Australian Government

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

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

Draft Environmental Impact Statement

Part A: Background

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Digital Data Sources

Data used in the maps contained in this EIS has been obtained from the following sources: Base map data including aerial photography – NSW Department of Customer Services; NSW Department of Infrastructure, Transport, Regional Development and Communications; NSW Department of Planning and Environment; GeoScience Australia; nearmap.com and Esri. Note Esri base map data is sourced from Esri, HERE, Garmin, (c) OpenStreetMap contributors, Airbus, USGS, NGA, NASA, CGIAR, NCEAS, NLS, OS, NMA, Geodatastyrelsen, GSA, GSI and the GIS user community. Other map data sources have been obtained from: Australian Government Department of Infrastructure, Transport, Regional Development, Communications and the Arts; Commonwealth of Australia and Department of Climate Change, Energy, the Environment and Water (DCCEEW) including DCCEEW National Flying-fox monitoring viewer spatial platform and Find Environmental Data; Australian Government Data.gov.au; National Native Title Tribunal, NSW Department of Customer Services; NSW Department of Planning and Environment (DPE) including DPE Important habitat maps for threatened species and Heritage Databases; NSW Department of Planning; NSW Department of Education; NSW Government – Heritage NSW (AHIMS); NSW Government, SEED The Central Resource for Sharing and Enabling Environmental Data in NSW; Navin Officer Heritage Consultants Pty ltd; Airbiz; IRIS Visual Planning + Design; Environmental Risk Science Pty Ltd. and Todoroski Air Sciences.

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Draft EIS guide

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Terms and acronyms

Term	Definition
05/23	The proposed runway orientation. Refers to a generally north-east/south-west orientated runway at 50 degrees north-east and 230 degrees south-west
2016 EIS	The earlier Western Sydney Airport Environmental Impact Statement
AHD (Australian height datum)	Common reference level which is approximately equivalent to the height above sea level
Airport	Western Sydney International (Nancy-Bird Walton) Airport
Airport Plan	The Western Sydney Airport – Airport Plan, published in 2016 and updated in 2020 and 2021
Airport Site	The site for Sydney West Airport as defined in the Airports Act *Note: Sydney West Airport is the name used in the Airports Act.*
Airports Act	*Airports Act 1996* (Commonwealth)
Airports Act amendment	*Airports Amendment Act 2015* (Commonwealth)
Air Services Act	*Air Services Act 1995* (Commonwealth)
Airshed	The volume of atmosphere over the area of interest
Airspace	Term used for the three-dimensional space in which aircraft fly
Airspace Act	*Airspace Act 2007* (Commonwealth)
Air traffic control	Service provided by ground-based air traffic controllers who direct aircraft on an airport and through a given section of controlled airspace. Can also provide advisory services to aircraft in uncontrolled airspace
Air traffic control procedures	Specific operating procedures or rules that apply to all aircraft flights within controlled airspace. The rules may vary under differing operational circumstances including time of day, traffic demand (the number of arriving or departing aircraft) and the prevailing weather conditions
Air traffic flow management	Regulation of air traffic so that the handling capacity of an airport or air traffic control is not exceeded and/or is used efficiently
Air traffic management	Aviation term encompassing all systems that assist aircraft to depart from an aerodrome, transit airspace and land at a destination aerodrome. The purpose of air traffic management is safe, efficient and expeditious movement of the aircraft in the airspace
ALC (Airport lessee Company)	The company that is granted a lease over the Airport Site. The ALC is WSA Co
ANEC (Australian noise exposure concept)	Noise exposure contours produced for a hypothetical future airport usage pattern used, for example, in the process of examining flight path options around an airport
ANEF (Australian noise exposure forecast)	Official forecasts of future noise exposure patterns around an airport. They constitute the contours on which land use planning authorities usually base their controls

Term	Definition
Area navigation	Method of IFR navigation. It allows aircraft to choose any course within a network of waypoints defined by geographic coordinates
Assessment years or scenarios	• **2033** – representing the early years of airport operation, when single runway operations handle up to 10 million annual passengers and around 81,000 air traffic movements per year • **2040** *(noise assessment only)* – representing an interim year of operation, when single runway operations handle around 15 million annual passengers and around 107,000 air traffic movements per year • **2055** – representing aircraft noise impacts as the single runway approaches capacity, when single runway operations handle around 37 million annual passengers and around 226,000 air traffic movements per year
Background levels	Existing concentration of pollutants in the ambient air
CALPUFF	A multi-layer, multi-species, non-steady state Gaussian puff dispersion model that is able to simulate the effects of time- and space-varying meteorological conditions on pollutant transport
Civil Aviation Act	*Civil Aviation Act 1988*
CO_{2e}	Cardon dioxide equivalent - used for describing different GHGs in a common unit
Containment	The term containment is used in various air navigation standards. Arrival and departure flight paths in controlled airspace are required to be contained within that controlled airspace in accordance with buffers prescribed by CASA, to protect aircraft using the flight paths from other aircraft and from terrain. There can be different containment areas between the day period and night period
Continuous climb operations	Involves an aircraft maintaining a steady angle of departure
Continuous descent approaches	Involves an aircraft maintaining a steady angle of arrival
Control area	Volume of airspace that exists in the vicinity of an airport, with defined upper and lower altitude bands, within which aircraft movements are subject to a defined level of control
Control zone	Volume of airspace surrounding major airports down to ground level within which all aircraft movements are subject to a defined level of control
Controlled airspace	Generic term for airspace with defined dimensions and within which air traffic control services are provided to aircraft
Danger areas	Declared where an activity is considered by CASA to pose a potential danger to aircraft
Datum	A level surface used as a reference in measuring elevations
dB(A)	A-weighted noise level – an expression of the relative loudness of sounds in air perceived by the human ear (A) is an adjusted dB reading (A-weighted sound level) to account for the varying sensitivity of the human ear to different frequencies of sound
Decibel (dB)	A unit of sound. The loudness of a sound depends on its sound pressure level, which is expressed in decibels (dB)

Term	Definition
Department	The Australian Government represented by the Department of Infrastructure, Transport, Regional Development, Communication and the Arts
Detailed Design	The final airspace and flight path design
Direct impact	Direct impacts are caused by an action and occur at the same time and place
Dispersion modelling	Modelling by computer to mathematically simulate the effect on plume dispersion under varying atmospheric conditions; used to calculate spatial and temporal fields of concentrations and particle deposition due to emissions from various source types
EIS guidelines	Guidelines for the EIS as issued by the delegate for the Minister for the Environment and Water on 26 April 2022 under the EPBC Act
Environmental assessment	A formal process of evaluating significant short term, long term and cumulative effects or impacts a project will have on the environment
Expert Steering Group	Expert Steering Group - led by the Australian Government Department of Infrastructure, Transport, Regional Development, Communications and the Arts and involving Airservices Australia, CASA, the Department of Defence and Western Sydney Airport Company (the Airport operator). This group was established to guide the development of the airspace and flight path design. It would continue to be involved for the remainder of the project
Forecast schedules	Projections which provide the break down each movement by the type of aircraft, operation type (arrival or departure), time of operation and port of origin or destination
Hazard	The potential or capacity of a known or potential risk to cause adverse effects
Hazardous material	Any item or agent that has the potential to cause harm to humans, animals or the environment
Hours of operation	Day-time operations occur between 5.30 am and 11 pm Night operations are between 11 pm and 5.30 am
ICAO (International Civil Aviation Organisation)	A specialised agency of the United Nations which codifies the principles and techniques of international air navigation and fosters the planning and development of international air transport to ensure safe and orderly growth
ICAO Standards	Standards and recommended practices concerning air navigation, its infrastructure, flight inspection, prevention of unlawful interference and facilitation of border-crossing procedures for international civil aviation
Impact	A change in the physical, natural or cultural environment brought about by an action. Impacts can be direct or indirect

Term	Definition
Indirect impact	As defined in the EPBC Act Significant impact guidelines 1.2, indirect impacts include downstream or downwind impacts, such as impacts on wetlands or ocean reefs from sediment, fertilisers or chemicals which are washed or discharged into river systems; upstream impacts, such as those associated with the extraction of raw materials and other inputs which are used to undertake the action; and facilitated impacts which result from further actions (including actions by third parties) which are made possible or facilitated by the action, such as urban or commercial development of an area made possible by a project. However, in order to qualify as an indirect impact, the relevant impact must be within the contemplation of the proponent or must be a reasonably foreseeable consequence of the proposed action
Instrument landing system	Allows a pilot to attempt to approach an airport in reduced visual conditions
L_{Aeq}	L_{Aeq} is used for both the intrusiveness noise level and the amenity noise level. This metric represents the level of average noise energy for each assessment period (day/evening/night) and takes account of noise peaks and fluctuations
L_{Amax}	L_{Amax} is the highest noise level from an aircraft noise event, measured in A-weighted decibels (dB(A))
Major development plan (MDP)	Major development plan prepared and approved in accordance with the Airports Act
Manual of Standards	Standard procedures for the operation of airports issued by the Civil Aviation Safety Authority
Master plan	Master plan prepared and approved in accordance with the Airports Act
Mitigation	The action of reducing the severity, seriousness, or harm of something
N60	N60 contours represent the number of aircraft noise events with L_{Amax} that exceed 60 dB(A) Night-time sleep disturbance potential is often assessed with N60-night-time contours
N70	N70 contours represent the number of aircraft noise events with L_{Amax} that exceed 70 dB(A) The N70 contours are typically used to assess day-time noise impacts
'Number (N)-above' contour levels	'Number (N)-above' contour levels (for example N70 and N60) are used to map noise 'zones' around an airport. They describe aircraft-noise impacts by the number of noise events that exceed a certain noise level (threshold)
Offset measure	A conservation action that is intended to compensate for the negative environmental impacts of an action, such as a development. Offsets can include protecting at-risk environmental assets, restoring or extending habitat for threatened species, or improving the values of a heritage place
PAAM (Plan for Aviation Airspace Management)	The PAAM outlines the decisions and processes followed to develop a preliminary airspace and flight path concept design for single runway operations at the Airport
Performance-based navigation	Requires that aircraft be capable of meeting navigation performance requirements for accuracy, integrity, continuity, availability and functionality

Term	Definition
Preliminary airspace design	Design and assessment process for the next phase of the airspace design
Prohibited areas	Areas of airspace within which aircraft are prohibited from flying, usually due to security or other reasons associated with national welfare. Also known as no-fly zones
Radar vector	Happens when a plane is visible to an air traffic controller on a radar screen, and the controller tells the pilot to fly specific navigation parameters
RBL	The overall background noise level for each assessment period (day/evening/night) measured over the entire monitoring period (as outlined by the NSW Noise Policy for Industry)
Reciprocal Runway Operations	Aircraft arrive and take-off in opposing directions (or nose-to-nose) (for example, all aircraft arrive from the southwest and take-off to the southwest)
Required Navigation Performance Authorisation Required	Highly accurate procedure to approach and land on a runway
Residual risk	Residual risk is the level of risk that remains after proposed mitigation and management measures are implemented
Restricted airspace	Airspace that has restrictions placed on its use and aircraft movements are confined to those with certain specified permissions
Reverse thrust	A temporary redirection of aircraft engines so that the direction of exhaust is reversed, usually to provide a breaking effect during landings. Reverse thrusting generally produces an increase in noise during landing
Runway Modes of Operation	Refers to the direction in which aircraft take off and land. Operating modes are informed by assessing runway orientation and availability against factors such as current and forecast and actual meteorological conditions (especially wind direction and strength), runway surface status, aircraft profile and capability, demand and traffic volumes, airspace management procedures, and potential impacts on surrounding communities, such as noise
Sensitive receiver	Land uses which are sensitive to noise and vibration; this may include a dwelling, school, hospital, office or public recreational area. Also termed sensitive receptor
SIDs and STARs	These are types of instruments that is, programmable) flight procedures that set defined departure or arrival routes to facilitate safe and efficient flow of air traffic
Significant impact	As defined in the EPBC Act Significance impact guidelines 1.2, a 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographical extent of the impacts
So far as is reasonably practicable	Used in defining an obligation under the relevant safety legislation, whereas in related guidance and in the practical implementation of this legislation reference is often made to a requirement that risks are managed to be 'as low as reasonably practicable'

Term	Definition
Stage 1 development	A single runway and terminal facility capable of initially handling up to 10 million passengers per year
Stage 1 operations	The airport operating at the capacity described in section 3.1.1 of the Airport Plan
Sydney Basin	Sydney Basin encompasses airspace that extends out to Katoomba to the west, the Hawkesbury River to the north, the southern boundary of the Royal National Park to the south and the coastline to the east
Terminal airspace (also known as the terminal control area)	Generally encompasses the area within 30 to 50 nautical miles (or approximately 55 to 93 kilometres) a major airport
Terminal instrument flight procedures	Also known as instrument approach procedures, is a series of predetermined manoeuvres that provide specific protection from obstacles and terrain
The project	The project consists of the development and implementation of proposed flight paths and a new controlled airspace volume for single runway operations at WSI. The project also includes the associated air traffic control and noise abatement procedures for eventual use by civil, commercial passenger and freight aircraft
Threatened species	Species of animals or plants which is a "listed threatened species" under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) or a critically endangered species, an endangered species or a vulnerable species listed in Schedule 1 of the *Biodiversity Conservation Act 2016* (NSW)
$\mu g/m^3$	Micrograms (one-millionth of a gram)
Uncontrolled airspace	Has no supervision by air traffic control. No clearance is required by aircraft to operate in uncontrolled airspace
Waypoint	Specified location used to define positions along an air navigation route. They are identified as either fly over or fly by

Acronyms	Definition
24/7	24-hour, 7 days a week
ABS	Australian Bureau of Statistics
ACI	Airport Council International
ACP	Airspace Change Proposal
AEDT	Aviation Environmental Design Tool
AEPR	*Airports (Environmental Protection) Regulation 1997* (Commonwealth)
AGL	Above Ground Level
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage and Information Management System
AIP	Aeronautical Information Publication
AIRAC	Aeronautical Information Regulation and Control
AIS	Aeronautical Information Services
ALC	Airport Lessee Company
AMSL	Above Mean Sea Level
ANEC	Australian noise exposure concept
ANEF	Australian noise exposure forecast
ANO	Aircraft Noise Ombudsman
ANSP	Air Navigation Services Provider
ANZECC	Australian and New Zealand Environment and Conservation Council
APAR	*Airports (Protection of Airspace) Regulations 1996* (Commonwealth)
ASA	Airservices Australia
ATC	Air Traffic Control
ATFM	Air Traffic Flow Movement
ATM	Air Traffic Movements
ATSAS	Automated Thunderstorm Alert Service
ATSB	Australian Transport Safety Bureau
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BIO map	Biodiversity Investment Map
BODP	Biodiversity Offset Delivery Plan
BOM	Bureau of Meteorology
BSR	Biodiversity Sensitive Receptors

Acronyms	Definition
CACG	Community Aviation Consultation Group
CALD	Culturally and Linguistically Diverse
CAMBA	China-Australia Migratory Bird Agreement
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulations
CAT	Category
CBD	Central Business District
CCC	Community Consultative Committee
CCO	Continuous Climb Operations
CDO	Continuous Descent Operations
CEDA	Committee for Economic Development of Australia
CH_4	Methane
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMATS	Civil Military Air Traffic Management System
CO	Carbon monoxide
CO_2	Cardon dioxide
CO_{2e}	Cardon dioxide equivalent
CTA	Control Area
Cth	Commonwealth of Australia
CTR	Control Zone
DAP	Departures and Approach Procedure
DATWG	Defence Airspace Technical Working Group
dB	Decibels
dB(A)	A-weighted decibel
DCCEEW	Australian Department of Climate Change, Energy, the Environment and Water
DCP	Development Control Plan
DEOH	Defence Establishment Orchard Hills
DfT	Department for Transport
DITRDCA	Australian Department of Infrastructure, Transport, Regional Development, Communications and the Arts
DPE	NSW Department of Planning and Environment

Acronyms	Definition
DPI	NSW Department of Primary Industries
Draft EIS	Draft Environmental Impact Statement
Draft NIPA	Draft Noise Insulation and Property Acquisition Policy
ECZ	Environmental Conservation Zone
ED	Emergency Department
EIS	Environmental Impact Statement
EMF	Environmental Management Framework
EMS	Environmental Management System
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPI	Environmental Planning Instrument
ERSA	En-Route Supplement
ESD	Ecological Sustainable Development
ESG	Expert Steering Group
FAQ	Frequently Asked Questions
FF	Feeder Fix
FFM	Localiser Far Field Monitor
FFR	Fire and Flood Relief
FOWSA	Forum on Western Sydney Airport
FSC	Full-service Carrier
ft	Feet
FTE	Full Time Equivalent
FTS	Fast Time Simulation
GBMA	Greater Blue Mountains Area
GBMWHAAC	Greater Blue Mountains World Heritage Area Advisory Committee
GDP	Gross Domestic Product
GHG	Greenhouse Gas
g/m^2/month	Mass in micrograms per square metre per month
GM	General Manager
GMAC	Greater Macarthur Growth Area

Acronyms	Definition
GNSS	Global Navigation Satellite System
GP	Glide Path
GPEC	Greater Penrith to Eastern Creek Investigation Area
GPS	Global Positioning System
GRP	Gross Regional Product
GVA	Gross Value Added
ha	Hectares
Heritage Act	*Heritage Act 1977* (NSW)
HIAL	High Intensity Approach Lighting
HIPAP	NSW Hazardous Industry Planning Advisory Paper
IAF	Initial Approach Fix
IAP2	International Association of Public Participation
IATA	International Air Transport Association
IATS	International Aviation, Technology and Services Division
IBRA	Interim Biogeographic Regionalisation for Australia
ICAO	International Civil Aviation Organisation
IEO	Index of Education and Occupation
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
IPCC	Intergovernmental Panel on Climate Change
IRSD	Index of Relative Socio-economic Disadvantage
IUCN	International Union for Conservation of Nature
JAMBA	Japan-Australia Migratory Bird Agreement
km	Kilometres
KPA	Key Performance Area
KTP	Key Threatening Process
LALC	Local Aboriginal Land Council
L_{Amax}	Maximum Noise Level
LCZ	Landscape Character Zone
LEP	Local environmental plan

Acronyms	Definition
LGA	Local Government Area
LL	Lower Level
LOC	Localiser
LSALT	Lowest Safe Altitude
LSPS	Local Strategic Planning Statement
LTO	Landing Take-off
LTOP	Long Term Operating Plan
LULUCF	Land Use, Land-Use Change and Forestry
m	Metres
MAP	Million Annual Passengers
MATS	Manual of Air Traffic Services
MDP	Major Development Plan
MEDEVAC	Medical Evacuation
MET	Meteorological Conditions
mg/m^3	Mass in milligrams per cubic metre
MNES	Matters of National Environmental Significance
MOS	Manual of Standards
MP	Member of Parliament
MSL	Mean Sea Level
N_2O	Nitrous Oxide
N-above	Noise Level Threshold
NAP	Noise Abatement Procedure
NASF	National Airports Safeguarding Framework
NCIS	Noise Complaints and Information Service
NDB	Non-Directional Beacon
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NFPMS	Noise Flight Path Monitoring System
NGER Act	*National Greenhouse and Energy Reporting Act 2007* (Commonwealth)
NHL	National Heritage List
NIR	National Inventory Report

Acronyms	Definition
nm	Nautical Miles
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide
NOS	National Operating Standard
NOTAM	Notice to Airmen
NPD	Noise-Power-Distance
NPV	Net Present Value
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NPWS	NSW National Parks and Wildlife Service
NS	Northern Summer
NSW	New South Wales
NTSB	US National Transportation Safety Board
NW	Northern Winter
O_3	Ozone
OAR	Office of Airspace Regulation
OEMP	Operational Environment Management Plan
OLM	Ozone Limiting Method
OLS	Obstacle Limitation Surfaces
OU	Odour Units
PAAM	Plan for Aviation Airspace Management
PAH	Polycyclic Aromatic Hydrocarbon
PANS-OPS	Procedures for Air Navigation Services – Aircraft Operations
PAPI	Precision Approach Path Indicator
PBN	Performance-based Navigation
PCT	Plant Community Types
PIR	Post-implementation Review
PM	Airborne Particulate Matter
PM_{10}	Airborne Particulate Matter with an aerodynamic diameter of less than 10 µm
$PM_{2.5}$	Airborne Particulate Matter with an aerodynamic diameter of less than 2.5 µm
PMST	Protected Matters Search Tool
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)

Acronyms	Definition
pphm	Parts Per Hundred Million
ppm	Parts Per Million
PPL	CASA Private Pilot Licence
PSA	Public Safety Area
Q&A	Question and Answer
RAAF	Royal Australian Air Force
RAWSA	Residents Against Western Sydney Airport
RFS	NSW Rural Fire Service
RMO	Runway Modes of Operation
RNAV	Area Navigation
RNP	Required Navigation Performance
RNP-AR	Required Navigation Performance Authorisation Required
ROKAMBA	Korea-Australia Migratory Bird Agreement
RPL	CASA Recreational Pilot Licence
RPT	Regular Passenger Transport
RRO	Reciprocal Runway Operations
RVR	Runway Visual Range
RWY05	Runway 05
RWY23	Runway 23
SACL	Sydney Airport Corporation Ltd
SAF	Sustainable Aviation Fuels
SAL	Suburbs and Localities
SAR	Search and Rescue
SEIFA	Socio-Economic Index for Areas
SEPP	State Environmental Planning Policy
SHR	State Heritage Register
SIA	Social Impact Assessment Could also refer to Significant Impact Assessment
SID	Standard Instrument Departure
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxides

Acronyms	Definition
STAR	Standard Instrument Arrival
SWA	Safe Work Australia
SWGA	South West Growth Area
TCU	Terminal Control Unit
TfNSW	Transport for NSW
TIS	Translating and Interpreting Service
TMA	Terminal Control Area
TSP	Total Suspended Particulates
UDIA	Urban Development Institute of Australia
µg	Mass in micrograms
µg/m^3	Mass in micrograms per cubic metre
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNSW	University of New South Wales
US FAA	United States Federal Aviation Administration
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VOC	Volatile Organic Compounds
VP	Viewpoint
WHMC	Wildlife Hazard Management Committee
WHO	World Health Organization
Wilton	Wilton Growth Area
WSA Co	Western Sydney Airport Company Limited (airport lessee company)
WSEA	Western Sydney Employment Area
WSI	Western Sydney International (Nancy-Bird Walton) Airport

Chapter 1 Introduction

This chapter provides an overview of the background to Western Sydney International (Nancy-Bird Walton) Airport and the proposed airspace and flight path design for the airport. It also describes the key features and objectives of the project and identifies the purpose and structure of this Draft Environmental Impact Statement (EIS).

1.1 Western Sydney International (Nancy-Bird Walton) Airport

1.1.1 Background

In 2016 the then Australian Minister for Urban Infrastructure approved development for a new airport for Western Sydney, now known as the Western Sydney International (Nancy-Bird Walton) Airport (WSI), under the *Airports Act 1996* (Commonwealth). The site of the new airport (the Airport Site) covers approximately 1,780 hectares (ha) at Badgerys Creek, as shown in Figure 1.1. The Airport Site is located within the Liverpool local government area (LGA).

Following the finalisation of the Western Sydney Airport – Environmental Impact Statement (2016 EIS), the Western Sydney Airport – Airport Plan (Airport Plan) (DITRDC, 2021) was approved in December 2016. The Airport Plan authorised the construction and operation of the Stage 1 Development of WSI (a single runway and terminal facility capable of initially handling up to 10 million passengers per year). It also set the requirements for the further development and assessment of the preliminary airspace design for WSI.

WSI will be a 24-hour, 7 days a week curfew-free international airport and will:

- cater for ongoing growth in demand for air travel, particularly in the rapidly expanding Western Sydney region, as well as providing additional aviation capacity in the Sydney region more broadly
- provide a more accessible and convenient international and domestic airport facility for the large and growing population of Western Sydney
- provide long term economic and employment opportunities in the surrounding area
- accelerate the development of critical infrastructure and urban development.

The Australian Government has committed to develop and deliver WSI to be ready for scheduled flight operations by late 2026.

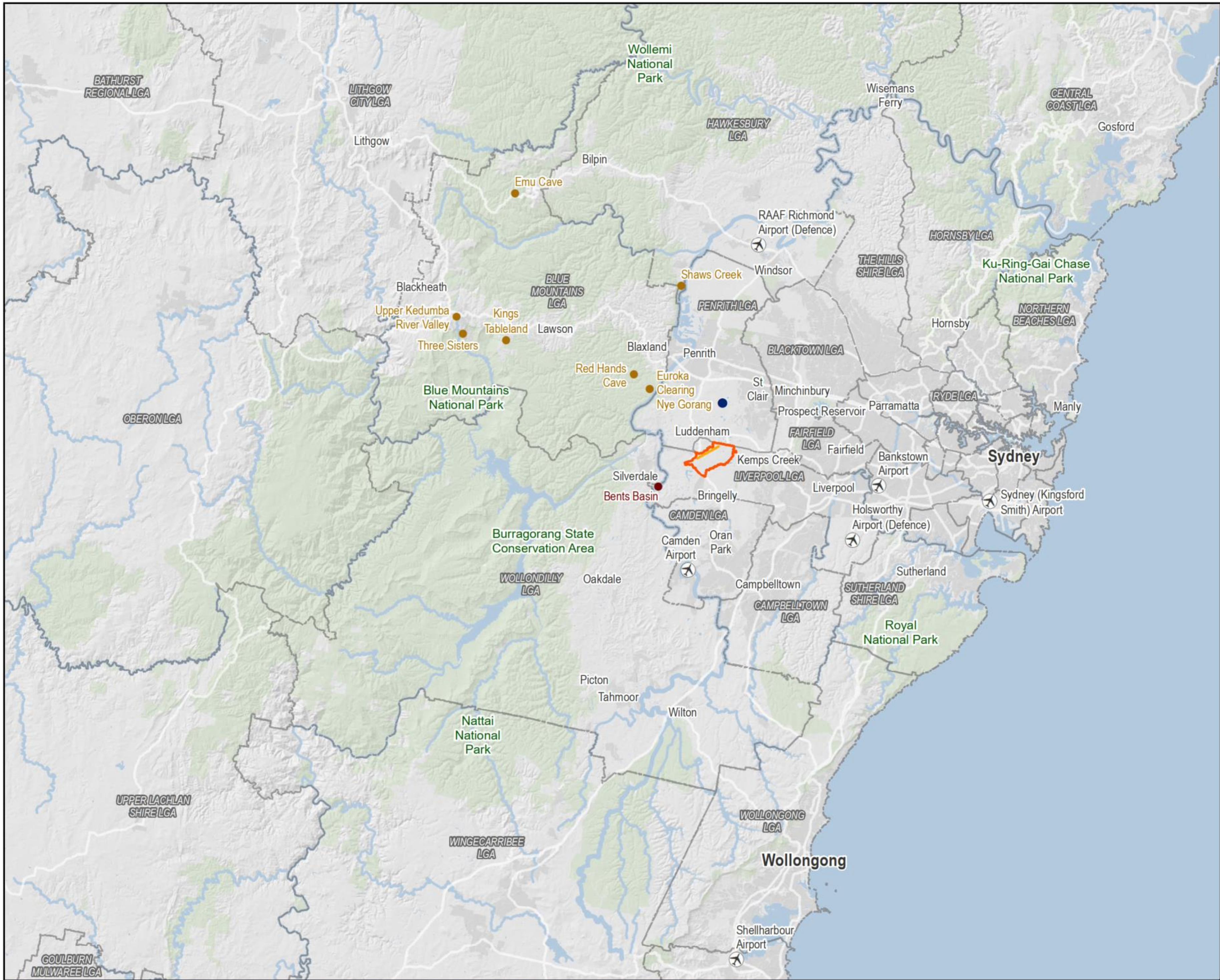
The 2016 approval provides for the on-ground development for the Stage 1 Development of WSI with indicative 'proof of concept' flight paths. These flight paths, presented in the 2016 EIS, demonstrated that WSI could operate safely and efficiently in the Sydney Basin. For the purposes of this Draft EIS, the Sydney Basin encompasses airspace that extends out to Katoomba to the west, the Hawkesbury River to the north, the southern boundary of the Royal National Park to the south and the coastline to the east.

The design and assessment process for the next phase of the airspace design (referred to as the preliminary airspace design) was set by Condition 16 of the Airport Plan. This included the future airspace design principles and the establishment of an Expert Steering Group. Key to these design principles was the need to optimise flight paths on the basis of safety, efficiency, capacity of WSI, and noise and environmental considerations, while minimising changes to existing airspace arrangements in the Sydney basin airspace. The airspace design must also meet the requirements of Airservices Australia and civil aviation safety regulatory standards.

Led by the Australian Government Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA), the Expert Steering Group has developed the preliminary flight paths and airspace arrangements for WSI (the project). Further discussion of this process is provided in Chapter 6 (Project development and alternatives). The preliminary airspace design is the subject of this Draft EIS.

Figure 1.1

Regional Context of the Western Sydney International (Nancy-Bird Walton) Airport



Legend

- WSI Runway
- Western Sydney International (Nancy-Bird Walton) Airport land boundary
- State local government area (LGA)
- Orchard Hills Defence Establishment
- Aboriginal Places raised during consultation (NPW Act)
- Site of Aboriginal significance

0 10 20 km

Coordinate system: GDA 1994 NSW Lambert

Scale ratio correct when printed at A4

1:750,000 Date: 27/06/2023

Data sources: - DITRDC, DCS, Geoscience Australia
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community

1.1.2 The Airport

1.1.2.1 Stage 1 Development

The Stage 1 Development of WSI has been approved and is limited to single runway operations. It will handle up to 10 million annual passengers and around 81,000 air traffic movements per year by 2033 including freight operations (a movement being a single aircraft arrival or departure). Single runway operations are expected to reach capacity at around 37 million annual passengers and around 226,000 air traffic movements per year in 2055.

The approval provides for the construction of the aerodrome (including the single runway), terminal and landside layout and facilities, and ground infrastructure such as the instrument landing systems and high intensity approach lighting arrays. Construction of the Stage 1 Development commenced in 2018. Figure 1.2 shows location of the single runway within the Airport Site.

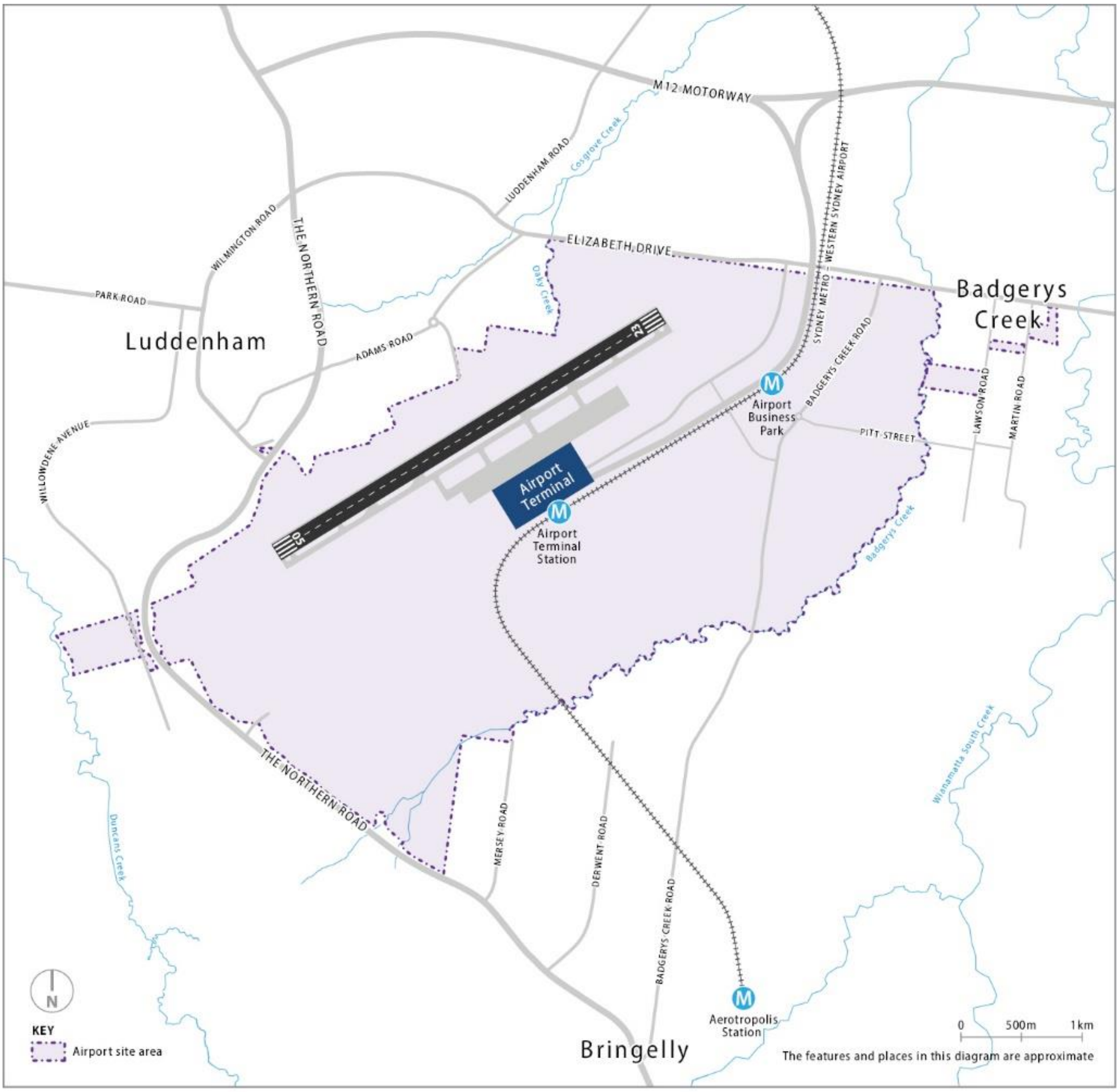


Figure 1.2 Western Sydney International Stage 1 Development

The single runway is 3,700 metres long and 45 metres wide, and is capable of handling both domestic and international services. The runway is orientated on an approximately north-east/south-west axis (refer to indicative schematic in Figure 1.3), which reflects the physical alignment of the runway and compass heading for aircraft operating to or from it – in this case 50 degrees north-east and 230 degrees south-west (magnetic).

The Airport Plan also contains operational conditions that govern the operational phase of the Stage 1 Development, including the requirement of a series of Operational Environment Management Plans (OEMPs) and a Community and Stakeholder Engagement Plan.

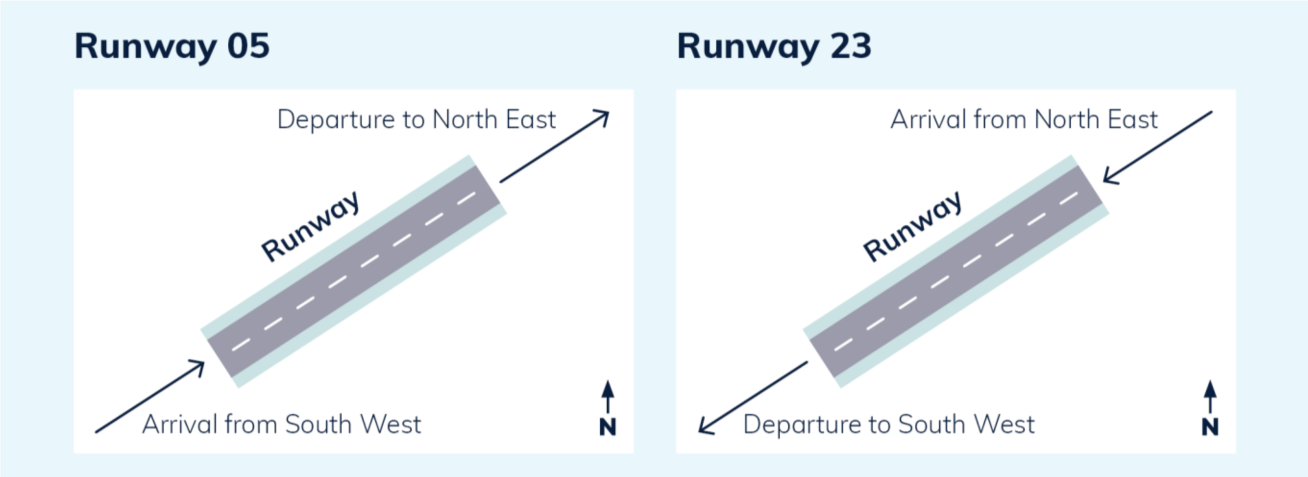


Figure 1.3 Runway 05 and Runway 23

1.1.2.2 Long term development

Incremental development and expansion of the airport facilities will be required at various stages as passenger demand increases. As demand grows over time, WSI is expected to include an expanded terminal, further supporting passenger and commercial facilities. When single runway operations approach capacity at around 37 million annual passengers and around 226,000 air traffic movements per year in 2055, a second parallel runway is expected to be required (DITRDC, 2021). By around 2063, under an ultimate capacity for a two-runway system, the total aircraft traffic movements per year is forecast to be around 370,000 air traffic movements per year, servicing approximately 82 million annual passengers.

Flexibility and expandability were considered in the geometry of the airport and facility layout to allow for its proposed development over the long term in line with increasing demand. Future development is subject to separate regulatory approvals in accordance with *Airports Act 1996* (Commonwealth), including any required environmental assessment.

1.1.3 Development of the airspace and flight path design for WSI

Designing flight paths for a new airport is a large, complex and technical task. The Sydney Basin airspace already comprises an extensive network of flight paths associated with civilian and Defence airports, and also caters for flying training, emergency aviation activities (including medical and firefighting), recreational aviation activities (such as gliders, ballooning and parachuting) and transiting flights (refer to Chapter 4 (Project setting) for further information).

The airspace and flight path design process for WSI has sought to optimise flight paths based on safety, efficiency, capacity, and noise and environmental considerations, while minimising changes to existing airspace arrangements in the Sydney Basin to the greatest extent practical. Any necessary changes and associated impacts to the flight paths at other airports 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 and environmental impact.

There are 4 main phases to the airspace and flight path design process (refer to Figure 1.4). It is an iterative process informed by community and stakeholder engagement at each phase. The phased process also allows the final airspace arrangements (the Detailed Design Phase) to better reflect the operating environment closer to the time the airport opens, taking account of factors such as new aviation technology – aircraft design and propulsion systems and air traffic management improvements, and global aviation industry environmental improvement initiatives.

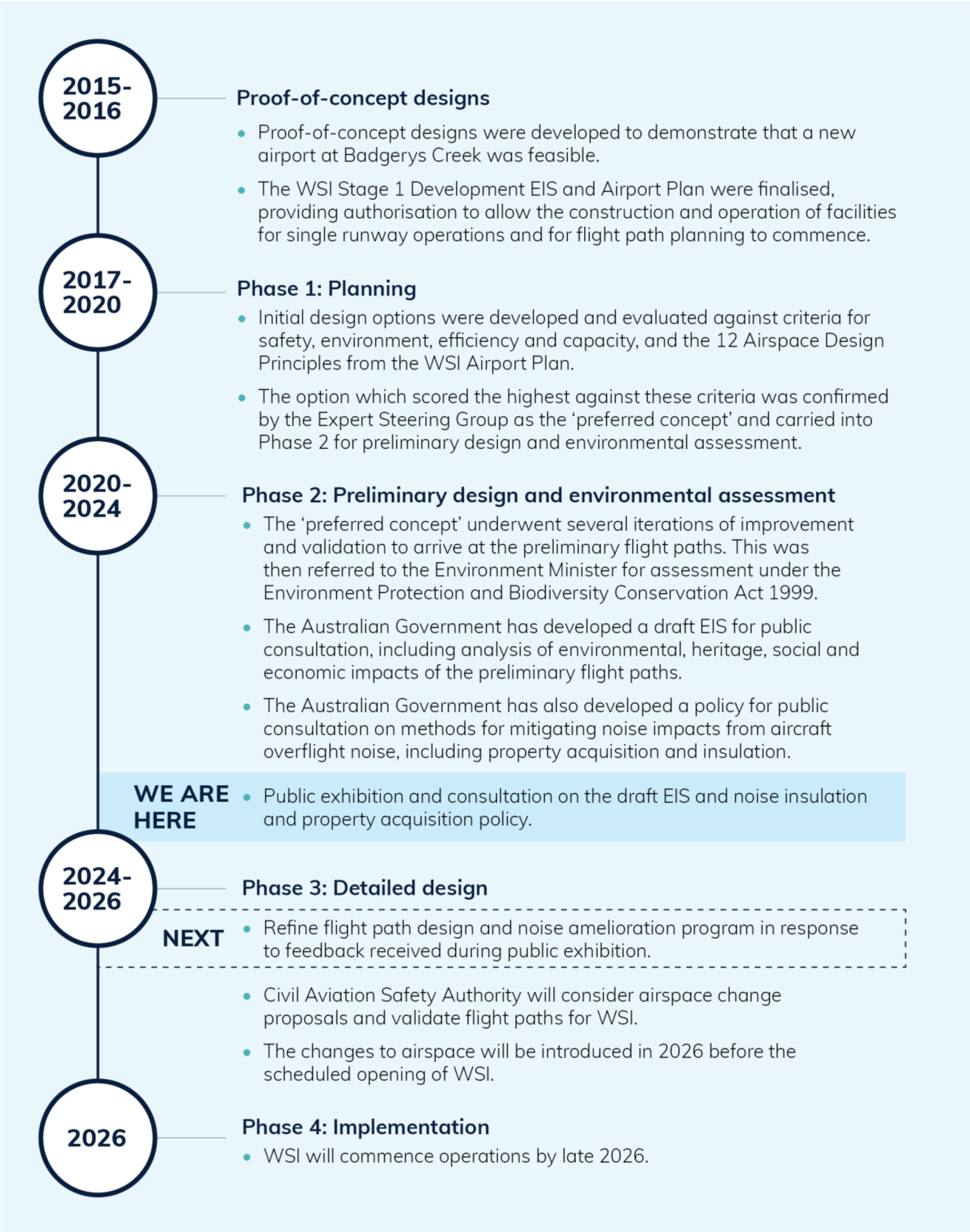


Figure 1.4 Flight path design pathway

This Draft EIS forms part of Phase 2: Preliminary design and environmental assessment. It provides the opportunity for the community and industry to make comment on the preliminary airspace design before a final airspace and flight path design is settled.

Further information on the airspace and flight path design process is provided in Chapter 6 (Project development and alternatives).

1.2 The project

1.2.1 Objectives of the project

The overall objectives for WSI are to:

- improve access to aviation services for Western Sydney
- resolve the long term aviation capacity constraints in the Sydney Basin
- maximise the economic benefit for Australia by maximising the value of the Airport as a national asset
- optimise the benefit of WSI for employment and investment in Western Sydney
- deliver sound financial, environmental and social outcomes for the Australian community.

The project will assist in achieving these overall objectives as it would enable single runway operations to commence at WSI through the introduction of new flight paths and a new controlled airspace volume.

The Airport Plan sets out 12 airspace design principles that the design process is required to follow. The principles were informed by and reflect community and industry feedback on the 2016 EIS. The principles seek to optimise proposed flight paths on the basis of safety, efficiency, capacity, and noise and environmental considerations while changes to existing airspace arrangements in the Sydney Basin. For further information on the airspace design principles refer to Chapter 6 (Project development and alternatives). These design principles are also supplemented by requirements for airspace design set out in Condition 16 of the approval of the Airport Plan.

1.2.2 Project flight paths

The project consists of the development and implementation of proposed flight paths and a new controlled airspace volume for single runway operations at WSI. The project also includes the associated air traffic control and noise abatement procedures for eventual use by civil, commercial passenger and freight aircraft. The airspace and flight paths would be managed by the Air Navigation Services Provider (ANSP), Airservices Australia.

The project involves flight paths for all-weather operations on Runway 05 and Runway 23 during the day (5:30 am to 11 pm) and night (11 pm to 5:30 am), as well as head-to-head Reciprocal Runway Operations (RRO) during night-time periods (when meteorological conditions and low flight demand permit) to minimise the number of residences subjected to potential noise disturbance.

The flight paths differ during the day and night. Flight paths at night differ to take advantage of the additional airspace capacity offered when the curfew for Sydney (Kingsford Smith) Airport is in force. The proposed flight paths are shown in Figure 1.5 to Figure 1.9.

The project does not include any physical infrastructure or construction work.

Further information on the project, including the runway modes of operation, are provided in Chapter 7 (The project).

1.2.3 Facilitated changes

To maintain the safety assurance of flight operations in the Sydney Basin while meeting the requirements of efficiency, capacity and environment, adjustments to airspace are required for Sydney (Kingsford Smith) Airport, Bankstown Airport, Camden Airport and the Royal Australian Air Force (RAAF) Base Richmond Airport (RAAF Base Richmond). For the Sydney (Kingsford Smith) Airport, this includes adjustments to existing arrival and departure routes. These changes need to occur prior to the opening of WSI in 2026. Further information on these facilitated changes are provided in Chapter 8 (Facilitated changes).

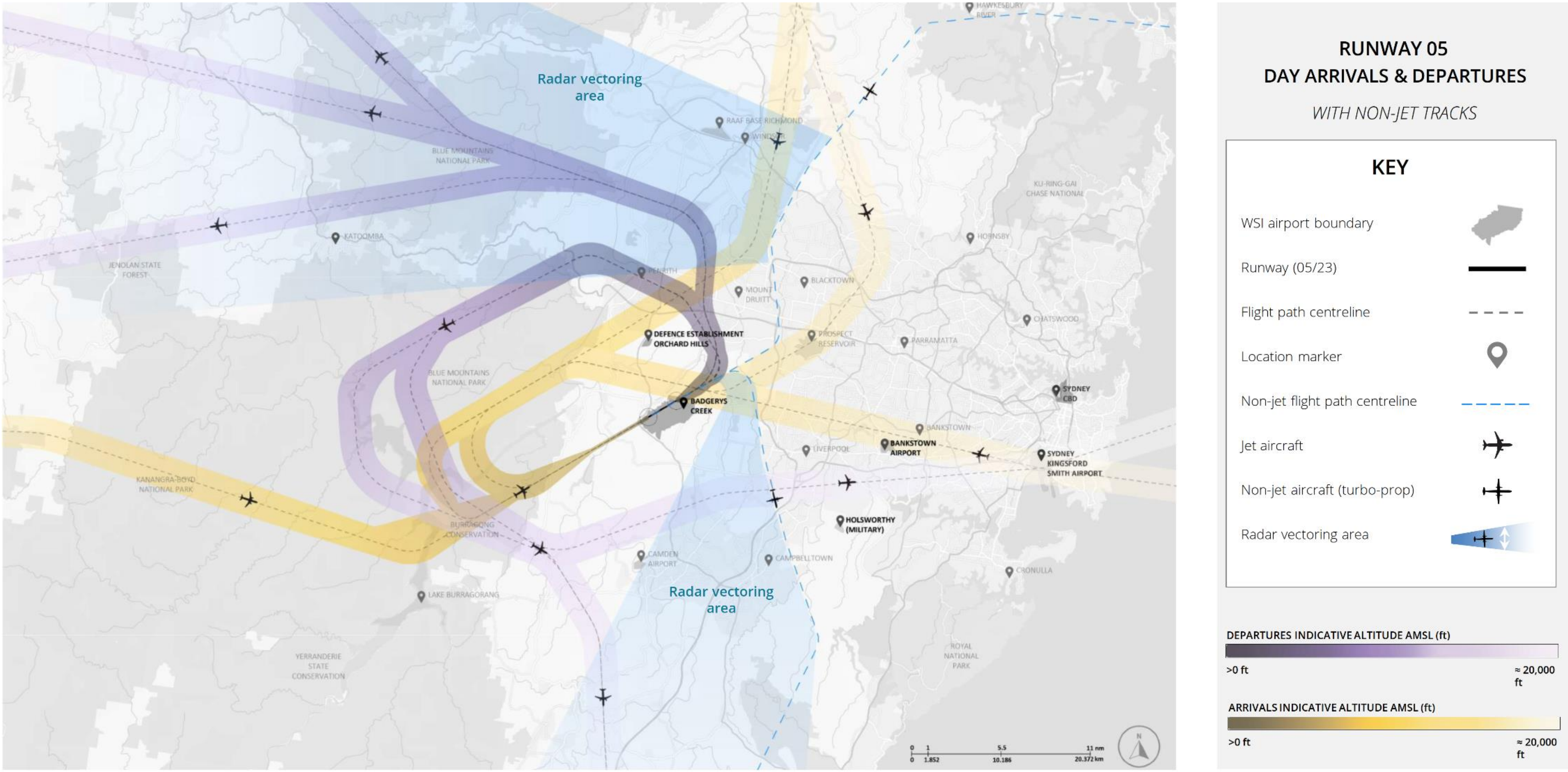


Figure 1.5 Proposed flight paths for Runway 05 (day)

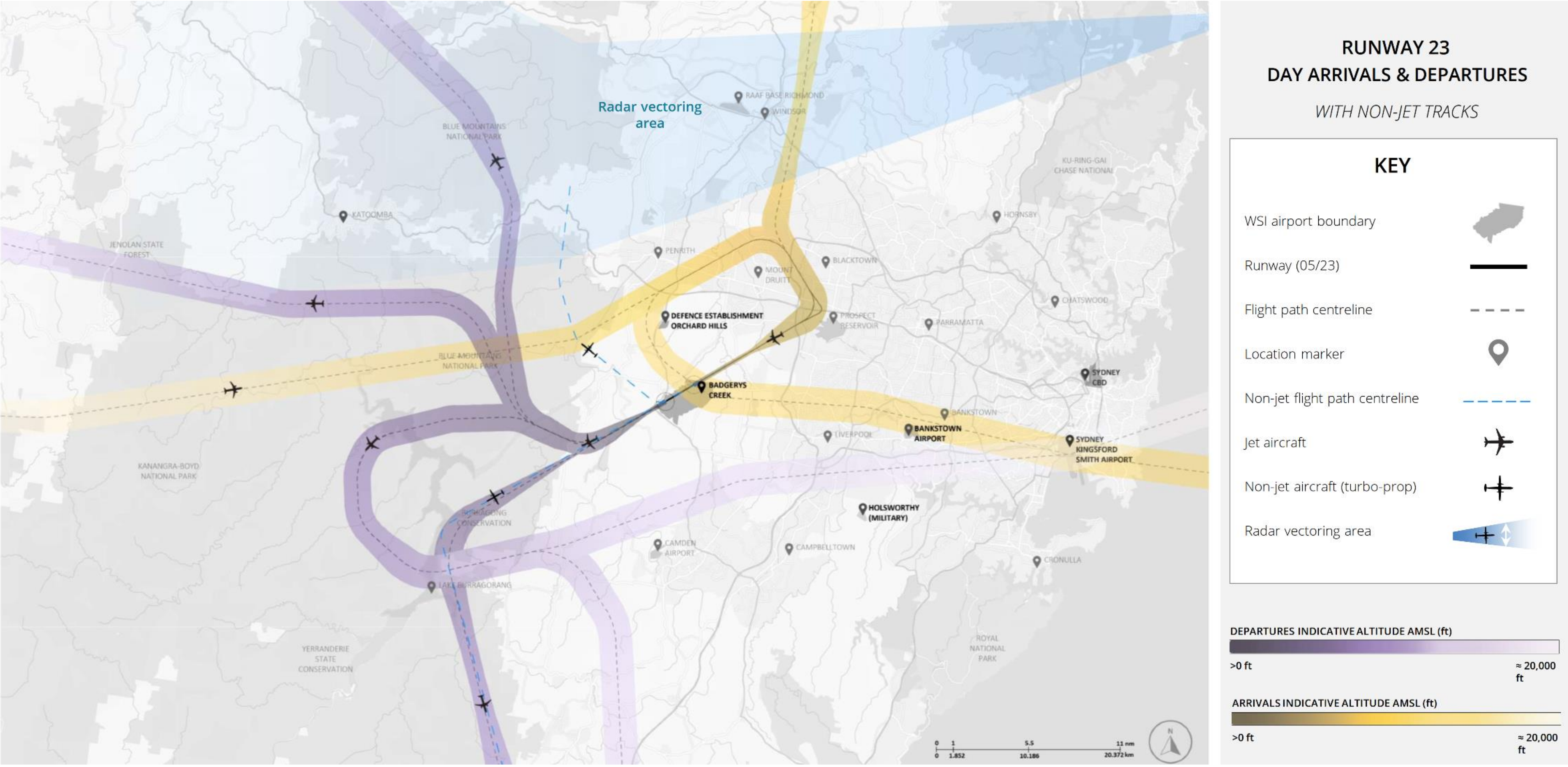


Figure 1.6 Proposed flight paths for Runway 23 (day)

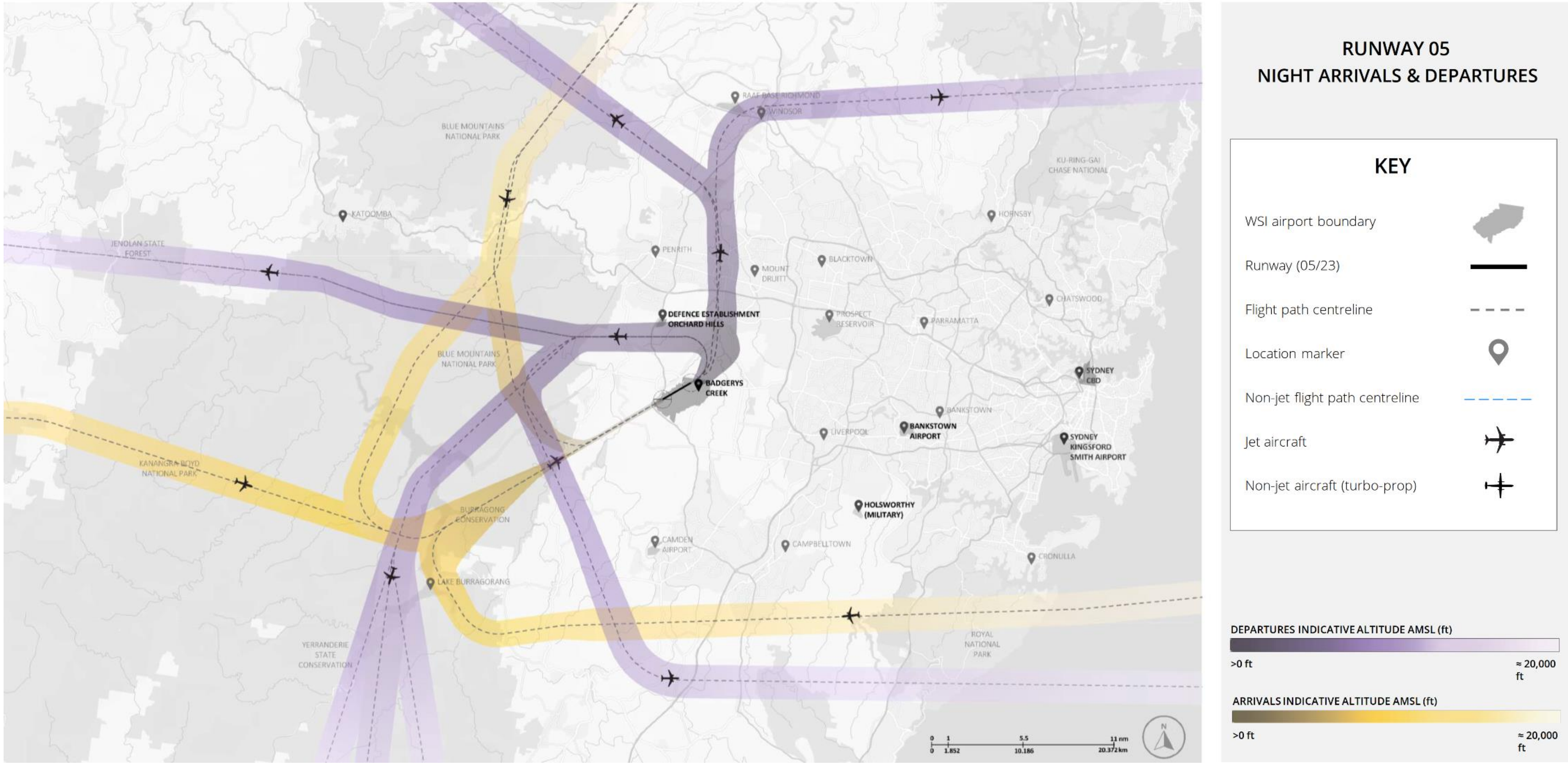


Figure 1.7 Proposed flight paths for Runway 05 (night)

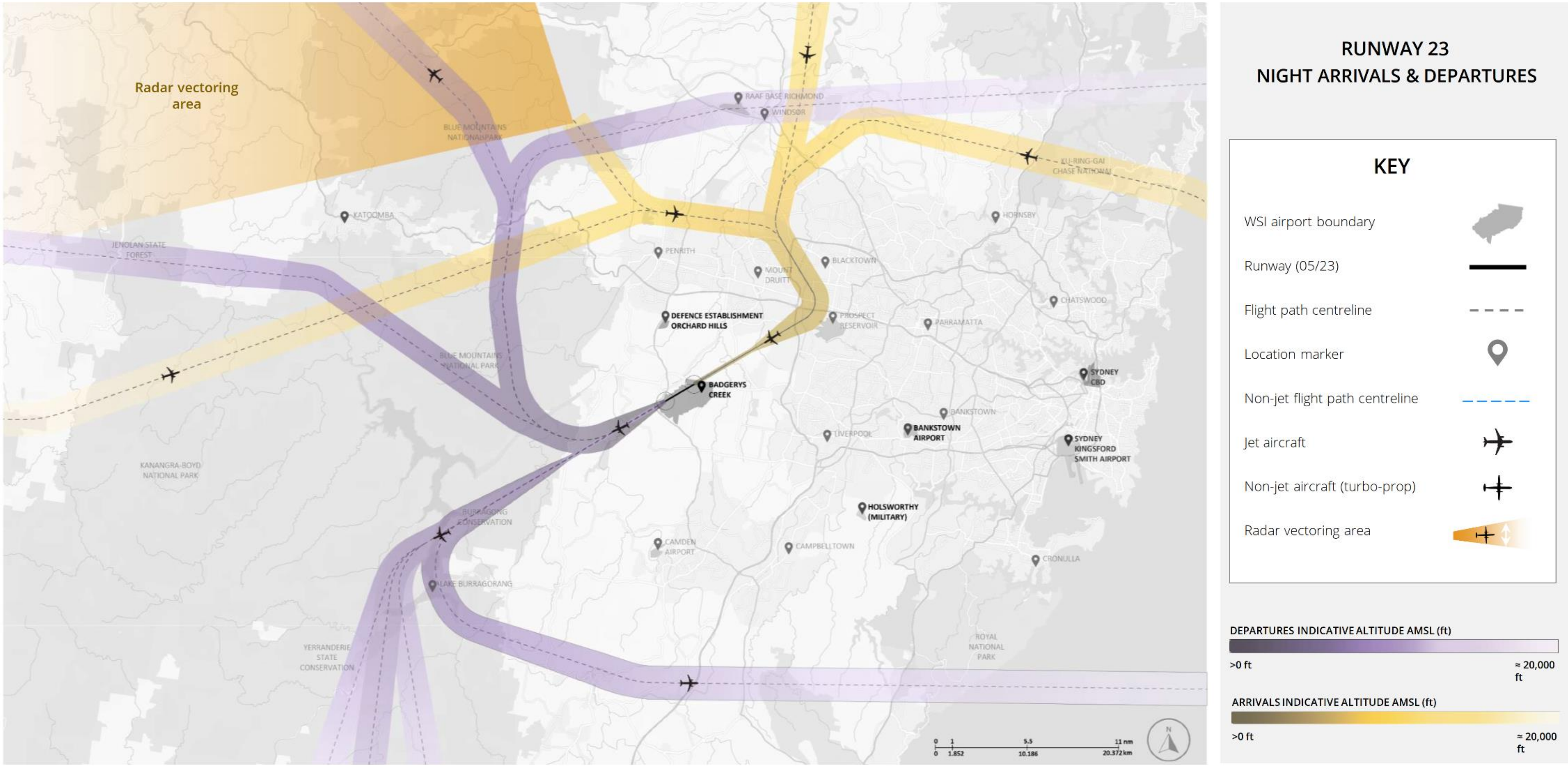


Figure 1.8 Proposed flight paths for Runway 23 (night)

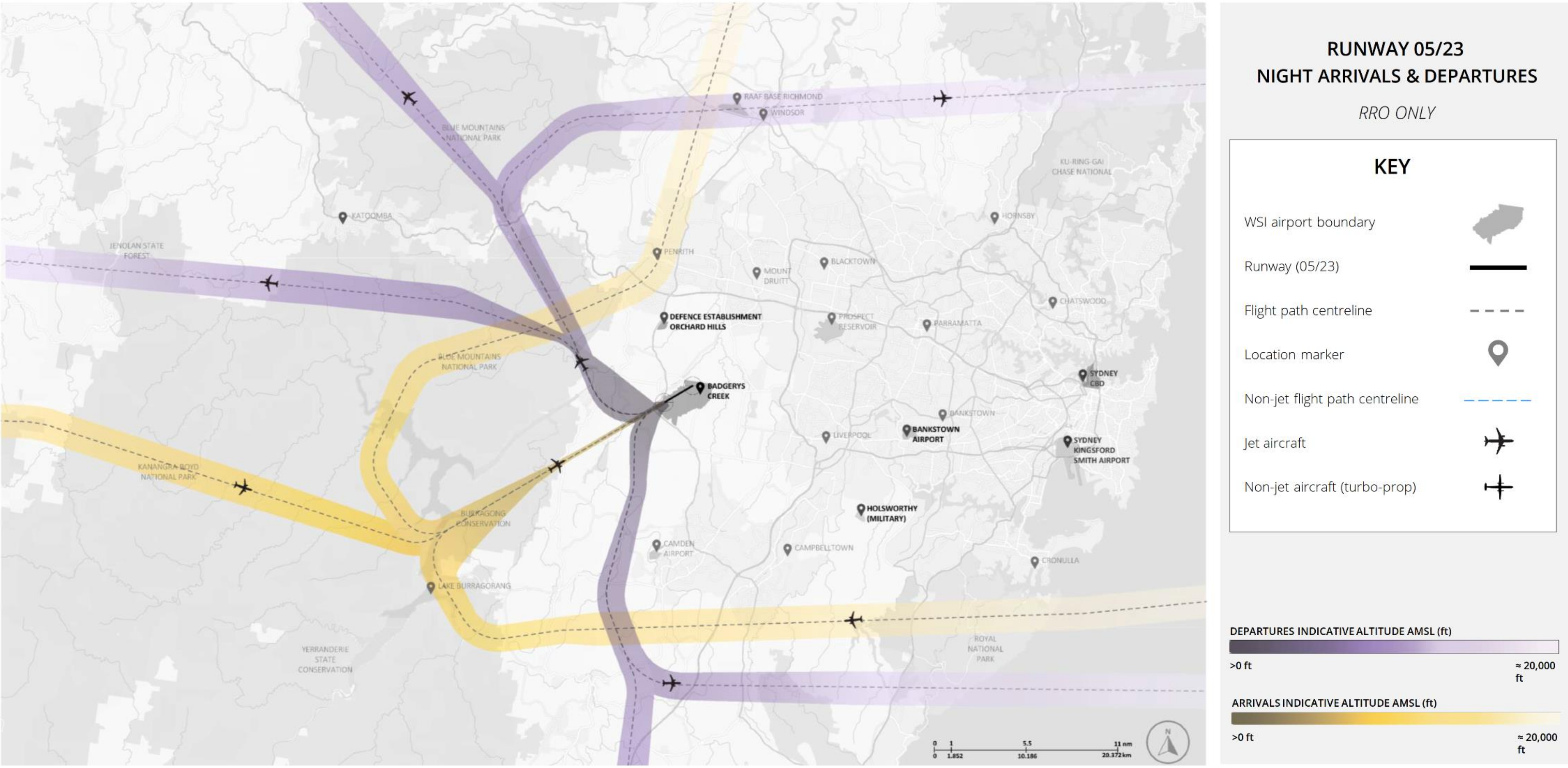


Figure 1.9 Reciprocal Runway Operations (RRO) (night)

1.3 Roles and responsibilities

1.3.1 The proponent

DITRDCA, Airservices Australia and the Civil Aviation Safety Authority (CASA) each have a role in the development and/or approval of the project (refer to Section 1.3.2). However, for the purposes of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (the EPBC Act), DITRDCA has been nominated as the proponent (refer to Chapter 5 (Statutory context) for further detail).

DITRDCA administers the *Airports Act 1996* (Commonwealth) (and its associated Regulations). The Australian Minister for Infrastructure, Transport, Regional Development and Local Government is responsible for the approval of all major developments at federally leased airports across Australia as defined by the *Airports Act 1996* (Commonwealth). DITRDCA is responsible for leading the airspace design for single runway operations at WSI. Once the environmental assessment and community consultation process is complete, DITRDCA alongside Airservices Australia will be responsible for the detailed design of the flight paths.

1.3.2 Other roles and responsibilities

Aside from the proponent, the primary roles and responsibilities in preparing the flight paths and airspace management concept are:

- **Airservices Australia**, as the relevant ANSP. Airservices Australia manages air traffic within Australia and its responsibilities include air traffic control, airways navigation and communication facilities, and publishing aeronautical data. Airservices Australia will ultimately be responsible for the implementation and management of the proposed airspace and flight paths. Once the detailed design process is complete, Airservices Australia will prepare the airspace change proposal for final approval by CASA.
- **CASA**, as the regulator responsible for the administration of airspace under the *Airspace Act 2007* (Commonwealth). The Office of Airspace Regulation (OAR) is an independent body that sits within CASA. The OAR will ultimately approve the proposed airspace changes to introduce the control zone, and changes to the control areas, including validating the flight procedures before the commencement of operations. CASA also administers the *Civil Aviation Act 1988* (Commonwealth), which is the primary legislation relating to aviation safety in Australia. Under this Act (and its associated regulations), CASA establishes safety standards for a range of aviation operations, including flight path design.
- **Airport Lessee Company** (ALC), as the owner of the airport lease granted by the Australian Government, and responsible for the development and operation of WSI. The ALC is Western Sydney Airport Company Limited (WSA Co). The ALC cannot permit regular aircraft operations to commence at WSI until the requirements of the Airport Plan (Condition 16) have been met.
- **The Expert Steering Group**, is led by DITRDCA and includes Airservices Australia, CASA and the ALC, WSA Co. This group was established to guide the development of the airspace and flight path design. It will continue to be involved for the remainder of the project.

A wide range of stakeholders have been consulted in the development of the project regarding the integration of the airspace design into the Sydney Basin operations, including other aircraft operators, as outlined in Chapter 9 (Community and stakeholder engagement). The Forum on Western Sydney Airport (FOWSA) has also been established in accordance with Condition 16 of the Airport Plan, which provides a forum for the community, the aviation industry (including airlines), local and State Government, the Australian Government and WSA Co during the delivery of WSI and the development of the proposed airspace and flight path design.

1.4 Purpose and structure of the Draft EIS

1.4.1 Purpose of the Draft EIS

The purpose of this Draft EIS is to address the requirements of Condition 16 of the Airport Plan and to support the request to the Australian Minister for the Environment and Water for advice in accordance with Section 160 of the EPBC Act prior to any approval of the airspace and flight paths.

The project was referred to the then Australian Minister for the Environment in 2021 (EPBC 2022/9143) in accordance with Section 161 of the EPBC Act and Condition 16 of the Airport Plan. In response, the delegate for the Minister determined that an EIS would be required and issued the EIS Guidelines on 26 April 2022 (refer to Appendix C (EIS Guidelines)). This Draft EIS has been prepared to address these requirements.

The Draft EIS has also been prepared to have regard to relevant Airservices Australia policies and standards.

Following the public display of this Draft EIS, the DITRDCA will consider the submissions received and finalise the EIS. This will trigger the detailed design phase of the project. The detailed design phase will include further evaluation and refinement of the proposed airspace design for implementation based on feedback received from the community and other technical stakeholders (such as airlines and industry bodies) on this Draft EIS.

Once finalised, the EIS will be given to the Australian Minister for the Environment and Water along with copies of submissions received during the public comment period and a summary of how these submissions have been considered. The Minister will then provide advice to the DITRDCA, Airservices Australia and CASA, including any recommended conditions, before any approval is given for the airspace design. A response will then be provided to the Minister on what action has been taken or not (including the adoption of any recommended conditions) and justification where recommendations were not given full effect (in full or in part).

Airservices Australia will then prepare the airspace change proposal for final approval by the OAR. The OAR will be ultimately responsible for the approval of the proposed airspace changes before the commencement of operations.

Further information on the approvals process is provided in Chapter 5 (Statutory context).

1.4.2 Structure of the Draft EIS

This Draft EIS is presented in 4 main parts, including the main project description and impact assessment, and is supported by a series of appendices and technical papers.

The structure and content of the Draft EIS is outlined in Table 1.1.

Table 1.1 Structure of the Draft EIS

Chapter	Description
Summary	Outlines the key findings of the Draft EIS for the project. The summary also describes the project and its development to date, including its legislative framework and the outcomes of public consultation.
Part A	**Background**
Chapter 1	**Introduction** Provides a background to the project and an overview of the key features of the project. The chapter also outlines the purpose and content of the Draft EIS.
Chapter 2	**Strategic context and need** Provides an overview of the strategic context and need for the project.
Chapter 3	**Introduction to airspace** Introduces the key concepts of airspace architecture and airspace management considerations.

Chapter	Description
Chapter 4	**Project setting** Provides a description of the Sydney Basin airspace and general biophysical and socio-economic environment within which the project would be located, including the regional setting and a description of the Matters of National Environmental Significance.
Chapter 5	**Statutory context** Provides an overview of the statutory context for the project and the approvals framework.
Part B	**The project**
Chapter 6	**Project development and alternatives** Provides a summary of the background to the development of the project, and the options considered.
Chapter 7	**The project** Provides a description of the airspace architecture and operating modes associated with the proposed operation of WSI. It defines the factors that influence the design of airspace architecture and the specific requirements for single runway operations.
Chapter 8	**Facilitated changes** Provides a description of changes required to the Sydney Basin airspace to enable the new flight paths and airspace for WSI. These adjustments are required prior to the opening of WSI in 2026 to ensure the safe and efficient use of airspace once WSI's single runway operations commence.
Chapter 9	**Community and stakeholder engagement** Provides a summary of the consultation that occurred during the project development and environmental assessment process, and the consultation proposed during public exhibition, detailed design, and delivery.
Part C	**Environmental impact assessment**
Chapter 10	**Approach to impact assessment** Provides a description of the overall approach and methodology used to undertake the Draft EIS for the project.
Chapters 11 to 23	Describes the results of the assessment of key environmental issues identified by the EIS Guidelines, including information on the existing environment, potential operation impacts, and the proposed approach to mitigation and management.
Part D	**EIS synthesis**
Chapter 24	**Mitigation and management** Provides a consolidated summary of the key potential impacts, a description of the proposed approach to environmental management, and a compilation of the mitigation measures for the project.
Chapter 25	**Conclusion** Conclusion for the project.
Chapter 26	**References** Provides a list of references used to inform the Draft EIS.

Chapter	Description
Appendices	
Appendix A	Proponent details and environmental record
Appendix B	EIS team
Appendix C	EIS Guidelines
Appendix D	List of persons and agencies consulted during the preparation of the Draft EIS
Appendix E	Project coordinates
Appendix F	Background to the draft Western Sydney International noise insulation and property acquisition policy
Technical papers	
Technical paper 1	Aircraft noise
Technical paper 2	Air quality
Technical paper 3	Greenhouse gas emissions
Technical paper 4	Hazard and risk
Technical paper 5	Wildlife strike risk
Technical paper 6	Land use and planning
Technical paper 7	Landscape and visual amenity
Technical paper 8	Biodiversity
Technical paper 9	Heritage
Technical paper 10	Social
Technical paper 11	Economic
Technical paper 12	Human health
Technical paper 13	Facilitated changes
Technical paper 14	Greater Blue Mountains World Heritage Area

Chapter 2 Strategic context and need

This chapter provides an overview of the strategic context and need for this project.

Western Sydney is one of Australia's fastest growing regions and is Australia's third-largest economy. Two million people currently live in Western Sydney with the expectation of another million people moving into the region by the 2030s. WSI will help support this population growth, as well as growth in business activities. Capacity constraints at existing airports in the Sydney Basin is also increasing, as well as demand for aviation services, in particular Western Sydney. The strategic context and need for WSI has been documented in the 2016 EIS. This chapter focuses more on the strategic context and need relevant to this project (the airspace and flight path design component).

This chapter also provides details on the forecast aircraft activity and fleet mix, and explains the benefits of the project.

2.1 Need and role of WSI

2.1.1 Role of the airport

Western Sydney is one of Australia's fastest growing regions. It is Australia's third-largest economy and Australia's fourth-largest city (DITRDCA, n.d.). Two million people live in Western Sydney and another million people are expected to move into the region by the 2030s (DITRDCA, n.d.). The need for an airport in Western Sydney was established in the 2016 EIS and is driven by a continued growth in demand for aviation services in Western Sydney and the Greater Sydney region more broadly. To ensure that Sydney stays an international commercial and financial centre, as well as one of Australia's foremost tourist destinations, there needs to be efficient access to air services for travel by passengers and freight.

The *2012 Joint Study on Aviation Capacity in the Sydney Region* (the Joint Study) identified growing airport capacity constraints in the Sydney Basin (Department of Infrastructure and Transport, 2012). The Joint Study found that while Sydney (Kingsford Smith) Airport would remain an important airport for the Greater Sydney region and Australia, it would be unable to meet the increasing demand in the Sydney Basin and an additional airport would be required by around 2030 (Department of Infrastructure and Transport, 2012). The Joint Study found that without significant additional aviation capacity in the Sydney Basin, the domestic airline sector would become increasingly constrained and new services from international markets could not be accommodated (Department of Infrastructure and Transport, 2012).

The physical constraints at Sydney (Kingsford Smith) Airport limits the ability to handle further passenger growth. These limitations are apparent at peak times and are likely to become more noticeable in the future. Demand for aviation services in the Sydney region is forecast to double from 2015 to 2035 (Department of Infrastructure and Transport, 2012). Even if operational restrictions were removed at Sydney (Kingsford Smith) Airport, it could not meet Sydney's long term aviation needs (Department of Infrastructure and Transport, 2012).

There is expected to be an increase in the demand for aviation services to meet the needs of population growth, as well as the growth in business activities, generally within the greater Sydney region. There are several key industries in the area that depend on air transport services.

The Commonwealth-owned land at Badgerys Creek was selected as the site for the proposed airport after extensive investigation of a range of location options between the Central Coast and Wollongong. Among a range of other considerations, Badgerys Creek was chosen as the preferred site due to its proximity to the predicted growing aviation demand within Western Sydney, as well as other factors such as its proximity to road and potential rail transport links, and the existing planning controls on surrounding lands. It was also found to provide additional benefits such as offering the potential for increased employment and economic opportunities for the Western Sydney community and to be a catalyst for much needed supply of housing.

This is reflected in the *Western City District Plan – connecting communities* (Greater Sydney Commission, 2018a) which seeks to leverage off the opportunity of WSI and the associated Aerotropolis (a new proposed economic and commercial precinct within Western Sydney centring on aerospace and defence, manufacturing, healthcare, freight and logistics, agribusiness, education and research industries). The new airport will act as an anchor for the Western Economic Corridor, broadening the employment opportunities for the region. WSI will also create opportunities to grow the Western City District's visitor economy through improved connections for international and domestic visitors to Western Sydney and the Greater Blue Mountains World Heritage Area (Greater Sydney Commission, 2018a).

Alternatives to developing a new airport in Western Sydney were documented as part of the 2016 EIS in Section 2.6 (Strategic alternatives). More detail on this can be found in the 2016 EIS.

2.1.2 Forecast aircraft activity and movements

WSI will be capable of catering for domestic and international passengers and freight service.

WSI will have capacity to handle up to 10 million annual passengers and around 81,000 air traffic movements by 2033 including freight operations. This capability would incrementally increase with airport facility expansion to handle up to 37 million annual passengers and around 226,000 air traffic movements to meet demand expected by around 2055. WSI will ultimately serve all types of commercial aviation traffic, including full-service carriers, low-cost carriers, international, domestic, connecting and regional traffic.

The volume and profile of passengers that WSI is expected to serve will evolve over time.

It is expected that in the early years, around 67 per cent of passenger demand at WSI will be for domestic travel (refer to Figure 2.1). This proportion will decrease to around 53 per cent by 2055 as the international passenger demand increases. Domestic demand is likely to be focused on capital city services including Melbourne, Brisbane, Perth and Gold Coast (DITRDC, 2021).

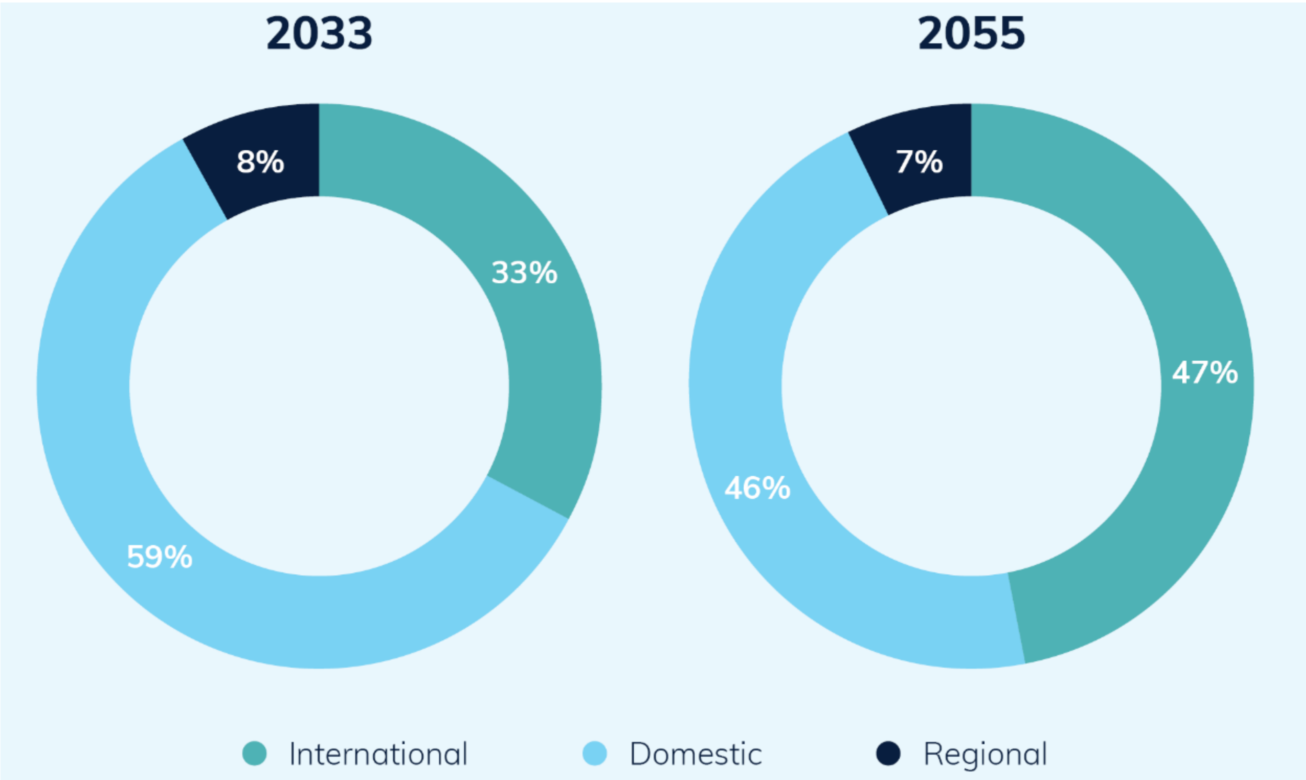


Figure 2.1 Domestic, regional and international passenger demand at WSI in 2033 and 2055

The international connections to Asia, the Middle-East and North America are an important traffic segment for WSI, as are dedicated freight operations.

Over time, it is expected that WSI will experience greater demand, with growth particularly strong in international regular public transport as the remaining available capacity at Sydney (Kingsford Smith) Airport is exhausted (DITRDC, 2021). By this time, the domestic-international traffic split at WSI could be approximately 53 per cent domestic and 47 per cent international.

Freight aircraft will also operate at WSI. Dedicated freight aircraft accounts for around 12 per cent of total air traffic movements (less than 10,000 freighter air traffic movements) by 2033 (refer to Figure 2.2). As WSI approaches full capacity for single runway operations in 2055, it is anticipated that freight aircraft movements will account for around 9 per cent of total air movements per year (nearly 20,000 dedicated freight movements).

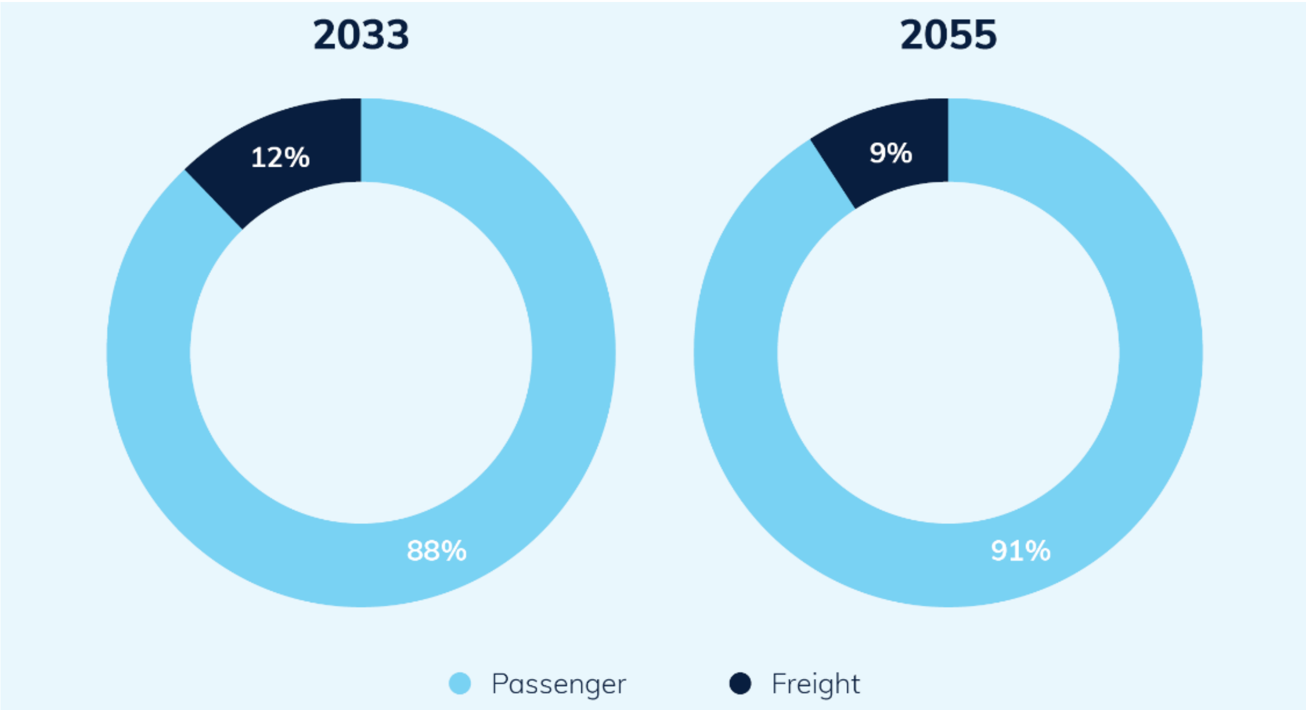


Figure 2.2 Passenger and freight movements at WSI in 2033 and 2055

2.1.3 Aircraft fleet mix

Most aircraft, nearly 80 per cent, at WSI are anticipated to be narrow-body (single aisle, twin-engine) jets (seating between 150 and 250 passengers), with the remainder consisting of wide-body (twin aisle, twin-engine) jets and non-jet (turbo-prop) aircraft (refer to Figure 2.3). The proportion of wide-body jets operating in the fleet mix at WSI is expected to increase by approximately 18 per cent between 2033 and 2055 (from 13 per cent to 31 per cent of all movements).

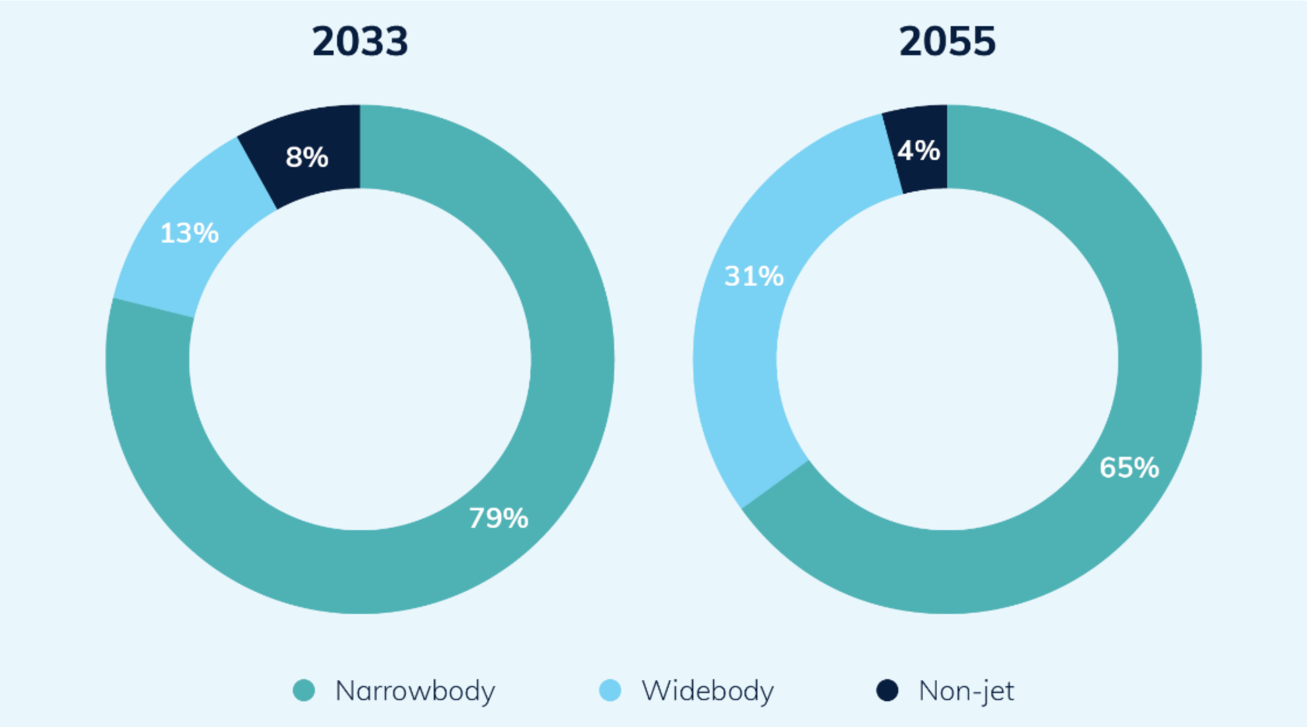


Figure 2.3 Aircraft fleet mix in 2033 and 2055

Aircraft are classified into aircraft types to determine whether a certain aircraft is able to use a particular aerodrome. The International Civil Aviation Organization (ICAO) Aerodrome Reference Code classifies aircraft by the aeroplane reference field length (being the minimum take-off distance in certain conditions) and by a combination of the aircraft wingspan and outer main gear wheel span (grouped by code letter). The code letter has direct relevance to detailed airport design.

The anticipated aircraft fleet mix at WSI would consist mainly of Code C (narrow-body jets and turbo-props) and E, with some Code B and F aircraft (DITRDC, 2021).

Table 2.1 outlines the fleet mix categories and provides an example of each type. Figure 2.4 provides a visual depiction of the range of representative aircraft types at WSI.

Code C aircraft are expected to account for all domestic operations at WSI in the early years up to 2033 and in the long term to 2055.

Code C aircraft are expected to represent approximately 60 per cent of the international fleet mix at WSI in the early years, and Code E approximately 39 per cent. In the long term, Code E aircraft could represent approximately 66 per cent of international fleet mix and international air traffic movements.

The freight aircraft fleet mix assumes all dedicated domestic freight activity is served by Code C aircraft with approximately 83 per cent of international freight activity served by the larger Code E and Code F aircraft.

Table 2.1 Types of aircraft by code

ICAO aircraft reference code letter	Wingspan	Example aircraft
A	Less than 15 metres	Beechcraft Baron (Be58) Cessna 404 Titan (C404)
B	15 metres but less than 24 metres	SAAB 340 Cessna Caravan (C208) Beechcraft King Air B200
C	24 metres but less than 36 metres	Embraer 190 Bombardier Dash 8 Airbus A220 Airbus A320 Fokker 100 (F100) Boeing 737
D	36 metres but less than 52 metres	Airbus A310 Boeing 767
E	52 metres but less than 65 metres	Airbus A330 Airbus A350 Boeing 777 Boeing 787
F	65 metres but less than 80 metres	Boeing 747-8

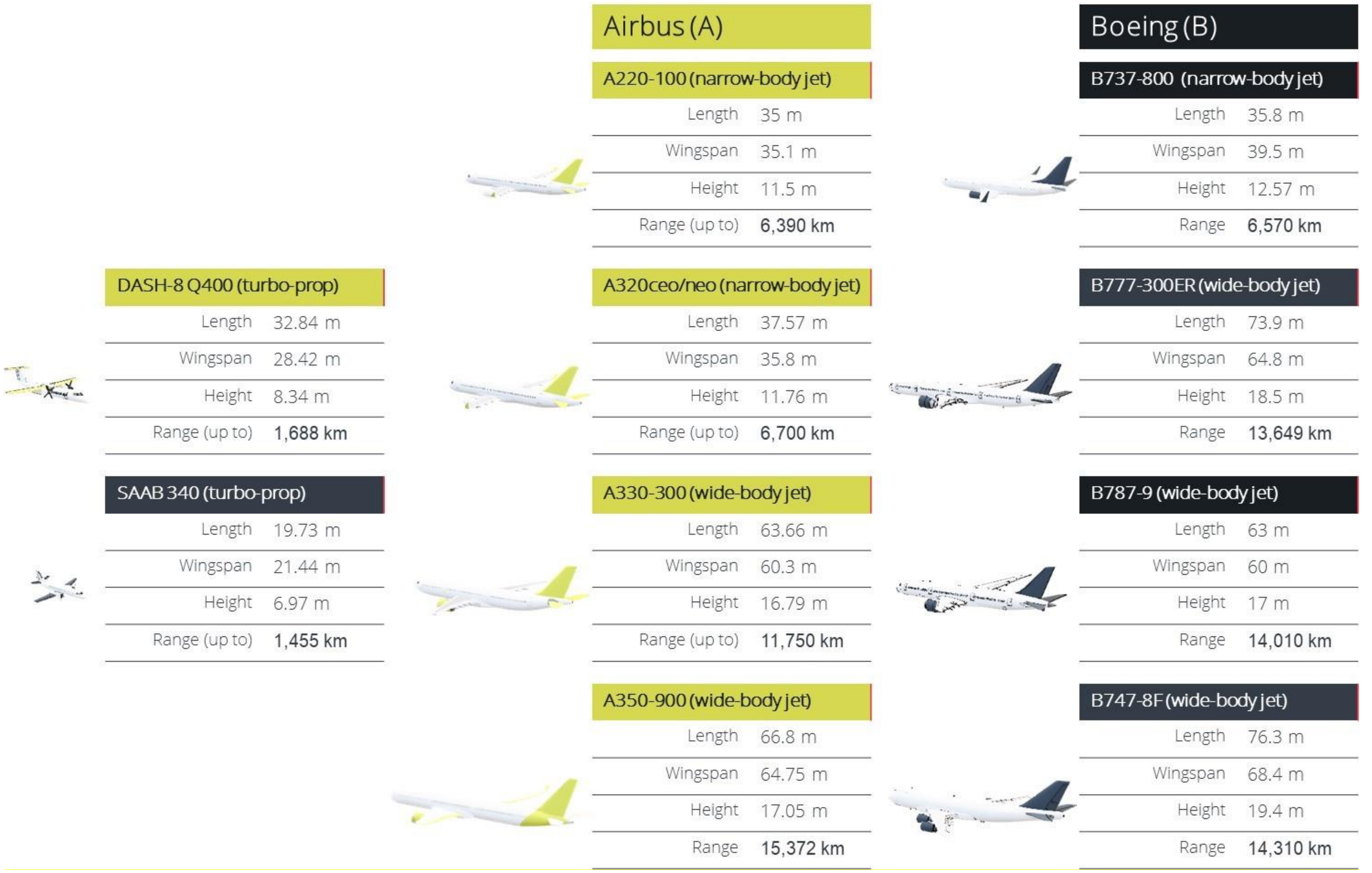


Figure 2.4 Size comparison of selected representative aircraft at WSI

2.2 Benefits of the project

The project is an integral part of WSI, ensuring that the benefits of the airport are realised.

WSI will be a major catalyst for investment and jobs growth in the Western Sydney region and will deliver benefits to the Australian economy more broadly.

Demand for passenger journeys in the Sydney region is forecast to more than double from 2015 to 2035 (DITRDC, 2021). WSI will increase aviation capacity for Sydney, meaning more passenger and freight services and less congestion for travellers. WSI will cater for domestic, international and freight flights with airport terminal facilities designed for both low cost and full-service carriers. This will also provide the growing communities of Western Sydney with better access to aviation services. Access today to an airport for Western Sydney residents can involve a 2-hour commute (DITRDC, 2021).

The development and operation of WSI will support the population and economic growth in the Western Sydney region and broaden employment opportunities. It is estimated that an airport in Western Sydney would generate $24.6 billion in direct expenditure by 2060 and contribute a $23.9 billion increase in Gross Domestic Product (GDP) to the national economy (DITRDC, 2021). It will also support almost 28,000 direct and indirect jobs by 2031 and increasing to around 47,000 direct and indirect jobs by 2041 (Ernst and Young, 2017). These job opportunities would span aviation, supporting services and non-aviation industries (DITRDC, 2021).

WSI will provide direct connections to the world, allowing opportunities for residents and the community to enhance Western Sydney's connection to world economies. Tourism will also be boosted, with WSI providing better accessibility to destinations across Western Sydney and the Blue Mountains. New or upgraded transport infrastructure that would be built to service the airport would also provide benefit to local communities.

Chapter 3 Introduction to airspace

This chapter introduces the key concepts and issues that relate to airspace operations, including a summary of how airspace is managed and key airspace terms.

It also explains the factors that can affect airspace operations. A range of factors play an important role in the operation of airspace and the safe and efficient movement of aircraft, such as time of day, traffic demand (including the number of arriving and departing aircraft), flight paths (including origin and destination), aircraft separation and sequencing, runway modes of operation and capacity, noise abatement procedures and weather conditions. Understanding the influence these factors can have on how aircraft are required to operate within airspace is important.

The new aircraft operations at WSI must integrate into the operations of the broader Sydney Basin airspace. Airspace in the Sydney Basin is likely the most complex and busiest in Australia and the interaction of WSI within this airspace is discussed in this chapter. Interactions with other airspace users is also briefly discussed, with further detail on the existing conditions within the Sydney Basin airspace included in Chapter 4 (Project setting).

Information in this chapter will assist with understanding Chapter 6 (Project development and alternatives) and Chapter 7 (The project), as well as provide the basis for discussions regarding noise (Chapter 11) and air quality (Chapter 12).

3.1 Airspace and how it is managed

Airspace is the term used for the three-dimensional space in which aircraft fly (refer to Figure 3.1). Most of the Australian airspace is available for civil aviation use, with overall responsibility for management of the airspace shared by Airservices Australia and the Australian Department of Defence (Defence). Airservices Australia and Defence work closely together to provide a seamless service to aircraft users.

Airservices Australia manages the non-military airspace and provides the necessary air traffic control services and equipment to maintain a safe and efficient flow of air traffic. Air traffic at WSI would be managed by Airservices Australia. Airservices Australia under established agreements also manages some military airspace including elements of RAAF Base Richmond. As the national Air Navigation Service Provider (ANSP), Airservices Australia ensures that aircraft are separated (for safety) throughout their flight, and sequenced (for efficiency) during arrival to and departure from an airport.

The Civil Aviation Safety Authority (CASA) is a government body that regulates aviation safety in Australia. The CASA sets policies and standards, based on the International Civil Aviation Organization (ICAO) standards and recommended practices, which govern the use of the non-military portion of the airspace.

The ICAO is a specialised agency of the United Nations (UN) and serves as the global forum of 193 Member States (including Australia) for international civil aviation. Its vision is to achieve the sustainable growth of the global civil aviation system, with the strategic objectives of managing the projected growth in global air transport capacity without unnecessary adverse impacts on safety, efficiency, convenience or environmental performance. In doing so, ICAO develops policies and standards, and performs compliance audits, research and analysis.

Daily management of the airspace is achieved through air traffic controllers directing the various phases of flight (refer to Figure 3.2). Management procedures are published for each airport including standard instrument procedures for departures and arrivals, and noise management and abatement procedures.

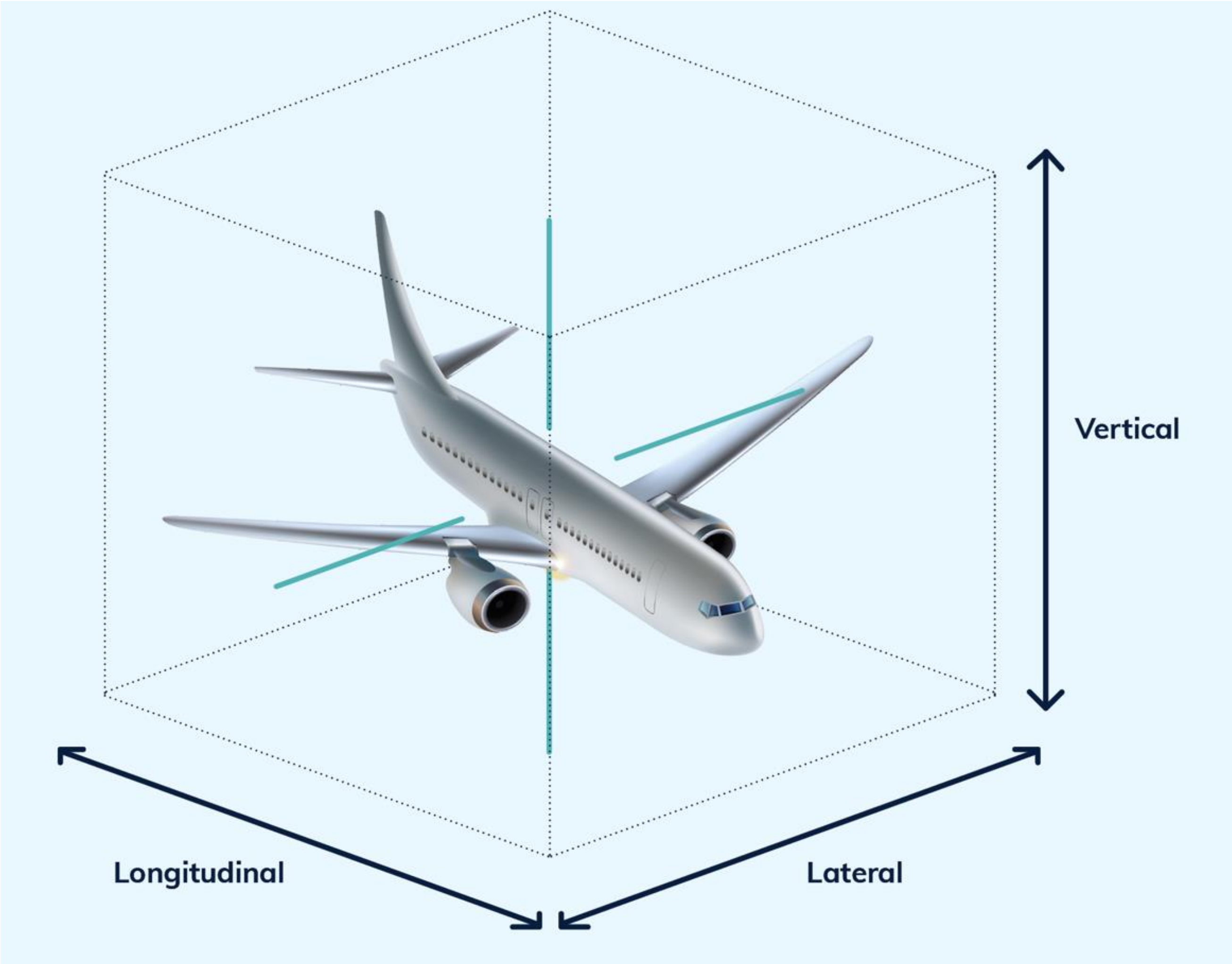


Figure 3.1 Three-dimensional space in which aircraft fly

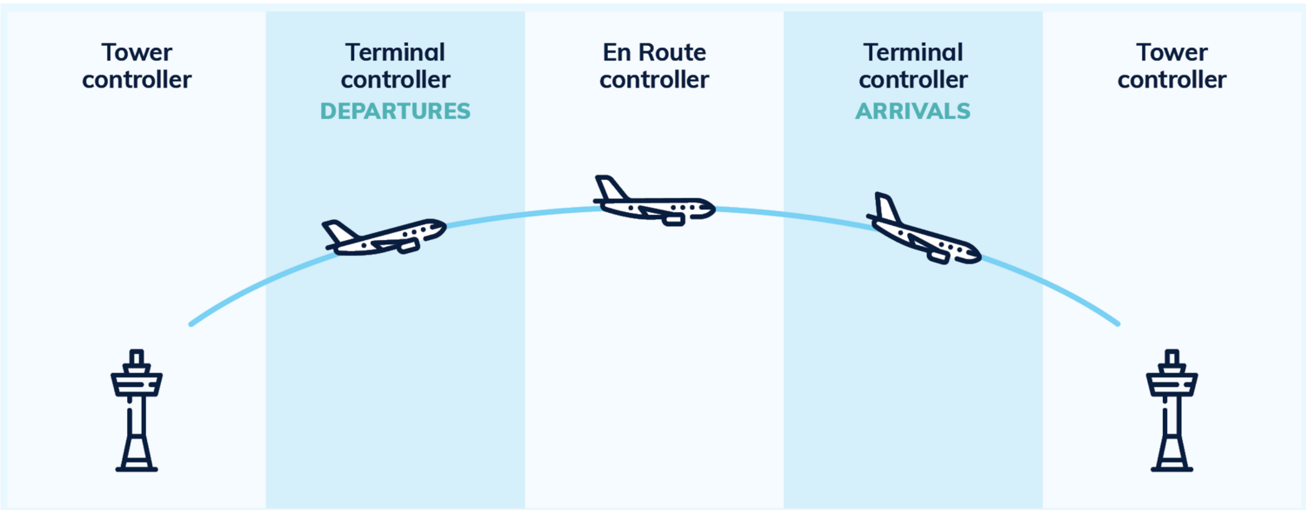


Figure 3.2 How air traffic control works

Elements of airspace include:

- **Controlled airspace**. Controlled airspace is a generic term for airspace with defined dimensions and within which air traffic control services are provided to aircraft. The primary role of air traffic services is to safely separate one aircraft from another both laterally and/or vertically. Controlled airspace in Australia is actively monitored and managed by air traffic controllers. To enter controlled airspace, an aircraft must first gain a clearance from an air traffic controller. Controlled airspace comprises control zones and control terminal areas.
- **Control zone (CTR)**. A control zone (refer to Figure 3.3) is a volume of airspace surrounding major airports down to ground level within which all aircraft movements are subject to a defined level of control. This airspace is usually dedicated to a tower controller. There are currently 3 existing civil control zones within the Sydney Basin airspace located at Sydney (Kingsford Smith) Airport, Bankstown Airport and Camden Airport. WSI will introduce a fourth control zone.

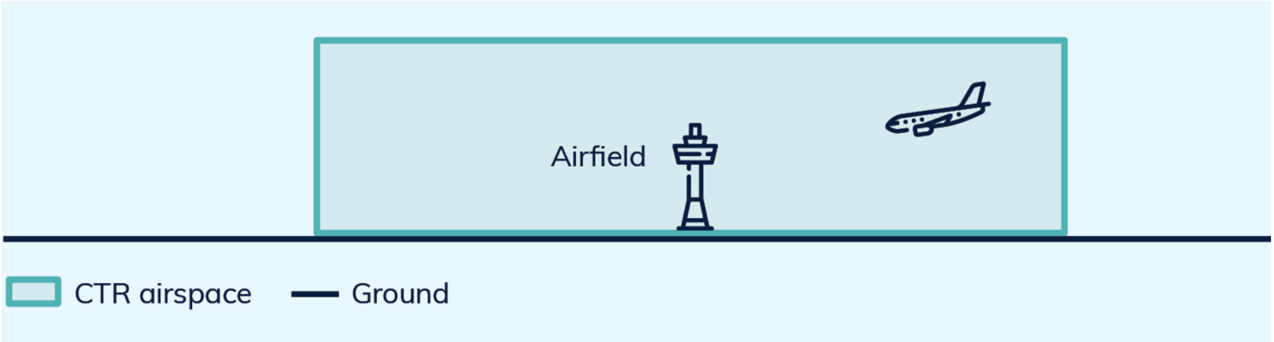


Figure 3.3 Control Zone (CTR)

- **Control area (CTA)**. A control area (refer to Figure 3.4) is a volume of airspace with defined upper and lower altitude bands, within which aircraft movements are subject to a defined level of control. The control areas within the Sydney Basin airspace are mainly Class C airspace (refer to Figure 3.6 for a description of classes of airspace). Some Class A airspace exists at high level above the Class C.

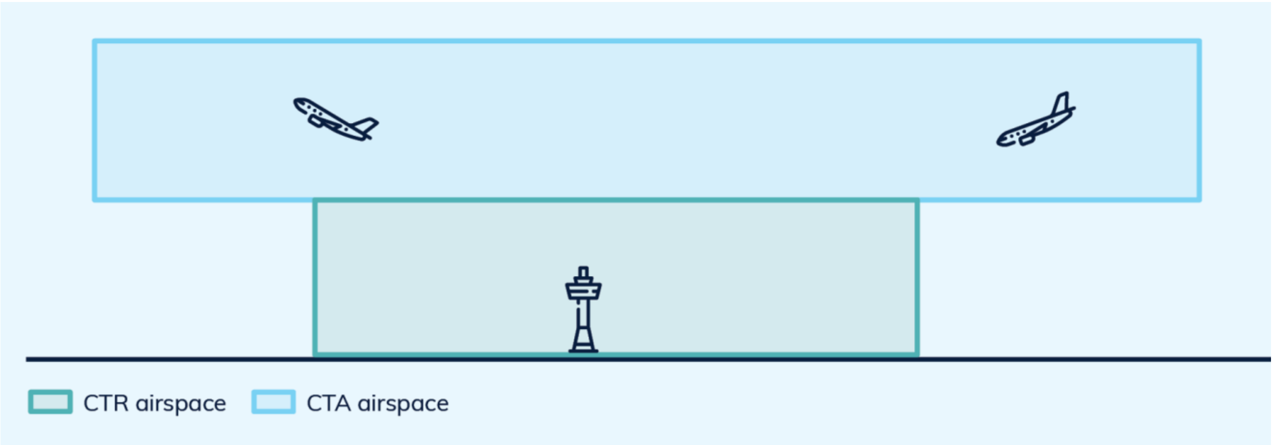


Figure 3.4 Control Area (CTA)

- **Terminal airspace** (also known as the terminal control area (TMA)). Terminal airspace (refer to Figure 3.5) generally encompasses the area within 30 to 50 nautical miles (nm) (or approximately 55 to 93 kilometres (km)) of a major airport. The vertical extent of terminal airspace varies depending on the operational parameters at an airport. As the distance from the airport increases, the lower boundary of controlled airspace rises in steps, until reaching the lower level of the overlying enroute airspace. Enroute controlled airspace is typically above 10,000 feet (ft) (around 3 km) above sea level and encompasses the major routes between cities.

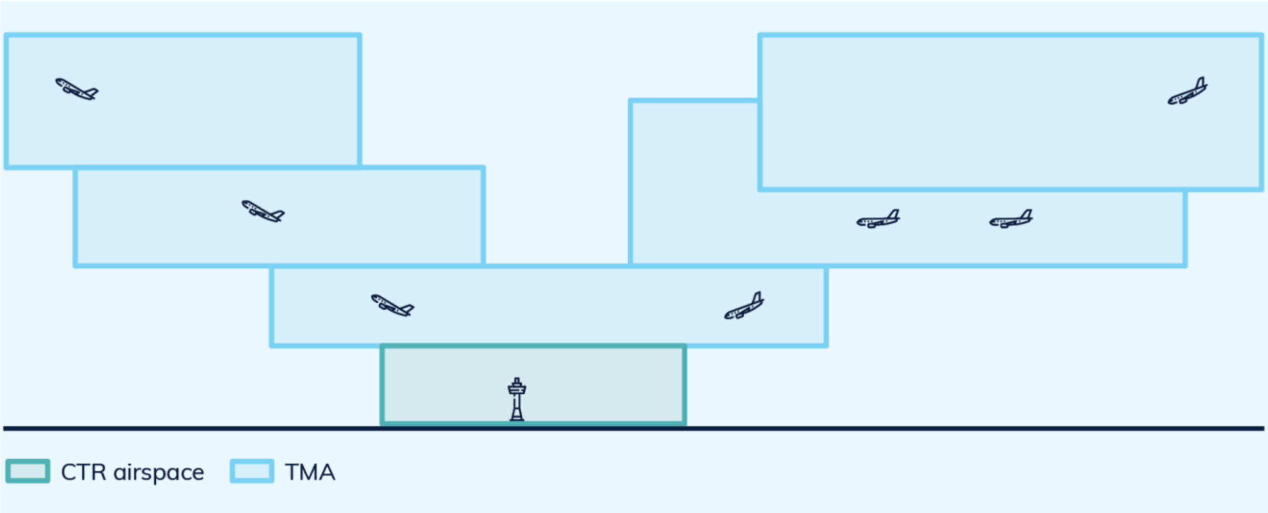
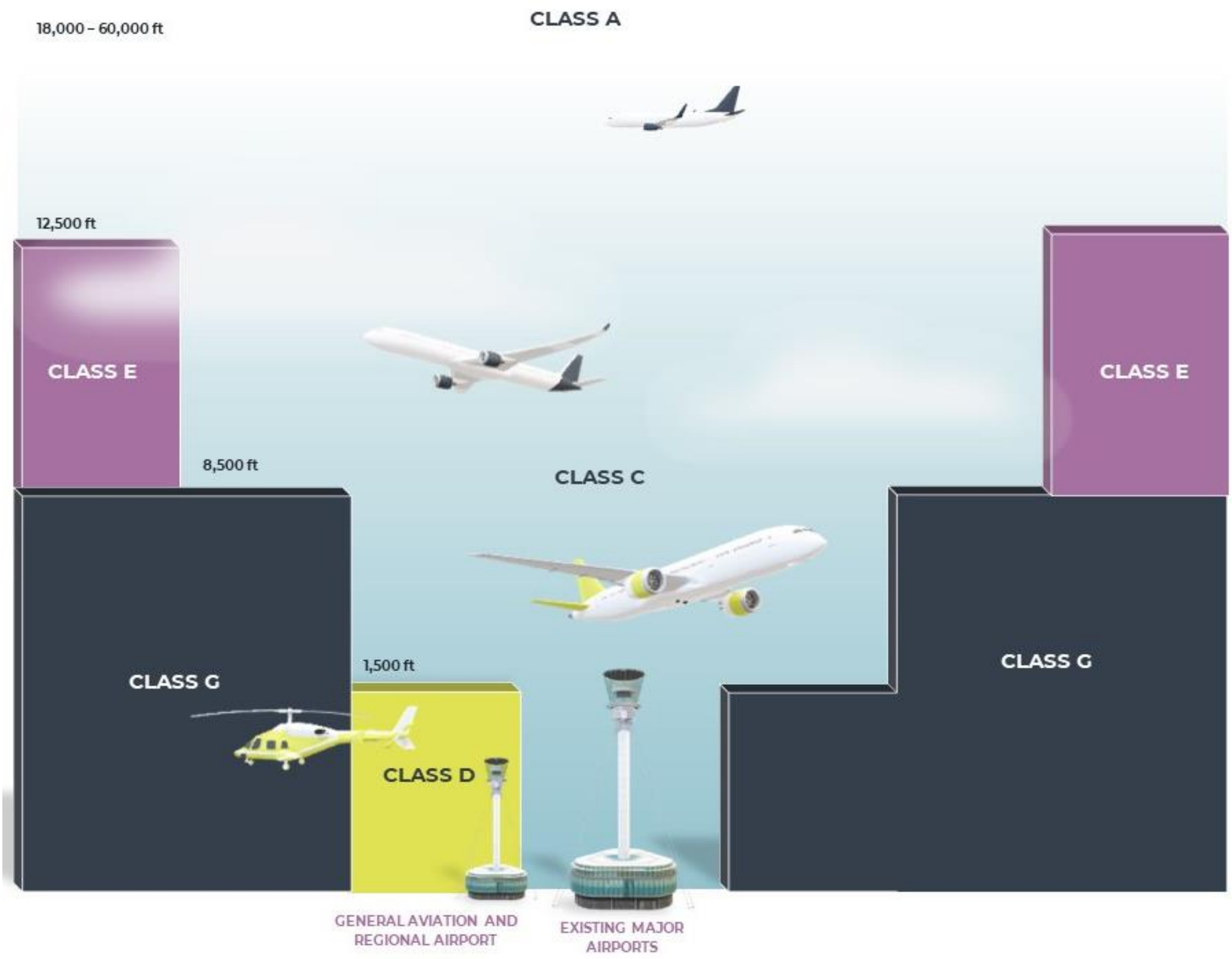


Figure 3.5 Terminal airspace

- **Uncontrolled airspace**. Uncontrolled airspace has no supervision by air traffic control. Therefore, no clearance is required by aircraft to operate in uncontrolled airspace. Most light aircraft and helicopters operate outside or underneath controlled airspace. Air traffic control may still provide basic information services to aircraft in radio contact.
- **Restricted airspace**. Restricted airspace is airspace that has restrictions placed on its use and aircraft movements are confined to those with certain specified permissions. This is generally associated with military installations including airports and associated flying training areas or other installations where safety is an issue, for example explosives storage facilities or artillery firing ranges. It can also be established for national security purposes or temporarily established to protect high-density flying operations at an air show or other large public event. It may also be temporarily requested by police or other emergency services for safety reasons (such as near bushfires or major crime scenes). CASA's Office of Airspace Regulation (OAR) is responsible for circulating the designation of restricted airspace. Restricted areas are also allocated a conditional status (restricted area 1, restricted area 2 or restricted area 3) which provides an indication as to the likelihood of obtaining a clearance to fly through the airspace. Restricted area 1 is the most likely to obtain a clearance from air traffic control.
- **Danger areas**. Danger areas are declared where an activity is considered by CASA to pose a potential danger to aircraft. Danger areas only warn airspace users about hazardous activities and do not restrict entry. Danger areas generally relate to airspace over hazardous areas such as mining and quarrying sites, or in areas of special use such as flying training areas, hang-gliding, parachuting and unmanned aerial vehicle testing. Approval to fly 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.
- **Prohibited areas** (also known as no-fly zones). Prohibited areas are areas of airspace within which aircraft are prohibited from flying, usually due to security or other reasons associated with national welfare.

Controlled and uncontrolled airspace is further divided into different classes, where internationally agreed rules for visual flight and instrument flying applies (refer to Figure 3.6 which shows the classes of airspace in Australia and how they connect and overlap). An aircraft may travel through different classes of airspace, depending on the flight path taken. Class B and Class F airspace have not been adopted for use in Australia.

The class of airspace in which an aircraft can fly is determined by whether it is operating under visual flight rules (VFR – most light aircraft and helicopters) or instrument flight rules (IFR – all large aircraft). These terms are explained further in Section 3.2. The class of airspace may change subject to the time of day at airports with a control tower facility.



Class A — This high-level enroute controlled airspace is used predominately by commercial and passenger jets. Only IFR flights are permitted and they require a clearance from air traffic control. All flights are provided with an air traffic control service and are positively separated from each other.

Class C — This is the controlled airspace surrounding major airports. Both IFR and VFR flights are permitted and must communicate with air traffic control. IFR aircraft are positively separated from both IFR and VFR aircraft. VFR aircraft are provided traffic information on other VFR aircraft.

Class D — This is the controlled airspace that surrounds general aviation and regional airports equipped with a control tower. All flights require clearance from air traffic control.

Class E — This mid-level enroute controlled airspace is open to both IFR and VFR aircraft. IFR flights are required to communicate with air traffic control and must request clearance from air traffic control.

Class G — This airspace is uncontrolled. Both IFR and VFR aircraft are permitted and neither require clearance from air traffic control.

Figure 3.6 Classes of airspace

3.2 Key airspace terms

This section provides an outline of terms used when describing the key concepts and issues that relate to airspace operations.

3.2.1 Air traffic management and control

Air traffic management is an aviation term encompassing all systems that assist aircraft to depart from an aerodrome, transit airspace and land at a destination aerodrome. The purpose of air traffic management is safe, efficient and expeditious movement of aircraft in the airspace. Its 2 major principles are air traffic control and traffic flow management:

- **Air traffic control** is a service provided by ground-based air traffic controllers who direct aircraft on an airport and through a given section of controlled airspace. Can also provide advisory services to aircraft in uncontrolled airspace.
- **Air traffic flow management** is the regulation of air traffic so that the handling capacity of an airport or air traffic control is not exceeded and/or is used efficiently.

Air traffic control procedures are specific operating procedures or rules that apply to all aircraft flights within controlled airspace. The rules may vary under differing operational circumstances including time of day, traffic demand (the number of arriving or departing aircraft) and prevailing weather conditions.

While a generic set of air traffic control procedures based on the international standards set by ICAO and regulated by CASA apply to Australian airspace, each controlled airport has a set of procedures specific to its operation. These are published by Airservices Australia and are available to pilots operating in Australian airspace. Air traffic control procedures include:

- SIDs (Standard Instrument Departure) and STARs (Standard Instrument Arrival)
- flight planning requirements
- weather criteria for visual and instrument landings
- criteria for selecting the operating runway (or the 'nominated' runway) (discussed further in Section 3.3.4)
- airport specific separation requirements for arriving and departing aircraft (discussed further in Section 3.3.4)
- airport specific sequencing requirements (discussed further in Section 3.3.5)
- noise abatement procedures (NAPs) (discussed further in Section 3.3.7)
- intersection departures.

3.2.2 Continuous climb and descent operations

Continuous climb operations (CCO) involve an aircraft maintaining a steady angle of departure (refer to Figure 3.7). It is a technique facilitated through the design of the airspace and SIDs, and the air traffic control procedures. It allows the flight profile to be optimised to the performance of the aircraft, leading to significant fuel economy and environmental benefits in terms of noise and emissions reduction.

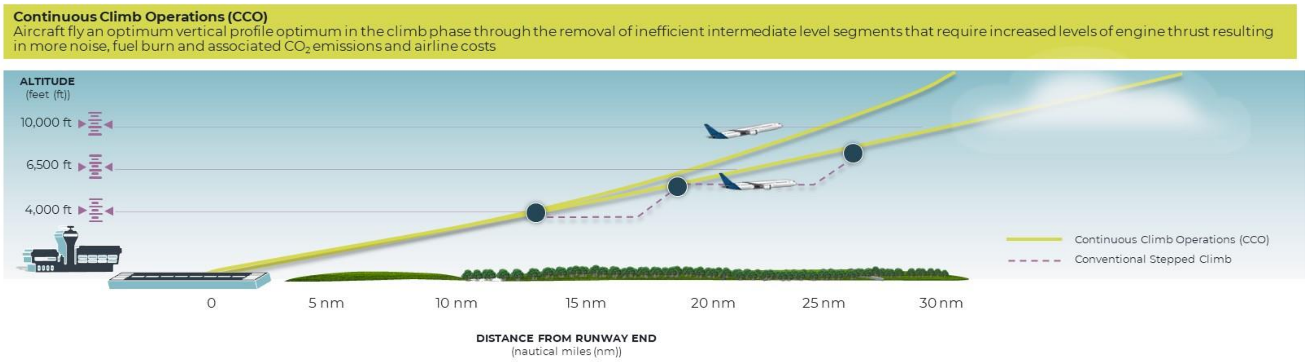


Figure 3.7 Continuous climb operations

Continuous descent operations (CDO) involves an aircraft maintaining a steady angle of arrival (refer to Figure 3.8). It is a technique facilitated through the design of the airspace and STARs, and the air traffic control procedures. It allows an arriving aircraft to descend from an optimal position with minimum thrust. It avoids level flight to the extent possible while meeting safety requirements and compliance with air traffic control procedures. This provides fuel economy and environmental benefits (in terms of noise and emissions reduction) by keeping aircraft higher for longer and smoothing the approach of the aircraft by limiting the use of the throttle to maintain altitude.

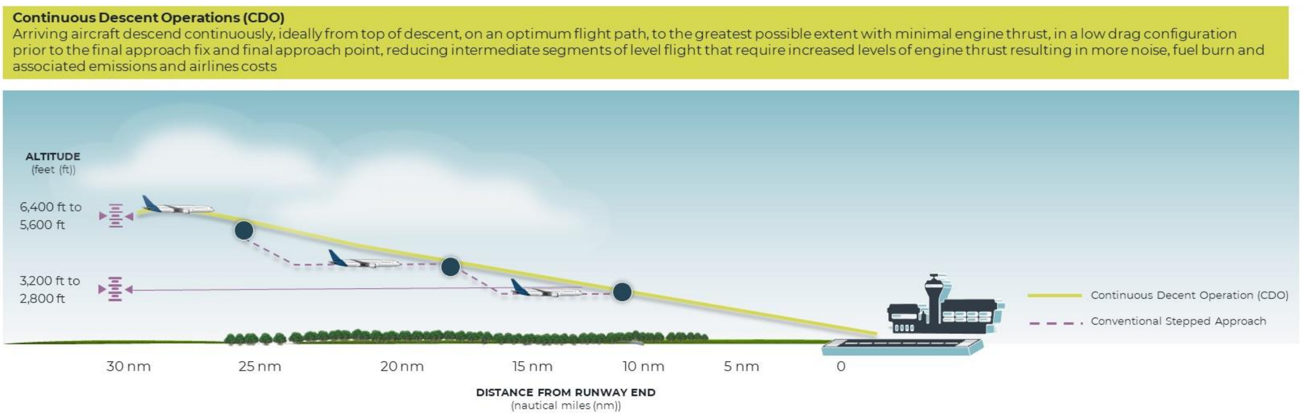


Figure 3.8 Continuous descent operations

3.2.3 Flight rules

Visual and Instrument Flight Rules (VFR / IFR) govern how aircraft are flown and how safe separations are maintained in differing meteorological conditions. Weather conditions determine which approach will be flown and this may vary slightly from airport to airport.

When flying using VFR, pilots may navigate by sight as well as by reference to specialised instruments in the aircraft's cockpit. Flights using VFR should fly in clear weather, known as visual meteorological conditions (VMC). Clouds, heavy precipitation, low visibility and otherwise adverse weather conditions must be avoided under VFR.

When flying using IFR, pilots fly by reference to the specialised instruments in the aircraft's cockpit alone. Flights using IFR can fly in VMC as well as in poor weather, known as instrument meteorological conditions (IMC). Flights in IMC require increased separation between aircraft.

3.2.4 Instrument landing system

An **instrument landing system** (ILS) allows a pilot to attempt to approach an airport in reduced visual conditions (refer to Figure 3.9). An ILS is a precision runway approach aid employing 2 radio beams to provide pilots with vertical and lateral guidance during the landing approach:

- a localiser, which keeps aircraft heading direct to the runway (lateral guidance)
- a glide path, which provides descent guidance to touch down on the runway (vertical guidance).

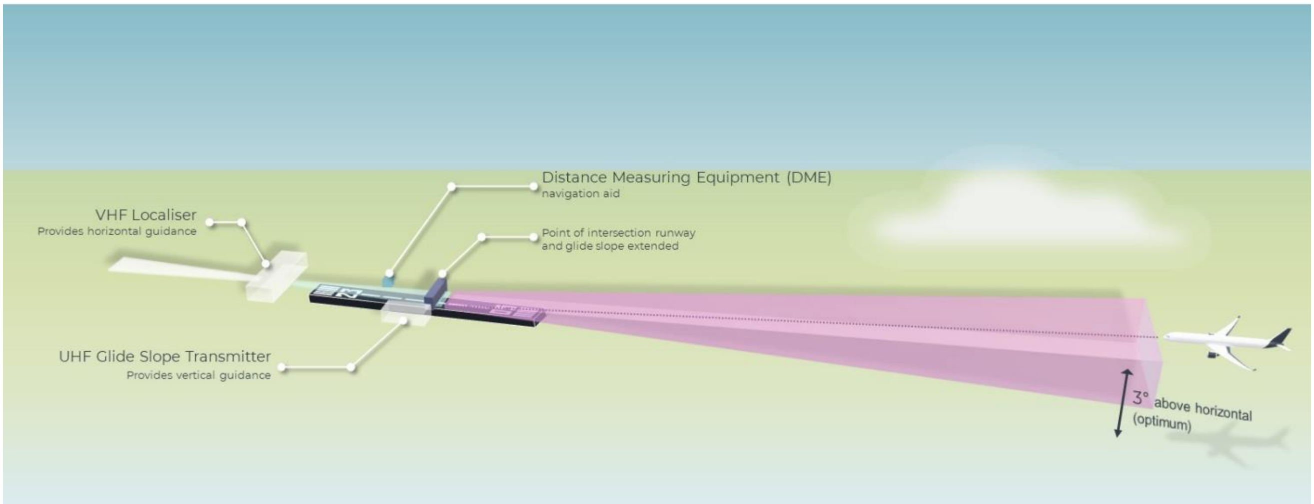


Figure 3.9 Instrument landing system

3.2.5 Intersection departures

An intersection departure is a take-off that starts at a position different than the end of a runway. This means that some of the runway would not be available for the take-off run. The main benefits associated with intersection departures include:

- separation facilitation
- runway capacity improvement
- reduced taxi time
- air pollution and greenhouse gas emissions reduction (optimal taxi distances).

Typically, intersection departures are only facilitated at taxiways aligned at or close to 90 degrees to the runway. This ensures appropriate pilot visibility of both runway directions from the cockpit and an accurate understanding of the resulting runway length available for departure. Non-jet aircraft are the principal user of intersection departures, but domestic jet operations may also use an intersection departure when their destination and reduced take-off runway length requirements ensure it is safe to do so.

An intersection departure may be at pilot request, to save taxiing time and fuel burn, or at air traffic control discretion to manage a departing aircraft sequence to minimise cumulative delay for a group of presenting aircraft. The use of intersection departures by jet aircraft is governed by the time of the day when specific noise abatement procedures apply.

3.2.6 Navigation

Aircraft navigation methods today rely on aircraft flight management systems and satellites for positioning and navigation. This provides greater precision and flexibility compared with conventional methods which employed fixed ground-based beacons to guide aircraft along published routes via waypoints. Figure 3.10 depicts the evolution of navigation performance with regard to airspace routing.

Area navigation (RNAV) is a method of IFR navigation. It allows aircraft to choose any course within a network of waypoints defined by geographic coordinates. Benefits of RNAV include reduced flight distance, reduced congestion and the permitting of IFR flights into airports without ground-based navigation beacons. Its use has been facilitated by the development and wide-spread deployment of mature satellite navigation systems.

Performance-based navigation (PBN) requires that aircraft be capable of meeting navigation performance requirements for accuracy, integrity, continuity, availability and functionality. Australia's implementation of PBN uses the required navigation performance (RNP) family of navigation specifications dependent on global navigation satellite systems (GNSS) such as the Global Positioning System (GPS) and on-board navigation performance monitoring to ensure precise flight path management. PBN in Australia is not reliant on ground-based radio navigation aids.

PBN has the major advantage of flexibility. Providing the aircraft has the means of determining its current position it can then operate anywhere within space that the positioning system will allow. PBN allows more direct routing along a flight path and more efficient landings and take-offs, which means a reduction in fuel burn and aircraft emissions. PBN also facilitates a high utilisation of continuous climb and descent operations (CCO / CDO) with resulting community benefits from reduced noise.

PBN is the basis for design of the WSI SIDs and STARs which ensures aircraft will be strategically separated, thereby reducing the level of interaction required by air traffic control to separate aircraft.

Required Navigation Performance Authorisation Required (RNP-AR) is a highly accurate procedure to approach and land on a runway. It can allow for 'curved' approaches to be made and can be more flexible than an instrument landing approach. Aircraft can line up with the runway much closer to the airport. RNP-AR approaches result in less distances flown (and the associated environmental benefits) compared to a traditional approach. Another potential advantage is a greater ability to avoid direct overflight of populated areas.

This is a new technology and requires aircraft to be fitted with certain equipment. New aircraft have this equipment installed. For older aircraft, the installation of the required equipment can be cost prohibitive or unfeasible. Crews also need to be specifically trained and not all aircraft operators will invest in this necessarily.

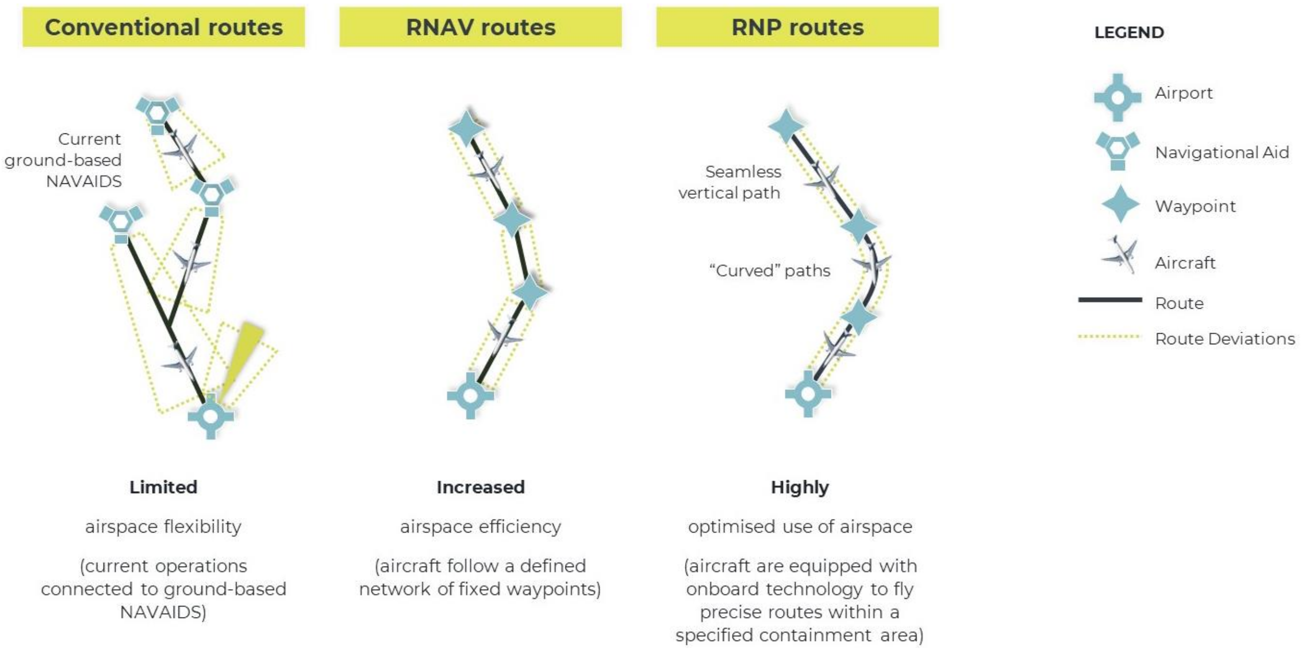


Figure 3.10 Conventional airspace routing versus RNAV and RNP routing

Radar vectoring happens when a plane is visible to an air traffic controller on a radar screen, and the controller tells the pilot to fly a specific heading. Radar vectoring is mainly used by air traffic control as a tool to ensure and enhance:

- the air traffic flow management in the arrival and/or approach phase of flight
- the aircraft sequence in any phase of flight
- the horizontal separation between aircraft.

The term **containment** is used in various air navigation standards. Arrival and departure flight paths in controlled airspace are required to be contained within that controlled airspace in accordance with buffers prescribed by CASA, to protect aircraft using the flight paths from other aircraft and from terrain. There can be different containment areas between the day period and night period.

3.2.7 Runway modes of operation

Runway modes of operation (RMO) refers to the direction in which aircraft take off and land. Operating modes are informed by assessing runway orientation and availability against factors such as meteorological conditions (especially wind direction and strength), runway surface status, aircraft profile and capability, demand and traffic volumes, airspace management procedures, and potential impacts on surrounding communities (such as noise).

3.2.8 SIDs and STARs

Standard Instrument Departure (SID) and **Standard Instrument Arrival** (STAR) are IFR flight procedures that set defined departure or arrival routes to facilitate safe and efficient flow of air traffic. These procedures manage traffic flows using defined routes, speed and altitude restrictions, and enable safe flight in all weather and visibility conditions. An aircraft will follow a SID from take-off to join the enroute phase of the flight (refer to Figure 3.11). The enroute phase of a flight comprises the segment of flight from the termination point of a departure procedure to the origination point of an arrival procedure (Federal Aviation Administration, 2017). An aircraft will follow a STAR from the enroute phase of flight to the commencement of the approach and landing phase, commencing at the Initial Approach Fix (IAF). The arrival approach may include a holding pattern (fixed circling pattern in which aircraft fly whilst they wait to land).

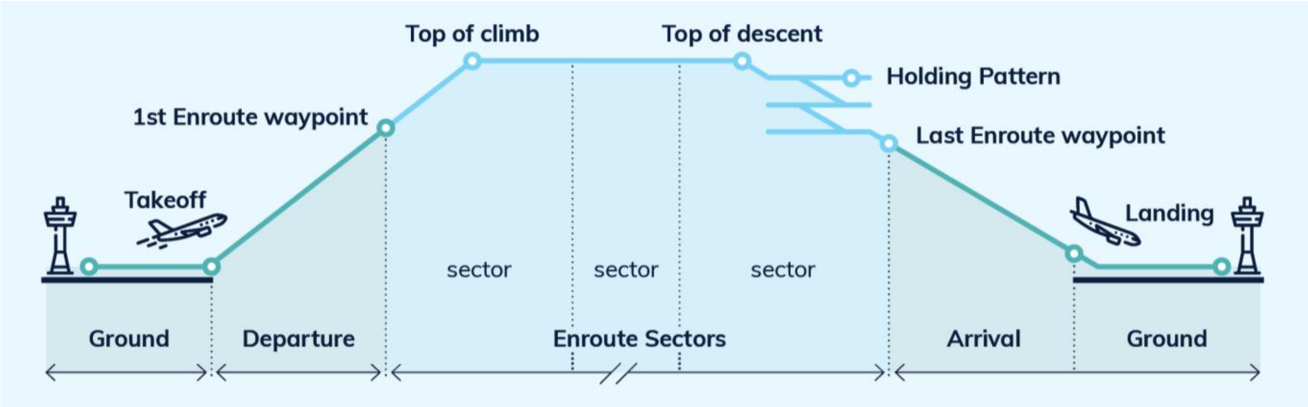


Figure 3.11 Phases of flight

Most of the modern domestic and international aircraft fleet operating to or from major Australian airports have flight management systems that the SIDs and STARs will be coded into, largely automating arrival and departure operations.

SIDs and STARs are developed for jet and non-jet aircraft. These can differ between jet and non-jet aircraft to account for differing aircraft performance.

The SIDs and STARs are designed to the rules and standards applicable to ICAO's PBN Standards, which have been adopted by CASA for airspace throughout Australia.

There are occasions where SIDs and STARs are cancelled for varied reasons and aircraft are radar vectored. Air traffic control initiated cancellations of SIDs can also be for reasons of route efficiency, better noise outcomes or better emissions outcomes. Any one of the 3 elements (track, vertical profile and 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.

3.2.9 Terminal instrument flight procedure

Terminal instrument flight procedures, also known as instrument approach procedures, is a series of predetermined manoeuvres that provide specific protection from obstacles and terrain. The term terminal instrument flight procedure is used throughout the Draft EIS. It is used for the orderly transfer of an aircraft from the end of the STAR to a landing, or to a point from which a landing may be executed visually, and commences at an IAF.

3.2.10 Waypoint

A **waypoint** is a specified location used to define positions along an air navigation route. Waypoints are defined by:

- geographic coordinates
- a name, which typically takes the form of a 5 letter capitalized word (for example, RIVET, ODALE and SABER).

They are identified as either fly over or fly by (refer to Figure 3.12) to indicate whether the aircraft flies over or by the waypoint. A SID or a STAR may incorporate a string of waypoints which require an aircraft to execute actions and adjust heading or altitude.

Some air routes have a small number of waypoints defined by a ground-based radio navigation aid immediately underneath the air route. These ground-based waypoints are identified by an internationally recognised 3 letter code.

Figure 3.12 Waypoints – fly by and fly over

Reference to some waypoints in the Draft EIS may not reflect current waypoints. This is due to these waypoints being:

- a placeholder for a future waypoint which is waiting for detailed design to confirm its exact location and assigned name from ICAO, or
- a current waypoint that has been renamed since the commencement of preparing the Draft EIS.

3.3 Airspace considerations

The following factors play an important role in the operation of airspace and the safe and efficient movement of aircraft:

- meteorological conditions (wind direction, air pressure and temperature, visibility, storm activity, rain etc and daily, weekly and seasonal variations in weather)
- aircraft flight paths
- demand, type, volume and nature of aircraft traffic, including origin and destination
- runway modes of operation and capacity
- aircraft separation and sequencing
- time of day (including peak demand period)
- noise abatement procedures
- temporary measures during emergency (medevac police and fire fighting) response operations
- local airspace coordination, particularly separation from other airspace users and the operating restrictions at other airports.

In airspace design, flight safety is always the primary consideration. The *Civil Aviation Act 1988* is the primary legislation relating to aviation safety in Australia and is overseen by CASA (discussed further in Chapter 5 (Statutory context)).

The National Airports Safeguarding Framework (NASF) provides guidance for ensuring developments in the vicinity of airports and certain airspaces (in the case of wind farms) do not infringe on the safety of aircraft operations. In the case of leased federal airports, such as WSI, this function is covered by the legislation. The NASF also provides guidance for land use planners in maximising the compatibility of development surrounding airports with the nature of impacts from aircraft operations, such as noise and public safety. The NASF principles and guidelines can be found on the Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA) website. Further discussion is provided in Chapter 5 (Statutory context) and Chapter 14 (Land use).

3.3.1 Meteorological conditions

Meteorological conditions are a major influence on aircraft operations into and out of an airport, the nomination of the operating runways and associated flight paths. Weather patterns influence aircraft operations in several ways, and can be on an hourly, daily, weekly and seasonal basis, including:

- wind direction and speed, this determines the direction of the operating runways (that is, the direction from which aircraft arrive or depart)
- rain, different operating rules apply if the runway is wet or dry
- low visibility conditions (for example, fog and bushfires), this determines which departure/arrival procedures and operating rules apply.

Weather conditions across the Sydney Basin are largely influenced by topography in and around the Greater Sydney region. Generally, the weather conditions experienced at a given location depends upon proximity to the ocean or some other body of water, elevation, and the surrounding terrain. These factors influence daily and seasonal temperature ranges and variability, humidity, rainfall, fog occurrence, and wind speed, direction and gustiness. The Bureau of Meteorology (BOM) works closely with Airservices Australia and CASA in providing meteorological services for civil aviation.

The location of WSI in the western part of the Sydney Basin means that the climate and weather phenomena can be significantly different to those experienced at other airports in the Sydney Basin. Topography in the Sydney Basin is likely to cause local disparities in temperature, moisture, pressure, rainfall and wind. Any combination of these factors will indirectly affect the frequency and severity of weather phenomena such as fog, thunderstorms, turbulence, wind shear and low cloud.

The following sections provide an outline of key meteorological conditions that can influence aircraft or airport operations, and how this can influence WSI operations with reference to data collected from the BOM's Badgerys Creek weather station for the period 1 January 2012 to 31 December 2021.

3.3.1.1 Wind

Wind at an airport is typically described as either crosswind, headwind or tailwind. Crosswind is the component of the wind that blows across the runway. The headwind or tailwind is the component of the wind that predominantly blows in line with the runway.

Runways can operate in both directions. Wind affects what runways at an airport are operationally suitable for arrivals and departures, and the direction in which those runways can be used. Generally, aircraft land and take-off into the wind, with a headwind. This enables aircraft to achieve the required lift for take-off at a slower ground speed and reduces the distance required for decelerating upon landing. Up to 5 knots tailwind is also permissible and considered to be normal operations.

The Aeronautical Information Publication (AIP) provides criteria for air traffic control to apply when selecting a nominated runway to accommodate noise abatement procedures. The criteria provide limits on crosswind (20 knots), tailwind (5 knots) and whether the runway is dry or wet. At a single runway airport, air traffic control will advise the strength of the crosswind and the Pilots in Command will determine the safety of landing or taking off having due regard to the operational crosswind limits of their aircraft. Wind direction can also change with short notice, and this may affect the flight paths and runways used. Runway direction may also be changed in anticipation of a wind change. Runway changes can add complexity to operations and there can be lead and lag times in setting up a runway direction change. For operational and safety reasons, air traffic control will hold a runway direction for a minimum amount of time (typically an hour) and similarly the frequency of runway changes minimised.

Wind direction and speed was a key factor in the selection of the runway alignment at WSI. It is expected that the north-east/south-west orientation of WSI's single runway (05/23) would be usable approximately 99.9 per cent of the time based on the ICAO standard crosswind limitation of 20 knots for runway nomination. The ICAO standard of maximum 20 knot crosswind applies where there are other runways that could be nominated. As there is only a single runway at WSI, the runway can be nominated at all times (that is, aircraft can land at WSI with more than 20 knots crosswind). However, if the crosswind is over 20 knots (around 0.1 per cent of the time), a pilot in command may seek an alternative such as delaying operation until conditions ease.

Local topography effectively blocks wind in all seasons from the west to north-westerly direction. Analysis of the BOM data indicates that there is a threshold (approximately 20–25 knots) in which the north-westerly synoptic winds are sufficiently strong to overcome the terrain and produce a crosswind at WSI. Crosswinds exceeding 20 knots at WSI are most likely to occur between August to November, with most crosswind events occurring from the north-west.

Figure 3.13 shows a wind rose plot for WSI based on data collected from 2012 to 2021.

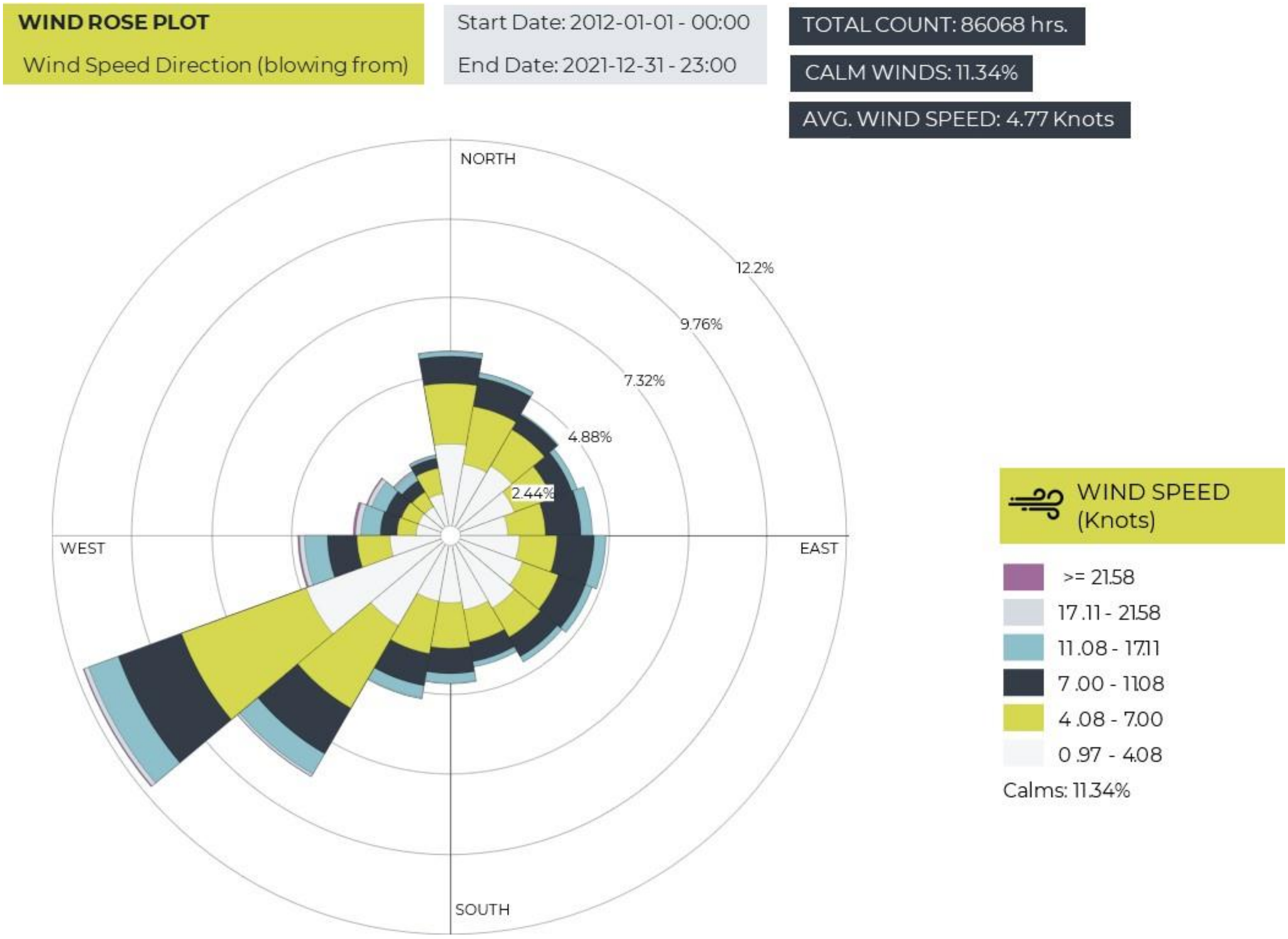


Figure 3.13 WSI wind rose

3.3.1.2 Visibility

Good visibility is important for aircraft operations particularly when the aircraft is close to the ground (take-off and initial climb, and approach and landing). Optimum conditions include clear weather and little or no cloud cover. Visibility can be reduced by rain, cloud, fog or smoke. VFR flights may not be able to operate in reduced visibility conditions. In a controlled airspace (like that surrounding WSI) air traffic control reports local conditions to the pilot.

Most Australian international airports are equipped with an ILS which allows a pilot to attempt to approach an airport in reduced visual conditions. Where fog has reduced visibility, the ILS may allow aircraft to land in dense fog subject to specific circumstances (including pilot certification). WSI will be equipped with a Category (CAT) IIIB ILS and all ancillary equipment required for it to allow aircraft to approach and land in extremely low cloud and visibility conditions.

3.3.1.3 Rain

The operating rules for aircraft are different if the runway is deemed to be wet (that is, potentially slippery). This can occur if it has recently rained or is currently raining, even if the rain is only very light. When a runway is deemed to be wet, operations with any tailwind element are generally not allowed due to safety considerations. The runway distance required for aircraft to depart and land generally increases when a runway is wet.

Rainfall data for WSI has been extracted and analysed from the most recent BOM data and findings show that the average annual rainfall at Badgerys Creek is 762.7 millimetres with rain recorded on average on around 112 days per year. Monthly rainfall more than 50 millimetres on average occurs in the months October to April at Badgerys Creek.

3.3.1.4 Air pressure and temperature

Aircraft performance, and therefore departure profile, is affected by air pressure, temperature and many other factors. Extreme high or low temperatures can have the most impact on airport operations generally.

High temperatures can affect airport operations and temperature has an indirect relationship with air density. As temperature climbs the air becomes less dense and affects the climb performance of aircraft. High temperatures can also affect fuel, causing it to expand and restrict the capacity to adequately refuel aircraft in some cases. Low temperatures increase the air density and enable all aircraft to climb at a more optimum rate.

Temperatures below zero degrees Celsius at surface level can produce adverse weather conditions that affect aircraft operations including hail, snow, sleet, frost, icing and freezing fog. Freezing fog can result in ice to form on an aircraft surface, which can reduce the performance of the aircraft due to increased weight, decreased thrust and increased drag. These conditions can also result in ice forming on paved areas such as the runway, especially after rain. Ice can present a risk to aircraft skidding due to loss of traction. De-icing equipment can mitigate the impact of icing on aircraft operations and hard surfaces.

At WSI, January has the most days on average above 30 degrees Celsius (15.1 days) and 35 degrees Celsius 6.1 days). July has the greatest number of days on average below zero degrees Celsius (2.8 days).

Frost and freezing fog at WSI could potentially occur between June to September, and May to September, respectively. Frost is most likely to occur in July, whereas freezing fog is more common from June to August. Frost is most likely to occur near sunrise. Freezing fog would most commonly occur in the hours between 5 am and 8 am prior to sunrise during the winter months.

Further temperature information at WSI is presented in Chapter 10 (Aircraft noise).

3.3.1.5 Thunderstorms

Thunderstorms, and the rapidly rising or falling air currents which usually accompany them, can be hazardous to aviation, regardless of size or intensity. Aircraft are unable to take-off or land during a thunderstorm and will often be re-routed around thunderstorm cells or diverted from their destinations. Thunderstorms and lightning strikes near airports may also stop ground operations until they pass. Aviation hazards encountered in and near thunderstorms include severe wind shear and turbulence, severe icing, downbursts, hail, lightning, heavy rain, low cloud, poor visibility, and rapid air pressure fluctuations. While most ordinary thunderstorms would occur over thirty minutes to an hour, thunderstorms can occur for several hours.

BOM data analysis suggests that the thunderstorm season in the vicinity of WSI appears to start and finish earlier in the year by approximately one month when compared to Sydney (Kingsford Smith) Airport. Outside of the thunderstorm season, there is expected to be less thunderstorm activity at WSI when compared to Sydney (Kingsford Smith) Airport. Most thunderstorms in the region develop over the Great Dividing Range moving eastwards into the Sydney Basin. The proximity of WSI to the Great Dividing Range may mean a relatively short lead time for thunderstorm impacts at the airport. For example, a thunderstorm that initiates over the Great Dividing Range and moving at 20 knots would reach WSI in approximately 30 minutes.

3.3.1.6 Turbulence and windshear

Turbulence is caused by a disruption to air flow. This can be created by the flow of air around an obstacle (such as topography or buildings) or due to meteorological conditions (such as temperature inversions). Turbulence can occur at any height. The Blue Mountains is a topographical obstacle, and strong wind conditions with a westerly influence are known to produce turbulence in the vicinity of WSI.

Turbulence impacts the control of an aircraft and is often experienced in-flight as aircraft bumpiness. Every aircraft also generates wake turbulence while in flight. Wake turbulence forms behind an aircraft as it passes through the air.

Windshear is a sudden change in wind direction or speed and is usually associated with thunderstorm activity. Windshear can be either vertical or horizontal and can have a significant impact on the control of aircraft during take-off and landing. Windshear is always present in turbulent air, but windshear can occur without turbulence being present.

Moderate and severe turbulence at WSI from these conditions would be most common in the winter months. When turbulence and windshear conditions occur, air traffic control will increase the standard separation distances between aircraft to maintain safe operations.

The NASF provides guidance on planning requirements for development to manage the risk of turbulence and windshear on airport operations. Controls have also been set in the *State Environmental Planning Policy (Precincts – Western Parkland City) 2021*.

3.3.2 Flight paths

Flight paths define the anticipated routes of aircraft both in the enroute phase of flight as well as when arriving and departing from an airport. Flight paths can be thought of as the highways in the sky. They are designated three-dimensional routes that guide safe flight between destinations, including manoeuvres for aircraft arriving and departing from an airport.

In the arrival or departure phase aircraft can fly either a SID (departure) or a STAR (arrival) under instrument guidance, or operate under VMC. Ideally, aircraft would fly by the most direct route and at the optimum altitude for reasons of economy and efficiency of flight operations. However, it is not always possible for aircraft to fly optimum routes because of safety considerations, the competing demands of other airspace users and consideration of noise impacts.

In controlled airspace, air traffic control endeavour to maintain aircraft on the designed flight paths whenever possible. However, for reasons of safety (for example, separation with other aircraft or thunderstorm avoidance), maintenance of runway capacity (minimising aircraft delay and fuel burn) or avoidance of temporary restricted airspace, some aircraft may be processed off the designed flight paths through the application of surveillance techniques.

Runway orientation at an airport is the major factor influencing the design of aircraft traffic flow patterns and flight path arrangements. Wherever operationally feasible, it is also desirable that aircraft traffic flow patterns are sufficiently flexible to deliver efficiencies in track-distance flown while minimising the effects of aircraft noise on surrounding residential and other noise sensitive areas.

Because of the greater manoeuvring options available for aircraft immediately after take-off, there is more flexibility in determining flight paths for departing aircraft than for aircraft landing at an airport. Landings need to aligned on the runway centreline and in a stable condition as an aircraft approaches the airport.

Aircraft will not adhere to a rigidly defined flight path and do not fly with the same level of consistency as a train running on a linear railway track, or a truck on a highway. This means that there will be some variation as to where different aircraft will be on the flight path because all aircraft perform slightly differently or may be affected by weather conditions, which can cause deviation to the left or right or vary positioning when flying a turning point. The variation of aircraft around a nominated flight path is referred to as dispersion.

Procedural departure flight paths commence as an extension of the runway centreline. Due to dispersion, the path will progressively widen to notionally 2 km either side of the nominal centreline of the SID flight path, transitioning to 5 km as the aircraft join the enroute flight network. This broad band is known as the flight path corridor. This caters for aircraft dispersion either side of the nominal centreline.

All departure aircraft must follow a departure flight path unless otherwise instructed by air traffic control. The day-to-day direction of air traffic, including the choice of a departure flight path, is primarily determined by the aircraft's departure point and its destination. Air traffic control will vary this flight path for reasons of safety or traffic sequencing when required.

For arriving flights, the flight path must be designed to ensure that an aircraft can safely leave the established higher level enroute airspace system to execute a safe landing onto the nominated runway. Aircraft arriving at WSI would normally be cleared by air traffic control to join a pre-determined STAR that provides standard vertical and lateral tracking guidance when leaving the enroute cruise phase of flight. Arriving aircraft would generally be required to join the final flight path using agreed instrument flight procedures such as an ILS approach.

The introduction of a set of SIDs and STARs to a new airport or an adjustment to SIDs and STARs at an existing airport may require an adjustment to enroute flight paths. Any such enroute changes will be made taking account of safety, efficiency, capacity and environment.

Airports are a destination or origin for a flight. An airport may also be overflown by aircraft transiting the airspace above while enroute to or from other airports. These transiting flight paths must be accommodated safely, efficiency, not impact the overflown airport capacity and minimise the effects of aircraft noise on surrounding residential and other noise sensitive areas when at lower altitudes.

The design of the flight paths must comply with all relevant national and international practices and regulations for safe and efficient air navigation and aircraft operations. It must also be compatible with the operational performance of the current and anticipated future aircraft fleets that could be expected to use an airport.

Chapter 6 (Project development and alternatives) and Chapter 7 (The project) provide detailed information on the flight path design for WSI.

3.3.3 Demand, type, volume and nature of aircraft traffic

The number of aircraft that arrive and depart an airport varies not only throughout the day but also between days and months.

For aircraft movement related planning such as airfield, airspace and flight paths, as well as operational environmental related impacts, there are important distinctions between:

- jet versus non-jet operations (turboprop aircraft typically operating on flights of less than 2-hours flight duration and with lighter passenger payloads)
- narrowbody jet (Airbus A320 and Boeing B737 families, typically on routes up to 7,000 km, with some new models now capable of flying more than 8,000 km) versus higher payload widebody jets (Airbus A330/A350 and Boeing B777/B787 with ranges up to, and in some cases beyond, 14,000 km)
- long haul (international destinations typically over 10 hours flight time) and short to medium haul operations (domestic, trans-Tasman and some of the closer Asian and Pacific ports) whether operated by narrowbody or widebody jets.

Longer flights generally have higher thrust settings and lower climb profiles due to the requirements for these aircraft to carry more fuel when departing. This typically means that aircraft on longer flights produce higher noise levels than shorter flights when departing. The noise emissions of arriving aircraft are generally independent of the distance flown.

The route densities by geographical direction, as well as aircraft type, are important in airspace planning. The aircraft movements at WSI are forecast to be dominated by domestic and short-haul international operations (refer to Chapter 2 (Strategic context and need)).

3.3.4 Runway modes and capacity

Generally, aircraft land and take-off into the wind. Runway operating modes are informed by assessing runway orientation and availability against factors such as current and forecast meteorological conditions (especially wind direction and strength), runway surface status, aircraft profile and capability, demand and traffic volumes, airspace management procedures, and potential impacts on surrounding communities (such as noise). Air traffic control is responsible for selecting the operating runway (or ‘nominated’ runway) at an airport.

Runways can operate in 2 ways:

- aircraft arrive and take-off in the same direction (for example, all aircraft arrive from the south-west and take-off to the north-east)
- aircraft arrive and take-off in opposing directions (or head-to-head) (for example, all aircraft arrive from the south-west and take-off to the south-west). This is known as Reciprocal Runway Operations (RRO) and is a low capacity mode. It is also dependant on weather conditions to ensure safe operations.

The Stage 1 airport infrastructure at WSI comprises a single runway orientated on a north-east/south-west axis. The airfield geometry and infrastructure were approved in the Airport Plan (DITRDC, 2021) and is currently under construction. This approval has set the runway orientation and length, and the location of runway taxiway entries and exits.

The initial and final flight path segments connecting to the runway are also fixed to ensure that aircraft can safely make the required turns following take-off or to stabilise on the final approach to the runway for landing.

Depending on the prevailing wind conditions at WSI, aircraft would be either on a north-easterly (Runway 05) or south-westerly (Runway 23) direction of operations (refer to Figure 3.14 and Figure 3.15). The Airport Plan also identified the potential for RRO as a third possible operating mode, with the viability of this mode to be investigated during the airspace and flight path design. Further discussion on this mode of operation at WSI is provided in Chapter 6 (Project development and alternatives) and Chapter 7 (The project).

Navigational aids (and associated systems) would be provided at WSI to support airport operations and are approved as part of the Stage 1 Development. Further information on the navigational aids is presented in Chapter 4 (Project setting).

The capacity of the runway mode (the mode capacity) is the maximum number of aircraft movements per hour that can be processed safely and consistently.

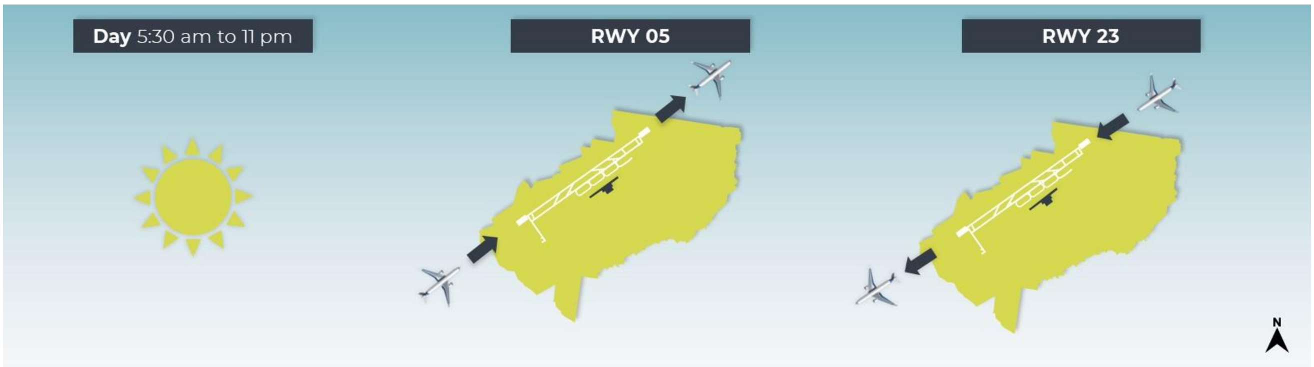


Figure 3.14 Arrival and departure models for Runway 05 and Runway 23 at WSI (day)

Figure 3.15 Arrival and departure models for Runway 05 and Runway 23 at WSI (night)

3.3.4.1 Aircraft separation

Separation standards refer to the minimum distance that aircraft operating in controlled airspace and at airports with an operational control tower must be kept apart. Different separation standards apply to aircraft operating under IFR or VFR. Air traffic controllers must keep aircraft separated vertically or horizontally.

CASA's Manual of Standards Part 172 – Air Traffic Services sets the minimum separation requirements for aircraft (vertical or lateral) which are applied in the design of SIDs and STARs. This is referred to as strategic separation assurance or '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 airports. A core element of Safety by Design is to deliver standardised procedures wherever possible and the introduction of variability in procedure must balance efficiency against safety.

Safety by Design develops SIDs and 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 cockpit computer systems of aircraft. 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 the aligned information.

When separation assurance is built into the system, air traffic control no longer has to provide instructions to pilots (as they do for example for Sydney (Kingsford Smith) Airport) to maintain separation and process aircraft to final approach. Instead, aircraft are able to be monitored with the instructions built into the arrival procedure design, allowing safety to be introduced by design.

3.3.4.2 IFR aircraft

In Australia, aircraft flying under IFR in controlled airspace up to 41,000 ft (12.5 km) must be separated by approximately 1,000 ft (305 metres (m)) vertically unless they are separated horizontally (refer to Figure 3.16). Above 41,000 ft (12.5 km), the vertical separation increases to approximately 2,000 ft (600 m).

When aircraft are separated vertically, horizontal separation can be reduced without compromising safety.

In controlled enroute airspace, the horizontal separation standard between aircraft flying at the same altitude is 5 nm (9 km). In terminal area airspace, the minimum separation is 3 nm (around 5.6 km) (refer to Figure 3.16). Within the confines of an airport control zone, the separation can be as close as practicable as long as the aircraft remain separated.

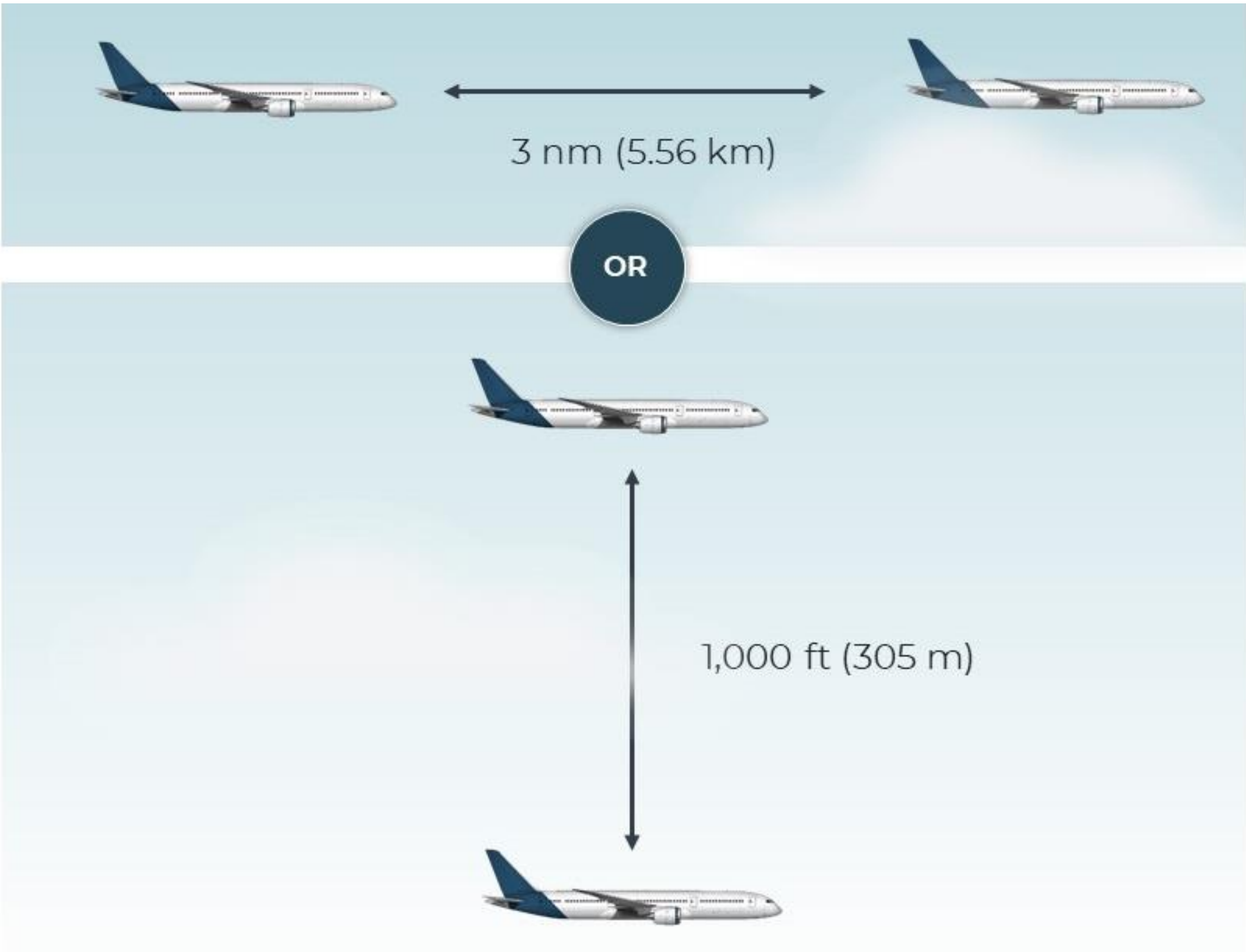


Figure 3.16 Separation distances for IFR aircraft

3.3.4.3 VFR aircraft

In uncontrolled airspace in Australia, aircraft flying under VFR are responsible for their own separation with other aircraft using 'see and avoid' procedures. In controlled airspace, these aircraft are generally separated from other aircraft by air traffic control.

3.3.5 Aircraft sequencing

Different types of aircraft require different separation between each other, depending on their size and weight. This separation is required to mitigate the effects of wake turbulence from aircraft that are departing or arriving. Wake turbulence, or wing tip vortices, is the rotating turbulence that is created behind a large aircraft. Its intensity is normally greatest when the large aircraft is flying at slow speeds with its wing flaps extended. It is a safety hazard to smaller aircraft and the separation distance behind large aircraft is increased to mitigate against its effects.

3.3.5.1 Arrivals

The maximum capacity of a runway can be achieved when departures occur between arriving aircraft operating in the same direction. This is known as mixed mode operations. Sufficient space must therefore be created between arriving aircraft to allow this to happen. Arriving aircraft must be sequenced in such a manner that the gap between subsequent arrivals allows a safe take off to occur.

Normally a 2.5 minute gap between arriving aircraft will allow for a take-off to safely occur. This equates to 25 arrivals per hour and with a balanced arrival and departure sequence, 24 to 25 departures in that hour would result in a maximum single runway throughput rate of 49 to 50 aircraft movements per hour. The gap between arrivals can sometimes be:

- increased to allow for the added separation distance requirement for smaller aircraft following larger aircraft (wake vortices impact)
- reduced when there are no departures presenting and when similar type aircraft are in trail (heading on the same flight path in the same direction) and the runway and taxiway infrastructure allows for a rapid exit from the runway for such aircraft types
- increased during low cloud conditions, reduced visibility and/or strong headwinds to allow air traffic control to maintain the required separation standards when aircraft using the runways are not necessarily visible to the air traffic controllers.

Other factors such as airport infrastructure can impact on capacity. An aircraft may spend less time on a runway, for example, if rapid exit taxiways are available. This allows aircraft to vacate a runway at higher speed.

When short-term demand exceeds capacity in busy traffic conditions or when capacity decreases due to reduced visibility or low cloud, enroute holding may be used to manage and sequence traffic flow to the runway. In this type of situation, some traffic will be sequenced through speed reduction or increasing the distance an aircraft must fly to the runway (known as track stretching). Other aircraft may be required to enter a holding pattern as they wait to join the arrival sequence. Consistent with other major Australian airports, holding patterns for arrival aircraft would typically be beyond 40 nm (74 km) from WSI and above 10,000 ft (3 km).

Some aircraft in extremely rare instances, and in line with safety requirements, could be required to enter a lower altitude and closer holding pattern at approximately 4,000 ft (one km) if there is an unplanned major issue at WSI or a technical issue with the aircraft.

3.3.5.2 Departures

A departure sequence of aircraft is managed to a set of international standards. Departing aircraft are typically sequenced in between aircraft that are arriving. Departing aircraft are held on the taxiway short of the runway until the arriving aircraft has passed. Departing aircraft are cleared for take-off once the landing aircraft is clear of the runway.

For successive departures numerous factors determine when the second (following) aircraft is cleared to depart. Once the first aircraft is airborne and has reached a separation of at least 1.8 km ahead, the second aircraft can be cleared for take-off. Measured in time this normally equates to about one to 1.5 minutes between aircraft. When sequencing multiple consecutive departures during a departure demand peak, there could be more than 30 departures in an hour with a limited number of arrivals.

The separation distance may increase if the following aircraft is faster or if a smaller aircraft follows an aircraft that is larger (due to turbulence). Departure capacity is reduced during poor weather.

3.3.6 Time of day

As outlined in Section 3.2, air traffic control procedures define the specific rules that apply to every flight. These rules differ for varying operational circumstances and are affected by such factors including time of day.

The day period for WSI is defined as 5:30 am until 11 pm local time and the night period as 11 pm to 5:30 am. Ambient noise levels are generally higher during day-time hours. Further information on the time periods and the runway modes of operation are found in Chapter 7 (The project)

During the night period there are generally fewer aircraft arriving and departing. This lower demand, and the operation of the curfew at Sydney (Kingsford Smith) Airport, permits the use of different runway modes.

3.3.7 Noise abatement procedures

Every major airport has noise abatement procedures which are airspace operational procedures designed to reduce the impact of aircraft noise from flight operations on the community in the vicinity of an airport, especially near residential areas.

Noise abatement procedures are normally applicable to jet aircraft and other aircraft with a Maximum Take-off Weight exceeding 5,700 kilograms (kg).

Noise abatement procedures can include:

- the preferred flight track and/or runway modes of operation (to move traffic as efficiently as possible while reducing the noise impact over residential areas)
- noise abatement departure procedures, such as directing aircraft to depart over certain areas at night
- approach procedures, such as continuous descent operations and low power, low drag techniques
- modified flight path angles to adjust climb gradients
- on-airport controls such as restrictions on engine run-ups (a type of engine check) and/or ground equipment use
- departure speed controls below certain altitudes
- reduced wing flap settings on approach and/or delayed deployment of landing gear
- control of the application of reverse thrust during noise sensitive periods
- the times of the day when specific noise abatement procedures apply
- any exemptions such as medical, emergency or rescue flights, or aircraft subject to an in-flight emergency.

Communities near airports may be sensitive to operations at different times of the day and night. To minimise the noise impacts on these communities noise abatement procedures may also include requirements regarding the time of day that the specific noise abatement procedure is applicable, including noise abatement procedure criteria to prioritise a preferred runway nomination.

Noise abatement procedures are implemented by air traffic control, airports or airport owners.

Airservices Australia is responsible for the development and review of noise abatement procedures with stakeholders, including aircraft operators, airlines, the airport operator and community aviation consultation groups. Noise abatement procedures are periodically monitored and reviewed by Airservices Australia to check the effectiveness of the procedures.

The development and review of noise abatement procedures requires appropriate consideration of a range of factors, including potential environmental impacts. This includes the physical layout of the airport, the airport surroundings, and the capacity of the airport and airspace, particularly during high demand periods.

There are some limitations to the use of noise abatement procedures, for example if they generate delay and congestion, as this can cause consequential noise and emissions impacts. Air traffic control or pilots may not be able to use them in certain situations, for example weather conditions or operational requirements. Noise abatement procedures are also not legally enforceable.

Noise abatement procedures and approaches taken in the design of the airspace architecture for WSI to reduce the impact of aircraft noise on the community is discussed further in Chapter 6 (Project development and alternatives) and Chapter 7 (The project).

3.3.8 Interaction with other airspace users

The airspace around an airport and its interaction with other airports plays a critical role in the use of runways and flight path design.

The Sydney Basin airspace comprises an extensive network of flight paths associated with existing civil airports (Sydney (Kingsford Smith) Airport, Bankstown, Camden), Defence facilities (RAAF Base Richmond, Holsworthy Military Airport, overflight restrictions at the Defence Establishment Orchard Hills), recreational aviation activities (gliders, ballooning, parachuting), emergency response aircraft movements and transiting flights.

Restricted airspace at the abovementioned Defence facilities and the Lucas Heights nuclear facility also restricts the flight of aircraft within these areas in accordance with specified conditions.

CASA regulates Australian administered airspace and undertakes regular reviews of existing airspace arrangements.

Section 4.1 in Chapter 4 (Project setting) provides further detail on the existing conditions within the Sydney Basin airspace, and consideration of airspace changes to accommodate WSI is discussed further in Chapter 6 (Project development and alternatives) and Chapter 8 (Facilitated changes).

Chapter 4 Project setting

The Sydney Basin airspace is likely the most complex and busiest in Australia, and most parts of the Sydney Basin including Western Sydney currently experience some level of daily aircraft overflight. The Sydney Basin airspace has an extensive network of flight paths associated with existing airports, Defence facilities, flying training, recreational aviation activities (gliders, ballooning and parachuting), emergency aviation activities (for example, medical or bushfire), helicopter activity and transiting flights. This chapter describes the existing Sydney Basin airspace, as well as the major airports and airspace activities operating within it.

WSI and its surrounds are located within the Western City District. Areas surrounding WSI are a mix of rural-residential, residential, agricultural, industrial, recreational and conservation land uses. Areas immediately surrounding WSI will transform under the NSW Government's overarching vision for the Western Parkland City, which will be established on the strength of WSI and the Aerotropolis. This includes the new Bradfield City Centre. This chapter provides an introduction to the existing regional context of WSI, a description of the Stage 1 Development (and the current status of construction), and the Matters of National Environmental Significance within 45 nautical miles (nm) (83 kilometres (km)) of the Airport Site.

4.1 The Sydney Basin airspace

4.1.1 Existing Sydney Basin airspace

The Sydney Basin airspace refers to the airspace area within the Greater Sydney region, bordered by Sutherland and Bargo in the south, Lake Macquarie and the Hawkesbury River in the north and Mount Victoria in the west. It encompasses an extensive network of flight paths associated with existing airports, Defence facilities, flying training, recreational aviation activities (gliders, ballooning and parachuting), emergency aviation activities (for example, medical or bushfire), helicopter activity and transiting flights.

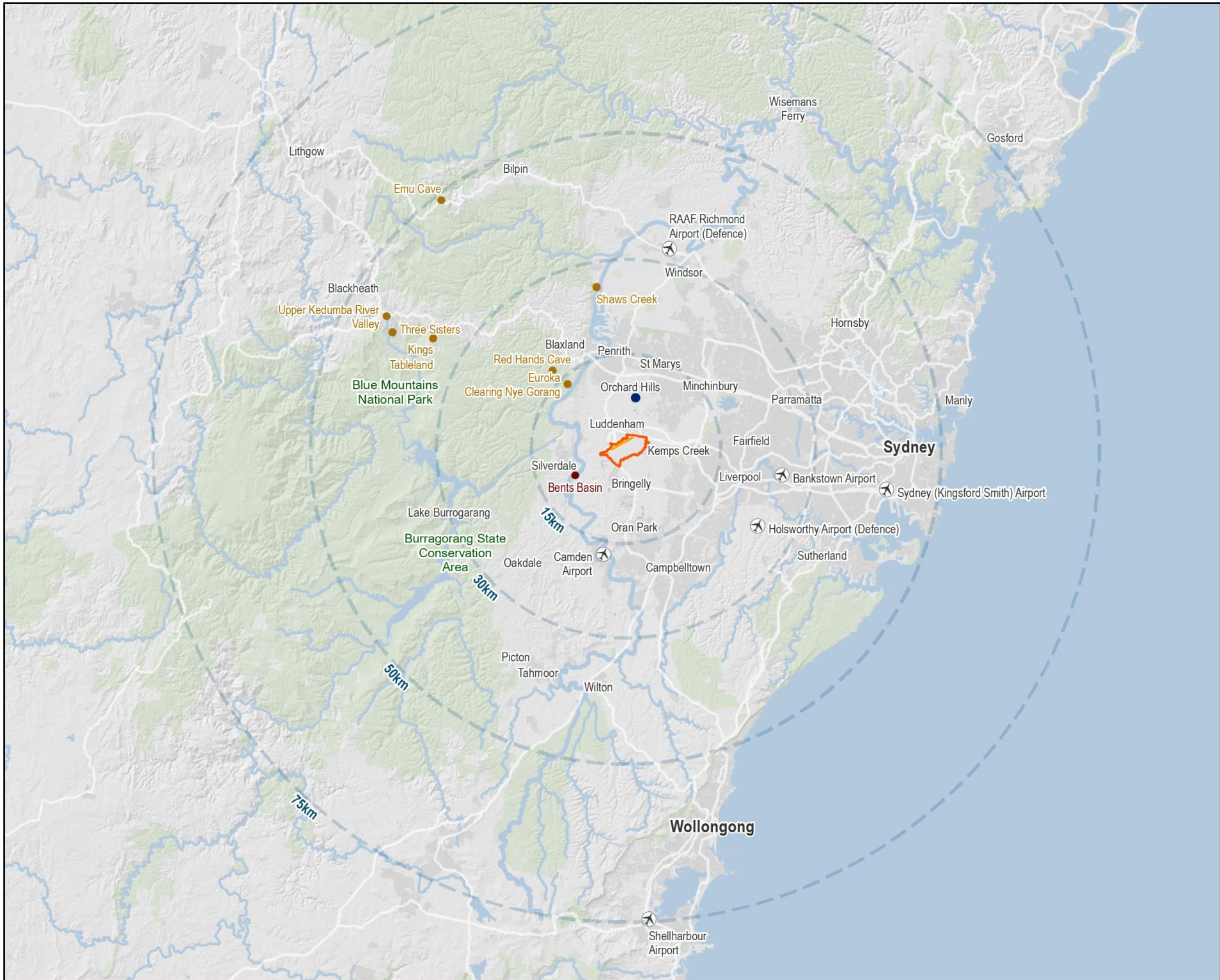
Key airports or sites that influence the Sydney Basin airspace include:

- Sydney (Kingsford Smith) Airport
- Bankstown Airport, Camden Airport and Shellharbour Airport
- Defence airports – Royal Australian Air Force (RAAF) Base Richmond and Australian Army Holsworthy Airport
- Defence Establishment Orchard Hills – This facility is operated by the RAAF and comprises munitions storage base and the Defence Explosive Ordinance Training School. Airspace over this facility is restricted when the site is in use.

Figure 4.1 shows the location of the key airports and sites within the Sydney Basin airspace relative to WSI.

Figure 4.1

Location of WSI, key airports and airspace users



Legend

- WSI Runway
- Western Sydney International (Nancy-Bird Walton) Airport land boundary
- Radial distances
- Orchard Hills Defence Establishment
- Aboriginal Places raised during consultation (NPW Act)
- Site of Aboriginal significance

0 10 20 km

Coordinate system: GDA 1994 NSW Lambert

Scale ratio correct when printed at A4

1:800,000 Date: 8/06/2023

Data sources: - DITRDC, DCS, Geoscience Australia
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community

The Sydney Basin airspace is likely the most complex and busiest in Australia. In 2019 there were more than 700,000 air traffic movements associated with the Sydney (Kingsford Smith), Bankstown and Camden airports. The actual flight tracks of individual aircraft within the Sydney Basin airspace are recorded by Airservices Australia using information from surveillance radars operated by air traffic control (noting this only captured aircraft that carry a transponder and can be tracked by Airservices Australia). Most parts of the Sydney Basin including Western Sydney currently experience some level of aircraft overflight. The level of existing aircraft activity within the Sydney Basin airspace is evident in reviewing actual flight tracks flown by aircraft from Sydney (Kingsford Smith), Bankstown, Camden and RAAF Base Richmond airports over a one week period in 2019 (refer to Figure 4.2). This figure does not include aircraft activities associated with the Australian Army Holsworthy Airport.

Figure 4.2 emphasises the already congested nature of air traffic movements in the Sydney Basin. Aircraft that already operate within the Sydney Basin range from large widebody jets (Airbus A380, Boeing B777, Boeing B787) through to narrowbody jets (Boeing B737, Airbus A320), turboprops (Dash 400, SAAB 340), military aircraft, to single/twin-engine piston aircraft and various helicopter models. Aircraft within the Sydney Basin can be on descent from around 15,000 feet (ft) (4.5 kilometres (km)) or on climb to around 20,000 ft (6 km) depending on aircraft type, its origin or destination within the Sydney Basin, and the associated Standard Instrument Arrival (STAR) or Standard Instrument Departure (SID) being flown. For the smaller aircraft they may also be at a low cruise altitude down to around 1,500 ft (460 metres (m)) or lower for helicopters.

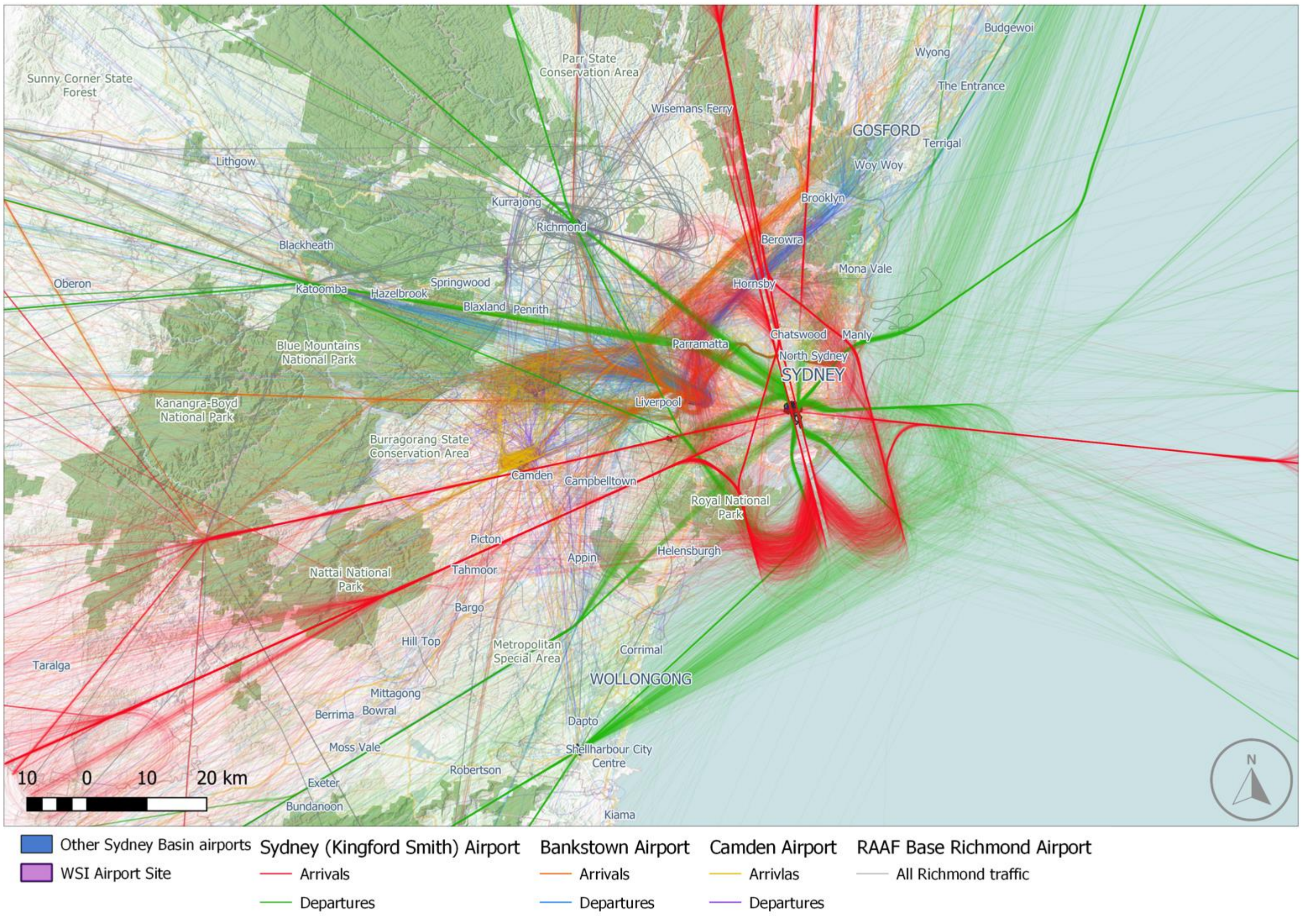


Figure 4.2 Sydney Basin airspace with one week of flight track movement activity in 2019 associated with Sydney (Kingsford Smith), Bankstown and Camden and RAAF Base Richmond airports

Figure 4.3 depicts aircraft movements operating under Visual Flight Rules (VFR) over a one month period (March 2019). These tracks represent around 1,600 departures, around 2,000 arrivals and around 820 circuit operations associated with Bankstown and Camden airports.

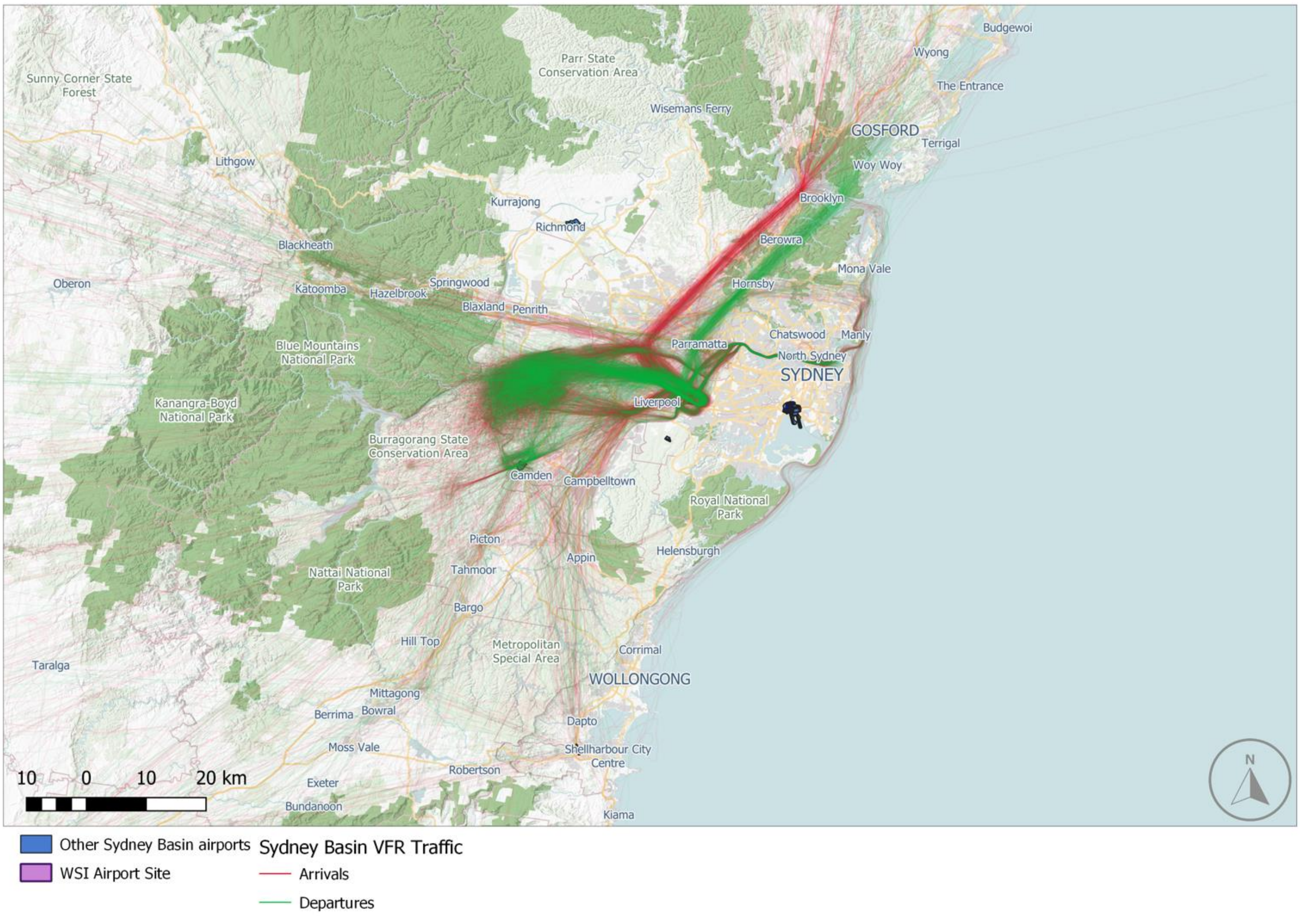


Figure 4.3 VFR tracks in the Sydney Basin over a one month period (March 2019)

4.1.1.1 Airspace classes

The Sydney Basin airspace comprises several airspace classes (as outlined in Chapter 3 (Introduction to airspace)) that are established to control the safety and efficiency of the airspace. A control zone extends from ground level to a specified altitude in the airspace surrounding an airport, whereas a control area extends upwards from a specified altitude. These include:

- Class A control area
- Class C control zone and control area
- Class D control zone
- Class G (uncontrolled airspace)
- restricted areas
- danger areas, which include training areas for Bankstown and Camden airports.

There are currently no prohibited areas (no-fly zones) in the Sydney Basin airspace.

Further information on airspace and how it is managed (such as an explanation of the different classes of airspace, controlled and uncontrolled airspace) refer to Chapter 3 (Introduction to airspace).

There are 3 control zones in the Sydney Basin (refer to Figure 4.4):

- the Sydney (Kingsford Smith) Airport control zone. The control zone is classified as Class C and extends from the ground to 2,500 ft (760 m) Above Mean Sea Level (AMSL). It is irregular in shape, extending approximately 4 nautical miles (nm) (7.5 km) to the north and approximately 11 nm (20 km) to the south-west from Sydney (Kingsford Smith) Airport
- the Bankstown control zone. This is classified as Class D during control tower hours and Class G outside of control tower hours, and extends from the surface to 1,500 ft (around 460 m) AMSL. It extends around 3 nm (6 km) north and 2 nm (4 km) south of Bankstown Airport. Its eastern extremity abuts the Sydney control zone
- the Camden control zone. This is classified as Class D during control tower hours and Class G outside of control tower hours, and extends from the surface to 2,000 ft (610 m) AMSL. It is centred on Camden Airport with a radius of 2 nm (4 km).

In addition to these control zones, the Sydney terminal control area covers a radius of 45 nm (83 km) from Sydney (Kingsford Smith) Airport. This has several different control areas stepped at different altitudes. The Sydney terminal control area is controlled by Airservices Australia. The control areas within the Sydney region are mainly Class C. Some Class A airspace exists at high level above the Class C.

Uncontrolled or Class G airspace exists below the Sydney terminal control area. It extends from the surface to the control area lower limits and close to Sydney (Kingsford Smith) Airport. It supports a range of typically smaller aircraft operations, including flying training (fixed-wing and helicopters), parachute operations, emergency services and sports and private general aviation. The volume of Class G airspace within the Sydney Basin will also vary depending on the activation of various restricted areas (which are utilised for Defence activities and are discussed further in Section 4.1.4) and control zones which are activated to accommodate operations at the smaller general aviation airports.

Further information on the existing air traffic control management, airports and other Sydney Basin airspace users is provided in Sections 4.1.1.2 to 4.1.5.

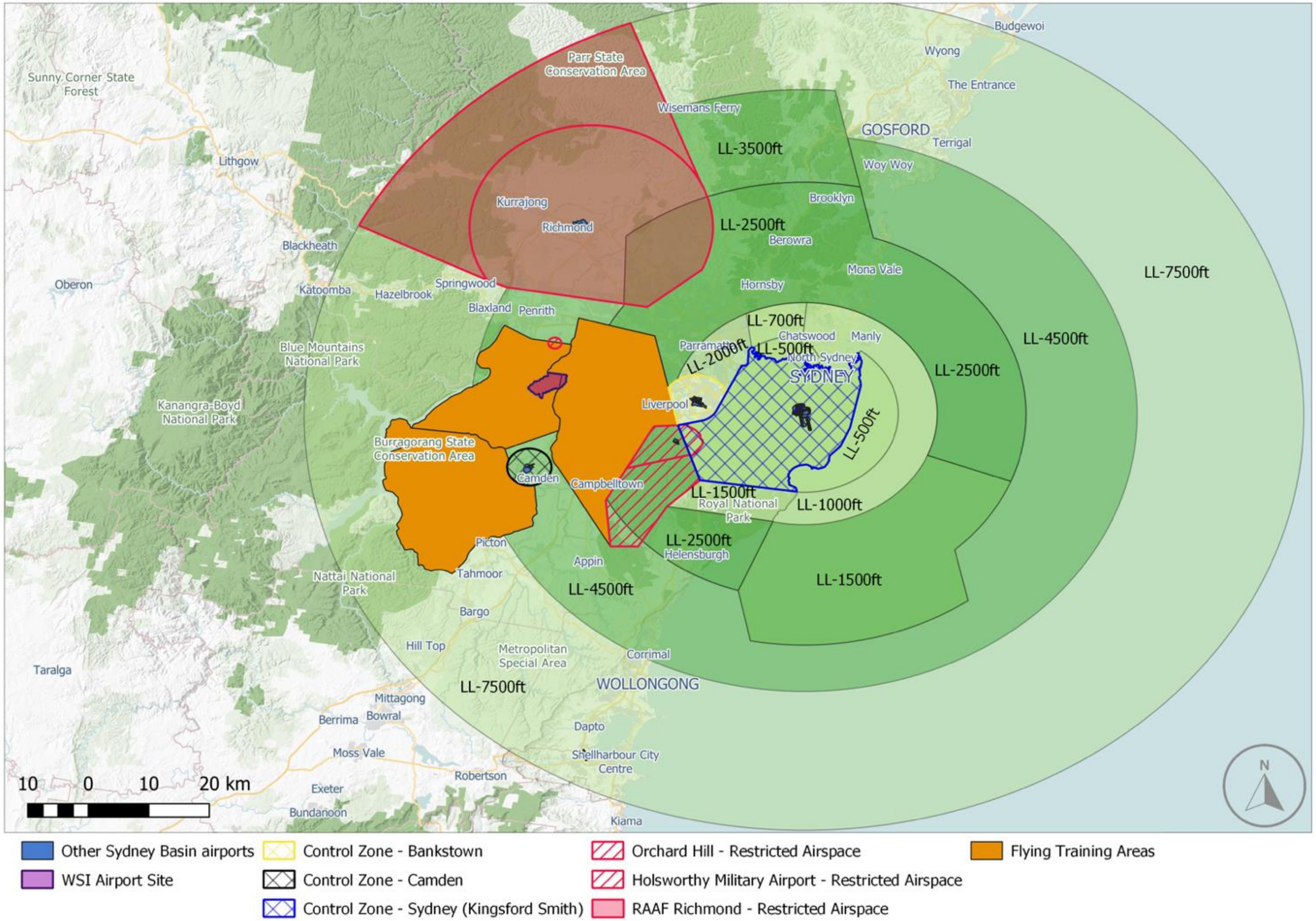


Figure 4.4 The Sydney Basin control area, control zones and lower level of controlled airspace

4.1.1.2 Air traffic control management

Air traffic control towers exist at Sydney (Kingsford Smith) Airport, Bankstown Airport, Camden Airport and RAAF Base Richmond.

The control function exercised from the Sydney (Kingsford Smith) Airport air traffic control towers is limited to the runways and taxiways of the airport itself.

At Bankstown and Camden airports, and RAAF Base Richmond, the control function exercised from the air traffic control towers manages the operations of the runways and taxiways of the airport itself, as well as local flying activity. The towers independently manage the initial departure phases of flight, the final arrival phases of flight and circuit flying at those airports.

A Terminal Control Unit (TCU), physically located at Sydney (Kingsford Smith) Airport, is responsible for exercising control in the airspace surrounding the airport out to about 45 nm (83 km) radius and up to 28,000 ft (8.5 km). The TCU controls all departing and arriving aircraft at Sydney (Kingsford Smith) Airport, as well as:

- any departures and arrivals from Bankstown and Camden airports and RAAF Base Richmond for aircraft that plan to fly inside the controlled airspace
- aircraft that are planning to fly through parts of the controlled airspace that have an origin or destination to an airport without an air traffic control tower (for example, Shellharbour Airport)
- helicopters from non-airport facilities (for example, Westmead Hospital) that are planning to fly in controlled airspace.

The TCU also provides:

- a separation service for transiting flights (that is, those crossing the 45 nm (83 km) airspace radius and not landing in it or departing from within it) when flying in controlled airspace
- traffic and flight information for aircraft operating under Instrument Flight Rules (IFR) in uncontrolled airspace.

Enroute controllers located in Melbourne and Brisbane are responsible for managing all aircraft traffic except aircraft within areas where the TCU or air traffic control towers have responsibility.

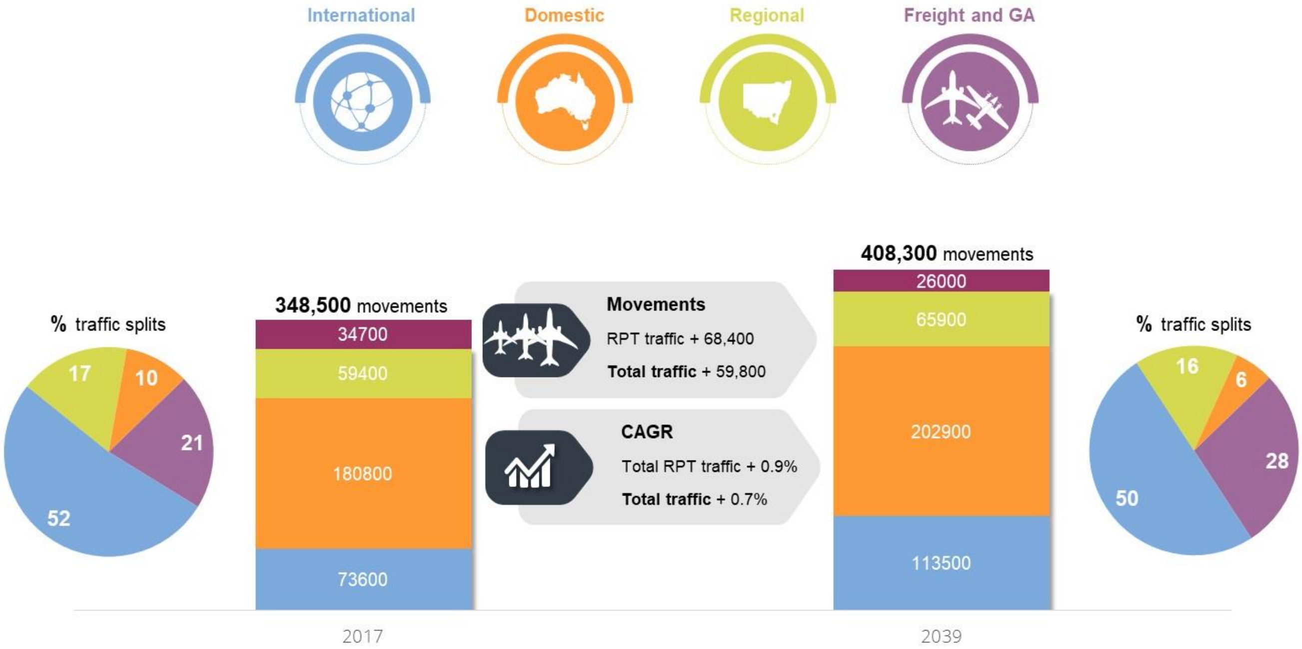
4.1.2 Sydney (Kingsford Smith) Airport

Sydney (Kingsford Smith) Airport is Australia's busiest airport in terms of passenger movements and freight. The airport is located in Mascot, approximately 24 nm (45 km) east of WSI and approximately 4nm (7.5 km) south of Sydney's Central Business District (CBD). There are currently over 50 international, domestic and regional airlines operating from the airport, which together service over 100 destinations.

In 2019 there were approximately 325,000 aircraft movements, 44.4 million passenger movements and 520,000 tonnes of international air freight (BITRE, 2022). As with most airports around the world, aircraft and passenger movements were temporarily reduced by a significant amount during the COVID-19 pandemic. In 2021 approximately 125,000 aircraft movements, 7.9 million passenger movements and 568,000 tonnes of international air freight passed through Sydney Airport (BITRE, 2022).

Figure 4.5 presents the traffic growth forecasts adapted from the current 2039 Master Plan for Sydney (Kingsford Smith) Airport including the compound annual growth rate. The forecasts were independently prepared for Sydney Airport Corporation Limited (SACL) 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 (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.



Sydney Airport Corporation Limited (SACL), 2019

Figure 4.5 Sydney (Kingsford Smith) Airport aircraft movement growth forecast (adapted from the Sydney Airport Master Plan 2039

Sydney (Kingsford Smith) Airport has 3 runways, comprising 2 parallel runways on an approximate north-south alignment and a cross runway on an east-west alignment, as shown on Figure 4.6. The 3 runways are:

- Runway 16R/34L (the main runway)
- Runway 16L/34R (the parallel runway)
- Runway 07/25 (the cross runway).

The Long Term Operating Plan for Sydney (Kingsford Smith) Airport and Associated Airspace (Airservices Australia, 1996) (LTOP) was developed (as one of a suite of policies and procedures) for the airport to manage aircraft noise impacts through a preferential runway selection system in conjunction with the following legislation:

- the *Sydney Airport Curfew Act 1995*, which imposes a curfew on aircraft operations between 11 pm and 6 am. During the curfew, departures are confined to Runway 16R and arrivals to Runway 34L. A limited number of aircraft types are allowed to operate during the curfew, including emergency service aircraft and any aircraft that needs to land for safety reasons. Some small jets, propeller-driven aircraft and freight movements are also allowed. Under this legislation, a limited number of international passenger aircraft are also permitted each day to operate between 5 am and 6 am, and 11 pm and 12 am. During periods of major runway works Runway 16L departures/34R arrivals are available conditional on government approval
- the *Sydney Airport Demand Management Act 1997*, which caps the scheduled arrivals and departures to 80 runway hourly movements.

The LTOP for Sydney (Kingsford Smith) Airport ensures that aircraft movements are maximised over water and non-residential land. When this is not possible, the LTOP shares the noise from aircraft operations across residential land. The LTOP provides 10 runway operation modes that Airservices Australia can select, taking into consideration safety, weather, traffic demand and the noise sharing targets. This model is not available for WSI as there is only one runway, and is not applied at other airports.

Photo credit: Sydney Airport Corporation Limited (SACL)

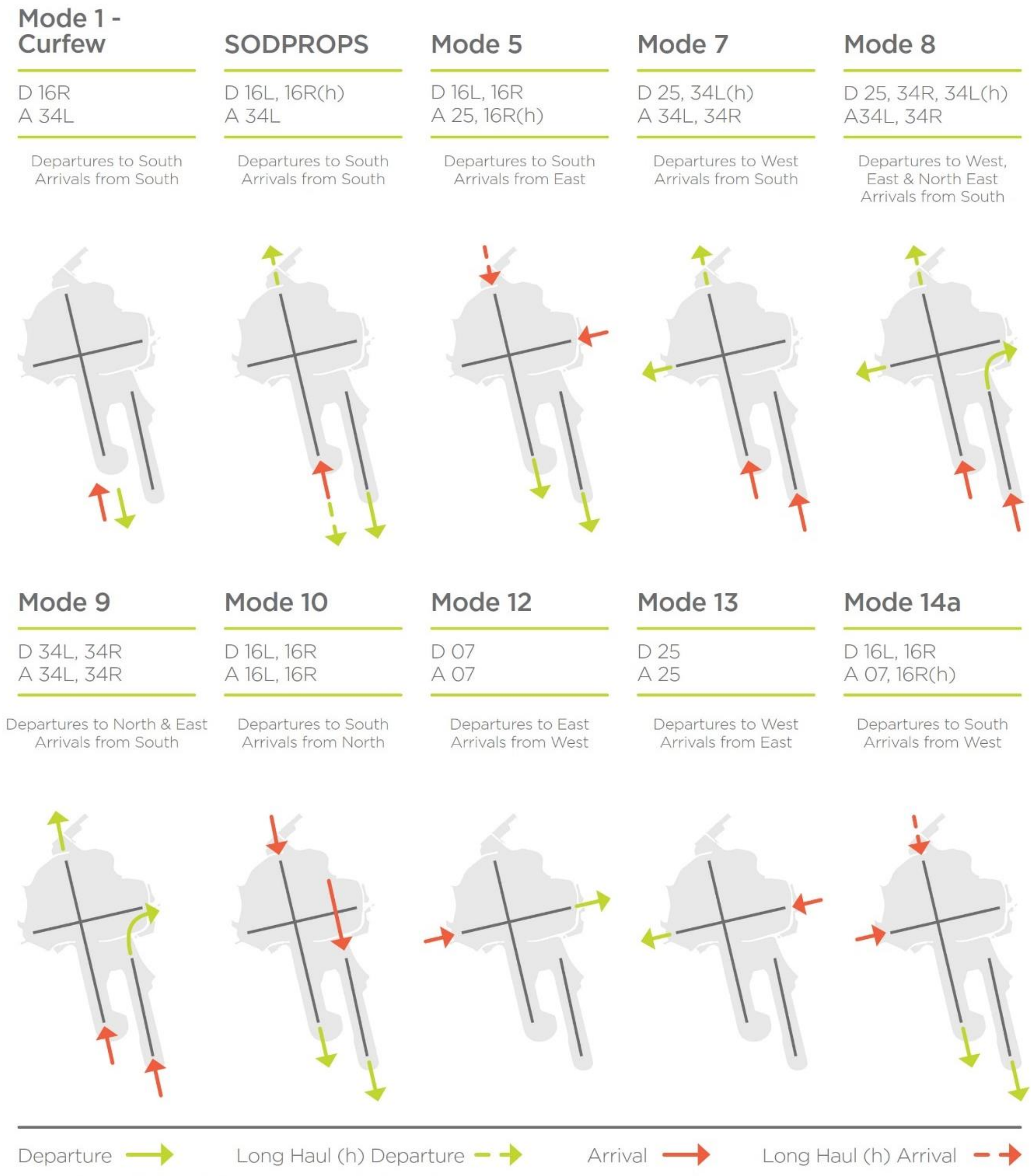
Figure 4.6 Sydney (Kingsford Smith) Airport

4.1.2.1 Arrivals and departures

Sydney (Kingsford Smith) Airport operates principally under IFR. It has many published flight paths that allow aircraft to safely navigate to and from the airport at times of low visibility.

During peak periods, both the main and the parallel runways are used at the same time (either Mode 9 or Mode 10) (subject to weather). Peak periods are generally from 7 am to 11 am and 3 pm to 8 pm. Outside of peak periods, the runway mode of operation would be dictated by safety, weather and demand. These modes include different combinations of the runways (including direction). The cross runway can only be used at the lower traffic volumes given it intersects the main and parallel runways. The cross runway can also become the only available runway during the infrequent situation of very high cross-wind conditions on the 16/34 parallel runway direction (Mode 12 and Mode 13). During the curfew, aircraft are only permitted to arrive and depart from the main runway (except for emergency medical flights) (Mode 1).

Figure 4.7 shows the runway modes of operation (RMOs) at Sydney (Kingsford Smith) Airport.



Sydney Airport Corporation Limited (SACL), 2019

Figure 4.7 Runway modes of operation at Sydney (Kingsford Smith) Airport

4.1.3 General aviation airports

General aviation refers to all civil aviation operations that are not commercial air transport services. This includes aerial work (such as agriculture, photography, surveying, search and rescue), instructional flying and recreational flying.

The 2 main general aviation airports in the Sydney Basin are Bankstown and Camden airports (refer to Figure 4.1).

There are several other smaller aeroplane landing areas within the Greater Sydney region. These facilities cater for activities such as private flying, aerial work, and sports and recreational aviation.

4.1.3.1 Bankstown Airport

Bankstown Airport is located approximately 14 nm (26 km) east of WSI and 14 nm (26 km) south-west of the Sydney CBD. It is operated and managed by Aeria Management Group and has 3 parallel runways (11L/29R, 11C/29C and 11R/29L). Bankstown Airport operates 24-hours, 7 days a week.

It caters for a wide range of general aviation activities (both fixed-wing and helicopter) including flying training, charter flights, aircraft sales and maintenance, air freight and emergency services. There are currently no regular scheduled passenger services at the airport, although the terminal building is used on an occasional basis for passenger processing for charter flights. Bankstown Airport also serves as a base for the NSW Police Air Wing, the NSW National Parks and Wildlife Service, the Royal Flying Doctor Service, Forestry Corporation of NSW, Sydney Basin Helicopter Medical Service and the Aviation Studies program of the University of NSW.

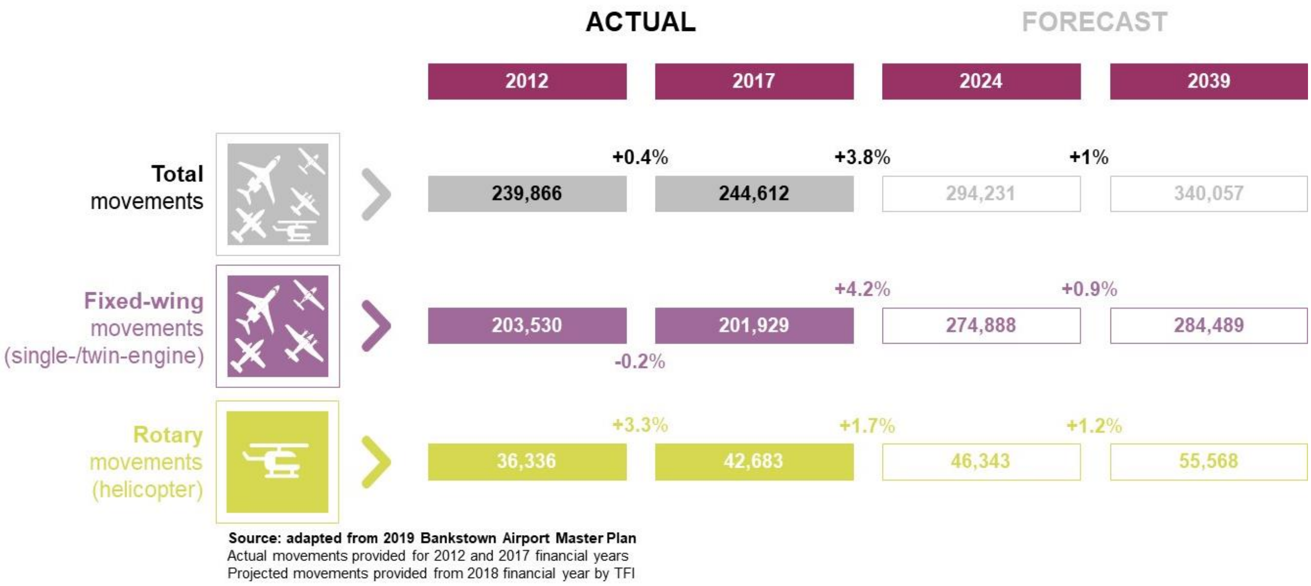
The airport currently accommodates around 700 aircraft movements per day on average. Around 80 per cent of aircraft operating at the airport are single-engine and twin-engine piston aircraft, typically engaged in flying training, private flying and related activities. Rotary aircraft (helicopters) account for 16 per cent of aircraft activity and are typically involved in emergency services and government agency operations, flying training, charter or freight activity. A further 4 per cent of aircraft are turboprop aircraft, which are typically involved in charter, business, corporate and other aerial work activities. Jet aircraft activity contributes only one per cent of aircraft operating at Bankstown Airport and typically includes business and private activities as well as maintenance of other aircraft.

The 3 parallel runway system at Bankstown Airport provides an estimated annual capacity of approximately 450,000 aircraft movements. With current movements around 247,500 annually (combined fixed-wing aircraft and helicopters), the runways have significant additional capacity available beyond a 20-year horizon.

Figure 4.8 summarises the forecasts presented in the Bankstown Airport Master Plan 2019 (Bankstown Airport Limited, 2019).

A set of noise abatement procedures are in place at Bankstown Airport. These 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 also has 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 flying training schools) based at the airport.



Bankstown Airport Limited, 2019

Figure 4.8 Bankstown Airport daily forecasts

Arrivals and departures

Most aircraft that arrive or depart from Bankstown Airport operate under Visual Flight Rules (VFR) and contain their operations to the control zone (circuit training), the associated flying training areas or in the surrounding Class G airspace. However, aircraft operating under Instrument Flight Rules (IFR) that arrive or depart from this airport do so through a combination of flight in both Class G and the overlying Class C airspace in the Sydney Basin.

Arriving aircraft operating under IFR plan to fly directly from the last enroute waypoint. Once the flight is established in visual conditions and above the lowest safe altitude for the remainder of the flight, the Sydney TCU provides the aircraft with a direct track to Bankstown Airport, subject to separation with other aircraft in the Sydney Basin. This includes clearance to leave the controlled airspace on descent, either into uncontrolled airspace or directly into the Bankstown control zone. If visual conditions cannot be encountered before reaching the lowest safe altitude for that route segment, then aircraft are radar vector controlled into a position where an instrument approach can be conducted.

Three non-precision approach procedures are established for Bankstown Airport. Two procedures provide approaches from the west and south, whereas one provides approaches from the north-east.

For IFR aircraft departures, a SID exists for Runway 11C/29C that provides an initial track to the north-west. Once the aircraft is clear of the Bankstown control zone, aircraft will be directed to contact the Sydney TCU for onwards clearance. This would either comprise clearance to track to the first enroute waypoint (subject to aircraft separation) or a series of radar vectors until the aircraft can be cleared to the enroute waypoint.

For VFR aircraft departing in the Runway 11 direction, aircraft initially travel straight in a south-east direction until turning to the left at around 500 ft. Aircraft then climb to around 800 ft to 1,000 ft, then turn left in order to travel in a north-west direction until the aircraft leaves the Bankstown control zone. For VFR aircraft departing in the Runway 29 direction, aircraft travel straight in a north-west direction, and progressively climb until the aircraft leaves the Bankstown control zone.

For VFR aircraft arriving at Bankstown Airport, there are no specific tracks for flights originating from the west or south but aircraft are required to arrive via the TWO RN radio mast (south of Liverpool) or Prospect Reservoir. For aircraft originating from the north, aircraft should track via Brooklyn Road bridge to the South Dural tanks and then to Prospect Reservoir. For aircraft originating from the east, aircraft would require clearance from the Sydney (Kingsford Smith) control zone or remain in uncontrolled airspace.

Commonly flown VFR arrival and departure routes beyond the control zones associated with Bankstown and Camden airports are depicted in Figure 4.9.

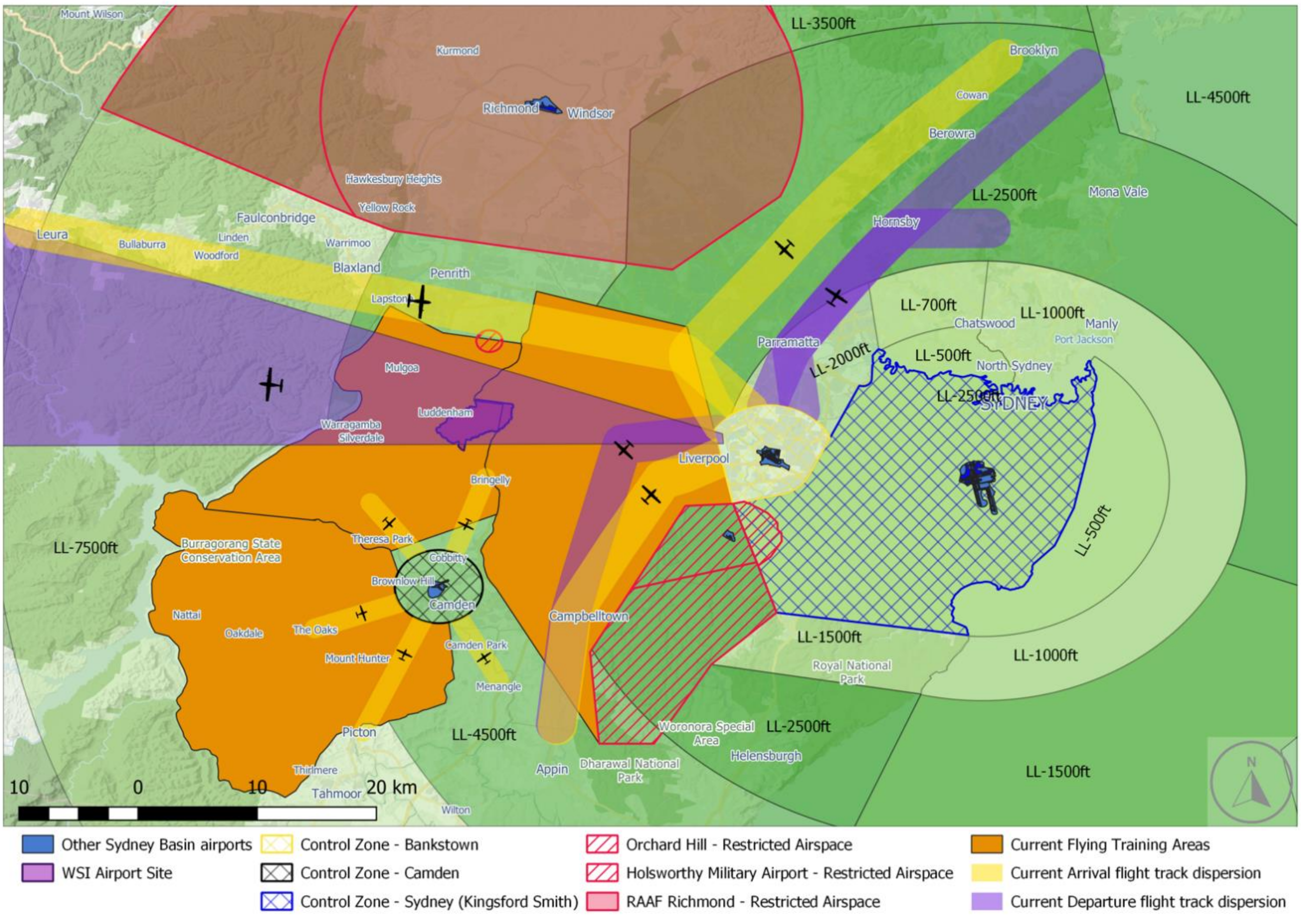


Figure 4.9 Commonly used VFR departure and arrival routes beyond the control zones for Bankstown and Camden airports

Flying training areas

Aircraft can access the 3 flying training areas in the Sydney Basin as depicted in Figure 4.4. The flying training areas include:

- 2 areas to the west of the Bankstown control zone which extend to approximately 23 nm (46 km) west of Bankstown Airport
- one area located immediately to the west of the Camden control zone boundary, which extends to approximately 13 nm (24 km) west of Camden Airport.

4.1.3.2 Camden Airport

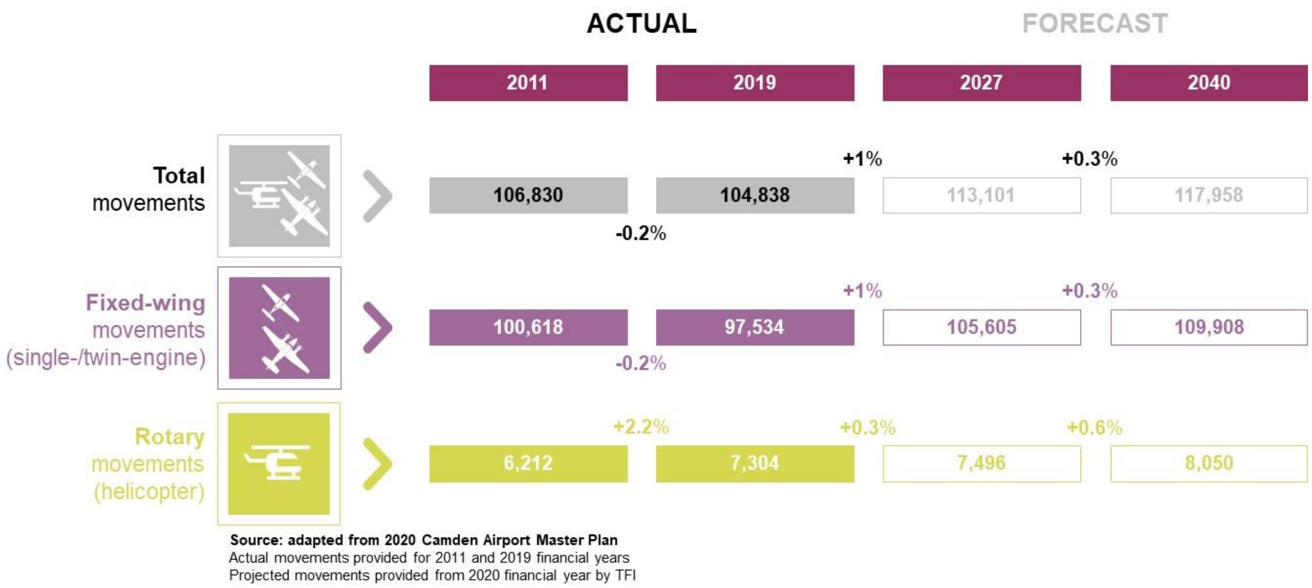
Camden Airport is located approximately 25 nm (17 km) south of WSI and approximately 27 nm (50 km) south-west of the Sydney CBD. It is operated and managed by Aeria Management Group. It has an air traffic control tower, 4 runways (2 for powered fixed-wing aircraft and 2 for gliders) and one designated helicopter landing site. Runway 06/24 is the main runway at Camden Airport. It operates 24-hours, 7 days a week.

The airport is used for flying training, emergency services, gliding, private flying and ballooning activities along with not-for-profit youth organisations and aviation maintenance facilities (Camden Airport Limited, 2021). It also serves as a base for helicopters involved in supporting seasonal bush firefighting activities.

Only one runway is sealed and equipped with runway lights. This is the main runway for aircraft movements. The remaining runways are grassed and can only be used during daylight hours under conditions of good visibility.

In 2019 Camden Airport had around 105,000 annual movements and accommodates an average of 290 aircraft movements per day (Camden Airport Limited, 2021). Aviation activity primarily consists of single-engine and twin-engine piston aircraft (around 93 per cent of aircraft movements), with helicopters accounting for the remainder (Camden Airport Limited, 2021). In addition to powered aircraft movements, there were more than 7,400 glider movements in 2018 (Camden Airport Limited, 2021).

Camden Airport has an estimated capacity of approximately 210,000 annual movements and is forecast to grow to around 118,000 movements by 2039/2040. The airport will have significant additional capacity available beyond a 20-year horizon. Figure 4.10 summarises the forecasts from the Camden Airport Master Plan 2020 (Camden Airport Limited, 2021).



Camden Airport Limited, 2021

Figure 4.10 Camden Airport daily forecasts

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. 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.

Arrivals and departures

Camden Airport operates principally under VFR conditions, although an instrument approach does exist for the limited number of instrument flights that operate there. In March 2019 there were approximately 120 total movements per day, of which 10 movements per day were by aircraft operating under IFR.

There are no specific routes for aircraft operating under VFR once they have departed the Camden control zone. Aircraft can track under pilot discretion to a flying training area or to the first waypoint of the travel plan.

For VFR aircraft arriving at Camden Airport, aircraft should track via Mayfield, Bringelly, Menangle, Picton or The Oaks (refer to Figure 4.9). Aircraft from these locations will be instructed by Camden Airport air traffic control on how to enter the control zone.

For IFR aircraft departures, departing aircraft must comply with any air traffic control instructions from the Camden Airport air traffic control tower until the aircraft departs the Camden control zone. Aircraft may then operate in uncontrolled airspace, as long as the aircraft remains outside the control area or other airport control zones. If aircraft wish to operate in the control area or other control zones, pilots are required to obtain clearance approvals before entering these areas.

For IFR aircraft arrivals, aircraft would fly directly to the airport from the last enroute waypoint, if operating in uncontrolled airspace, or as instructed under air traffic control if descending from the control area. Aircraft may make a visual approach (if conditions permit) under air traffic control guidance or will follow a required navigation performance (RNP) approach.

All circuit training occurs to the north-west of the airport. Glider towing operations take place to the south-east of the airport.

Flying training areas

Aircraft can access the 3 flying training areas in the Sydney Basin, as described for the Bankstown Airport.

4.1.4 Defence

There are 2 Defence airports within the Greater Sydney region as well as the Orchard Hills Defence Establishment. Restricted airspace associated with these facilities are shown on Figure 4.11.

4.1.4.1 Royal Australian Airforce (RAAF) Base Richmond

RAAF Base Richmond is located approximately 16 nm (32 km) north of WSI and approximately 27 nm (50 km) north-west of the Sydney CBD.

The airport is the headquarters for the Air Mobility Group and houses the military aviation activities of the RAAF Heavy Lift Group. The main aircraft type operated from the base is the Lockheed C-130 Hercules and C-27J Spartan. RAAF Base Richmond also serves as an alternative aerodrome for military fast jet operations that operate from RAAF Base Williamstown (north of Newcastle). Gliding activity is also permitted on weekends. The airport has a single sealed runway (10/28).

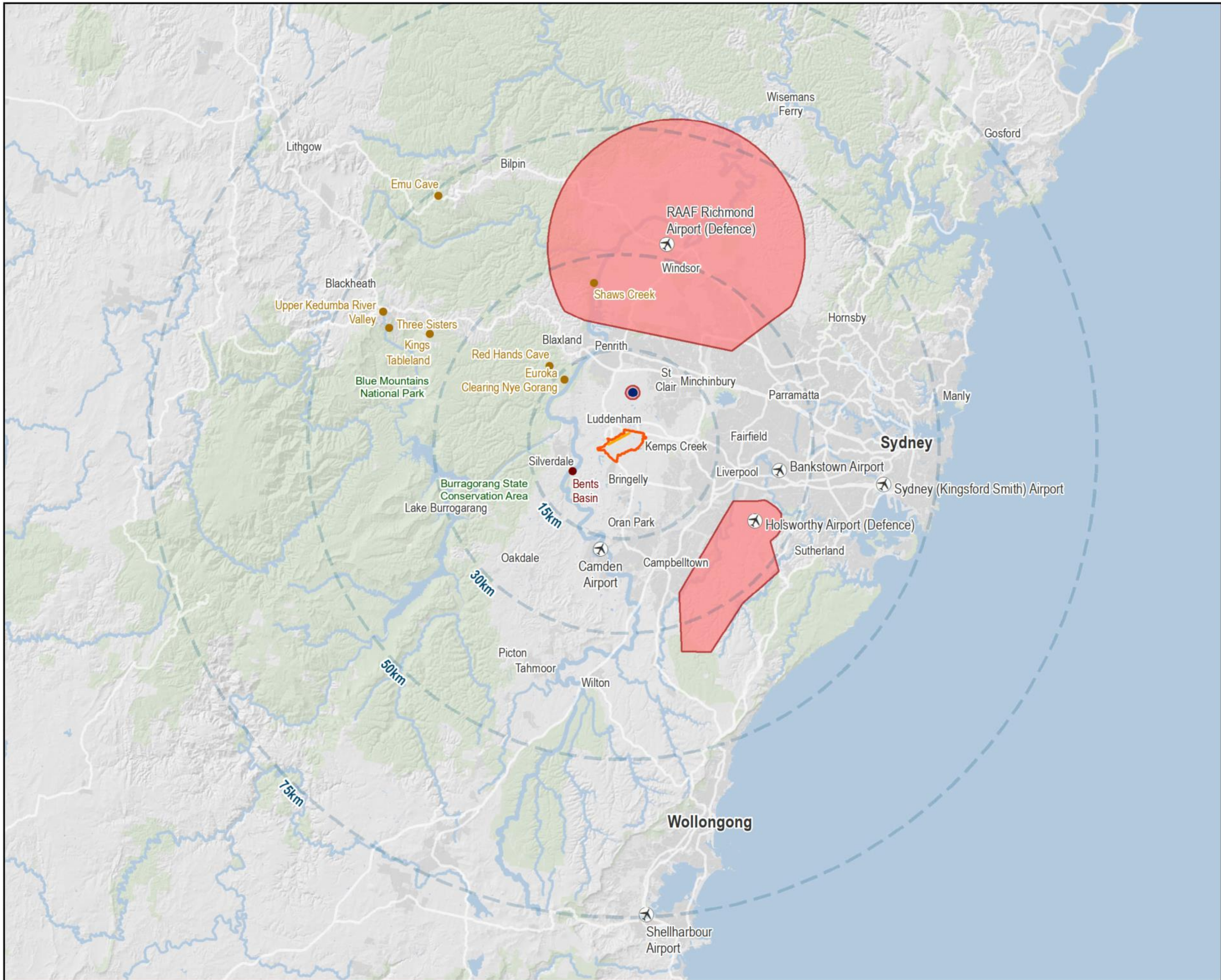
Operations are governed by a set of noise abatement procedures published in the Australian Aeronautical Information Publication. Wherever possible, and subject to operational necessity, RAAF Base Richmond applies a fly neighbourly approach to their operations to minimise the impact of aircraft operations on the local community. The airspace architecture for RAAF Base Richmond consists of 3 restricted areas:

- terminal area airspace (R470 and R469). R469 and R470 are activated in conjunction with each other and are generally active 15 hours per day, 7 days a week. There are multiple parachute zones that are active at various times of the week, as well as instrument approach training, tactical formation operations, circuit and low flying training. Both areas are classified Restricted Area 1, which allows civilian aircraft to use these areas for instrument training and transit if a clearance is available
- R494. This is the upper airspace and is primarily used as air-test airspace. Activation is by a Notice to Airmen (NOTAM). When the military airspace is active pilots are notified by an information system called NOTAM.

A Visual Flight Rules (VFR) lane exists to the west of RAAF Base Richmond to allow civilian aircraft to transit around active military activity. However, clearance through the terminal area via the VFR lane is required.

Figure 4.11

Key Defence facilties in the Sydney Basin and associated restricted airspace



Legend

- WSI Runway
- Western Sydney International (Nancy-Bird Walton) Airport land boundary
- Restricted areas
- Radial distances
- Orchard Hills Defence Establishment
- Aboriginal Places raised during consultation (NPW Act)
- Site of Aboriginal significance

0 10 20 km

Coordinate system: GDA 1994 NSW Lambert

Scale ratio correct when printed at A4

1:800,000 Date: 8/06/2023

Data sources: - DITRDC, DCS, Geoscience Australia
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community

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4.1.4.2 Holsworthy Airport

Holsworthy Airport is operated by the Australian Army and is located within the Holsworthy Military Reserve, a training area and artillery range for the Australian Army. It is located appropriately 13.5 nm (25 km) south-east of WSI and approximately 14 nm (26 km) south-west of the Sydney CBD.

The airfield has a single sealed runway that is only suited to light aircraft and military helicopters. Access to the airport and the airspace (which extends over the reserve) is restricted. The Holsworthy restricted areas are provided to protect activities in support of both flying and non-flying operations. Holsworthy Barracks is home to special operations personnel and includes helicopter units based at its airport. Additionally, there are weapons firing and explosive demolitions.

A minor portion of the restricted area is active 24-hours, 7 days a week and prevents civilian entry to potentially hazardous military airspace. The remaining portions are a combination of Restricted Area 2 and Restricted Area 3, which apply as required to protect civilian operations from potentially dangerous military operations. Rescue and police operations are allowed into specific areas with prior notice.

4.1.4.3 Orchard Hills Defence Establishment

The Orchard Hills Defence Establishment is a RAAF operated facility. It is located approximately 2.2 nm (4 km) north of WSI. It has a restricted airspace that is approximately 1.2 nm (around 2.2 km) in diameter and exists to prevent aircraft overflying an explosive risk area.

The airspace is classified as Restricted Area 3 which means that a clearance to fly through this volume cannot be obtained due to the explosive risk and activation times which may vary. The restricted area is in place while the facility is in operation. These hours may vary, but this restriction is generally in place between Monday to Friday 9 am to 4 pm. Overflight is not permitted between ground level and 3,000 ft.

4.1.5 Other aviation facilities, operations and airspace controls

4.1.5.1 Additional restricted areas

An additional restricted area is located at the Australian Nuclear Science and Technology Organisation’s Lucas Heights facility. The restricted area is active 24-hours, 7 days a week.

Sydney Harbour is also a restricted area. Further afield is the Tasman Sea Military Flying Training restricted area.

4.1.5.2 Class G airspace

The Sydney Basin Class G airspace supports a range of typically smaller aircraft operations including flying training (fixed-wing and helicopters), parachute operations, emergency services, sports and private general aviation. A clearance from air traffic control to operate in Class G airspace is not required. Aircraft operating with instrument flight rule (IFR) receive a flight information service from air traffic control, including movement information on other operating IFR aircraft.

To aid visual flying in the Sydney Basin, the Civil Aviation Safety Authority (CASA) in consultation with Airservices Australia, has published the Sydney Basin Visual Pilot Guide 2020, Sydney General Flying Guide 2021 and Visual Flight Rules Guide 2022. To support light aircraft and helicopter flights between the control zones and for those operations over the Sydney CBD and along the coast, rules of entry have been established for VFR aircraft in Class G airspace.

4.1.5.3 Danger areas

There are 10 danger areas located within 45 nm (83 km) of Sydney (Kingsford Smith) Airport. Five of these encompass 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.

Indicative locations of the danger areas within 45 nm (83 km) of Sydney (Kingsford Smith) Airport are identified in red in Figure 4.4.

4.1.5.4 Transit routes

There are numerous flights which transit the Sydney Basin airspace each day. Aircraft transiting above 28,000 ft (8.5 km) are managed by the overlying enroute air traffic control sector. Lower level transiting aircraft are controlled by the Sydney TCU.

4.1.5.5 Helicopters

Helicopters operating from non-airport facilities, such as Westmead Hospital, that are planning part of their flight in controlled airspace would be controlled by the Sydney TCU. Transiting flights (i.e., those crossing the 45 nm (around 83 km) airspace radius) are also provided with air traffic control services.

4.1.5.6 Gliding and parachuting

Gliding and parachuting activity takes place in designated locations.

4.1.5.7 Commercial photography and surveys

Commercial activity including aerial photography and aerial surveys take place within the Sydney Basin. These activities do not occur on a programmed basis and have to be coordinated with air traffic control and are subject to air traffic control clearance for their operation.

4.2 The Airport Site

4.2.1 Stage 1 Development

As outlined in Chapter 1 (Introduction), the Stage 1 Development of WSI was approved in 2016 pursuant to the approval of the Sydney Airport Plan (and the subsequent variations to this plan in 2020 and 2021). This approval included the construction of the airfield, terminal and the landside layout and associated facilities (refer to Figure 4.12). This includes navigational aids (and associated systems) that would be provided at WSI to support airport operations, including:

- Category IIIB (CAT IIIB) Instrument Landing System (ILS) at each runway end to enable pilots to safely land aircraft in low visibility conditions (for example, fog and bushfires). An ILS is a highly accurate navigation aid that uses radio signals to give the pilot vertical and horizontal guidance on an approximately 3-degree descent profile to the runway for landing. An instrument approach would be required when there is low cloud or reduced visibility and the pilot relies on guidance to land being received from instruments located in both the aircraft and on the ground
- precision approach path indicator (PAPI)
- glide path (GP)
- localiser (LOC)
- high intensity approach lighting (HIAL). HIAL arrays may extend up to 900 m beyond the end of each runway however is expected that these would be largely contained within the Airport Site
- localiser far field monitor (FFM)
- runway visual range (RVR) monitors.

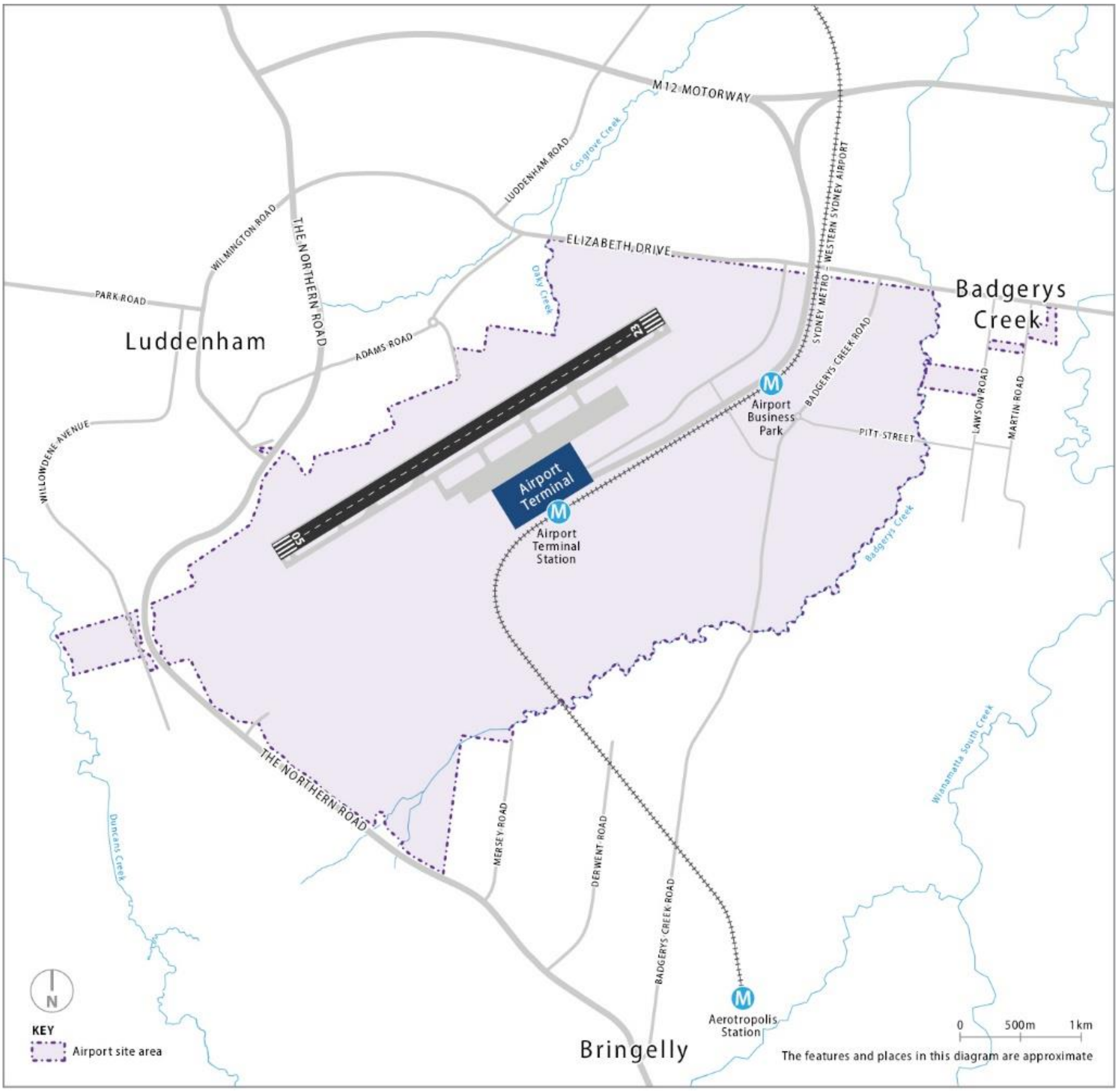


Figure 4.12 WSI – Stage 1 development

Construction commenced in 2018 and is scheduled to be completed in 2026 to enable operations to commence. Major earthworks and vegetation clearing across the construction impact zone have been completed. Construction work that is currently underway at the Airport Site includes construction of the airport terminal, airside civil and pavement works (for example, runway, taxiways and navigational aids), as well as terminal landside civil and building works. Construction work is being supported by various temporary infrastructure and plant, including internal haulage roads, external road upgrades, site compounds and batching plants.

Figure 4.13 and Figure 4.14 shows the construction and terminal construction activity at WSI, respectively.

Since the completion of the major earthworks, most of the construction impact zone is generally level (excluding drains and basins) with a surface elevation of around 90 mAHD (elevation in metres with respect to the Australian Height Datum) at the western end of the runway to 75 mAHD at the eastern end.

Source: WSA Co, April 2023

Figure 4.13 Construction activity at WSI

Source: WSA Co, April 2023

Figure 4.14 Terminal construction activity at WSI

An environmental conservation zone protects various locations around the edges of the Airport Site. This includes a vegetation corridor associated with the Badgerys Creek riparian zone, which predominately consists of native grassy woodland and exotic grassland. Habitat augmentation and enhancement works is progressing in the environmental conservation zone, including nest box installations, replacing exotic vegetation with native vegetation and rehabilitating areas of native remnant vegetation.

4.2.2 Sydney Metro – Western Sydney Airport

Sydney Metro – Western Sydney Airport is a new metro railway line that will service Greater Western Sydney, connecting WSI and the Western Sydney Aerotropolis with St Marys and the existing Sydney Trains suburban T1 Western Line. Two stations are proposed to be built within the Airport Site (Airport Business Park and Airport Terminal). The future metro line within the Airport Site is primarily located below the surface level of the airport infrastructure (refer to Figure 4.15).

Source: Sydney Metro, 2022

Figure 4.15 Sydney Metro – Western Sydney Airport overview

The metro railway line, where it is located within the WSI site, was approved in 2021 through an amendment to the Airport Plan.

Major construction, including station excavation, commenced in late 2022. Construction sites have been established within the Airport Site to support tunnelling and the construction of the 2 station boxes. Construction works for the metro railway line within the WSI Airport Site are contained within the construction impact zone for WSI.

Construction is scheduled to be completed to enable operation of the railway line to commence in 2026.

4.3 Regional context

WSI is located within the Western City District, which includes the Blue Mountains, Camden, Campbelltown, Fairfield, Hawkesbury, Liverpool, Penrith and Wollondilly Local Government Areas (LGA). Blacktown LGA, located around 8 km from the Airport Site, is within the Central City District, alongside Cumberland, Parramatta and The Hills LGAs.

Western Sydney, which encompasses the Western City District and Central City District of Sydney, is one of Australia's fastest growing regions and currently is home to around 2 million people. With the population of Sydney forecast to grow to 8 million over the next 40 years, almost half of the population is expected to reside in areas west of Parramatta (Greater Sydney Commission, 2018b). In the Western City District alone, the population is forecast to be around 1.1 million by 2036 (Greater Sydney Commission, 2018b). This represents an increase of around 360,000 people from 2016.

Western Sydney is Australia's third largest economy. Key employment generating industries include manufacturing, retail, health care and social assistance, transport, warehousing, and construction. In the Blue Mountains, tourism is the second largest employment generating industry.

Western Sydney also supports a diverse and competing range of current and proposed land uses, for example, growth areas, urban renewal corridors, the Western Economic Corridor and large infrastructure projects (planned or currently under construction).

Large population centres, such as Penrith, Liverpool and the Camden LGA, are experiencing significant population growth that is being driven by major infrastructure and land use initiatives in Western Sydney. WSI and the Aerotropolis will be the key catalyst for driving further growth and development in Western Sydney.

Areas surrounding WSI are a mix of rural, rural-residential, urban residential, agricultural, commercial and industrial land uses. Further detail is provided in Section 4.3.1 and 4.3.2.

Detail on the social, economic and cultural environment is provided in Chapter 17 (Heritage), Chapter 18 (Social) and Chapter 19 (Economic).

4.3.1 Current setting

4.3.1.1 Rural-residential and residential

Rural-residential and rural areas broadly surround WSI. The landscape to the north-west of WSI includes the Mulgoa and Wallacia Significant Rural Landscape (Penrith City Council, 2020), which is characterised by its predominately rural landscape and undulating agricultural land. These areas form part of the larger Metropolitan Rural Area of Sydney, a region broadly located in the western, northern and southern areas of the Western City District.

Residential areas in the vicinity of WSI include:

- the villages of Luddenham, Wallacia, Mulgoa and Cobbitty, with Luddenham village located immediately west of the Airport Site, and the residential estate associated with the Twin Creeks Golf and Country Club directly north of WSI
- residential suburbs to the west (such as Silverdale and Warragamba), north (such as Glenmore Park, St Clair and Erskine Park), east (such as Middleton Grange, Hoxton Park, Cecil Hills and Abbotsbury) and south (such as Oran Park and Camden).

To the south of WSI is the South West Growth Area (SWGA), which comprises approximately 10,000 hectares adjoining the Western Sydney Aerotropolis and the Glenfield to Macarthur Urban Renewal Corridor. This area will continue to transition from a rural/rural-residential landscape to suburban, such as Oran Park and Leppington (in the Camden LGA).

Within the Blue Mountains, low-density residential areas are located along either side of the major road and rail infrastructure (Great Western Highway, Main Western Rail Line and Hawkesbury Road), and generally extend along ridgelines. Springwood and Katoomba are key town centres within the Lower and Upper Blue Mountains, respectively. Small village centres are along the urban spine, such as Glenbrook, Hazelbrook, Wentworth Falls and Blackheath. Further north, land uses are typically rural-residential concentrated along The Bells Line of Road and connecting roads.

4.3.1.2 Employment areas

Significant agricultural activities occur in the vicinity of WSI and more broadly within the Metropolitan Rural Area. These support a broad range of agricultural activities, including food production, irrigated horticulture, turf farming and nurseries.

Industrial land uses within Western Sydney are concentrated in Penrith, Fairfield, Liverpool, Campbelltown, Blacktown, Parramatta and Cumberland LGAs. Industrial land uses in the immediate vicinity of WSI support a range of activities, including advanced manufacturing, trade and freight logistics. These are primarily concentrated in the Western Sydney Employment Area, which encompasses areas within Erskine Park, Eastern Creek, Horsley Park and Kemps Creek.

The Kemps Creek Resource Recovery Park is immediately to the north of WSI and extractive industries that supply construction materials (sand, clay and shale) are located throughout the Western City District.

Major commercial and retail centres closest to WSI are located at Penrith, Liverpool, Campbelltown and Blacktown. Small-medium commercial and industrial enterprises are scattered throughout the areas surrounding WSI and beyond. This includes retail and service industries.

4.3.1.3 Recreation, open space and conservation areas

Numerous parks and open spaces are located throughout Western Sydney. In addition to local parks and open spaces scattered throughout urban areas, other recreational and open space areas include:

- several golf courses such as Twin Creeks Golf and Country Club, Wallacia Panthers Country Club, Penrith Golf Course and Camden Lakeside Golf Course
- Robert Green Oval (including Sales Park) at Luddenham
- Workers Hubertus Country Club, Luddenham
- Nepean River
- Bents Basin State Conservation Area, Greendale
- Wianamatta-South Creek corridor, which will be developed further to provide a significant green corridor to local communities
- Western Sydney Parklands, which provides a green, recreational corridor and stretches for 27 km. This includes Sydney Zoo, Sydney Motorsport Park, Prospect Reservoir (public access restricted), walking and cycling trails
- Burragorang State Conservation Area, noting only limited areas can be accessed with this area accounting for 80 per cent of Sydney's water supply
- the Greater Blue Mountains Area (GBMA), comprising several national parks and conservation areas. The area supports a range of recreational and tourism activities (such as lookouts, picnic areas, camping, hiking, cycling, rock climbing and canyoning) in addition to its conservation and wilderness values. Further detail on the GBMA is provided in Section 4.4.1.

4.3.1.4 Health and education

There are numerous education, health, and emergency facilities throughout Western Sydney. This includes the Penrith health and education precinct (a major cluster of health and educational land uses) and several rural properties associated with the science, veterinary and agricultural schools and institutes of the University of Sydney at Camden, Kemps Creek and Bringelly.

Education and health facilities such as high schools, primary schools, pre-schools, child care centres, hospitals, medical specialist and general practitioner surgeries are located throughout the region, generally in proximity to residential areas. The closest school to WSI is Luddenham Public School (primary), located in Luddenham Village.

4.3.1.5 Key infrastructure

WSI is the catalyst for much of Western Sydney's planned road and public transport projects. Strategic planning for WSI and the Aerotropolis has been prepared concurrently with the NSW Government's *Future Transport Strategy 2056* and Infrastructure NSW's *State Infrastructure Strategy 2018–2038* to integrate land use, transport and infrastructure across the region.

Existing major transport infrastructure in Western Sydney includes:

- the M4 Western Motorway and the Great Western Highway
- the M7 Motorway
- the Northern Road (A9) (currently being upgraded) which runs north-south (past the Airport Site) from the M4 Western Motorway to Camden Valley Way
- Elizabeth Drive, which runs east-west from Luddenham to the M7 Motorway
- Bringelly Road, which runs east-west from The Northern Road (Bringelly) to Camden Valley Way
- Main Western Rail Line, connecting Sydney and the Blue Mountains
- The Inner West and Leppington Rail Line (previously called the South West Rail Link), which terminates at Leppington
- Sydney Metro – Western Sydney Airport (under construction).

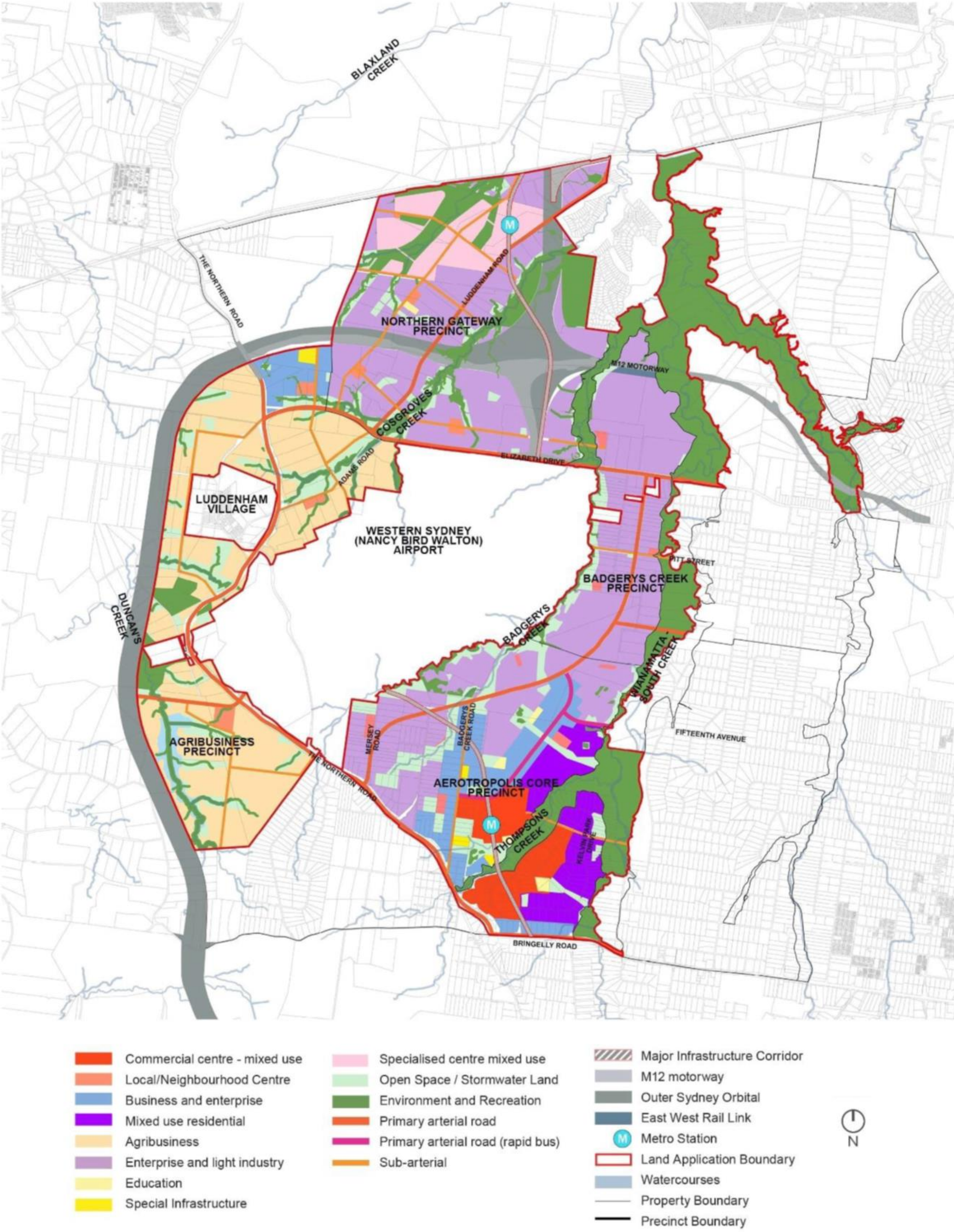
Warragamba Dam and Lake Burragorang is located around 8 km to the west of WSI within the Wollondilly LGA. It supplies around 80 per cent of Sydney's water supply. Prospect Reservoir, located around 13 km to the north-east of WSI, remains as a back-up water supply for Sydney and is rarely used.

4.3.2 Future setting

Under the NSW Government's overarching vision for Sydney, the Western Parkland City will be the primary focus of the Western City District and will be established on the strength of WSI and the Aerotropolis. It will be a polycentric city capitalising on the established centres of Liverpool, Greater Penrith and Campbelltown.

The Aerotropolis is a 11,200-hectare area surrounding WSI (refer to Figure 4.16). The Aerotropolis will become a hub of industry and innovation, creating more than 100,000 new job opportunities across the Aerotropolis Core, Badgerys Creek, Northern Gateway and Agribusiness precincts by 2056. It will also include Bradfield City Centre, which will be established within the Aerotropolis Core and centred on the new Sydney Metro station. Luddenham Village, located at the core of the Agribusiness precinct, is set to become a tourist and cultural hub for the Aerotropolis, while servicing employees within the Agribusiness Precinct.

Urban development will be limited within the Metropolitan Rural Area under the Greater Sydney Region Plan and Western City District Plan. These plans seek to maintain and enhance the values of the Metropolitan Rural Area and the distinctive character of each rural village.



Source: NSW DPE, 2023a

Figure 4.16 Western Sydney Aerotropolis Precinct Plan

4.4 Matters of National Environmental Significance

There are numerous Matters of National Environmental Significance within 45 nm (83 km) of the Airport Site. These include:

- 6 World Heritage Areas – the GBMA, Australian Convict Sites (multiple sites located in eastern Sydney CBD, Parramatta and north-west Sydney) and the Sydney Opera House
- 19 National heritage places – including the GBMA, multiple sites in eastern Sydney (extending from the Royal National Park to the Ku-ring-gai Chase National Park) and sites in Parramatta (Old Government House and the Parramatta Female Factory and Institutions Precinct)
- 24 listed Threatened Ecological Communities (including 16 critically endangered ecological communities)
- 238 threatened fauna and flora species
- 90 migratory fauna species
- one wetland of international importance (Ramsar Wetlands), at Towra Point Nature Reserve.

Threatened species, threatened ecological communities and migratory fauna species that have a high and moderate likelihood of occurrence within the biodiversity study area is detailed in Chapter 16 (Biodiversity).

The Towra Point Nature Reserve is located around 24 nm (45 km) to the east of the airport runway and directly across Botany Bay from Sydney (Kingsford Smith) Airport.

Further detail on the listed heritage places or areas within 45 nm (83km) of the Airport Site is provided in the following sections, and considered in Chapter 17 (Heritage).

4.4.1 World Heritage Areas

4.4.1.1 Greater Blue Mountains Area

The GBMA is listed as a World and National Heritage place. It was inscribed on the World Heritage list in 2000 as it satisfies 2 of the criteria for natural values of outstanding universal value:

- Criterion (ix) – to be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, freshwater, coastal and marine ecosystems and communities of plants and animals.
- Criterion (x) – to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science of conservation.

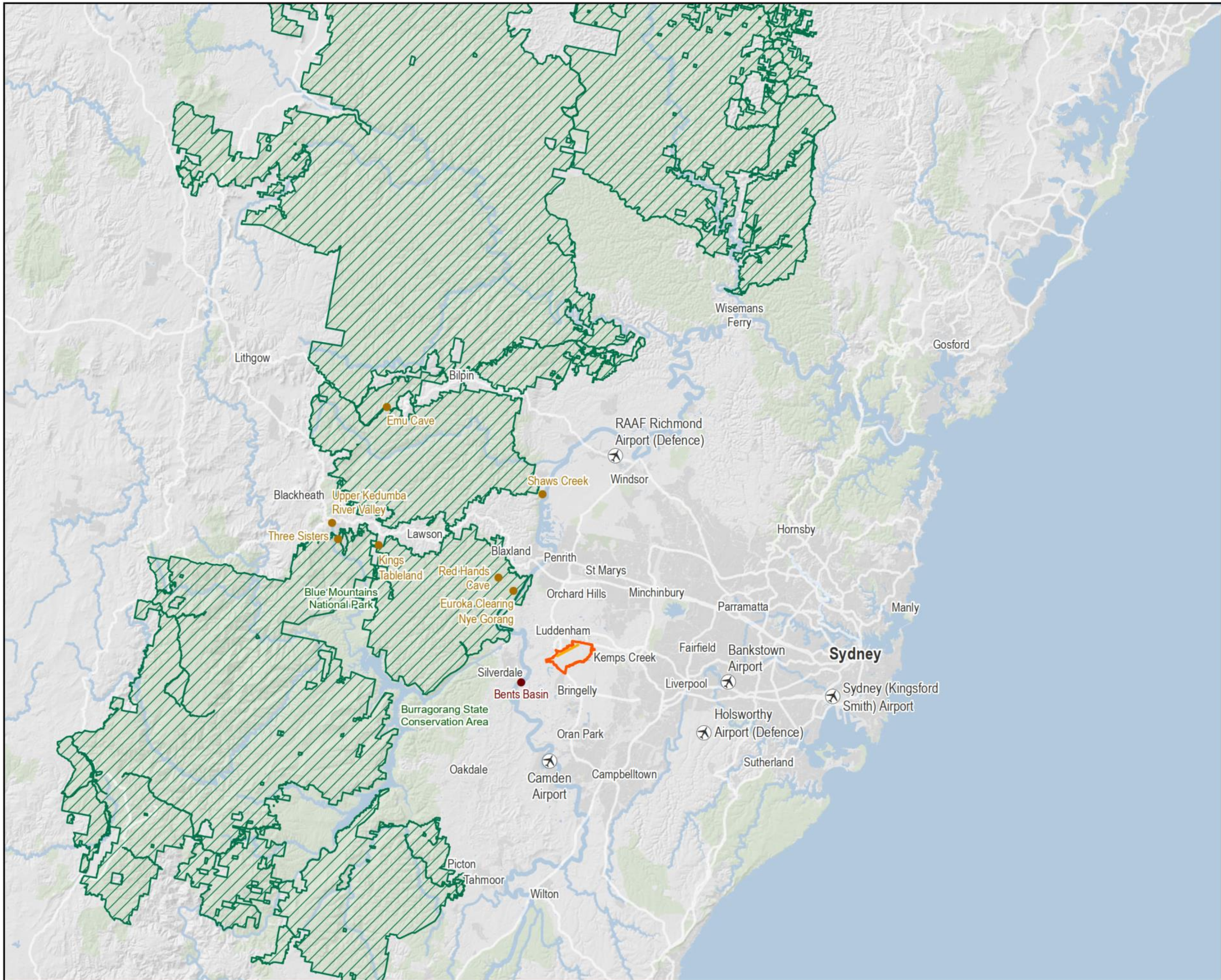
In addition to meeting at least one of the criteria for outstanding universal value, a world heritage area property that is listed for natural values also needs to meet conditions of integrity. Integrity is a measure of the 'wholeness and intactness' of the natural heritage and its attributes (UNESCO, 2021). The integrity of the GBMA:

- relates to its size and connectivity, its high wilderness quality for most of the natural bushland area, and the protection afforded by its natural barriers and regulatory protections (including wilderness declarations and land adjacent to the GBMA)
- depends upon the complexity of its geological structure, geomorphology and water systems, which require the same level of protection
- includes its cultural context with the conservation of the custodial relationships and associations with the area.

Chapter 23 (Matters of National Environmental Significance) provides a full description of how the GBMA satisfies the above criteria and the statement of integrity. The GBMA in the vicinity of the Airport Site is provided in Figure 4.17.

Figure 4.17

The Greater Blue Mountains World Heritage Area and surrounds



Legend

- WSI Runway
- Western Sydney International (Nancy-Bird Walton) Airport land boundary
- Greater Blue Mountains World Heritage Area
- Aboriginal Places raised during consultation (NPW Act)
- Site of Aboriginal significance

0 10 20 km

Coordinate system: GDA 1994 NSW Lambert

Scale ratio correct when printed at A4

1:800,000 Date: 8/06/2023

Data sources: - DITRDC, DCS, Geoscience Australia
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community

In addition to the attributes recognised by the World Heritage Committee in 2000, the GBMA has several other important values that complement and interact with its World Heritage values (NSW DECC, 2009). Protection of these values is integral in managing individual protected areas and the GBMA as a whole. These include:

- geodiversity and biodiversity
- water catchment
- indigenous heritage values
- historic heritage vales
- recreation and tourism
- wilderness
- social and economic
- research and education
- scenic and aesthetic
- bequest, inspiration, spirituality and existence.

Other World heritage places

The project area covers a large portion of the Sydney Basin airspace and areas beyond. Table 4.1 summarises the places listed on the World Heritage List within the project study area.

Table 4.1 World Heritage places within the project study area

Name	Place ID [1]	Status	World Heritage Criteria [2]	Address
Australian Convict Sites (Old Great North Road and Buffer Zone)	106209	Declared property Buffer zone	iv, vi	The Old Great Northern Rd, Wisemans Ferry NSW
Australian Convict Sites (Old Government House and Domain)	106209	Declared property	iv, vi	Corner of Pitt Street and Macquarie Street, Parramatta NSW
Australian Convict Sites (Cockatoo Island Convict Site)	106209	Declared property	iv, vi	Cockatoo Island, Sydney Harbour
Australian Convict Sites (Hyde Park Barracks)	106209	Declared property	iv, vi	Queens Square, Macquarie Street, Sydney
Sydney Opera House	105914	Declared property	i	Pitt Street and Macquarie Street, Parramatta

1. Australian Heritage Database ID Number
2. Criterion descriptions:
   - Criterion i – to represent a masterpiece of human creative genius
   - Criterion iv – to be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history
   - Criterion vi – to be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance

4.4.2 National Heritage items

Australia's most valued Indigenous and historic heritage sites are listed on the National Heritage List in accordance with the criteria contained in the statutory provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and regulations. These places reflect the richness of Australia's heritage and the story of its development, from its original inhabitants to present day, and its unique landscapes.

19 National Heritage items are located within 45 nm (83 km) of the Airport Site and are listed in Table 4.2.

The GBMA was added to the National Heritage List in 2007 for similar values for which it was included on the World Heritage list. The Australian Heritage Council is currently assessing whether the GBMA National Heritage place has additional nationally significant heritage values, and whether to expand it to include adjacent areas. The values relate to geodiversity, biodiversity and historic values that satisfy the National Heritage criterion of events and processes, rarity and aesthetic characteristics. The Australian Heritage Council has identified engagement with First Nations People is required before it can identify any Aboriginal cultural heritage values that satisfy National Heritage criteria. Consent would also be sought to list any such values.

Table 4.2 Places on the National Heritage List within 45 nm (83 km) of the Airport Site

Nationally listed place	Distance from WSI (km)
Bondi Beach Campbell Parade/Bondi Surf Pavilion	51
Cockatoo Island	42
First Government House Site	45
Hyde Park Barracks	45
Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves	55
North Head – Sydney North Head Scenic Drive	54
Old Great North Road/The Old Great Northern Road	62
Royal National Park and Gawarra State Conservation Area	40
Sydney Opera House	46
Centennial Park	47
Cyprus Hellene Club – Australian Hall	45
Governors' Domain and Civic Precinct	46
Kamay Botany Bay: botanical collections sites	46
Kurnell Peninsula Headland	49
Old Government House and the Government Domain Parramatta	27
Parramatta Female Factory and Institutions	27
Sydney Harbour Bridge Bradfield Highway	45
GBMA	10

4.5 Commonwealth land

The Commonwealth holds land parcels in all Australian states and territories.

The Commonwealth Government acquired approximately 1,780-hectares of land at Badgerys Creek for the proposed Western Sydney Airport in the 1980s and 1990s. All land within the airport boundary will be used for airport operations.

There are around 3,700 Commonwealth land holdings within 45 nm of the Airport Site. The majority are managed by Defence (around 80 per cent), including Defence housing. The remaining holdings include operations associated with communications, research and science, postal services, treasury and transport.

There are 2 Defence airports within the Greater Sydney region (Holsworthy Airport and RAAF Base Richmond), as well as the Orchard Hills Defence Establishment. Details on these sites is included within Section 4.1.4.

4.6 Commonwealth heritage sites

There are 89 Commonwealth heritage sites located within 45 nm of the Airport Site (being sites of heritage value managed by an Australian agency). The sites are predominately historic heritage sites, but also include sites listed for cultural landscape and/or natural heritage values (for example, Cubbitch Barta National Estate Area at Holsworthy or the Orchard Hills Cumberland Plain Woodland).

The majority of Commonwealth heritage sites are located within eastern Sydney. The closest listed item is the Orchard Hills Cumberland Plain Woodland, located around 2 nm (4 km) to the north of the Airport Site.

Chapter 5 Statutory context

This chapter provides an overview of the relevant planning and legislative framework that applies to the project. It explains the relationship of the legislation that regulates the Australian airspace, the Airport Plan and the environmental assessment process for the project under the *Environment Protection and Biodiversity Conservation Act 1999*.

5.1 Overview

The Australian airspace is governed by Commonwealth legislation, specifically the *Airspace Act 2007* (the Airspace Act) the *Civil Aviation Act 1988* (the Civil Aviation Act), and their associated regulations, whereas the on-ground development of certain airports and protection of the airspace is primarily governed by the *Airports Act 1996* (the Airports Act) (and its regulations, in particular the *Airports (Protection of Airspace) Regulations 1996*).

In the case of WSI, the approval provisions of the EPBC Act do not apply, and the approval for construction was given by the approval of Part 3 of the Airport Plan. The Airport Plan was approved in 2016 by the then Australian Minister for Urban Infrastructure under the Airports Act. The Airport Plan authorised the construction and operation of the Stage 1 Development, being single runway operations and facilities capable of handling up to 10 million annual passengers. It also set the requirements for the further development and assessment of the preliminary airspace design for WSI (being Condition 16 of the Airport Plan), which must be satisfied before regular operations can commence at WSI.

The Australian Government Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA) is leading the development of the flight path design for WSI in close collaboration with Airservices Australia and the Civil Aviation Safety Authority (CASA) to satisfy Condition 16 of the Airport Plan alongside the regulations and standards that apply to airspace design in Australia. Airservices Australia, as the relevant Air Navigation Service Provider (ANSP), will ultimately be responsible for the detailed design, implementation and management of the proposed airspace and flight paths. CASA, as the regulator responsible for the administration of airspace under the Airspace Act, will be responsible for the approval of the proposed airspace management arrangements through the approval of an Airspace Change Proposal (in its role as the Office of Airspace Regulation).

Condition 16 of the Airport Plan sets out the various requirements for development and assessment of airspace design and, as a consequence, governs the project. Condition 16 provides that the project is to be progressed pursuant to the process set out in sections 160 and following of the EPBC Act by making clear that, once the airspace design is developed, it is to be progressed as a plan for aviation airspace management under section 160 of the EPBC Act.

Consequently, and in accordance with Condition 16 and Section 160 of the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act), the project has been referred to the Minister for the Environment and Water for advice. In doing so, the delegate for the Australian Minister for the Environment and Water has determined that the DITRDCA is the nominated proponent and that an EIS would be required that addresses the EIS Guidelines issued for the project. This Draft EIS has been prepared to address these requirements.

Following the public display of this Draft EIS, the DITRDCA will consider the submissions received and finalise the EIS. Once finalised, the Final EIS will be provided to the Australian Minister for the Environment and Water who will then provide advice to the DITRDCA under section 163 of the EPBC Act, Airservices Australia and CASA, including any recommended conditions, before any approval is given for the airspace design. Airservices Australia will be responsible for submitting the Airspace Change Proposal that will be submitted to CASA for approval. This would need to consider the advice provided by the Australian Minister for the Environment and Water.

The finalisation of the EIS will also enable the detailed design phase of the project to progress. The detailed design phase will include further evaluation and refinement of the proposed selected airspace design for implementation based on feedback received from the community and other technical stakeholders such as airlines and industry bodies on this Draft EIS.

Once the Airspace Change Proposal has been approved, the procedures associated with the flight paths and changes to the Sydney Basin airspace will be published. A process of training and testing the procedures would occur before runway operations commence. Further detail on detailed design and implementation of the airspace changes is provided in Section 6.4.

A flow chart of this assessment, approvals and implementation pathway is provided in Figure 5.1. Further detail is provided in Section 5.2.1.

Figure 5.1 The assessment, approvals and implementation pathway for the project

5.2 Legislation

5.2.1 Commonwealth legislation

This section describes the legislative context under the following Acts and related Regulations:

- Airports Act
- Airspace Act
- Civil Aviation Act
- EPBC Act
- *Air Services Act 1995* (Air Services Act).

5.2.1.1 Airports Act 1996

The Airports Act establishes the regulatory arrangements that apply to certain federally-leased airports, including the requirements for land use planning, building approvals, environmental management and airspace protection. These arrangements require the approval of master plans and major development plans, which are submitted by an Airport Lessee Company (ALC).

As WSI was a 'greenfield' development with no appointed ALC at the time of developing and assessing the proposal for WSI, the statutory process at that time did not appropriately cater for WSI. As such, the Airports Act was amended to provide an alternative approvals pathway for the initial development of the WSI through the approval of an Airport Plan and to exclude the approvals pathway under Part 9 of the EPBC Act. This amendment provided a transparent mechanism to approve the Stage 1 Development through the authorisation of the Airport Plan. The Airports Act amendment also required:

- the advice from the then Australian Minister for Environment and Energy to be sought before the approval; and
- the then Australian Minister for Urban Infrastructure to considers any recommended conditions from Australian Minister for the Environment and Water when approving the Airport Plan.

In seeking the then Australian Minister of the Environment and Energy's advice, a Draft EIS was prepared and publicly exhibited in 2015. The Airport Plan was approved on 15 September 2016 with conditions following the finalisation of the 2016 EIS.

The Airport Plan will ultimately be replaced by a master plan, and any major airport by the ALC not covered by Part 3 of the Airport Plan (e.g. Stage 1 Development) will require the preparation of a major development plan by the ALC. Since its approval in 2016 the Airport Plan has undergone 2 variations relating to utility works in Badgerys Creek and Oaky Creek, and inclusion of the airport section of the Sydney Metro – Western Sydney Airport.

The project, does not need an additional Airport Plan, a master plan or a major development plan as it does not involve any physical works. However, Condition 16 of the Airport Plan sets out what requirements must be addressed or followed before the WSI airport operator can permit regular aircraft operations to commence at WSI.

DITRDCA is leading the design of the WSI airspace arrangements for single runway operations at WSI that will address Condition 16 of the Airport Plan in close collaboration with Airservices Australia, CASA and the ALC. Table 5.1 sets out these requirements and where these have been or will be addressed.

Table 5.1 Condition 16 of the Airport Plan

Condition 16	Comment
1. The ALC must not permit regular aircraft operations to commence at the Airport unless the requirements of this condition have been satisfied.	This Draft EIS documents how these requirements have been or will be met through future engagement.
2. The airspace and flight path design are to be developed by a steering group led by the Infrastructure Department and involving Airservices Australia and the Civil Aviation Safety Authority. After an Airport Lease is granted the ALC will also be invited to participate in the steering group. The Infrastructure Department must establish a community and stakeholder reference group (Forum on Western Sydney Airport) which will operate until the end of the detailed design stage identified in Table 10 in Part 2 of the Airport Plan.	The Expert Steering Group, which includes Airservices Australia and CASA is responsible for the development of the preliminary airspace design. Matters relating to the preliminary airspace design has been subject to discussions at the Forum on Western Sydney Airport. The forum continues to operate.
3. In developing the airspace and flight path design, the steering group must conduct public consultation with stakeholders who include the aviation industry, the community and state and local government authorities.	Refer to Chapter 6 (Project development and alternatives) and Chapter 9 (Community and stakeholder engagement). In addition to the engagement completed to date, feedback received during the exhibition of this Draft EIS will be considered before the design is finalised.
4. The airspace and flight path design, once developed, is to be referred as a plan for aviation airspace management, to the Environment Minister under section 161 of the EPBC Act.	The project was referred to the (then) Australian Minister for the Environment and Water in 2021 and EIS Guidelines were issued in January 2022 (EPBC 2022/9143). This Draft EIS has been prepared to address these requirements. Once finalised, the Final EIS will be provided to the Australian Minister for the Environment and Water who will then provide advice to the DITRDCA, Airservices Australia and CASA. Further discussion on the EPBC Act is provided in Section 5.2.1.4.
5. The airspace and flight path design must take account of the following principles, in addition to the principles in section 2.2.5 of the Airport Plan: a. airspace and flight path design must explicitly consider the Aircraft Overflight Noise mitigation options presented in chapters 7 and 10 of the [2016] EIS b. airspace and flight path design must have regard to the social and economic impacts on existing airspace users in the Sydney basin c. airspace and flight path design must explicitly consider whether arrangements are required for managing Aircraft Overflight Noise at night; and	The development of the airspace and flight path design as presented in this Draft EIS has taken into account a range of requirements, principles and guidelines, including the principles outlined in section 2.2.5 of the Airport Plan and Condition 16(5) of the Airport Plan. Refer to Chapter 6 (Project development and alternatives) for details on the phases of development that have led to the current airspace and flight path design.

Condition 16	Comment
d. airspace and flight path design must minimise to the extent practicable the impact of Aircraft Overflight Noise on the following: i. residential areas ii. Sensitive Receptors iii. the Greater Blue Mountains World Heritage Area – particularly areas of scenic or tourism value; and iv. Wilderness Areas.	Additionally, the consideration of these principles is documented as part of the relevant impact assessment within this Draft EIS including: • aircraft overflight noise (Chapter 11 (Aircraft noise)) • social and economic impacts on existing airspace users in the Sydney basin (Chapter 18 (Social) and Chapter 19 (Economic) • impact to the Greater Blue Mountains Area and other wilderness areas (Chapter 16 (Biodiversity) and Chapter 17 (Heritage)).
6. The airspace and flight path design for the Airport, once developed, must include or be accompanied by noise modelling of a range of realistic airport capacity and meteorological scenarios.	This is documented in this Draft EIS (refer to Chapter 11 (Aircraft noise) and Technical paper 1).
7. The Infrastructure Department must develop a noise insulation and property acquisition policy in relation to Aircraft Overflight Noise for buildings outside the Airport Site, having regard to the 24-hour nature of operations at the Airport.	The draft noise insulation and property acquisition policy is discussed in this Draft EIS (refer to Chapter 11 (Aircraft noise). Further information on the development of the draft policy is provided in Appendix F of this Draft EIS.
8. Any referral(s) of a plan for aviation airspace management, in accordance with section 161 of the EPBC Act, must explain how all matters in this condition 16 have been addressed in developing the plan.	This was supplied at the time of the referral (EPBC 2022/9143).

Protection of the airspace

Part 12 of the Airports Act provides the framework for the protection of airspace surrounding an airport. The associated regulations provide for airspace to be declared 'prescribed airspace' if it is in the interests of safety, efficiency and regularity of existing or future air transport operations for the airspace to be protected. Activities that protrude into this prescribed airspace are called 'controlled activities' and require approval. The prescribed airspace would include the airspace above the Obstacle Limitation Surfaces (OLS) and Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) surfaces.

The OLS for WSI was initially declared on 19 October 2017 under the provisions of the Airports Act and Airports (Protection of Airspace) Regulation 1996 for the long-term development of WSI (including parallel runways). A revised OLS was subsequently declared on 16 June 2023 to reflect the 'as built' runway parameters.

The PANS-OPS for WSI will be declared once the flight paths have been approved.

Noise regulation

Under the Airports Act, airports regulated by the Act are required to have an Australian Noise Exposure Forecast (ANEF) that has been endorsed for technical accuracy by Airservices Australia. The ANEF is a tool that is used to inform land use planning around an airport site and assessing the effects of aircraft noise.

An Australian Noise Exposure Concept (ANEC) for WSI is provided in the Airport Plan and has been reflected in State Environmental Planning Policy (Precincts – Western Parkland City) 2021 (NSW) (Western Parkland City SEPP). This was generated based on the runway direction and indicative flight paths as presented in the 2016 EIS and the ANEC presented in Western Parkland City SEPP represents the long-term development of WSI (including parallel runways). An updated ANEC is presented in this Draft EIS for single runway operations (refer to Chapter 11 (Aircraft noise)).

An ANEF is a more refined ANEC and will be generated for WSI based on the final approved flight path design and the long-term development of WSI. Until the ANEF contour is approved, the ANEC contour presented in the Western Parkland City SEPP will continue to be used to inform land use planning.

DITRDCA has also prepared a draft noise insulation and property acquisition policy in relation to the management of aircraft noise from WSI. This is discussed in Chapter 11 (Aircraft noise).

5.2.1.2 Airspace Act 2007

The object of the Airspace Act is to ensure that Australian-administered airspace is administered and used safely, taking into account the protection of the environment, efficient use of that airspace, equitable access to the airspace for all users of that airspace, and national security.

CASA is the regulator responsible for the administration of Australian airspace architecture under this Act and the Airspace Regulation 2007. The Office of Airspace Regulation (OAR) is an independent body that sits within CASA. The OAR will ultimately be responsible for approving the proposed changes to the existing airspace (referred to as an Airspace Change Proposal) to introduce the control zone, including validating the flight procedures, before the commencement of operations. In approving changes to the airspace, the Office of Airspace Regulation will consider the capacity of Australian-administered airspace to accommodate the proposed changes, national security, the safety and environmental implications of the proposed changes, consultation outcomes, alignment with government policy and how it promotes and/or fosters civil aviation.

In accordance with the Airport Plan, CASA and Airservices Australia have been involved in the development of the preliminary airspace design, as presented in this Draft EIS. Following the exhibition of the Draft EIS and the finalisation of this EIS, Airservices Australia will be responsible for the detailed design and implementation of the airspace. Airservices Australia will seek the approval from OAR on the detailed design of the airspace architecture.

The assessment by the OAR consider the advice of the Australian Minister for the Environment and Water provided under Section 160 of the EPBC Act, as well as the safety case that would be undertaken as part of the detailed design. It is intended that the detailed airspace design as submitted to the OAR will be generally consistent with the preliminary design and assessment considered by the Australian Minister for the Environment and Water and their advice. Any significant differences may require an additional EPBC Act referral or assessment.

5.2.1.3 Civil Aviation Act 1988

The Civil Aviation Act is the primary legislation relating to aviation safety in Australia and is administered by CASA. Requirements relating to the safety of all aspects of civil aviation are set out in the Civil Aviation Regulations 1988 and the *Civil Aviation Safety Regulations 1998*. The Regulations implement the standards and recommended practices of the International Civil Aviation Organization (ICAO), which govern international civil aviation world-wide, and are closely aligned with the Federal Aviation Regulations of the United States of America.

As a contracting State under the 1944 Convention on International Civil Aviation, Australia has an obligation to adopt these ICAO standards. Licensing of aerodromes in accordance with these technical standards ensures that airports such as WSI provide safe environments for the operation of the types of aircraft that they are intended to serve. Further regulations apply to the operation of aircraft and to air traffic management services to ensure that all elements of the system provide for safe and efficient air transport.

Manuals of Standards (MOS) are legislative instruments that provide the technical requirements, standards and specifications that complement the requirements of the Civil Aviation Safety Regulations 1998. Key MOS that are applicable to airspace design are:

- MOS Part 172 – Air Traffic Services
- MOS Part 173 – Standards Applicable to Instrument Flight Procedure Design.

As detailed throughout the Draft EIS, the project has been designed in accordance with the relevant provisions and safety standards.

Under Part 175 of the Civil Aviation Safety Regulations 1998, Airservices Australia is authorised to publish the Aeronautical Information Package (AIP) for Australian airspace. The AIP will detail the flight paths (SIDs and STARs) and associated procedures for WSI once approved by CASA.

5.2.1.4 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides the national framework for protecting and managing designated 'matters of national significance', such as nationally (and internationally) important flora and fauna, ecological communities and heritage places (including World heritage). In particular, the EPBC Act is Australia's main legislative instrument for implementing its obligations under the World Heritage Convention. The EPBC Act also confers jurisdiction over actions that have the potential to make a significant impact on the environment where the actions affect Commonwealth land or are undertaken on behalf of Commonwealth agencies.

Under Section 160 of the EPBC Act, an Australian agency (or employee) must obtain and consider advice from the Australian Minister for the Environment and Water before a plan for aviation airspace management is adopted or implemented where the aircraft operations will have or is likely to have a significant impact on the environment. The preliminary airspace design for the project is a plan for aviation airspace management within the meaning of the EPBC Act.

A referral was made under Section 161 of the EPBC Act by DITRDCA, Airservices Australia and CASA in 2021 (EPBC 2022/9143). The delegate for the Australian Minister for the Environment and Water determined on 28 January 2022 that:

- the project would be assessed by way of an EIS and in doing so issued the EIS Guidelines (see Appendix C), and DITRDCA is the nominated proponent for the project.

For projects (referred to as actions) subject to Section 160 of the EPBC Act, Part 8 of the EPBC Act (except for certain provisions) continues to apply. This includes:

- addressing EIS Guidelines issued by the Australian Environmental Minister
- exhibiting the Draft EIS once the Australian Minister for the Environment and Water (or her delegate) is satisfied that the Draft EIS has addressed the EIS Guidelines
- inviting comment (in writing) on the Draft EIS during the display period, which will be set by the Australian Minister for the Environment and Water (or her delegate)
- finalising the EIS in response to the submissions received, including a summary of how these comments have been addressed in the EIS
- providing the Australian Department of Climate Change, the Environment, Energy and Water with the Final EIS and copies of the submissions received.

Following receipt of the Australian Department of Climate Change, the Environment, Energy and Water's recommendations, the Australian Minister for the Environment and Water will provide advice to DITRDCA, Airservices Australia and CASA in accordance with Section 163 of the EPBC Act as to whether:

- the project should be approved
- what conditions (if any) should be attached to the approval (if possible) to protect the environment
- any other matter relating to the protection of the environment from the project.

Under Section 164 of the EPBC Act, DITRDCA, Airservices Australia and CASA will then be required to provide the Australian Environment Minister with a report that documents the response to her advice. This report would state what action has been taken or not (including the adoption of any recommended conditions) and the justification where any of the recommendations were not given effect (in full or in part).

Figure 5.2 shows an overview of assessment pathway under the EPBC Act.

Figure 5.2 Overview of the assessment pathway under the EPBC Act

Matters of National Environmental Significance

The EPBC Act considers 9 matters of environmental significance (MNES). They are outlined below:

- world heritage properties
- national heritage places
- wetlands or international importance (listed under RAMSAR Convention)
- listed threatened specifies and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mines), and
- a water resource (in relation to a coal seam gas development and large coal mine development).

Under Part 3, Division 1 of the EPBC Act, a project (or action) that will or is likely to have a significant impact on MNES, a significant impact on the environment generally (if carried out by a Commonwealth agency) or a significant impact on the environment on Commonwealth land, requires an approval from the Australian Minister for the Environment and Water (referred to as a 'controlled action'). However, as the project is subject to Section 160(2) of the EPBC Act, this approval is not required. While this approval is not required, the assessment of the project will still need to consider the impacts on the 'whole of the environment'. That is, the assessment will assess impacts to MNES but it will not be limited to those considerations.

5.2.1.5 Air Services Act 1995

The Air Services Act establishes and governs Airservices Australia, which is wholly owned by the Australian Government and is accountable to the Minister for Infrastructure, Transport, Regional Development and Local Government. Under the Act, Airservices Australia is to provide the facilities and services for the safety, regularity and efficiency of air navigation within Australian-administrated airspace. This includes providing air traffic services, aviation rescue fire fighting services, aeronautical information, radio navigation and telecommunications.

5.2.2 NSW legislation

NSW planning laws do not apply in relation to the management of controlled airspace and they are largely excluded from application to the Airport pursuant to section 112 of the Airports Act. They also does not apply to the assessment of a plan for aviation airspace management by virtue of Section 160(5) of the EPBC Act.

While condition 16 of the Airport Plan and the EIS Guidelines provide the primary guidance for what this Draft EIS must address, consideration has also been given to relevant NSW legislation including environmental planning instruments where considered appropriate. DITRDCA will continue to coordinate with the NSW Government and local councils to ensure integrated planning occurs.

Table 5.2 provides a summary of the key elements of the NSW planning framework. How these Acts have been taken into consideration can be found in the relevant EIS chapters and technical papers.

Table 5.2 Summary of NSW Acts

NSW legislation and planning instruments	Overview
Environmental Planning and Assessment Act 1979 (EP&A Act)	The EP&A Act (and its regulation) establishes a framework for the assessment and approval of developments in NSW. They also provide for the making of environmental planning instruments, including state environmental planning policies (SEPPs) and local environmental plans (LEPs), which include land use controls.
National Parks and Wildlife Act 1974 (NPW Act)	This NPW Act provides for the protection and reservation of certain lands, the protection of Aboriginal objects and places, the protection of fauna and the protection of native vegetation.
Biodiversity Conservation Act 2016 (BC Act)	The BC Act provides for the conservation of NSW-listed threatened species, populations and ecological communities of animals and plants.
Heritage Act 1977 (Heritage Act)	The Heritage Act makes provisions for the conservation of NSW's non-Aboriginal (built and historic) heritage.

5.3 National Airports Safeguarding Framework

The National Airports Safeguarding Framework (NASF) provides guidance on planning requirements for developments that could potentially affect aviation operations. The framework aims to improve community amenity by minimising aircraft noise-sensitive developments near airports; and improve safety outcomes by ensuring aviation safety requirements are recognised in land use planning decisions through guidelines being adopted by jurisdictions on various safety-related issues.

The NASF currently comprises 9 guidelines:

- Guideline A: Measures for Managing Impacts of Aircraft Noise
- Guideline B: Managing Risks of Building Windshear and Turbulence at Airports
- Guideline C: Managing Risks of Wildlife Strike in the Vicinity of Airports
- Guideline D: Managing Risks Associated with Wind Turbines
- Guideline E: Managing Risks of Distractive Lighting in Vicinity of Airports
- Guideline F: Managing Risks of Intrusion into Protected Airspace
- Guideline G: Protecting Aviation Facilities – Communications, Navigation and Surveillance
- Guideline H: Protecting Strategically Important Helicopter Landing Sites
- Guideline I: Managing the Risks in Public Safety Areas at the ends of Runways.

The NASF guidelines are used by relevant planning authorities to help inform land use planning decisions and by proponents to prepare applications on land impacted by aviation safeguarding controls. The NASF has been implemented primarily through the land use controls provided in the Western Parkland City SEPP.

The NSW Department of Planning and Environment's (DPE) Aviation Safeguarding Guidelines – Western Sydney Aerotropolis and surrounding areas (October 2021) (NSW DPE, 2022a) also provides guidelines for managing land use impacts related to aircraft noise and were developed with input from DITRDCA. The guidelines seek to ensure planning authorities consider the aircraft noise guidelines and noise exposure contour maps when undertaking land use planning for the Aerotropolis and surrounding areas of influence.

The NSW Government supports the NASF with the exception of Guideline A and uses the existing policy of DPE which relies on ANEF contours and *Australian Standard AS 2021:2015 Acoustics – Aircraft Noise Intrusion Building Siting and Construction*. The NSW Government has endorsed the use of ANEF for land use planning, not the N-above contours. Further discussion on these matters is provided in Chapter 14 (Land use).

5.4 Related actions and proposals

Key actions or proposals/projects that have been, or are being taken, on the Airport Site are detailed in Table 5.3, which are in addition to the facilitated changes to airspace detailed in Chapter 8 (Facilitated changes). There are a number of other actions or proposals/projects in Western Sydney that could lead to cumulative impacts, which are considered further in Chapter 22 (Cumulative impacts).

Table 5.3 Related actions and proposals

Relation action or proposal	Overview
Stage 1 Development (WSI)	The project relates directly to the Stage 1 Development of WSI, including the airfield, terminal and landside layout and facilities approved under Stage 1 (refer to Section 4.2.1).
Sydney Metro – Western Sydney Airport	A proposed new metro line that will serve WSI and the surrounding area. Two of the 6 metro stations will be provided within the Airport Site – a station at the integrated international and domestic terminal as well as the on-airport business park. Major construction has commenced on this project and will be completed by 2026 (refer to Section 4.2.1).

Australian Government

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