Australian Government

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

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

Environmental Impact Statement

Technical paper 11: Economic

October 2024

Contents

Contents (continued)

List of tables

List of figures

Terms and abbreviations

Term/abbreviation	Definition
ABS	Australian Bureau of Statistics
AEDT	Aviation Environmental Design Tool (US FAA)
ANEC	Australian Noise Exposure Concept
ANEF	Australian Noise Exposure Forecast
ANEI	Australian Noise Exposure Index
ANP	Aircraft noise performance (characteristics)
AS	Australian Standard
B	Boeing (type of aircraft)
BOM	Bureau of Meteorology
CBD	Central Business District
Cth	Commonwealth (Australia)
DITRDCA	Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Commonwealth)
EIS	Environmental Impact Statement
EPBC Act	Environment Protection and Biodiversity Conservation (Cth, 1999)
GBMA	Greater Blue Mountains Area (World Heritage and National Heritage Place)
GDP	Gross domestic product
GHG	Greenhouse gas
GIS	Geographic information system
GRP	Gross regional product
GVA	Gross value added
KSA	Sydney (Kingsford Smith) Airport
LGA	Local Government Area (New South Wales)
LTOP	Long Term Operating Plan
NEF	Noise Exposure Forecast
NIPA	Noise insulation and property acquisition
NPV	Net present value
NSR	Noise sensitive receiver
NSW	New South Wales
PAAM	Plan for Aviation Airspace Management version 1.72 (6 December 2021)
WSA	Western Sydney Airport Company Limited (airport operator)
WSI	Western Sydney International (Nancy-Bird Walton) Airport

Executive summary

Introduction

The Western Sydney International (Nancy-Bird Walton) Airport (WSI) Airspace and Flight Path Design (the project) is being developed to facilitate aircraft operations at WSI.

Technical paper 11: Economic was prepared to understand the economic impacts resulting from the project. A range of scenarios was considered including the operation of the new runway in the early years (2033) and when WSI's single runway is expected to operate near capacity (2055).

This report has defined a study area that encompasses 8 Local Government Areas (LGAs) in Western Sydney that are wholly or partially affected by the N60 24-hour contour. These LGAs include Blacktown, Blue Mountains, Camden, Fairfield, Hawkesbury, Liverpool, Penrith and Wollondilly.

Existing conditions

In 2021 the study area provided around 427,550 jobs. The study area has a high representation of 'blue-collar' industries (construction, manufacturing, wholesaling, transport and warehousing) comprising 32% of all jobs compared to 22% in Greater Sydney. The study area has an underrepresentation of 'white-collar' industries being 'information, media and telecommunications, financial and insurance services, rental, hiring and real estate services and professional, scientific and technical services'. These industries comprise 7.1% of total jobs compared to 23% for Greater Sydney.

Gross output across all industries in the study area in 2021 was $140.5 billion. Gross value added (GVA) was $58.1 billion[1]. This represents 15% of Greater Sydney total.

In 2018/19 the tourism industry provided 24,960 jobs in the study area which comprised 17% of Greater Sydney. In 2018–19 there were more than 11 million visitors to the study area of which 42% was in the Blue Mountains. The study area accommodated 11.25 million visitor nights.

It is estimated that 50,033 private dwellings will be affected by the N60 (10+ flights in 24hr) noise contour in 2033 increasing to 65,909 by 2055. Around 10% (1,492) of these dwellings will be inside the N70 contour (5+ flights in 24-hours) in 2033 increasing to 12% (3,762) by 2055. 61 dwellings will be affected inside the ANEC 20 contour in 2033 increasing to 260 dwellings in 2055. The number of dwellings diminishes considerably in the higher ANEC levels.

HillPDA identified 106 noise sensitive land uses inside the 2055 N60 24-hour contour of which 19 are inside the N70 contour. The impacts on these land uses outside the N70 contour are considered insignificant. However within the N70 contour the impacts are more moderate. Of these uses 6 of them are schools, 2 are childcare centres and 2 are aged-care homes.

---

1 Gross value added (GVA) of an industry refers to the value of outputs less the costs of inputs. It measures the contribution that the industry makes to the country's wealth or gross domestic product (GDP). The main components of GVA are workers remuneration, company profits and taxes generated.

Economic impacts

From the outset it is important to recognise that impacts that have been quantified in dollar terms are a measure of the proposed flight paths versus a base case of no flight paths. However the base case is unrealistic given an operating airport. Flight paths generally provide no benefits – only costs. However they are an integral component of the airport which itself generates considerable economic benefits.

Facilitated changes

WSI and the proposed flight paths will impact the use of the airspace. Currently the area is used by Bankstown and Camden airports for flying training, emergency services and other operations.

Bankstown Airport is a major integrated aviation and commercial centre for Sydney, including home for 160 businesses including emergency services, general aviation, training, logistics and destination retail. Bankstown is the third busiest airport in Australia and the second busiest general aviation airport with annual aircraft movements of circa 250,000 in 2017 which is forecast to reach 300,000 movements by 2026. Camden Airport is a general aviation, emergency services, sport and recreational aviation airport servicing the South West Growth Centre with annual aircraft movements of circa 100,000 per annum.

It is anticipated that greater distances will need to be travelled to reach the new flying training areas which means increased 'transit' flight durations, extended training schedules and increased costs including increased flying training times and increased fuel and maintenance costs. The estimated cost is $15m in 2026 increasing at a rate of around one per cent per annum in line with increasing aircraft movements.

Impacts on employment and economic output

The airport itself will generate a significant number of jobs for Western Sydney and contribute significantly to gross regional product. The conclusions from the EY study in the 2016 EIS was that airport operations would directly generate 8,730 jobs in 2031 increasing to 61,500 jobs by 2063.

Additional jobs on the airport site could be accommodated in retail, hospitalities, business park and airport related industries. The EY study estimated an additional 4,439 jobs in 2031 increasing to 27,148 jobs by 2063.

These of course are jobs generated by the airport itself and not generated by the flight paths. Flight paths are a necessary component of the airport itself and do not directly generate jobs or create economic value.

Apart from the airport site itself the Aerotropolis will provide as many as 100,000 jobs by Year 2060 spread over 11,200 hectares of land surrounding the airport.

Tourism impacts

There are 26 short-stay accommodation places inside the N60 contour but none inside the N70 contour. The majority of these places are in the St Marys to Penrith urban corridor with only one in the Blue Mountains. Most of the places are small scale motels and hotels each providing around 15 to 30 rooms. There are a few larger hotels such as The Holiday Inn in St Marys North, the Mercure Hotel in Penrith and the recently constructed Astina suites in Penrith CBD and Quest Penrith in the Thornton estate. Being outside the N70 contour and based on the JLL study none of these places would be measurably impacted by the flight paths. They are not expected to lose any revenue in any measurable way.

The overall conclusion from Technical paper 7: Landscape and visual amenity (Technical paper 7) is that visual impacts are likely to be negligible to high-moderate. Walls Lookout and Echo Point Lookout would experience a high-moderate visual impact due to the very high sensitivity of these views and the introduction of flights that would be perceptible moving across the view even though the altitudes are high. The visual impacts are not considered significant enough to result in any measurable economic impacts in terms of visitation numbers to Blue Mountains area.

Technical paper 1: Aircraft noise (Technical paper 1) concluded that the primary tourist destinations in the Blue Mountains (upper mountain area from Wentworth Falls to Blackheath and the surrounding lookouts and short walks near these townships) would be unaffected by noise levels. Occasionally noise levels over 70 dB(A) may be experienced by users of walking trails and camp sites in the lower Blue Mountains National Park area near the Nepean River, and Warragamba dam but on most occasions below 50 dB(A) to 60 dB(A) will be experience depending on the aircraft. However the level of visitation in these areas is much lower than the Upper Blue Mountains. The noise impacts are not considered significant enough to result in any measurable economic impacts in terms of visitation numbers to Blue Mountains area.

As a result there would be no loss in tourism spend in the area and hence no impacts on the local economy. On the contrary the airport itself provides some potential for positive impact on tourism in the Blue Mountains due to its proximity.

Impacts on property values

Various sources were used to measure land value impacts including the JLL study for the 2016 EIS. Most of these papers also refer to other earlier research papers and academic studies including studies in Europe and North America. Predominantly these studies have been based on econometric modelling using hedonic price models. Most commonly these studies found that there was some negative impact on residential properties. However, this was not the case for commercial and industrial property. Commercial (office, hotel, retail etc.), industrial and employment related uses are considered to be less adversely impacted from airport and flight paths than residential buildings. This is probably due to their building characteristics, nature of activities and lower night-time use. On the contrary these land uses can benefit from the increased economic activity that will come from their proximity of the airport site, which would positively impact land values.

From the research the following impacts were adopted.

Table ES.1 Total loss in values of residential property over time

Noise Contour	Dwellings in 2033	Dwellings in 2055	% loss in value
N60 (10+ movements in 24-hrs)	50,000	65,600	No discernible impact
N70 (5+ movements in 24-hrs)	1,700	4,300	3.0%
ANEC 20	93	320	9.5%
ANEC 25	22	58	14.7%
ANEC 30	6	15	19.8%
ANEC 35	1	5	25.0%

From the above estimates, the total loss in the value of residential property was calculated as follows:

- Year 2033 $56m
- Year 2040 $77m
- Year 2055 $148m.

The above impacts are cumulative (and hence should not be added together). Total impact is 56 million dollars loss in total residential values in 2033 increasing to a cumulative level of 148 million dollars by 2055 (measured in 2022 dollars).

It is important to realise that residential values in Western Sydney have increased considerably over the past 10 years. The median house price in Blacktown and Penrith LGAs have both increased by 130% (more than doubled) from September 2012. Average real growth has been 6.3% per annum. Hence for a dwelling inside the N70 contour an immediate loss in value of 3.0% would be 'made good' by 6 months of growth in real capital gain.

Other impacts

Social impacts were covered in Technical paper 10: Social (Technical paper 10) and include:

- changes to community composition and cohesion
- increased inequality (as lower income households are likely to be more impacted)
- loss of residential amenity
- use and enjoyment of social infrastructure (such as parks).

All these impacts (with exception to increased inequality) can be quantified by loss in residential land values since land values reflect the desirability of living in the area. There were other social impacts identified but quantifying these are more vexed. In some cases impacts can be mitigated, such as impacts on children's education which can be mitigated by noise insulation measures. The cost of these measures can be internalised in any quantitative assessment – that is they can form part of the capital cost.

Net present value

Over a project life out to 2055 the net present value (NPV) (at 5% discount rate) of the economic impacts quantified was calculated at negative $309 million.

While negative $309m appears to be a significant number it's important to recognise that the flight paths are an integral component of the airport itself. And the airport itself generates huge benefits to Western Sydney, Greater Sydney and NSW. By 2033 there will be more than 16,000 jobs on the airport site itself both in airport operations and in airport related businesses and ancillary services (retail, food services, accommodation, etc). Total jobs on the airport site are expected to increase to more than 69,000 by 2055. At an average GVA of around $120,000 per worker total GVA generated by the airport in Year 2033 is expected to be $1.58b increasing to $8.3b by Year 2055. The NPV of GVA over a project life out to 2055 is estimated at 45 billion dollars – 147 times more than the NPV of the economic costs of the flight paths.

Management and mitigation measures

Facilitated changes

The Department of Infrastructure, Transport, Regional Development, Communications and the Arts' (DITRDCA) commitments relating to airspace design are set out in the WSI Airport Plan – Airspace Design Principles, October 2021. Under this plan consultation and engagement by DITRDCA is required with aviation operators to ensure the impacts are properly assessed. To ensure this, DITRDCA and other relevant authorities need to ensure that the airspace design and associated EIS processes for WSI fully considers impacts to aircraft operators at Bankstown and Camden airports.

There is a need for agreed procedures between Airservices and emergency service operators from a safety and operational perspective. Such processes already exist for Sydney (Kingsford Smith) Airport (KSA). Arrangements are critical to assessing these safety risks. Assuming emergency service providers have priority over the airspace in cases of emergencies then potential adverse economic impacts will be mitigated. DITRDCA and Airservices have held discussions with emergency services operators on these matters.

Residential areas

The DITRDCA will implement a noise insulation and property acquisition (NIPA) policy which details the eligibility requirements for inclusion in the program. This policy will be used for the most impacted individuals who are eligible according to DITRDCA for either land acquisition or participation in a property upgrade scheme.

Non-residential noise sensitive land uses

There are fifteen (15) non-residential noise sensitive land uses within the N70 contour including 6 schools. The impacts on these land uses should be individually assessed. These land uses should meet the indoor design sound levels as detailed in the Australian Standard AS2021:2015, which is 50 dB for libraries and study areas, 65 dB for teaching areas and 75 dB for workshops and gymnasia. Noise attenuation measures should be implemented in buildings that fail to meet these standards.

Chapter 1 Introduction

This chapter provides an overview of the proposed airspace and flight path design for the Western Sydney International (Nancy-Bird Walton) Airport (WSI). This includes the background to WSI and its accompanying airspace and flight path design (the project) which impacts on the existing Sydney Basin airspace. It describes the key features and objectives of the project and identifies the purpose and structure of this this technical paper.

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) was approved in December 2016. The Airport Plan authorised the construction and operation of the Stage 1 Development. It also set the requirements for the further development and assessment of the preliminary airspace design for WSI. The Australian Government has committed to developing and delivering WSI by the end of 2026.

The 2016 approval provided for the on-ground development of Stage 1 Development of WSI (a single runway and terminal facility capable of initially handling up to 10 million passengers per year) utilising 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. WSI will be a 24-hour 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 developing and delivering WSI by the end of 2026.

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 minimise the impact on the community and other airspace users while maximising safety, efficiency and capacity of WSI and the Sydney Basin airspace. The airspace design must also meet the requirements of Airservices Australia and civil aviation safety regulatory standards.

Led by the DITRDCA, the Expert Steering Group has developed the preliminary flight paths and airspace arrangements for WSI (the project). The preliminary airspace design is the subject of the EIS.

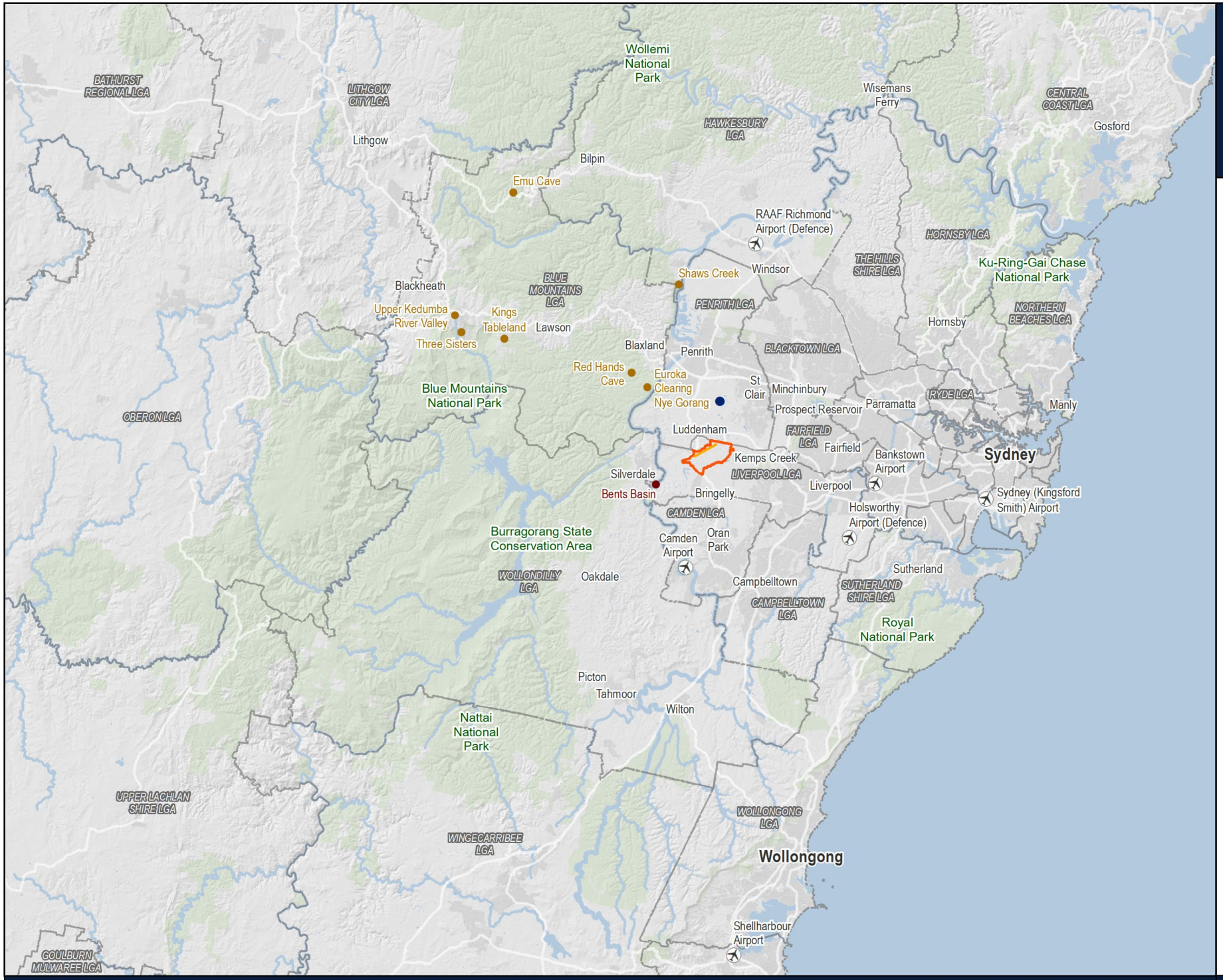


Figure 1.1

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.

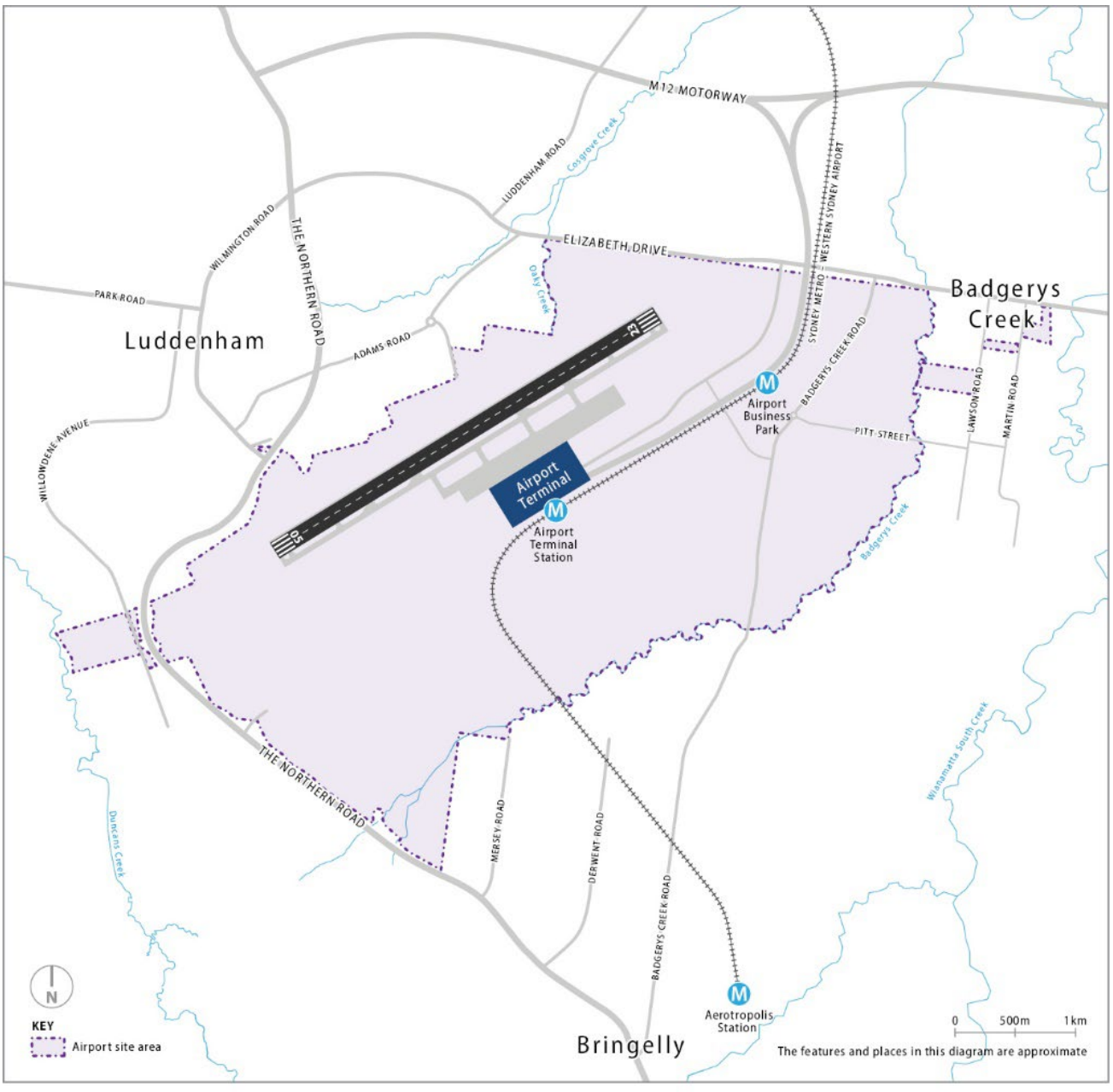


Figure 1.2 Western Sydney International Stage 1 Development

1.2 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. 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 (as exhibited) are depicted in Figure 1.3 to Figure 1.7.

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

Since the exhibition of the Draft EIS, refinements to the project have been incorporated into the preliminary flight path design. The final preliminary flight path design is presented in Chapter 7 (The Project) of the EIS.

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 Western Sydney 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 maximise safety, efficiency and capacity, while minimising impacts on the community and the environment. For further information on the airspace design principles refer to Chapter 6 (Project development and alternatives) in the EIS.

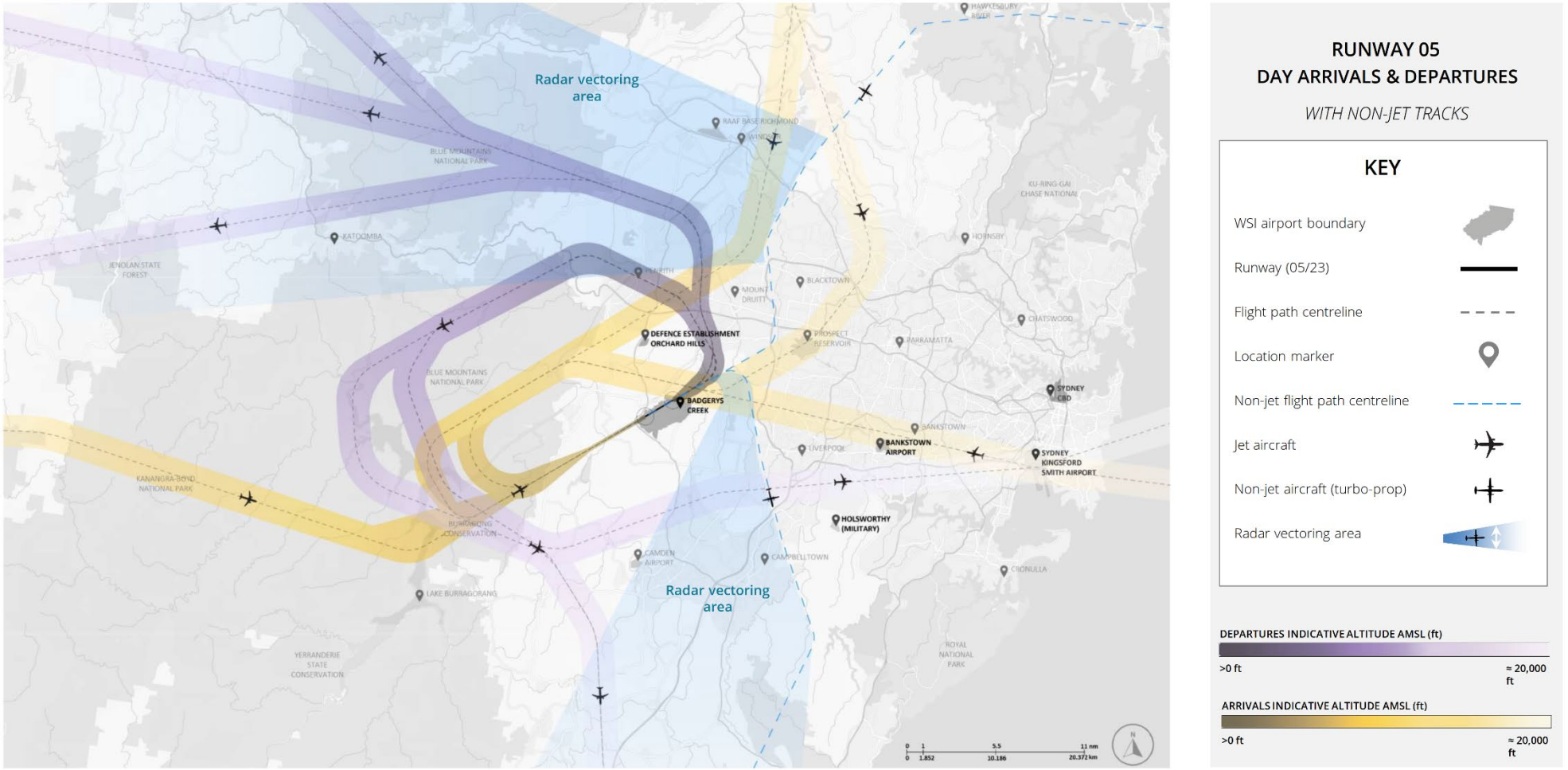


Figure 1.3 Proposed flight paths for Runway 05 (day)

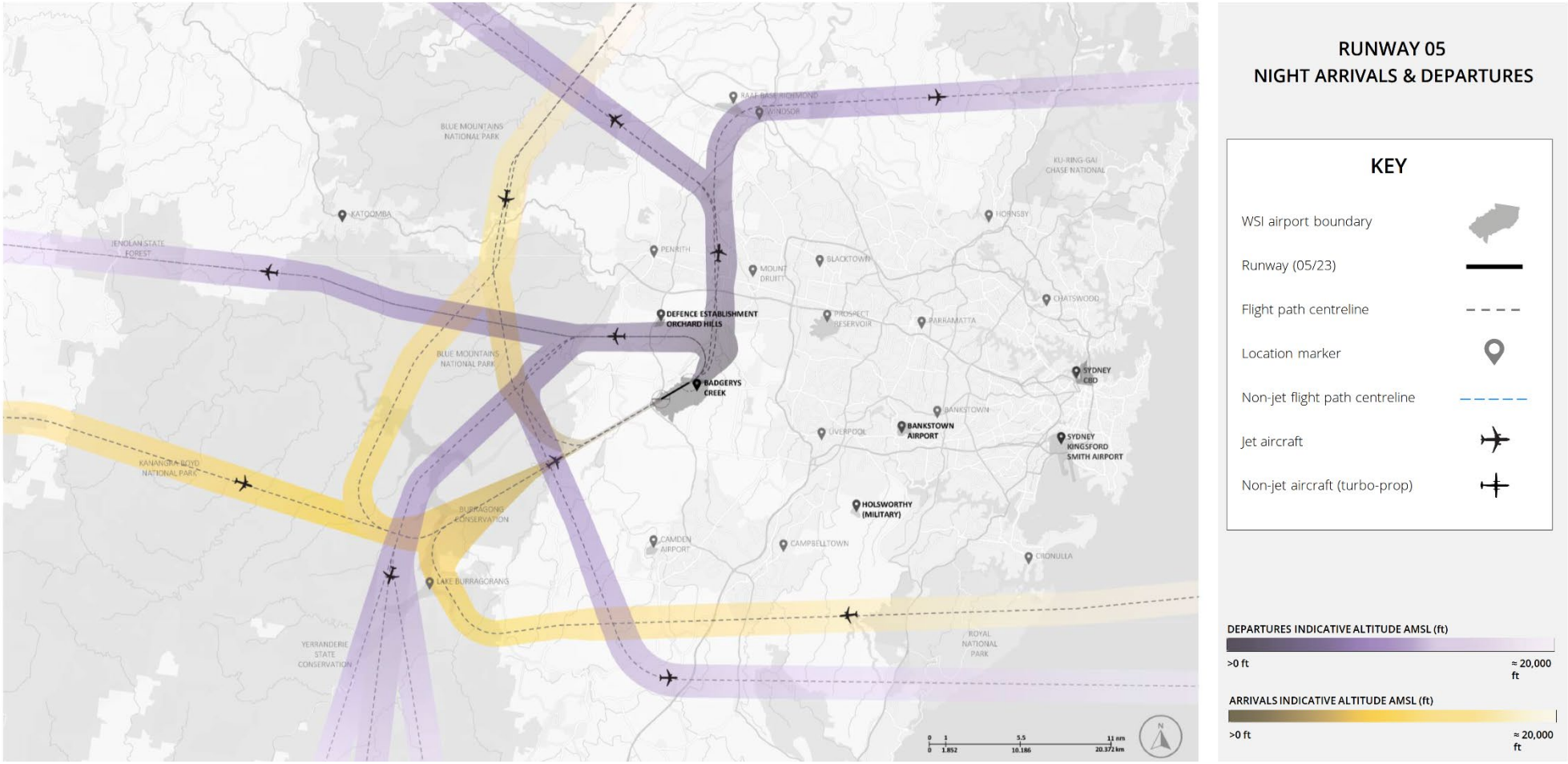


Figure 1.4 Proposed flight paths for Runway 05 (night)

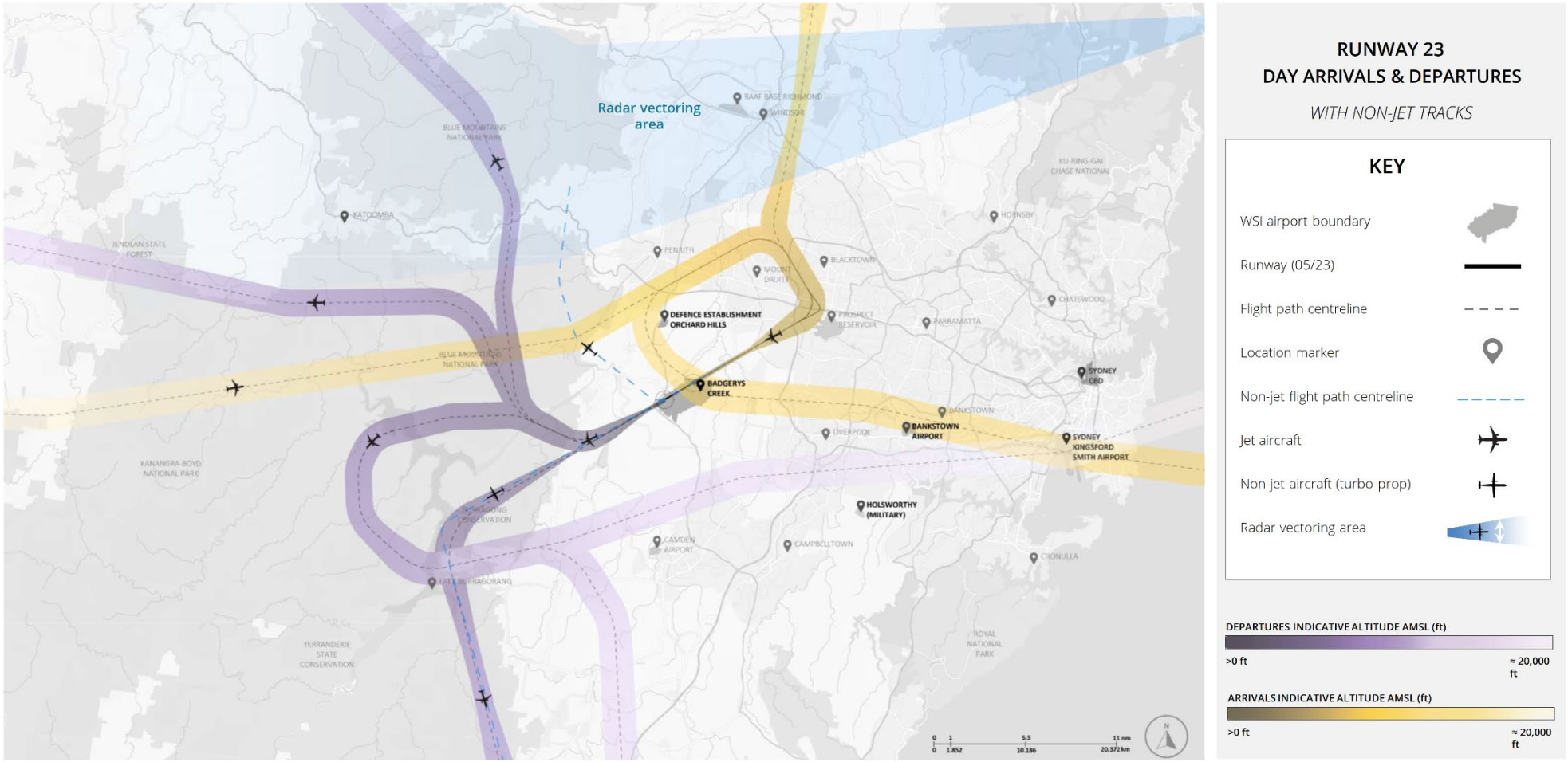


Figure 1.5 Proposed flight paths for Runway 23 (day)

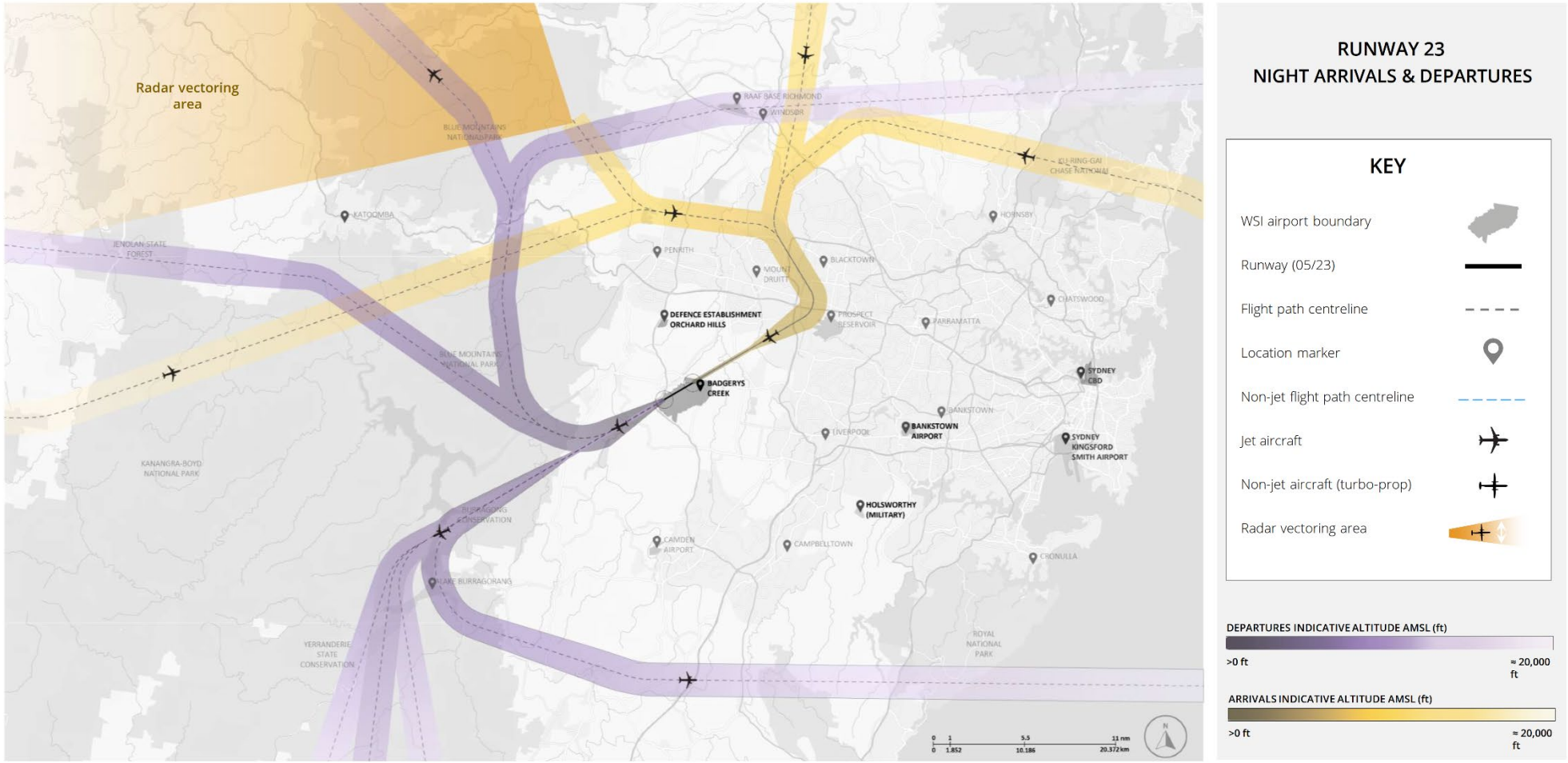


Figure 1.6 Proposed flight paths for Runway 23 (night)

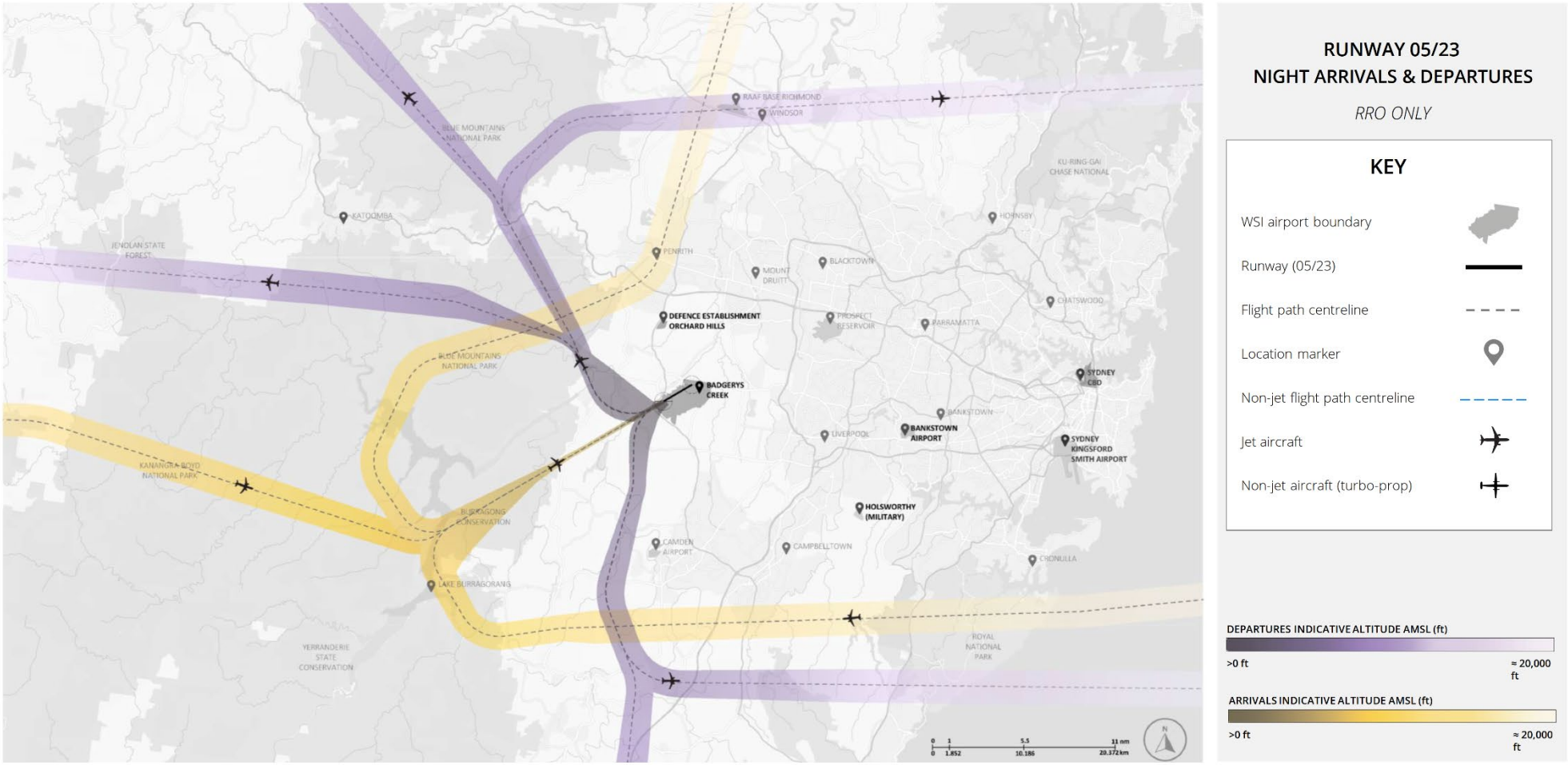


Figure 1.7 Proposed flight paths for Runway 05/23 (night)

1.3 Purpose of this document

HillPDA was engaged to prepare an Economic Impact Assessment Technical Paper (Technical paper 11) to support the EIS for the WSI Airspace and Flight Path Design and subsequent Airspace EIS. In accordance with the outline set out in the preceding introduction, this Technical Paper addresses the likely economic impacts resulting from the proposed flight path design, as required by the EPBC Act.

This Technical Paper demonstrates that the proposed airspace, once operational, will achieve an acceptable level of impact to surrounding businesses and land uses. In this context, achievement of an acceptable level of impact means that any impacts that may be associated with the airspace operation have been minimised, so far as is reasonably practicable, and that any residual impacts are sufficiently minor to be considered acceptable in return for the benefits associated with the activities giving rise to them.

Please note that a previous assessment has been undertaken in relation to the Airport itself, for further information see EPBC 2014/7391.

The Technical Paper has been prepared in accordance with the Minister's EIS Requirements summarised in Table 1.1 below.

Table 1.1 Summary of Minister's EIS Requirements (EPBC 2022/9143)

No.	Summary of requirements	Where addressed in this report
1	Point 6 – Description of the Environment • Description of the environment, land uses and character of the proposal site and surrounding areas • For any listed World Heritage properties and National Heritage places that may be impacted by the proposed action: i. Provide information about location, physical features, condition, historical context, current uses, and social, economic and cultural aspects of the property; (g) A description of the environment in all areas of potential impact, including all components of the environment as defined in Section 528 of the EPBC Act: EIS Guidelines – Western Sydney International Airport airspace and flight path design 8 a. ecosystems and their constituent parts, including people and communities; b. natural and physical resources; c. the qualities and characteristics of locations, places and areas, d. heritage values of places; and e. the social, economic and cultural aspects of a thing mentioned in paragraph a, b, c or d.	Chapter 3
2	Point 7.1 – Describe and assess relevant impacts	Chapter 5
3	Point 7.3.1 – Detailed assessment of any likely impact that the proposed action may facilitate on the natural, cultural, heritage and socioeconomic values of the Greater Blue Mountains Area (GBMA), and any other World Heritage properties or National Heritage places identified as relevant to the impacts of the proposed action.	Section 5.3
4	Point 7.3.4 – A discussion of impacts on the natural, cultural, heritage and socio-economic values of the GBMA. This discussion must include, but not limited to, the consideration of: • habitats, species and ecological communities within the GBMA, and the processes that support their connectivity, productivity and function. • the benefit of national parks for people, businesses and the economy.	Section 5.3

No.	Summary of requirements	Where addressed in this report
5	Point 7.4 – People and communities Identify whether land uses that are noise sensitive could be affected, directly and indirectly, by the proposal including identification and analysis of impacts to: • social and economic factors. A discussion of social and economic impacts, including both positive and negative impacts for a range of stakeholders and communities. Include a discussion of impacts to existing and proposed urban, industrial, rural and tourism activities within areas that may be affected by the proposal.	Chapter 3 Chapter 5
6	Point 8 – Proposed Safeguards and mitigation measures	Chapter 6
7	Point 13 – Economic and social matters The economic and social impacts of the action, both positive and negative, must be analysed. Matters of interest may include: • details of any public consultation activities undertaken and their outcomes • projected economic costs and benefits of the project, including the basis for their estimation through cost/benefit analysis or similar studies • employment opportunities expected to be generated by the project • impacts on or changes in land values. Economic and social impacts should be considered at the local, regional and national levels. Details of the relevant cost and benefits of alternative options to the proposed action, should also be included.	Chapter 5

As identified in Section 1.2, refinements to the project have been incorporated into the preliminary flight path design. The assessment of these changes has been presented in Chapter 24 (Refinements since exhibition of the EIS) of the Submissions Report and incorporated into the EIS.

1.4 Basis for economic assessment

1.4.1 Noise

The most likely impacts created by the airport flight paths are generated mainly through noise or visual amenity.

While there are no legislative criteria for the evaluation of aircraft noise in Australia, the National Airports Safeguarding Framework (NASF) recognises the merits of utilising a range of noise measures including ANEC, N70 day and evening, N70 24-hours, N60 night and N60 24-hours.

When conducting noise assessments on flight paths, Airservices requires a consideration of noise sensitive receivers (NSR) which include residences, hotels, motels and other places of temporary residence, schools and other places of education, pre-schools and childcare centres, hospitals, aged care facilities and other health facilities.

Airservices considers it is reasonable to assume that the noise criteria described below will serve as a proxy for identifying potentially significant impacts on economic matters. The Airservices criteria for 'significant impact' related to noise is:

- N70 (24-hr) – greater than or equal to 5 events
- N60 (24-hr) – greater than or equal to 10 events
- N60 (11 pm – 6 am) – greater than or equal to 2 events.

Airservices considers noise below these thresholds is highly unlikely to represent 'significant impact' as defined under the EPBC Act. These impacts have not been considered as significant in this assessment.

Chapter 2 Legislation

This chapter provides an overview of the broader policies, legislation and strategies relevant to the economic impacts of the project and considered in this technical paper.

The EIS fulfils the requirements for Commonwealth action under sections 28 and section 160 of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The Commonwealth requires approval of activities that 'significantly affect the environment', which includes the proposed airspace arrangements and flight paths.

The assessment of the economic and property value impacts has considered:

- EPBC Act
- Airservices Australia, Environmental Management of Changes to Aircraft Operations standard (AA-NOS-ENV2.100 Version 16: Effective 08 March 2022)
- Ministers Guidelines
- The Western Sydney Airport Plan
- The Environmental Planning and Assessment Act 1979.

As a Commonwealth agency, Airservices is required by the EPBC Act to assess the potential environmental significance of the proposed airspace arrangements and flight paths in the Plan for Aviation Airspace Management (PAAM).

2.1 Condition 16 of the approved Western Sydney Airport Plan (Airport Plan)

The airspace and flight path design for WSI is addressed in Condition 16 of the Airport Plan. The PAAM includes defining the flight paths, airspace changes, air traffic control (ATC) procedures and noise abatement procedures (NAPs).

The airspace and flight path design must take account of the following principles:

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

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.

The airspace and flight path design for WSI, once developed, must include, or be accompanied by noise modelling of a range of realistic airport capacity and meteorological conditions.

This assessment looks at the economic impacts on existing airspace users and balances it against the broader economic costs and benefits of the project.

2.2 What is the Environment?

The EPBC Act require Minister to consider economic and social matters when making a decision under the Act. Section 528 of the EPBC Act defines environment:

> ***environment*** *includes:*
>
> *(a) ecosystems and their constituent parts, including people and communities; and*
>
> *(b) natural and physical resources; and*
>
> *(c) the qualities and characteristics of locations, places and areas; and*
>
> *(d) heritage values of places; and*
>
> *(e) the social, economic and cultural aspects of a thing mentioned in paragraph (a), (b), (c) or (d).*

The economic aspects relate to the presence of the economic aspects including, jobs, people, businesses and trade within the catchment area. For the flight paths the environment includes the businesses and employees that are overflown, impacting those businesses would create an environmental impact.

2.3 Environmental Planning and Assessment Act 1979

In considering the economic impacts created through changes to land use and affordability, HillPDA has considered the process under the *Environmental Planning and Assessment Act 1979.*

The principal controls developed through this process are the Aerotropolis SEPP and Western Sydney Aerotropolis Plan, which require development within the ANEC 20 and above contours to be subject to meeting appropriate indoor sound levels. Existing residential areas and land already approved for residential development will not lose their development rights for residential development, that is these controls are prospective only.

These controls are under state government jurisdiction and are not discussed further in this report.

Chapter 3 Existing conditions

This chapter defines a Study Area for assessing the economic impacts of the WSI airspace operations. In defining this study area, an overview of the current economic and business characteristics is provided, which includes sensitive receptors that may be directly impacted by the project. These sensitive receivers have been sourced from Technical paper 1 and Technical paper 6: Land use and planning (Technical paper 6).

3.1 The study area

The site of the new WSI lies within the localities of Badgerys Creek and Luddenham, and within the Liverpool local government area (LGA). The northern boundary of the WSI site adjoins the Penrith LGA boundary. WSI is situated about 50 kilometres west of the Sydney central business district and KSA covering 1,780 hectares of land. The major population centres of Campbelltown, Fairfield, Liverpool and Penrith are all located within 15 to 20 kilometres of WSI, with Parramatta located around 30 kilometres to the northeast.

Most of the land within and immediately surrounding the WSI site comprises low density rural residential and agricultural land uses with a few residential areas adjacent to The Northern Road and Park Road intersection and further south of The Northern Road.

Economic considerations (relating to noise and operational airspace) extend beyond the WSI airport boundary.

In relation to noise, this Technical Paper has adopted the N60 24-hour contours 10 events per day as the key metric to assess potential economic impacts of overflight operations. The N60 24-hour contours primarily extend across 8 local government areas (LGAs), these being including Camden, Blacktown, Blue Mountains, Fairfield, Hawkesbury, Liverpool, Penrith and Wollondilly. The combination of these LGAs form the study area for this Technical paper (refer to Figure 3.1). The study area selected is the same as Technical paper 10.

Economic and tourism data is available at the LGA which makes identifying an economic baseline against which the project's impacts can be assessed more reliable and robust.

Please note, that in some cases the existing environment of the study area was refined to the N60 24-hour contours or a similar area. These circumstances include identification of:

1. specific noise sensitive receptors (sourced from Technical paper 1
2. residential areas (number of dwellings and resident population impacted).

Please note that the identifying and quantification of the impacts on operational airspace was not aligned to any particular study area.

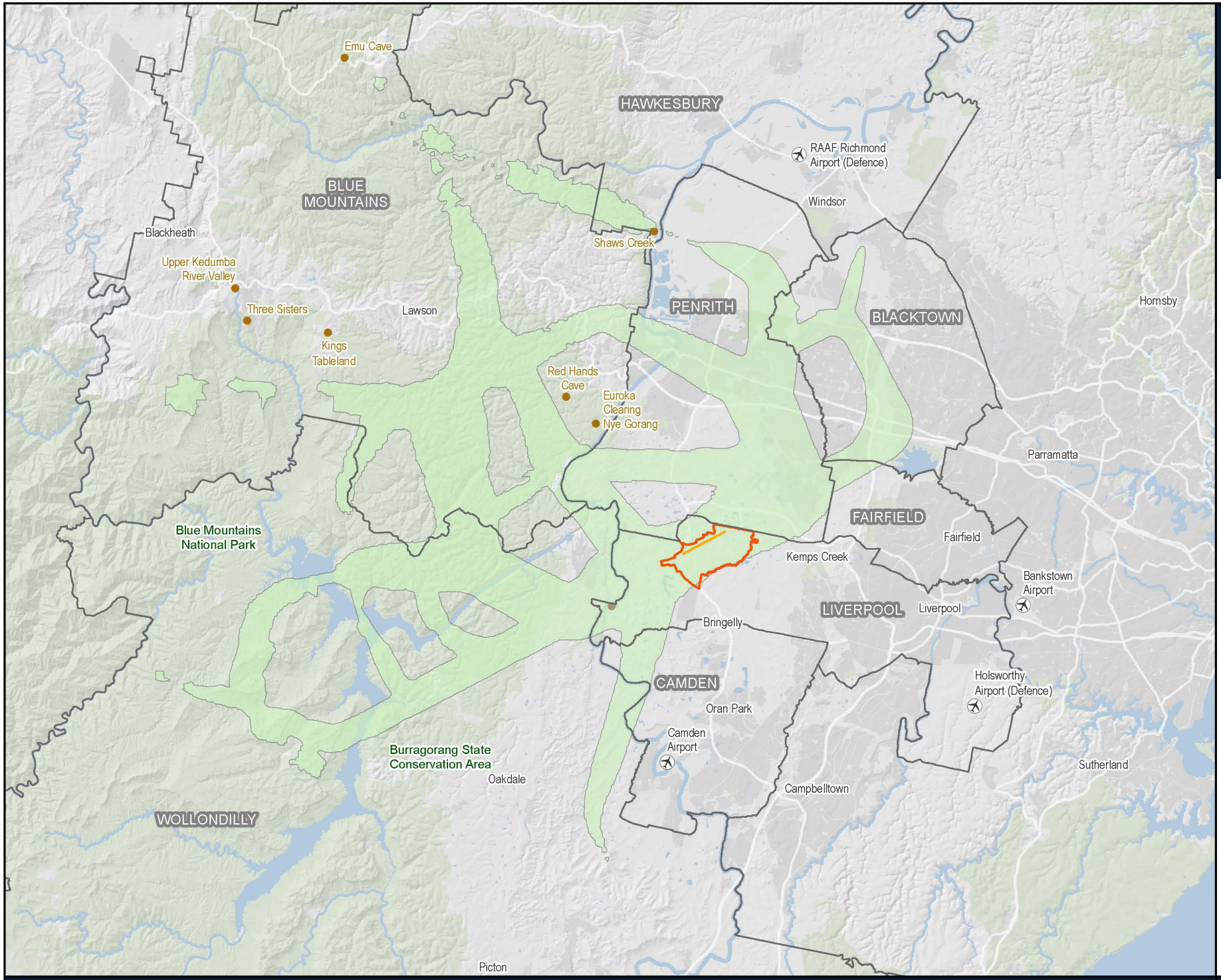


Figure 3.1

The economic study area

Legend

- WSI Runway
- Western Sydney International (Nancy-Bird Walton) Airport land boundary
- 2055 Scenarios 1,3 and 4 ANEC N60 contours 10 events
- LGAs covered by the N60 contour
- Aboriginal Places raised during consultation (NPW Act)
- Site of Aboriginal significance

0 3 6 km

Coordinate system: GDA 1994 NSW Lambert

Scale ratio correct when printed at A4

1:400,000 Date: 27/07/2023

The following provides an overview of the study area's economy measured by a number of key performance indicators including employment, gross output and gross value added. Information has been sourced from ABS 2021 Census, Profile.id and REMPLAN.

3.2 Employment

As of 2021, the study area accommodated around 427,550 jobs. This represented 18% of the 2.39 million jobs in Greater Sydney and 12% of the 3.67 million jobs in NSW.

As of 2021, the top 6 employment generating industries in the study area were:

- Health Care and Social Assistance – 60,301 jobs
- Retail Trade – 47,138 jobs
- Construction – 42,790 jobs
- Education and Training – 41,652 jobs
- Manufacturing – 37,331 jobs.

Table 3.1 provides an overview of the amount and type of employment generated across the study area, Greater Sydney and NSW as of 2021.

Table 3.1 Employment by industry 2021

Industry	Study area	Greater Sydney	NSW
Agriculture, Forestry and Fishing	4,528	9,604	75,236
Mining	2,134	5,198	34,646
Manufacturing	37,331	132,458	201,894
Electricity, Gas, Water and Waste Services	5,689	20,055	35,516
Construction	42,970	170,260	314,158
Wholesale Trade	17,605	81,087	105,052
Retail Trade	47,138	213,145	330,780
Accommodation and Food Services	25,298	131,787	227,806
Transport, Postal and Warehousing	32,590	119,859	169,619
Information Media and Telecommunications	3,092	58,864	68,521
Financial and Insurance Services	5,888	171,397	195,139
Rental, Hiring and Real Estate Services	6,010	46,614	62,384
Professional, Scientific and Technical Services	15,378	266,290	326,550
Administrative and Support Services	12,262	71,233	117,944
Public Administration and Safety	23,802	134,337	213,284
Education and Training	41,652	206,260	320,474
Health Care and Social Assistance	60,301	319,725	528,476
Arts and Recreation Services	4,199	35,673	51,395

Industry	Study area	Greater Sydney	NSW
Other Services	15,290	75,428	124,764
Inadequately described/Not stated	24,390	116,983	168,602
Total	**427,547**	**2,386,257**	**3,672,240**

Source: ABS 2021 Census

The study area has a high representation of 'blue-collar' industries (construction, manufacturing, wholesaling, transport and warehousing) comprising 32% of all jobs compared to 22% in Greater Sydney. The location quotient in these industries average 1.45 (32%/22%). The study area has an underrepresentation of 'white-collar' industries being 'information, media and telecommunications, financial and insurance services, rental, hiring and real estate services and professional, scientific and technical services'. These industries comprise 7.1% of total jobs compared to 23% for Greater Sydney. Location quotient = 0.31 (7.1% / 23%).

3.3 Gross output

Gross output refers to total revenue generated by all industries in the study area. In 2021 gross output in the study area was $137.9 billion. This represented 16% of the gross output of Greater Sydney and 11% of NSW.

The top 5 largest output industries in the study area, as of 2021, were:

- Manufacturing – $24.7 billion
- Construction – $24.4 billion
- Transport, Postal and Warehousing – $12.7 billion
- Wholesale Trade – $12.0 billion
- Rental, Hiring and Real Estate Services – $9.0 billion.

Table 3.2 provides an overview of the output generated by the types of industries present in the study area, Greater Sydney and NSW as of 2021.

Table 3.2 Gross output by industry 2021 ($m)

Industry	Study area	Greater Sydney	NSW
Agriculture, Forestry and Fishing	$2,060	$4,006	$187,227
Mining	$1,631	$4,907	$173,883
Manufacturing	$24,692	$81,085	$137,181
Electricity, Gas, Water and Waste Services	$4,660	$17,418	$113,497
Construction	$24,414	$96,399	$100,842
Wholesale Trade	$11,957	$47,248	$74,905
Retail Trade	$7,092	$33,453	$69,471
Accommodation and Food Services	$3,110	$21,635	$65,310
Transport, Postal and Warehousing	$12,670	$48,430	$55,050
Information Media and Telecommunications	$1,483	$47,398	$49,150
Financial and Insurance Services	$2,716	$111,088	$48,454

Industry	Study area	Greater Sydney	NSW
Rental, Hiring and Real Estate Services	$9,041	$106,191	$42,297
Professional, Scientific and Technical Services	$4,423	$97,825	$39,519
Administrative and Support Services	$3,474	$30,340	$38,715
Public Administration and Safety	$6,303	$34,543	$26,410
Education and Training	$5,269	$32,123	$26,384
Health Care and Social Assistance	$8,135	$42,530	$23,997
Arts and Recreation Services	$1,563	$10,460	$19,833
Other Services	$3,170	$14,863	$10,253
Total	**$137,863**	**$881,942**	**$1,302,378**

Source: ABS 2021 Census, Profile.id, REMPLAN and HillPDA

The study area has a high output in the blue-collar industries comprising 56% of total output of all industries compared to 33% in Greater Sydney. Location quotient averages 1.7 in these industries. Gross output of white-collar industries in the study area is only 13% of all industries compared to 41% in Greater Sydney resulting in a location quotient of 0.31.

3.4 Gross value added

Gross value added (GVA) of an industry refers to the value of outputs less the costs of inputs. It measures the contribution that the industry makes to the country's wealth or gross domestic product (GDP). The main components of GVA are workers remuneration, company profits and taxes generated.

Based on the industries and employment present in 2021, it is estimated that the study area generated $58.10 billion in GVA. This represented 15% of GVA generated across Greater Sydney and 10% of NSW's industry GVA in 2021.

The top 6 largest GVA industries in the study area, as of 2021, were:

- Construction – $7.7 billion
- Manufacturing – $7.3 billion
- Wholesale Trade – $6.1 billion
- Transport, Postal and Warehousing – $5.7 billion
- Health Care and Social Assistance – $5.5 billion.

Table 3.3 provides an overview of the output generated by the types of industries present in the study area, Greater Sydney and NSW as of 2021.

Table 3.3 Value added by industry 2021 ($m)

Industry	Study area	Greater Sydney	NSW
Agriculture, Forestry and Fishing	$797	$1,515	$10,691
Mining	$649	$2,382	$27,166
Manufacturing	$7,256	$24,436	$32,432
Electricity, Gas, Water and Waste Services	$1,901	$7,264	$15,159
Construction	$7,731	$30,959	$51,103
Wholesale Trade	$6,078	$23,890	$20,815
Retail Trade	$4,236	$20,191	$24,768
Accommodation and Food Services	$1,368	$9,253	$11,169
Transport, Postal and Warehousing	$5,662	$21,687	$28,732
Information Media and Telecommunications	$541	$17,970	$19,116
Financial and Insurance Services	$1,627	$61,240	$80,653
Rental, Hiring and Real Estate Services	$2,110	$19,494	$81,188
Professional, Scientific and Technical Services	$2,210	$49,302	$49,969
Administrative and Support Services	$2,013	$18,642	$14,061
Public Administration and Safety	$3,652	$20,559	$38,390
Education and Training	$3,863	$21,288	$34,248
Health Care and Social Assistance	$5,476	$28,523	$52,253
Arts and Recreation Services	$554	$3,767	$3,959
Other Services	$1,330	$6,632	$9,588
Total	**$59,054**	**$388,991**	**$605,460**

Source: ABS 2021 Census, Profile.id, REMPLAN and HillPDA

The study area has a high proportion of GVA in the blue-collar industries comprising 49% of total GVA of all industries compared to 28% in Greater Sydney. Location quotient averages 1.76 in these industries. GVA of white-collar industries in the study area is only 10% of all industries compared to 38% in Greater Sydney resulting in a location quotient of 0.26.

3.5 The tourism industry

The following provides an overview of the economic value that tourism provides to the study area. Mitigation measures implemented to reduce the spread of COVID-19 in 2020 impacted visitation rates and the economic value of tourism. For this reason, this section describes the economic value that tourism provided in the study area prior to COVID-19.

Tourism data was sourced from Profile.id, REMPLAN and Tourism Research Australia. Tourism data for Fairfield LGA and Wollondilly was limited.

3.5.1 Tourism overview

In 2018/19 there were 24,960 direct jobs in tourism in the study area which comprised 17% of Greater Sydney.

Tourism is a significant component of the economy contributing $57 billion to GDP just before the COVID-19 pandemic and employing 660,000 workers across Australia in 2018–19[2]. The industry has strong linkages with other sectors, so the impacts on the economy go further than the direct contribution of the industry. This is known as the multiplier effect. Multipliers refer to the level of additional economic activity generated by a source industry.

There are 2 types of effects captured by multipliers:

Production Induced Effects: which is made up of:

- *Direct effects:* which constitutes all outputs and employment required to produce the inputs for the industry, and
- *Indirect effects:* which is the induced extra output and employment from all industries to support the increased production of inputs.

Consumption Induced Effects: which relates to the demand for additional goods and services due to increased spending by the wage and salary earners across all industries arising from employment.

The modelling for this report is based on the Australian National Accounts and these effects have also been adjusted for industry size relative to the study area to calculate the direct and indirect (induced effects) of construction expenditure as well as industry output and employment job creation at the regional level[3].

In addition to the 24,960 jobs in the tourism industry in the study area, a further 20,160 jobs were generated and/or supported in production and consumption induced impacts, representing 14% of all employment directly generated and/or supported by tourism activities across Greater Sydney.

Tourism in the study area directly contributed a total of $1.79 billion to Greater Sydney's Gross Regional Product (GRP), representing 11.4% of Greater Sydney's total. A further $2.61 billion was generated and/or supported through multiplier impacts.

---

2 IBIS World Report on Tourism in Australia 2020

3 The ABS notes that "Care is needed in interpreting multiplier effects; their theoretical basis produces estimates which somewhat overstate the actual impacts in terms of output and employment." In particular it may leave the impression that resources used for production would not have been utilised elsewhere in the local economy. There are several other limitations with the use of input-output multipliers that are documented on the ABS website (https://www.abs.gov.au/methodologies/australian-national-accounts-input-output-tables-methodology/2020-21)

Table 3.4 Tourism industry in the study area 2018/19

	Study area									Greater Sydney
	Camden	Black-town	Blue Mtns	Fairfield	Hawkes-bury	Liverpool	Penrith	Wollon-dilly	Total	
Number of jobs										
Direct	1,837	5,623	3,924	3,334	1,372	4,149	4,151	569	24,959	149,288
Indirect	1,249	5,683	3,190	2,693	988	3,135	2,796	428	20,162	175,747
Total	**3,086**	**11,305**	**7,114**	**6,027**	**2,360**	**7,284**	**6,947**	**997**	**45,120**	**325,034**
Gross value added ($m)										
Direct	$115	$420	$287	$233	$97	$322	$277	$41	$1,792	$14,856
Indirect	$143	$671	$419	$347	$137	$433	$408	$55	$2,614	$21,255
Total	**$258**	**$1,091**	**$706**	**$580**	**$234**	**$755**	**$685**	**$96**	**$4,406**	**$36,110**

Source: Profile.id, REMPLAN, Tourism Research Australia and HillPDA

3.5.2 Tourism visitor numbers and nights

In 2018/19 the total number of tourists and visitors to the study area was estimated at just over 11 million. This represented 21.5% of the 51.5 million tourists and visitors to Greater Sydney and 9.6% of NSW's tourists and visitors in that year.

Of the total number of tourist and visitors to the study area, the largest category was domestic day visitors. They recorded 8.3 million visitors in 2018/19, representing 75% of all visitors to the study area in that year.

The main tourist and visitor attractor within the study area is the Blue Mountains region with 4.6 million tourists and visitors being recorded in the locality in 2019. This represented 42% of all tourists and visitors estimated to have visited the study area.

Table 3.5 Visitor numbers and visitor nights (000s) 2018/19

Visitors (000)	Study area									Greater Sydney	NSW
	Camden	Black-town	Blue Mtns	Hawkes-bury	Fairfield	Liver-pool	Penrith	Wollon-dilly	Total		
International	11	82	115	13	20	47	25	*	313	4,647	5,802
Domestic overnight	129	276	1,318	268	*	175	239	108	2,513	14,993	41,826
Domestic day	554	1,083	3,200	932	*	714	1,109	685	8,277	31,880	68,259
Total	**694**	**1,441**	**4,633**	**1,214**	**20**	**936**	**1,373**	**793**	**11,103**	**51,520**	**115,887**

Visitor nights (000)	Study area									Greater Sydney	NSW
	Camden	Black-town	Blue Mtns	Hawkes-bury	Fairfield	Liver-pool	Penrith	Wollon-dilly	Total		
International	195	2,285	482	229	617	1,320	764	*	5,892	84,336	97,923
Domestic overnight	306	675	1,859	646	*	793	801	277	5,357	38,767	114,058
Total	**501**	**2,961**	**2,341**	**874**	**617**	**2,113**	**1,565**	**277**	**11,249**	**123,103**	**211,981**

Source: Profile.id, REMPLAN, Tourism Research Australia and HillPDA

* no available data

3.6 Residential areas

The following estimates the resident population and number of dwellings, by broad typology in the study area that may be impacted by aircraft noise. For this section the area has been confined to the N60 24-hour contour boundary. The number of residents and dwellings by dwelling type was estimated from Technical paper 1 based on ABS 2021 meshblocks. Statistical Area Level 1 Census data was used to separate dwellings by dwelling type.

3.6.1 Population

Technical paper 1 estimates 132,000 people living within the N60 (10+ movements per day under all scenarios) in 2033 and this will increase to 175,000 people by 2055. The numbers are considerably lower in the N70 contour (5+ movements per day) with 5,100 people in 2033 increasing to 13,000 by 2055.

3.6.2 Number of dwellings

It is estimated that 50,000 private dwellings will be affected by the N60 24hr noise contour in 2033 increasing to 65,600 by 2055. Of these total dwellings, it is estimated that:

- 75% will be separate houses
- 13% will be townhouses
- 11% will be apartments/flats.

It is further estimated that 1,700 dwellings will be affected by the N70 24hr noise contour in 2033 increasing to 4,300 by 2055. Of these dwellings, it is estimated that:

- 95% will be houses
- 4% will be townhouses
- 0.4% will be apartments/flats.

Resident population and dwelling estimates for the N60 and N70 24hr noise contours are summarised in Table 3.6.

Table 3.6 Forecast dwellings affected by aircraft noise

		2033	2040	2055
N60	Non-strata	37,750	46,055	49,528
	Strata	12,250	14,945	16,072
	Total	50,000	61,000	65,600
N70	Non-strata	1,622	2,194	4,102
	Strata	78	106	198
	Total	1,700	2,300	4,300
ANEC 20		93	150	320
ANEC 25		22	29	58
ANEC 30		6	9	15
ANEC 35		1	2	5

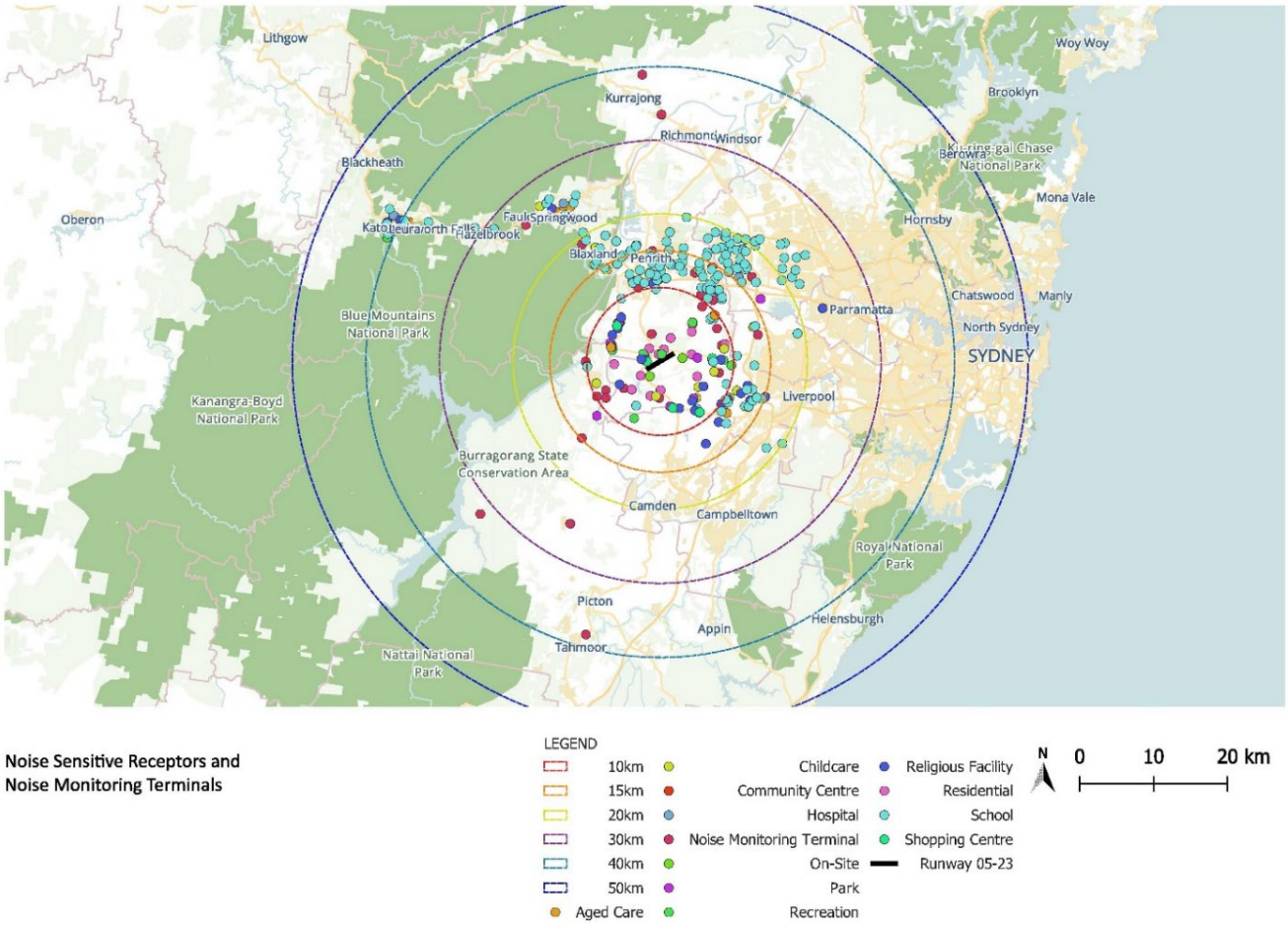
Source: Technical paper 1: Aircraft noise, ABS 2021 Census and HillPDA

Please note that the numbers in the above table are cumulative. That is the 65,600 dwellings by Year 2055 in the N60 contour includes the 4,300 dwellings in the N70 which includes the 320 dwellings in the ANEC 20 contour and so on.

3.7 Noise sensitive receivers (NSRs)

This section identifies Noise sensitive receivers (NSRs) within the study area. The type and location of these NSRs has been sourced from Technical paper 1. As described in Technical paper 1 the NSRs were based on the 2016 EIS and supplemented with a range of residential, commercial and community facilities such as schools, hospital, childcare centres and places of worship within a 15 km radius from WSI. Additional sites were considered up to 50 km in rural areas where aircraft noise is more likely to be noticeable due to the lower ambient soundscape.

A full list of these NSRs can be found in Appendix D of Technical paper 1.



Source: Technical paper 1: Aircraft noise

Figure 3.2 Noise sensitive receptors (NSRs) and noise monitoring terminals (NMTs)

HillPDA has identified the NSRs that are located within the N60 24hr and N70 24hr contours. These are provided in Table 3.7.

Table 3.7 Noise sensitive receivers

ID	Type	Area	N60 24hr	N70 24hr
R34	Aged Care	Emmaus Residential Aged Care	Y	Y
N1	Aged Care	CATHOLIC HEALTHCARE EMMAUS VILLAGE	Y	Y
N3	Aged Care	REGAL OAKS VILLAGE	Y	
R35	Childcare	Mamre After School and Vacation Care	Y	Y
R37	Childcare	Schoolies at Mulgoa	Y	
R40	Childcare	Little Smarties Childcare Centre	Y	Y
R49	Childcare	Luddenham Child Care Centre	Y	
R54	Childcare	Mulgoa Preschool	Y	
N11	Childcare	MY FIRST SCHOOL CHILDCARE CENTRE	Y	
N12	Childcare	SILVERDALE CHILD CARE CENTRE	Y	
R63	Community Centre	Luddenham Progress Hall	Y	
R64	Community Centre	Mulgoa Hall	Y	
N16	Hospital	NEPEAN HOSPITAL	Y	
N17	Hospital	NEPEAN PRIVATE HOSPITAL	Y	
R85	Park	Bents Basin State Conservation Reserve & Gulguer	Y	
R86	Park	Blaxland Crossing Reserve	Y	
R91	Park	Western Sydney Parklands	Y	
R94	Park	Freeburn Park	Y	
R95	Park	Overett Reserve	Y	
R97	Park	Mulgoa Park	Y	
R98	Recreation	Wallacia Bowling and Recreation Club	Y	
R99	Recreation	Hubertus Country Club	Y	Y
R100	Recreation	Sugarloaf Cobbitty Equestrian Club	Y	
R102	Recreation	Panthers Wallacia (country club)	Y	
R103	Recreation	Twin Creeks Gold and Country Club	Y	Y
R108	Recreation	Luddenham Showground	Y	
R110	Religious Facility	St James Luddenham	Y	Y
R115	Religious Facility	Anglican Parish of Mulgoa	Y	

ID	Type	Area	N60 24hr	N70 24hr
R124	Religious Facility	Wallacia Christian Church	Y	
R126	Religious Facility	St Francis Xavier Church	Y	Y
R127	Religious Facility	Luddenham Uniting Church	Y	
N21	Religious Facility	Holy Family Church	Y	
N23	Religious Facility	Holy Spirit Parish	Y	
N31	Religious Facility	St Clair Anglican Church	Y	
N34	Religious Facility	Uniting Church St Clair	Y	
R17	Residential	Luddenham Road	Y	
R18	Residential	Cnr Adams & Elizabeth Drive	Y	Y
R19	Residential	Cnr Adams & Anton Road	Y	Y
R21	Residential	Cnr Willowdene Ave and Vicar Park Lane	Y	Y
R23	Residential	Wallacia, Greendale Road	Y	Y
R31	Residential	Mt Vernon residential	Y	
R65	School	Emmaus Catholic College	Y	Y
R66	School	University of Sydney Farms	Y	
R69	School	Mamre Anglican School	Y	Y
R73	School	Luddenham Public School	Y	Y
R75	School	Trinity Catholic Primary School	Y	Y
R78	School	Mulgoa Public School	Y	
R80	School	Wallacia Public School	Y	
R140	School	Holy Family Catholic Primary and Church	Y	
N39	School	BANKS PUBLIC SCHOOL	Y	Y
N42	School	BIDWILL PUBLIC SCHOOL	Y	
N48	School	BLACKWELL PUBLIC SCHOOL	Y	Y
N50	School	BLAXLAND HIGH SCHOOL	Y	
N51	School	BLAXLAND PUBLIC SCHOOL	Y	
N53	School	CAMBRIDGE PARK PUBLIC SCHOOL	Y	
N54	School	CATHWEST INNOVATION COLLEGE MCCARTHY CAMPUS	Y	
N56	School	CHIFLEY COLLEGE BIDWILL CAMPUS	Y	
N57	School	CHIFLEY COLLEGE DUNHEVED CAMPUS	Y	

ID	Type	Area	N60 24hr	N70 24hr
N60	School	CHIFLEY COLLEGE SHALVEY CAMPUS	Y	
N62	School	CLAIRGATE PUBLIC SCHOOL	Y	
N63	School	CLAREMONT MEADOWS PUBLIC SCHOOL	Y	
N67	School	EASTERN CREEK PUBLIC SCHOOL	Y	
N68	School	EASTERN CREEK PUBLIC SCHOOL PRESCHOOL	Y	
N70	School	EMU HEIGHTS PUBLIC SCHOOL	Y	
N72	School	ERSKINE PARK HIGH SCHOOL	Y	
N74	School	GLENDENNING PUBLIC SCHOOL	Y	
N79	School	HASSALL GROVE PUBLIC SCHOOL	Y	
N82	School	HOLY SPIRIT PRIMARY SCHOOL	Y	
N86	School	JAMES ERSKINE PUBLIC SCHOOL	Y	
N90	School	KINGSWOOD PARK PUBLIC SCHOOL	Y	
N91	School	KINGSWOOD PUBLIC SCHOOL	Y	
N92	School	KINGSWOOD SOUTH PUBLIC SCHOOL	Y	
N97	School	LLANDILO PUBLIC SCHOOL	Y	
N107	School	MONTGROVE COLLEGE	Y	
N111	School	MOUNT RIVERVIEW PUBLIC SCHOOL	Y	
N113	School	NEPEAN CREATIVE AND PERFORMING ARTS HIGH SCHOOL	Y	
N114	School	NEPEAN TAFE COLLEGE KINGSWOOD CAMPUS	Y	
N115	School	NEPEAN TAFE COLLEGE PENRITH CAMPUS	Y	
N116	School	NOUMEA PUBLIC SCHOOL	Y	
N118	School	OUR LADY OF THE ROSARY PRIMARY SCHOOL	Y	
N121	School	PENOLA CATHOLIC COLLEGE EMU PLAINS	Y	
N124	School	PENRITH HIGH SCHOOL	Y	
N125	School	PENRITH PUBLIC SCHOOL	Y	
N126	School	PENRITH SOUTH PUBLIC SCHOOL	Y	
N128	School	PLUMPTON PUBLIC SCHOOL	Y	
N132	School	ROPES CROSSING PUBLIC SCHOOL	Y	
N134	School	SHALVEY PUBLIC SCHOOL	Y	
N139	School	ST CLAIR HIGH SCHOOL	Y	

ID	Type	Area	N60 24hr	N70 24hr
N140	School	ST CLAIR PUBLIC SCHOOL	Y	
N142	School	ST FRANCIS OF ASSISI PRIMARY SCHOOL	Y	
N143	School	ST JOSEPH'S PRIMARY SCHOOL	Y	
N145	School	ST MARYS NORTH PUBLIC SCHOOL	Y	
N146	School	ST MARYS PUBLIC SCHOOL	Y	
N147	School	ST MARYS SENIOR HIGH SCHOOL	Y	
N148	School	ST MARYS SOUTH PUBLIC SCHOOL	Y	
N149	School	ST NICHOLAS OF MYRA PRIMARY SCHOOL	Y	
N154	School	UNIVERSITY OF WESTERN SYDNEY PENRITH CAMPUS	Y	
N155	School	UNIVERSITY OF WESTERN SYDNEY WERRINGTON NTH CAMPUS	Y	
N156	School	UNIVERSITY OF WESTERN SYDNEY WERRINGTON STH CAMPUS	Y	
N159	School	WARRIMOO PUBLIC SCHOOL	Y	
N160	School	WERRINGTON COUNTY PUBLIC SCHOOL	Y	
N161	School	WERRINGTON PUBLIC SCHOOL	Y	
N165	School	WILLMOT PUBLIC SCHOOL	Y	
R135	Shopping Centre	Luddenham shops	Y	Y
R136	Shopping Centre	Mulgoa shops	Y	
R138	Shopping Centre	Wallacia Shops	Y	

Source: Technical paper 1: Aircraft noise, HillPDA

Chapter 4 Methodology

This chapter provides an overview of the methodology for the economic impact assessment, including the approach to assessment, review of existing information, consultation carried out, dependencies with other studies and any limitations and assumptions.

4.1 Impact assessment approach

From the outset, it is imperative to distinguish the difference between WSI and the flight paths in relation to economic impact. WSI itself will generate considerable economic impact and this was assessed by Ernst and Young (EY) in the 2016 EIS.

The purpose of this report is to assess the economic impact of the flight paths. Economic appraisals require a base case to measure against or an assessment between options. In this case the flight paths are unavoidable with an operating airport.

Western Sydney Airport will bring significant economic benefits to Sydney and NSW but flight paths are an integral component that are more likely to generate disbenefits (noise, air quality, amenity, etc) than benefits.

This methodology included the following steps:

- A review of the Stage 1 WSI EIS particularly:
  - socio-economic impact assessment by GHD
  - economic impact analysis by EY
  - potential impacts on Property Values by JLL (August 2016)
  - noise assessment.
- A review of the new airspace-related technical papers including:
  - Technical paper 1: Aircraft noise
  - Technical paper 7: Landscape and visual amenity
  - Technical paper 6: Land use and planning
  - Technical paper 10: Social.
- The JLL study and other similar studies were reviewed to quantify the percentage of devaluation on property prices by land use types (residential and non-residential) as a result of flight paths which is a proven method of monetarising or quantifying the impacts on amenity. Technical paper 1 quantified the number of residential properties within the various noise contours.
- Likely key sensitive land uses that may be affected were identified such as education and health institutions. The best method of measuring economic costs on these uses is the inclusion of mitigation measures (noise attenuation and in high impact scenarios relocation). However these costs have yet to be quantified (discussed in Chapter 6).
- Other particular employment uses that may be impacted by airport noise were identified, such as tourism land uses in areas identified to be impacted. The JLL study and the Noise, Landscape and visual amenity and Social Technical papers were all sources refer to in assessing the economic impacts in the locality.
- Where possible the economic impacts from changes to airspace architecture and arrangements on existing airspace users in the Sydney basin were quantified. The method of quantification was based on stakeholder consultation and an estimation of the costs of additional flying time by the number of forecast flights from Bankstown Airport.
- Other impacts identified in the other technical papers including social impacts were considered and methods of quantifying these impacts in monetary terms where investigated.

4.2 Dependencies and interactions with other technical studies

The information presented in this paper has been informed by the following:

Table 4.1 Dependencies and interactions with other technical studies

Technical paper	Relevance
Technical paper 1: Aircraft noise	Residential dwellings by noise contours and noise levels on the GBMA
Technical paper 10: Social	Impacts on residential, recreational and other noise sensitive areas and impacts on the GBMA
Technical paper 7: Landscape and visual amenity	Impacts on tourist destination areas
Technical paper 6: Land use and planning	Impacts on residential and other noise sensitive areas and impacts on the GBMA

4.3 Limitations and assumptions

As stated above the purpose of Technical paper 11 is to assess the impacts of the flight paths and not WSI. An economic impact assessment generally requires the preferred project to be measured against a base case. This report has assessed impacts from the flight path measured against a base case of 'no flight paths'. However the base case of 'no flight paths' is a hypothetical option and not a real option because an operating airport will be delivered in 2026 under all options and hence flight paths are an integral component of the operating airport.

This report has relied on the findings of other technical papers (refer to Table 4.1) and other data sources including, but not limited to the following:

- the 2016 EIS of WSI itself
- data provided by Aeria (manager of Bankstown and Camden airports) and DITRDCA.

All monetarised values in this report are expressed in 2022–23 dollars.

Chapter 5 Economic impact assessment

This assessment looks at the economic impacts on existing airspace users and balances this against the broader economic costs and benefits of the project.

5.1 Economic impacts to existing airspace users

WSI and the proposed flight paths will impact the use of the airspace. Currently the area is used by Bankstown and Camden airports for flying training, emergency services and other operations.

A stakeholder briefing and workshop was held at Bankstown Airport on 12 December 2022 with Aeria (manager of Bankstown and Camden airports), DITRDCA and tenants of Bankstown Airport with WSP and HillPDA to assist the consultancy team in identifying and assessing the financial and economic impacts in relation to likely changes in use of airspace.

A short presentation was provided to the group on developing flight paths for the Western Sydney International (Nancy-Bird Walton) Airport (WSI). This included an update on the design process and community engagement. This was then followed by discussion with the participants to gain feedback to help inform the drafting of the social and economic technical papers.

Bankstown Airport is a major integrated aviation and commercial centre for Sydney, including home for emergency services, general aviation, training, logistics and destination retail. Bankstown is the third busiest airport in Australia and the second busiest general aviation airport with annual aircraft movements of circa 250,000 in 2017 which is forecast to reach 300,000 movements by 2026. WSI operates on a 24/7 basis and serves as a flying base for emergency services, major flying schools and small to medium-size air freight, aircraft maintenance, charter and private business flights. Home to more than 160 businesses, Bankstown Airport plays an important role as a major commercial centre within the Canterbury Bankstown region.

Camden Airport is a general aviation, emergency services, sport and recreational aviation airport servicing the South West Growth Centre of Sydney, and a bespoke commercial and employment hub for the Camden region. WSI operates on a 24/7 basis and currently caters for a wide range of general aviation movements (fixed wing, helicopter and gliders), providing for flying training, emergency services, gliding, ballooning and recreational flying, along with not-for-profit youth organisations and aviation maintenance facilities – with annual aircraft movements of circa 100,000 per annum.

According to Aeria these 2 airports contribute over $1.1bn and 6,500 jobs to the NSW economy, and this is anticipated to increase significantly over the respective master plan periods to $1.6bn and 10,000 jobs by 2024/2025. Transport for NSW and Economy.ID suggests that there is around 3,500 jobs at Bankstown Airport[4]. Around 350 work in retail and food services (Bunnings, ALDI, McDonalds, etc) on the fringe sites.

Bankstown and Camden Airports facilitate critical operations of a broad spectrum of emergency services operators, including Toll Air Ambulance, Royal Flying Doctor Service, Nets (Sydney Children's Hospital), Airmed, Little Wings, Police AirWing (NSW Police), NRMA Rescue and Coulson Aviation (NSW Rural Fire Service). Any potential interruption or delay to these services has potential for adverse impacts to life safety and accordingly a number of these emergency service providers intend to engage directly with DITRDCA.

---

4 https://economy.id.com.au/canterbury-bankstown
https://www.transport.nsw.gov.au/data-and-research/reference-information/travel-zone-explorer-visualisation

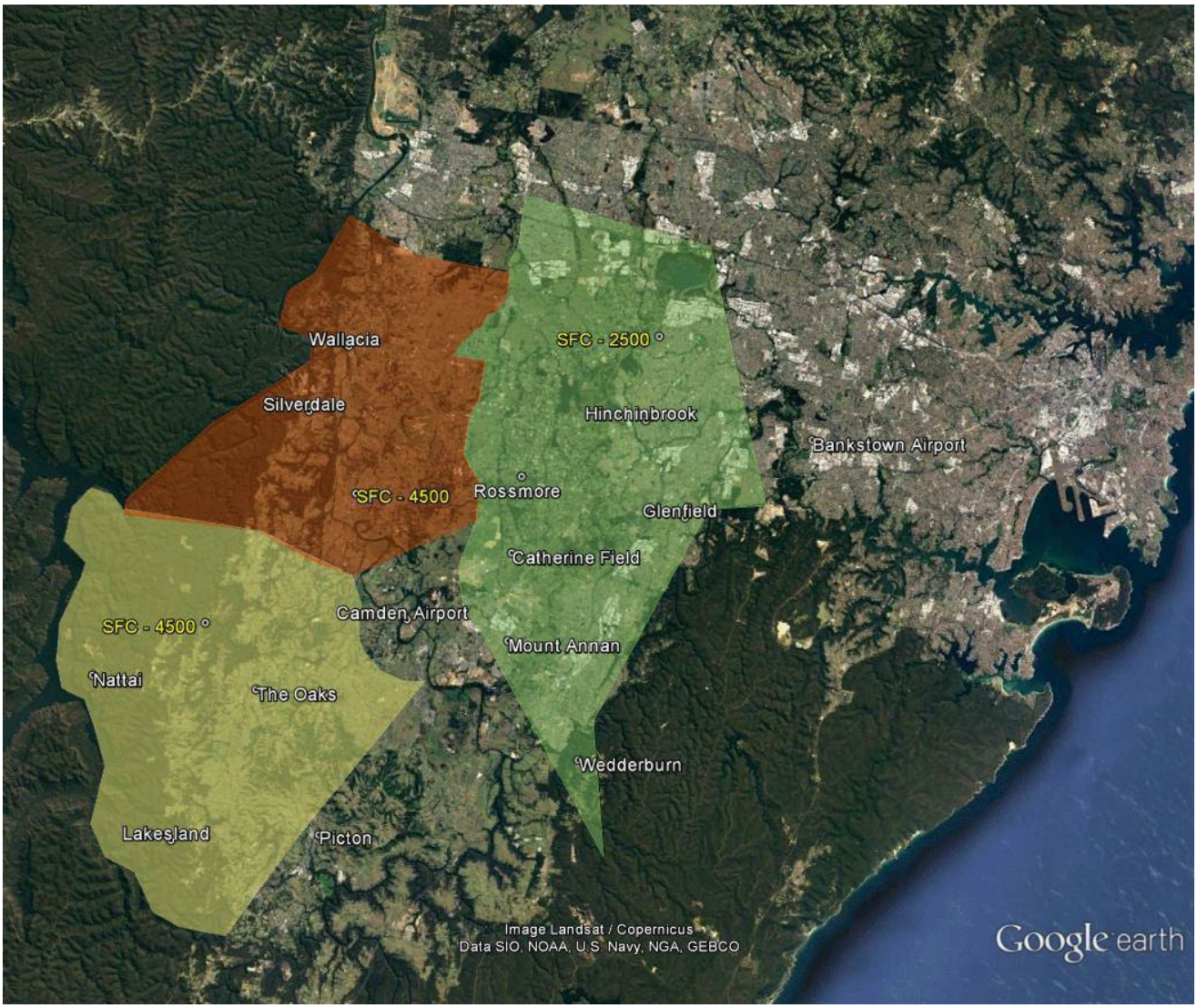
Global pilot shortages are a persistent economic challenge with a projected 770,000 new pilots required in the next twenty years and a projected shortfall of 80,000 pilots estimated by 2032. The pilot shortages constrain the economy with wide ranging impacts. Bankstown and Camden Airports provide essential flying training capacity with more than 600 student pilots per annum receiving training at the airports.

The key points raised by stakeholders were:

- In the absence of detail of proposed flight paths, it is difficult for the aviation community to provide detailed analysis of the impact.
- There was a high level of uncertainty about flight paths and hence the financial impacts to the stakeholders.
- Flying training operators based at Bankstown and Camden currently use 3 flying training areas (FTA) in relatively close proximity to each of the airports. With the introduction of WSI and the proposed airspace design, these FTA are anticipated to be reduced to the extent that they are no longer suitable for some flying training operations.
- Accordingly, it is anticipated that greater distances will need to be travelled to reach the FTA which will translate to increased “transit” flight durations, extended training schedules and increased costs including increased flying training times and increased fuel and maintenance costs.
- There are also potential safety concerns arising from either the prolonged transit flights to appropriate FTA and generally extended student flying time. WSI will compress the training area in the Sydney Basin resulting in more aircraft in a smaller space, thereby reducing safety levels.
- Current limit for recreational flying from Bankstown Aerodrome is 40 km. Further restrictions reduces the area that can be used.
- Relocation of operations could be costed although relocation to other areas is not an option for all participants and would be dependent on the availability of students at those locations. Camden cannot accommodate all current Bankstown operations.
- The introduction of the new WSI controlled airspace may result in increased response times for emergency services operators with significant potential human and environmental consequences, including for life critical operations.

On the last point there is a need for agreed procedures between Airservices and emergency service operators from a safety and operational perspective. Such processes already exist for KSA. DITRDCA and Airservices have held discussions with emergency services operators on these matters. Aircraft participating in a Search and Rescue (SAR), Medical (MEDEVAC), or Fire and Flood Relief (FFR) flights shall be granted priority as necessary, which will mitigate any potential adverse economic impacts.

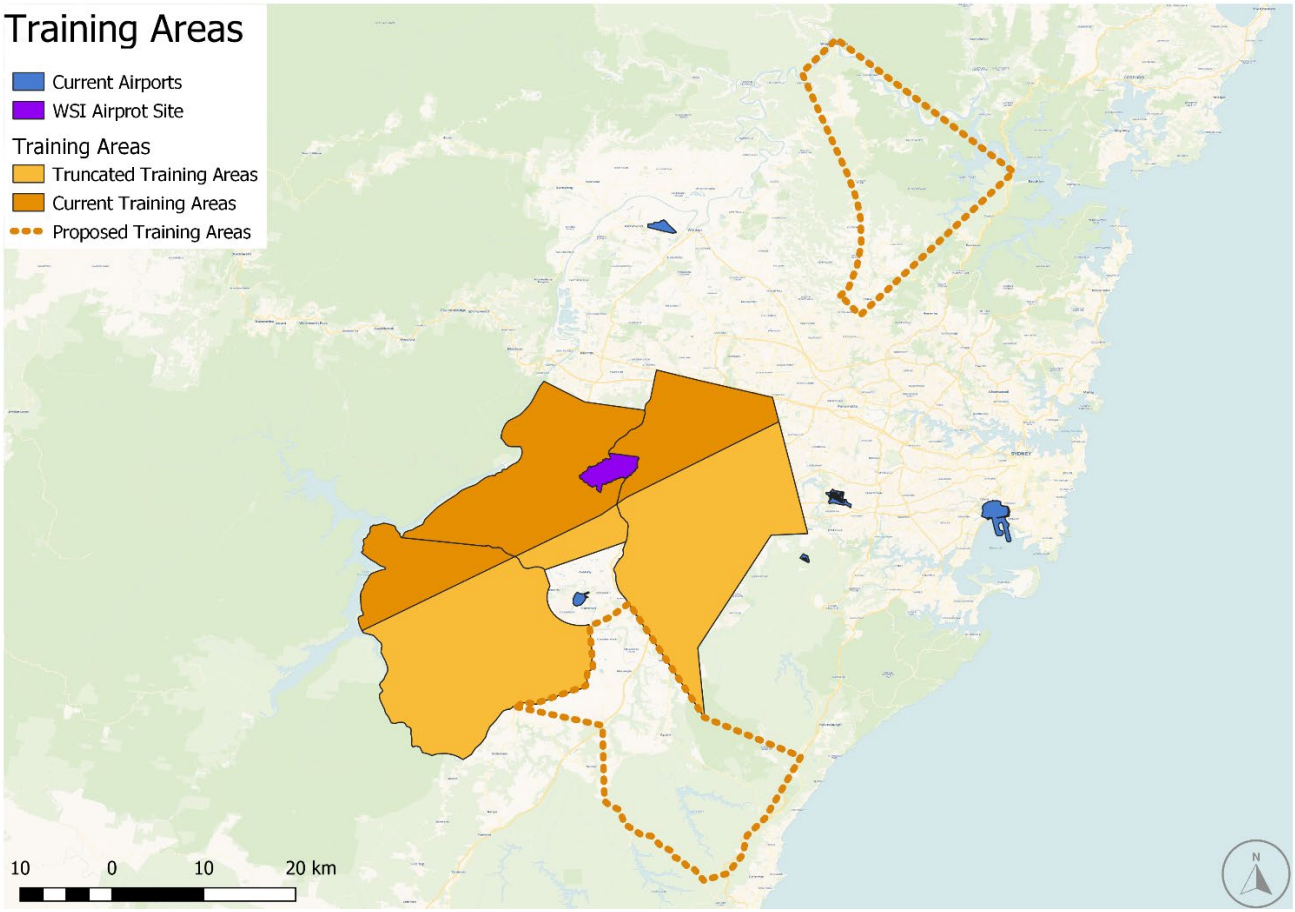
Training and other operations however will be impacted. Existing training areas are shown in Figure 5.1.



Source: Airservices Australia

Figure 5.1 Current flying training areas

WSI operations will restrict the existing FTA mainly by removing the western area (shown in orange colour above) as well as the northern part of the eastern area (shown in green colour above). The proposed training areas are shown in Figure 5.2.



Source: Airservices Australia

Figure 5.2 Proposed flying training areas

It is anticipated that greater distances will need to be travelled to reach the new flying training areas which means increased 'transit' flight durations, extended training schedules and increased costs including increased flying training times and increased fuel and maintenance costs. Furthermore, student pilots are unlikely to be able to assume control of aircraft during the transit flight times due to anticipated increased aircraft congestion and less aircraft separation along the modified and more concentrated flight paths. This results in increased flying time required by aircraft operators to deliver student pilots the time in the air that counts towards training. This is anticipated to also result in additional training flights being required to meet CASA licencing requirements, further increased costs to flying training operators and students.

The majority of training flights for the issue of the CASA Recreational Pilot Licence (RPL) are based on a 1.0-hour start-up to shutdown sortie length. According to operators at Bankstown this is likely to increase to 1.2 hours due to longer transit times to and from what is anticipated to be the new training area resulting in a marginal cost of $91.80 per lesson. Training flights for the issue of a CASA Private Pilot Licence (PPL) will increase flight time by around 10% at a marginal cost of $50.60 per lesson. Joy flight sorties will face an increase in flying time of approximately 20% at a marginal cost of $222.

If we assume say half of all aircraft movements (150,000 in 2026) are affected by extending flight times at an average cost of say $100 this would amount to $15.0m in additional costs in the first year of WSI operations. This is expected to increase over time with rising demand at around one percent per annum[5].

We consider this to be an absolute maximum cost which again is largely attributed more to the WSI airport itself rather than to the flight paths generated from WSI. In other words the same, or similar, impacts will occur under all flight path options.

There may be some ways to mitigate this cost which is discussed in Chapter 6.

5.2 Impacts on employment and economic output

WSI itself will generate a significant number of jobs for Western Sydney and contribute significantly to gross regional product. The conclusions from the EY study in the 2016 EIS was that airport operations would directly generate 8,730 jobs in 2031 increasing to 61,500 jobs by 2063.

Additional jobs at WSI could be accommodated in retail, hospitalities, business park and airport related industries. The EY study estimated an additional 4,439 jobs in 2031 increasing to 27,148 jobs by 2063.

Further to this are indirect jobs that are generated and/or supported. There are 2 types of indirect jobs:

- production induced jobs that relate to industries in the supply chain (providing the inputs to the industries on WSI) and
- consumption induced jobs which relates to jobs meeting the demand for additional goods and services due to increased spending by the wage and salary earners arising from employment at WSI.

The 2017 its study titled "*Western Sydney Airport Labour Market Analysis*" EY estimates further indirect jobs at 14,777 in 2031 and 23,428 in 2041. Total jobs estimated in 2033 and 2055 are as follows:

Table 5.1 Forecast jobs related to WSI

	2033	2055
Jobs on Airport Site*	16,467	69,267
Indirect jobs**	16,507	67,487
Total	**32,974**	**136,755**

* Includes jobs in retail, business/industrial park, accommodation and food services, etc on the airport site

** Forecast jobs outside the airport that are generated and/or supported through multiplier impacts

Source: Western Sydney Airport EIS - Economic Impact Analysis, EY, August 2016

These of course are jobs generated by WSI itself and not generated by the flight paths. Flight paths are a necessary component of WSI itself and do not directly generate jobs or create economic value. To the contrary flight paths can undermine the number of jobs and reduce gross regional product if it results in significant adverse impact due to noise, air quality, safety and/or other factors on sensitive land uses.

The JLL study for the 2016 EIS found that commercial and industrial property values were not adversely affected by aircraft flight paths. On the contrary commercial and industrial property values largely benefited from increased economic activity that come from proximity to the Airport Site.

---

5 Bankstown Airport Masterplan 2019, Page 39

Apart from the Airport Site itself the Aerotropolis will provide as many as 100,000 jobs by 2060 spread over 11,200 hectares of land surrounding the Airport Site. This will include:

- an Aerotropolis core (Bradfield City Centre) with as many as 50,000 to 60,000 jobs over 114 hectares southeast of the Airport Site
- a Northern Gateway precinct on 1,616 hectares of land housing the Sydney Science Park as well as manufacturing, freight and logistics, visitor accommodation and other employment uses
- an agri-business precinct of 1,130 hectares
- green utilities and technologies
- an intermodal airfreight interface and
- various other precincts, utilities and employment uses that will benefit from proximity to the Airport Site.

In conclusion the study area currently accommodates around 428,000 jobs and significant growth is expected in jobs over the next several decades with another 180,000 to 190,000 jobs at WSI and in the aerotropolis by 2063. This growth is expected regardless of the selection of flight paths.

5.3 Tourism impacts

Western Sydney and, in particular, the Blue Mountains is expected to benefit from WSI. Both the EY study and the GHD Social Impact Assessment in 2016 identified this benefit generated by WSI itself. However neither study quantified those benefits in monetary terms.

Again it is WSI that generates the benefits to the tourism industry while the flight paths can potentially disbenefit the tourism industry if it results in loss in amenity to sensitive land uses such as tourism accommodation or to tourist places/points of interest such as open spaces, heritage sites, lookouts, etc.

There are 26 short-stay accommodation places inside the N60 contour but none are inside the N70 contour. The majority of these places are in the St Marys to Penrith urban corridor with only one in the Blue Mountains. Most of the places are small scale motels and hotels each providing around 15 to 30 rooms. There are a few larger hotels such as The Holiday Inn in St Marys North which has approximately 130 rooms, the Mercure Hotel in Penrith with 220 rooms and the recently constructed Astina suites in Penrith CBD and Quest Penrith in the Thornton estate. Being outside the N70 contour and based on the JLL study none of these places would be measurably impacted by the flight paths. They are not expected to lose any revenue in any measurable way.

Technical paper 7 has assessed the visual impact of planes flying over the GBMA from various scenic points. The overall conclusion from the study was that there would be:

- high-moderate landscape character impact on the Blue Mountains iconic features in 2033 and 2055
- moderate landscape character impact on the Blue Mountains forested hills and valleys in 2033, increasing to high-moderate in 2055 due to the increase in flight frequency
- moderate-low landscape character impact on the Blue Mountains township spine in 2033 and 2055.

Of the 8 views assessed, there would be a high-moderate visual impact during the 2033 scenario in views from Walls Lookout and Echo Point Lookout. This impact is due to the very high sensitivity of these views and the introduction of flights that would be perceptible moving across the view. This high-moderate visual impact would continue as flight frequency increases in the 2055 scenario. These impact levels would remain unchanged as while the flight frequency increases, the flights are generally at higher altitudes and would continue to be seen intermittently, so this impact level would be experienced more frequently, rather than with a greater magnitude of change at any one time.

There would be a moderate visual impact in views from Burragorang Lookout, The Rock Lookout, Wynnes Rocks Lookout and Clearys Memorial Lookout during the 2033 scenario, where the sensitivity of the view is less. For the and Burragorang Lookout, this impact would increase to high-moderate in 2055 due to the increase in flight frequency at relatively low altitudes. The remaining views would remain as moderate impact in 2055 as the flight frequency increases, as the flights are generally at higher altitudes and would continue to be seen intermittently.

Technical paper 1 did not identify any locations in the GBMA where maximum noise levels (L_{Amax}) would exceed 65 dB(A) during day and evening hours. There were a number of locations where L_{Amax} could reach 60 dB(A) but these locations are less utilised than the main tourist destinations in the GBMA. The main tourist destinations of Jenolan and the upper Blue Mountains (Wentworth Falls, Leura, Katoomba and Blackheath) and the nearby lookouts and walks in these areas are all located well outside L_{Amax} 60 dB(A).

Technical paper 1 concluded that noise levels over 70 dB(A) L_{Amax} may be experienced occasionally by users of walking trails and camp sites within the lower Blue Mountains National Park area near the Nepean River, and Warragamba dam. However, maximum sound exposure levels will more typically range from below 50 dB(A) to 60 dB(A) based on the aircraft type, with some noisier wide-body jets reaching closer to 65 dB(A) near the flight paths.

Concerns have been raised about the overall loss of tourist enjoyment in the Blue Mountains resulting from the flight paths. There are a few points to be made here.

- The flight paths generally avoid the primary tourist destinations in the Blue Mountains. The main tourist area is the Upper Blue Mountains from Lawson to Mt Victoria with Wentworth Falls, Leura, Katoomba and Blackheath being the primary destinations for staying overnight and for daytime tourist activities such as sightseeing, bushwalking, adventure and other activities. Springwood in the mid-Blue Mountains is also a popular destination although to a lesser extent. Springwood is 3 km from the nearest N60 contour. In the Upper Blue Mountains all the towns, lookouts and nearby bushwalks are more than 5 km from any N60 contour.
- Views of planes from WSI at the main lookouts will be very distant at more than 5 km away and the number of flights will not be frequent.
- Flight paths to and from KSA Mascot currently fly over the Blue Mountains.
- Flight paths are an integral component of the operating airport. The selection of flight paths appears to have been done with the deliberate intention to minimise impacts to built up areas over the Blue Mountains. A high impact scenario would be to have flight paths directly over the townships in the Upper Blue Mountains, but this appears to largely have been avoided. Parts Blaxland, Warrimoo and Mt Riverview in the Lower Blue Mountains and a small area on the east side of Linden are inside the N60 contour.
- There is no evidence or data that would implicate the flight paths as causing a loss to tourism in the Blue Mountains whether that be the number of overnight visitors, the number of day visitors or the level of enjoyment in undertaking tourist activities in the Blue Mountains including bush walking and camping.

Concerns have been raised in the media about the impacts on the GBMA and comparing it to the impacts on Sydney and the Gold Coast as raised in Technical paper 10.

> *While there have not been cases in which a UNESCO heritage site has lost its status due to aircraft noise, impacts to the tourism economy resulting from aircraft noise in Australia have been documented. In 2018, a study by the University of Technology Sydney found that aircraft noise was a major concern for tourists visiting Sydney's popular tourist destinations, such as Bondi Beach and Sydney Opera House, with many reporting that it impacted their overall experience. The study estimated that the negative impact of aircraft noise on tourism in Sydney could cost up to $1.9 billion per year (Source: University of Technology Sydney – Sydney Morning Herald).*
>
> *On the Gold Coast, a report by the Gold Coast Tourism Corporation (2015) found that aircraft noise was a major concern for tourists visiting the area, with many reporting that it impacted their decision to return. The report estimated that the negative impact of aircraft noise on tourism on the Gold Coast could cost up to $350 million per year (Source: Gold Coast Tourism Corporation – The Australian).*

Note however that noise levels are considerably higher in these locations. Sydney CBD, Sydney Opera House and Bondi Beach are within 10 km of KSA Mascot. Broadbeach, Burleigh Beach, Palm Beach and Currumbin Wildlife Park on the Gold Coast are 10 km, 4–5 km and 3 km respectively from Gold Coast Airport and all directly under the main flight path. By comparison the tourist destinations and lookouts in the Upper Blue Mountains (from Wentworth Falls to Blackheath) are 35 km to 45 km from WSI and are more than 5 km from the flight paths.

Given the above there would be no loss in tourism spend in the area and hence no impacts on the local economy. On the contrary WSI itself provides some potential for positive impacts on tourism in the Blue Mountains due to its proximity. By car WSI is around 35 to 50 minutes closer to the Blue Mountains than KSA.

5.4 Impacts on property values

Any changes in land values resulting from a project is not a direct economic impact. Direct social and economic impacts include changes in amenity and potential productivity. Changes in amenity and economic performance then impacts land values. Therefore, changes in land value becomes a useful way of measuring or quantifying the direct socio-economic impacts of a project. It is a popular tool for economists to measure impacts because it utilises market evidence rather than relying on value judgement.

The primary paper used to measure land value impacts was the JLL study for the 2016 EIS. Other literature reviews included *"The Impact of Aircraft Noise on Brisbane Residential Property Sectors: 1988-2013"* by QUT, School of Civil Engineering and Built Environment and the Air Transport Innovation Centre (ATIC). Most of these papers also refer to other research papers and academic studies on the impact of flight paths on property values. The majority of earlier studies have been undertaken in Europe and North America with less attention in Australia. Predominantly these studies have been based on econometric modelling using hedonic price models. Most commonly these studies found that there was some negative impact on residential properties. However, this was not the case for commercial and industrial property. These studies also generally showed there to be no impact of aircraft noise on residential property outside the 60dB noise contour.

In Brisbane, the experience was that residential property prices impacted negatively during the planning, construction and early operations of airport. However, post 1992, areas affected by airport noise enjoyed stronger capital gains than areas not affected.

The critical contour is the 20 ANEF which corresponds to the minimum level for acceptability for residential buildings (Australian Standards AS2021). The region within the range of 20-25 ANEF is classed as conditionally acceptable for residential buildings, requiring noise attenuation to meet the target levels of AS2021.

In addition to ANEF/ANEI measures, aircraft noise is also measured by the number of instances in a given period of noise events such as N60 and N70. Typically, the N70 contour extends well beyond the 20 ANEF contour. However the assessment by JLL of the N60 and N70 contours on property sales price data showed lower levels of impact and were considerably less statistically valid. That is there was a higher level of uncertainty with the results and JLL excluded it from their study. According to the JLL report the N60 and N70 contours are not subject to Airservices Australia endorsement.

The JLL study did allude to impacts on valuation outside the 20 ANEF contour. The earlier JLW Advisory study in 1997 for the EIS of the Badgerys Creek airport determined a devaluation range of 0% to 6% for residential properties in the 15 to 20 ANEF contour and it adopted 3% as an average impact on all residential properties in that range. An ANEF 15 contour has not be determined but the N70 provides a reasonable substitute. Previous studies, that the 2016 JLL report identified, suggested possible impacts on residential values outside the 20 ANEF contour although the impacts are likely to be quite low and statistically insignificant.

The key findings from the JLL study were:

- Commercial (office, hotel, retail etc.), industrial and employment related uses are considered to be less adversely impacted from airport and flight paths than residential buildings. This is probably due to their building characteristics, nature of activities and lower night-time use. On the contrary these land uses are likely to materially benefit from the increased economic activity that will come from their proximity of the Airport Site, which will positively impact land values.
- Previous studies have found a relatively consistent adverse effect of aircraft noise on residential prices – 0.4% to 1.1% per unit of ANEF. Marginal impacts are higher in higher ANEF levels and in higher priced markets.
- None of the previous studies explored the impact on large lot land holdings comparable to those around Badgerys Creek.

- The JLL study encompassed over 1,800 residential sales transactions in suburbs in the vicinity of 4 main Australian international airports and found:
  - no statistically significant relationship between noise exposure and housing prices in Melbourne and Sydney
  - noise exposure was a more significant factor influencing residential prices in Adelaide and Brisbane
  - in Brisbane, prices for houses exposed to aircraft noise between 20 and 25 ANEI/ANEF, experienced a 10.7% reduction compared with dwellings outside the noise affected area and
  - in Adelaide, a statistically significant impact was found ranging from:
    - -8.3% in the 20-25 ANEI/ANEF contour to
    - -14.7% in the 25-30 ANEI/ANEF contour to
    - -19.8% in the 30- 35 ANEI/ANEF contour
  - compared with prices in areas less than 20 ANEI/ANEF.
- At Sydney Airport, analysis of long run house prices since 1991 found no appreciable difference in growth rate between median prices in suburbs subject to 20 ANEI or more and those in similar areas not exposed to aircraft noise. Possible reasons may be:
  - housing pressures restrict housing choices
  - the benefits of living close to the city outweigh possible noise effects in the minds of potential purchasers
  - noise attenuation measures to dwellings with above 20 ANEI may have reduced the impact of noise on residents and
  - aircraft noise sharing protocols and rising ambient noise levels in many suburbs may reduce the perceived impact of noise.
- Examination of sales of large lot land holdings in the vicinity of Melbourne, Perth and Avalon airports failed to establish any statistically significant relationship between noise exposure and property prices. Possible reasons for the lack of clear effect may include:
  - the lesser significance of the dwelling in the context of large land areas, compared with established urban areas
  - land used primarily for primary production may be less affected by noise and
  - the wider range of factors influencing price that cannot be analysed from the available sales data, e.g. aspect, topography, soil and micro-climate.
- Analysis of long run growth rates of residential sales in the suburbs around Badgerys Creek indicates that despite short term fluctuations, property prices have grown at a similar rate to the wider Western Sydney and metropolitan regions.
- Rather than suffering a slowing of growth as a result of possible fears of noise or other impact, residential prices in the suburbs around Badgerys Creek grew strongly in the period following the announcement in April 2014 that Badgerys Creek would be the site of the proposed airport, increasing by almost 24% and substantially faster than both Western Sydney and the Sydney metropolitan regions.
- Overall, the analysis failed to establish conclusive evidence of an adverse impact on large lot land property prices as a result of aircraft noise at levels of 20–25 ANEF that would suggest the development of the proposed airport at Badgerys Creek may have a major adverse impact on property prices in the vicinity.

JLL derived the following table (Table 5.2) for estimating the percentage discount on residential properties having primary consideration to the statistically significant results from the Brisbane and Adelaide airports, with support from academic literature and professional studies. The analysis on the large lot land holdings had reference to both the interstate analysis on Avalon, Perth and Melbourne Airports as well as analysis of price changes related to the announcements at Badgerys Creek.

Table 5.2 Summary of assessment of noise impact on property values by land use type

Land use	ANEI/ANEF 20-25	ANEI/ANEF 25-30	ANEI/ANEF 30-35
Residential	-9.5%	-14.7%	-19.8%
Large Lot Land Holdings	No discernible impact	No discernible impact	No discernible impact

The earlier study by JLW Advisory in 1997 (for the Badgerys Creek Airport EIS) concluded a 3% reduction in residential values in the ANEC 15 to ANEC 20 range and an 8% reduction in the ANEC 20 to ANEC 25 range.

From Technical paper 1 and ABS data we have quantified the number of dwellings and the estimated devaluation of those dwellings in Table 5.3. The number of dwellings identified in Table 5.3 is a cumulative count based on a worst-case composite contour of the 3 operating scenarios (No preference, Prefer Runway 05 and Prefer Runway 23) in each assessment year (2033, 2040 and 2055).

Table 5.3 No. of dwellings affected by aircraft noise by severity by year by dwelling type

Noise contour	Dwelling type	Year			Mean dwelling price	Average loss in value (%)
		2033	2040	2055		
N60*	Non-strata	37,750	46,055	49,528	975,000	No discernible impact
	Strata	12,250	14,945	16,072	580,000	No discernible impact
	Total	50,000	61,000	65,600		No discernible impact
N70**	Non-strata	1,622	2,194	4,102	915,000	3.0%
	Strata	78	106	198	910,000	3.0%
	Total	1,700	2,300	4,300		3.0%
ANEC 20		93	150	320	1,115,000	9.5%
ANEC 25		22	29	58	1,115,000	14.7%
ANEC 30		6	9	15	1,115,000	19.8%
ANEC 35		1	2	5	1,115,000	25.0%

* N60 at 10 or more movements over 24-hours

** N70 at 5 or more movements over 24-hours. 3% devaluation is consistent with the earlier 1997 JLW Advisory study but please note that the confidence level is statistically low.

From the assumptions in Table 5.3 the total loss in value of residential property is forecast as follows:

- Year 2033 $56m
- Year 2040 $77m
- Year 2055 $148m.

The above impacts are cumulative (and hence should not be added together). Total impact is a 56 million dollars loss in total residential values in 2033 increasing to a cumulative level of 148 million dollars by 2055 (measured in 2022 dollars).

While the impact appears high it is important to realise that residential values in Western Sydney have increased considerably over the past 10 years. The median house price in Blacktown and Penrith LGAs have both increased by 130% (more than doubled) since September 2012[6]. When converting the median house price in 2012 into 2022 dollars (using the CPI index) real growth remains high at 80%. This calculates to an average real growth rate of 6.3% per annum.

Also while the number of affected dwellings is high at 4,300 by 2055, 92% of these dwellings are outside the ANEC 20 contour. Dwellings within the N70 zone (and outside the ANEC 20) are expected to have a low level of impact resulting in a loss in residential values of 3.0% average. In all likelihood this loss will be 'made good' by 6 months growth in real capital gain.

The impact on properties within the ANEC 20 are more significant but this affects only 320 dwellings by 2055 – 7.4% of all residential properties inside the N70 contour and only 0.5% of all dwellings inside the N60 contour. Please note that these figures have been calculated on the composite noise contours, and the affected dwelling count will be less depending on the runway operating scenario that is ultimately adopted.

Finally, it is imperative to understand that this impact is a maximum impact. It is the difference between the flight paths and no flight paths (or flight paths that do not impact residential areas). Given that flight paths are an integral component of WSI itself and that a base case of no impact on residential properties is highly unlikely then the marginal impact is likely to be significantly lower than the numbers shown above.

5.5 Social impacts

Social impacts were covered in Technical paper 10. Social impacts include:

- changes to community composition and cohesion
- increased inequality (as lower income households are likely to be more impacted)
- loss of residential amenity
- use and enjoyment of social infrastructure (such as parks).

All these impacts (with exception to increased inequality) can be quantified by loss in residential land values since land values reflect the desirability of living in the area. There were other social impacts identified but quantifying these are more vexed, and includes impacts on cultural heritage (aboriginal and non-aboriginal) for example. In some cases impacts can be mitigated, such as impacts on children's education which can be mitigated by noise insulation measures. The cost of these measures can be internalised in any quantitative assessment – that is they can form part of the capital cost whether it be for new buildings or existing buildings.

---

6 NSW Rent and Sales Reports, NSW Department of Communities and Justice

5.6 Net present value

Over a project life out to 2055 the net present value (at 5% discount rate) of the economic impacts quantified above has been calculated at negative $309 million as shown in Table 5.4.

Table 5.4 Forecast economic impacts to 2055

Year	Tourism impacts	Residential land values	Airspace operations	Other social impacts	Total
2023	0.0				0.0
2024	0.0				0.0
2025	0.0				0.0
2026	0.0	-20.8	-15.0		-35.8
2027	0.0	-5.0	-15.2		-20.1
2028	0.0	-5.0	-15.3		-20.3
2029	0.0	-5.0	-15.5		-20.5
2030	0.0	-5.0	-15.6		-20.6
2031	0.0	-5.0	-15.8		-20.8
2032	0.0	-5.0	-15.9		-20.9
2033	0.0	-5.0	-16.1		-21.1
2034	0.0	-3.1	-16.3		-19.3
2035	0.0	-3.1	-16.4		-19.5
2036	0.0	-3.1	-16.5		-19.6
2037	0.0	-3.1	-16.7		-19.8
2038	0.0	-3.1	-16.8		-19.9
2039	0.0	-3.1	-17.0		-20.1
2040	0.0	-3.1	-17.2		-20.2
2041	0.0	-4.7	-17.3		-22.0
2042	0.0	-4.7	-17.5		-22.2
2043	0.0	-4.7	-17.7		-22.4
2044	0.0	-4.7	-17.9		-22.6
2045	0.0	-4.7	-18.0		-22.7
2046	0.0	-4.7	-18.2		-22.9
2047	0.0	-4.7	-18.4		-23.1
2048	0.0	-4.7	-18.6		-23.3

Year	Tourism impacts	Residential land values	Airspace operations	Other social impacts	Total
2049	0.0	-4.7	-18.8		-23.5
2050	0.0	-4.7	-19.0		-23.7
2051	0.0	-4.7	-19.1		-23.8
2052	0.0	-4.7	-19.3		-24.0
2053	0.0	-4.7	-19.5		-24.2
2054	0.0	-4.7	-19.7		-24.4
2055	0.0	-4.7	-19.9		-24.6
TOTAL	**0.0**	**-147.6**	**-520.4**	**0.0**	**-668.0**
NPV @ 5%	**0.0**	**-82.7**	**-257.6**	**0.0**	**-308.7**

While negative $309m appears to be a significant number it is important to recognise that the flight paths are an integral component of the WSI itself. And WSI generates huge benefits to Western Sydney, Greater Sydney and NSW. There will be a total of 8,730 jobs in airport operations in 2031 increasing to 61,500 by 2063 (EIS 2016 EY report). These jobs will provide a range of services in airport administration, retail, food services, travel services, customs and other government services, airline operations, freight, baggage handling, security, etc. There will be further jobs on the Airport Site in airport related businesses, industrial, commercial office jobs, food and hotel services and the like. At an average GVA of $135,000 per worker in airport operations and $102,000 per worker in other services on the Airport Site total GVA generated in Year 2033 is expected to be $1.976 billion increasing to $8.3b in Year 2055. The net present value of GVA over a project life out to 2055 is estimated at 45 billion dollars – 147 times higher than the NPV of the total quantified costs in the above table.

Please note also that the GVA from WSI excludes GVA from other businesses outside WSI in the Aerotropolis. It also excludes any input/output multiplier impacts. Inclusion of these impacts would make the above adverse impacts appear even less significant against the benefits of WSI itself.

Chapter 6 Management and mitigation measures

This chapter outlines the management and mitigation measures applicable to the project.

6.1 Facilitated changes

DITRDCA's commitments relating to airspace design are set out in the WSI Airport Plan – Airspace Design Principles, October 2021. There are twelve principles relating to airspace design of which the final principle states that *"safety is non-negotiable – only practical solutions that uphold Australia's long tradition of world-leading aviation safety will be implemented"*. Two other relevant that relate to current airspace rights are:

> *Principle 8: In determining the final flight paths, the community, aerodrome operators and airspace users will be consulted extensively and flight path designs will be subject to referral under the EPBC Act.*
>
> *Principle 10: Current airspace restrictions such as those associated with military establishments will be reviewed to improve efficiency and environmental impacts from commercial operations, while meeting Australia's future defence requirements.*

Current preliminary airspace design could have significant operational impacts and safety risk to aircraft operators at Bankstown and Camden Airports without the appropriate responses in airspace design, operational procedures and/or support. These concerns particularly relate to the impact of changes to airspace on the operations of flying training operators and emergency services operations based at Bankstown and Camden Airports. In addition, forecast increases in concentration of flight paths proposes additional risk for operators of aircraft in and out of both Bankstown and Camden Airports.

Under Principle 8, further consultation and engagement by DITRDCA is required with aviation operators to ensure the impacts are properly assessed. DITRDCA has stated that Bankstown Airport shall remain as the principal general aviation aerodrome in the Sydney basin, and this was acknowledged in the 2016 WSI EIS. To ensure this, the DITRDCA and other relevant authorities need to ensure that the airspace design and associated EIS processes for WSI fully considers impacts to aircraft operators at Bankstown and Camden Airports.

There is a need for agreed procedures between Airservices and emergency service operators from a safety and operational perspective. Such processes already exist for KSA. Arrangements are critical to assessing these safety risks. Assuming emergency service providers have priority over the airspace in cases of emergencies then potential adverse economic impacts will be mitigated. DITRDCA and Airservices have held discussions with emergency services operators on these matters.

6.2 Residential areas

Technical paper 1 provides an extensive set of measures in relation to noise, although these measures mainly relate to the source of the aircraft noise rather than noise attenuation measures for noise sensitive land uses that likely to be affected.

DITRDCA will implement a NIPA policy which details the eligibility requirements for inclusion in the program. This policy will be used for the significantly impacted properties that are eligible according to the policy for either land acquisition or participation in a property insulation scheme.

From an economic point of view the main consideration with any noise attenuation measure (acoustic treatment) is ensuring that the marginal costs do not exceed the marginal benefits which is generally measured by the improvement in market value of the property (or improvement in market rent over the remaining life of the building).

6.3 Non-residential noise sensitive land uses

There are 15 non-residential noise sensitive land uses within the N70 contour including 6 schools (refer to Section 3.7 above for a list of these). The impacts on these land uses should be individually assessed. These land uses should meet the indoor design sound levels as detailed in the Australian Standard AS2021:2015, which is 50 dB for libraries and study areas, 65 dB for teaching areas and 75 dB for workshops and gymnasia. Noise attenuation measures should be implemented in buildings that fail to meet these standards.

6.4 Project specific mitigation measures

Table 6.1 provides a summary of mitigation and management measures identified for the proposal, indicating the relevant impact area and applicable mitigation measure. Please note that there are mitigation measures in other technical papers, particularly Technical paper 1, that relate to amenity, property values and other economic impacts. These are not shown below but are incorporated in the other technical papers.

Table 6.1 Summary of mitigation measures

ID No.	Issue	Mitigation measure	Owner	Timing
E1	Existing airspace users	DITRDCA will continue to consult with aerodrome operators and airspace users at Bankstown and Camden Airports regarding airspace requirements in order to minimise risks and associated economic costs.	DITRDCA	**Pre-operation** (Detailed design, 2024–2026)
E2	Emergency services	DITRDCA and Airservices Australia will continue to consult with emergency services operators regarding priorities of airspace in order to minimise risks and associated economic costs.	DITRDCA and Airservices Australia	**Pre-operation** (Detailed design, 2024–2026) and **Operation** (Implementation, 2026–ongoing)

Chapter 7 Conclusion

From the outset it is important to recognise that impacts that have been quantified in dollar terms are a measure of the proposed flight paths versus a base case of no flight paths. However the base case is unrealistic given an operating airport. Flight paths generally provide no benefits – only costs. However they are an integral component of WSI which itself generates considerable economic benefits.

7.1 Facilitated changes

It is anticipated that greater distances will need to be travelled to reach the new flying training areas which means increased 'transit' flight durations, extended training schedules and increased costs including increased flying training times and increased fuel and maintenance costs. The estimated cost is $15m in 2026 increasing at a rate of around one per cent per annum in line with increasing aircraft movements.

7.2 Impacts on employment and economic output

WSI itself will generate a significant number of jobs for Western Sydney and contribute significantly to gross regional product. The conclusions from the EY study in the 2016 EIS was that airport operations would directly generate 8,730 jobs in 2031 increasing to 61,500 jobs by 2063.

Additional jobs on the Airport Site could be accommodated in retail, hospitalities, business park and airport related industries. The EY study estimated an additional 4,439 jobs in 2031 increasing to 27,148 jobs by 2063.

These of course are jobs generated by WSI itself and not generated by the flight paths. Flight paths are an integral component of WSI itself and do not directly generate jobs or create economic value.

Apart from the Airport Site itself the Aerotropolis will provide as many as 100,000 jobs by Year 2060 spread over 11,200 hectares of land surrounding the Airport Site.

7.3 Tourism impacts

The overall conclusion from Technical paper 7 is that visual impacts are likely to be negligible to high-moderate. Walls Lookout and Echo Point Lookout would experience a high-moderate visual impact due to the very high sensitivity of these views and the introduction of flights that would be perceptible moving across the view even though the altitudes are high. The visual impacts are not considered significant enough to result in any measurable economic impacts in terms of visitation numbers to Blue Mountains area.

Technical paper 1 concluded that the primary tourist destinations in the Blue Mountains (upper mountain area from Wentworth Falls to Blackheath and the surrounding lookouts and short walks near these townships) would be unaffected by noise levels. Occasionally noise levels over 70 dB(A) may be experienced by users of walking trails and camp sites in the lower Blue Mountains National Park area near the Nepean River, and Warragamba dam but on most occasions below 50 dB(A) to 60 dB(A) will be experience depending on the aircraft. However the level of visitation in these areas is much lower than the Upper Blue Mountains.

As a result there would be no loss in tourism spend in the area and hence no impacts on the local economy. On the contrary WSI itself provides some potential for positive impact on tourism in the Blue Mountains due to its proximity.

7.4 Impacts on property values

From the research the total loss in the value of residential property was calculated as follows:

- Year 2033 $56m
- Year 2040 $77m
- Year 2055 $148m.

The above impacts are cumulative (and hence should not be added together). Total impact is 56 million dollars loss in total residential values in 2033 increasing to a cumulative level of 148 million dollars by 2055 (measured in 2022 dollars).

It is important to realise that residential values in Western Sydney have increased considerably over the past 10 years. The median house price in Blacktown and Penrith LGAs have both increased by 130% (more than doubled) from September 2012. Average real growth has been 6.3% per annum. Hence for a dwelling inside the N70 contour an immediate loss in value of 3.0% would be 'made good' by 6 months of growth in real capital gain.

7.5 Other impacts

Many of the impacts identified in Technical paper 10 can be quantified by loss in residential land values since land values reflect the desirability of living in the area. There were other social impacts identified but quantifying these are more vexed. In some cases, impacts can be mitigated, such as impacts on children's education which can be mitigated by noise insulation measures. The cost of these measures can be internalised in any quantitative assessment – that is they can form part of the capital cost.

7.6 Net present value

Over a project life out to 2055 the net present value (NPV) (at 5% discount rate) of the economic impacts quantified was calculated at negative $309 million.

While negative $309m appears to be a significant number it's important to recognise that the flight paths are an integral component of WSI itself. And the WSI itself generates huge benefits to Western Sydney, Greater Sydney and NSW. By 2033 there will be more than 16,000 jobs on the Airport Site itself both in airport operations and in airport related businesses and ancillary services (retail, food services, accommodation, etc). Total jobs on the Airport Site are expected to increase to more than 69,000 by 2055. At an average GVA of around $120,000 per worker total GVA generated by WSI in Year 2033 is expected to be $1.6 billion increasing to $8.3 billion by Year 2055. The NPV of GVA over a project life out to 2055 is estimated at 45 billion dollars – 147 times more than the NPV of the economic costs of the flight paths.

Chapter 8 References

Aircraft Noise Technical paper 1 (Airbiz 2022)

ABS Australian National Accounts: Input-Output Tables 2019-20

ABS Census 2021

Profile.id.com.au

Bankstown Airport Masterplan 2019

Destination NSW and Tourism Research Australia

IBIS World Report on Tourism in Australia 2020

Information Pack: Potential New Pilot Training Areas, AERIA Management Group, December 2022

JLW Advisory (1997) *Property Values: Technical Paper 4, Proposal for a Second Sydney Airport at Badgerys Creek or Holsworthy Military Area*

Landscape and Visual Amenity Technical paper 7 (Iris 2023)

Land Use and Planning Technical paper 6 (WSP 2023)

National Strategic Airspace National Aviation Policy Issues Paper, Commonwealth Department of Infrastructure, Transport, Regional Development and Communications, May 2021

NSW Environmental Planning and Assessment Act 1979

NSW Rent and Sales Reports, NSW Department of Communities and Justice

Social Technical paper 10 (WSP 2022)

Submission by AERIA Management Group to WSP 25 January 2023

Submission by Australian Aerobatic Academy, 19 December 2022

The Impact of Aircraft Noise on Brisbane Residential Property Sectors 1988-2019, QUT, Business School 2020

Western Sydney Aerotropolis, Australia's newest investment opportunity, Western Parkland City Authority 2022

Western Sydney Airport EIS, Potential Impacts on Property Values, JLL 2016

Western Sydney Airport EIS, Economic Impact Analysis, EY 2016

Western Sydney Airport Labour Market Analysis, EY 2017

Western Sydney Airport Plan 2021.

Australian Government

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