airport.

8.1.3 RNP approaches

Two new RNP approaches are proposed. These provide an approach procedure for Bankstown Airport in IMC conditions. The final approach path for both these RNP procedures are aligned slightly to the north-east and south-west of the current RNP approach path. With altitudes that are consistent with the existing RNP approach and only minor alignment changes aircraft on the new approaches will be visible from the current overflown areas.

The very minor change in alignment between the existing RNP final approach path and the 2 proposed new RNP final approach path is sufficiently small to allow for no change in visual amenity outcomes for IFR operations within the Bankstown CTR.

8.2 Radar vectoring

In locations where no SIDs or STARs are available for an aircraft's particular operation, or where adverse weather requires the cancellation of a SID or STAR for safety reasons, air traffic control will provide radar vectoring to safely manage those applicable operating aircraft. Radar vectoring involves air traffic control determining a safe path for all aircraft and issuing heading and sometimes altitude and speed instructions to one or more aircraft to avoid any possible conflictions. While the objective of a set of SIDs and STARs in terminal airspace designed under “Safety by Design” principles is for onboard flight management systems monitored by air traffic control to ensure aircraft remain separated, there are occasions where SIDs and STARs are cancelled for varied reasons and aircraft are radar vectored.

A cancellation of a SID or STAR resulting in radar vectoring involving a departure from lateral track, could also involve a variation in vertical profile or speed requirements and may be either at pilot request or initiated by air traffic control.

Pilot requests for departing from a SID may be for:

- route efficiency – where there is a more direct route to the destination than the published procedure allows, saving time, fuel and emissions
- weather avoidance – particularly around turbulence associated with thunderstorms.

Pilot requests in all instances are subject to air traffic control approval. Avoidance of thunderstorms which has a safety priority is readily approved. Direct routing requests will be considered by air traffic control in light of safety and overall management of other aircraft within the vicinity.

Air traffic control-initiated cancellations of SIDs can also be for reasons of route efficiency, better noise outcomes or better emissions outcomes. Separation requirements with other departing, arriving or transiting aircraft can also necessitate the cancellation of a SID.

Any one of the 3 elements (track, vertical profile, speed) of a SID can be cancelled individually or collectively.

Aircraft will eventually either re-join the published procedure at a later waypoint or will connect with the enroute network at a designated waypoint.

A pilot can request cancellation of a STAR for reasons of weather avoidance or to enter a holding pattern to address an equipment malfunction.

Air traffic control will cancel a STAR when an alternate track or vertical profile is required by one or more aircraft to maintain the optimum landing sequence at the airport. Up to a point, speed adjustment can also be made within the lateral or vertical profile of a STAR.

In low arrival demand conditions air traffic control will occasionally cancel a STAR to reduce track miles and emissions if a shorter arrival route is available.

8.2.1 SIDs

The 2 proposed SIDs terminate at waypoints NB013 and NOLEM, at which point air traffic control will provide tracking instructions for aircraft. Due to the proximity of WSI to Bankstown Airport it is expected that little or no radar vectoring of IFR departures will take place prior to aircraft reaching the end point of the proposed new SIDs.

8.2.2 STARs

In the existing Bankstown Airport IFR arrival operation, aircraft can be cleared to track directly to Bankstown Airport by air traffic control when the weather conditions allow an aircraft to safely proceed visually for its last stage of flight. A clearance to track directly to Bankstown Airport will be subject to separation requirements of other aircraft in the vicinity. This procedure will still be available once WSI is operational subject to weather and other aircraft disposition.

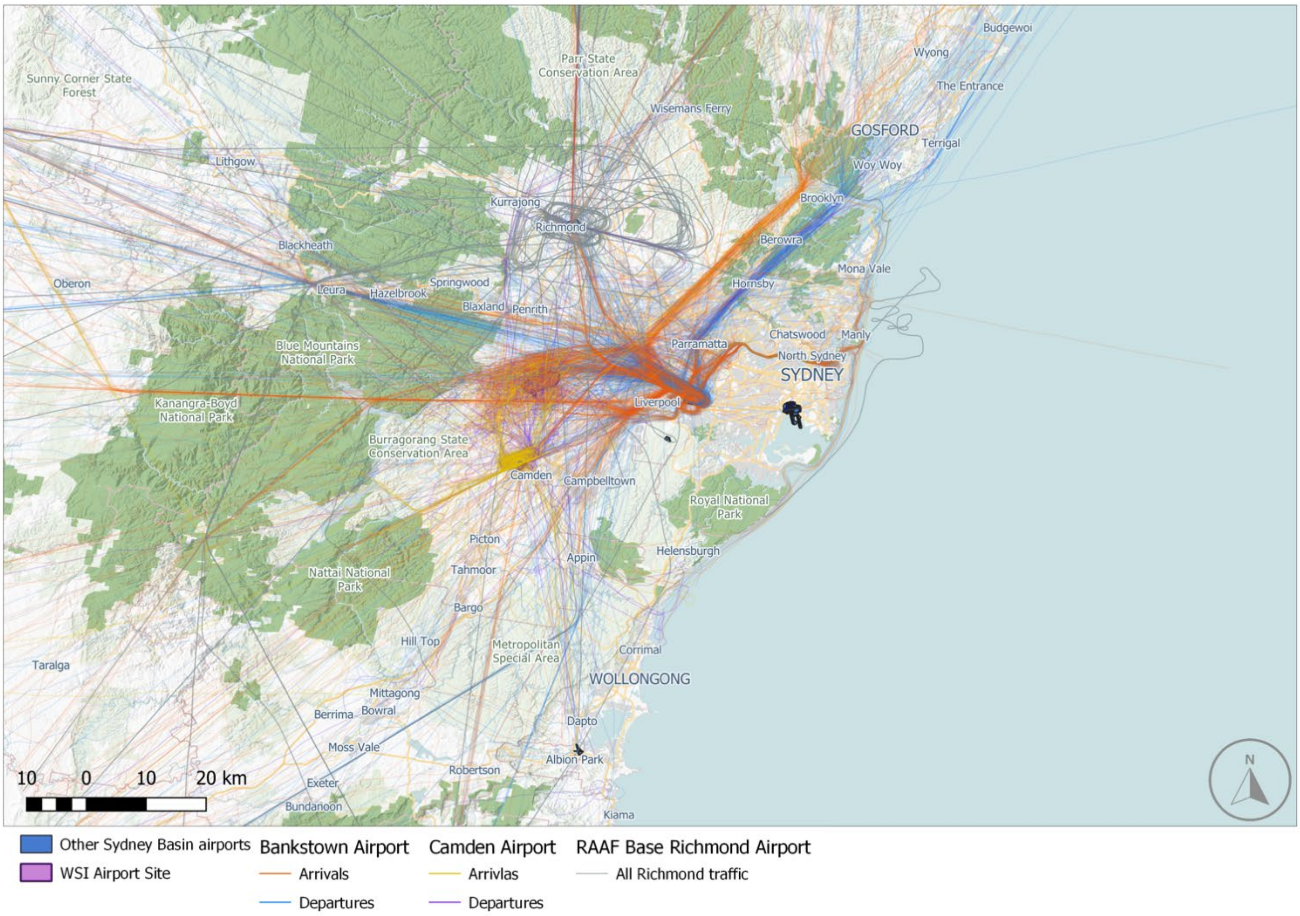


Figure 8.1 Current flight radar tracks for Bankstown and Camden Airports for a one-week period of March 2019

8.3 Track distances and emissions

While the new STAR and RNP combinations are in themselves shorter than the existing RNP approach, given the variability of the departure points and the subsequent routes flown to connect with the STARs it is not possible to accurately estimate any track mile or emissions savings or increases.

The south-western SID almost replicates the current IFR departure track to the south-west and as such no track distance differences are expected. The SID to the north-west will require some aircraft (particularly with destinations to the west) to fly a slightly increased track distance of less than 1 nm (2 km).

Chapter 9 Conclusion

Bankstown Airport is the most affected of all Sydney Basin airports by the proposed introduction of WSI operations. This is reflected by the need to introduce an adjusted SID and new IFR STARs and instrument approaches (RNP) to Bankstown Airport procedures. The proposed introduction of this suite of procedures provides for "Safety by Design" but the changes have been the minimum required by Condition 16 of the approval process for the building of WSI.

The area overflown by the proposed new SIDs and STARs for Bankstown Airport IFR operations is currently frequently overflown with similar aircraft undertaking both IFR and VFR flights. While there is some uniformity of flight tracks in the current operation (refer to Figure 8.1) aircraft are still able to operate in a random nature particularly in fine weather conditions. Due to the close proximity of WSI once operational, it is expected that IFR aircraft in particular operating to and from Bankstown Airport will more frequently fly the new IFR procedures than is currently the case. This is more so for arriving aircraft where the new STARs will position most IFR arrivals in such a way that flying the new RNP approaches will provide the optimum arrival path in both IMC and VMC. This is not the case currently particularly for northern arrivals. The implications of this are an increased frequency and concentration of overflight by aircraft arriving to Bankstown Airport using these procedures, particularly in the final approach phase of the arrival (refer to Figure 7.2).

While the adjusted SID describes a defined flight track for departing aircraft, air traffic control radar vectoring for separation with other Sydney Basin aircraft operations, managing air traffic control workload (refer to Section 6.1) and to reduce track distance and emissions will provide some dispersion of flight tracks around this nominal SID path.

The areas that will be subjected to overflight by the proposed adjusted SID and new STARs are frequently currently overflown by both IFR and VFR flight movements, therefore no additional impacts are expected.

Appendix H

Camden Airport proposed new STARs

Western Sydney International (Nancy-Bird Walton) Airport – Airspace and flight path design | Environmental Impact Statement

Technical paper 13: Facilitated changes

Appendix H – Camden Airport proposed new STARs

October 2024

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Terms and abbreviations

Term/abbreviation	Definition
ACP	Airspace Change Proposal (Airservices)
AEDT	Aviation Environmental Design Tool (US FAA)
AIP	Aeronautical Information Package (Australia)
AIRAC	Aeronautical Information Regulation and Control (Australia)
CASA	Civil Aviation Safety Authority (Australia)
CO_2	Carbon dioxide (a greenhouse gas)
CTA	Control area (3-dimensional airspace boundary)
CTAF	Common Traffic Area Frequency
Cth	Commonwealth of Australia
CTR	Control zone (3-dimensional airspace boundary)
DAP	Departure and Approach Procedures
dB(A)	A-weighted decibel (unit of sound)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Australian Government)
DITRDCA	Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Australian Government)
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation 1999 (Cth)*
FAA	Federal Aviation Administration (United States)
ft	feet (unit of distance or height equivalent to 0.3048 m)
GA	General Aviation
GBMA	Greater Blue Mountains Area (World Heritage property)
IAF	Initial Approach Fix
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
km	kilometre (unit of distance equivalent to 1,000 m)
km^2	square kilometre (metric unit of area equal to a square that is one km long on each side)
LL	Lower Level (altitude for transit flights through Sydney Basin)
LSALT	Lowest Safe Altitude

Term/abbreviation	Definition
m	metre (unit of distance or height equivalent to 3.281 ft)
MNES	Matters of National Environmental Significance (EPBC Act) (Cth)
N60/N70	Number above (N-above noise metric)
NFPMS	National flight path monitoring system (Airservices Australia database)
nm	nautical mile (unit of distance equivalent of 1.852 km)
NPD	Noise-Power-Distance (aircraft noise curve charts)
NSR	Noise Sensitive Receiver
PAAM	Plan for Aviation Airspace Management
PBN	Performance Based Navigation
PMST	Protected Matters Search Tool (DCCEEW)
RAAF	Royal Australian Air Force
RNP	Required Navigation Performance
SARP	Standards and Recommended Practices (ICAO)
SID	Standard Instrument Departure
STAR	Standard Instrument Arrival
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WSI	Western Sydney International (Nancy-Bird Walton) Airport

Chapter 1 Introduction

Although aircraft differ in operation, type, altitude, noise level and frequency, most areas of the Sydney Basin are overflown at some stage as shown in Figure 1.1.

The introduction of new flight paths to be used by aircraft into and out of Western Sydney International (Nancy-Bird Walton) Airport (WSI) has considered a multitude of options to minimise any adjustments required to existing flight paths in the Sydney Basin airspace. Single runway operations at WSI, require adjustments to Sydney Basin operations prior to opening in 2026 to facilitate its flight paths and airspace structure. Those proposed facilitated airspace changes include the development of, or adjustments to:

- Sydney (Kingsford Smith) Airport Runway 25 Standard Instrument Departures (SIDs) to the west, north-west, north and east – (Appendix A)
- Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs to the south, west, north, and east – (Appendix B)
- Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID to the west and north-west – (Appendix C)
- Sydney (Kingsford Smith) Airport non-jet SID to the west or north-west – (Appendix D)
- Sydney (Kingsford Smith) Airport AKMIR Standard Instrument Arrival (STAR) jet and non-jets from the south and west – (Appendix E)
- Royal Australian Air Force (RAAF) Base Richmond SID and STARs – (Appendix F)
- Bankstown Airport SID and STARs – (Appendix G)
- **Camden Airport STARs – (Appendix H) – this Appendix**
- Sydney Basin Visual Flight Rules (VFR) operations – (Appendix I)
- Miscellaneous and Minor procedure adjustments – (Appendix J)
  - Sydney (Kingsford Smith) Airport BOREE STAR
  - Sydney (Kingsford Smith) Airport RIVET STAR
  - Sydney (Kingsford Smith) Airport Runway 07 Initial Approach Fix (IAF)
  - Sydney (Kingsford Smith) Airport Runway 07 SID
  - Sydney Basin low altitude transit flight routes.

This Appendix – Appendix H, presents an assessment of the required new proposed Camden Airport STARs.

The design process for the safe and efficient integration of WSI's new flight paths into the existing Sydney Basin airspace has been one of adopting "Safety by Design" principles to deliver the highest level of safety separation assurance in conformance with rules set by the Civil Aviation Safety Authority (CASA). This is to enable aircraft to operate safely within their performance envelope into an already complex airspace structure. "Safety by Design" ensures that aircraft are separated from each other according to the flight routes and the type of air traffic service being provided. As such, this requires the new or amended SIDs and STARs and altitudes to be published and then downloaded into the cockpit flight management systems of all aircraft. At the same time the same information must be downloaded into the software of the surveillance systems used by air traffic control to manage and monitor the safe separation of all controlled aircraft.

The preliminary airspace design process has appropriately accorded "safety" as the highest priority to ensure robust operational safety outcomes. Environmental outcomes, with a particular focus on the minimisation of potential community impacts and the operational efficiency of the facilitated airspace changes has also been a key design criterion.

Instrument Flight Rules (IFR) are the rules that govern the operation of aircraft in Instrument Meteorological Conditions (IMC) (conditions in which flight In IMC, an aircraft must be flown with reference to its onboard flight instruments.) Two sets of rules, IFR or Visual Flight Rules (VFR) exist to govern flight in either IMC or Visual Meteorological Conditions (VMC).

The proposed introduction of STAR procedures for Camden Airport presented in this Appendix have been designed to be flown under IFR to ensure safety by design is embedded in the new procedures and to allow continued operations in all weather conditions. Aircraft flying to IFR standards and rules can operate in either IMC or VMC, but aircraft flying to VFR standards and rules can only operate in VMC.

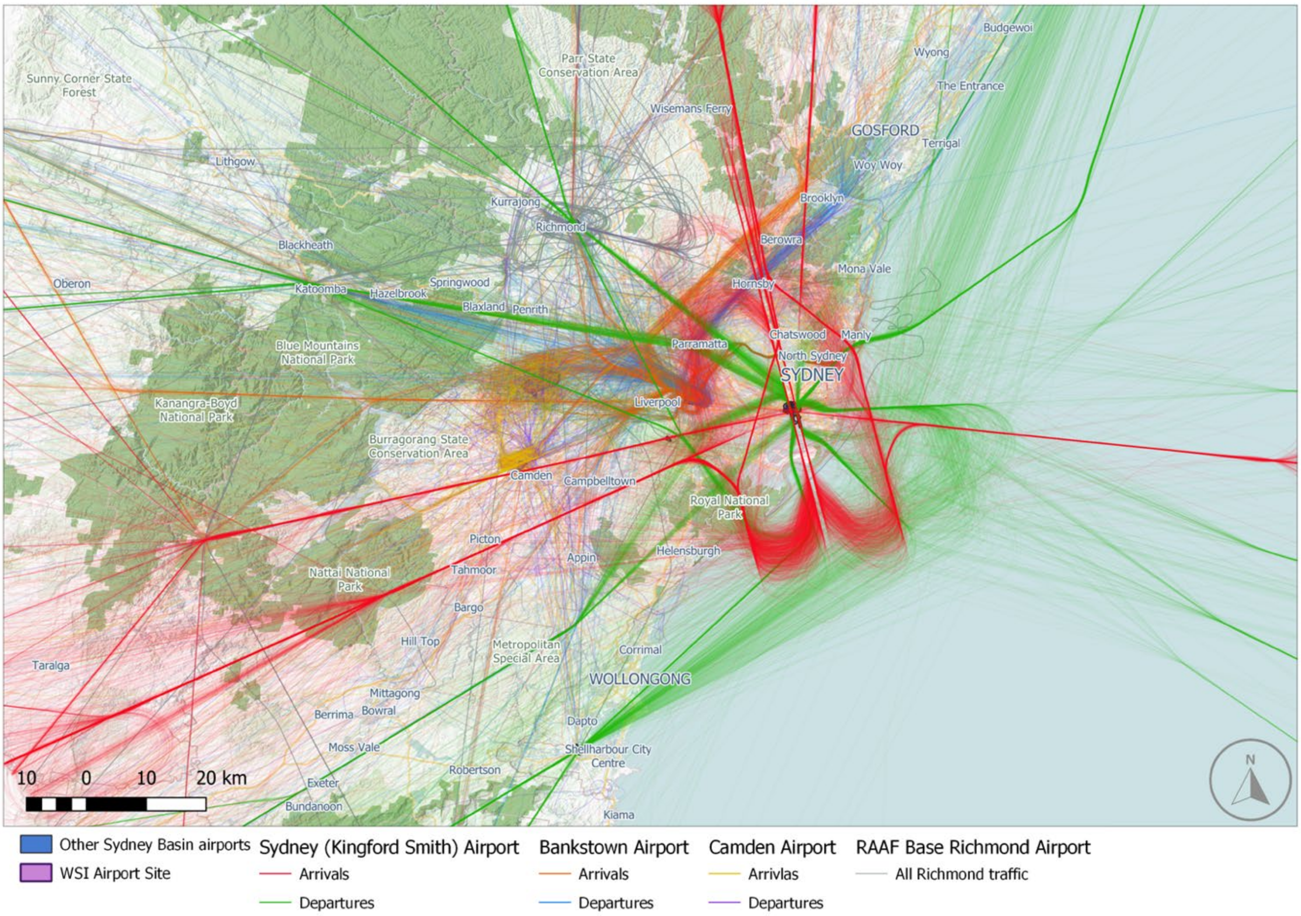

Figure 1.1 Sydney Basin airspace with one-week of flight track movement activity in March 2019

Chapter 2 Background

Camden Airport is located around 50 kilometres (km) south-west of both the Sydney CBD and Sydney (Kingsford Smith) Airport and 17 km south of WSI. Camden Airport is a general aviation, emergency services, sport and recreational aviation airport. Camden Airport operates on a 24-hour, 7 days a week (24/7) basis and currently caters for a wide range of general aviation movements (fixed wing, helicopter and gliders), providing for flight training, emergency services, gliding, ballooning and recreational flying, along with not-for-profit youth organisations and aviation maintenance facilities.

Camden Airport is one of the busiest general aviation airports in Australia with 104,838 overall aircraft movements in the 2019 financial year. Aviation activity at the Airport primarily consists of single-engine and twin-engine piston aircraft, with helicopters accounting for around 7 per cent of movements. In addition, there were more than 7,400 glider movements in 2018.[1]

General aviation will continue to be the predominant form of aviation activity at Camden Airport in the next 8 years, growing by approximately one per cent per annum, to approximately 113,100 movements.

Given its proximity (17 km south), once WSI is operational in 2026, its newly introduced flight paths and airspace containment requirements will significantly impact flights operating to and from Camden Airport to the east, north and west. The facilitated airspace changes required to Sydney Basin operations, include the proposed new STARs which have been designed for IFR aircraft arrivals to Camden Airport as part of the Plan for Aviation Airspace Management (PAAM) process for WSI.

There are no changes proposed to the current noise abatement procedures.

Prior to the opening of WSI in 2026, changes to the arrival flight paths at Camden Airport will be required to organise aircraft arriving onto new STARs from the east, north and west.

These changes are required for IFR aircraft arrivals to Camden Airport with the requirement to deliver a “Safety by Design” outcome with other Sydney Basin operations.

These STARs will need to be published and implemented prior to the first flight operations at WSI in 2026. The changes would be introduced in 2026 on a scheduled Aeronautical Information Regulation and Control (AIRAC) date, prior to the opening of WSI. Introducing these changes ahead of WSI's opening will allow pilots and air traffic control to adjust their systems and become familiar with changes to current procedures before single runway operations at WSI commence and will minimise the likelihood of conflicts or incidents in the airspace.

Figure 2.1 shows the location of WSI, the locations of other key airports in the Sydney Basin and geographic extent of a nominal area radiating 45 nautical miles (nm) (around 83 km) from the Aerodrome Reference Point (ARP) of WSI.

Figure 2.2 is the Aerodrome Chart for Camden Airport. The chart has been extracted from the Aeronautical Information Package (AIP) Departure and Approach Procedures (DAP) to assist the interpretation of the information presented in this Appendix. It depicts the general layout of Camden Airport including its 4-runway system and orientations, runway headings (06, 23, etc.) and dimensions (lengths and widths).

1 Source: Camden Airport Master Plan 2020

Figure 2.1 Location of airports in the Sydney Basin

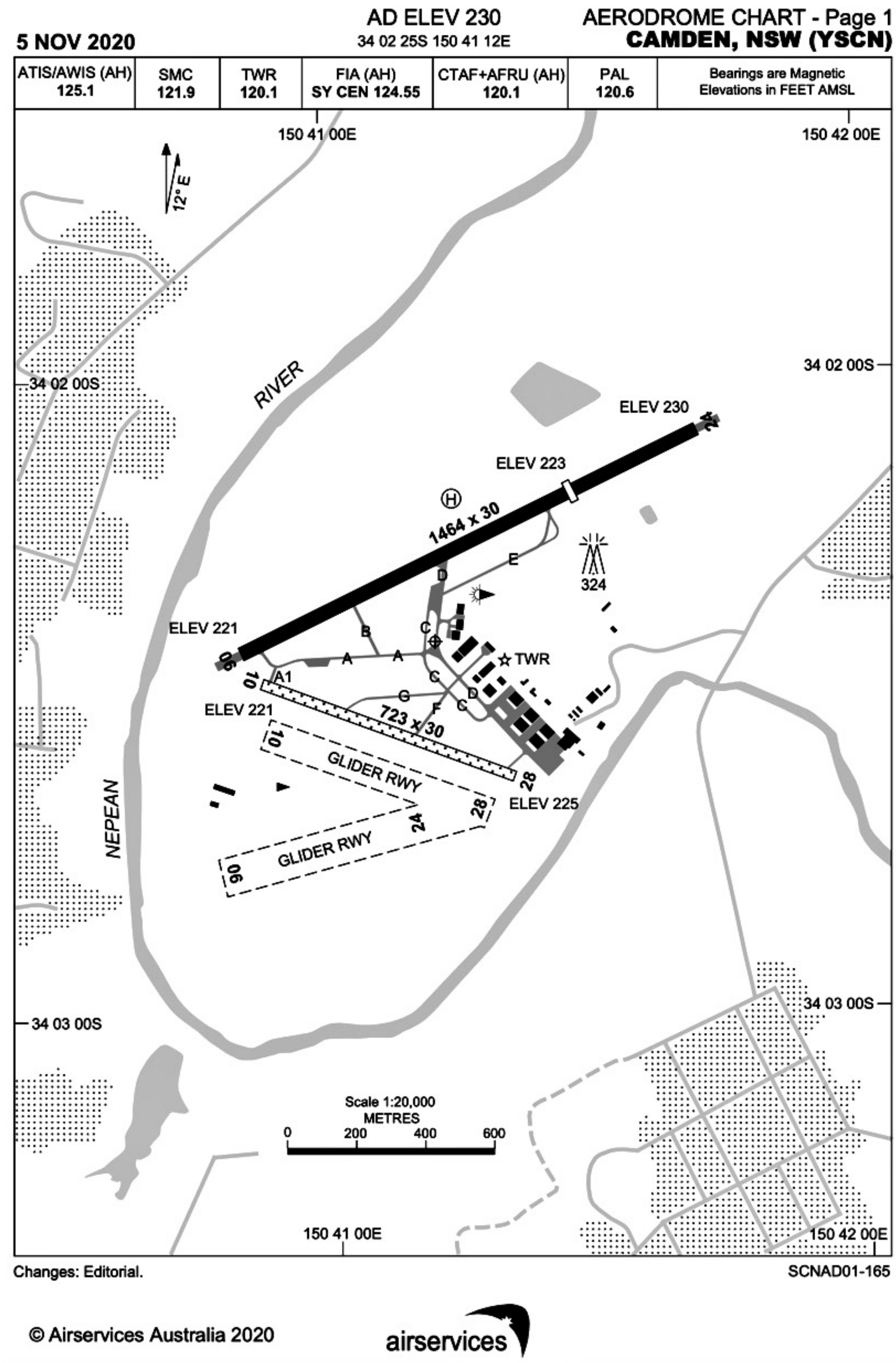

Figure 2.2 Camden Airport – Aerodrome Chart (AIP / DAP)

Chapter 3 Purpose

The purpose of this document is to present an environmental assessment of the proposed STARs for IFR arrival operations at Camden Airport. It includes an analysis and assessment of potential noise impacts from aircraft overflights of this proposed change.

It describes the reason for the proposed changes and the associated safety and operational considerations, along with other environmental issues.

Chapter 4 Current IFR operations

In 2019 (pre-coronavirus (COVID-19) pandemic), about 265 aircraft (fixed wing) on average operated each day at Camden Airport. Of these, 93 per cent were single and twin-engine engine piston aircraft undertaking flying training or a limited number of private travel flights. Most of these aircraft operate under VFR and contain their operations to uncontrolled airspace.

Adjustments required to Sydney Basin VFR operations, including some VFR operations associated with Camden Airport, are necessary to address the introduction of a large Controlled Airspace Volume and a suite of procedures for the commencement of operations at WSI are considered in a separate Appendix – Appendix I (Sydney Basin VFR operations).

Around 5 per cent of flights were twin piston engine aircraft and the remaining one per cent were turbo-prop aircraft or military flights. This group of flights (less than 10 per day in 2019) also included very occasional small turbo-jet aircraft, and training and travel flights, that were more likely to operate under IFR and for parts of their flight inside controlled airspace under direction from air traffic control.

There is a Class D Control Zone (CTR) at Camden Airport from ground level to 2,000 feet (ft) (610 m) with a radius of 2 nm (around 4 km). Within this CTR, aircraft must operate under Camden Tower air traffic control guidance and control. The CTR is surrounded both laterally and vertically by uncontrolled airspace which allows pilots to conduct their flights without reference to air traffic control (refer to Figure 4.3 depicting the current airspace boundaries).

Only when a pilot wishes to operate in controlled airspace must they obtain a clearance from air traffic control and contain their operation to the limits of that clearance.

Camden Airport Tower air traffic control operates between the hours of 8 am and 6 pm local time. Outside of these hours the Class D CTR becomes uncontrolled airspace and Common Traffic Area Frequency (CTAF) procedures apply. CTAF procedures allow for pilots to announce their intentions on a common radio frequency and arrange their own separation from other aircraft.

In the 2019 financial year, Camden Airport recorded 104,838 aircraft movements, making it one of the busiest general aviation airports in Australia. Aviation activity at Camden Airport primarily consists of single-engine and twin-engine piston aircraft (more than 93 per cent of its aircraft movements), with helicopters accounting for a further 7 per cent, as shown in Figure 4.1.

In 2018, (last glider statistics made available) there were an estimated 7,400 plus glider movements.

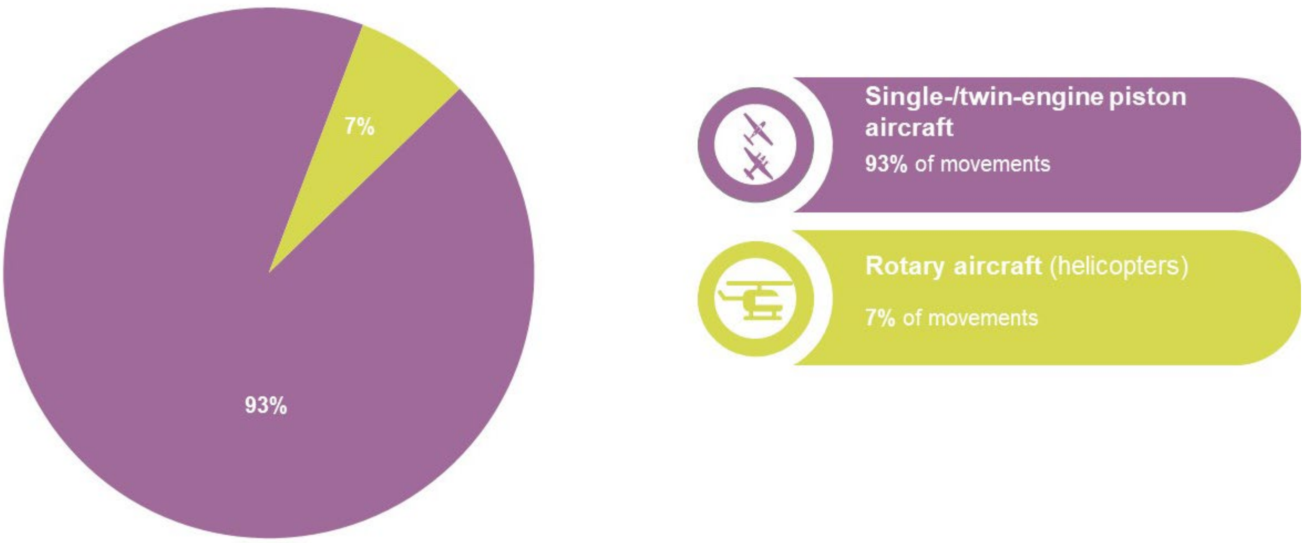

Figure 4.1 Camden Airport aircraft fleet mix in 2019 financial year

Figure 4.2 presents the current Camden Airport flight path movement activity for the month of March in 2019. There are approximately 265 total movements per day, and around 10 IFR movements per day operating to and from Camden Airport. Many of the flight paths in Figure 4.2 are related to VFR and circuit flights.

The large oval collection of flight paths surrounding waypoint RAKSO are aircraft operating within the circuit area of Camden Airport.

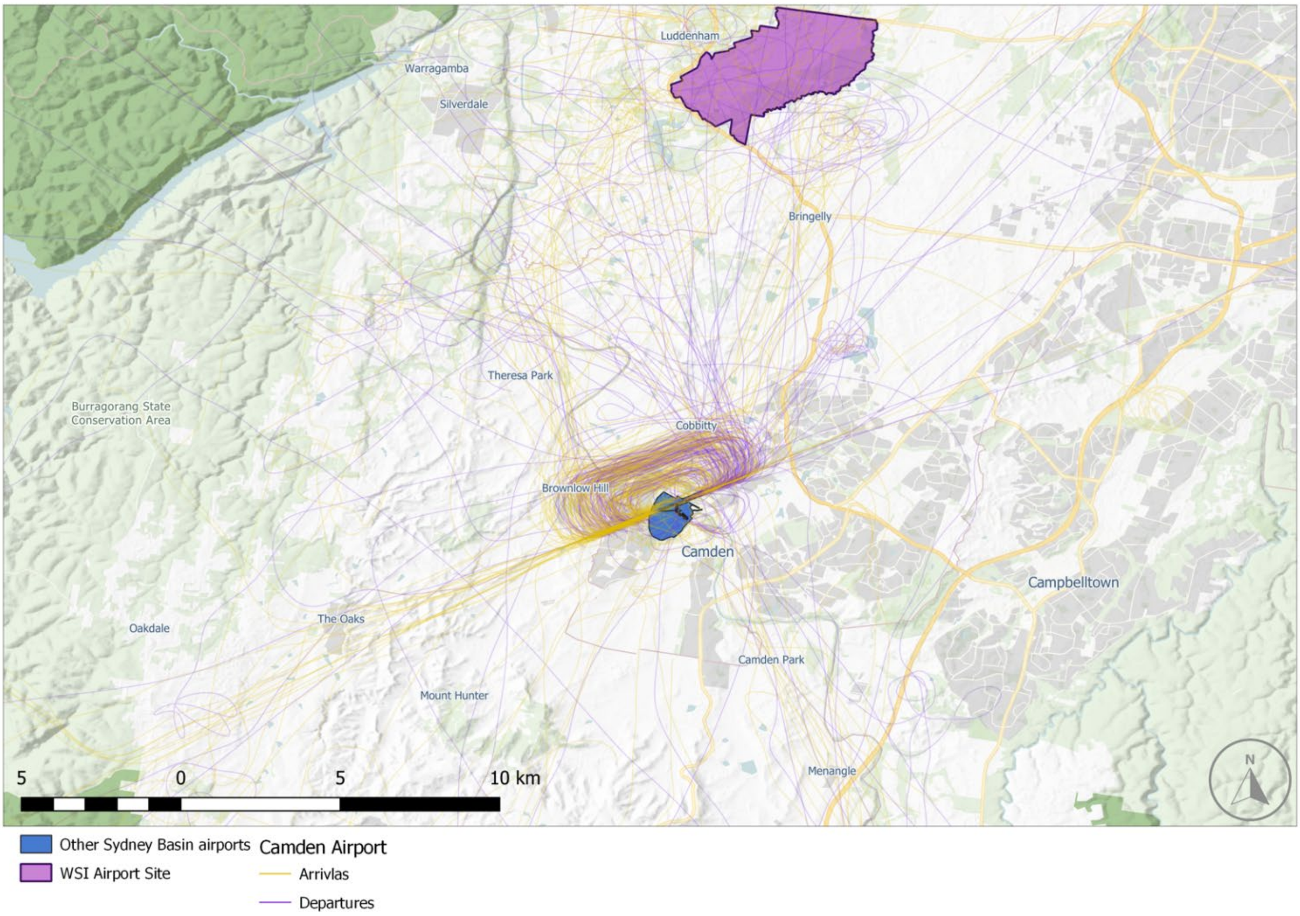

Figure 4.2 Current flight path movement activity for Camden Airport for the month of March 2019

4.1 Current departures

During the hours of operation of the Camden Tower a departing aircraft must comply with any air traffic control instructions until leaving the CTR either vertically or laterally. If the pilot then wishes to remain in uncontrolled airspace, the only limitation is to remain below or laterally clear of the control area (CTA) and other CTRs. A description of these limits both vertically and laterally are available to pilots from the maps produced as part of the Australian AIP.

If the pilot wishes to operate in the CTA or other CTRs they will make radio contact with the appropriate air traffic control radio frequency, ask for a clearance to operate and comply with the clearance approvals. There is sufficient airspace below and laterally clear of the CTA to allow the flight to continue toward its destination while waiting for air traffic control to issue a clearance or if a clearance is not available. Northbound aircraft may opt to hold on the ground until an air traffic clearance is available (refer to Figure 4.3 depicting the current airspace boundaries).

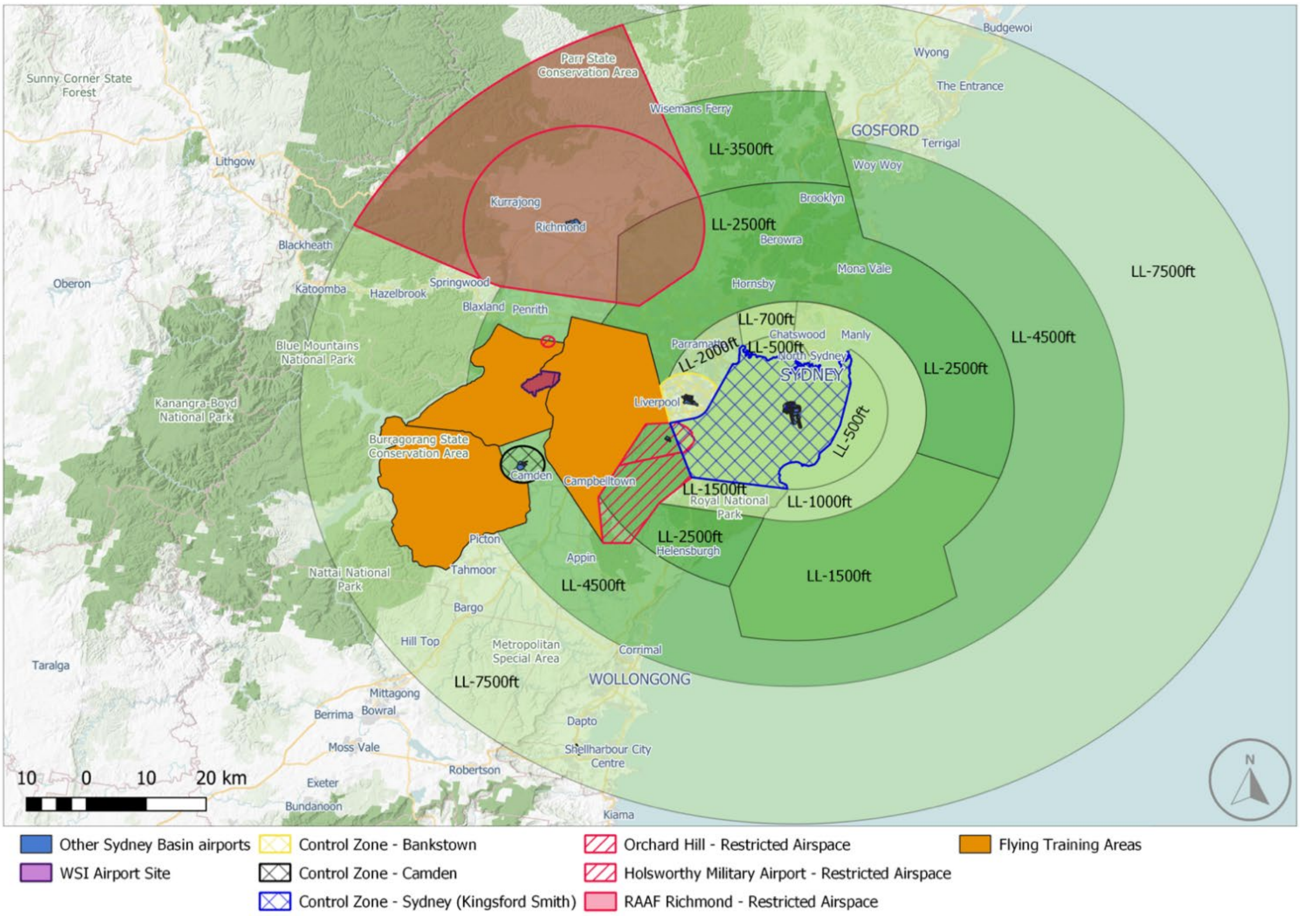

Figure 4.3 Current Sydney Basin Airspace Control Area (CTA) and Control Zone (CTR) boundaries including the Lower Level (LL) of controlled airspace

4.2 Current arrivals

Aircraft operating under IFR can fly directly to Camden Airport from their last enroute waypoint, if operating in uncontrolled airspace, or as instructed by the appropriate air traffic control unit if descending from CTA. In visual weather conditions pilots may then make a visual approach to the runway under Camden Airport Tower air traffic control guidance.

In weather conditions requiring an approach to be made via the Instrument Flight Procedure, aircraft will position themselves to intercept one of the transition legs of the Required Navigation Performance (RNP) approach. This approach serves either end of Runway 06/24 at Camden Airport.

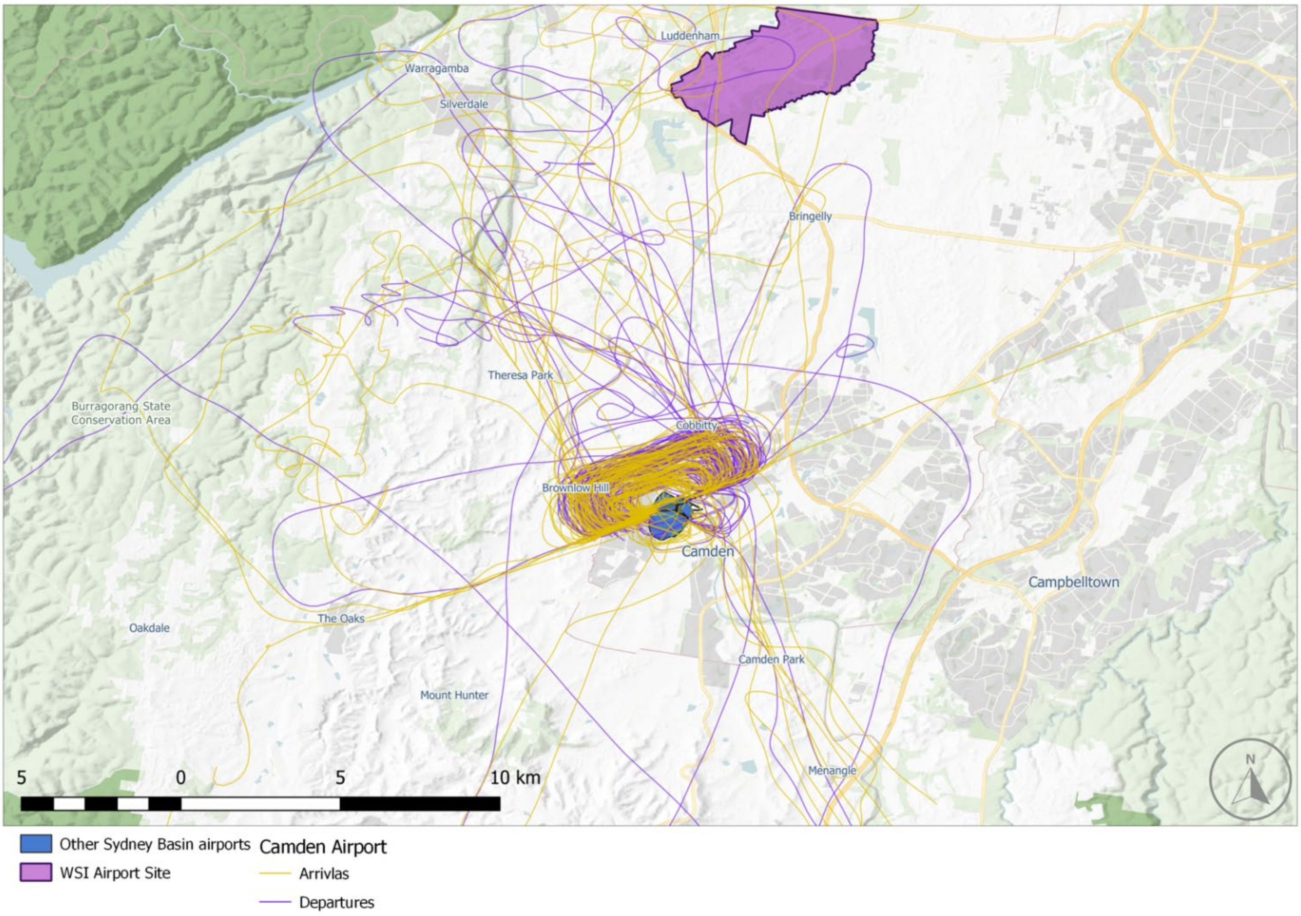

Figure 4.4 Camden Airport – IFR arrival and departure flight path movement activity for one-week in 2019

With reference to Figure 4.4, historical departure radar tracks show the random tracking of departing IFR aircraft. Some of these departures will be under air traffic control clearances if operating inside controlled airspace, but the majority are under the pilot’s own navigation when operating in uncontrolled airspace.

The arrival flight paths show the random nature of IFR arrival operations to Camden Airport. Similarly, departing aircraft are either under air traffic control instructions if descending from controlled airspace, or under the pilot’s own navigation if operating in uncontrolled airspace.

The radar tracks from waypoint SC2WI to Camden Airport waypoint are aircraft operating on the Camden Airport RNP instrument approach. The majority of these will be training aircraft, although some will represent aircraft that need to fly this approach in IMC to be able to complete a landing at Camden Airport.

This RNP procedure (refer to Figure 4.5) will largely be retained in the new Camden Airport arrival operation. The small variance will be discussed as part of the explanation of Figure 5.5.

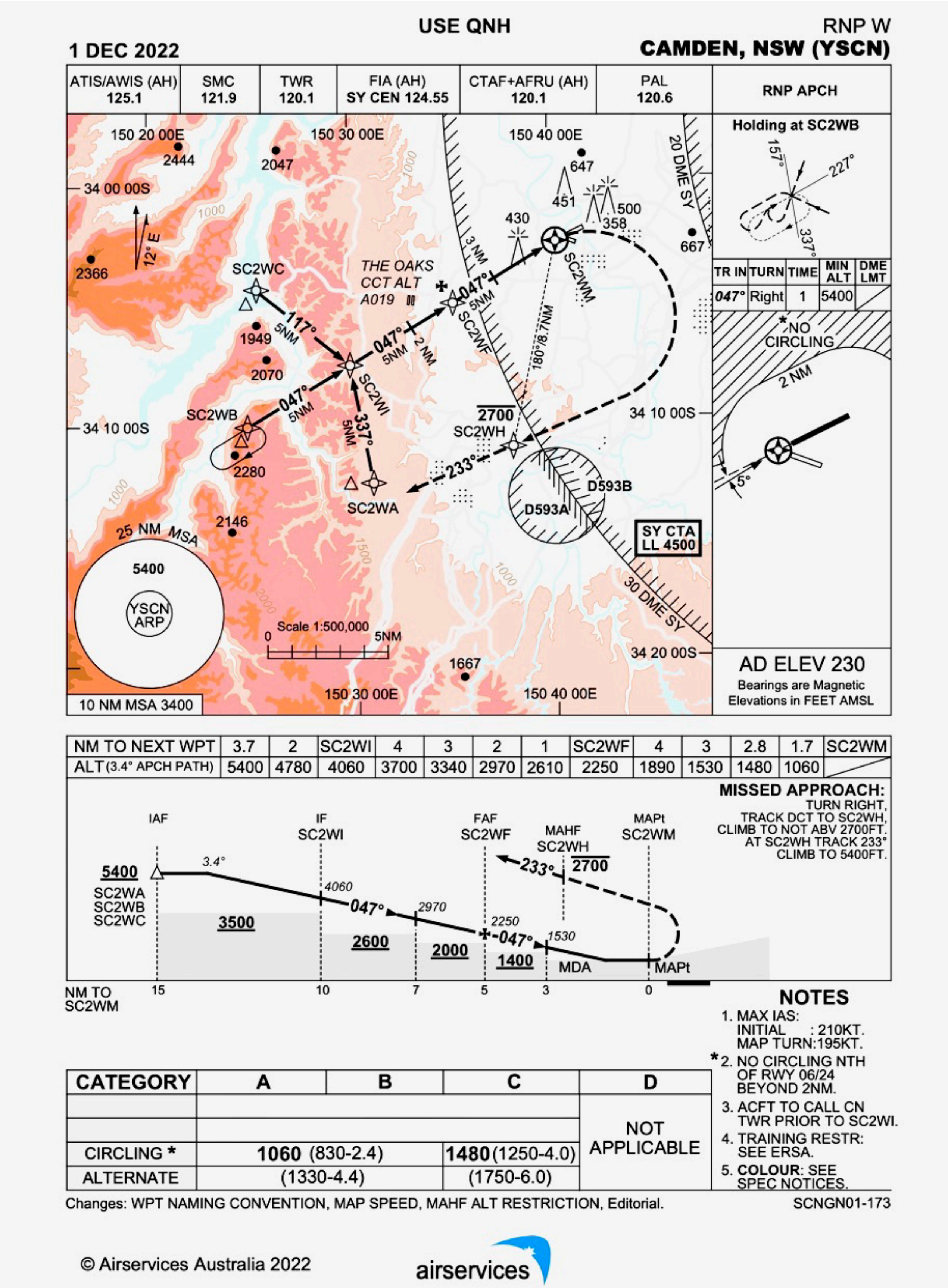

Figure 4.5 Camden Airport RNP W – Source AIP DAP

The RNP W approach (refer to Figure 4.5) to Camden Airport is designed to the RNP approach standards and recommended practices (SARPs) of the International Civil Aviation Organization (ICAO). It provides a straight approach segment of approximately 10 nm (19 km) between waypoints SC2W1 and SC2WM and 3 legs (from waypoints SC2WC, SC2WB, and SC2WA) to allow aircraft to stabilise their descent and tracking tolerances before intercepting the straight in approach section at waypoint SC2W1.

4.3 Current circuit flying

Aircraft undertaking circuit training (repetitive take-offs and landings) or departing from or arriving to Camden Airport must operate in accordance with the prescribed circuit direction published in the AIP, unless authorised to vary this by Camden Airport Tower air traffic control.

Runway 06/24 is the main runway at Camden Airport. For operations on Runway 06 (north-east direction) aircraft must fly a left-hand circuit. For operations on Runway 24 (south-west direction) aircraft must fly a right-hand circuit. This left hand and right-hand requirement results in all circuit traffic operating to the north-west of the airport. Glider towing operations take place to the south-east of the airport.

There will be no change to these procedures after WSI is operational in 2026.

Figure 4.4 shows all the IFR arrival and departure flight paths flown by aircraft into and out of Camden Airport for a one-week period in March 2019.

4.4 Camden Airport Noise Management

Aircraft noise is complex and varies according to a range of factors, including:

- aircraft type (including age of the aircraft, number and type of engines, weight)
- aircraft altitude
- engine power (thrust) settings and speed
- pilot technique
- meteorological conditions.

Aircraft noise is present during all phases of flight but is most significant during take-off and landing, due to the aircraft's proximity to the ground. During take-off, the weight and throttle settings are at their highest point, and therefore the noise is generated through engine noise. In contrast, during landing, throttle settings are varied, and landing gear and control surfaces are extended, with greater noise being generated by the airframe.

The operator of Camden Airport - Aeria Management Group, recognises that aircraft noise is a very important issue to the community, especially to people living close to the airport or under flight paths. A voluntary Fly Neighbourly Procedures Program was established in 2020 and is a joint program between the airport operator and the aviation community based at the airport.

The Fly Neighbourly Procedures program contains neighbourly procedures for pilots to consider (refer to Figure 4.6). It outlines flight procedures for fixed-wing aircraft and helicopters that will assist with noise-related airport issues. This includes aircraft noise from airborne and ground-based activities, such as aircraft maintenance.

A set of noise abatement procedures are published for pilot information. Prominent among these procedures are a preference for operations to take place on Runway 06, a ban on practice instrument approaches between the hours of 11 pm and 6 am local time, and a ban on circuit training between 10 pm and 7 am weekdays and 8 pm and 7 am on weekends.

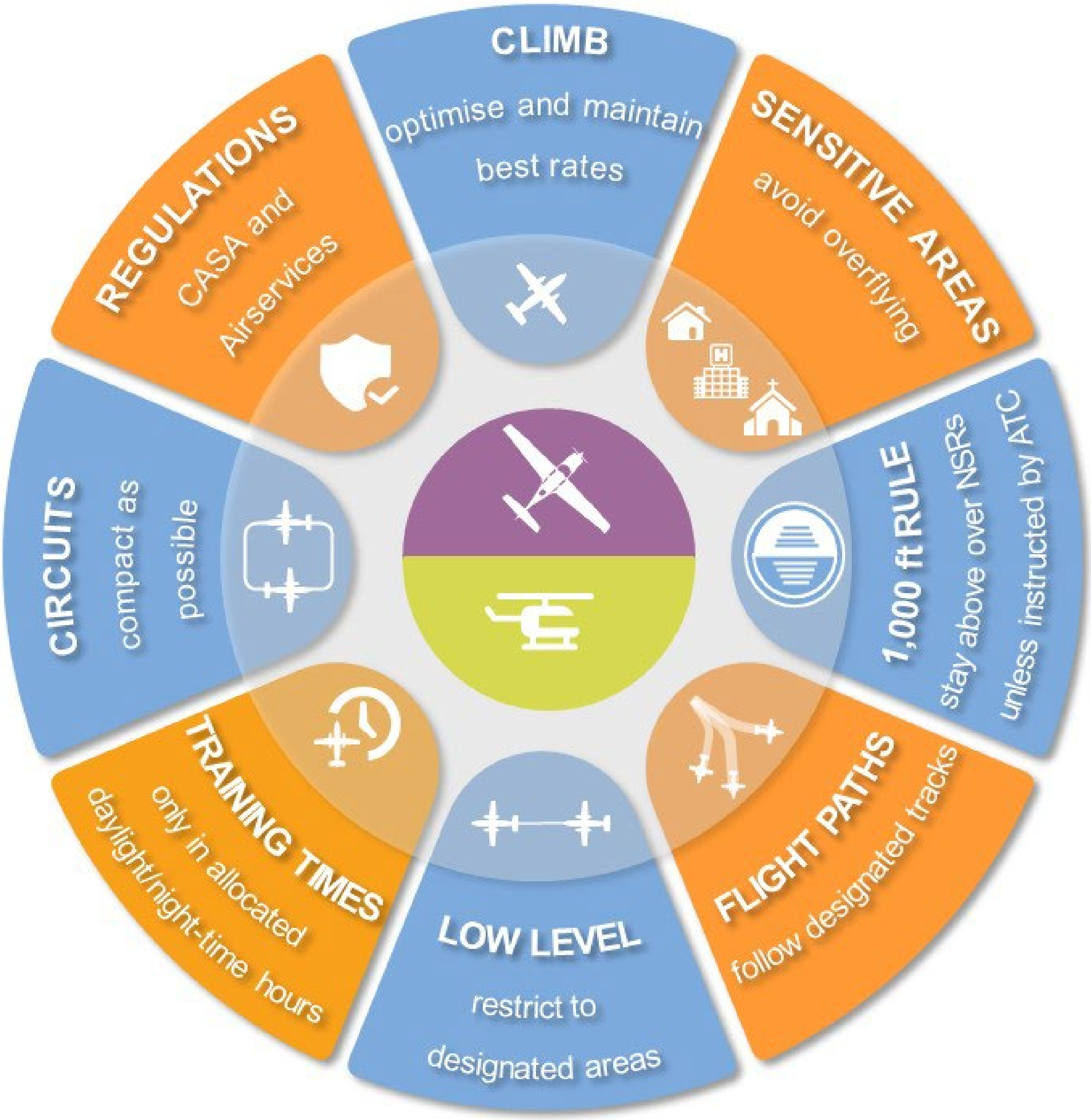

Figure 4.6 Fly neighbourly procedures program selected procedures

Chapter 5 Proposed Camden Airport IFR operations

The expected commencement of operations at WSI in 2026 will require some changes and adjustments to flight paths, procedures, airspace boundaries, and airspace classifications to ensure that the proposed procedures developed for WSI operations have the appropriate level of protection afforded by a controlled airspace volume. Resulting changes to VFR operations resulting from this change are addressed in a separate Appendix – Appendix I (Sydney Basin VFR operations). (Figure 5.1 presents the proposed airspace boundaries.)

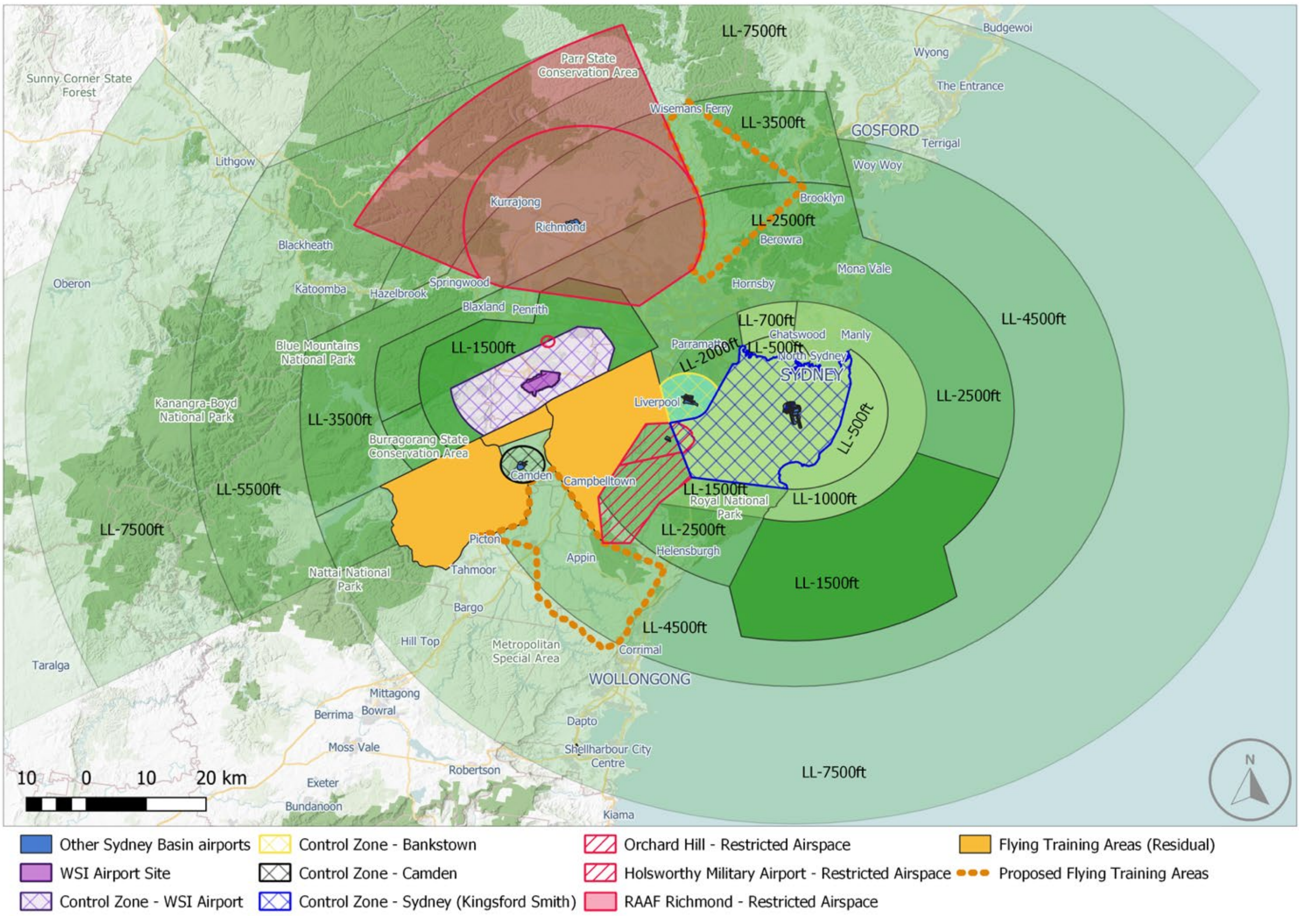

Figure 5.1 Proposed Sydney Basin Airspace Control Area (CTA) and Control Zone (CTR) boundaries including the Lower Level (LL) of controlled airspace

The following current Camden IFR operations will not change:

- operations inside the Camden CTR
- the RNP Approach final track
- the initial tracking of IFR departures.

IFR arrivals from the north and north-east will continue to be able to access the RNP approach from random tracks in uncontrolled airspace.

5.1 Camden Airport traffic projections

Camden Airport is one of the busiest GA airports in Australia with 104,838 overall aircraft movements in the 2019 financial year. *(Source – Camden Airport Master Plan 2020)*

The Camden Airport Master Plan 2020 states that in the 20-year planning horizon of the Master Plan, aircraft movements are projected to grow by approximately 0.3 per cent annually to almost 118,000 movements by 2039/40.

Figure 5.2 presents information extracted from the 2020 Camden Airport Master Plan. It shows the projected aircraft movements out to 2040 prepared by Tourism Futures International.

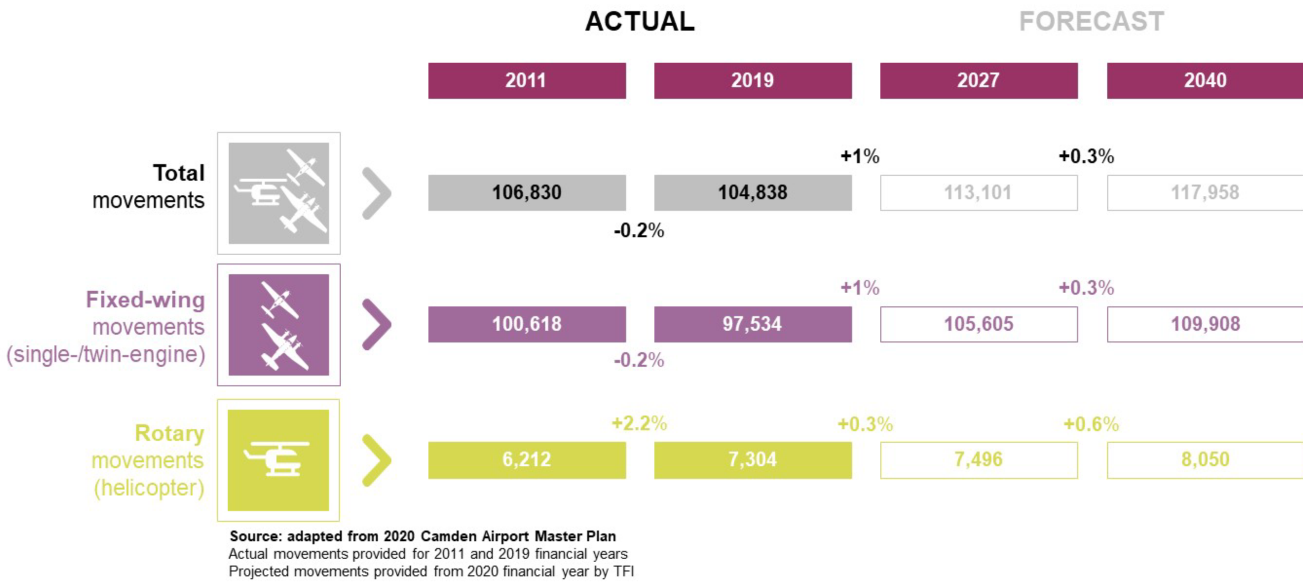

Figure 5.2 Camden Airport aircraft movement projection to 2040

GA continues to be the predominant form of aviation activity at Camden Airport and is projected to grow by one per cent per annum from 2019 to 2027. This is reflected in the commitments that current operators at Camden Airport will be maintained, with minor growth.

For the remainder of the Master Plan period out to 2040, general aviation growth is forecast to slow down to 0.3 per cent annual growth.

Table 5.1 also presents information extracted from the 2020 Camden Airport Master Plan on the fleet mix expected to operate at Camden Airport in 2040.

Table 5.1 Camden Airport projected fleet mix in 2040

AEDT code	Aircraft types	Total annual movements	% of total aircraft
Fixed-wing aircraft			
BEC58P	GA	1,120	1
CNA441		560	0.5
PA30		196	0.2
PA31		176	0.2
CNA172		6,816	6.2
GASEPF		9,058	8.2
CNA206		518	0.5
CNA208		736	0.7
GASEPV		3,218	2.9
CNA182	Gliding (tow aircraft)	7,000	6.4
BEC58P	GA training	5,198	4.7
CNA500		92	0.1
CNA172		29,760	27.1
GASEPF		36,146	32.9
CNA206		92	0.1
CNA208		182	0.2
GASEPV		9,040	8.2
	Total fixed-wing aircraft	**109,908**	**100**
Helicopters			
R22	GA	734	9.1
R44		230	2.9
EC130		704	8.7
B206B3		146	1.8
B430		210	2.6
R22	Helicopter training	3,198	39.7
R44		2,152	26.7
EC130		400	5
B206B3		166	2.1
B430		110	1.4
	Total helicopters	**8,050**	**100**
	TOTAL ALL AIRCRAFT	**117,958**	**100**

From an analysis of Table 5.1, the BEC58P being a twin-engine Beechcraft Baron aircraft and the CNA172 being a single-engine Cessna Skyhawk aircraft, and combined representing around 40 per cent of the annual flight movements at Camden Airport, have been selected as suitable representative aircraft for the overflight noise assessment in Chapter 6 of this Appendix.

In the absence of specific forecast growth data for IFR training and travel flights, the generic annual growth percentages (one per cent or less) presented in Figure 5.1 would apply evenly across all the various operational sectors of at Camden Airport.

5.2 Camden Airport future IFR departures

There will be no change for IFR aircraft to the initial flight paths that are used by departures from Camden Airport. However, the introduction of new flight paths and proposed airspace containment associated with WSI will mean that departures to northern and north-western destinations once clear of the Camden Airport control zone will be required to avoid the WSI controlled airspace if remaining in uncontrolled airspace.

Whilst operating in uncontrolled airspace it will be the pilot's responsibility to comply with these new constraints. For aircraft wishing to operate in CTA, air traffic control will issue clearances to avoid WSI traffic. The procedures for Camden Airport IFR departures remaining in uncontrolled airspace or accessing CTA will remain the same.

5.3 Camden Airport proposed STARs

IFR arrival procedures from the south and south-west will generally continue as they are currently.

To ensure Camden Airport IFR arrivals from the east, north and west are separated with all WSI operations, 3 new IFR flight paths have been designed as STARs from these compass directions. Each STAR will terminate in a position that allows the aircraft to intercept a transition leg of the RNP approach. These STARs and their vertical restrictions are shown in Figure 5.4.

Aircraft arriving to Camden Airport from the north will track via waypoint NB059.

Aircraft arriving to Camden Airport from the west will track via waypoint WYATT.

Aircraft arriving to Camden Airport from the east will track via waypoint TESAT to waypoint NB008 and then via radar vectors to Camden. (Flight numbers on this proposed eastern STAR are expected to be less than one per month).

All IFR aircraft arriving from the east, north and west to Camden Airport through controlled airspace can expect to be processed into the airport via these new STARs. When conditions allow for visual flight, arriving aircraft may manage their own tracking via visual fixes to Camden Airport. This procedure is the same as currently in use.

There is a minor change planned for the RNP approach procedure that is explained below and forms part of the assessment of change.

To provide separation assurance with the new flight paths to be introduced at WSI, the arrival leg from waypoints SC2WC to SC2WI will be removed and replaced with a leg a little further south via waypoint NB235 which is still within the design standards for an RNP approach of this nature (refer to Figure 5.4). This change forms part of this assessment.

As there is no change proposed to the straight-in final approach segment of the RNP approach from waypoints SC2WI or to the 2 lead-in legs from waypoints SC2WB and SC2WA and given the low frequency of use as a percentage of overall use of Camden Airport is not expected to vary greatly from today, these segments of the RNP approach do not form part of this assessment.

Current operations for arriving aircraft to Camden Airport permit IFR operations from the south-west. Airspace introduced to support WSI imposes some adjustment to this operation. A change to the instrument flight procedure to allow operations to continue, albeit at a lower level from that direction may be required. Where aircraft in this area may be at or above 5,400 ft (1650 m), they may now be at 4,500 ft (1400 m).

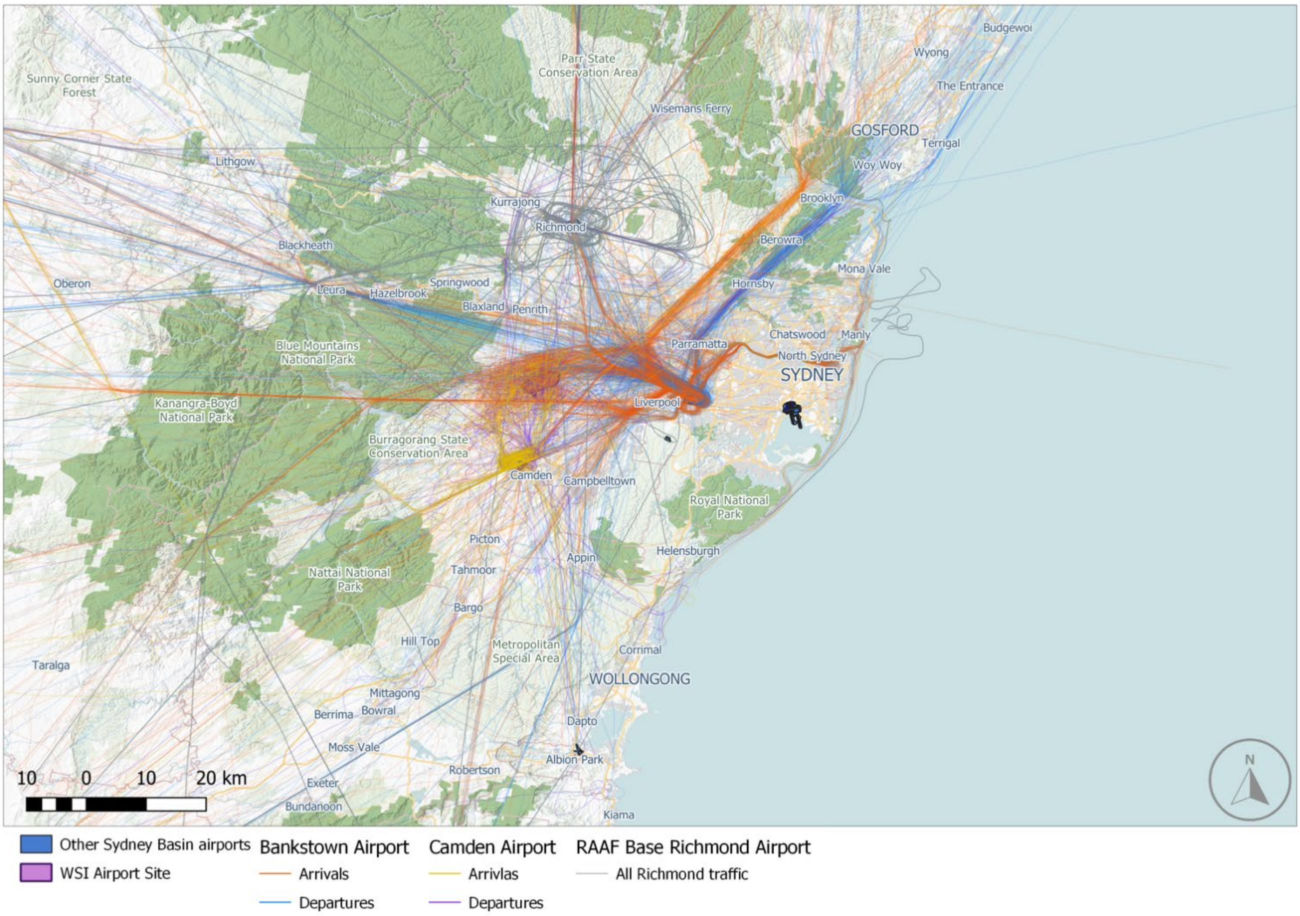

Figure 5.3 Arrivals and departure flight path movement activity to/from Camden and Bankstown Airports (one-week in March 2019)

(Figure 5.3 does not include flight radar tracks to and from Sydney (Kingsford Smith) Airport. These can be found as part of Figure 1.1.)

Bankstown Airport radar tracks are included to illustrate some of the commonality and combined numbers of operations of Camden Airport and Bankstown Airport flights which are not always clearly able to be differentiated in their origin or destination airport from the ground.

Figure 5.4 includes the location of WSI (purple) and the 3 proposed new STARs designed for Camden Airport; northern, north-western and eastern arrivals. The proposed new STARs are shown in purple with their waypoint names and locations. Two waypoints NB234 and NB235 have altitude restrictions in place to ensure safety by design with the new WSI flight paths. Using the proposed STAR flight paths, the altitude restrictions at waypoints NB234 and NB235 and the altitude requirements of the RNP approach (refer to Table 5.2) it is possible to estimate a descent profile and provide an assessment of noise impact under these 2 new flight paths (refer to Table 6.2).

The STAR from the east terminates overhead WSI from which point air traffic control will radar vector the aircraft to the RNP approach. The eastern STAR is expected to be used less than ten times a year. RAKSO is an IFR waypoint located overhead Camden Airport.

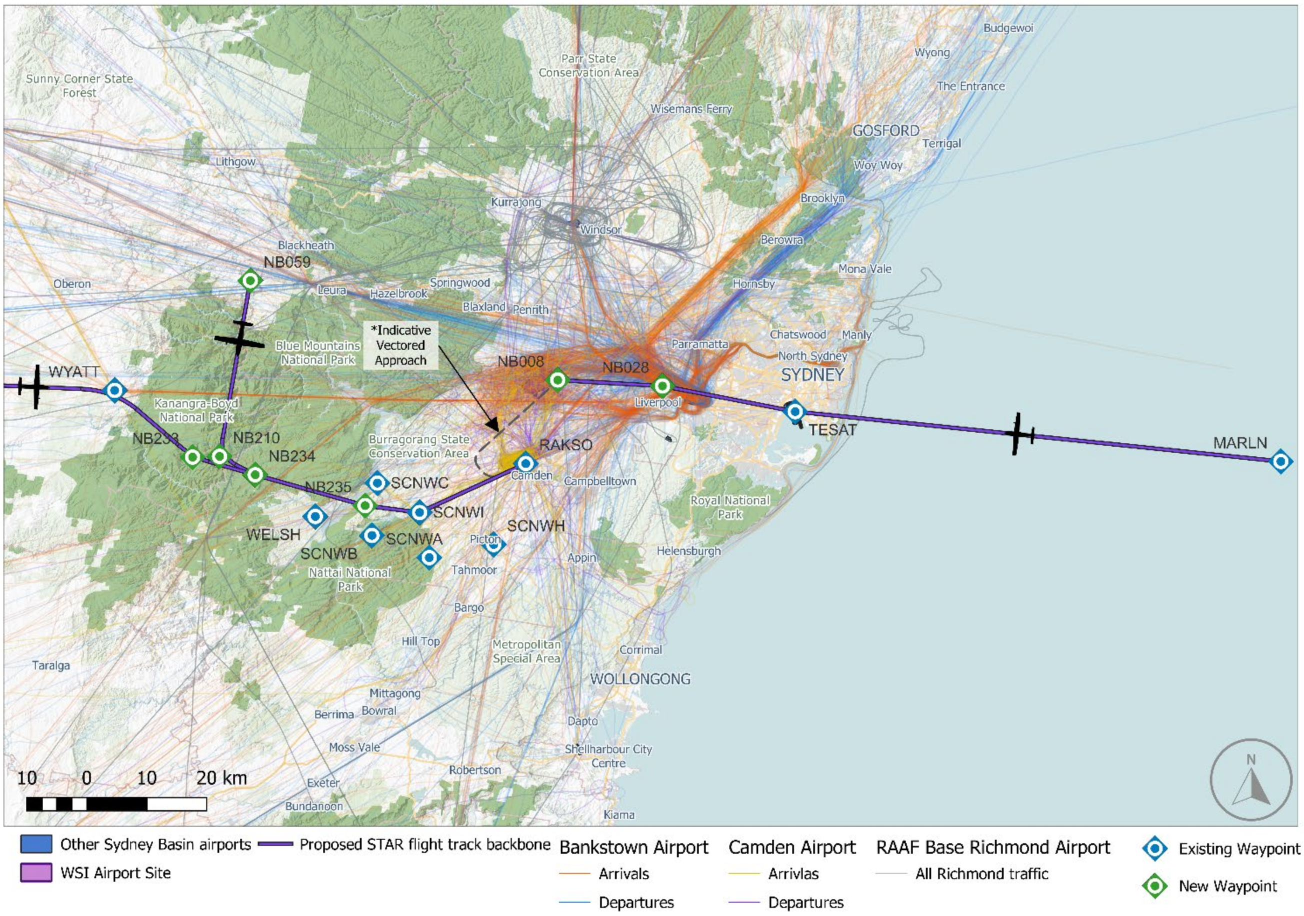

Figure 5.4 Current IFR flight path movement activity to/from Camden Airport and proposed IFR STARs – nominal backbone flight tracks

Nominal backbone flight tracks are used to identify either the centre of an existing flight path, or the designed nominal backbone flight track of a proposed SID or STAR. In the case of a current nominal backbone flight track, it is based on an average of current radar plotted flight tracks. In the case of a proposed new procedure design, the nominal backbone flight track will be primary track used to establish and ensure safety by design standards are met.

Flight dispersion around an actual or proposed nominal backbone flight track will vary considerably where the designed nominal flight path proceeds via a fly-by waypoint. The amount of variation will depend on the angle of turn that the designed flight path is required to make at the waypoint.

Table 5.2 presents the altitude restrictions of the new and the existing waypoints on the proposed STARs to Camden Airport for arrivals from the east, north and west.

Table 5.2 Proposed STARs – waypoint altitude requirements

Waypoint identifier	Altitude requirement
NB059	6,000 to 10,000 ft
NB210	6,000 to 7,000 ft
NB234	6,000 ft or below
NB235	5,000 ft or below
SCNWI	4,000 ft
WYATT	9,000 ft or below
NB233	7,000 ft or below
SCNWI	5,400 ft
SCNWB	5,400 ft
TESAT	12,000 ft or below
NB028	10,000 ft
NB008	10,000 ft

The STAR waypoints (NB210, NB234, etc.) identified in Figures and Tables above, have been allocated a temporary identifier which will be replaced by a conforming 5 letter alpha character designator as part of the detailed design phase and implementation of the proposed procedures.

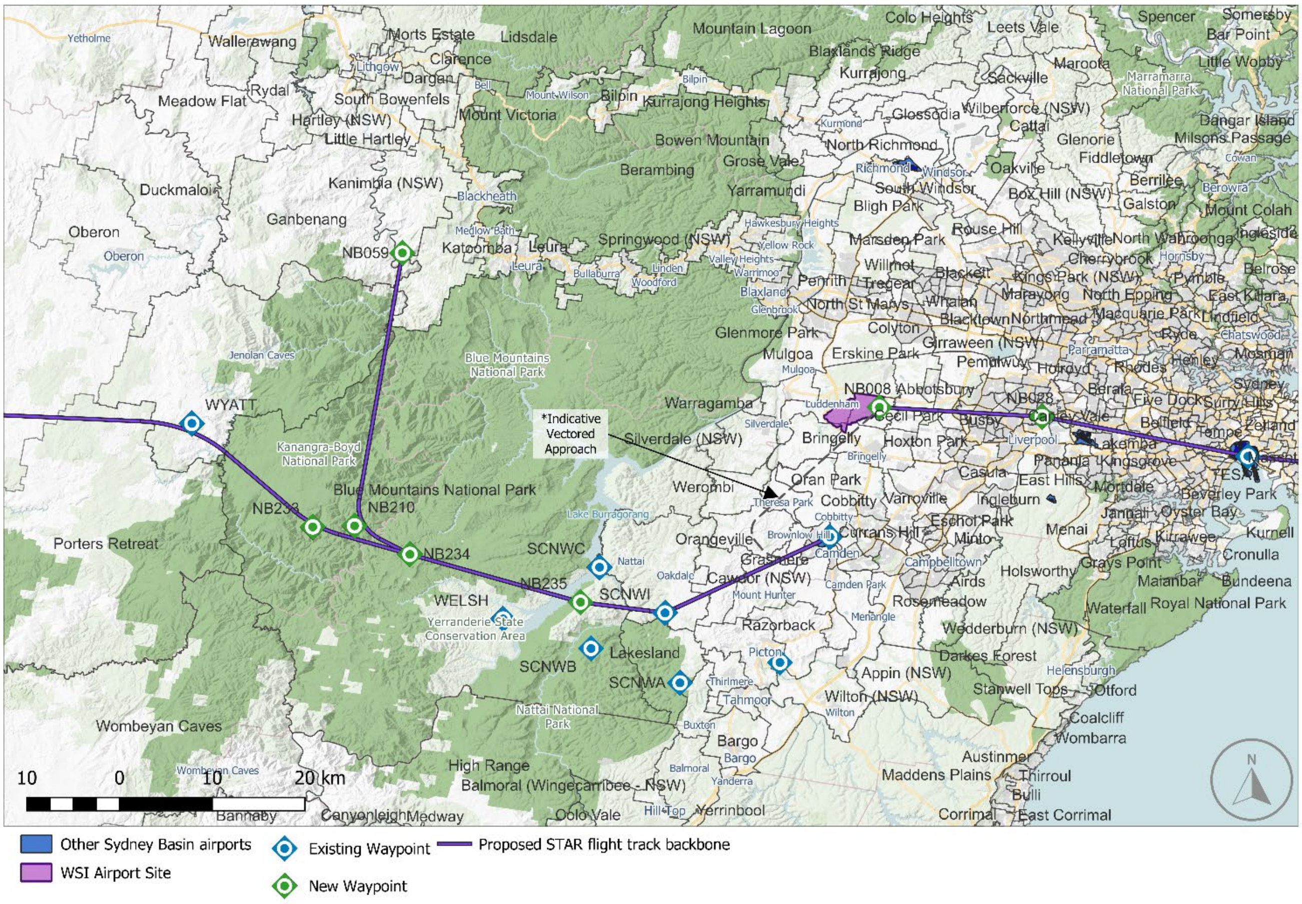

Figure 5.5 Camden Airport proposed IFR STARs with Suburb overlay

5.4 Camden Airport proposed IFR transit flight paths overhead WSI

Flight paths will be designed to enable IFR general aviation aircraft to transit overhead WSI to and from Camden Airport. The precise final location of these flight paths will be finalised following an evaluation of the final detailed design of WSI flight paths. This work will primarily take into account safety and environmental considerations.

The proposed transit flight paths will be able to be flown in either direction and are expected to be operated at altitudes above 4,000 ft (1.2 km).

This proposed transit flight paths are expected to be flown infrequently when WSI traffic levels permit and will primarily be flown by aircraft associated with emergency response operations.

These proposed transit flight paths overhead WSI are included in this Appendix as it is expected that they will be flown by a limited number of operations associated with Camden Airport. They are further addressed and assessed in Appendix J Sydney Basin LL transit flight routes).

Figure 5.6 depicts potential IFR transit flight paths overhead WSI and Figure 5.7 includes a suburb overlay.

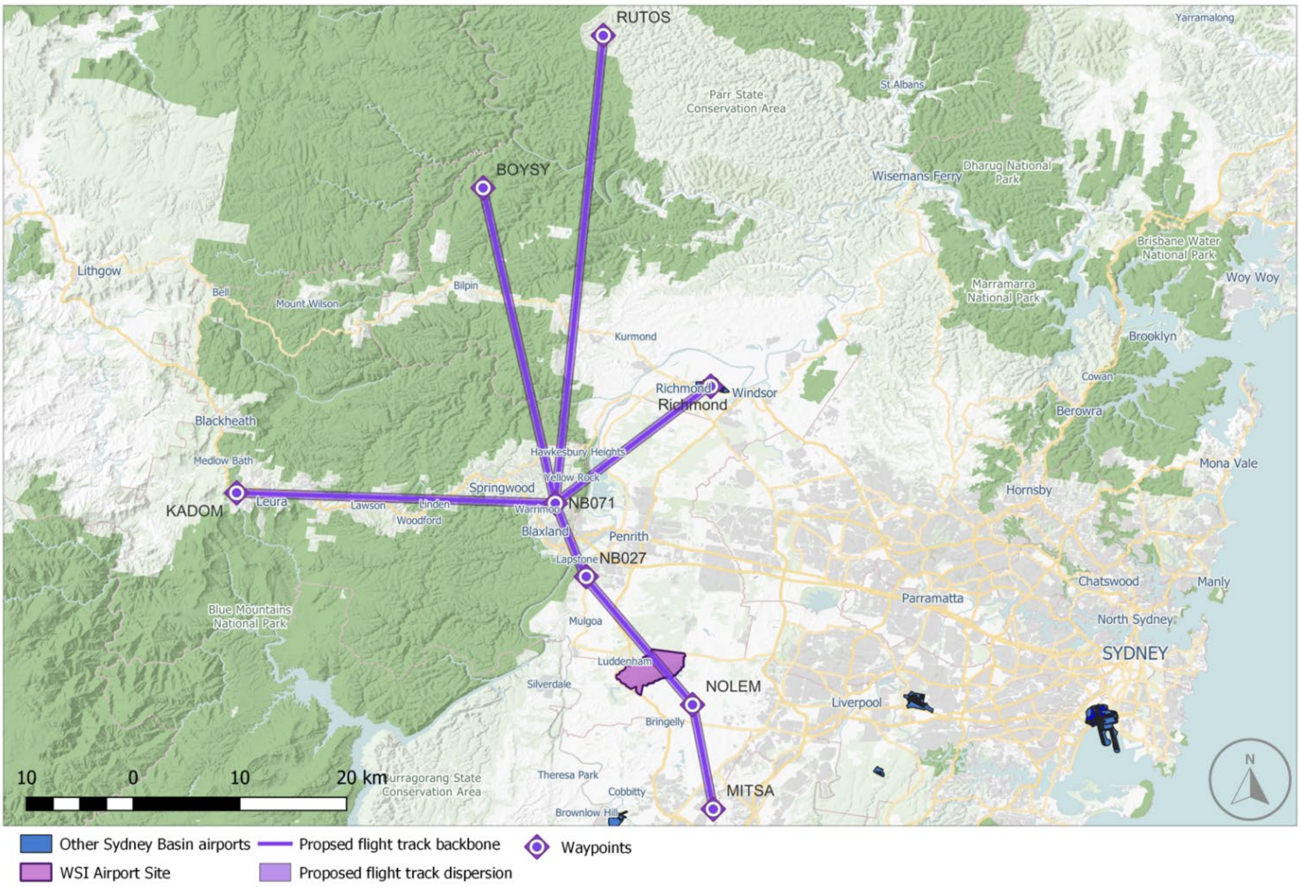

Figure 5.6 Proposed IFR transit flight paths overhead WSI

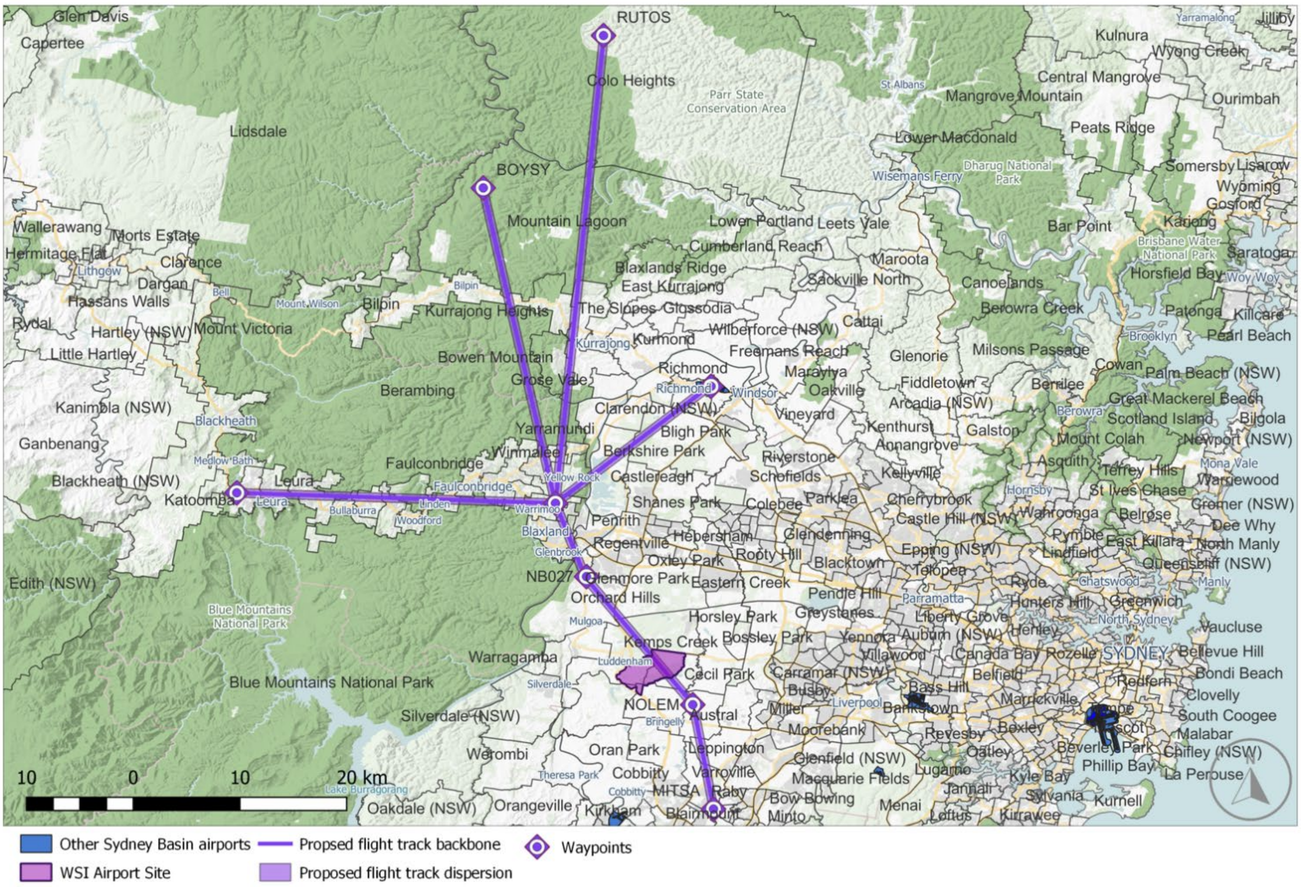

Figure 5.7 Proposed IFR transit flight paths overhead WSI with suburb overlay

5.5 STAR cancellation and radar vectoring

As described in Section 4.2, in visual conditions, pilots may request, and air traffic control may offer, to cancel the STARs subject to separation requirements with other aircraft, and radar vector aircraft on a more direct route to Camden Airport. It is anticipated that this will result in a dispersion of arrival traffic over the ground much the same as today for aircraft from the south and west, and not too dissimilar to today for aircraft from the east, north and north-west.

Chapter 6 Aircraft noise impact assessment

The aircraft noise assessment of the proposed changes to IFR arrival operations at Camden Airport is qualitative in nature due to the many uncertainties in current and future IFR movement numbers. The extent of these impacts is partially dependent on projected demand schedules and mix of aircraft expected to operate at Camden Airport. It has been assumed that up to 10 flights per day will utilise the proposed STARs from west and north-west origins. It has also been assumed that only around 10 flights per year may use the proposed STAR from the east.

To assess the change of any noise impacts created by the introduction of these proposed new STARs to Camden Airport, a knowledge of the noise impacts of the existing arrival tracks and the ability to establish a reliable lateral and vertical profile of the new STARs is important.

As illustrated in Figure 5.2 and Figure 5.3, current arrivals to Camden Airport are random in lateral tracking with no vertical profiles available.

While the new STARs provide a clearly defined lateral track, as discussed in Section 5.4 above (air traffic control Radar Vectoring of Arrivals), air traffic control's ability to cancel STARs for safety or reduced track distance reasons is expected to continue to a large degree, and that will continue to deliver a large amount of random tracking in the future operations.

It is possible to determine a vertical profile for the new STARs for the last 24 nm (around 44 km) of the joint arrival procedure utilising the combined altitude requirements on the STARs and the RNP approach, starting at waypoints NB059, WYATT, and TESAT and finishing at the airport (refer to Table 5.2 for the altitude restrictions at the STAR waypoints). Using Table 5.2, and the average elevation of the terrain overflown, and the stepped down altitude restrictions of the RNP approach, it is possible to make some estimate of noise impact in the areas of change, i.e., waypoint NB235 to SC2WI, which is presented in Table 6.2.

To inform a qualitative analysis of the potential noise from overflights associated with the proposed new STARs, predicted overflight noise levels were interpolated from a series of Noise-Power-Distance (NPD) curves generated using the Aviation Environment Design Tool (AEDT) to provide an indication of what overflight noise from representative aircraft types could be expected on existing tracks, or on tracks that have either changed laterally or vertically or both.

Average expected overflight noise levels in A-weighted decibels (dB(A)) can be determined from the NPD data by selecting the most suitable aircraft type, subtracting the ground level at a location from the expected operating level of the IFR flight, and intersecting this distance with the line representing a particular phase of flight – climb, level flight, or descent. Informed by typical operating techniques, it has been assumed that for piston-engine aircraft, the engine power (thrust) settings adopted are:

- climb – 100 per cent
- cruise (level flight) – 80 per cent
- descent – 50 per cent.

Due to the number of issues still requiring clarification no attempt is made to provide cumulative noise impacts on the proposed new IFR flight paths.

The single piston engine Cessna 172 and the twin piston engine Beechcraft 58 have been chosen as representative aircraft based on the 2019 actual IFR aircraft types using the proposed IFR procedures to Camden Airport. Using the NPD data mentioned above the average expected overflight noise level in dB(A) for aircraft in cruise/level flight is listed in Table 6.1.

Table 6.1 Predicted average overflight noise levels in dB(A)

Aircraft type/Altitude AMSL	1,000 ft	1,500 ft	2,000 ft	2,500 ft	3,000 ft	3,500 ft	5,000 ft
CNA172 – Cessna 172 Skyhawk (single-engine)	66	63	59	57	55	52	48
BEC58P – Beechcraft 58 Baron (twin-engine)	77	74	71	68	66	63	60

The dB(A) values presented in Table 6.1 should be considered as a median value of a range of plus or minus 3 dB(A) – i.e., 50 dB(A) would indicate potential overflight noise of between 47 and 53 dB(A).

As shown, Table 6.1 presents expected average overflight noise levels for aircraft in cruise – flying level at around an 80 per cent power setting. For aircraft undertaking descent (an assumed 50 per cent engine power (thrust) setting), estimated overflight noise levels will decrease by 5 to 7 dB(A) on the above Table 6.1 values.

To aid in the application of NPD overflight noise estimations, a worked example is included in this Appendix:

Aircraft – Cessna 172 "Skyhawk" (representing a typical small piston-single-engine training aircraft)

Flight altitude – 6,000 ft (above mean sea level (AMSL)

Terrain height - 1,000 ft

Flight phase – cruise/level flight

Height above an on-ground receiver = 6,000 – 1,000 = 5,000 ft

From Table 6.1 the estimated overflight noise for 5,000 ft above the receiver = ***48 dB(A)***

(if the aircraft was in a descent phase of flight = 48dB(A) – 6 dB(A) = ***42 dB(A))***

(if the aircraft was in a climb phase of flight = 48dB(A) + 3 dB(A) = ***51 dB(A)***

With reference to Figure 5.4, Table 6.2 provides an estimate of the expected overflight noise levels at key waypoints on the proposed STARs to Camden Airport for 2 suitably representative aircraft.

Table 6.2 Predicted average overflight noise levels in dB(A) at STAR waypoints

Aircraft	Waypoint identifier refer Figure 5.4	Flight altitude less terrain height	Noise level dB(A)**	
			Descent flight	Level/cruise flight
CNA172 – Cessna Skyhawk single-engine propeller	**STAR from the north**			
	NB059	2,500 ft	52 dB(A)	57 dB(A)
	NB210	3,000 ft	50 dB(A)	55 dB(A)
	NB234	3,600 ft	47 dB(A)	50 dB(A)
	NB235	2,500 ft	52 dB(A)	57 dB(A)
	SCNWI	2,500 ft	52 dB(A)	57 dB(A)
	STAR from the west			
	WYATT	7,000 ft	39 dB(A)	43 dB(A)
	NB233	4,000 ft	46 dB(A)	51 dB(A)
	SCNWI	2,500 ft	52 dB(A)	57 dB(A)
	SCNWB	2,500 ft	52 dB(A)	57 dB(A)

Aircraft	Waypoint identifier refer Figure 5.4	Flight altitude less terrain height	Noise level dB(A)**	
			Descent flight	Level/cruise flight
	STAR from the east			
	TESAT	12,000 ft *	31 dB(A)	36 dB(A)
	NB028	10,000 ft *	34 dB(A)	38 dB(A)
	NB008	9,000 ft	36 dB(A)	41 dB(A)
BEC58P – Beechcraft Baron Twin-engine propeller	**STAR from the north and south arrivals to SCNWI and SCNWB**			
	NB059	2,500 ft	62 dB(A)	68 dB(A)
	NB210	3,000 ft	60 dB(A)	66 dB(A)
	NB234	3,600 ft	59 dB(A)	65 dB(A)
	NB235	2,500 ft	62 dB(A)	68 dB(A)
	SCNWI	2,500 ft	62 dB(A)	68 dB(A)
	STAR from the west and south arrivals to SCNWI and SCNWB			
	WYATT	7,000 ft	52 dB(A)	57 dB(A)
	NB233	4,000 ft	57 dB(A)	63 dB(A)
	SCNWI	2,500 ft	62 dB(A)	68 dB(A)
	SCNWB	2,500 ft	62 dB(A)	68 dB(A)
	STAR from the east			
	TESAT	12,000 ft *	44 dB(A)	50 dB(A)
	NB028	10,000 ft *	46 dB(A)	52 dB(A)
	NB018	9,000 ft	48 dB(A)	53 dB(A)

* non-pressurised light aircraft have an operating ceiling of around 10,000 ft.

*** The dB(A) values presented in Table 6.2 should be considered as a median value of a range of plus or minus 3 dB(A) – i.e., 50 dB(A) would indicate potential overflight noise of between 47 and 53 dB(A).*

Chapter 7 Other environmental factors

As presented in Chapter 6 above, it is expected that up to 10 flights per day could utilise the proposed new STARs when arriving at Camden through controlled airspace.

Chapter 5 identifies the area of change below 6,000 ft (1.8 km) as being the 10 nm (19 km) track between waypoints NB234 and NB235 (new) and its continuing 5 nm (9 km) from waypoint NB235 to SC2WI (a replacement for SC2WC to SC2WI). This track crosses from the higher peaks of the Great Dividing Range to the foothills of the Lower Blue Mountains once east of Lake Burragorang. Only when the track passes waypoint SCNW1 does It cross into the flat land containing housing development. However once past waypoint SCNW1 the new track is the same as the current track and as stated in Chapter 4 does not form part of this assessment.

It is not possible to draw any reliable conclusions on noise impacts of the new STARs before they become a common track at waypoint NB234. It is not clear what vertical profiles will exist before this point other than the knowledge that aircraft will be required to fly a minimum height above the terrain and that non pressurised aircraft normally operate in cruise flight below 10,000 ft (3 km).

The STAR from the north which starts at waypoint NB059 passes well to the west of Katoomba and tracks down the highest part of the GBMA before turning left at waypoint NB210.

7.1 Visual amenity

With reference to Figures 1.1, 5.3 and 5.4 in this Appendix, that depict the density, mixing and randomness of flight tracks in the vicinity of Camden Airport, it will in many instances and in many areas in proximity to Camden Airport be challenging for an observer to correlate an aircraft overflight’s origin or destination to Camden or Bankstown Airport.

For the small number of mainly piston engine aircraft using the proposed new STARs, which are largely west of the metropolitan area, the visual impact to communities in the Sydney Basin is expected to be negligible.

Given that the area under the new STARs is already overflown by a mix of aircraft types, some of which are already proceeding to intercept the northern leg of the RNP approach to Camden Airport and coupled with the low numbers of IFR aircraft (up to 10 per day) expected to use the STARs inside controlled airspace, additional visual amenity impacts related to the proposed new STARs should be minimal if any at all.

7.2 Radar vectoring

In locations where no SIDs or STARs are available for an aircraft's particular operation, or where adverse weather requires the cancellation of a SID or STAR for safety reasons, air traffic control will provide radar vectoring to safely manage those applicable operating aircraft. Radar vectoring involves air traffic control determining a safe path for all aircraft and issuing heading and sometimes altitude and speed instructions to one or more aircraft to avoid any possible conflictions. While the objective of a set of SIDs and STARs in terminal airspace designed under “Safety by Design” principles is for onboard flight management systems monitored by air traffic control to ensure aircraft remain separated, there are occasions where SIDs and STARs are cancelled for varied reasons and aircraft are radar vectored.

A cancellation of a SID or STAR resulting in radar vectoring involving a departure from lateral track, could also involve a variation in vertical profile or speed requirements and may be either at pilot request or initiated by air traffic control.

Pilot requests in all instances are subject to air traffic control approval. Avoidance of thunderstorms which has a safety priority is readily approved. Direct routing requests will be considered by air traffic control in light of safety and overall management of other aircraft within the vicinity.

A pilot can request cancellation of a STAR for reasons of weather avoidance or to enter a holding pattern to address an equipment malfunction.

Air traffic control will cancel a STAR when an alternate track or vertical profile is required by one or more aircraft to maintain the optimum landing sequence at the airport. Up to a point, speed adjustment can also be made within the lateral or vertical profile of a STAR.

In low arrival demand conditions air traffic control will occasionally cancel a STAR to reduce track miles and emissions if a shorter arrival route is available.

For all the reasons aircraft are radar vectored by air traffic control, aircraft using these newly proposed STARs may also be subject to radar vectoring. It is anticipated that this will result in a dispersion of arrival traffic over the ground much the same as today for aircraft from the south and west, and not too dissimilar to today for aircraft from the east, north and north-west.

7.3 Track distance and emissions

Given the wide number of departure points from the north and northwest for aircraft that will be processed through controlled airspace to Camden Airport on the new proposed STARs it is not possible to make any meaningful comparisons with current distances flown from the same mixed set of departure points under the current radar vectoring procedures that facilitate arrivals to Camden Airport today.

Chapter 8 Conclusion

The qualitative analysis of the changes proposed to IFR operations is considered the best available representation of potential impacts. This must be heavily qualified due to the variability associated with noise generation from variations of even the same aircraft type, varying pilot technique and variations in meteorological conditions. Overflight noise levels will also vary with respect to the lateral offset positioning of the at-ground receptor to the aircraft operating above.

This assessment finds that the proposed introduction of STARs to cater for IFR aircraft arrivals to Camden Airport from the east, north and west is unlikely to result in any significant environmental impacts.

The sparsely populated area between the waypoint NB234, at which aircraft must be below 6,000 ft and the waypoint NB235 at the commencement of the RNP new approach leg are already overflown at similar altitudes in the current operation. A possible small increase over the next 5 years in the very low current numbers of IFR arrival operations adopting this proposed procedure to around 10 per day is not considered to be significant in overflight noise exposure.

In general, the area overflown by the proposed new Camden Airport STARs is currently frequently overflown with similar aircraft undertaking both IFR and VFR flights (refer to Figures 1.1 and 5.3). The predicted low utilisation of the STARs by up to 10 flights per day and the low growth forecasts of only one per cent or less, result in the expectation that there will be little or no material change over today's operations.

Appendix I

Proposed changes to Sydney Basin Visual Flight Rules (VFR) operations

Western Sydney International (Nancy-Bird Walton) Airport – Airspace and flight path design | Environmental Impact Statement

Technical paper 13: Facilitated changes

Appendix I – Proposed changes to Sydney Basin Visual Flight Rules (VFR) operations

October 2024

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Terms and abbreviations

Term/abbreviation	Definition
ACP	Airspace Change Proposal (Airservices)
AIP	Aeronautical Information Publication (Australia)
AIRAC	Aeronautical Information Regulation and Control (Australia)
ARP	Aerodrome Reference Point
CASA	Civil Aviation Safety Authority (Australia)
CO_2	Carbon dioxide (greenhouse gas)
Cth	Commonwealth (Australia)
CTR	Control Zone
DAP	Departures and Approach Procedures (Australia AIP)
dB(A)	A-weighted decibel
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Australian Government)
DITRDCA	Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Australian Government)
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation 1999* (Cth)
ERSA	En Route Supplement (Australian AIP)
ft	feet (unit of distance or height equivalent to 0.3048 m)
FTA	Flight Training Area
GA	General Aviation
GBMA	Greater Blue Mountains Area (World Heritage property)
IAF	Initial Approach Fix
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
km	kilometre (unit of distance equivalent to 1,000 m)
LL	Lower Level (altitude)
MNES	Matters of National Environmental Significance (EPBC Act) (Cth)
nm	nautical mile (unit of distance equivalent of 1.852 km)
NPD	Noise Power Distance (aircraft noise chart)
PMST	Protected Matters Search Tool (DCCEEW)

Term/abbreviation	Definition
RAAF	Royal Australian Air Force
SID	Standard Instrument Departure (flight path)
STAR	Standard Instrument Arrival (flight path)
TFI	Tourism Futures International
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WSI	Western Sydney International (Nancy-Bird Walton) Airport

Chapter 1 Introduction

Although aircraft differ in operation, type, altitude, noise level and frequency, most areas of the Sydney Basin are overflown at some stage as shown Figure 1.1.

The introduction of new flight paths to be used by aircraft into and out of Western Sydney International (Nancy-Bird Walton) Airport (WSI) has considered a multitude of options to minimise any adjustments required to existing flight paths in the Sydney Basin airspace. To facilitate the use of new flight paths at WSI, there are adjustments required to Sydney Basin operations prior to the opening of WSI in 2026 to facilitate its flight paths and airspace structure. Those proposed facilitated changes include the development of, or adjustments to:

- Sydney (Kingsford Smith) Airport Runway 25 Standard Instrument Departures (SIDs) to the west, north-west, north and east – (Appendix A)
- Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs to the south, west, north, and east – (Appendix B)
- Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID to the west and north-west – (Appendix C)
- Sydney (Kingsford Smith) Airport non-jet SID to the west or north-west – (Appendix D)
- Sydney (Kingsford Smith) Airport AKMIR Standard Instrument Arrival (STAR) jet and non-jets from the south and west – (Appendix E)
- Royal Australian Air Force (RAAF) Base Richmond SID and STARs – (Appendix F)
- Bankstown Airport SID and STARs – (Appendix G)
- Camden Airport STARs – (Appendix H)
- **Sydney Basin Visual Flight Rules (VFR) operations – (Appendix I)**
- Miscellaneous and Minor procedure adjustments – (Appendix J)
  - Sydney (Kingsford Smith) Airport BOREE STAR
  - Sydney (Kingsford Smith) Airport RIVET STAR
  - Sydney (Kingsford Smith) Airport Runway 07 Initial Approach Fix (IAF)
  - Sydney (Kingsford Smith) Airport Runway 07 SID
  - Sydney Basin low altitude transit flight routes.

This Appendix – Appendix I, presents an assessment of the impacts of the changes proposed to current Visual Flight Rules (VFR) operations in the Sydney Basin.

The design process for the safe and efficient integration of WSI's new flight paths into the existing Sydney Basin airspace has been one of adopting "Safety by Design" principles to deliver the highest level of safety separation assurance in conformance with rules set by the Civil Aviation Safety Authority (CASA). This is to enable aircraft to operate safely within their performance envelope into an already complex airspace structure. "Safety by Design" ensures that aircraft are separated from each other according to the flight routes and the type of air traffic service being provided. As such, this requires the new or amended SIDs and STARs and altitudes to be published and then downloaded into the cockpit flight management systems of all aircraft. At the same time the same information must be downloaded into the software of the surveillance systems used by air traffic control to manage and monitor the safe separation of all controlled aircraft.

The preliminary airspace design process has appropriately accorded "safety" as the highest priority to ensure robust operational safety outcomes. Environmental outcomes, with a particular focus on the minimisation of potential community impacts from aircraft overflights and the operational efficiency of the facilitated airspace changes have also been key criteria used to inform the preliminary airspace design.

Instrument Flight Rules (IFR) are the rules that govern the operation of aircraft in Instrument Meteorological Conditions (IMC) (conditions in which flight In IMC, an aircraft must be flown with reference to its onboard flight instruments.) Two sets of rules, IFR or VFR exist to govern flight in either IMC or Visual Meteorological Conditions (VMC).

The proposed changes to VFR operations in the Sydney Basin have been designed to be flown under VFR.

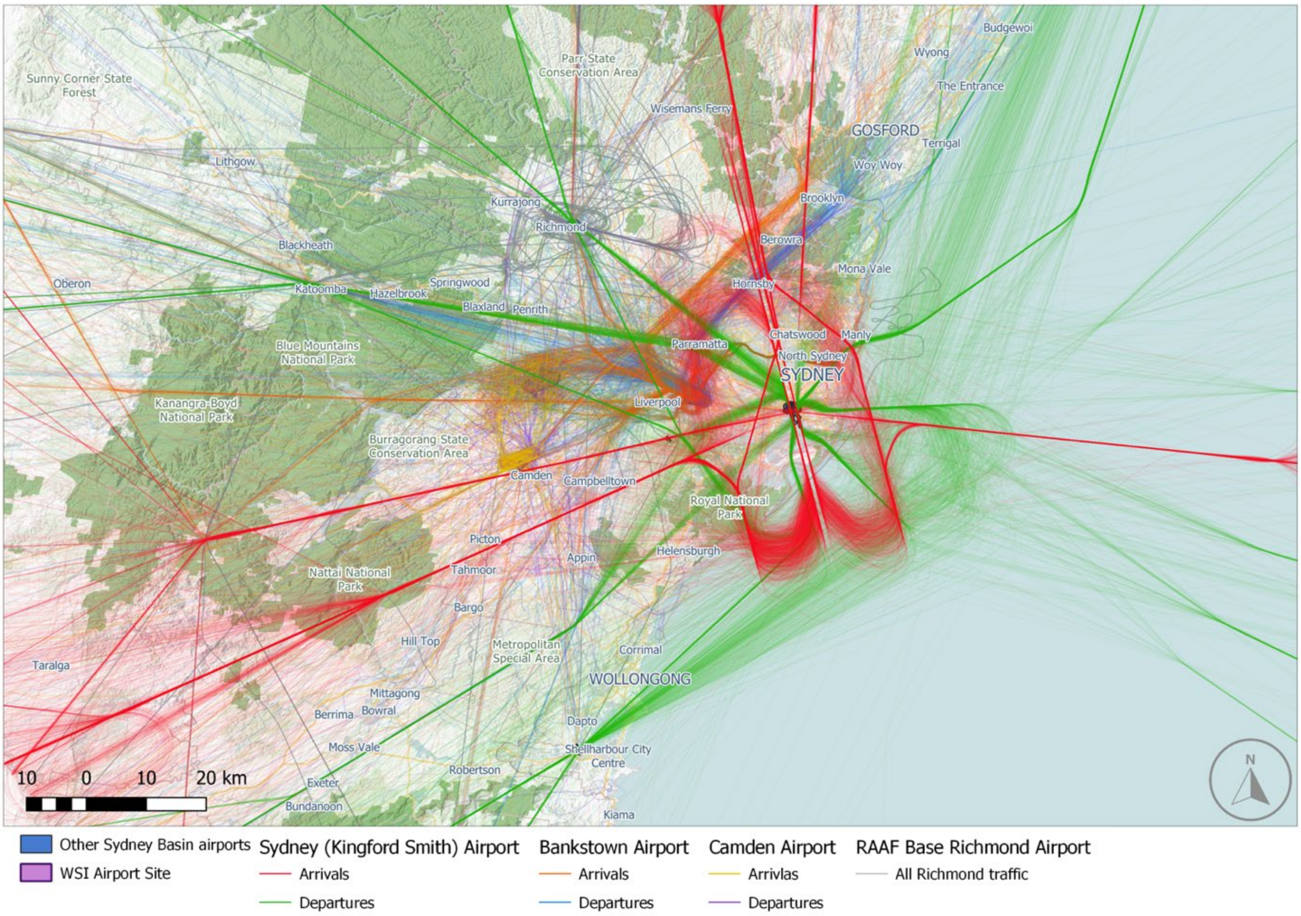

Figure 1.1 Sydney Basin airspace with one-week of flight track movement activity in March 2019

Chapter 2 Background

The safe introduction of flight paths for single runway operations at WSI into the Sydney Basin airspace will facilitate a change in the way aircraft operating in the currently uncontrolled airspace overhead and surrounding WSI can be expected to operate in the future.

Many types of flights occur in uncontrolled airspace, including helicopters (commercial, medical, police, etc.), media, photography and fire and rescue. Most of these aircraft are single or twin-engine piston aircraft operating in visual conditions under VFR. Most of these aircraft are undertaking some form of flight training, either in specifically designated areas or as the start or end of an extended cross-country navigational training flight beyond the Sydney Basin. While some training flights transit the Sydney Basin, e.g., Tamworth to Shellharbour, many of these training flights start and end at Bankstown Airport and to a lesser but still significant degree, Camden Airport.

Due to the location of WSI, a very large volume of the airspace used for dedicated flight training and a commonly used cross-country navigational training route will no longer be available to VFR training or travel flights.

In consultation with stakeholders, the designers of the WSI airspace have identified possible additional flight training areas (FTAs) and 2 new flight paths for travel flights to the west of Bankstown Airport that are able to operate in the newly constrained airspace in the Sydney Basin. While these possible alternatives present as a preliminary draft operating plan, they cannot yet be considered as definitive.

At the current state of the design, a high-level understanding of the procedures and processes that can be expected to operate after the opening of WSI in 2026 has been developed. Final proposed detail and the ultimate procedures will not be confirmed until completion of a separate change proposal. The design may then be subject to further change when WSI becomes operational.

Any facilitated changes to VFR operations in the Sydney Basin airspace will require detailed consideration of:

- the possible approval by CASA of the location of possible new FTAs to the east of RAAF Base Richmond Airport and south of Camden Airport (refer to Figure 6.1)
- the change of classification of part of the current uncontrolled airspace to controlled airspace
- the commercial and safety issues to be assessed by flying training operators when determining how to access and undertake flying training in the proposed new FTAs, should they gain CASA approval noting that some preliminary consultation has been undertaken.

Facilitated changes to VFR operations, once agreed, would need to be published and implemented prior to the opening of WSI in 2026. These changes would be introduced in 2026 on a scheduled Aeronautical Information Regulation and Control (AIRAC) date, prior to the opening of WSI. Introducing these changes ahead of WSI's opening will allow pilots and air traffic control to adjust their systems and become familiar with changes to current procedures before single runway operations at WSI commence, and will minimise the likelihood of conflicts or incidents in the airspace.

Figure 2.1 shows the location of WSI, the locations of other key airports in the Sydney Basin and geographic extent of a nominal area radiating 45 nautical miles (nm) (around 83 km) from the Aerodrome Reference Point (ARP) of WSI.

Figures 2.2 and 2.3 are the Aerodrome Charts for Bankstown and Camden Airports. These charts have been extracted from the Aeronautical Information Package (AIP) Departure and Approach Procedures (DAP) to assist the interpretation of the information presented in this Appendix as most VFR flights in the Sydney Basin are related to these 2 airports. They depict the general layout of Bankstown and Camden Airports including their runway systems and orientations, runway headings (06, 23, etc.) and dimensions (lengths and widths).

Figure 2.1 Location of airports in the Sydney Basin

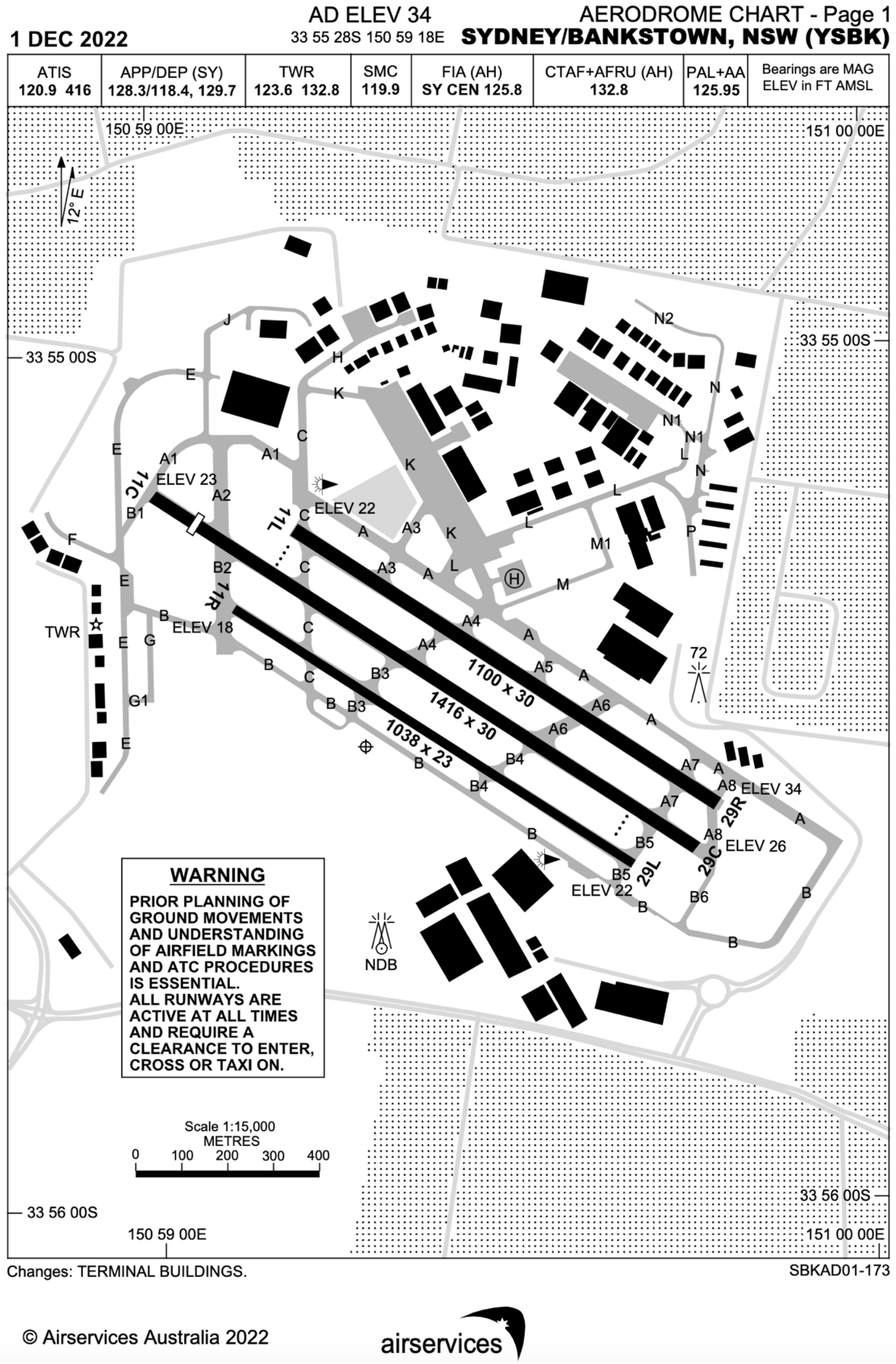

Figure 2.2 Bankstown Airport – Aerodrome Chart (AIP / DAP)

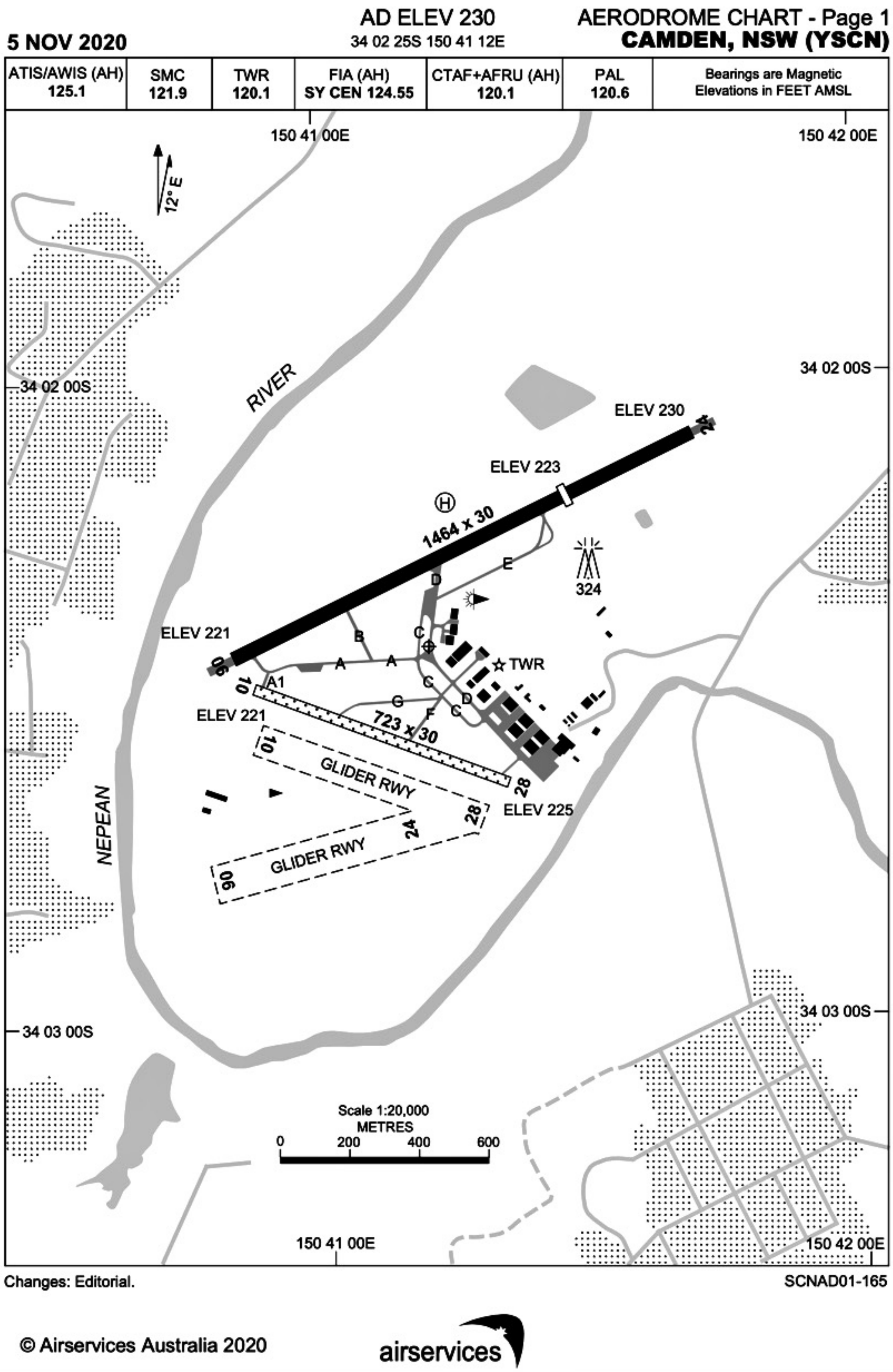

Figure 2.3 Camden Airport – Aerodrome Chart (AIP / DAP)

Chapter 3 Purpose

The purpose of this Appendix is to present an environmental assessment of the facilitated changes to VFR operations in uncontrolled airspace within the Sydney Basin area as part of the introduction of WSI's new flight paths and airspace containment requirements. This Appendix includes analysis and assessment of potential noise impacts from aircraft overflights of this proposed facilitated airspace change.

It describes the reason for the facilitated airspace changes and the associated safety and operational considerations, along with other environmental issues.

Chapter 4 Current VFR operations at Bankstown Airport

Figure 4.1 presents the aircraft mix operating at Bankstown Airport for the 2019 financial year. This information was extracted from the 2019 Bankstown Airport Master Plan.

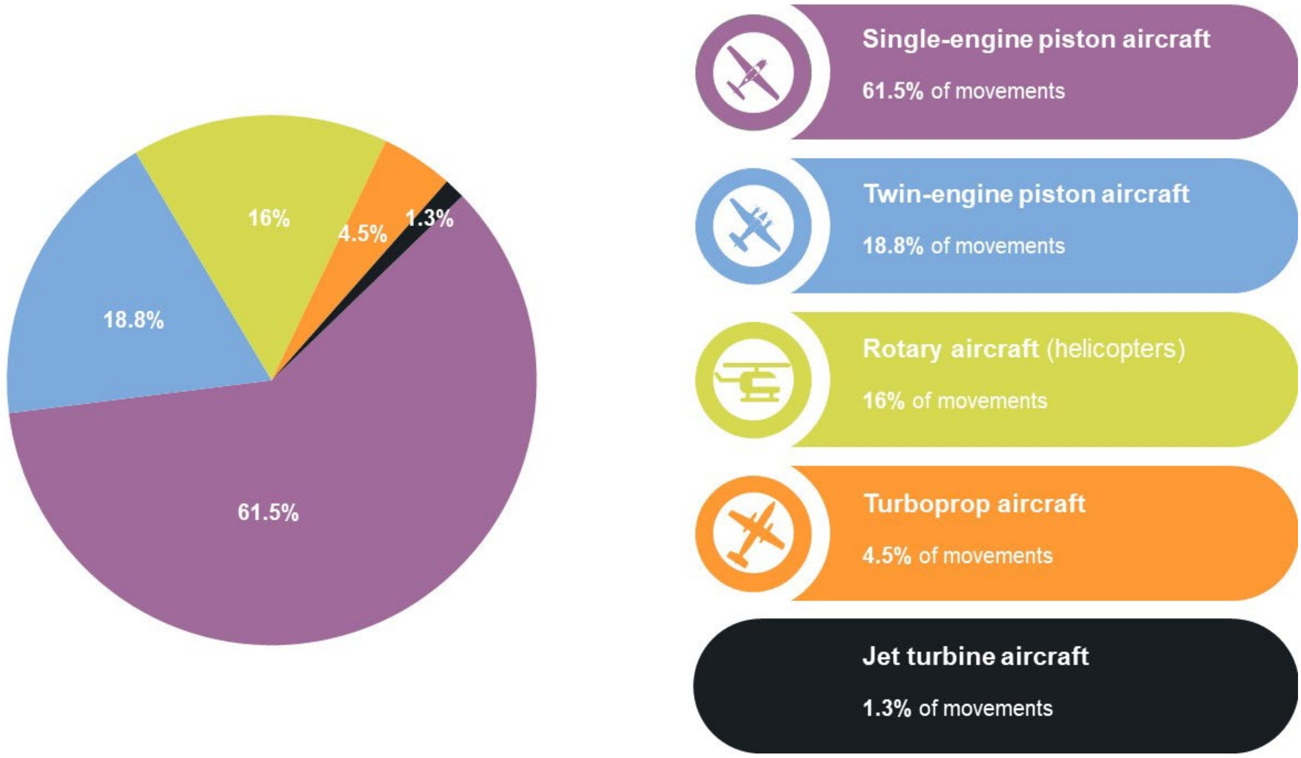

Figure 4.1 Bankstown Airport aircraft fleet mix in 2019 financial year

4.1 Flying training

Several FTAs currently exist in the Sydney Basin airspace to the west of Bankstown Airport and north and south-west of Camden Airport (refer to Figure 4.4). These FTAs have lateral and vertical boundaries and because of the nature of the flying activity which takes place within these areas have long been designated as “Danger Areas” to heighten the awareness of other airspace users that unpredictable aircraft manoeuvres may occur within the FTAs by training pilots.

Figure 4.2 provides a snapshot of VFR flights over the Sydney Basin for the month of March in 2019 and demonstrates an intensity of VFR operations over the Airport Site (WSI), which includes: 1,605 departures, 2,087 arrivals and 816 circuit operations for Bankstown and Camden Airports.

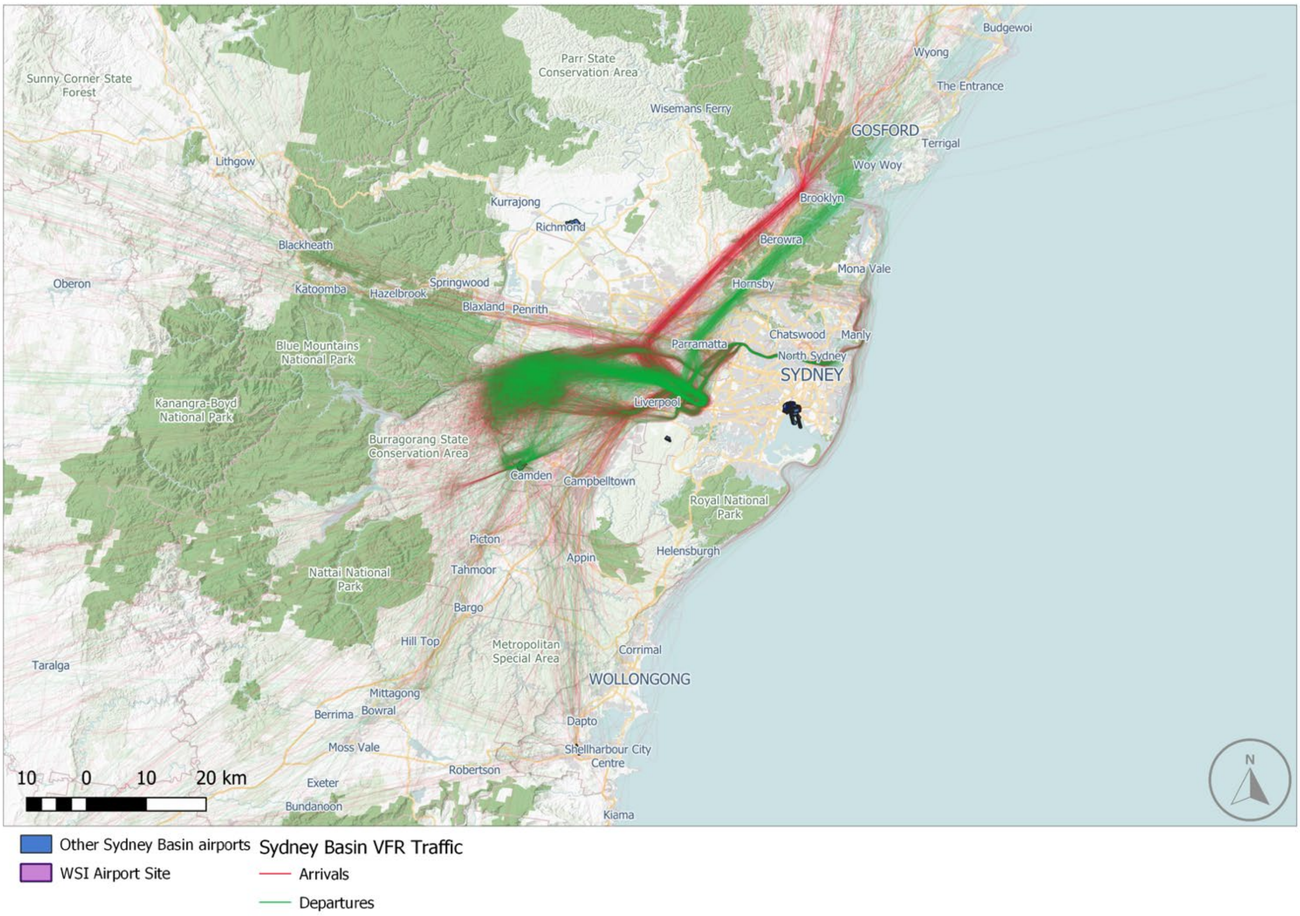

Figure 4.2 Current Sydney Basin VFR flight track movement activity for the month of March 2019

(Figure 4.2 does not include flight radar tracks to and from Sydney (Kingsford Smith) Airport. These can be found as part of Figure 1.1.)

Figure 4.3 is a zoomed in version of Figure 4.2 depicting VFR flight path movements for the month of March 2019, over the Airport Site (WSI is represented in purple) and the future proposed Control Zone (CTR) for WSI. Prior to the opening of WSI in 2026, this VFR flight and flying training activity will have to be displaced clear of the extent of the future proposed CTR boundary for WSI shown in blue on Figure 4.3.

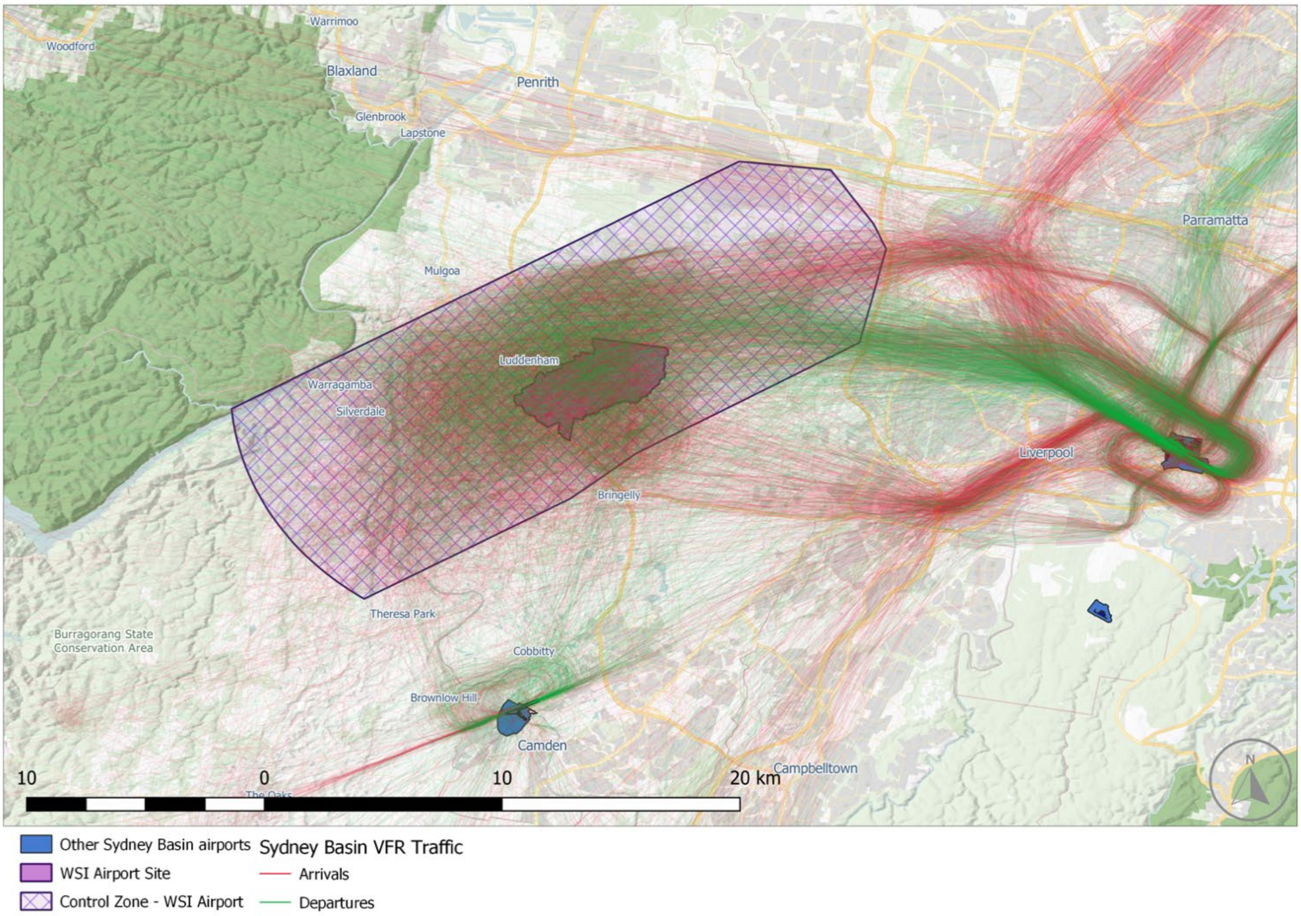

Figure 4.3 **VFR flight path movement activity over the Airport Site for WSI in March 2019 and the proposed future airspace Control Zone (CTR) for WSI**

The lateral boundaries of the existing FTAs are described with reference to a prominent geographical feature, e.g., a river, major road or rail corridor or a line between 2 or more major urban developments such as a shopping or industrial complex.

Vertical boundaries also apply to ensure separation exists between aircraft operating in the FTA and aircraft operating in the overlying controlled airspace. The vertical boundaries (operating altitude limits) do not necessarily overlay the lateral boundaries of the FTAs. The vertical boundaries are defined by the climb and descent profiles of the aircraft operating within the controlled airspace above.

Different FTAs have different vertical boundaries to allow for all flight manoeuvres to be taught and practiced by a trainee pilot. For example, stall training, where an aircraft can drop several hundred feet in performing the manoeuvre, for safety reasons cannot be taught or conducted in FTAs that have a vertical constraint of only 2,000 feet (ft) (610 m) maximum altitude.

Figure 4.4 shows the lateral and vertical limits of the current FTAs in the Sydney Basin airspace. The lower level (LL) of the various overlying controlled airspace surfaces are also depicted. The location of the Airport Site boundary for WSI has been included to illustrate the need for a redesign of VFR activities prior to the opening of WSI in 2026.

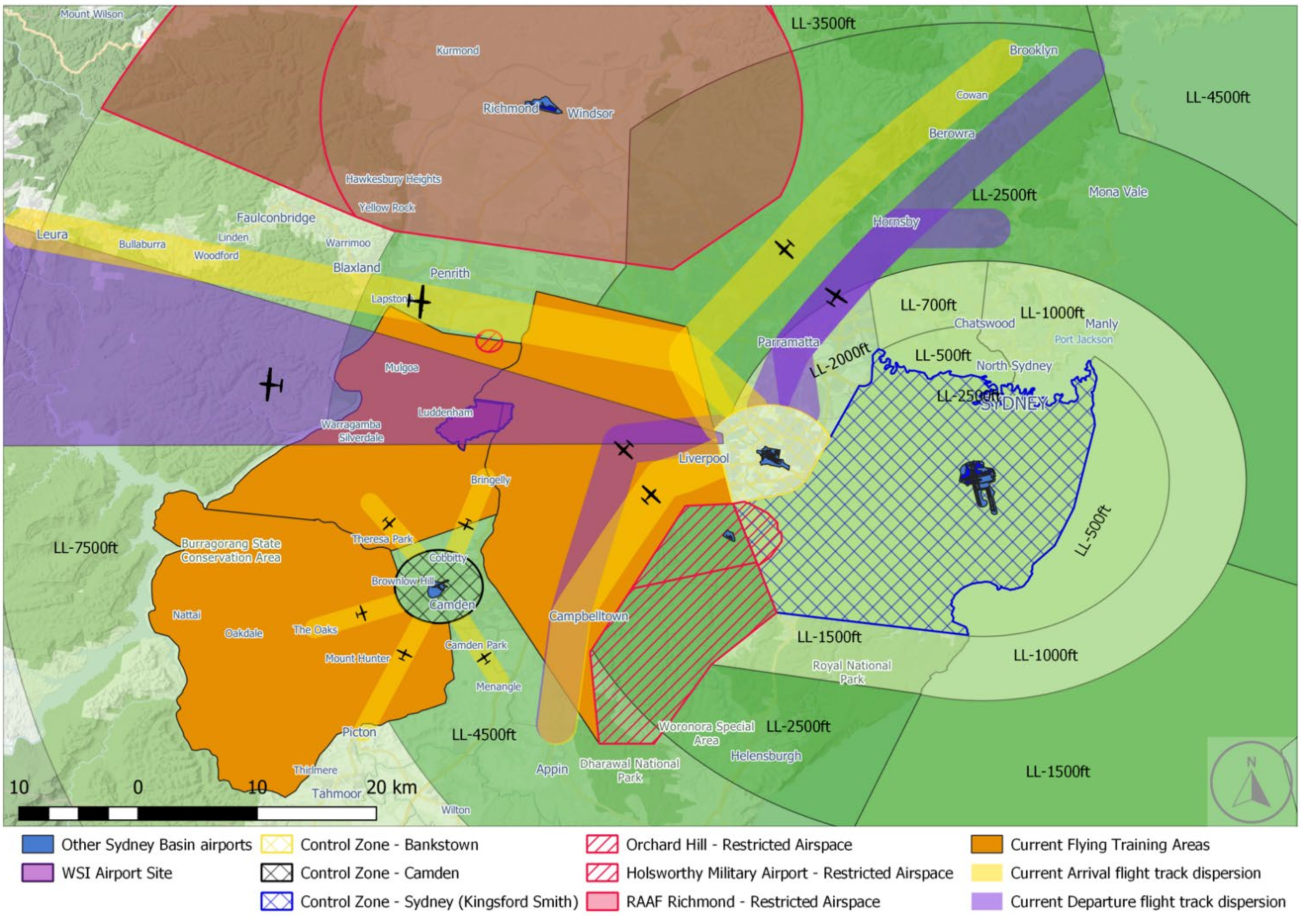

Figure 4.4 **Current Sydney Basin Airspace Control Area (CTA) and Control Zone (CTR) boundaries including the Lower Level (LL) of controlled airspace with current VFR departure and arrival routes**

4.2 Flight paths flown to access or exit existing training areas

4.2.1 Departing aircraft

Most VFR aircraft departing Bankstown Airport fall into 2 categories. One, is those aircraft that are proceeding to one of the FTAs to undertake general aircraft handling techniques. The other is aircraft departing on a travel flight. A travel flight involves leaving the vicinity of Bankstown Airport and tracking to another destination airport (e.g., Bankstown for Tamworth).

Travel flights can fall into 2 categories, those that land at the destination airport either for training purposes or to offload passengers or cargo, and those that simply overfly the destination airport and return to Bankstown Airport as part of a training navigational exercise.

The Bankstown Airport AIP En Route Supplement (ERSA) entry defines requirements for VFR aircraft wishing to depart the Bankstown Airport CTR into uncontrolled airspace. VFR pilots must advise Bankstown Airport Tower air traffic control of their intentions before take-off. Their intention may be to conduct circuit training inside the Bankstown Airport CTR, to proceed to the training areas, or to operate a travel flight.

Aircraft proceeding to the training areas or on a travel flight are required to leave the Bankstown Airport CTR “on an extended leg of the circuit”. What this means is that aircraft departing in the Runway 29 direction will track straight ahead on a track of 290 degrees (slightly north of west) on climb until they have left the CTR, 2 nm (3.7 km) from the centre of the airport).

Aircraft departing in the Runway 11 direction will fly straight ahead 110 degrees (slightly south of east) until leaving 500 ft (150 m), make a left turn of 90 degrees (to slightly east of north) and then at around 800 ft (245 m) to 1,000 ft (300 m) on climb, make a further 90 degree left turn (to slightly north of west) to fly parallel to the runway direction as they fly north-westwards until 2 nm (3.7 km) from the centre of the airport leaving the Bankstown Airport CTR.

Figure 4.5 shows the current configuration of departure tracks inside the Bankstown Airport CTR. The tracks in green are flight radar tracks from March 2019 and VFR flights are expected to continue to track the same way after the opening of WSI in 2026. The purple tracks and hatching area relate to proposed IFR aircraft SIDs which will be implemented to facilitate operations at WSI and are explained in detail in Appendix G: Bankstown Airport proposed new SIDs and STARs.

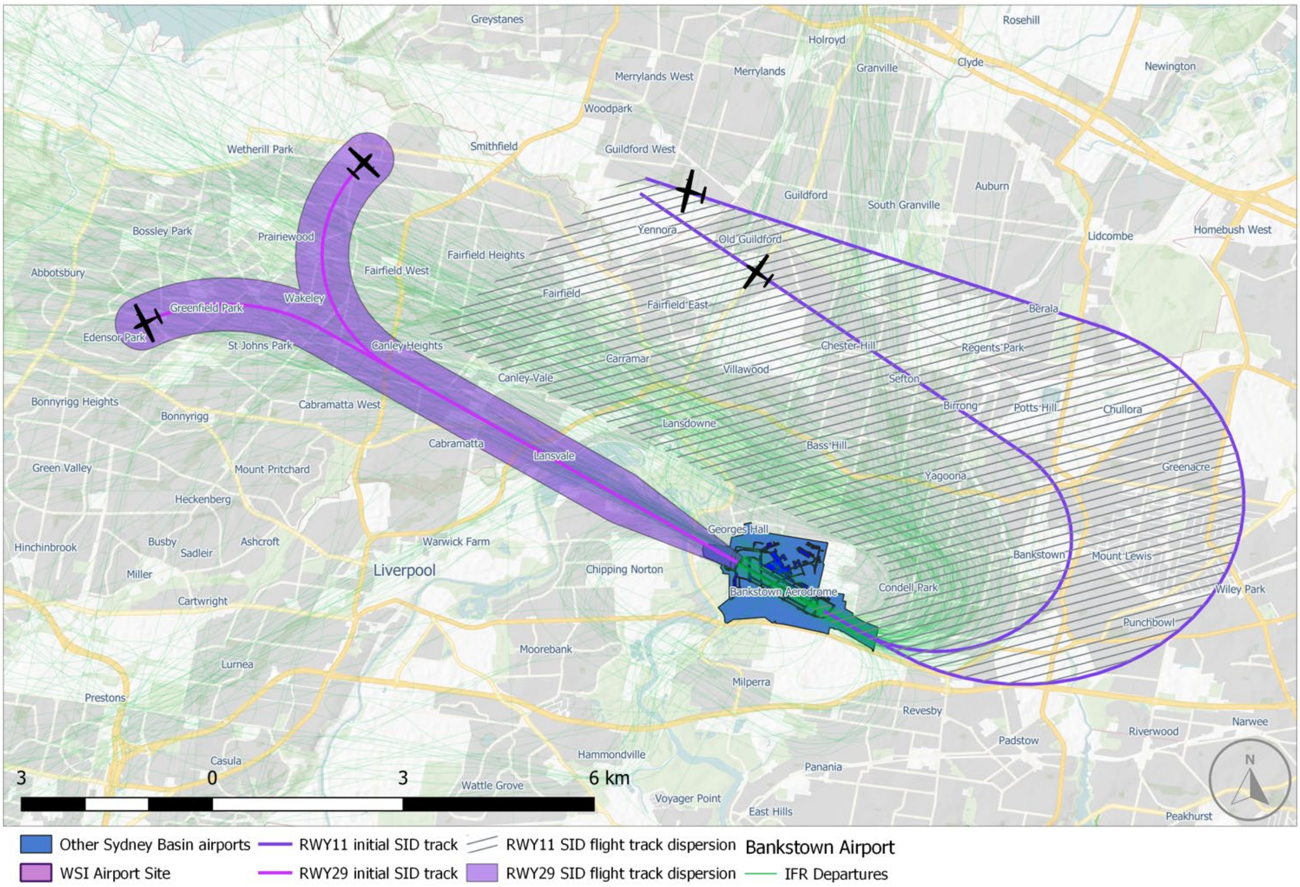

Figure 4.5 Bankstown Airport current initial departure flight paths

The IFR flight radar tracks depicted in “green” in Figure 4.5 are also flown by VFR aircraft. Once clear of the Bankstown Airport CTR boundary aircraft are free to use a track that gets them to the appropriate FTA for their activity. In planning a track to their training area outbound aircraft should avoid the prescribed inbound routes.

4.2.2 Arriving aircraft

All aircraft leaving the existing FTAs and tracking to Bankstown Airport should do so either via the TWO RN radio mast, just south of Liverpool, or Prospect Reservoir. After contacting Bankstown Airport Tower air traffic control, pilots will be given instructions on how to enter the Bankstown Airport CTR.

4.2.3 Flight tracks flown by VFR travel flights or navigational training flights to and from Bankstown Airport

A travel flight can be defined as one that leaves Bankstown or Camden Airport for a destination beyond the Sydney Basin airspace or commences outside of the Sydney Basin airspace and terminates at Bankstown or Camden Airport. Travel flights can be private or commercial or may simply be a "joy flight" in which case they may not land at an intermediate destination but just leave and re-enter the Sydney Basin airspace as part of their flight.

There are no specific routes to or from Bankstown Airport for VFR flights in a westerly or southerly direction, except for inbound aircraft from these directions to plan the last segments of their flights to arrive via the TWO RN radio mast or Prospect Reservoir.

Specific routes are identified for aircraft on a northern travel flight due to the already constrained airspace to the north of Bankstown Airport. Outbound aircraft should track via the Parramatta Central Business District (CBD), Pennant Hills and Hornsby Railway Sheds. Once north of the Hornsby Railway Sheds, they may turn right to the coast or continue on a northerly heading via Patonga. Inbound aircraft should track via Brooklyn Road Bridge to South Dural Tanks and then the north-eastern shore of Prospect Reservoir to Bankstown Airport.

Aircraft that operate in an easterly direction, either obtain an airways clearance through the Sydney (Kingsford Smith) Airport CTR or remain in uncontrolled airspace and track around the boundaries of the Sydney (Kingsford Smith) Airport CTR and controlled airspace.

4.2.4 Combined travel and training area flights

To minimise the cost of pilot training, some flights combine activities of a general aircraft handling nature performed in a FTA, and then undertake a cross-country navigational exercise in the one flight. This may mean accessing a FTA on departure from Bankstown Airport for a period of time, then leaving it for a navigational exercise before returning to Bankstown Airport from any direction.

Training aircraft on a cross-country navigational exercise from airports outside the Sydney Basin (e.g., Cessnock to Wollongong, or Cessnock for Cessnock with no interim landing) will access the FTAs west of Bankstown Airport as part of their training exercise to undertake some specific training activity as part of their flight.

Figure 4.6 depicts VFR flight path movement activity for the month of March 2019 and the current FTAs which have been designated as Danger Areas. These VFR flights – both travel flights and flying training activities are predominately associated with Bankstown and Camden Airports.

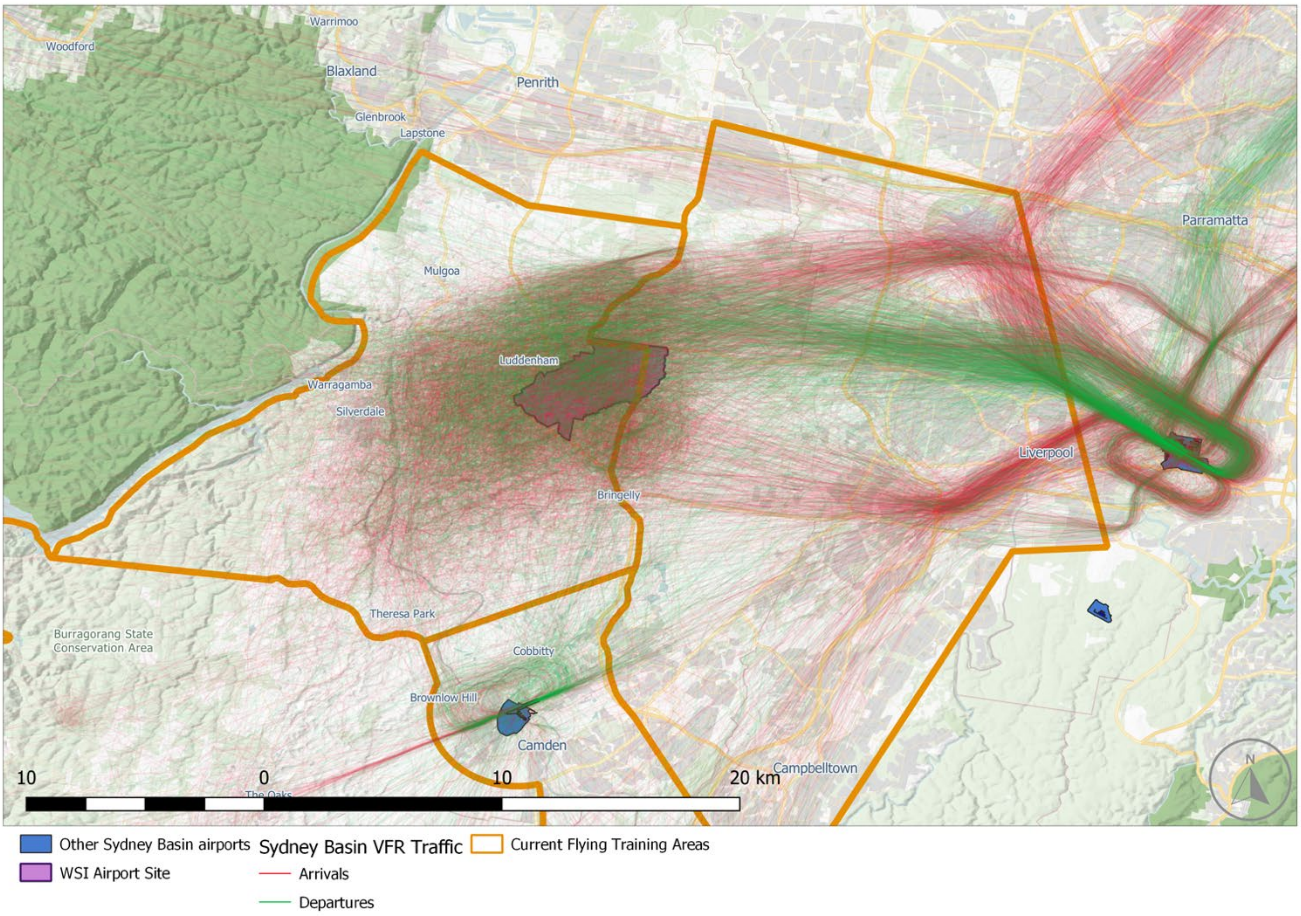

Figure 4.6 Current FTAs and VFR flight path movement activity for the month of March 2019

Chapter 5 Bankstown Airport noise management

Aircraft noise is complex and varies according to a range of factors, including:

- aircraft type (including age of the aircraft, number and type of engines, weight)
- aircraft altitude
- engine power (thrust) settings and speed
- pilot technique
- meteorological conditions.

Aircraft noise is present during all phases of flight but is most significant during take-off and landing, due to the aircraft's proximity to the ground. During take-off, the weight and throttle settings are at their highest point, and therefore the noise is generated through engine noise. In contrast, during landing, throttle settings are varied, and landing gear and control surfaces are extended, with greater noise being generated by the airframe.

Bankstown Airport is not under curfew. However, circuit training is restricted to the following hours:

- Monday to Friday from 6 am until 10 pm (10:30 pm during daylight savings)
- Saturdays and Sundays from 7 am until last light.

These procedures are designed to reduce the impact of night-time aircraft noise on the surrounding community.

For operational and safety reasons, aircraft land and take-off into the wind, or with a minimal tailwind. The wind direction determines the mode of runway operation (i.e., runway direction) in use and flight path designation. At Bankstown Airport, Airservices assigns the runway direction and flight route depending on the wind direction and speed, runway conditions and visibility.

A set of noise abatement procedures are in place at Bankstown Airport. They detail the preferred runway and circuit directions to be flown and limitations during prescribed hours of the day and night. The noise abatement procedures are published in the Australian AIP and are applicable to all aircraft operations at Bankstown Airport.

Bankstown Airport has also an established a voluntary Fly Neighbourly Procedures Program. It was established in 2018 and is a joint program between the airport operator, Aeria Management Group and the aviation community (i.e., operators, tenants and flight training schools) based at the airport.

The Fly Neighbourly Procedures Program contains neighbourly procedures for pilots to consider (refer to Figure 5.1). It outlines flight procedures for fixed-wing aircraft and helicopters that will assist with noise-related airport issues. This includes noise from aircraft operations on the ground (i.e., taxiing, engine testing and maintenance) and in the air.

It is expected that the Fly Neighbourly Program currently adopted at Bankstown Airport will continue into the future.

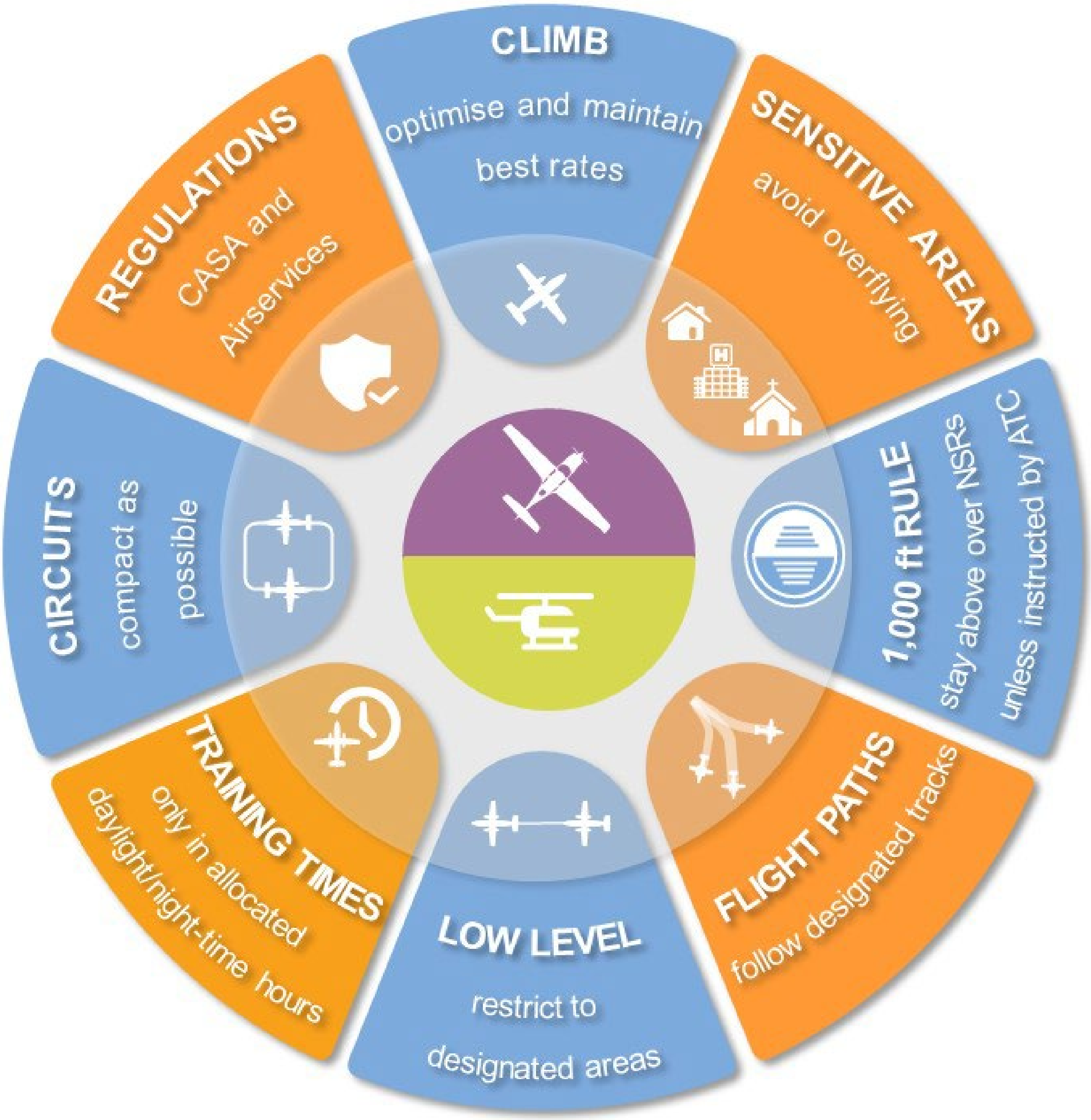

Figure 5.1 Fly Neighbourly Procedures Program selected procedures

Chapter 6 Bankstown Airport post WSI commencement of operations

Figure 6.1 shows the proposed airspace boundary extents across the Sydney Basin after the opening of WSI in 2026. It also depicts the VFR flight path routes to and from the north, south and west.

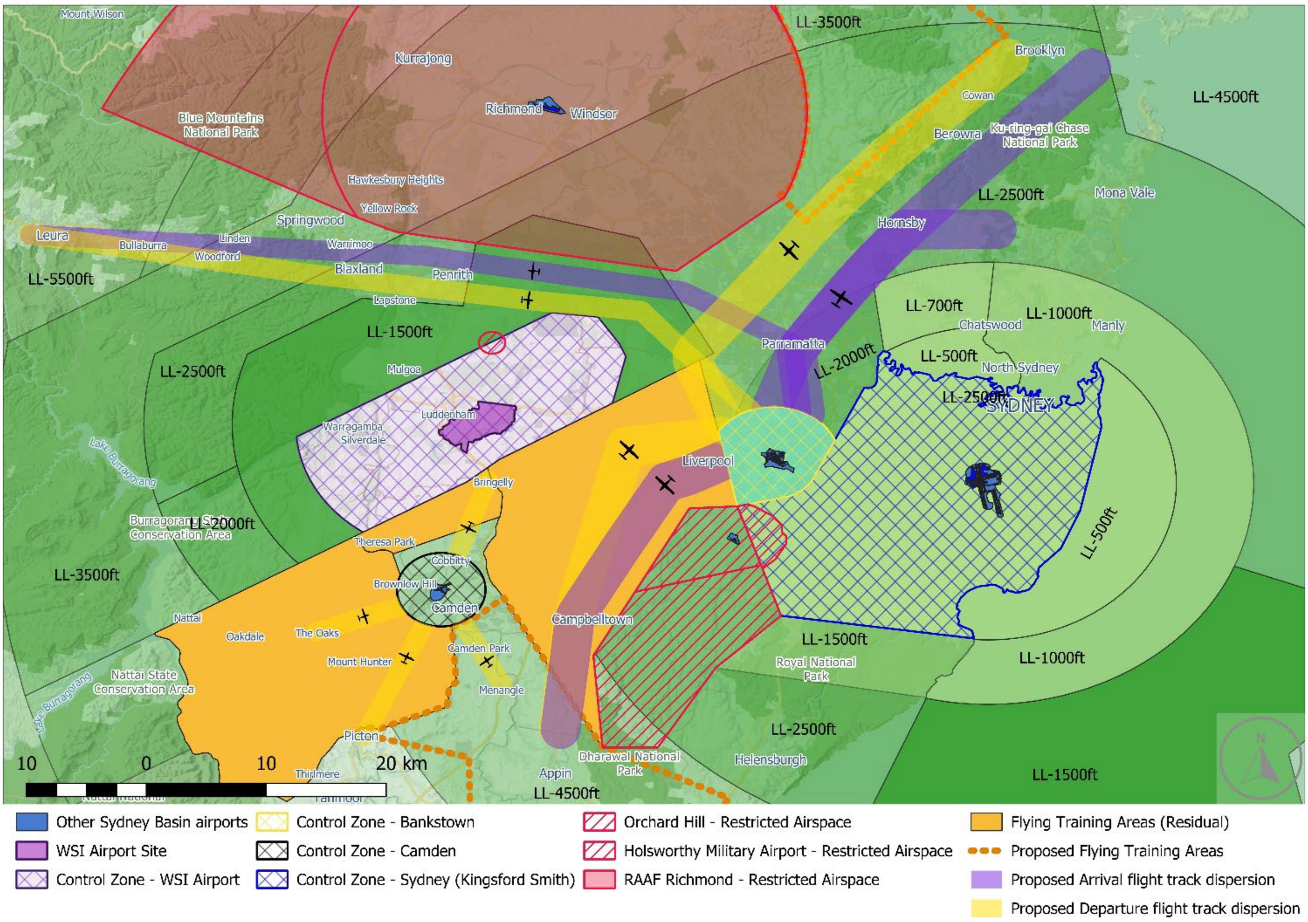

Figure 6.1 Proposed Sydney Basin Airspace Control Area (CTA)and Control Zone (CTR) boundaries including the Lower Level (LL) of controlled airspace with proposed VFR departure and arrival routes

Aircraft may leave the proposed outbound route once west of Emu Plains (refer to Figure 11.2) and track to the north-west or south-west towards their destination. Similarly, inbound aircraft can operate on dispersed routes west of Emu Plains and only need to join the proposed inbound route by Emu Plains.

After the opening of WSI, the lateral and vertical dimensions of the Bankstown and Camden Airports' CTRs may change to maintain safety levels.

6.1 Future FTAs

The existing FTAs (represented by the orange block in Figure 6.1) will have their lateral boundaries significantly reduced by the introduction of controlled airspace safety containment around WSI. It is expected that those segments of the existing training areas that remain in place will retain the same vertical limits that currently exist.

Two possible new FTAs are being considered (depicted by orange dashed outlines in Figure 6.1). The exact location and extents of these areas are subject to on-going discussion. One considered as the northern training area to the northeast of the RAAF Base Richmond Restricted Airspace and one to the south of Camden Airport (southern training area).

As the existing FTAs in the Sydney Basin are declared as "Danger Areas" there is an expectation that CASA may declare the proposed future FTAs similarly. This could follow a request by flying training school operators or as a CASA safety initiative.

For training aircraft wanting to access the proposed new southern training area and the remaining segments of the existing south-western training areas they will be able to by using the existing departure and arrival procedures and flight paths currently in use and described in Section 4.2.1 of this Appendix and shown in Figure 6.1.

For aircraft wanting to access the proposed new northern training area they will need to transit to and from that area via the existing northern VFR transit routes described in Section 4.1 of this Appendix and depicted in Figure 4.1 and Figure 6.1.

A definitive percentage breakdown of the number of training aircraft from Bankstown Airport that will continue to use the residual and proposed southern training areas versus those that will use the proposed new northern training area is not possible.

It is estimated that in 2019 there was around 175 flight movements a day associated with training aircraft from Bankstown Airport accessing the FTAs.

In attempting to provide some qualitative assessment of the potential environmental impact a breakdown of 75 per cent to existing and proposed southern training areas and 25 per cent to the newly proposed northern training area is assumed. This is based on the prediction of a preference for access to the proposed southern training area due to its proximity to Bankstown Airport and its higher altitude ceiling level which will enable a wider variety of flight training activities.

6.2 Travel flights and navigational training exercises

Following the commencement of WSI operations in 2026, aircraft intending to operate to and from the north of Bankstown Airport can expect to continue to track via the existing routes described in Section 4.1 of this Appendix and shown in Figure 4.4 and Figure 6.1.

Aircraft intending to operate to the south of Bankstown Airport can expect to operate on similar routes to those they fly today. Safety work still in the consultation stage may necessitate a reversal of the direction of traffic in this area (see Figure 4.4 for the current situation and Figure 6.1 for the proposed situation).

There will be a variation – a new proposed VFR flight path corridors for aircraft tracking to and from the west.

Figure 4.2 in Chapter 4 of this Appendix shows the current broad spread of actual flights to and from the west.

Figure 6.1 shows proposed new and more northerly VFR flight corridors for aircraft departing and arriving Bankstown Airport in a westerly direction once WSI is operational. Outbound aircraft that choose to operate directly in a westerly direction are expected to still use the existing Bankstown Airport CTR exit procedures and then track via the Parramatta CBD and Blacktown and remain south of the RAAF Base Richmond Restricted Airspace.

Inbound aircraft to Bankstown Airport choosing to operate directly from the west are expected to track north of the Great Western Highway to Prospect Reservoir and remain south of the RAAF Base Richmond Restricted Airspace, and then via existing VFR arrival procedures to the airport. This is an existing arrival flight path for some of the aircraft currently flying to Bankstown Airport from western and north-western departure points.

Aircraft using these new corridors will have vertical limitations through altitude restrictions as well, and these are shown in Figure 6.1.

Aircraft outbound from Bankstown Airport will be limited to 1,500 ft (460 m) above mean sea level (approximately 1,400 ft above ground) until crossing The Northern Road when they can climb to 2,500 ft (760 m) and then progressively to a higher altitude while remaining below controlled airspace.

Aircraft inbound to Bankstown Airport will need to progressively descend from their cruising altitude to be below 1,500 ft (460 m) before crossing The Northern Road.

It is expected that some pilots, particularly those on navigational training travel flights, may choose to initially track to the south of WSI controlled airspace before tracking towards a western destination. This type of track will allow earlier access to higher altitudes than the route between WSI and the RAAF Base Richmond Restricted Airspace.

As VFR flights do not currently fly on nominated routes, currently do not need to file a flight plan, are currently not tracked by air traffic control, a definitive percentage breakdown of the number of aircraft to and from Bankstown Airport that may use the newly proposed corridors between WSI and RAAF Base Richmond is problematic.

In attempting to provide some qualitative assessment of environmental impact a count of flight tracks from Figure 4.2 (actual VFR flight path movements in March 2019) has been undertaken and an assessment of possible usage numbers on the new tracks has been applied.

In March 2019, track information for VFR operations (refer to Figure 4.4) identified 139 outbound aircraft from Bankstown Airport as continuing through the FTAs and undertaking a travel or navigational training exercise to western destinations. Similarly, there were 132 aircraft that tracked directly from the Katoomba area to Prospect Reservoir and then to Bankstown Airport. This can be broken down further to a daily average travel flight demand to the west of less than 5 outbound flights and less than 5 inbound flights - this number may vary between weekday and weekend).

For this Appendix it is assumed that half of the aircraft that currently track from Bankstown Airport directly to and from western destinations as part of a navigational travel flight, will choose to track south of WSI over lower terrain and through less complex airspace to conduct their operations using south-western airports such Goulburn, Temora or Wagga as intermediate destinations, thus avoiding using the narrow route structure between WSI and RAAF Base Richmond.

Based on a this 50:50 split, it is possible that 2 to 3 aircraft will use the new outbound corridor daily, and 2 to 3 aircraft will use the new inbound corridor daily. Applying the projected movement growth rate (refer to Figure 6.2) of around one per cent will see little change in these flight movement daily frequencies.

6.3 Bankstown Airport traffic projections

The expected aircraft movement projection for Bankstown Airport was extracted from the 2019 Bankstown Airport Master Plan. Figure 6.2 shows an adaptation of this projection prepared by Tourism Futures International (TFI) out to 2039.

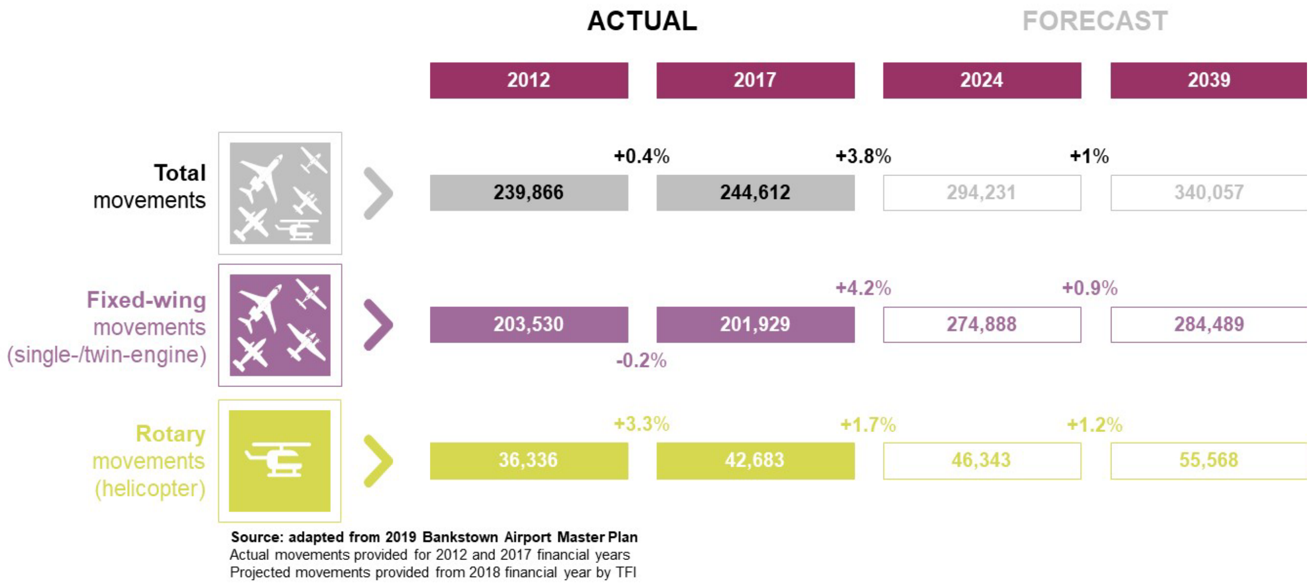

Figure 6.2 Bankstown Airport aircraft movement projection to 2039

In the absence of specific forecast growth data for VFR training and travel flights, the generic annual growth percentages presented in Figure 6.2 above would apply evenly across all the various operational sectors of at Bankstown Airport.

Table 6.1 shows the expected fleet mix and projected annual movements for each aircraft type at Bankstown Airport in 2039. This information has been adapted from the 2019 Bankstown Airport Master Plan. The 20-year forecast fleet mix generally reflects the types of aircraft currently using the airport. It is not anticipated to change significantly in the future. The conclusion from Table 6.1 is that future operations at Bankstown Airport are consistent with current and will continue to be dominated by single and twin piston engine aircraft.

Table 6.1 Bankstown Airport aircraft fleet mix projection in 2039

INM code	Aircraft types	Total annual movements	% of total aircraft
Fixed-wing aircraft			
CNA182	General Aviation	8,626	3
BEC58P		64,690	22.7
GASEPF		195,733	68.8
CNA404	Large Piston	125	0
BN2A		175	0.1
BEC300	Small turboprop	3,612	1.3
CNA208		5,188	1.8
PA60		313	0.1
ATR42	Large turboprop	1,000	0.4
DHC830		40	0
SA227		1,754	0.6
CNA750	Small turbofan	250	0.1
CNA510		2,922	1
GV		52	0
BAE146	Large turbofan	10	0
	Total fixed-wing aircraft	**284,489**	**100**
Helicopters			
B427	General Aviation	2,182	3.9
B407		4,160	7.5
R44		17,514	31.5
R430		9,428	17
R44	Training	22,284	40.1
	Total helicopters	**55,568**	**100**
	TOTAL ALL AIRCRAFT	**340,057**	**100**

Chapter 7 Current VFR operations at Camden Airport

Figure 7.1 presents information extracted from the 2020 Camden Airport Master Plan. It depicts the current aircraft fleet mix operating at Camden Airport.

In the 2019 financial year, Camden Airport recorded 104,838 aircraft movements, making it one of the busiest general aviation airports in Australia. Aviation activity at Camden Airport primarily consists of single-engine and twin-engine piston aircraft (more than 93 per cent of aircraft movements), with helicopters accounting for a further 7 per cent, as shown in Figure 7.1.

In 2018, there were an estimated 7,400 plus glider movements.

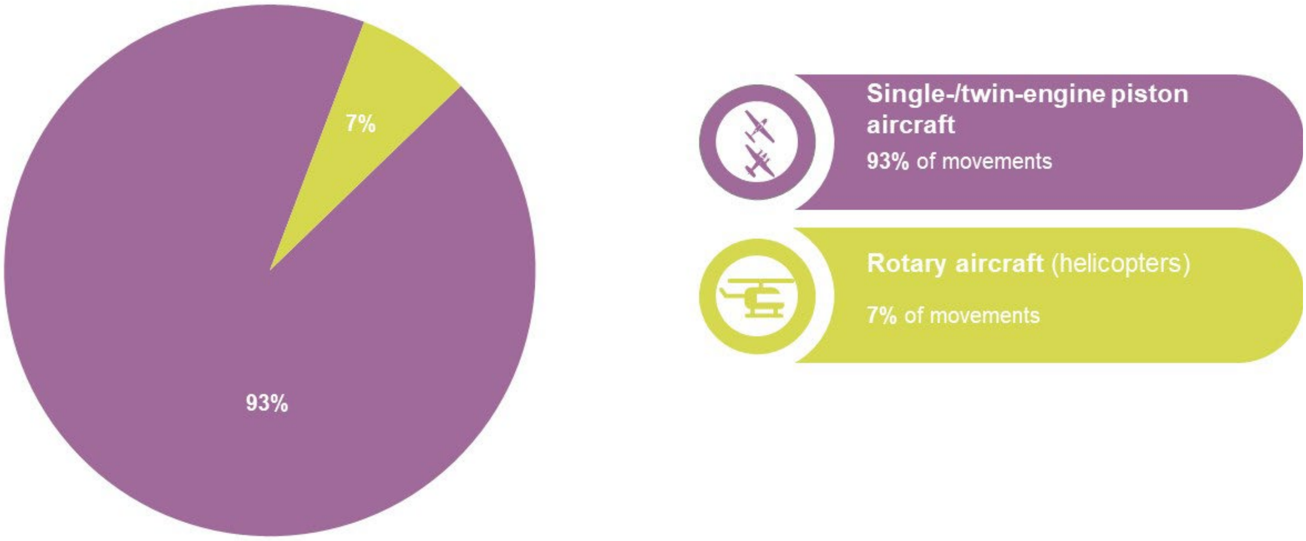

Figure 7.1 Camden Airport aircraft fleet mix in 2019 financial year

7.1 Camden Airport noise management

The operator of Camden Airport, Aeria Management Group, recognises that aircraft noise is a very important issue to the community, especially to people living close to the airport or under flight paths. A voluntary Fly Neighbourly Procedures Program was established in 2020 and is a joint program between the airport operator and the aviation community based at the airport.

The Fly Neighbourly Procedures program is consistent with that adopted by Bankstown Airport and contains neighbourly procedures for pilots to consider (refer to Figure 5.1). It outlines flight procedures for fixed-wing aircraft and helicopters that will assist with noise-related airport issues. This includes aircraft noise from airborne and ground-based activities, such as aircraft maintenance.

It is expected that the Fly Neighbourly Program currently adopted at Camden Airport will continue into the future.

Chapter 8 Camden Airport current operations

8.1 Departures

Flights operating from Camden Airport are currently able to access the FTAs to the north and west of Camden Airport for general flying training activities which include the undertaking of manoeuvres such as stalls, spins, engine restarts and forced landing practice. These areas are also the ones used by Bankstown Airport training operations (refer to Figure 4.4).

There are no specific routes for VFR travel and training navigational flights to follow once they have departed the Camden CTR. The extents of the Camden CTR (lateral and vertical) will be in line with current boundaries.

When leaving the CTR, ERSA states that *"VFR aircraft departing into Class G uncontrolled airspace depart the CTR on an extended leg of the circuit."* Figure 4.4 illustrates the circuit legs.

Once in uncontrolled airspace, aircraft can track under pilot discretion of route selection, to a training area or the first waypoint on their travel flight.

8.2 Arrivals

When providing directions for VFR arriving aircraft at Camden, ERSA states that *"Arriving VFR aircraft should track via and report at Mayfield, Bringelly, Menangle, Picton or The Oaks"*. From these locations aircraft will be given instructions by Camden Airport air traffic control on how to enter the Camden Airport CTR. These entry points apply to VFR aircraft returning to Camden Airport from a FTA or a travel or navigational exercise training flight. These inbound VFR tracks are shown at Figure 4.4.

Chapter 9 Camden Airport post WSI commencement of operations

The FTAs to the north and west of Camden Airport will be reduced in their lateral dimensions (refer to Figure 6.1) but the residual areas will still retain their vertical dimensions and the altitude level limits imposed on training activities.
Flights from Camden Airport wishing to use these residual areas will still have easy access via the existing Camden Airport CTR exit procedures. However, given the reduction in size of the current FTAs it is likely that Flying Training Schools may opt to proceed to the residual south-western FTA or the possible new southern FTA as these will provide more space for training activities.

The newly proposed training area to the south of Camden Airport will also have easy access from Camden Airport using the existing Camden Airport CTR exit procedures.

As with VFR flying training aircraft from Bankstown Airport, it is not yet possible to determine what percentage of aircraft will relocate their flying training activities from the current FTAs north and west of Camden Airport to the possible new FTA to the south of Camden Airport. It is possible that the majority of VFR flying training flights out of Camden Airport will choose to undertake their operations to areas to the south and west of Camden Airport to reduce track miles to access the area.

Likewise, there is no understanding yet of how the introduction of controlled airspace to the north of Camden to contain the manoeuvring areas associated with WSI operations will affect VFR travel or navigational training flights that currently transit that part of the Sydney Basin. The following paragraphs describe the option that will be available to a pilot wishing to undertake a flight to the north from Camden.

VFR routes have been designed to transit overhead WSI at low altitudes, but these will require an air traffic control clearance and while available to VFR aircraft are expected to be used mainly by emergency service operators. Without obtaining an air traffic control clearance, VFR flights will not be able to access the new controlled airspace to the north of Camden Airport. However, by remaining in uncontrolled airspace beneath the new control areas, VFR aircraft will have access to northern destinations by tracking between the WSI and Bankstown Airport CTRs and using the current VFR northern departure routes north of Bankstown Airport. This route will be available in both directions albeit in a congested section of uncontrolled airspace.

It is possible that a majority of VFR navigational training flights will choose to undertake their operations to the south and west of Camden Airport and avoid the complexity of transiting the airspace to the north and east, which will encompass WSI, Sydney (Kingsford Smith) Airport, Bankstown Airport and RAAF Base Richmond aircraft manoeuvring areas.

Travel flights with a specific northern destination will still be able to transit that relatively complex piece of airspace either by requesting an air traffic control clearance to use the over-lying controlled airspace or remain in uncontrolled airspace and track around and under the relevant CTRs and controlled airspace zones. These flights may also choose to remain in uncontrolled airspace and transit to the west of the WSI CTR to and from northern destinations.

The inbound track via Mayfield will no longer be available and it is probable that the inbound track via Bringelly will be seldom used as it is very close to the boundary of the new WSI CTR (refer to Figure 6.1). All other fixed wing VFR flying (including circuits) within the Camden CTR and surrounding airspace will remain unchanged.

Given the likelihood of less aircraft leaving and entering the Camden Airport CTR to and from the north, some changes to the numbers of aircraft operating immediately to the north of the CTR can be expected. However, as the degree of change is yet to be determined by actual use and as the procedures inside the Camden CTR are expected to remain the same as current, there is no ability to undertake an environmental assessment for Camden Airport CTR in this Appendix.

The further consideration of changes to VFR operations within the Camden Airport CTR will occur as part of the detailed airspace design phase which may enable further environmental impact analysis.

9.1 Gliding

A considerable part of VFR flying at Camden Airport is associated with gliding. Specific procedures are published in ERSA which detail how gliders and their fixed-wing tugs must operate within the CTR and surrounding airspace. Once operating free of their tug aircraft, gliders are free to operate within uncontrolled airspace to the limit of their range. There will be no change to these operating procedures inside the Camden Airport CTR.

Due to the constraints imposed by the WSI controlled airspace to the north of Camden, there will be some effect on gliding operations to the north of the airport due to the lower limit of the overlying control areas. Gliding activity to the south and west of Camden Airport will take place as it currently does.

9.2 Camden Airport traffic projections

Figure 9.1 presents information extracted from the 2020 Camden Airport Master Plan. It shows the projected aircraft movements out to 2040 prepared by TFI.

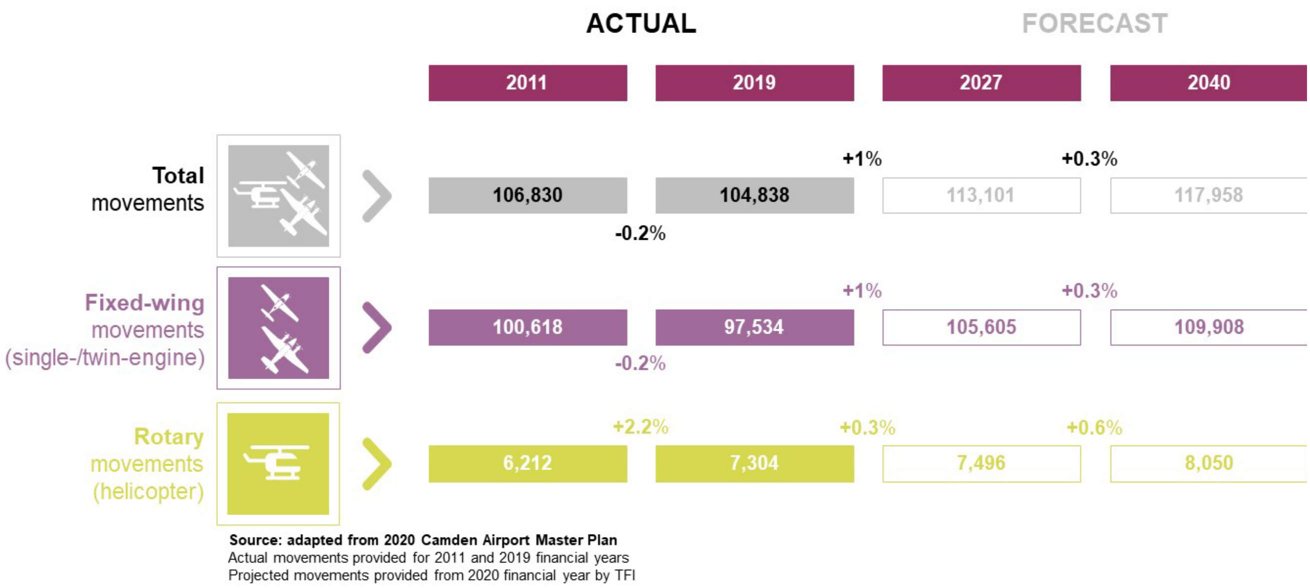

Figure 9.1 Camden Airport aircraft movement projection to 2040

General aviation continues to be the predominant form of aviation activity at Camden Airport and is projected to grow by one per cent per annum from 2019 to 2027. This is reflected in the commitments that current operators at Camden Airport will be maintained, with minor growth.

For the remainder of the Master Plan period out to 2040, general aviation traffic growth is forecast to slow down to 0.3 per cent annual growth.

Table 9.1 also presents information extracted from the 2020 Camden Airport Master Plan on the fleet mix expected to operate at Camden Airport in 2040.

Table 9.1 Camden Airport projected fleet mix in 2040

AEDT code	Aircraft types	Total annual movements	% of total aircraft
Fixed-wing aircraft			
BEC58P	GA	1,120	1
CNA441		560	0.5
PA30		196	0.2
PA31		176	0.2
CNA172		6,816	6.2
GASEPF		9,058	8.2
CNA206		518	0.5
CNA208		736	0.7
GASEPV		3,218	2.9
CNA182	Gliding (tow aircraft)	7,000	6.4
BEC58P	General aviation training	5,198	4.7
CNA500		92	0.1
CNA172		29,760	27.1
GASEPF		36,146	32.9
CNA206		92	0.1
CNA208		182	0.2
GASEPV		9,040	8.2
	Total fixed-wing aircraft	**109,908**	**100**
Helicopters			
R22	General aviation	734	9.1
R44		230	2.9
EC130		704	8.7
B206B3		146	1.8
B430		210	2.6
R22	Helicopter training	3,198	39.7
R44		2,152	26.7
EC130		400	5
B206B3		166	2.1
B430		110	1.4
	Total helicopters	**8,050**	**100**
	TOTAL ALL AIRCRAFT	**117,958**	**100**

The analysis of in Table 9.1 suggests that future operations at Camden Airport are consistent with current and will continue to be dominated by single piston engine aircraft.

Chapter 10 VFR overflight of WSI

VFR overflight of WSI is expected to be available in the first years of operation where weather, traffic and other considerations permit. Aircraft using these proposed flight paths will require an air traffic control clearance and the tracks have been designed to provide easy visual identification and to facilitate air traffic control separation of the VFR aircraft with arriving and departing aircraft at WSI. Figure 10.1 shows these proposed overflight routes which can be used in either direction.

These VFR routes have been designed to transit overhead WSI at lower level, but these will require an air traffic control clearance and while available to VFR aircraft are expected to be used mainly by emergency service operators.

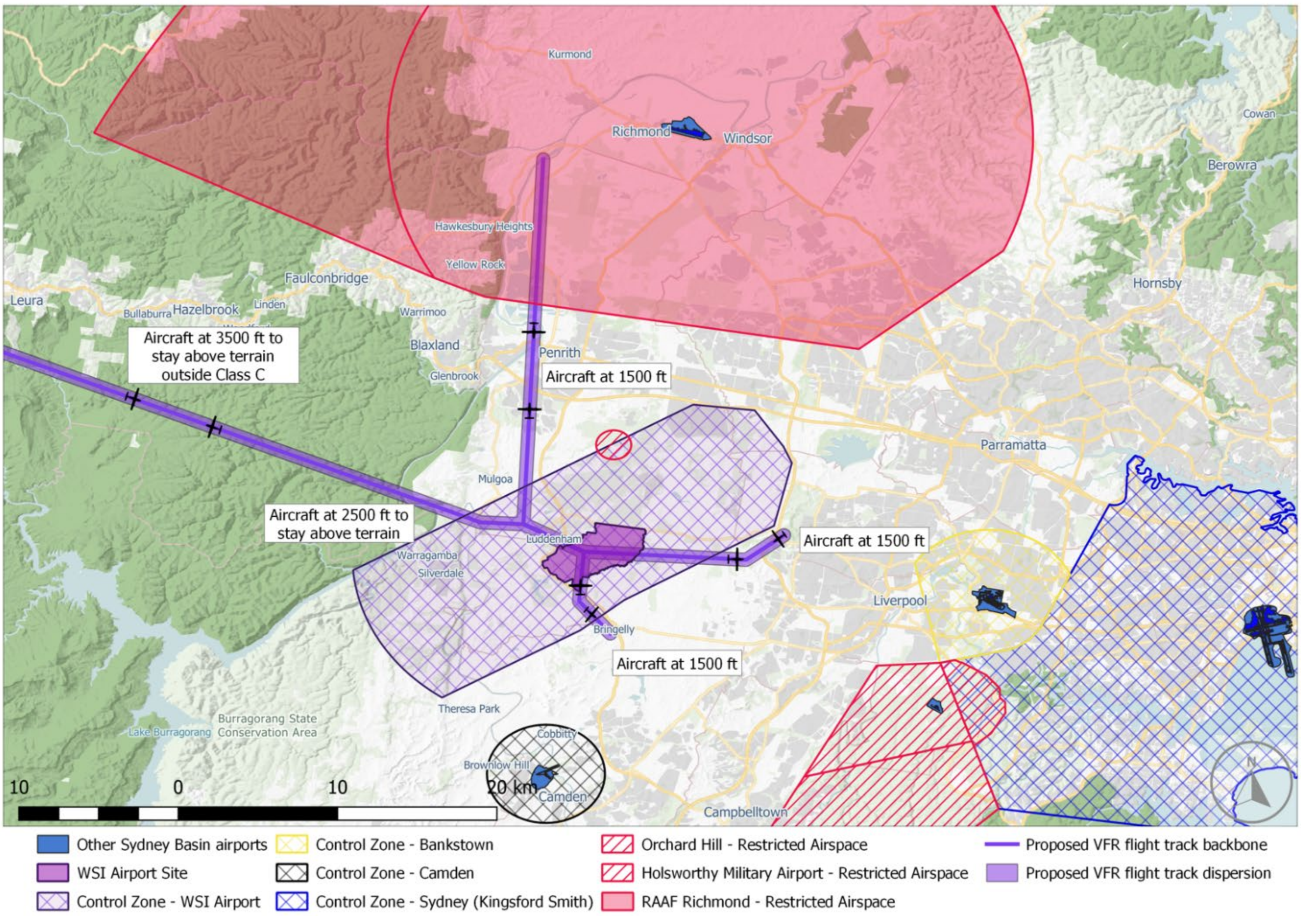

Figure 10.1 Proposed VFR overflights of WSI

Chapter 11 Aircraft noise impact assessment

The aircraft noise assessment of the facilitated changes to VFR operations in the Sydney Basin airspace is qualitative in nature due to the many uncertainties in movement numbers, outstanding approvals for changes to FTAs, and individual operators preferred mode of operations when the changes are introduced. The extent of these impacts is partially dependent on projected demand schedules and mix of aircraft expected to operate at Bankstown and Camden Airports.

Based on the best information currently available, a qualitative assessment of aircraft noise impacts relating to VFR operations at Bankstown and Camden Airports is included in Chapter 21 (Facilitated impacts).

To support a qualitative analysis of potential noise from operations, a series of Noise-Power-Distance (NPD) curves were developed and interpolated to provide an indication of what overflight noise from representative aircraft types could be expected on existing tracks, or on tracks that have either changed laterally or vertically or both.

Average expected overflight noise levels in dB(A) can be determined from NPD data by selecting the most suitable aircraft type, subtracting the ground level at a location from the expected operating level of the VFR flight, and intersecting this distance with the line representing a particular phase of flight – climb, level flight, or descent. Informed by typical operating techniques, it has been assumed that for piston-engine aircraft, the engine power (thrust) settings adopted are:

- climb – 100 per cent
- cruise (level flight) – 80 per cent
- descent – 50 per cent.

Due to the number of issues still requiring clarification (refer to Chapter 2 of this Appendix), no attempt is made to provide cumulative noise impacts on the new tracks, or on those existing tracks that may carry more flights but at existing altitudes, or in the residual and newly proposed training areas (northern and southern). Chapter 6 provides possible percentage variations of numbers of aircraft on existing tracks and postulates on the number of aircraft that may use the only new tracks, being those between the WSI CTR and the RAAF Base Richmond Restricted Airspace. The new altitude restrictions are also articulated for aircraft using these new tracks.

The proposed lower level of controlled airspace as shown in Figure 6.1 defines the highest altitude at which an aircraft can operate in uncontrolled airspace. Aircraft inside controlled airspace will fly at a minimum of 500 ft above this lower level, providing safe separation.

For level flight segments, average noise estimates are based on the aircraft flying at or near the lower level of the controlled airspace above it. For example, between WSI and RAAF Base Richmond Restricted Airspace, the controlled airspace has a 1,500 ft (460 m) lower level. VFR aircraft using that route must remain below the controlled airspace and are therefore assumed to operate at the maximum allowable ceiling of 1,500 ft (460 m).

The single piston engine Cessna 172 and the twin piston engine Beechcraft 58 have been chosen as representative aircraft based on the 2019 actual VFR aircraft types using the uncontrolled airspace in the Sydney Basin. Using the NPD data mentioned above the average expected overflight noise level in dB(A) for aircraft in cruise/level flight is listed in Table 11.1.

Table 11.1 Predicted average overflight noise levels in dB(A) for cruise/level flight

Altitude AMSL	1,000 ft	1,500 ft	2,000 ft	2,500 ft	3,000 ft	3,500 ft	5,000 ft
Cessna 172 “Skyhawk” (single prop)	66	63	59	57	55	52	48
Beechcraft 58 “Baron” (twin prop)	77	74	71	68	66	63	60

The dB(A) values presented in Table 11.1 should be considered as a median value of a range of plus or minus 3 dB(A) – i.e., 50 dB(A) would indicate potential overflight noise of between 47 and 53 dB(A).

As stated, Table 11.1 presents expected average overflight noise levels for aircraft in cruise – flying level at around an 80 per cent engine power (thrust) setting. For aircraft undertaking climb (100 per cent engine power (thrust) setting) the noise levels will increase by around 3 dB(A) and for aircraft in descent (50 per cent engine power (thrust) setting), will decrease by 5 to 7 dB(A) to the above Table 11.1 values.

11.1 NPD noise level estimate – worked examples

To aid in the application of NPD overflight noise estimations, a worked example is included in this Appendix:

- Aircraft – Cessna 172 "Skyhawk" (representing a typical small piston-single-engine training aircraft)
- Flight altitude – 6,000 ft (above mean sea level (AMSL)
- Terrain height - 1,000 ft
- Flight phase – cruise/level flight
- Height above an on-ground receiver = 6,000 – 1,000 = 5,000 ft
- From Table 11.1 the estimated overflight noise for 5,000 ft above the receiver = 48 dB(A)
- (if the aircraft was in a descent phase of flight = 48 dB(A) – 6 dB(A) = 42 dB(A))
- (if the aircraft was in a climb phase of flight = 48 dB(A) + 3 dB(A) = 51 dB(A).

Figure 11.1 presents a second example of the application of NPD noise levels for VFR western arrival and departure flights that will transit between WSI and RAAF Base Richmond using the proposed VFR corridor while maintaining clearances with the RAAF Base Richmond Restricted Area and the future proposed WSI CTR. As noted above, safety work still in the consultation stage may necessitate a reversal of the direction of traffic in this area (see Figure 4.4 for the current situation and Figure 6.1 for the proposed situation).

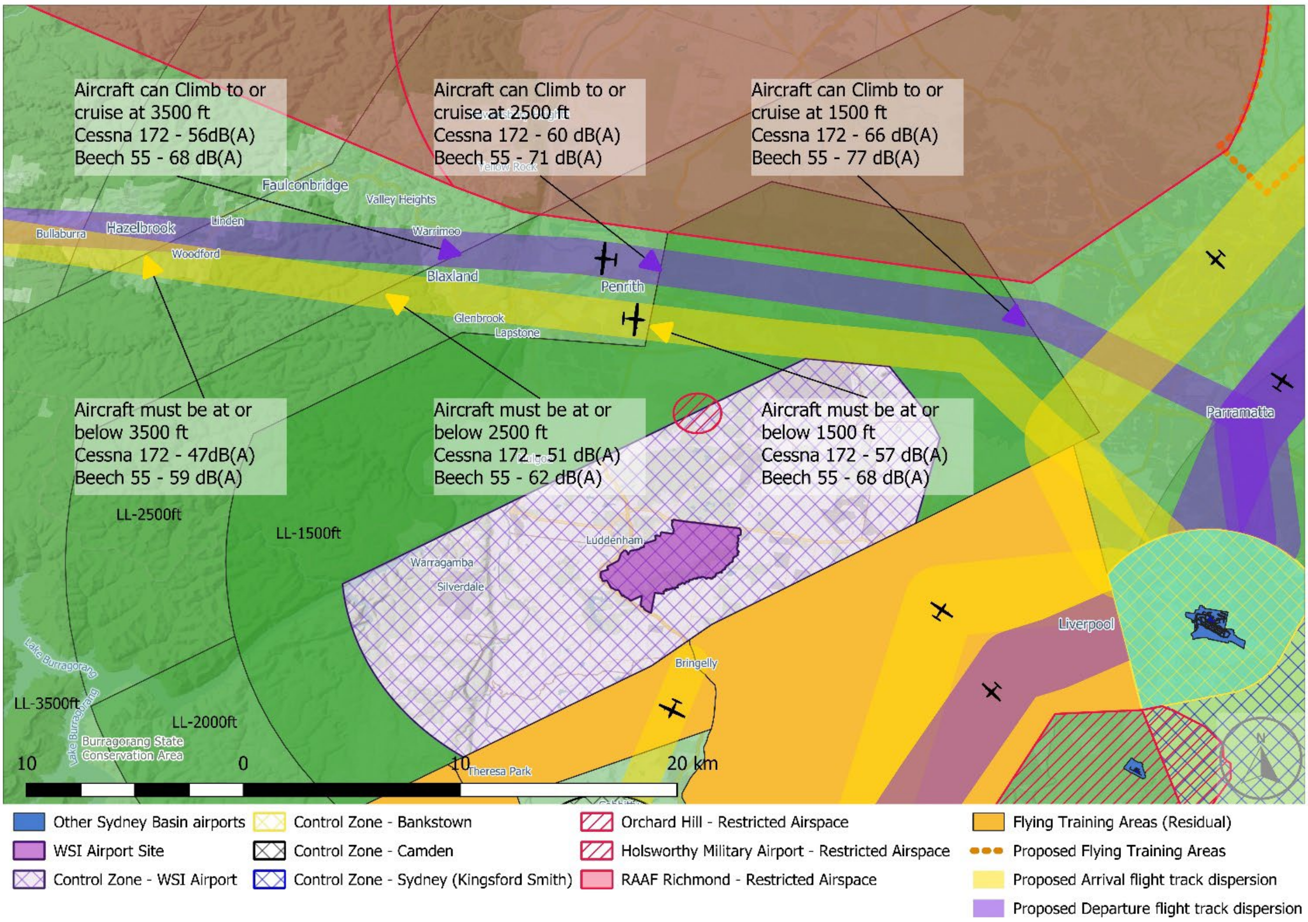

Figure 11.1 NPD application example – VFR western arrivals and departures route

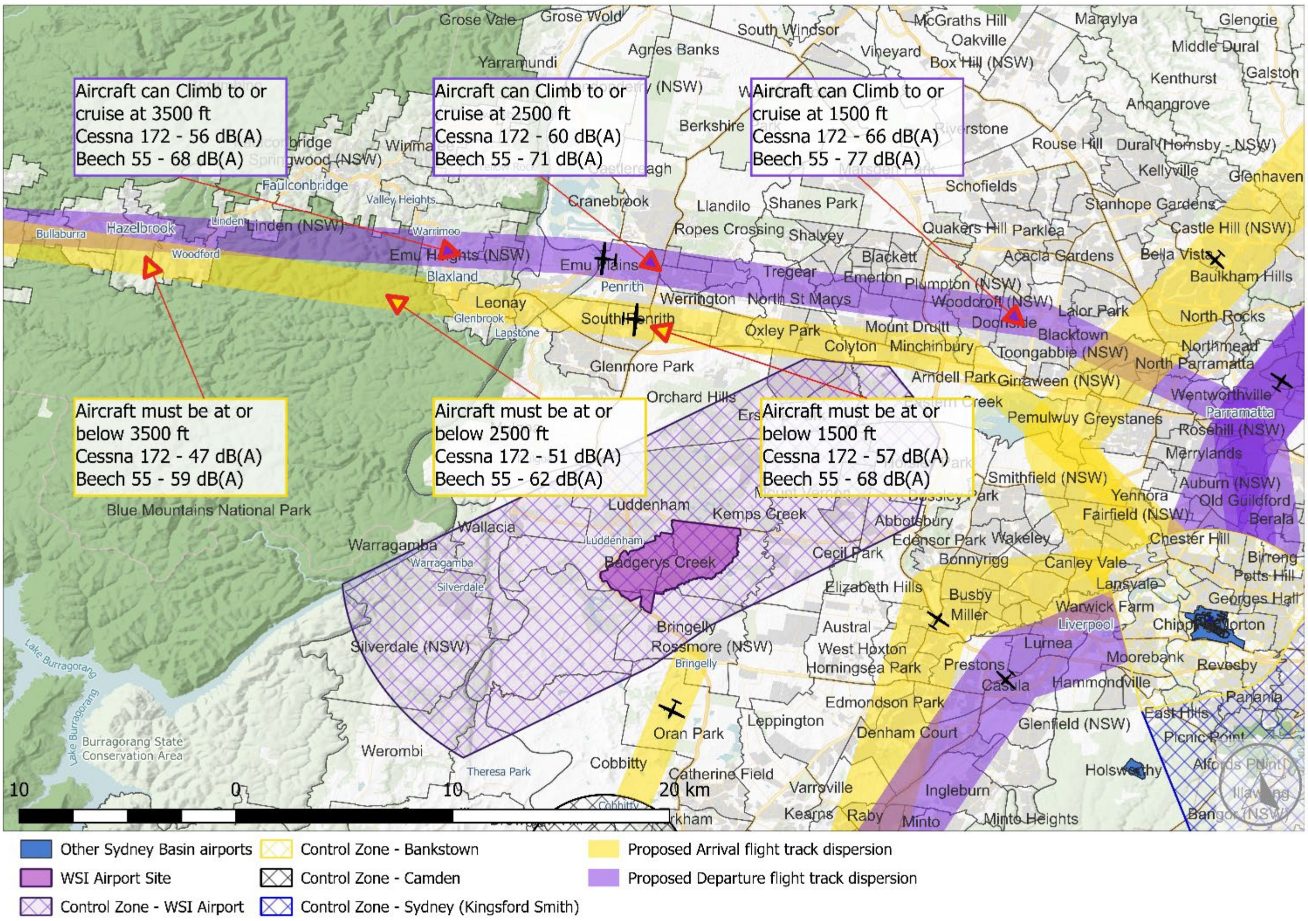

Figure 11.2 Suburb overlay - NPD application example – VFR western arrivals and departures route

The dB(A) values presented in Figures 11.1 and 11.2 should be considered as a median value of a range of plus or minus 3 dB(A) – i.e., 50 dB(A) would indicate potential overflight noise of between 47 and 53 dB(A).

Aircraft may leave the proposed outbound route once west of Emu Plains and track to the north-west or south-west towards their destination. Similarly, inbound aircraft can operate on dispersed routes west of Emu Plains and only need to join the proposed inbound route by Emu Plains.

Chapter 12 Flying training areas

Flying training is typically conducted during daylight hours.

Within a FTA there is no consistency of flight paths or altitudes as the training of new pilots requires the teaching and practicing essential skills before a pilot licence can be issued. These variable flight activities, when viewed from the ground, can at times appears to the layperson that an aircraft is not in controlled flight and is having engine problems due to the variation in engine power settings required by the training manoeuvres. This is not the case.

As a means of being able to conduct their training safely and not close to other aircraft, trainee pilots and their instructors mostly attempt to not congregate in the one part of a training area for their scheduled activity. There is to a degree a resulting benefit of reduced frequency of noise impacts to areas underneath or immediately peripheral to a training area by this dispersion of flying activities.

Amongst other disciplines, training activities can involve:

- spins – where the aircraft descends rapidly in a corkscrewing flight path. Trainee pilots are then taught the recovery procedure
- stalls – where engine power is reduced till the speed of the aircraft is below that needed to maintain straight and level flight and the nose drops rapidly towards the ground. Trainee pilots are them taught the recovery procedure
- steep turns – where a pilot is trained to maintain a constant altitude while banking the aircraft at a very steep angle.

All these manoeuvres require variable engine power (thrust) settings from sometimes less than 50 per cent to maximum power (100 per cent) and are normally conducted above 3,000 ft. This is to ensure there is sufficient airspace available to comfortably recover and resume controlled flying.

Other general handling manoeuvres, including practiced forced landing techniques can be performed at lower altitudes, but again some require variable engine power (thrust) settings. Variable engine power (thrust) settings will influence the resulting overflight noise levels experienced by receptors on the ground, and unexpected variations may initially alarm individuals but are an outcome of critical flying training requirements.

All types of training will be available in the residual training areas depending on the LL of the overlying controlled airspace (refer to Figure 6.1), and will also be available in the possible new southern and north-eastern FTAs, again subject to the lower level of the overlying controlled airspace.

As shown in Figure 4.3, the proposed new airspace volumes and CTRs that are required for the commencement of WSI operations will displace a significant density of current flying training operations and their associated impacts from the areas close to WSI. This could potentially benefit those areas currently impacted by these activities.

In the interests of an aviation safety outcome, CASA may at its own initiative declare FTAs as “Danger Areas” because of the type of activities that may occur in those designated areas. Alternatively, the regular users of the FTAs – general aviation airports, flying training schools, clubs and associations, etc., may request CASA to make such a declaration.

CASA may declare a Danger Area where, in its opinion, there exists an activity that is a potential danger to aircraft. Danger Areas generally relate to airspace over hazardous areas such as mining or quarrying sites, high velocity exhaust plumes, or in areas of special use such as hang-gliding, parachuting and unmanned aerial vehicle testing. They are also used to delineate areas where flying training takes place. Approval for flight through a Danger Area outside controlled airspace is not required. However, pilots are expected to maintain a high level of vigilance when transiting a Danger Area.

There are 10 Danger Areas located within 45 nm (83 km) of Sydney (Kingsford Smith) Airport. Five of these relate to VFR training areas and lanes of entry supporting operations to and from Bankstown and Camden Airports. Other danger areas support parachuting and unmanned aerial vehicle testing activities.

The current FTAs (refer to Figure 4.4) are designated as “Danger Areas”.

It could be expected that the future possible training areas to the south of Camden Airport and to the north-east of RAAF Base Richmond (refer to Figure 6.1) may also be declared as Danger Areas.

Chapter 13 Other environmental factors

13.1 Visual amenity

Once WSI is operational the large number of aircraft that use the existing FTAs over the WSI site (refer to Figure 4.3) will have to relocate to other parts of the Sydney Basin. Possible FTAs are positioned to the north of Bankstown and to the south of Camden (refer to Figure 6.1) with flying training activity in these areas to be visible from the ground.

While already overflown currently, the compression of the available airspace for travel flights between WSI and RAAF Base Richmond Restricted Airspace will mean communities in this area will see the same types of aircraft that currently use this airspace but flying at lower altitudes due to the proposed lowering of the controlled airspace stepped boundary above this area, associated with WSI (refer to Figures 4.4, 6.1, 11.1 and 11.2).

13.2 Track distance

The possibility of 2 new FTAs, one north of Bankstown Airport and one south of Camden Airport, will mean Flying Training Organisations will need to adjust their training programs to accommodate activities in these possible new areas. It is not possible to say how these organisations may choose to use the possible new FTAs. Organisations choosing to continue to use the residual FTA to the south and west of Bankstown Airport will still be able to access the area and undertake some training activity as they leave the Bankstown Airport CTR as they do currently, therefore having no change to track distance over their current procedures.

For those Flying Training Organisations that choose to use the possible FTA north of Bankstown Airport, a short flight of 10 nm (19 km) from Bankstown Airport to access this possible FTA will be required.

An economic impact assessment associated with the consequences of reduced current FTAs and possible future FTAs is presented in Technical paper 11: Economic.

Chapter 14 Conclusion

The qualitative analysis of the proposed changes to VFR operations is considered the best available representation of potential impacts but must be heavily qualified due to the variability associated with noise generation from variations of even the same aircraft type, varying pilot technique and variations in meteorological conditions. Overflight noise levels will also vary with respect to the lateral offset positioning of the at-ground receptor to the aircraft operating above.

As described in Chapter 12, flying training activity is highly variable and potential overflight noise impacts from this activity cannot be accurately quantified in contrast with the presented potential impacts associated with the more predictable VFR travel flights.

Circuit training activity and its associated impacts at both Bankstown and Camden Airports – a significant component of their operations will not change and continue consistent with current practice.

The most constrained corridor for VFR travel flight operations between WSI and RAAF Base Richmond – limited in lateral extents and with only a 1,500 ft operating ceiling for some of its extent, is expected to have less than 10 flights daily and with the low growth forecast predictions (approximately one per cent for both Bankstown and Camden Airports) should not constitute a significant impact to overflown receptors on its implementation or into the future.

Socio-economic implications of the impacts of the proposed WSI operations are addressed in Chapters 18 (Social) and 19 (Economic).

The quantification of increased operating costs to businesses connected to VFR operations is challenged by uncertainties related to promulgation of proposed new FTAs and the practices adopted by related businesses and operators on how those areas will be accessed and utilised. The identified and discussed future proposed VFR route between WSI and RAAF Base Richmond for the expected small number of daily VFR travel flights to and from the west, has a very minor penalty in extra track miles to clear the north-east corner of the proposed WSI CTR, and is expected to have a minimal impact on operating costs.

In general, the areas identified in this Appendix to be overflown by the adjustments required to VFR flights are currently frequently overflown with similar aircraft and aircraft from other Sydney Basin airports operating both IFR and VFR flights (refer to Figure 1.1). Coupled with the low growth forecasts for Bankstown and Camden Airports of around only one per cent or less, it can be expected that there will be little or no material change over today's operations.

Appendix J

Proposed miscellaneous and minor procedure adjustments

Sydney (Kingsford Smith) Airport BOREE STAR

Sydney (Kingsford Smith) Airport RIVET STAR

Sydney (Kingsford Smith) Airport Runway 07 Initial Approach Fix (IAF)

Sydney (Kingsford Smith) Airport Runway 07 SID

Sydney Basin low altitude transit flight routes

Western Sydney International (Nancy-Bird Walton) Airport – Airspace and flight path design | Environmental Impact Statement

Technical paper 13: Facilitated changes

Appendix J – Proposed miscellaneous and minor procedure adjustments

Sydney (Kingsford Smith) Airport BOREE STAR

Sydney (Kingsford Smith) Airport RIVET STAR

Sydney (Kingsford Smith) Airport Runway 07 Initial Approach Fix (IAF)

Sydney (Kingsford Smith) Airport Runway 07 SID

Sydney Basin Lower level (LL) transit flight routes

October 2024

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Terms and abbreviations

Term/abbreviation	Definition
ACP	Airspace Change Proposal (Airservices)
AEDT	Aviation Environmental Design Tool (US FAA)
AIP	Aeronautical Information Package (Australia)
AIRAC	Aeronautical Information Regulation and Control (Australia AIP)
AMSL	Above Mean Sea Level
ARP	Aerodrome Reference Point (ICAO)
CASA	Civil Aviation Safety Authority (Australia)
CDO	Continuous Descent Operation
CO_2	Carbon dioxide (a greenhouse gas)
Cth	Commonwealth of Australia
DAP	Departure and Approach Procedures (Australian AIP)
dB(A)	A-weighted decibel (unit of sound)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Australian Government)
DITRDCA	Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Australian Government)
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation 1999* (Cth)
FAA	Federal Aviation Administration (United States)
ft	feet (unit of height equivalent to 0.3048 m)
GA	General Aviation
GBMA	Greater Blue Mountains Area (World Heritage property)
IAF	Initial Approach Fix
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
km	kilometres (unit of distance equivalent to 1,000 m)
LL	Lower Level (altitude for transit flights through Sydney Basin)
LSALT	Lowest Safe Altitude
m	metre (unit of distance or height equivale to 3.281 ft)

Term/abbreviation	Definition
MNES	Matters of National Environmental Significance (EPBC Act) (Cth)
N60/N70	Number above (N-above noise metric)
NDB	Non-Directional Beacon
NFPMS	National Flight Path Monitoring System (Airservices database)
nm	nautical mile (unit of distance equivalent of 1.852 km)
NPD	Noise-Power-Distance (aircraft noise curve charts)
NSR	Noise Sensitive Receiver
NSW	New South Wales (state of Australia)
PAAM	Plan for Aviation Airspace Management
PBN	Performance Based Navigation
PMST	Protected Matters Search Tool (DCCEEW)
RAAF	Royal Australian Air Force
RNP	Required Navigation Performance
SID	Standard Instrument Departure
STAR	Standard Instrument Arrival
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WSI	Western Sydney International (Nancy-Bird Walton) Airport

Chapter 1 Introduction

Although aircraft differ in operation, type, altitude, noise level and frequency, most areas of the Sydney Basin are overflown at some stage as shown in Figure 1.1.

The introduction of new flight paths to be used by aircraft into and out of Western Sydney International (Nancy-Bird Walton) Airport (WSI) has considered a multitude of options to minimise any adjustments required to existing flight paths in the Sydney Basin airspace. Single runway operations at WSI require adjustments to Sydney Basin operations prior to opening in 2026 to facilitate its flight paths and airspace structure. Those proposed facilitated airspace changes include the development of, or adjustments to:

- Sydney (Kingsford Smith) Airport Runway 25 Standard Instrument Departures (SIDs) to the west, north-west, north and east – (Appendix A)
- Sydney (Kingsford Smith) Airport Runway 34L KADOM SIDs to the south, west, north, and east – (Appendix B)
- Sydney (Kingsford Smith) Airport Runway 34L RICHMOND SID to the west and north-west – (Appendix C)
- Sydney (Kingsford Smith) Airport non-jet SID to the west or north-west – (Appendix D)
- Sydney (Kingsford Smith) Airport AKMIR Standard Instrument Arrival (STAR) jet and non-jets from the south and west – (Appendix E)
- Royal Australian Air Force (RAAF) Base Richmond SID and STARs – (Appendix F)
- Bankstown Airport SID and STARs – (Appendix G)
- Camden Airport STARs – (Appendix H)
- Sydney Basin Visual Flight Rules (VFR) operations – (Appendix I)
- **Miscellaneous and Minor procedure adjustments – (Appendix J) – this Appendix**
  - **Sydney (Kingsford Smith) Airport BOREE STAR**
  - **Sydney (Kingsford Smith) Airport RIVET STAR**
  - **Sydney (Kingsford Smith) Airport Runway 07 Initial Approach Fix (IAF)**
  - **Sydney (Kingsford Smith) Airport Runway 07 SID**
  - **Sydney Basin low altitude transit flight routes.**

This Appendix – Appendix J, presents an assessment of the proposed adjustments required to a number of Sydney (Kingsford Smith) Airport procedures and Sydney Basin Airspace lower level (LL) transit overflight routes prior to the opening of WSI in 2026 to facilitate its flight paths and airspace structure.

The design process for the safe and efficient integration of WSI's new flight paths into the existing Sydney Basin airspace has been one of adopting "Safety by Design" principles to deliver the highest level of safety separation assurance in conformance with rules set by the Civil Aviation Safety Authority (CASA). This is to enable aircraft to operate safely within their performance envelope into an already complex airspace structure. "Safety by Design" ensures that aircraft are separated from each other according to the flight routes and the type of air traffic service being provided. As such, this requires the new or amended SIDs and STARs and altitudes to be published and then downloaded into the cockpit flight management systems of all aircraft. At the same time the same information must be downloaded into the software of the surveillance systems used by air traffic control to manage and monitor the safe separation of all controlled aircraft.

The preliminary airspace design process has appropriately accorded "safety" as the highest priority to ensure robust operational safety outcomes. Environmental outcomes, with a particular focus on the minimisation of potential community impacts and the operational efficiency of the facilitated airspace changes has also been a key design criterion.

Instrument Flight Rules (IFR) are the rules that govern the operation of aircraft in Instrument Meteorological Conditions (IMC) (conditions in which flight In IMC, an aircraft must be flown with reference to its onboard flight instruments.) Two sets of rules, IFR or Visual Flight Rules (VFR) exist to govern flight in either IMC or Visual Meteorological Conditions (VMC).

The minor adjustments required to a number of Sydney (Kingsford Smith) Airport procedures and the change to Sydney Basin airspace lower level transit overflight routes, have been designed to be flown under IFR. This is to ensure “Safety by Design” is embedded in the new procedures and to allow continued operations in all weather conditions. Aircraft flying to IFR standards and rules can operate in either IMC or VMC, but aircraft flying to VFR standards and rules can only operate in VMC.

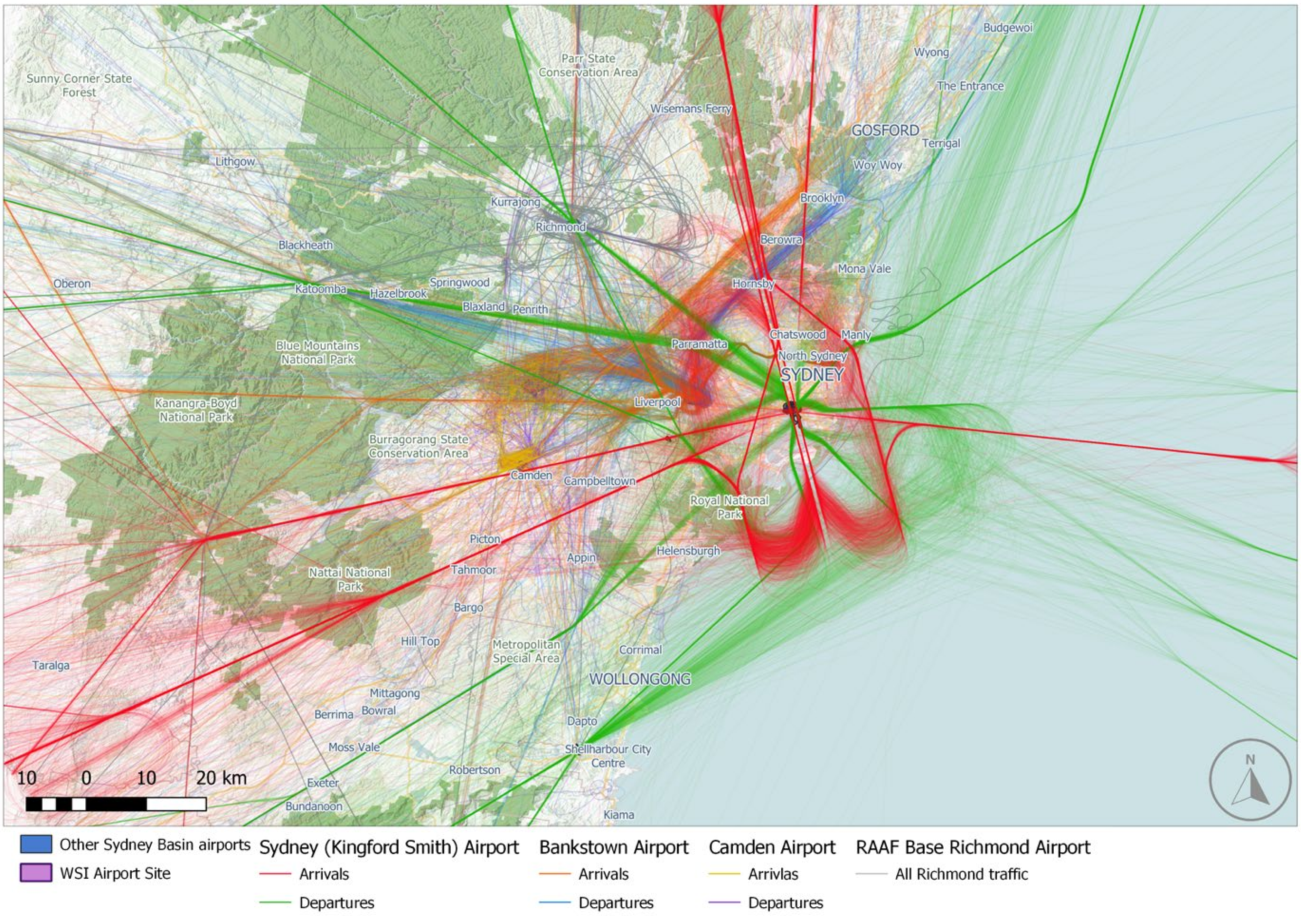


Figure 1.1 Sydney Basin airspace with one-week of flight track movement activity in March 2019

Chapter 2 Background

The adjustments required to procedures addressed in this Appendix are considered minor in nature. This is because they either involve no lateral change and minimal change to the altitude requirements and vertical conditions of the procedure (RIVET/BOREE STARs), or because the adjustments required are to procedures which historically have little use (Runway 07 SIDs and Runway 07 Initial Approach Fix (IAF)) and lower level transit flights of the Sydney Basin and which are expected to continue to have little use.

The 6 facilitated airspace changes considered in this Appendix fall into 4 categories:

1. The changes proposed to the RIVET and BOREE STARs at Sydney (Kingsford Smith) Airport contain no lateral flight path change. They both include the addition of a proposed new waypoint to introduce an altitude restriction on descent at a point on the current flight path to establish separation assurance with the proposed WSI arrivals and departures.
2. The 2 minor changes proposed to Runway 07 procedures at Sydney (Kingsford Smith) Airport involve the introduction of a waypoint which establishes a secondary IAF with a vertical restriction. The other adjustment required is a procedural SID that replicates an existing SID, but which formalises an altitude restriction required before aircraft departing off Runway 07 at Sydney (Kingsford Smith) Airport off to western and north-western destinations, recross the coastline. The introduction of both altitude restrictions will provide separation assurance with the proposed WSI arrivals and departures.
3. A new transit route (flight path) positioned on a north to south alignment over areas of the Blue Mountains, west of Katoomba and clear of the complexity of the flight paths in the Sydney Basin will be formalised for the small number of aircraft that transit the Sydney Basin airspace.
4. Proposed 2-way IFR transit routes (flight paths) overhead WSI from north to south.

The minor adjustments required to procedures at Sydney (Kingsford Smith) Airport and for low altitude transit flights over the Sydney Basin presented in this Appendix will be published and implemented prior to the opening of WSI in 2026. These facilitated airspace changes will not impact the application of noise sharing runway modes at Sydney (Kingsford Smith) Airport.

Figure 2.1 shows the location of WSI, the locations of other key airports in the Sydney Basin and geographic extent of a nominal area radiating 45 nautical miles (nm) or around 83 kilometres (km) from the Aerodrome Reference Point (ARP) of WSI.

Figure 2.2 is the Sydney (Kingsford Smith) Airport Aerodrome Chart. This has been extracted from the AIP DAP to assist the interpretation of the content presented in this Appendix. It depicts the general layout of Sydney (Kingsford Smith) Airport including its 3 runways - orientations, designations (34L, 25 etc.) and lengths.

Figure 2.3 shows the current IFR jet aircraft flight path movement activity for all runways at Sydney (Kingsford Smith) Airport for a one-week period in 2019. This is included to further assist in the interpretation of the minor changes proposed to operations at the airport.

The proposed new waypoints identified in this Appendix have been allocated a temporary identifier (NB017, NB252, etc.) which will be replaced by a conforming 5 letter alpha character designator as part of the detailed design phase and implementation of the proposed adjusted procedure.

Figure 2.1 Location of airports in the Sydney Basin

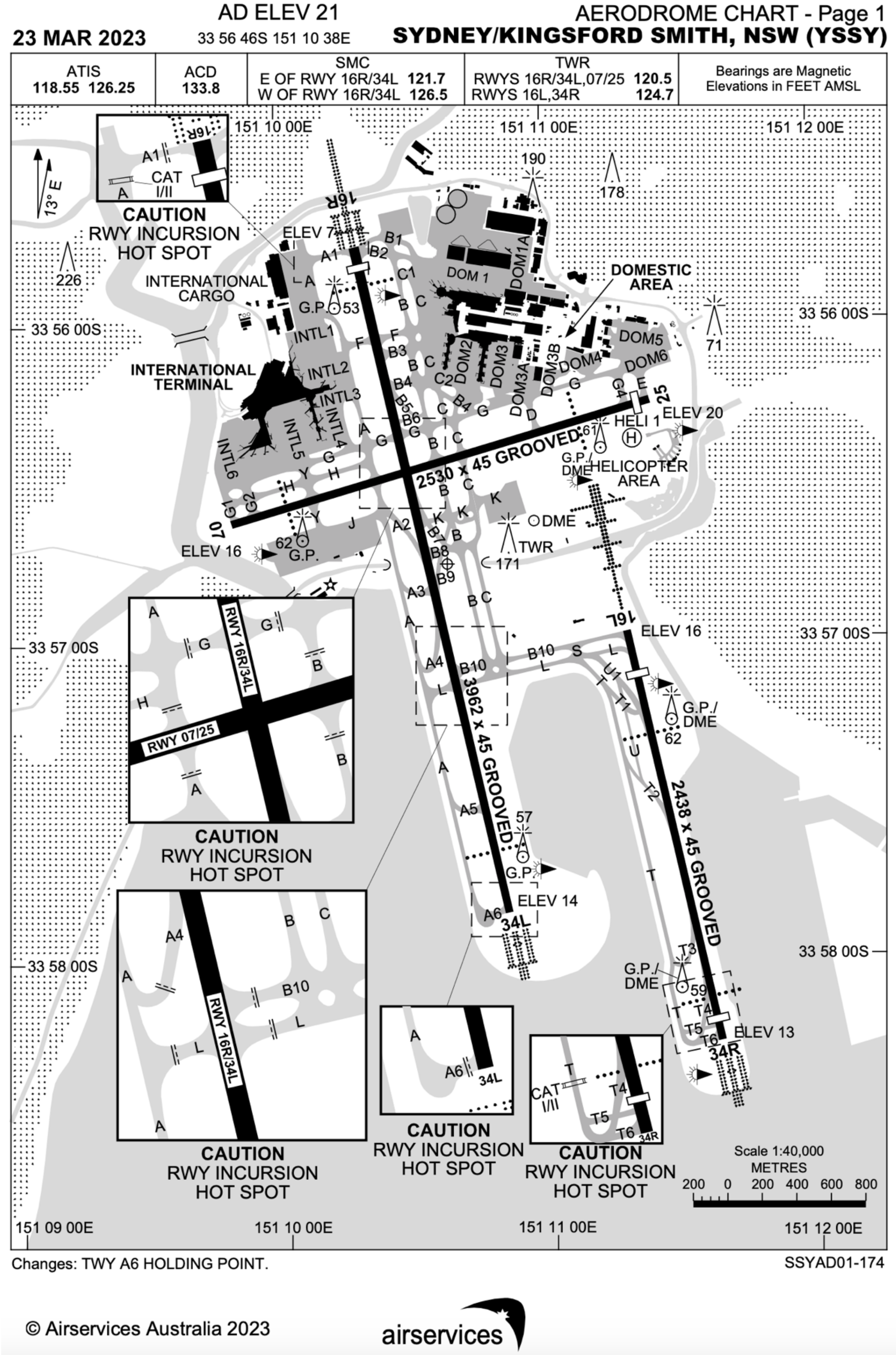


Figure 2.2 Sydney (Kingsford Smith) Airport – Aerodrome Chart (AIP / DAP)

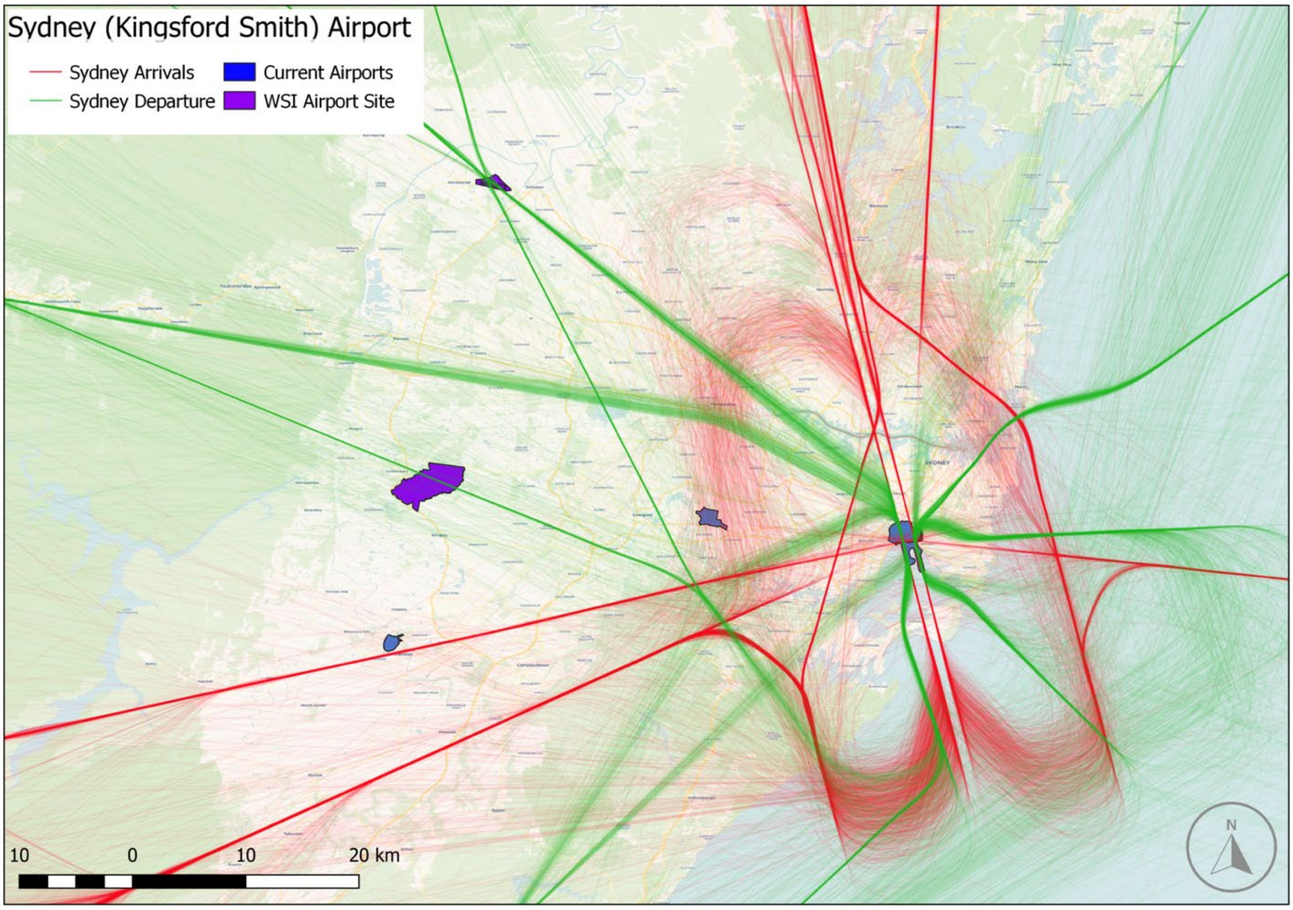


Figure 2.3 Current IFR flight track movement activity for jet aircraft to all runways at Sydney (Kingsford Smith) Airport – one-week period in March 2019

Chapter 3 Purpose

The purpose of this Appendix is to present an environmental assessment of the minor adjustments required to 2 STARs, Runway 07 SIDs and Runway 07 approach procedures at Sydney (Kingsford Smith) Airport along with the introduction of 2 new low altitude transit flight routes for the Sydney Basin airspace. These proposed 6 minor changes and adjustments required to Sydney (Kingsford Smith) Airport and Sydney Basin operations prior to the opening of WSI in 2026 are to facilitate the introduction of its new flight paths and airspace containment requirements. The assessment includes a qualitative analysis and assessment of the potential noise impacts of these facilitated airspace changes.

The Appendix also describes the reason for the changes and adjustments required, and the associated safety and operational considerations.

Chapter 4 Changes to the RIVET and BOREE STARs

4.1 Current RIVET STAR

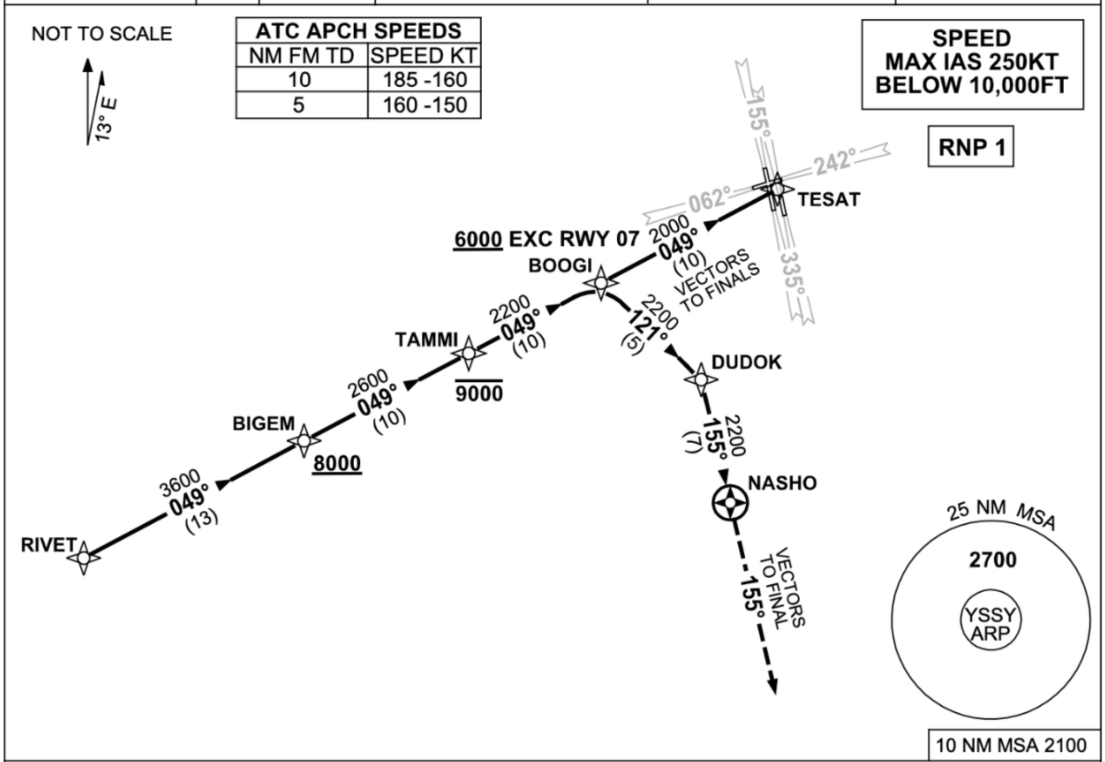
The RIVET STAR is an arrival procedure for jet aircraft to Sydney (Kingsford Smith) Airport from the south and west. Aircraft from airports such as Canberra, Melbourne, and Perth (domestically) and from cities such as Singapore, Dubai, and Jakarta (internationally) connect with this STAR from their enroute flight path to arrive at Sydney (Kingsford Smith) Airport. On occasions, air traffic control will re-route non-jet aircraft via the RIVET STAR to optimise arrival sequencing to Sydney (Kingsford Smith) Airport.

Figure 4.1 presents the AIP DAP Procedure Plate showing the existing track and altitude restrictions of the RIVET STAR. The critical altitude constraint requires aircraft to be below 9,000 feet (ft) (2.7 km) by waypoint TAMMI, which is located 20 nm (36 km) from Sydney (Kingsford Smith) Airport. This altitude restriction is fixed and is a continuing requirement post WSI opening to assist air traffic control to change the nominated runways at Sydney (Kingsford Smith) Airport in line with noise sharing runway modes, without having to re-route aircraft in the enroute phase of flight.

The requirement to be below 9,000 ft (2.7 km) by waypoint TAMMI is the target altitude that is set within the aircraft's flight management systems to provide a Continuous Descent Operation (CDO) from cruise altitude to 9,000 ft (2.7 km). Below 9,000 ft (2.7 km), descent is subject to air traffic control clearance and can occur at different locations depending on the runways being used at Sydney (Kingsford Smith) Airport.

STANDARD INSTRUMENT ARRIVAL (STAR)
RIVET THREE ARRIVAL (RNAV)
24 MAR 2022 **SYDNEY/KINGSFORD SMITH, NSW (YSSY)**

ATIS	APP	DIRECTOR	TWR	SMC	
118.55 126.25	128.3	125.3 126.1	RWYS 16R/34L, 07/25 **120.5** RWYS 16L/34R **124.7**	E OF RWY 16R/34L **121.7** W OF RWY 16R/34L **126.5**	Bearings are Magnetic Elevations in FEET AMSL



ARRIVAL: **RIVET THREE**

- From RIVET track 049° to BIGEM
  Cross BIGEM AT or ABV 8000FT
- Track 049° to TAMMI
  Cross TAMMI AT or BLW 9000FT

RWY 07:

- Track 049° to BOOGI
- Track 049° to TESAT
- EXPECT radar vectors to final

RWY 16L,16R or 25:

- Track 049° to BOOGI
  Cross BOOGI AT or ABV 6000FT
- Track 049° to TESAT
- EXPECT radar vectors to final

RWY 34L or 34R:

- Track 049° to BOOGI
  Cross BOOGI AT or ABV 6000FT
- Turn RIGHT, track 121° to DUDOK
- Turn RIGHT, track 155° to NASHO
- Track 155°, EXPECT radar vectors to final

COMMUNICATIONS FAILURE: PROCEDURE IN IMC

- Squawk 7600, comply with vertical navigation requirements, but not below MSA.
- Track via the latest STAR clearance to the nominated runway, then fly the most suitable approach in accordance with ERSA EMERG Section 1.5.

Changes: Editorial. SSYSR05-170

airservices

Figure 4.1 Sydney (Kingsford Smith) Airport – RIVET THREE ARRIVAL (AIP / DAP)

4.2 Proposed RIVET STAR changes

Once WSI airport is operational, aircraft on its southern departure tracks will need to safely cross the Sydney (Kingsford Smith) Airport arrival aircraft on the RIVET STAR, in order to join the major outbound route to the south from the Sydney Basin. Because of their different performance characteristics, non-jet aircraft departing WSI will cross below the arriving aircraft on the RIVET STAR track and jet departures from WSI will cross above the RIVET STAR arriving aircraft. The crossing altitudes and procedural separations described below, are part of the "Safety by Design" process being adopted for WSI integration into the existing Sydney Basin airspace and will be published via the Australian AIP for pilot conformance.

The requirement for aircraft to be below 9,000 ft (2.7 km) at waypoint TAMMI and the subsequent radar vectored descent will not change after the commencement of WSI operations.

Figure 4.2 depicts the proposed adjustment to the RIVET STAR. It introduces a new waypoint (NB017) between waypoints RIVET and TAMMI. Sydney (Kingsford Smith) Airport arrival aircraft on the RIVET STAR will be required to be below 14,000 ft (4.3 km) and above 9,000 ft (2.7 km) at proposed waypoint NB017. These altitudes have been chosen to allow all aircraft types to adopt a CDO which will allow them to continue to meet the target altitude requirement of below 9,000 ft (2.7 km) by waypoint TAMMI.

Most current aircraft arrivals to Sydney (Kingsford Smith) Airport operating on the RIVET STAR are between 9,000 ft (2.7 km) and 14,000 ft (4.3 km) at the location of the proposed waypoint NB017. This proposed adjustment to the RIVET STAR simply mandates that altitude restriction to ensure safe and predictable separation from aircraft flying to WSI.

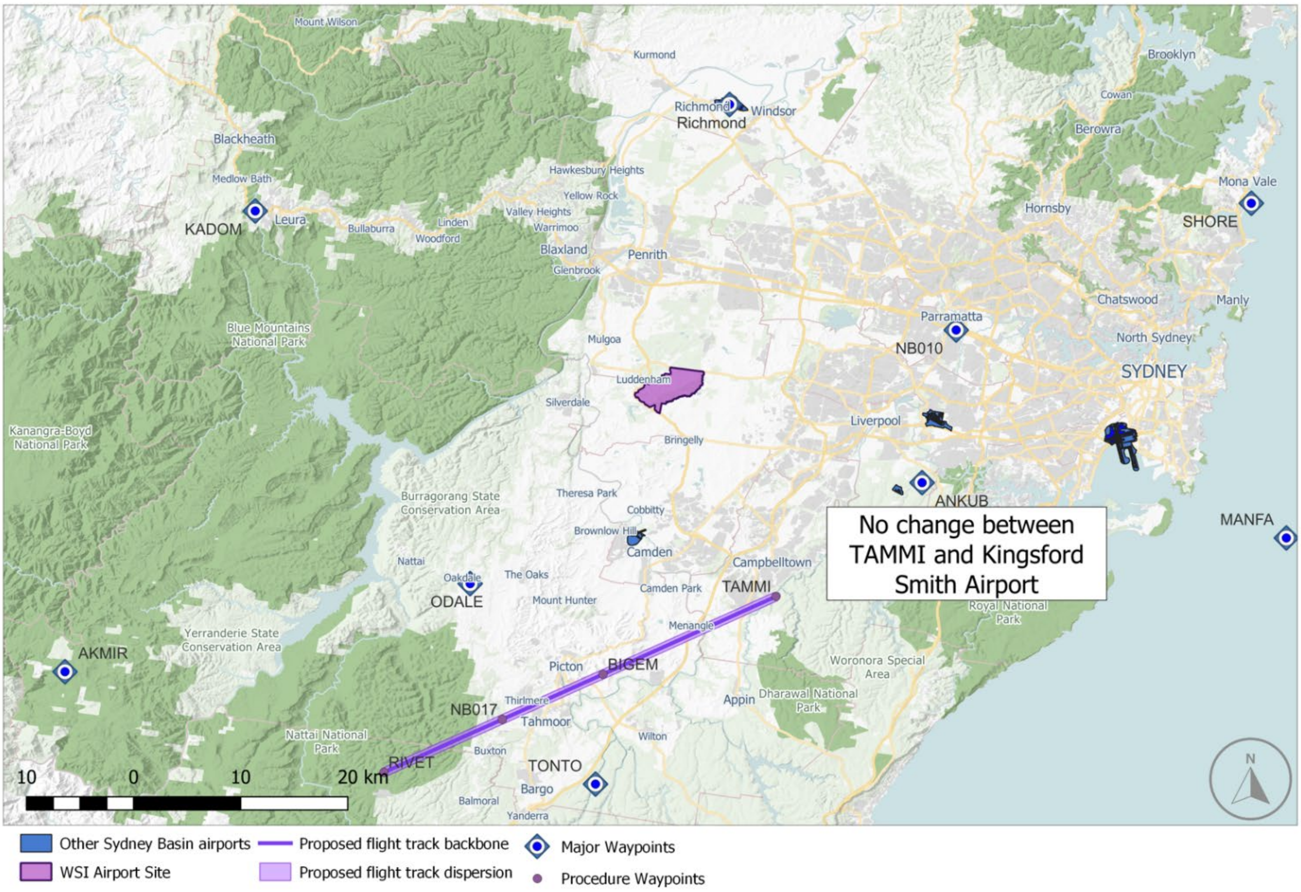


Figure 4.2 Proposed adjusted RIVET STAR

The proposed additional waypoint, NB017 imposes no lateral change to the RIVET STAR. The altitude window of 9,000 ft (2.7 km) to 14,000 ft (4.3 km) will allow departing aircraft from WSI to safely cross the RIVET STAR either under it at 8,000 ft (2.4 km) or below, or over it, at 15,000 ft (4.5 km) or above, maintaining safe separations for Sydney (Kingsford Smith) Airport arrival operations. These altitude requirements for WSI departing aircraft will be published on the WSI SIDs and provide for “Safety by Design” separation assurance.

The nominal backbone flight track is used to identify either the centre of an existing flight path corridor, or the designed nominal backbone flight track of a proposed SID or STAR. In the case of a current nominal backbone flight track, it is based on an average of current radar plotted flight paths. In the case of a proposed new procedure design, the nominal backbone flight track will be primary track used to establish and ensure “Safety by Design” standards are met.

Flight path dispersion corridors show the actual or expected variation of flights when flying the procedure.

Flight path dispersion around an actual or proposed nominal backbone flight track will vary considerably where the designed nominal flight path proceeds via a fly-by waypoint. The amount of variation will depend on the angle of turn that the designed track is required to make at the waypoint.

4.3 Current BOREE STAR

The BOREE STAR is an arrival procedure for jet aircraft to Sydney (Kingsford Smith) Airport from the north. Aircraft from airports such as Brisbane, Gold Coast and Cairns (domestically) and from cities such as Tokyo, Hong Kong and Manila (internationally) fly along this STAR from their enroute flight path to arrive at Sydney (Kingsford Smith) Airport. On occasion, air traffic control will re-route non-jet aircraft via the BOREE STAR to optimise arrival sequencing to Sydney (Kingsford Smith) Airport.

Figure 4.3 presents the AIP DAP Procedure Plate showing the existing track and current altitude restrictions of the BOREE 3A STAR. The critical altitude constraint requires aircraft to be below 9,000 ft (2.7 km) by waypoint BEROW, which is located 20 nm (36 km) from Sydney (Kingsford Smith) Airport. This altitude requirement is fixed and is a continuing requirement post WSI opening and allows air traffic control to change the nominated runways at Sydney (Kingsford Smith) Airport in line with noise sharing runway mode arrangements, without having to re-route aircraft in the enroute phase of flight.

The requirement to be below 9,000 ft by waypoint BEROW is the target altitude that is set within the aircraft’s flight management systems to allow a CDO from cruise altitude to 9,000 ft (2.7 km). Below 9,000 ft (2.7 km), descent is subject to air traffic control clearance and can occur at different locations depending on the runways being used at Sydney (Kingsford Smith) Airport.

Another BOREE STAR, known as the BOREE 3P STAR, is not subject to any changes.

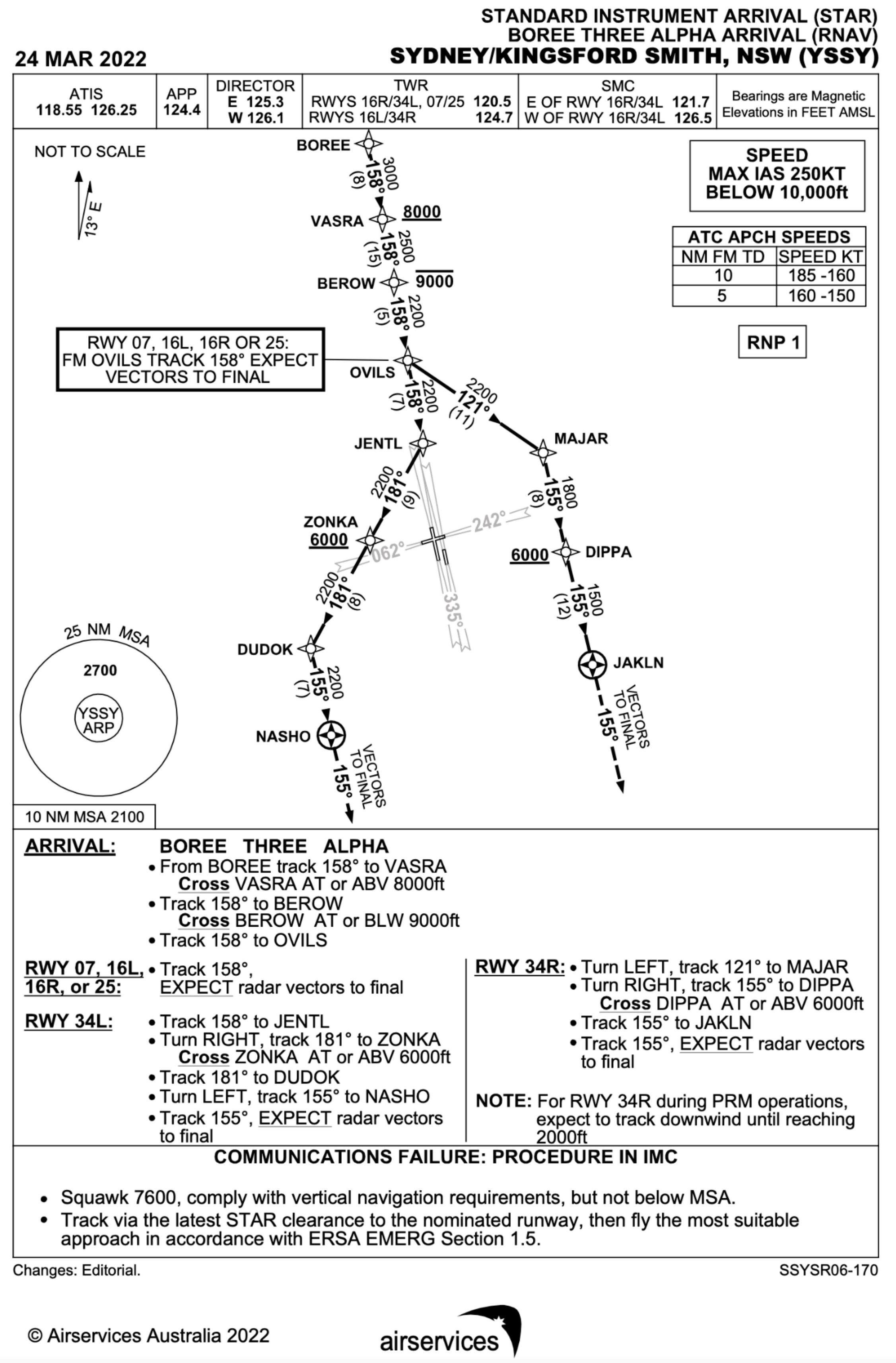


Figure 4.3 Sydney (Kingsford Smith) Airport – BOREE THREE ALPHA ARRIVAL (AIP / DAP)

4.4 Proposed BOREE STAR changes

The adjustment proposed to the BOREE STAR mandates an altitude block requirement to ensure safe and predictable separation from aircraft flying to WSI and with aircraft crossing to RAAF Base Richmond.

The requirement for aircraft to be below 9,000 ft (2.7 km) at waypoint BEROW and the subsequent radar vectored descent will not change after the commencement of WSI operations.

Figure 4.4 depicts the proposed adjusted BOREE STAR. It introduces a new waypoint (NB252) between existing waypoints BEKLO and BEROW. Sydney (Kingsford Smith) Airport arrival aircraft on the BOREE STAR will be required to be below 12,000 ft (3.7 km) at proposed waypoint NB252. This altitude restriction allows all aircraft types to adopt a CDO which will allow them to continue to meet the current target altitude restriction of 9,000 ft (2.7 km) or below by the waypoint BEROW.

The proposed additional waypoint NB252 imposes no lateral change to the BOREE STAR.

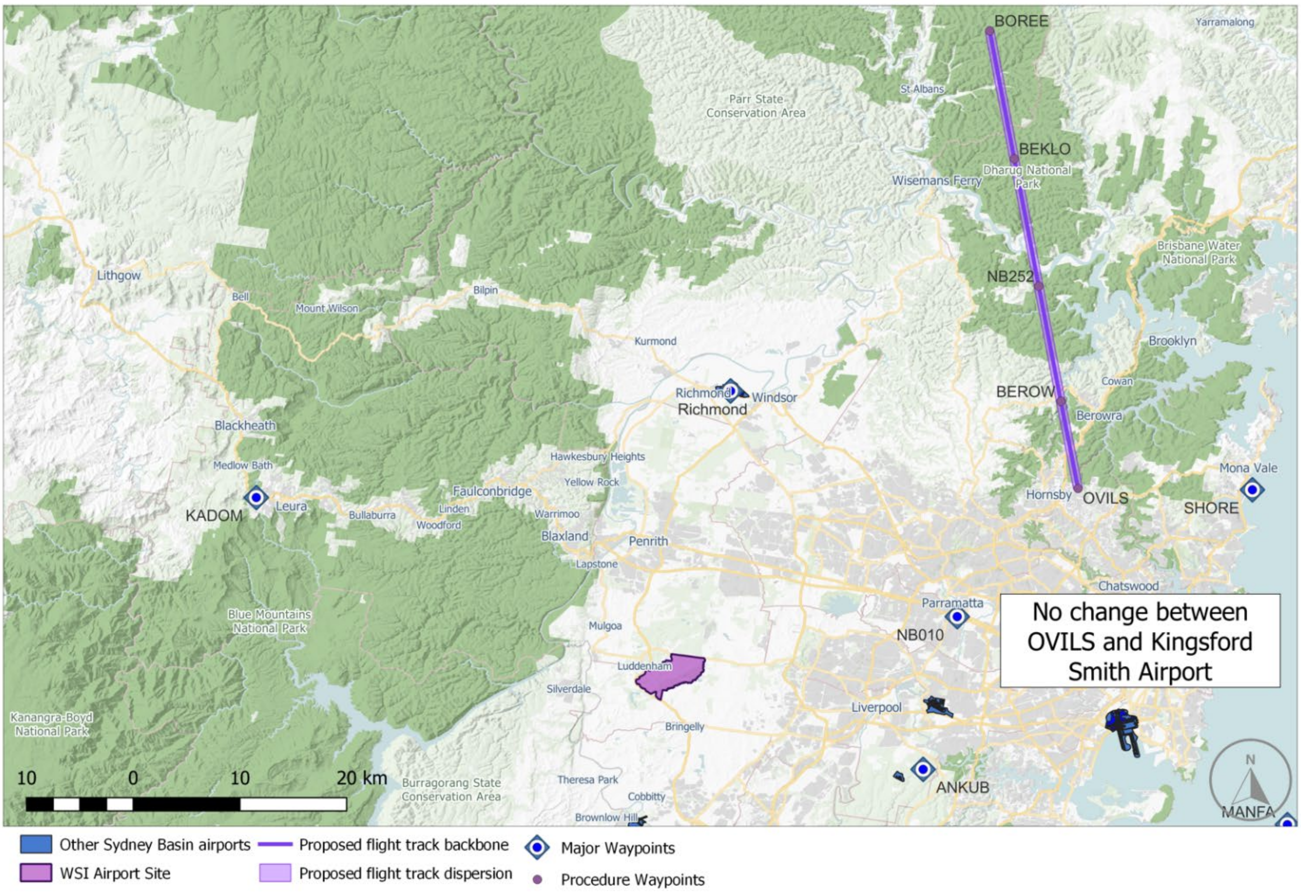


Figure 4.4 Proposed adjusted BOREE STAR

Chapter 5 Proposed Runway 07 SID changes

Runway 07 is the easterly direction of the east-west crosswind runway (07/25) at Sydney (Kingsford Smith) Airport. It is used less than one per cent of the time either for departures in a noise sharing mode, or for arrivals and departures in a standalone mode when crosswind from the east precludes the use of the parallel runways.

5.1 Current Runway 07 SIDs

Jet aircraft that currently depart from Runway 07 for Richmond or KADOM (north-western and western destinations) are issued with a SID common to all jets for all destinations – (i.e., RWY 07 FISHA RNAV Departure). This details the noise preferred flight path from Runway 07 until aircraft are east of the coast. Figure 5.1 which presents the AIP DAP Procedure Plate showing the existing track and altitude requirements of the current Runway 07 FISHA EIGHT jet departures SID.

Once east of the coast, aircraft bound for the north and south have specific tracking instructions to their next waypoint, but eastern, north-western and western departures are radar vectored to their next waypoint. In the case of eastern departures this is due to a multitude of possible destinations. For aircraft heading west, there is a need to cross multiple arrivals paths being flown from the north to Sydney (Kingsford Smith) Airport. To ensure aircraft separation is maintained and to facilitate constant climb and descent operations radar vectoring is applied to all western departing aircraft.

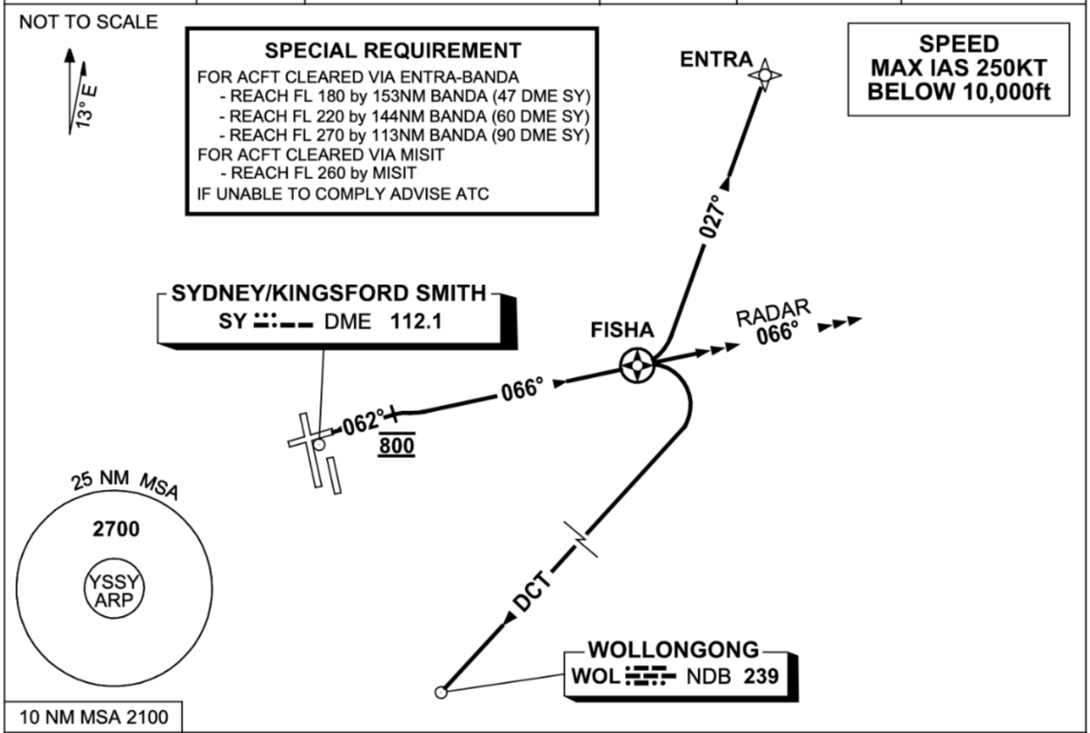
Air traffic control noise abatement procedures require jet aircraft to be at or above 5,000 ft (1.5 km) before recrossing the coast.

This means that aircraft recross the coast anywhere from just north of Sydney Harbour to north of Palm Beach and are tactically separated with arriving aircraft before being given a clearance to track to either waypoints RICHMOND or KADOM.

STANDARD INSTRUMENT DEPARTURES (SID)
RWY 07 FISHA EIGHT (JET) (RNAV)
SYDNEY/KINGSFORD SMITH, NSW (YSSY)

24 MAR 2022

ATIS	ACD	SMC	TWR	DEP(N) N&E	DEP(S) S,W&NW
118.55 126.25	133.8	E OF RWY 16R/34L 121.7 W OF RWY 16R/34L 126.5	120.5	123.0	129.7



DEPARTURE: **FISHA EIGHT**

RWY 07

- GRAD 4.7% to 1500ft, then 3.3%
- Track 062°, at 800ft turn RIGHT intercept and track 066° to FISHA then follow transition instructions

TRANSITIONS:

RADAR
- At FISHA CONTINUE tracking 066°
- Expect radar vectors to cleared route
- For ACFT cleared via MISIT see SPECIAL REQUIREMENT above

WOLLONGONG (WOL)
- At FISHA turn RIGHT
- Track DCT to WOL NDB, thence as cleared

ENTRA
- At FISHA turn LEFT
- Track DCT to ENTRA (approx 027°), thence as cleared
- See SPECIAL REQUIREMENT above

Changes: Editorial. SSYDP01-170

Figure 5.1 Sydney (Kingsford Smith) Airport – Runway 07 FISHA EIGHT (JET) (RNAV) - (AIP / DAP)

5.2 Proposed Runway 07 SIDs changes

The introduction of WSI arrivals from the north to Runway 05 will be much higher than both the current Sydney (Kingsford Smith) Airport arrivals to all runways and WSI arrivals to Runway 23. This will necessitate departures from Runway 07 at Sydney (Kingsford Smith) Airport for waypoints RICHMOND or KADOM to meet a known altitude restriction at a known point to ensure “Safety by Design” outcomes and separation assurance safety standards are met.

Two new SIDS have been designed for jet aircraft departing from Runway 07 at Sydney (Kingsford Smith) Airport and tracking either via RICHMOND or KADOM to their destination. The initial departure track for both SIDs from the runway threshold will be the same as the existing FISHA SID until aircraft are east of the coast. There is a common track for both SIDs until the new waypoint NB170 at which point the track splits for either RICHMOND or waypoint NB033 and on to KADOM. (Refer to Figure 5.2).

There will be an altitude restriction for aircraft to be above 10,000 ft (3 km) as they cross the waypoint SHORE (the coastline) and subsequently to be above 15,000 ft (4.5 km) as they cross the new waypoint NB170. These altitude requirements are on both SIDs and provide strategic separation assurance with aircraft arriving from the north to both Sydney (Kingsford Smith) Airport and the proposed arrivals to WSI.

For the very small amount of time that Runway 07 at Sydney (Kingsford Smith) Airport is used as a departure runway, it is expected that some aircraft will continue to be processed by air traffic control as they are today.

Radar vectoring as explained in Section 5.1 will continue to be used by air traffic control for departures off Runway 07 to the west and north-west when required.

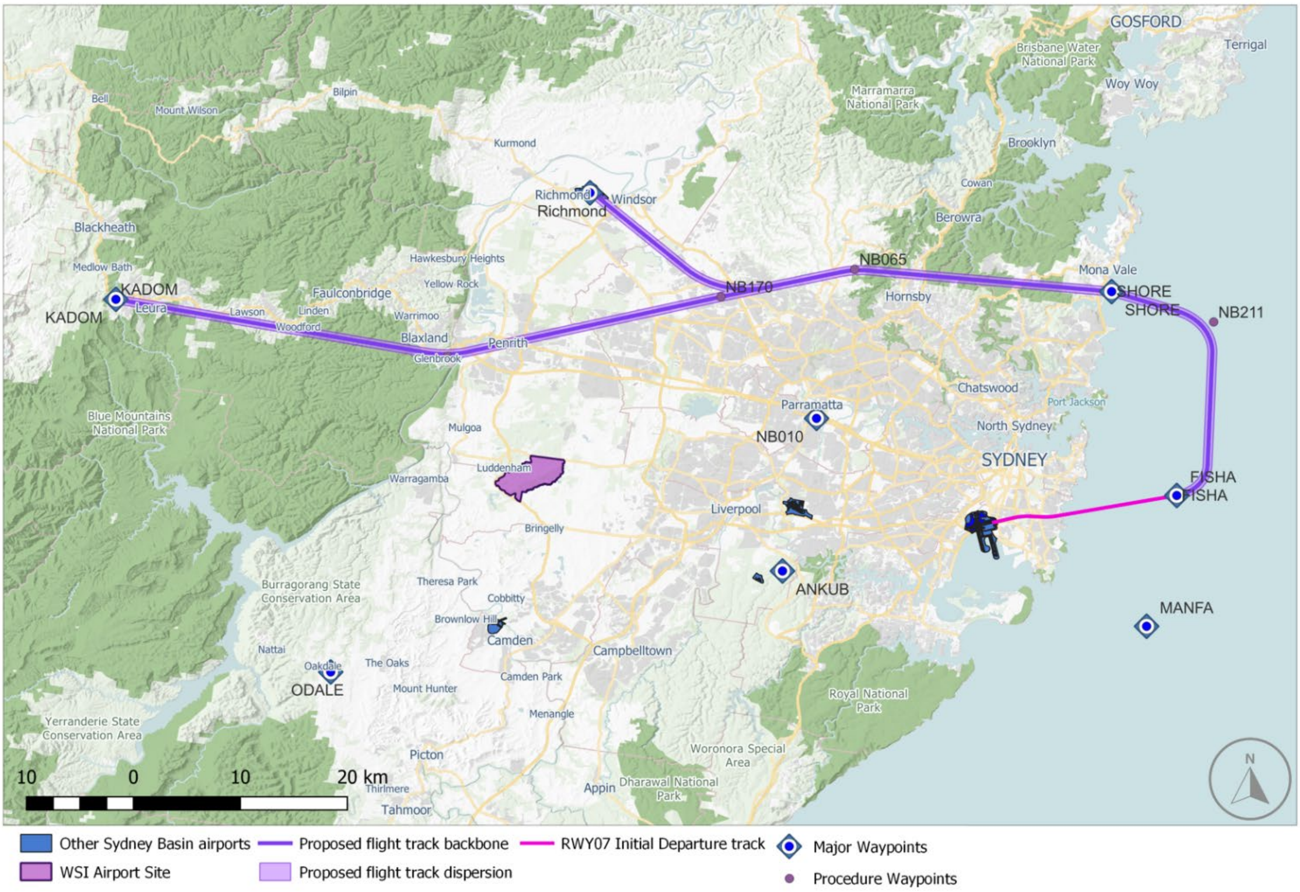


Figure 5.2 Proposed Runway 07 SIDs

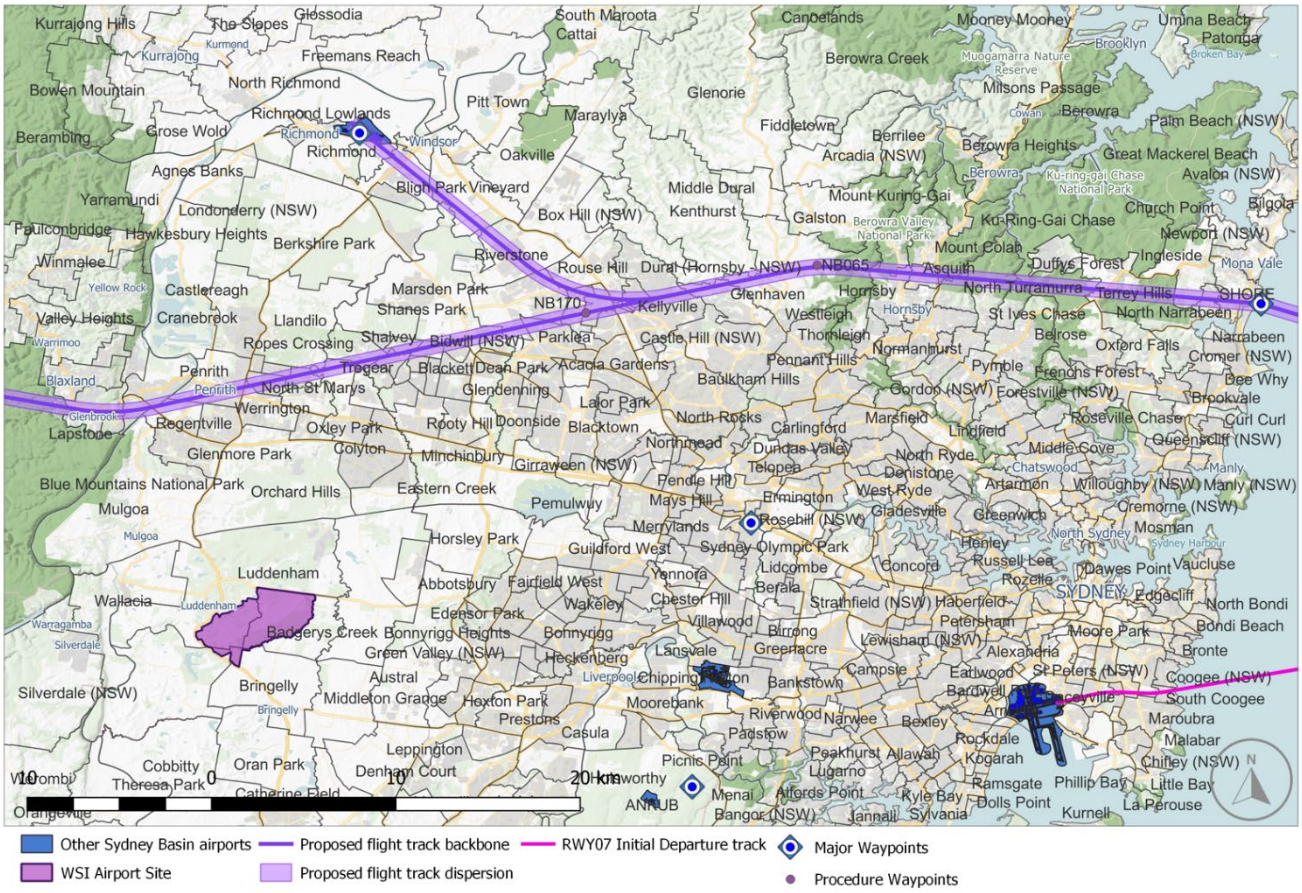


Figure 5.3 Proposed Runway 07 SIDs – suburb overlay

Chapter 6 Proposed Runway 07 IAF

6.1 Current Runway 07 Initial Approach Fix (IAF)

Runway 07 at Sydney (Kingsford Smith) Airport is used less than one per cent of the time. Within that time, it is used for an even smaller percentage of time for Instrument Landing System (ILS) approaches in poor weather conditions. Under ILS conditions aircraft arriving to Runway 07 are radar vectored into a position which allows them to intercept the ILS at existing waypoint ANKUB at an altitude of 3,000 ft (1 km). To allow aircraft a period of descent stability prior to waypoint ANKUB, radar vectoring can extend out to around 16 nm (29 km) from the airport. Figure 6.1 presents the AIP DAP Procedure Plate showing the existing ILS or LOC Runway 07 Approach.

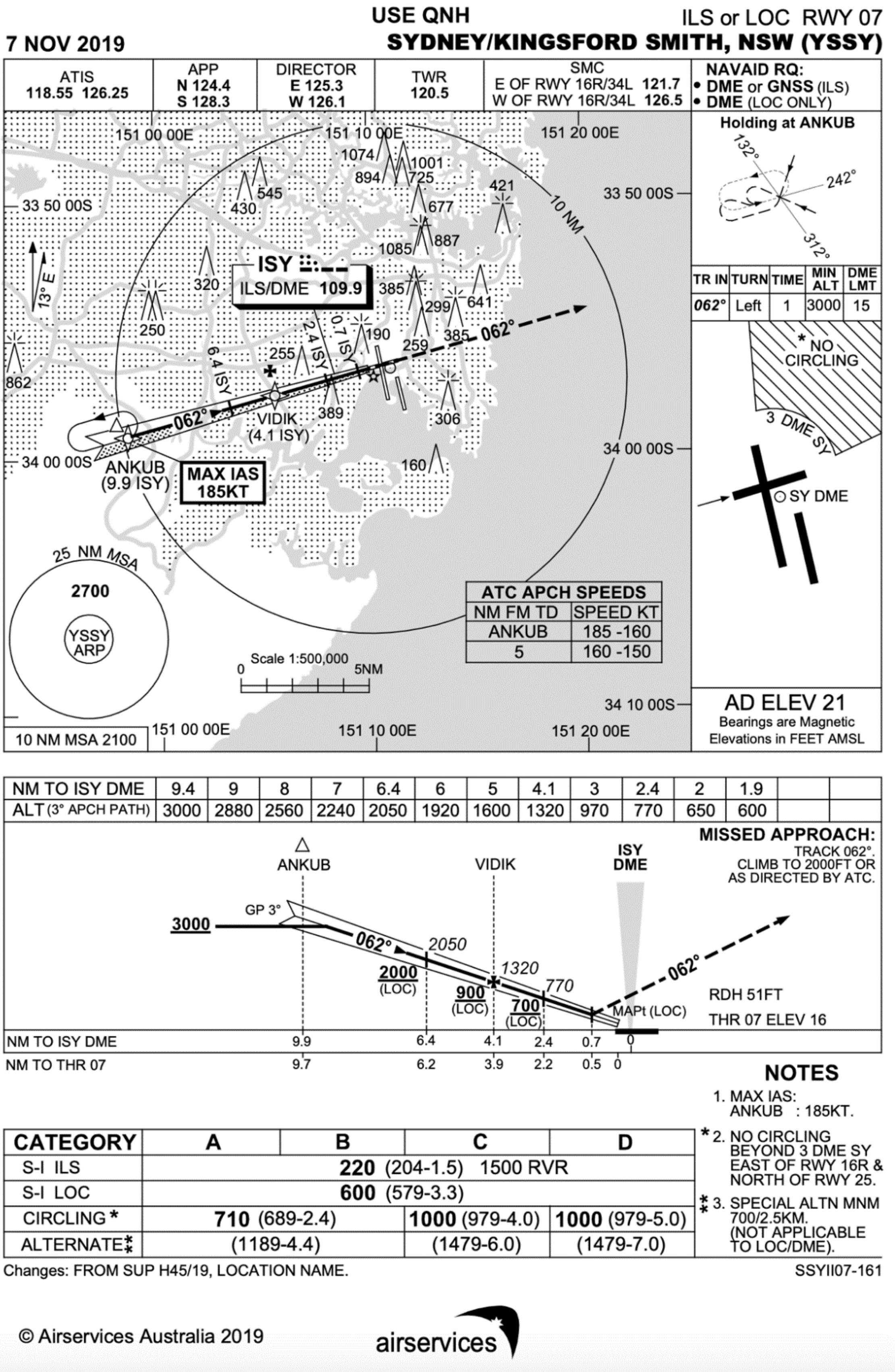


Figure 6.1 Sydney (Kingsford Smith) Airport – ILS or LOC Runway 07 – (AIP / DAP)

6.2 Proposed Runway 07 Initial Approach Fix (IAF)

To ensure that when the Sydney (Kingsford Smith) Airport Runway 07 ILS is being used, there is vertical separation assurance with the proposed non-jet departures turning right from Runway 05 at WSI, a new IAF for Runway 07 at Sydney (Kingsford Smith) Airport will be introduced at a new waypoint NB253. Waypoint NB253 is on the extended centreline of Runway 07 ILS at Sydney (Kingsford Smith) Airport and allows an intercept altitude of 4,000 ft (1.2 km). The proposed 4,000 ft (1.2 km) requirement will facilitate descent on the glidepath and provides separation assurance with Runway 05 Non-jet departures from WSI maintaining 3,000 ft (1 km). The position of waypoint NB253 is on the current flight path of aircraft arriving from the north that are radar vectored for the ILS approach.

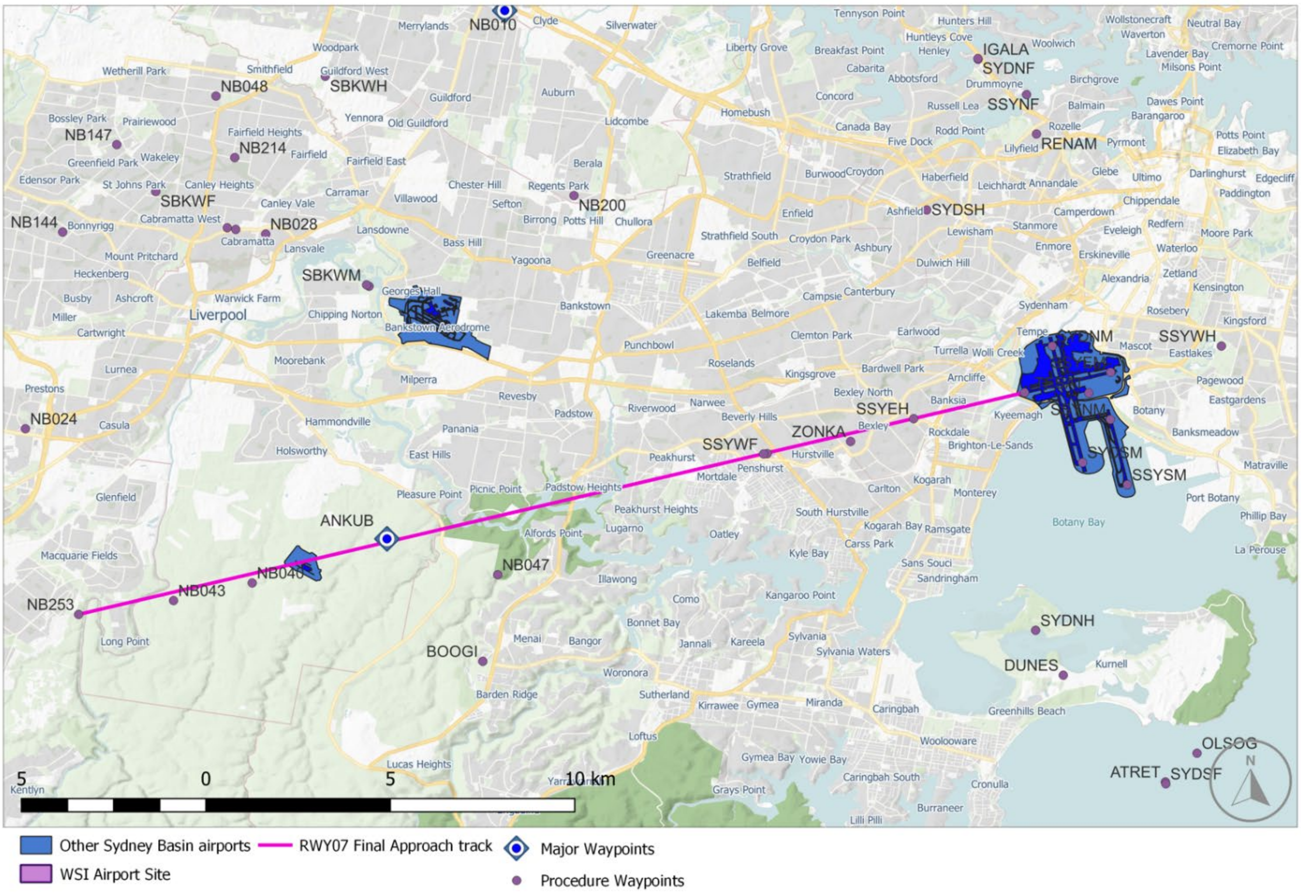


Figure 6.2 Proposed Runway 07 IAF at Sydney (Kingsford Smith) Airport

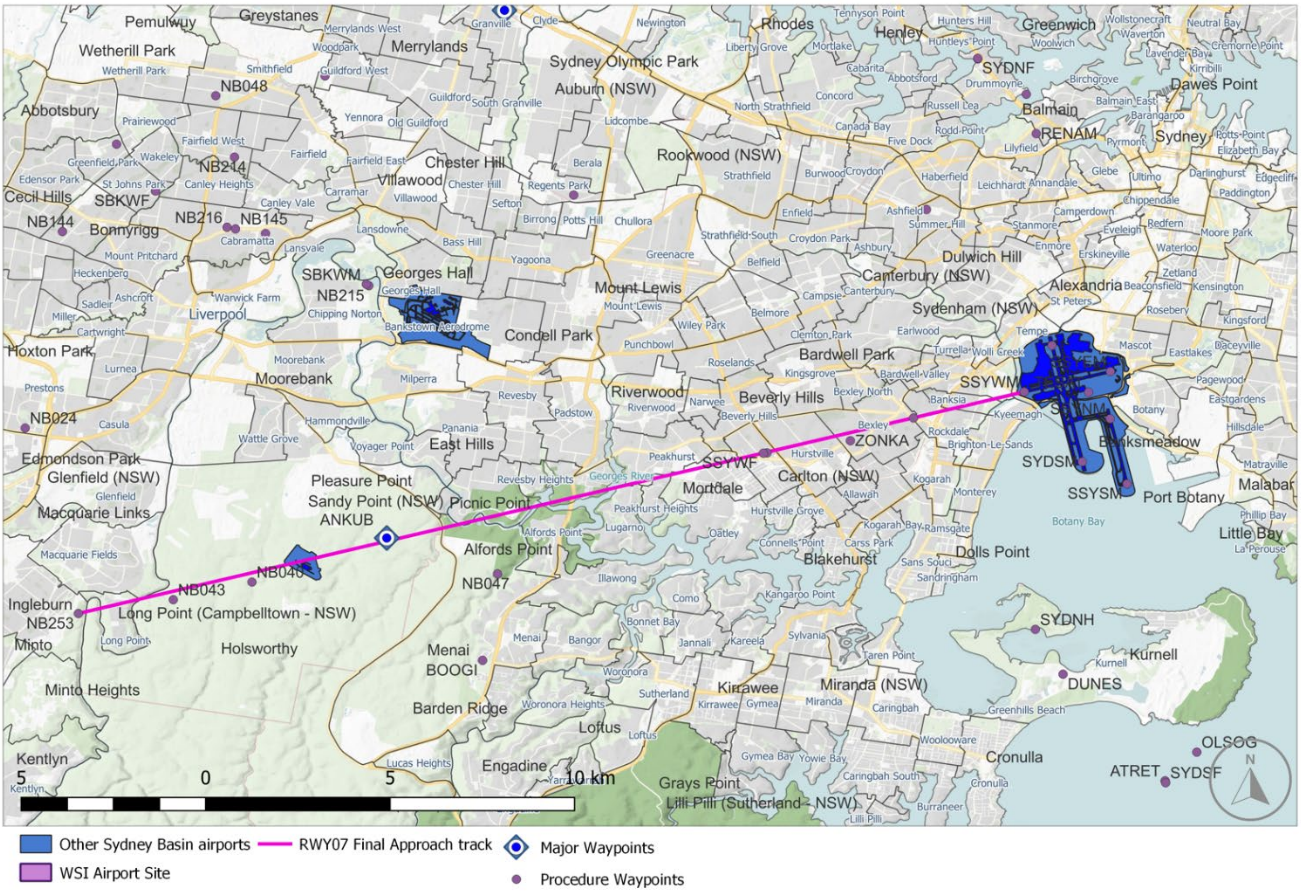


Figure 6.3 Proposed Runway 07 IAF at Sydney (Kingsford Smith) Airport – suburb overlay

Chapter 7 Growth forecasts

Sydney (Kingsford Smith) Airport growth forecasts have been extracted from the current 2019 Airport Master Plan:

The forecasts were independently prepared for Sydney Airport Corporation Limited by a third party in consultation with major international, domestic and regional airlines, and airline associations.

Growth in total aircraft movements is expected to increase by around 17 per cent from 348,520 movements in 2017 to 408,260 in 2039, an annual increase of 0.7 per cent. Of that, Regular Public Transport (RPT) services are projected to be 382,305 in 2039, representing around 94 per cent of total air traffic movements. This reflects airline feedback and expectations on the continued up-gauging of aircraft and increases in seat density and load factors across the Sydney (Kingsford Smith) Airport route network. It is understood that all forecasts assume that from late 2026, the Sydney Basin's aviation demand will be served by 2 international airports – WSI and Sydney (Kingsford Smith) Airport.

Figure 7.1 shows the projected growth in aircraft movements for Sydney (Kingsford Smith) Airport as adapted from the 2019 Master Plan in the period from 2017 to 2039.

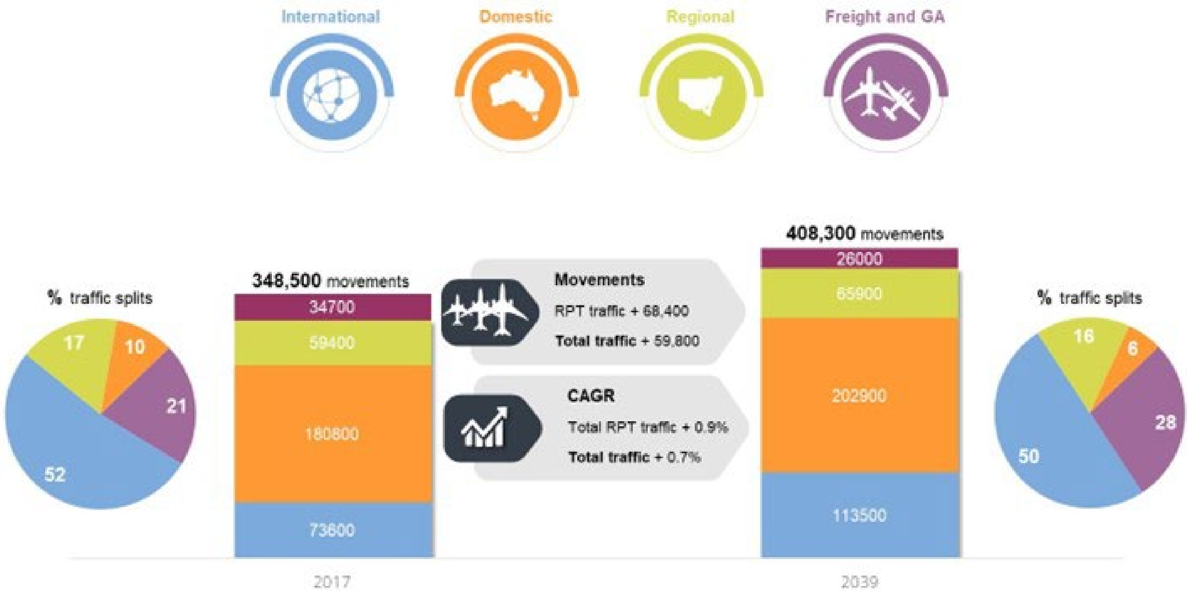


Figure 7.1 Sydney (Kingsford Smith) Airport aircraft movement growth forecast (adapted from the 2039 Master Plan)

In the absence of specific forecast growth data for the various jet aircraft operations to and from Runway 07, the generic annual growth percentages presented in Figure 7.1 above would be assumed to apply evenly across all the various operational sectors at Sydney (Kingsford Smith) Airport.

Chapter 8 Proposed changes to Sydney Basin transit flights

The Sydney Basin is regularly overflown by aircraft at all levels, through and below controlled airspace.

8.1 Current Sydney Basin transit flights procedure

Transit flights of the Sydney Basin can occur 24-hours a day, 7 days a week (24/7).

For aircraft capable of operating at 10,000 ft (3 km) or higher the basic current method of processing these aircraft is to track them towards Sydney (Kingsford Smith) Airport utilising established arrival flight paths. The aircraft are then processed outbound on Sydney (Kingsford Smith) Airport on established departure flight paths. This process will continue after operations commence at WSI.

8.2 Proposed Sydney Basin western IFR low altitude transit flight route

Where possible, for aircraft capable of flying above 10,000 ft (3 km), this process (as described in Section 8.1 above) of overflying Sydney (Kingsford Smith) Airport has been maintained, with some amendments to accommodate the location of flight paths for WSI.

A proposed low altitude transit route to be used predominantly by non-pressurised piston-engine aircraft that normally operate at altitudes between the Lowest Safe Altitude (LSALT) and 10,000 ft (3 km), strategically positioned to the west of WSI over uninhabited zones has been established – refer to Figure 8.1. This transit route will be available on a 24/7 basis and if transiting aircraft are within controlled airspace, they will be separated by air traffic control. If flying in uncontrolled airspace, procedures exist to ensure aircraft fly at segregated altitudes depending on their direction of flight.

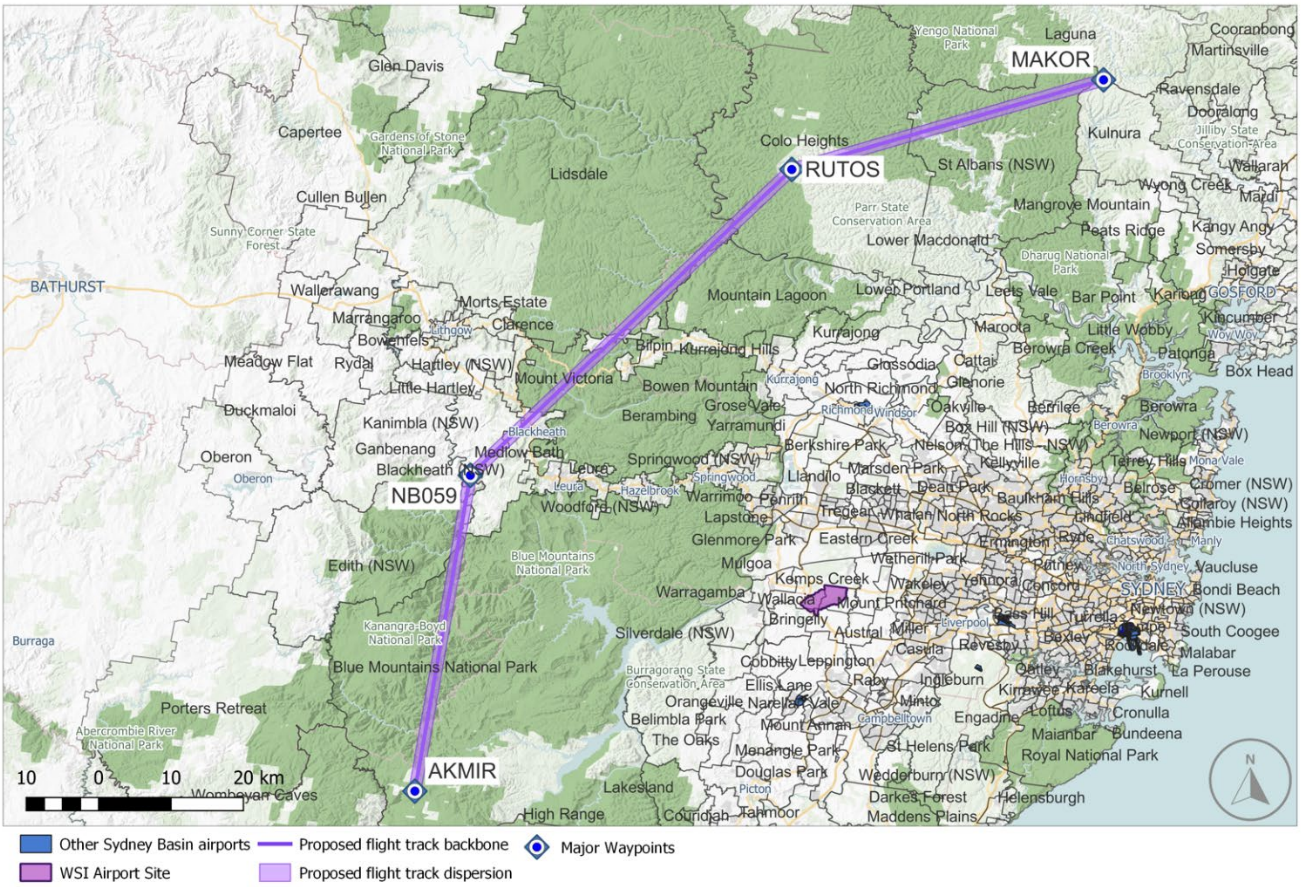


Figure 8.1 Proposed low altitude transit flight path with suburb overlay

Figure 8.2 presents a flight path that enables general aviation aircraft using IFR to transit overhead WSI to and from Bankstown and Camden Airports at and above 4,000 ft (1.2 km). The precise final location of this flight path will be finalised following an evaluation of the final detailed design of WSI flight paths. This future evaluation will primarily consider safety and environmental considerations.

8.3 Proposed low altitude IFR transit routes overhead WSI

A proposed flight path that enables general aviation aircraft using IFR to transit overhead WSI to and from Bankstown and Camden Airports at and above 4,000 ft (1.2 km). The precise final location of this flight path will be finalised following an evaluation of the final detailed design of WSI flight paths. This work will primarily consider safety and environmental considerations.

Figure 8.2 depicts the proposed WSI transit route flight path corridors which could be flown in both directions. Figure 8.3 presents these proposed transit route flight paths with a suburb overlay.

The altitudes that air traffic control will use to provide aircraft a clearance to fly these WSI overflight routes will be dependent on all aircraft disposition at the time of use. It will be no lower than 4,000 ft (1.2 km), but may be higher. Table 9.2 provides approximate noise levels by a representative selection of aircraft using these transit routes.

These proposed transit route flight paths are expected to be flown infrequently when WSI traffic levels permit and will primarily be flown by aircraft associated with emergency response operations.

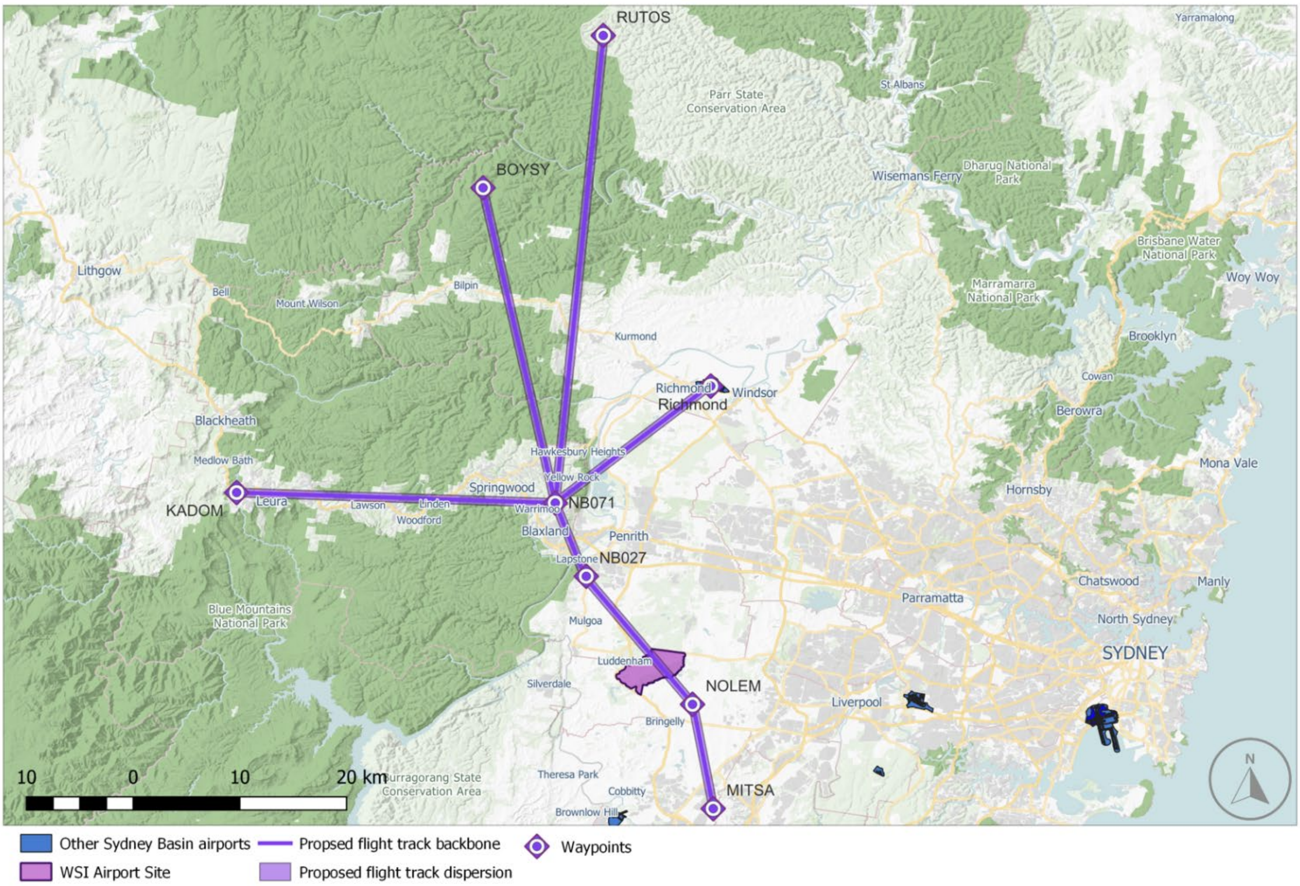


Figure 8.2 Proposed low altitude IFR transit route flight paths overhead WSI

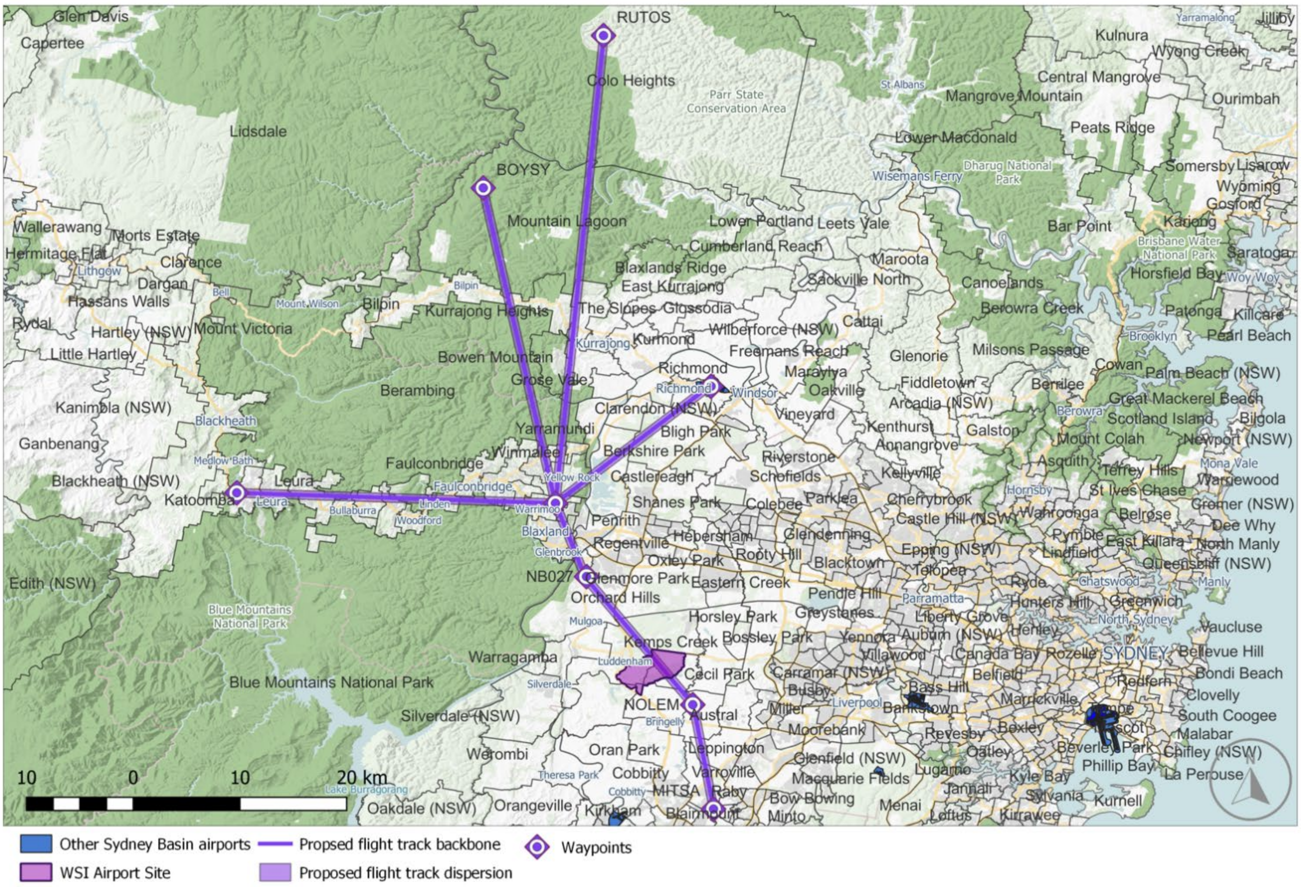


Figure 8.3 Proposed low altitude IFR transit route flight paths overhead WSI with suburb overlay

Chapter 9 Aircraft noise impact assessment

The aircraft noise assessment of the minor changes proposed to several Sydney (Kingsford Smith) Airport procedures and to Sydney Basin low altitude transit overflights considers each of those proposed changes in isolation. The information presented in this chapter describes the potential implications of the proposed individual procedure change only. It does not consider cumulative impacts nor include other operations to or from Sydney (Kingsford Smith) Airport that may overfly similar areas.

The aircraft noise assessment of the minor changes proposed to SIDs and STARs from Sydney (Kingsford Smith) Airport and approach procedures and a change proposed to the procedure for low altitude overflights of the Sydney Basin is qualitative in nature due to the low frequency of use or the neutral outcome of the change itself. To support a qualitative analysis of potential noise from operations, a series of Noise-Power-Distance (NPD) curves were developed and interpolated to provide an indication of what overflight noise from representative aircraft types could be expected on existing tracks, or on tracks that have either changed laterally or vertically or both.

9.1 Proposed adjustments to the RIVET and BOREE STARs

The proposed change has no effect on the lateral or altitude profiles of the STAR procedures – there will be no change to the noise profiles.

9.2 Proposed change to Runway 07 SID

The change proposed to the Runway 07 SID to Sydney (Kingsford Smith) Airport positions aircraft above 10,000 ft (3 km) on crossing the coast, increasing to a 15,000 ft (4.5 km) altitude at proposed waypoint NB170 approximately 19 nm (35 km) inland. Typically, jet aircraft operations above 10,000 ft (3 km) will still be audible and noticeable but not at levels considered to result in disturbance and are expected to not result in noise impacts. Aircraft operating on the procedure are expected to be considerably higher than the current radar vectored operation so should in fact deliver a reduction in overflight noise levels.

Table 9.1 Predicted average overflight noise levels in dB(A) at Runway 07 SID waypoints

Aircraft	Waypoint identifier (refer to Figure 5.3)	Waypoint altitude	Flight altitude less terrain height	Noise level dB(A)*
				Climb flight phase
Boeing 737-800 – narrow-body commercial passenger jet - domestic	NSW coastline[1]	5,000 ft	5,000 ft	72 dB(A)
	SHORE	10,000 ft	10,000 ft	63 dB(A)
	NB065	12,500 ft	12,000 ft	58 dB(A)
	NB170	15,000 ft	14,000 ft	52 dB(A)
Boeing 777-300 – wide-body commercial passenger jet - international	NSW coastline	5,000 ft	5,000 ft	78 dB(A)
	SHORE	10,000 ft	10,000 ft	65 dB(A)
	NB065	12,500 ft	12,000 ft	61 dB(A)
	NB170	15,000 ft	14,000 ft	58 dB(A)

**The dB(A) values presented in Table 9.1 above should be considered as a median value of a range of plus or minus 3 dB(A) – i.e. 50 dB(A) would indicate potential overflight noise of between 47 and 53 dB(A).*

[1] Sydney (Kingsford Smith) Airport Noise Abatement Procedures (NAPs) require jet aircraft on departing Runway 07 to be 5,000 feet or higher before recrossing the coastline.

9.3 Proposed change to Runway 07 IAF

The proposed change has no effect on the lateral or altitude profiles of the approach procedure – it introduces a waypoint (NB253) to provide "Safety by Design" separation with non-jet departures from WSI while maintaining the same glideslope approach angle – no change to noise profiles is expected.

9.4 Proposed Sydney Basin low altitude western IFR transit route

This western transit route will be available on a 24/7 basis, and used mostly by non-pressurised piston-engine aircraft that normally operate at altitudes between the LSALT and 10,000 ft (3 km). If transiting aircraft are within controlled airspace, they will be separated by air traffic control. If flying in uncontrolled airspace, procedures exist to ensure aircraft fly at segregated altitudes depending on their direction of flight.

This assessment does not have the benefit of current numbers of flights undertaking a Sydney Basin low altitude transit procedure, nor an indication of future numbers of this operation and what proportion of those numbers would choose to select the proposed routing option to the west of WSI. To inform this assessment it has been assumed that up to 10 general aviation aircraft flights per day may adopt this routing option.

Based on the best information currently available, a qualitative assessment of aircraft noise impacts relating to the proposed alternate routes for Sydney Basin western low altitude transit overflights has been developed by the analysis of a series of NPD charts (refer to Section 9.6).

9.5 Proposed low altitude IFR transit routes overhead WSI

This IFR transit route will be available on a 24/7 basis and will require a clearance from air traffic control. Transit altitudes will be 4,000 ft (1.2 km) or above and the route has been designed to mostly facilitate aircraft departing either Bankstown or Camden Airports for north-western and western destinations. It can also be used by aircraft travelling in the opposite direction.

Due to the low expected use (possible 2 aircraft per hour) of this proposed route and the variability of the altitude at which it will be flown under air traffic control clearance, this Appendix does not contain any specific noise information. Some indication of possible noise under this transit route can be gained from the NPD curve information in Table 9.2.

9.6 Noise assessment – NPD analysis

Average expected overflight noise levels in A-weighted decibels (dB(A)) can be determined from interpolation of NPD curves by selecting the most suitable aircraft type, subtracting the ground level at a location from the expected operating altitude of the flight, and intersecting this distance with the line representing a particular phase of flight – climb, level flight, or descent. Informed by typical operating techniques, it has been assumed that for piston-engine aircraft, the engine power (thrust) settings adopted are:

- climb – 100 per cent
- cruise (level flight) – 80 per cent
- descent – 50 per cent.

Due to the inability to define potential flight numbers, aircraft types and operating altitudes, the average expected noise levels presented in Table 9.2, will be subjected to significant variation and must be considered indicative only.

Table 9.2 Indicative non-pressurised piston-engined aircraft overflight noise levels

Aircraft type/ AMSL altitude	1,000 ft	1,500 ft	2,000 ft	2,500 ft	3,000 ft	3,500 ft	5,000 ft
CNA172 – Cessna "Skyhawk" single-prop	66	63	59	57	55	52	48
BEC58P – Beechcraft "Baron" twin-prop	77	74	71	68	66	63	60

The dB(A) values presented in Table 9.2 should be considered as a median value of a range of plus or minus 3 dB(A) – i.e., 50 dB(A) would indicate potential overflight noise of between 47 and 53 dB(A).

As stated, Table 9.2 presents expected average overflight noise levels for aircraft in cruise – flying level at around an 80 per cent engine power (thrust) setting. For aircraft undertaking climb (100 per cent engine power (thrust) setting) the noise levels are expected to increase by around 3 dB(A) and for aircraft in descent (50 per cent engine power (thrust) setting), are expected to decrease by 5 to 7 dB(A) to the above Table 9.1 values.

To aid in the application of NPD overflight noise estimations, a worked example is included in this Appendix:

- Aircraft – Cessna 172 "Skyhawk" (representing a typical small piston-single-engine training aircraft)
- Flight altitude – 6,000 ft (above mean sea level (AMSL)
- Terrain height - 1,000 ft
- Flight phase – cruise/level flight
- Height above an on-ground receiver = 6,000 – 1,000 = 5,000 ft
- From Table 9.1 the estimated overflight noise for 5,000 ft above the receiver = 48 dB(A)
- (if the aircraft was in a descent phase of flight = 48 dB(A) – 6 dB(A) = 42 dB(A))
- (if the aircraft was in a climb phase of flight = 48 dB(A) + 3 dB(A) = 51 dB(A).

9.6.1 Proposed western low altitude transit route – expected overflight noise

Table 9.3 provides an estimate of the expected overflight noise levels at the proposed western low altitude transit route waypoints for 2 suitably representative aircraft.

Table 9.3 Predicted average overflight noise levels in dB(A) at STAR waypoints for non-pressurised piston-engine aircraft

Aircraft	Waypoint identifier Refer Figure 8.1	Waypoint altitude	Flight altitude less terrain height	Noise level dB(A)* Level/cruise flight
CNA172 – Cessna Skyhawk single-engine propeller	AKMIR	Not specified	2,000 ft	59 dB(A)
	NB059	Not specified	1,500 ft	63 dB(A)
	RUTOS	Not specified	3,500 ft	52 dB(A)
	MAKOR	Not specified	3,400 ft	52 dB(A)
BEC58P – Beechcraft Baron twin-engine propeller	AKMIR	Not specified	2,000 ft	71 dB(A)
	NB059	Not specified	1,500 ft	74 dB(A)
	ROTOS	Not specified	3,500 ft	63 dB(A)
	MAKOR	Not specified	3,400 ft	63 dB(A)

** The dB(A) values presented in Table 9.3 should be considered as a median value of a range of plus or minus 3 dB(A) – i.e., 50 dB(A) would indicate potential overflight noise of between 47 and 53 dB(A).*

To determine the estimated overflight noise levels in Table 9.3, and erring on a conservative worst-case output, it is assumed that aircraft will be flying the proposed western transit route in cruise/level-flight configuration at an altitude of 5,000 ft AMSL. Non-pressurised light aircraft could be flying this transit procedure at up to 10,000 ft AMSL which would result in a reduction to the estimated overflight noise levels from those presented in Table 9.3.

The qualitative analysis of the potential overflight noise levels associated with the proposed Sydney Basin western low altitude transit route is considered the best available representation of potential impacts. This must be heavily qualified due to the variability associated with noise generation from variations of even the same aircraft type, varying pilot technique and variations in meteorological conditions. Overflight noise levels will also vary with respect to the lateral offset positioning of the at-ground receptor to the aircraft operating above.

Chapter 10 Other environmental factors

10.1 Proposed changes to RIVET and BOREE STARs

10.1.1 Visual amenity

There is no lateral change in tracks between the current STARs and those tracks proposed for the new STARs.

There is the addition of a new waypoint on both proposed new STARs with an altitude window to provide “Safety by Design” with WSI operations. The current descent profile is proposed to be maintained in the new STARs.

There will be no change to the visible descent profile.

10.1.2 Radar vectoring

In locations where no SIDs or STARs are available for an aircraft's particular operation, or where adverse weather requires the cancellation of a SID or STAR for safety reasons, air traffic control will provide radar vectoring to safely manage those applicable operating aircraft. Radar vectoring involves air traffic control determining a safe path for all aircraft and issuing heading and sometimes altitude and speed instructions to one or more aircraft to avoid any possible conflictions. While the objective of a set of SIDs and STARs in terminal airspace designed under “Safety by Design” principles is for onboard flight management systems monitored by air traffic control to ensure aircraft remain separated, there are occasions where SIDs and STARs are cancelled for varied reasons and aircraft are radar vectored.

A cancellation of a SID or STAR resulting in radar vectoring involving a departure from lateral track, could also involve a variation in vertical profile or speed requirements and may be either at pilot request or initiated by air traffic control.

Pilot requests for departing from a SID may be for:

- route efficiency – where there is a more direct route to the destination than the published procedure allows, saving time, fuel and emissions
- weather avoidance – particularly around turbulence associated with thunderstorms.

Pilot requests in all instances are subject to air traffic control approval. Avoidance of thunderstorms which has a safety priority is readily approved. Direct routing requests will be considered by air traffic control in light of safety and overall management of other aircraft within the vicinity.

Air traffic control-initiated cancellations of SIDs can also be for reasons of route efficiency, better noise outcomes or better emissions outcomes. Separation requirements with other departing, arriving or transiting aircraft can also necessitate the cancellation of a SID.

Any one of the 3 elements (track, vertical profile, speed) of a SID can be cancelled individually or collectively.

Aircraft will eventually either re-join the published procedure at a later waypoint or will connect with the enroute network at a designated waypoint.

A pilot can request cancellation of a STAR for reasons of weather avoidance or to enter a holding pattern to address an equipment malfunction.

Air traffic control will cancel a STAR when an alternate track or vertical profile is required by one or more aircraft to maintain the optimum landing sequence at the airport. Up to a point, speed adjustment can also be made within the lateral or vertical profile of a STAR.

In low arrival demand conditions air traffic control will occasionally cancel a STAR to reduce track miles and emissions if a shorter arrival route is available.

There will be no change to the current operation of the RIVET and BOREE STARs.

Radar vectoring associated with the proposed adjusted RIVET and BOREE STARs will continue consistent with current practice. The main reason for radar vectoring off the STAR tracks will be to ensure that the arrival sequence to Sydney (Kingsford Smith) Airport is optimised to meet the capacity of the available runway operating mode.

As there is no lateral change proposed the distances flown on the proposed adjusted STARs will be the same as that currently flown on the existing STARS. The result is no change in track distances or associated CO_2 emissions from jet aircraft operations on these 2 STARs.

10.2 Proposed changes to Runway 07 SIDs

10.2.1 Visual amenity

The initial flight path of the proposed new Runway 07 SID at Sydney (Kingsford Smith) Airport for aircraft tracking via KADOM or RICHMOND will be identical to the current Runway 07 SID flight path over the eastern suburbs. As with the current SID aircraft will continue their climb over the ocean and track north before crossing back over the coast at the waypoint SHORE and at 10,000 ft or above.

While not a specific enroute transition track on the current SID, this track or a close approximation of it, is used during the extremely low usage of Runway 07 as a departure runway.

Aircraft using this proposed new flight path will be visible crossing the coastline and tracking westward at high level.

10.2.2 Radar vectoring

In the case of Runway 07 SIDs at Sydney (Kingsford Smith) Airport the current SID does not define a specific track for aircraft transitioning to their enroute track via KADOM or RICHMOND. For the small amount of time and small number of aircraft, air traffic control direct flights across the many inbound tracks to Sydney (Kingsford Smith) from the north. This results in aircraft departing from Runway 07 for the west and north-west sometimes crossing the coast as far south as Manly or as far north as north of waypoint SHORE. The location at which they cross the coast is determined by the actual northern arrivals presenting at the time.

Airservices Australia advise that after the introduction of the proposed new Runway 07 SIDs at Sydney (Kingsford Smith) Airport this variable radar vectoring tracking will continue to be employed and aircraft will still be visible crossing the coast dispersed along the Sydney Northern Beaches from Manly north to Palm Beach, and then will track westbound in a similar flight path to the current procedures.

Aircraft will still be radar vectored at times for separation, track shortening, to save fuel and emissions, and hazardous weather avoidance.

10.2.3 Track distance and emissions

In line with Airservices Australia's expectation of maintaining radar vectoring techniques for the small percentage of time that Runway 07 is used for departures, there is little, or no change expected to the current track distance and emissions when the proposed new SID is introduced.

10.3 Proposed changes to Runway 07 IAF

10.3.1 Visual amenity

As detailed in Chapter 6 above, the IAF is a waypoint that allows the aircraft to position itself on the instrument approach to Runway 07 at Sydney (Kingsford Smith) Airport. The proposed inclusion of a new IAF for "Safety by Design" reasons for separation with WSI turbo-prop departures, defines a pre-determined altitude restriction at an existing radar vectored track.

The Runway 07 instrument approach is used for less than one percent of the time in both visual conditions and in conditions of low cloud and/or reduced visibility. Visibility of these Runway 07 instrument approaches is expected to be consistent with the current operations.

10.3.2 Radar vectoring

Once the proposed new IAF is introduced, some aircraft may be given air traffic control clearance to track directly via the new IAF to join the ILS. However, to maintain an optimised landing sequence it is most likely that aircraft will be under radar vectors before being cleared to intercept the ILS at similar distances from the runway threshold as is currently the case.

Other radar vectoring may occur for reasons of safety or inclement weather avoidance.

10.3.3 Track distance and emissions

There is no change expected to the current track distance and emissions when the proposed new Runway 07 IAF is introduced.

10.4 Proposed Sydney Basin low altitude western IFR transit route

This assessment does not have the benefit of current numbers of flights undertaking a Sydney Basin low altitude transit procedure, nor an indication of future flight numbers of this operation and what proportion of those numbers would choose to select the proposed routing option to the west of WSI which is positioned over the western slopes of the GBMA.

As presented in Section 9.4 above, it is expected that up to 10 flights per day by non-pressurised piston-engine aircraft could utilise the proposed low altitude transit flight routing option.

10.4.1 Visual amenity

For the small number of mainly piston engine aircraft expected to use the proposed new low altitude transit route, which is west of the metropolitan area, the visual impact to communities in the Sydney Basin is expected to be negligible. Aircraft adopting this routing option would no longer fly over the current communities in the adjacent Sydney Basin area providing a minor positive benefit and outcome in reducing visual impacts.

Given the expected low numbers of aircraft (up to 10 flights per day) expected on the route, visual amenity impacts should result in a low impact outcome.

10.4.2 Radar vectoring

For all the reasons aircraft are radar vectored by air traffic control, aircraft using this low altitude transit route may also be subject to radar vectoring.

10.4.3 Track distance and emissions

When compared to the current practice of low altitude transit flights crossing the Sydney Basin closer to the coast, this proposed new western route may offer a reduction in track distances for some flights but have an increase for others. An increase or decrease will depend on the departure point and destination of each flight and the pilot's choice of a flight planned route. With this variability it is not possible to reliably estimate any track distance or emissions variations for the very small number of piston-engine aircraft expected to use this route.

10.5 Proposed low altitude IFR transit routes overhead WSI

10.5.1 Visual amenity

Aircraft will be visible on this route whenever the cloud base is above the air traffic control cleared altitude of the overflying aircraft. They will mostly cross the new WSI flight paths at right angles.

10.5.2 Radar vectoring

The transit route is designed to cross the WSI arrival and departure flight paths at right angles and at altitudes cleared by air traffic control (4,000 ft (1.2 km) and above). This will provide “Safety by Design” for these operations. Radar vectoring of aircraft on this transit route may be possible when WSI traffic is light, and no conflicts will occur if a transiting aircraft is radar vectored off the transit route.

10.5.3 Track distance and emissions

This route is designed with safety as its principal objective to allow some IFR aircraft to cross WSI from north to south or vice versa. In some instances, this may increase the track distance or in other instances may reduce the track distance. No prediction of a general nature of distance variations can be made without specific knowledge of the departure point and destination of the aircraft flying this route.

Chapter 11 Conclusion

The 6 changes facilitated by the introduction of WSI's new flight paths and operating procedures covered in this Appendix are of a minor nature and resulting impact and they can be grouped together in this single Appendix.

The RIVET and BOREE STARS have no lateral or vertical change from the current procedures. The only change is to include a definitive altitude window on the outer sections of each STAR to ensure "Safety by Design" separation with the proposed WSI operations. Efficient CDO will be maintained on both STARs.

The proposed introduction of a new SID transition for Runway 07 departures to the west and northwest from Sydney (Kingsford Smith) Airport is to provide "Safety by Design" separation when required between departing aircraft and the proposed WSI operations for a low level of usage (less than one per cent) when Runway 07 is in use. Within that small amount of time, it is expected that current radar vectoring practice of these departures will continue. The proposed new SID will be the same as the existing SID immediately after take-off from Runway 07 at Sydney (Kingsford Smith) Airport all aircraft are east of the coast.

The introduction of a new IAF for the Runway 07 ILS at Sydney (Kingsford Smith) Airport is required by "Safety by Design" principles for separation between Runway 07 ILS arrivals and some proposed WSI operations, for the less than one per cent of time when Runway 07 is in use and the weather conditions requires aircraft to conduct ILS approaches to land safely. The new IAF is embedded both laterally and vertically within the current radar vectoring area for aircraft from the north that are landing at Sydney (Kingsford Smith) Airport via the Runway 07 ILS.

The proposed new low altitude transit route for aircraft transiting north to south, or south to north at altitudes below 10,000 ft (3 km) is positioned well west of the Sydney metropolitan area and is anticipated to be used by 10 or less flights per day.

The qualitative analysis of the potential overflight noise levels associated with the proposed low altitude transit flight route is considered the best available representation of potential impacts but must be heavily qualified due to the variability associated with noise generation from variations of even the same aircraft type, varying pilot technique and variations in meteorological conditions. Overflight noise levels will also vary with respect to the lateral offset positioning of the at-ground receptor to the aircraft operating above.

The proposed new IFR low altitude transit route overhead WSI Airport is in the middle of a very complex piece of airspace and will primarily be used by emergency services flights. A small number of aircraft to and from Bankstown or Camden Airports may be issued with an air traffic control clearance to use this transit route when low traffic demand at WSI allows.

In general, the areas overflown by the proposed minor adjustments to Sydney (Kingsford Smith) Airport procedures and the proposed new Runway 07 SIDs which are expected to have little use are currently frequently overflown with similar aircraft undertaking both IFR and VFR flights (refer to Figures 1.1 and 5.3). The proposed new Sydney Basin lower level transit route utilisation of less than 10 flights per day is expected to be flown by similar light aircraft that are frequently operating in that area daily. This results in the expectation that there will be little or no material change over today's operations.

Australian Government

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Regional Development, Communications and the Arts