Australian Government
Department of Infrastructure and Regional Development

WESTERN SYDNEY AIRPORT

DRAFT ENVIRONMENTAL IMPACT STATEMENT

VOLUME 1
PROJECT BACKGROUND

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Western Sydney Airport Draft Environmental Impact Statement

Proponent	The Australian Government Department of Infrastructure and Regional Development.
EPBC Referral	The action was referred to the Commonwealth Minister for the Environment on 4 December 2014, referral 2014-7391
Proposed action	The proposed Western Sydney Airport would be developed over a number of stages in response to increasing demand. The proposed action is the construction and operation of the first stage of development for the proposed Western Sydney Airport at Badgerys Creek. The draft environmental impact statement (EIS) provides a detailed consideration of likely environmental impacts arising from the Stage 1 development. The Stage 1 development includes a single runway with associated aviation facilities for up approximately 10 million passengers each year and is fully described in the draft Airport Plan. This is the level of passenger demand that is expected to occur in approximately 2030.
Airport Plan	The Stage 1 development would take place under an airport plan determined under Division 4A of Part 5 of the *Airports Act 1996.*
Airport site	The airport site covers about 1,700 hectares at Badgerys Creek. The Stage 1 development impacts about 1,065 hectares within this site. The airport site currently comprises the following properties owned by the Commonwealth: - Lot 1 on DP838361 - Lot 1 on DP851626 - Lot 2 Section C on DP1451 - Lot 17 on DP258581 - Lot 22 on DP258581 - Lot 23 on DP259698 - Lot 32 on DP259698 - Lot 33 on DP259698 - Lot 7 on DP3050 - Lot 8 on DP3050 - Lot 9 on DP226448 - Lot 3 on DP611519 - Lot 11 on DP226448 - Lot 1 on DP129674 - Lot 1 on DP129675 - Lot 1 on DP996420 - Lot 2 on DP996420 - Lot 28 on DP217001 - Lot 1 on DP996379 - Lot 2 on DP996379 It is also anticipated that one or more easements and a small amount of additional land would be acquired by the Commonwealth and incorporated into the airport site for operational and safety reasons.
Draft EIS	This draft EIS has been prepared by the Department of Infrastructure and Regional Development supported by GHD Pty Ltd, RPS Manidis Roberts Pty Ltd and various specialist sub-consultants. The draft EIS has been prepared in accordance with the *Guidelines for the content of a draft environmental impact statement* for the proposed airport issued on 29 January 2015. The draft EIS is divided into four volumes. Volume 1 provides a description of the proposed Stage 1 development. Volume 1 also explains the approvals and community consultation process. Volume 2 provides a detailed impact assessment of the Stage 1 development. Volume 3 provides a strategic level assessment of environmental impacts of an indicative long term development of the airport site. The assessment has been undertaken to provide a broad understanding of the potential impacts facilitated by the Stage 1 development, given that development beyond Stage 1 would be the subject of future approvals processes. Volume 4 contains detailed technical assessments that have informed the assessment of environmental impacts in Volume 2 and Volume 3. Volume 4 also contains the further information about the proponent, the EIS study team and the *Guidelines for the content of a draft environmental impact statement*.

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Terms and Abbreviations

Term	Definition
05/23	The proposed runway orientation. Refers to a generally north-east/south-west orientated runway at 50 degrees north-east and 230 degrees south-west.
1997-99 EIS	PPK 1997, Draft Environmental Impact Statement Second Sydney Airport Proposal, Commonwealth Department of Transport and Regional Development and PPK Environment and Infrastructure Pty Ltd 1999, Supplement to Environmental Impact Statement Second Sydney Airport Proposal, Volume 3 Supplement. Prepared on behalf of the Department of Transport and Regional Services, Prepared on behalf of the Department of Transport and Regional Services.
90^{th} Percentile N60	The N60 value that is exceeded on 10 per cent of nights.
90^{th} Percentile N70	The N70 value that is exceeded on 10 per cent of days.
ABS	Australian Bureau of Statistics
Acid sulfate soils	Naturally occurring soils or sediments containing iron xvulphides, which produce sulfuric acid when exposed to air.
AHD	Australian height datum
Airport Plan	Draft plan developed in accordance with the requirements of the *Airports Act 1996*, setting out the Australian Government's requirements for the initial development of the proposed airport.
Airport site	The site for the proposed airport covering an area located at Badgerys Creek, Western Sydney.
Airports Act	*Airports Act 1996* (Commonwealth)
Airports Act amendment	Airports Amendment Bill 2015
ALC	Airport Lessee Company
ANEC	Australian noise exposure concept
ANEF	Australian noise exposure forecast
APU	Auxiliary power unit
ARI	Average recurrence interval – the average or expected value of the periods between exceedances of a given rainfall total accumulated over a given duration.
ATM	Air traffic movement
Australian Height Datum	A common reference level which is approximately equivalent to the height above sea level.
Australian Noise Exposure Concept	Scenario contours used to produce 'what if' contours, for example, in the process of examining flight path options around an airport.
Australian Noise Exposure Forecast	Official forecasts of future noise exposure patterns around an airport. They constitute the contours on which land use planning authorities base their controls.
BoM	Bureau of Meteorology
Bulk earthworks	The removal, moving or adding of large quantities of soil or rock from a particular area to another.
Bund	A constructed retaining wall designed to prevent inundation or breaches from a known source.

Term	Definition
BWSEA	Broader Western Sydney Employment Area
CASA	Civil Aviation Safety Authority
Catchment	The area drained by a stream, lake or other body of water.
CO	Carbon monoxide
Construction impact zone	The area that would be directly impacted by construction of the Stage 1 development.
Continuous descent approaches	A method by which aircraft approach airports prior to landing. Designed to reduce fuel consumption and noise compared to other conventional descents.
Controlled airspace	Airspace of defined dimensions within which air traffic control services are provided.
Criteria pollutants	Air pollutants that have been regulated and are used as indicators of air quality.
Datum	A level surface used as a reference in measuring elevations.
dB(A)	A weighted noise level – an expression of the relative loudness of sounds in air as perceived by the human ear.
DEC	NSW Department of Environment and Conservation (now Office of Environment and Heritage)
DECC	NSW Department of Environment and Climate Change (now Office of Environment and Heritage)
DECCW	NSW Department of the Environment Climate Change and Water (now Office of Environment and Heritage)
Decibel (dB)	A unit of sound.
Direct impact	Direct impacts are caused by an action and occur at the same time and place.
DP&E	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
EEC	Endangered ecological community.
EIS	Environmental Impact Statement
EIS guidelines	Guidelines for the Content of a Draft Environmental Impact Statement – Western Sydney Airport.
EMS	Environmental management system
Environmental assessment	A formal process of evaluating significant short-term and long-term effects or impacts a project will have on the environment.
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPA	NSW Environmental Protection Agency
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FTE	Full time equivalent
Fugitive emissions	Dust derived from a mixture of sources (non-point source) or not easily defined sources. Examples of fugitive dust include dust from vehicular traffic on unpaved roads, materials transport and handling, and un-vegetated soils and surfaces.
GBAS	Ground based augmentation system
GBMWHA	Greater Blue Mountains World Heritage Area

Term	Definition
GDE	Groundwater dependent ecosystem
GDP	Gross domestic product
General aviation	Name given to the aviation industry that is non-military (both fixed wing and helicopter) and that excludes the larger airlines operating scheduled passenger services. General aviation sector undertakes a diverse range of passenger and freight activities including charter operations, flight training, aerial agriculture, aerial work, private and business flying and sports related activities.
GPS	Global positioning system
Greenfield airport	A new airport on land which was not previously used for aviation purposes.
Grey water	Wastewater stream from all domestic wastewater sources other than the toilet (such as baths, sinks, washing machines, etc.).
Groundwater	Water found below the surface, usually in porous rock, soil or in underground aquifers.
GRP	Gross regional product
GSE	Ground support equipment
Hazard	The potential or capacity of a known or potential risk to cause adverse effects.
Hazardous material	Any item or agent that has the potential to cause harm to humans, animals or the environment.
Hazardous waste	Any waste that is classified as hazardous in accordance with the Waste Classification Guidelines (NSW EPA, 2014). Hazardous waste cannot be disposed of to landfill unless it is treated to remove or immobilise the contaminants. – including waste batteries, fertilisers, fuels, herbicides, oils pesticides, paints, solvents, cleaners, clinical and pharmaceutical waste, and waste tyres.
Heavy metal	Any metal or metalloid of environmental concern.
HIAL	High intensity approach lighting
HIPAP	NSW Hazardous Industry Planning Advisory Papers
IAP2	International Association of Public Participation
ICAO	International Civil Aviation Organisation – A specialised agency of the United Nations which codifies the principles and techniques of international air navigation and fosters the planning and development of international air transport to ensure safe and orderly growth.
ICAO Standards	Standards and recommended practices concerning air navigation, its infrastructure, flight inspection, prevention of unlawful interference and facilitation of border-crossing procedures for international civil aviation.
Impact	A change in the physical, natural or cultural environment brought about by an action. Impacts can be direct or indirect.
Impervious	Impervious surfaces are surfaces non-permeable to water.
Indirect impact	As defined in the EPBC Act *Significant impact guidelines 1.2*, indirect impacts are downstream or downwind impacts, such as impacts on wetlands or ocean reef; upstream impacts, such as those associated with the extraction of raw materials; or facilitated impacts, such as urban or commercial development of an area made possible by a project.
Km/h	Kilometres per hour
L_{A90}	The L_{A90} level is the A-weighted noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

Term	Definition
L_{Aeq}	The equivalent continuous sound level (L_{Aeq}) is the energy average of the A-weighted noise level over a sample period, and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is sometimes used to describe aircraft noise, in which case it refers to the noise level that is due to aircraft only, excluding other noise. Variants of this measure have been defined that cover specific time periods, such as $L_{Aeq,9am\text{-}3pm}$, which is used to describe noise affecting school classrooms.
$L_{Aeq,9am\text{-}3pm}$	The impact of noise on school students and teachers.
Leachate	The liquid that passes through, or is released by, waste.
LEP	Local environmental plan
LGA	Local Government Area
$L_{night,outside}$	The equivalent-continuous noise level between 11pm and 7am, or $L_{Aeq,11pm\text{-}7am}$ (it is used to describe night time noise exposure and assess chronic health impacts associated with exposure)
Long term development	The long term development of the airport, including parallel runways and facilities for up to 82 million passengers annually (nominally occurring in 2063).
LOS	Level of service
m^2	Square metres
Manual of Standards	Standard procedures for the operation of airports issued by the Civil Aviation Safety Authority.
MAP	Million annual passengers
Master plan	Non-statutory document that outlines a vision to guide the growth and development of a place.
Maximum noise level (LA_{max})	LA_{max} over a sample period is the maximum A-weighted noise level measured during the period. In the context of aircraft noise, LA_{max} generally means the maximum A-weighted noise level recorded during a specific overflight, measured using "Slow" speed, and can therefore also be written LAS_{max}. In this report, Lamax denotes the maximum level attained during a single overflight.
MDP	Major development plan in accordance with the Airports Act.
Mg/m^3	Milligrams per cubic metre
MIKE21 modelling	MIKE21 is a two dimensional hydraulic modelling software program used to simulate surface flow and estimate flood levels and flow velocities.
Minister for Infrastructure and Regional Development	Hon. Warren Truss MP
Minister for the Environment	Hon. Greg Hunt MP
Mitigation	The action of reducing the severity, seriousness, or painfulness of something.
MNES	Matters of national environmental significance
MOS	Manual of standards
MUSIC modelling	MUSIC is a software program used to estimate the performance of stormwater quality management systems.

Term	Definition
N60	N60 is a measure of noise exposure defined exactly as for N70, but representing the average number of aircraft overflights per day exceeding 60 dBA. However, N60 is generally used to describe night time noise exposure. In this report, unless otherwise noted, N60 values represent the average number of aircraft overflights per day exceeding 60 dBA during the period 10pm to 7am.
N70	N70 is a measure of noise exposure that indicates the average number of times per day (or other specified time period) that an aircraft overflight will have L_{Amax} greater than 70 dBA respectively. The numbers of overflights are graded in contour lines on a map. N70 contours can be calculated for different time periods, indicating the average number of over flights experienced per day in that period.
NASF	National Airports Safeguarding Framework
National environmental protection measure	Broad framework-setting statutory instruments which outline agreed national objectives for protecting or managing particular aspects of the environment. NEPMs are similar to environmental protection policies and may consist of any combination of goals, standards, protocols, and guidelines.
Nautical mile	A unit of distance. One nautical mile equals 1.852 kilometres.
NEPM	National Environmental Protection Measure
NGER Regulations	*National Greenhouse and Energy Reporting Regulations 2008* (Cth)
Nitrogen	Nitrogen is a colourless element that has no smell and is usually found as a gas. It forms about 78% of the earth's atmosphere, and is found in all living things.
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxide
Non-putrescible	General solid waste including waste cardboard, glass, green waste, metals, paper, plastics, wood and electronic waste.
NPWS Act	*National Parks and Wildlife Act 1974* (NSW)
Nuisance dust	Dust which reduces environmental amenity without necessarily resulting in material harm. Nuisance dust comprises particles with diameters nominally from about one millimetre to 50 micrometres (microns).
O_3	Ozone
Offset measure	A conservation action that is intended to compensate for the negative environmental impacts of an action, such as a development. Offsets can include protecting at-risk environmental assets, restoring or extending habitat for threatened species, or improving the values of a heritage place.
OLS	Obstacle limitation surface – a series of surfaces that define the limits to which structures or objects may project into the airspace to ensure the safety of aircraft.
Organic	An organic compound is any member of a large class of gaseous, liquid, or solid chemical compounds whose molecules contain carbon.
PAH	Polycyclic aromatic hydrocarbon
PANS-OPS	Procedures for air navigation services – aircraft operations
Particulate	A complex mixture of extremely small particles and liquid droplets.
Pathogen	A bacterium, virus, or other microorganism that can cause disease.
Permissible use	A land use which may receive development consent under the *Environmental Planning and Assessment Act 1979* (NSW).
PM	Airborne particulate matter

Term	Definition
PM_{10}	Airborne particulate matter with an aerodynamic diameter of less than 10 µm
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of less than 2.5 µm
POEO Act	*Protection of the Environment and Operations Act 1997* (NSW)
Point merge system	This is a way of synchronising arriving aircraft and directing them to the runway in a structured manner through a single final approach track. By directing aircraft though a series of predictable routes, the vertical and lateral path taken on approach is more accurate and can result in a reduction in the number of level flight segments required at a low altitude.
Ppb	Parts per billion
ppm	Parts per million
Proposed airport	The proposed airport at Badgerys Creek and assessed in the Western Sydney Airport Environmental Impact Statement.
PSZ	Public safety zone
Putrescible	In relation to waste, material that may decay or putrefy.
RAAF	Royal Australian Air force
Ramsar Convention	An intergovernmental treaty that provides the framework for national action and international cooperation in wetland conservation. The treaty is named after the city of Ramsar in Iran, where it was signed.
Receivers	See sensitive receiver.
Receptors	See sensitive receiver.
Residual risk	Residual risk is the level of risk that remains after proposed mitigation and management measures are implemented.
Restricted airspace	Restricted airspace includes all airspace that has restrictions placed on its use. This is generally associated with military installations or other situations where safety is an issue, for example explosives storage facilities such as the Defence Establishment Orchard Hills.
Reticulated	In relation to water or another utility, transferred from one place to another.
Reverse thrust	A temporary redirection of aircraft engines so that the direction of exhaust is reversed, usually to provide a breaking effect during landings. Reverse thrusting generally produces an increase in noise during landing.
SACL	Sydney Airport Corporation Limited
SEIFA	Socioeconomic Indexes for Areas
Sensitive receiver	A place occupied by people that is sensitive to impacts. This term is usually used in air and noise studies to refer to dwellings, businesses, schools and the like. Also termed sensitive receptor.
SEPP	NSW State Environmental Planning Policy
Significant impact	As defined in the EPBC Act *Significant impact guidelines 1.2*, a 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.
SO_2	Sulphur dioxide
SO_x	Sulfur oxides
Stage 1 development	The initial stage in the development of the proposed airport, including a single runway and 10 million annual passengers (nominally occurring in 2030).

Term	Definition
STM3	Strategic Travel Model (Version 3)
SWRL	South West Rail Link
Sydney Airport	Sydney (Kingsford Smith) Airport
Sydney Basin	The Sydney Basin extends over approximately 350 kilometres of coastline from Newcastle in the north, to Durras Lake in the south. To the west the boundary runs in a line through Lithgow along the Liverpool Range to about 80 kilometres north of Muswellbrook and back to the coast at Newcastle. The total land area of the basin is approximately 44,000 square kilometres and the centre lies about 30 kilometres west of the Sydney CBD at Fairfield.
Sydney CBD	Sydney Central Business District
TAPM	The Air Pollution Model
Taxiways	Defined paved areas provided for the surface movement of aircraft between runways and aprons.
The Department	Australian Government Department of Infrastructure and Regional Development
The Proponent	The proponent for the development and operation of the airport is the Australian Government Department of Infrastructure and Regional Development.
The proposed airport	The proposed Western Sydney Airport.
Threatened species	Species of animals or plants that are at risk of extinction, or becoming endangered within the next 25 years ('vulnerable species'), defined by the *Threatened Species Conservation Act 1995* and the *Environment Protection and Biodiversity Conservation Act 1999*
TSC Act	*Threatened Species Conservation Act 1995* (NSW)
TSP	Total suspended particulates
ug/m^3	Micrograms per cubic metre
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compounds
Western Sydney Airport	The proposed airport. The airport is referred to as Sydney West Airport under the *Airports Act 1996* (Commonwealth).
Western Sydney Region	Western Sydney is a major region of Sydney, New South Wales. Defined by the Western Sydney Regional Organisation of Councils (WSROC) as ranging from Auburn to the Blue Mountains and from Liverpool to Hawkesbury, with a total land area of about 5,400 square kilometres.
WHS	Work health and safety
WM Act	*Water Management Act 2000* (NSW)
WSEA	Western Sydney Employment Area
WSIP	Western Sydney Infrastructure Plan
WSU	Western Sydney Unit, Australian Government Department of Infrastructure and Regional Development

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Executive Summary

Executive Summary

Introduction to Western Sydney Airport

On 15 April 2014 the Australian Government announced that Commonwealth-owned land at Badgerys Creek will be the site for a second Sydney airport. The Badgerys Creek airport site was selected following extensive studies completed over a number of decades and culminating in the release of the *Joint Study on Aviation Capacity in the Sydney Region* (Joint Study) (Department of Infrastructure and Transport 2012) in March 2012 and A Study of Wilton and RAAF Base Richmond for Civil Aviation Operations (DIRD 2013) (the Wilton and Richmond Study) in April 2013.

The proposed Western Sydney Airport (proposed airport) would 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. An airport in Western Sydney would also provide long term economic and employment opportunities in the surrounding area and accelerate the development of critical infrastructure and urban development. The proposed airport is planned to be operational by the mid-2020s and would service both domestic and international markets. Development would be staged in line with ongoing growth in aviation demand.

- Catering for increasing demand for air travel in Western Sydney and the broader Sydney region, the proposed Western Sydney Airport is predicted to cater for 10 million passengers per year by 2030, similar to Adelaide Airport, increasing to 82 million by 2063. It would also provide critical additional aviation capacity within the Sydney Basin as Sydney Airport becomes increasingly constrained over the coming decades.
- The estimated workforce during construction of Stage 1 would be expected to peak at around 700 to 800 jobs in 2022. Cumulatively, construction of the proposed airport would generate approximately 3,200 person-years[1] of direct employment. In addition there would be indirect and induced employment in Western Sydney for 8,000 person-years over the construction period between 2016 and 2024. During the same period, the proposed airport would generate an additional 2,200 person-years of indirect and induced employment in the Greater Sydney Metropolitan region.
- There would be an estimated 8,730 direct jobs generated at the proposed airport in 2031. This is based on a ratio of 750 airport employees per million annual passengers.
- Over the long term, by around 2063, the airport is anticipated to deliver an estimated 61,500 direct jobs at the airport site.

[1] *Person-years is a measure of employment which accounts for the employment of one person in a full-time capacity for one year. It provides a consistent basis for accounting for employment where, for example, one person might be employed full time for five years or five different people working in different roles of one year each (both of which would be 5 person years).*

The airport site covers an area of approximately 1,700 hectares at Badgerys Creek in Western Sydney, as shown in Figure ES 1. The airport site is located within the Liverpool local government area (LGA), around 50 kilometres west of Sydney's central business district (CBD) and 15 to 20 kilometres from major population centres including Liverpool, Fairfield, Campbelltown and Penrith, and 30 kilometres from Parramatta.

The Northern Road transects the western end of the airport site and Elizabeth Drive borders the site to the north. Badgerys Creek flows in a north-easterly direction and forms the south-eastern boundary of the airport site. The airport site is located on undulating topography that has been extensively cleared, with the exception of stands of remnant vegetation located predominantly along Badgerys Creek and in the south western portion of the site.

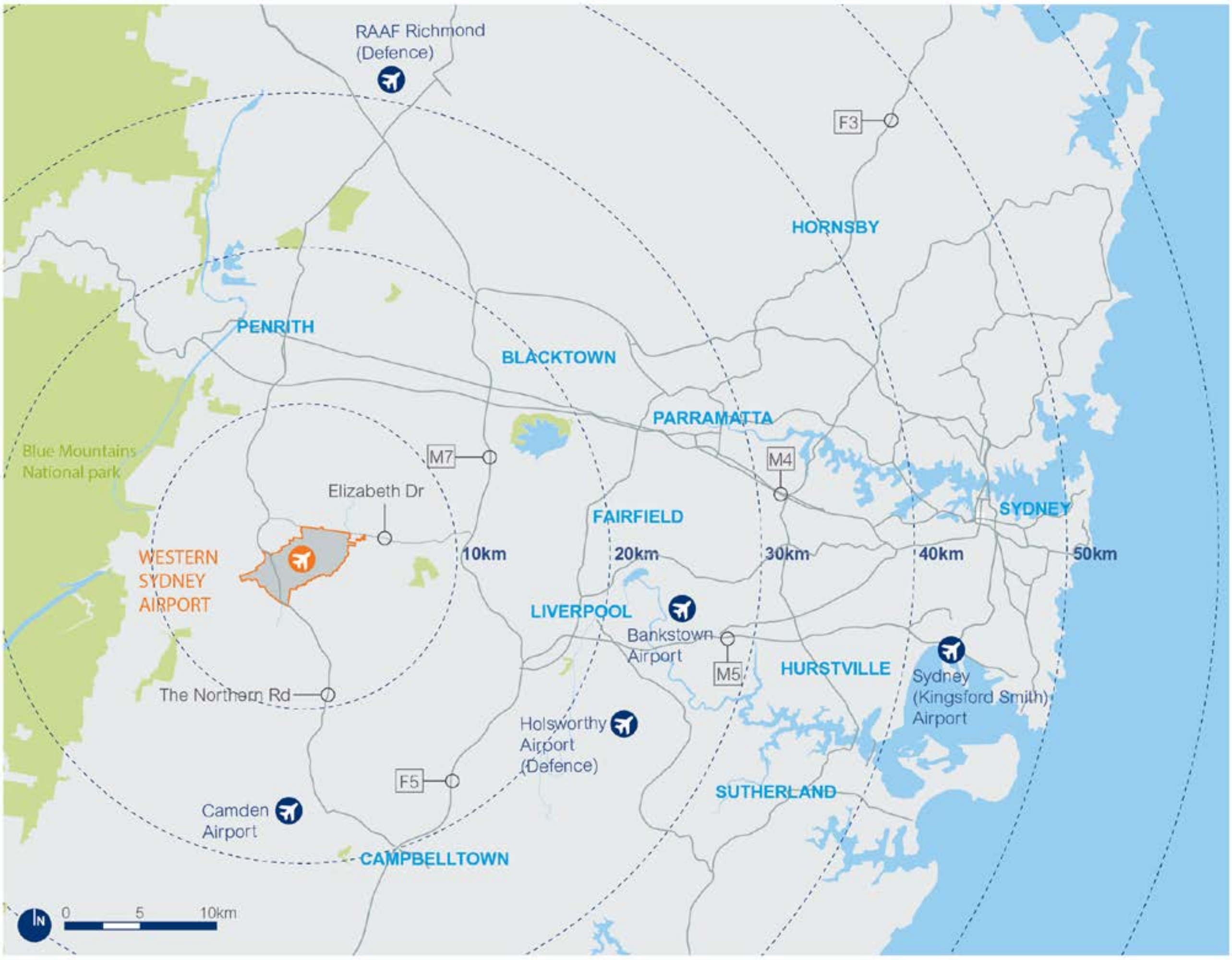


Figure ES 1 – Location of the proposed Western Sydney Airport

Historical context

The need and potential location for a second airport in the Sydney region has been considered periodically since 1946. A summary of the major studies and key milestones in the selection of Badgerys Creek as the location of the proposed airport is shown in Figure ES 2.

Badgerys Creek was first identified as a preferred site in the *Major Airport Needs of Sydney* (MANS) study (MANSSC 1979). The MANS study assessed sites within a number of zones including a northern zone (near Scheyville, Nelson and Galston), north-western zone (near Richmond and Londonderry), south-western zone (near Badgerys Creek and Bringelly) and a southern zone (in the Holsworthy Military Area). The study identified Badgerys Creek as the preferred site on environmental, economic and financial grounds.

Badgerys Creek was again identified as the preferred site for a second airport in the *Second Sydney Airport Site Selection Programme Draft Environmental Impact Statement* (Kinhill Stearns 1985) (1985 EIS). The programme evaluated 10 sites: Badgerys Creek, Bringelly, Darkes Forest, Goulburn, Holsworthy, Londonderry, Scheyville, Somersby, Warnervale and Wilton. Badgerys Creek and Wilton were short listed through this process and the two sites were subsequently assessed in an environmental impact statement (EIS), with Badgerys Creek again identified as the preferred site.

Badgerys Creek was first formally announced as the site for a major airport by the Australian Government in 1986. Land acquisitions made at Badgerys Creek from the mid-1980s form the basis of the current airport site. The land acquired has remained in Commonwealth ownership since that time.

In January 1996, the Australian Government announced that an EIS would be prepared for the construction and operation of a second Sydney airport at Badgerys Creek. The scope of the environmental assessment process was broadened to include an alternative to the Badgerys Creek site at Holsworthy Military Area, but this was subsequently ruled out as an option on environmental grounds. The *Environmental Impact Statement Second Sydney Airport Proposal* (PPK 1997) (1997–99 EIS) assessed the environmental, social and economic impacts of constructing and operating a second major airport at Badgerys Creek. In providing recommendations and advice on the 1997–99 EIS, the then Minister for the Environment found that there were no insurmountable challenges to developing an airport at Badgerys Creek.

More recently, Badgerys Creek was identified as the preferred site in the Joint Study (Department of Infrastructure and Transport 2012). The study assessed 80 sites across 18 locations including Wilberforce, Somersby, Wilton, Luddenham and Badgerys Creek. An airport at Wilberforce was discounted as it would likely require closure of RAAF Base Richmond, while Somersby was discounted due to conflict with Sydney Airport airspace. Wilton was considered too far from most airport users to justify the development of an airport. Both Luddenham and Badgerys Creek were considered to be geographically well placed in relation to growth areas, with Badgerys Creek the preferred choice based on its higher benefit cost ratio. The Wilton and RAAF Base Richmond Study (DIRD 2013) subsequently supported these findings, noting a ‘clear preference’ within the aviation industry for an airport at Badgerys Creek.

1946
First investigation into the best site for further airport development in/around Sydney considers three options including a site at Towra Point and expansions of existing airports at Bankstown and Mascot.

1969
Advisory committee to the Australian Government considers 11 potential sites for a second airport, including a site at Badgerys Creek.

1971
Advisory committee narrows potential locations to sites in Richmond, Somersby, Duffys Forest and Wattamolla.

1972
Benefit-cost analysis undertaken of an additional 106 sites. Assessment reduces the number of sites to five potential sites: Towra Point, Rouse Hill/Nelson, Long Point, Marsden Park and Bringelly.

1973
Government announces that Galston has been selected as the site for a potential second airport (decision reversed in 1974 following further consideration).

1976
Major Airport Needs of Sydney Study Committee convened as a joint initiative by the Federal and State governments. Study considers six sites including Londonderry, Scheyville, Austral, Long Point, Bringelly and Badgerys Creek.

1979
Preliminary report released by the Major Airport Needs of Sydney Study Committee. Scheyville and Badgerys Creek shortlisted as potential sites, but development could not be justified before a third runway at Sydney Airport.

1982
Third runway at Sydney Airport announced (decision reversed in 1983).

1983
New programme announced to identify a site for a second airport in Sydney (the Second Sydney Airport Site Selection Programme). Ten sites re-examined: Bringelly, Darkes Forest, Goulburn, Holsworthy, Londonderry, Scheyville, Somersby, Warnervale, Wilton and Badgerys Creek.

1985
Wilton and Badgerys Creek assessed in detail in Second Sydney Airport Site Selection Programme Draft Environmental Impact Statement.

1986
Badgerys Creek announced as the site of the second airport. Acquisition of land begins (completed by 1991).

1991
Decision made to proceed with the construction of a third runway at Sydney Airport and an initial development of a general aviation airport at Badgerys Creek.

1994
Third runway at Sydney Airport opens and the plans to develop the Badgerys Creek site are expanded to provide an international standard airport in time for the Sydney 2000 Olympics.

1996
Government announces that an EIS will be prepared for the development of a second Sydney airport at Badgerys Creek. Scope subsequently broadened to include a potential site at Holsworthy Military Area.

1997
Holsworthy Military Area ruled out on environmental grounds and draft EIS released for public comment prior to finalisation in 1999.

2000
Further development of a potential second airport at Badgerys Creek put on hold.

2004–08
Further consideration of other potential sites by the Australian and NSW governments, including Well's Creek, Camden, RAAF Base Richmond and expansion of the existing Canberra Airport.

2009
Joint Australian and NSW government steering committee appointed to guide a Joint Study on Aviation Capacity for the Sydney Region (the Joint Study).

2012
The Joint Study is released and concludes that an additional airport would be needed from around 2030 and that out of 80 sites considered, Badgerys Creek would be the most logical and cost effective site.

2013
Study into the suitability of Wilton as a second airport and limited civil operations at RAAF Base Richmond supported previous findings that Badgerys Creek would be the most economically viable option for further development.

2014
Australian Government announces that Badgerys Creek will be the site for a second airport for Sydney. Department of Infrastructure and Regional Development start preparing EIS.

Figure ES 2 – Key milestones in the development of the proposed Western Sydney Airport

Most recently, on 15 April 2014, the Australian Government announced that the Commonwealth owned land at Badgerys Creek will be the site for a second Sydney airport. The announcement was followed by the Western Sydney Infrastructure Plan, committing $3.6 billion over ten years to major road upgrades in Western Sydney to relieve pressure on existing infrastructure and provide connectivity to the airport before operations commence.

The need for a new airport

The need for development of the proposed airport is driven by the continued growth in demand for aviation services in Western Sydney and the Sydney region more broadly and physical constraints at the existing Sydney Airport.

Aviation services are critical to a well-functioning developed country like Australia. Efficient access to air services for passenger travel and high-value freight is essential to ensure that Sydney remains an international commercial and financial centre and keeps its place as Australia's foremost tourist destination.

Sydney Airport has limited ability to handle further passenger growth due to the physical constraints at the existing site. The limitations of existing infrastructure are becoming apparent at peak times and are expected to become more pronounced over the coming decades.

According to the Joint Study, in the absence of additional aviation capacity in the Sydney region:

- by 2020, all weekday slots for periods at Sydney Airport between 6.00 am and 12 noon and between 4.00 pm and 7.00 pm would be fully allocated;
- by around 2027, all slots at Sydney Airport would be allocated, so new entrants cannot be accommodated, unless another service were cancelled; and
- by around 2035, there would be practically no scope for further growth of regular passenger services at Sydney Airport.

Demand for aviation services is anticipated to continue to increase to service Sydney's ongoing growth in population and business activities. Any shortfall in capacity to meet demand would affect future economic growth, productivity, employment, lifestyle and amenity. Notably, the Joint Study found that the economic cost of not meeting the expected increased demand would be substantial.

By 2060, the economy-wide (direct and flow-on) impacts across all sectors of the Australian economy could total $59.5 billion in foregone expenditure and $34.0 billion in foregone gross domestic product (based on 2010 dollars). The NSW economy would be especially heavily affected, with losses across all industries totalling $30.6 billion in foregone expenditure and $17.5 billion in foregone gross state product.

Strategic alternatives to the development of a new airport in Western Sydney have been assessed over a long period of time. Commonly referenced alternatives include increasing the capacity of Sydney Airport or other existing airport facilities, establishing a new airport outside the Sydney basin or using high speed rail as a substitute for aviation services. While these alternatives have demonstrated potential to provide marginal capacity benefits, they would not replace the need for the proposed airport. Detailed studies have been undertaken over a number of decades to assess these alternative options and have consistently found that the most effective way to address increased aviation demand, while mitigating environmental and social impacts, is to develop a new airport at Badgerys Creek.

Growth in Western Sydney

As well as providing additional aviation capacity in the Sydney region, locating the proposed airport at Badgerys Creek would provide access to aviation infrastructure in Western Sydney for this heavily populated and growing region. Development of the proposed airport is expected to provide the current and future community with improved access to aviation services by reducing travel times, increasing destination choice and increasing competition.

Western Sydney is a dynamic multicultural region and is currently home to around 47 per cent of Sydney's population and nine per cent of Australia's population. Over the next 20 years, the number of people in Western Sydney will grow faster than other parts of Sydney, with almost one million more people expected to live west of Homebush by 2031 (DP&E 2014).

There are a number of key industries in the area that depend on air transport services based in the area and the development of a new airport is likely to trigger further growth in aviation dependent industry sectors given the availability of land, labour and transport linkages.

The south-west subregion is the fastest growing subregion in Sydney and a new airport would be a major catalyst for growth in investment, infrastructure and jobs throughout this area.

The need for a new EIS

Development of an airport at Badgerys Creek has been assessed through the preparation of two previous environmental impact statements. The 1997-99 EIS (PPK 1997) is the most recent comprehensive environmental assessment and considered three separate options for the development of the airport site. Option A proposed a 50/230 degree runway orientation and location, substantially the same as currently proposed, however the capacity of the airport site was limited to 30 million passengers annually.

In September 2014, SMEC Australia was commissioned by the Department of Infrastructure and Regional Development (the Department) to undertake an environmental field survey of the Commonwealth owned land at Badgerys Creek. The purpose of the field survey was to update the Australian Government's knowledge of flora and fauna, European and Aboriginal heritage and hydrology aspects of the land at Badgerys Creek. The resulting report, *Environmental Field Survey of Commonwealth Land at Badgerys Creek* (SMEC 2014) found that the previous EISs, although comprehensive and useful as background information, were outdated due to changes in legislative requirements and obligations, best-practice and industry standard assessment methods, and threatened flora and fauna listings. In addition, there have been substantial changes to the indicative design and operational parameters of the proposed airport, reflecting the changing nature of airports as centres of economic activity. As such, the Australian Government commenced a new environmental assessment for the proposed airport.

This draft EIS has been developed to assess the proposed airport in the context of an updated concept design, demand forecasts, regulatory framework (as outlined below) and the contemporary regional setting for Western Sydney. Where relevant, information from previous assessments such as the 1997-99 EIS (PPK 1997) has been used to support technical information required for this draft EIS.

The proponent

The proponent for the development and operation of the proposed airport is the Australian Government Department of Infrastructure and Regional Development (the Department).

The Department is responsible for national policies and programmes that promote, evaluate, plan and invest in infrastructure and regional development, and foster an efficient, sustainable, competitive, safe and secure transport system for Australia. The Department administers the *Airports Act 1996* (Airports Act) (and its associated regulations) and the Minister for Infrastructure and Regional Development is responsible for the approval of all major developments at federally leased airport facilities across Australia as defined by the Airports Act. The proposed airport would be developed and operated under the Airports Act. Construction to prepare the site, including earthworks may be undertaken by the Australian Government or the private sector. An airport lease would be granted by the Australian Government to an airport lessee company (ALC), which would then become responsible for developing and operating the proposed airport.

The Australian Government is required to meet its obligations in relation to Sydney Airport Group's right of first refusal to develop and operate a second Sydney airport. This right was granted as part of the Government's sale of Sydney Airport in 2002 and is applicable to the proposed airport. The right of first refusal consists of a number of phases, including a consultative phase and a contractual phase. The first phase consisted of a nine-month consultation between the Australian Government and Sydney Airport Group which concluded on 30 June 2015.

If the Government decides to proceed with the project, a contractual offer (a 'Notice of Intention') would first be issued to Sydney Airport Group. Sydney Airport Group would then have the opportunity to exercise its option to develop and operate the airport. The Notice of Intention would set out the detailed terms for the development and operation of an airport at Badgerys Creek, including technical specifications, contractual terms and development timetables.

Should Sydney Airport Group decline the opportunity, the Australian Government may approach the market, or develop the airport itself.

Regulatory framework

The proposed airport is one of the largest infrastructure projects considered in Australia in recent years and would be the first major new Australian airport development in decades.

Development of the proposed airport is subject to a Commonwealth environment and development approvals framework. Development at existing federally leased airports requires approvals under the Airports Act, through the approval of major development plans submitted by an ALC.

As this process did not appropriately cater for development of an airport at a new site, the Australian Parliament passed amendments (*Airports Amendment Bill 2015* – 'Airports Act amendments') to provide for a single and transparent mechanism to seek planning, environment and development approval for Stage 1 of the proposed airport. The Airports Act amendments provide for the preparation of an 'Airport Plan' to guide the development of the airport, which is to be determined by the Minister for Infrastructure and Regional Development. The finalisation of the draft EIS is a pre-condition to the determination of the Airport Plan under the Airports Act.

Accordingly, the Airports Act amendments strengthen the Minister for the Environment's role under the Airports Act in relation to the Airport Plan. This draft EIS has been prepared and will be finalised under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Department of the Environment issued guidelines for the content of a draft EIS for the proposed airport in January 2015. This draft EIS has been prepared in accordance with the requirements of the EPBC Act and the EIS guidelines , including the requirement for public consultation. In determining the Airport Plan, the Minister for Infrastructure and Regional Development must accept any environmental conditions proposed by the Minister for the Environment, taking into account the finalised EIS.

To this end, the draft Airport Plan sits alongside this draft EIS as a companion document. The draft Airport Plan specifies how Stage 1 of the proposed airport is to be developed on the Badgerys Creek airport site, while this EIS assesses the environmental, social and economic impacts associated with the Stage 1 development, as shown in Figure ES 3.

Figure ES 3 – Proposed Western Sydney Airport approval process

The draft EIS and draft Airport Plan will be placed on public exhibition concurrently for a duration to be determined by the Minister for the Environment. During the public exhibition period any person, group, corporation or agency can submit comment on the draft EIS and/or the draft Airport Plan to the Department. A copy of all comments received on the draft EIS will be forwarded to the Department of the Environment.

The draft EIS and the draft Airport Plan must be revised taking account of comments received during the exhibition period. The finalised EIS will also provide any additional information that may be relevant to the Minister for the Environment's consideration of the environmental impacts of the proposal.

The Minister for the Environment will consider the draft Airport Plan (having regard to the finalised EIS) from an environmental perspective and notify the Minister for Infrastructure and Regional Development whether the Airport Plan should be determined and, if it is determined, whether any specific conditions or provisions should be included for the purpose of protecting the environment.

If the Minister for the Environment is satisfied with the draft Airport Plan, the Minister for Infrastructure and Regional Development may determine the Airport Plan. The Airport Plan must include any conditions or provisions specified in a notice from the Minister for the Environment.

The role of an Airport Lessee Company

Once an airport lease is granted, the airport lessee company (ALC) would be responsible for the implementation of the proposal in accordance with an Airport Plan. The ALC would also be responsible for planning and development assessment for all future development of the airport in accordance with the Airports Act and other regulatory requirements.

Within five years of an airport lease being granted by the Commonwealth for the airport site, or such longer period as approved by the Minister for Infrastructure and Regional Development, the ALC would be required to submit a master plan for approval by the Minister for Infrastructure and Regional Development. The Minister is able to refuse to approve a master plan that is not consistent with the Airport Plan.

All future development for the proposed airport must be consistent with the master plan and existing regulatory requirements contained in the Airports Act, including requirements for public consultation and approval of major development plans for major or sensitive developments.

The Airport Plan

Stage 1 of a Western Sydney Airport would be constructed and operated in accordance with the Airport Plan, which forms a transitional planning instrument under the Airports Act. The Airport Plan consists of three main parts:

- Part 1 is the title section and provides an overview and regulatory context;
- Part 2 outlines the concept design for the Stage 1 development and an overview of the long term development; and
- Part 3 details the specific developments which will form the Stage 1 development.

The concept design outlined in Part 2 of the draft Airport Plan provides the planning framework for the proposed airport until the first master plan is in place. This part includes the development objectives, indicative flight paths, projected aircraft noise contours and the land use plan for the airport site.

The Airport Plan can only be varied in accordance with the Airports Act.

The initial airport development (referred to as Stage 1) is designed to cater for the predicted demand of up to 10 million passengers annually as well as freight traffic for five years following opening around 2025 until around 2030.

The draft Airport Plan also refers to the potential long term development of the proposed airport. As demand increases beyond 10 million annual passengers, additional aviation infrastructure and aviation support precincts would add capacity to meet growing aviation demand.

It is anticipated that the proposed airport may eventually expand to include a second parallel runway on the same north-east/south-west orientation as the Stage 1 runway, with associated expansion in aviation supporting facilities. The need for a second runway would be triggered when the operational capacity approaches 37 million annual passengers, which is forecast to occur by around 2050. The long term passenger capacity of approximately 82 million annual passengers is forecast to occur by around 2063.

The Land Use Plan as presented in the draft Airport Plan (presented in Figure ES 4) would be applicable in the period between an airport lease being granted to an ALC and a master plan being developed by the ALC and approved by the Minister for Infrastructure and Regional Development. The Land Use Plan regulates the types of development, in terms of permissible land uses, that can occur within the airport site. It also outlines land uses and indicative developments that would facilitate long term growth.

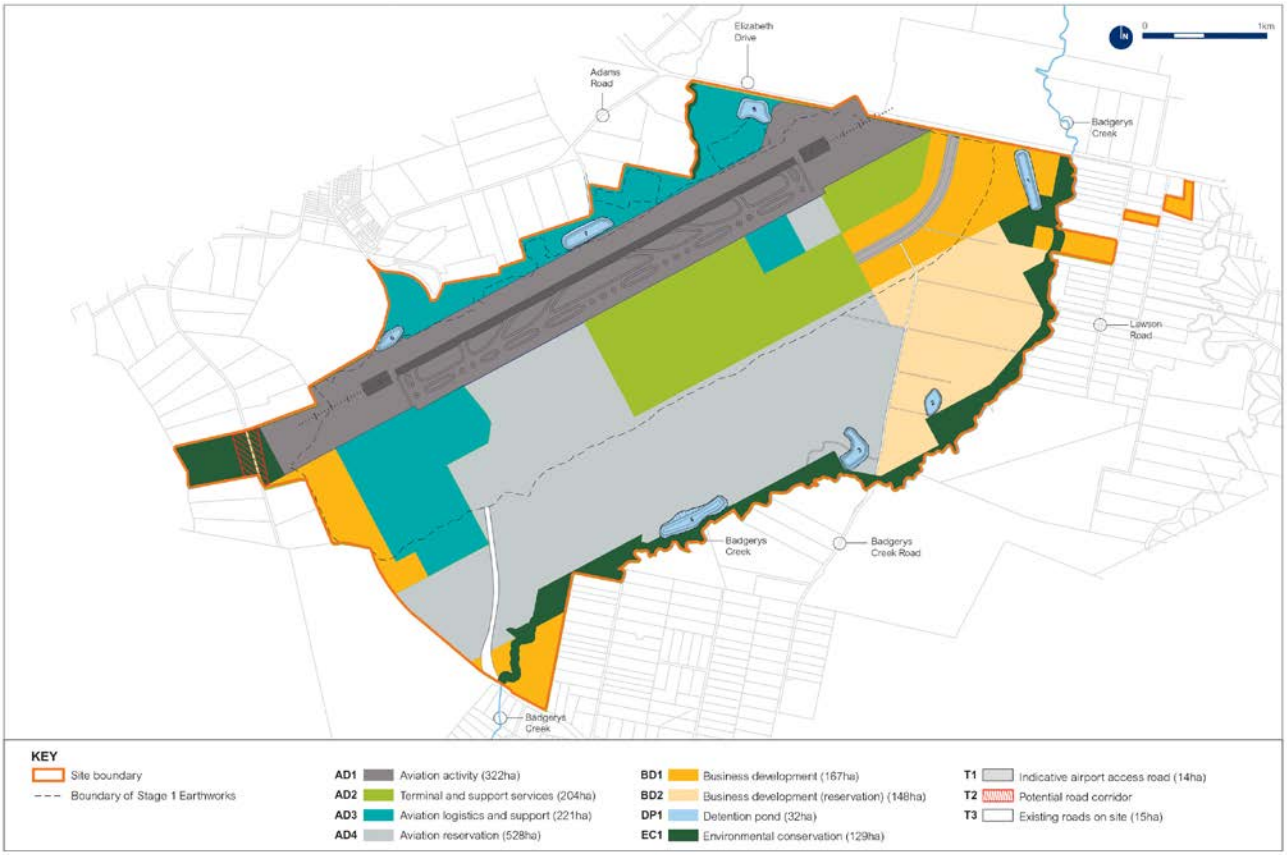


Figure ES 4 – Land use zones (Stage 1)

Part 3 of the Airport Plan provides details of the developments for which authorisation is being sought under the Airports Act. This part sets out the Australian Government's requirements for the proposed Stage 1 airport development. Any future work not covered by Part 3 of the Airport Plan, including the long term development, would be undertaken under the planning framework in Part 5 of the Airports Act as it applies to existing federally leased airports.

Determination of an Airport Plan would authorise the Stage 1 development encompassing the initial design, construction and operation of the proposed airport (that is, the activities described in Part 3 of the Airport Plan). The EIS provides a detailed consideration of likely environmental impacts arising from the Stage 1 development based upon the defined design and operational parameters described in the draft Airport Plan.

The EIS also provides a strategic level environmental assessment of a possible long term development of the proposed airport. This approach enables preliminary consideration of the extent of potential long term impacts (such as noise exposure) and, in particular, can help inform land use planning decisions in the vicinity of the airport site. Future developments would be subject to separate approval processes through master planning and major development plan requirements under the Airports Act.

Stage 1 Airport

The proposed Stage 1 development would include a 3,700 metre runway, positioned in the northern portion of the site on an approximate north-east/south-west or 50/230 degree orientation, as shown on Figure ES 5. The Stage 1 development also includes a single, full-length taxiway parallel to the runway, and a range of aviation support facilities including passenger terminals, cargo and maintenance areas, car parks and navigational aids.

The Stage 1 development is designed to be capable of facilitating the safe and efficient movement of up to 10 million domestic and international passengers per year, which is equivalent to approximately 63,000 air traffic movements annually, including freight movements, while also allowing sufficient space for future expansions.

The proposed airport would operate on a 24 hour basis. The draft Airport Plan would also set aside areas for a range of commercial uses (as set out in the land use plan) outside the airport terminal, such as retail and business parks. Any such commercial uses would be subject to separate consideration and approval requirements.

The Stage 1 development would encompass the entire 1780 hectare airport site. The majority of construction activity for Stage 1, including bulk earthworks and aviation infrastructure works would be restricted to a 1065 hectare Stage 1 construction impact zone, which is predominantly located in the northern portion of the site The existing terrain is made up of rolling hills and substantial earthworks, involving the relocation (on site) of around 22 million cubic metres of soils and rock, would be required to create a level surface to allow construction of the runway, taxiways and support services. There would also be some limited earthworks in the southern portion of the site during Stage 1, for the establishment of ancillary infrastructure including drainage swales and detention ponds as part of the water management system developed for the airport site.

The southern portion of the site would predominantly remain uncleared during the initial stage of airport development. This area is reserved for future development activities which, over the long term, could include construction of a second runway, and expansion of aviation uses and business development in accordance with the Airport Plan. Activities associated with these future uses do not form part of the Stage 1 development.

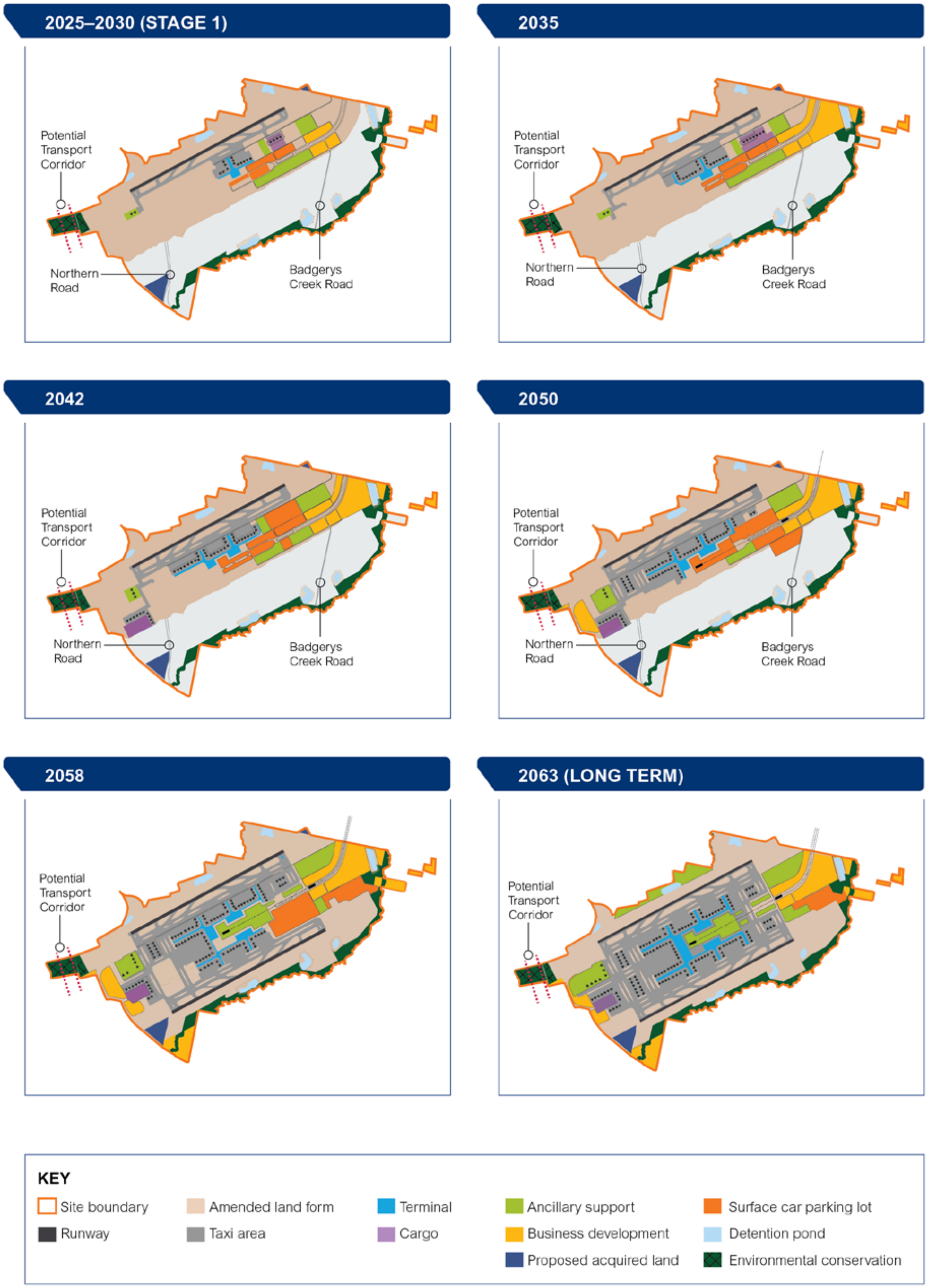


Figure ES 5 – Indicative Stage 1 development and long term concept designs

Long term development

It is expected that the proposed airport would be progressively developed as demand increases beyond 10 million passengers annually. Additional aviation infrastructure and support services such as taxiways, aprons, terminals and support facilities would be required to service the growing demand. Future developments beyond the scope of Stage 1 would be subject to the requirements of the Airports Act.

The need for a second runway would be triggered when the operational capacity approaches 37 million passengers annually, which is equivalent to approximately 185,000 air traffic movements per year. A second runway is forecast to be required by around 2050 and would be located parallel to the first runway with a centre line separation distance of approximately 1,900 metres.

The indicative long term airport concept considered in this draft EIS is forecast to service approximately 82 million passengers annually, which is equivalent to approximately 370,000 air traffic movements per year by about 2063. Indicative configurations for airport development beyond 2030 are provided in Table ES 1. The layout of the long term airport development will form part of subsequent master plans in accordance with the requirements of the Airports Act.

Operation of the airport and airspace design

Capacity and activity forecasts

Airservices Australia has assessed the airspace implications and air traffic management approaches for the Sydney region airspace associated with the development of the proposed airport. It is important for long term planning that the configuration of the airport site in Stage 1 does not preclude development in the long term. Therefore the airfield capacity analysis is based on the long term, parallel runway scenario.

This analysis indicates that an airport development at Badgerys Creek with parallel runway operations could achieve capacity for 103 total aircraft movements (landing and departing) per hour in the long term. This would comprise:

- 45 landing operations per hour; and
- 58 departure operations per hour.

The major functional areas of the airport such as terminal facilities, runways, taxiways and roadways would be designed to accommodate the peak hour passenger or peak hour aircraft demand. The peak hour activity represents the greatest level of demand being placed on facilities required to accommodate passenger and aircraft movements. Consideration of the peak hour activities during planning allows facilities to be sized appropriately so that they are neither underutilised nor overcrowded too often, and ensures that users consistently receive a satisfactory level of service and are not subject to significant congestion.

The Stage 1 and long term capacity requirements for the proposed airport, based on the indicative activity forecasts and the expected peak hour activity, are presented in Table ES 1. The Stage 1 airport layout would be designed so as not to preclude future works to accommodate expected long term capacity requirements.

Table ES 1 – Summary of activity forecasts

	Stage 1 (c. 2030)	First runway at capacity (c. 2050)	Long term (c 2063)
Annual passengers (arrivals and departures)	10 million	37 million	82 million
Peak hour passengers (international and domestic)	3,400	9,500	18,700
Total annual air traffic movements (passenger and freight)	63,000	185,000	370,000
Total peak hour air traffic movements	21	49	85

The volume and profile of passengers using the proposed airport is expected to evolve over time in response to growing demand and relative market position. It is expected that in the early years around 80 per cent of passenger demand at the proposed airport would involve regional and domestic travel. Domestic demand is likely to be focused on travel between capital cities, including Melbourne, Brisbane and Perth, as well as the Gold Coast.

Over time, it is expected that demand would grow, particularly in international passenger movements, as residual capacity at Sydney Airport is used. It is expected that the proposed airport could serve approximately two million annual international passengers by 2030, growing to approximately 18 million annual passengers by 2050. By this time, the domestic/ international split could be approximately 43 per cent domestic and 57 per cent international. In the long term, the proposed airport is expected to serve all types of aviation traffic including low cost carriers, full service carriers, international, domestic, connecting and regional traffic.

Freight aircraft are also expected to operate at the proposed airport, with the site able to accommodate approximately 7,000 dedicated freight air traffic movements in 2030, increasing to 30,000 air traffic movements in 2063.

Operating modes

Aircraft operations are controlled by air traffic control personnel and are based on a combination of meteorological conditions and airport operating policy. Aircraft are allocated to a runway, which determines both the physical runway to be used for take-off and landing and the direction in which that runway is to be used.

Wind conditions at the airport site may limit the times when particular runway orientations may be selected. However, an analysis of meteorological conditions at Badgerys Creek indicates that the preferred operating mode would be able to be selected over 80 percent of the time. Therefore there would be a substantial proportion of the time when the choice of runways would be determined by airport operating policy.

The design of the runways at the proposed airport has been developed around an optimal orientation of 50/230 degree (magnetic) heading as illustrated in Figure ES 6. This orientation is referred to as 05/23.

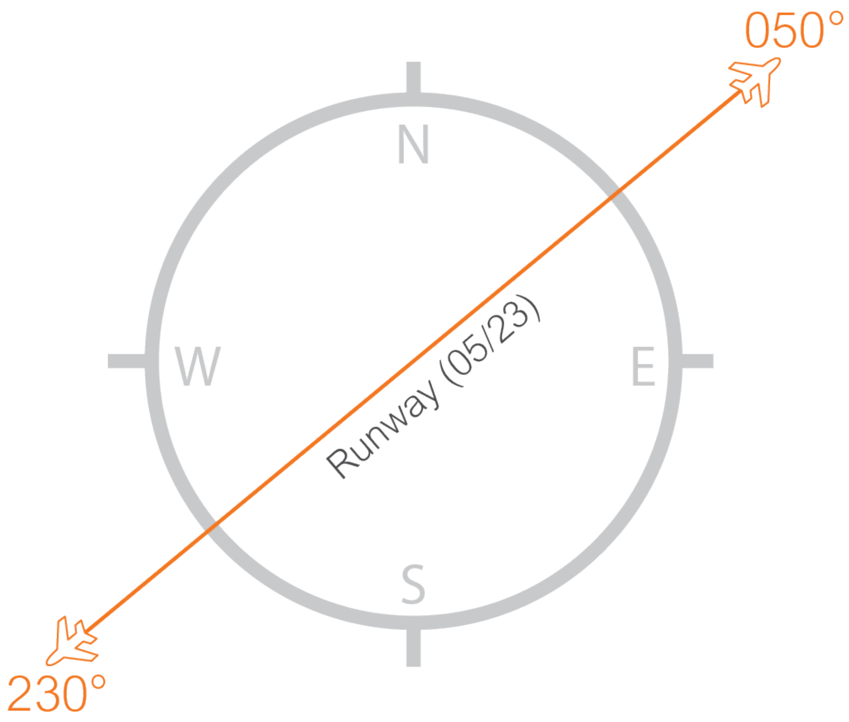


Figure ES 6 – Runway orientation

Based on the 05/23 runway orientation, for Stage 1 there are two main operating modes that would occur depending on meteorological conditions at different times including:

- '05' operations whereby aircraft would take off and land on the 05 orientation. Under this operating mode, all aircraft would be directed to approach the proposed airport to land from the south west and directed to take-off to the north east before redirecting towards their ultimate destination; and
- '23' operations whereby aircraft would take off and land on the 23 orientation. Under this operating mode, all aircraft would be directed to approach the proposed airport to land from the north east and directed to take-off to the south west before redirecting towards their ultimate destination.

The concept of 05 and 23 operations is illustrated in Figure ES 7. Under each of these operating modes, when the non-preferred operating direction is used for a period of time, operations would be switched back to the preferred direction when it became available after a time lag.

A third operating mode, 'Head to Head' may be feasible following further detailed assessment before the start of operations. This would involve all landings and take off movements occurring in opposing directions, either to or from the south west; or to or from the north east. Under this mode all aircraft operations would occur only on one side of the airport site, thus offering a period of respite from aircraft operations for other areas while this mode was in operation.

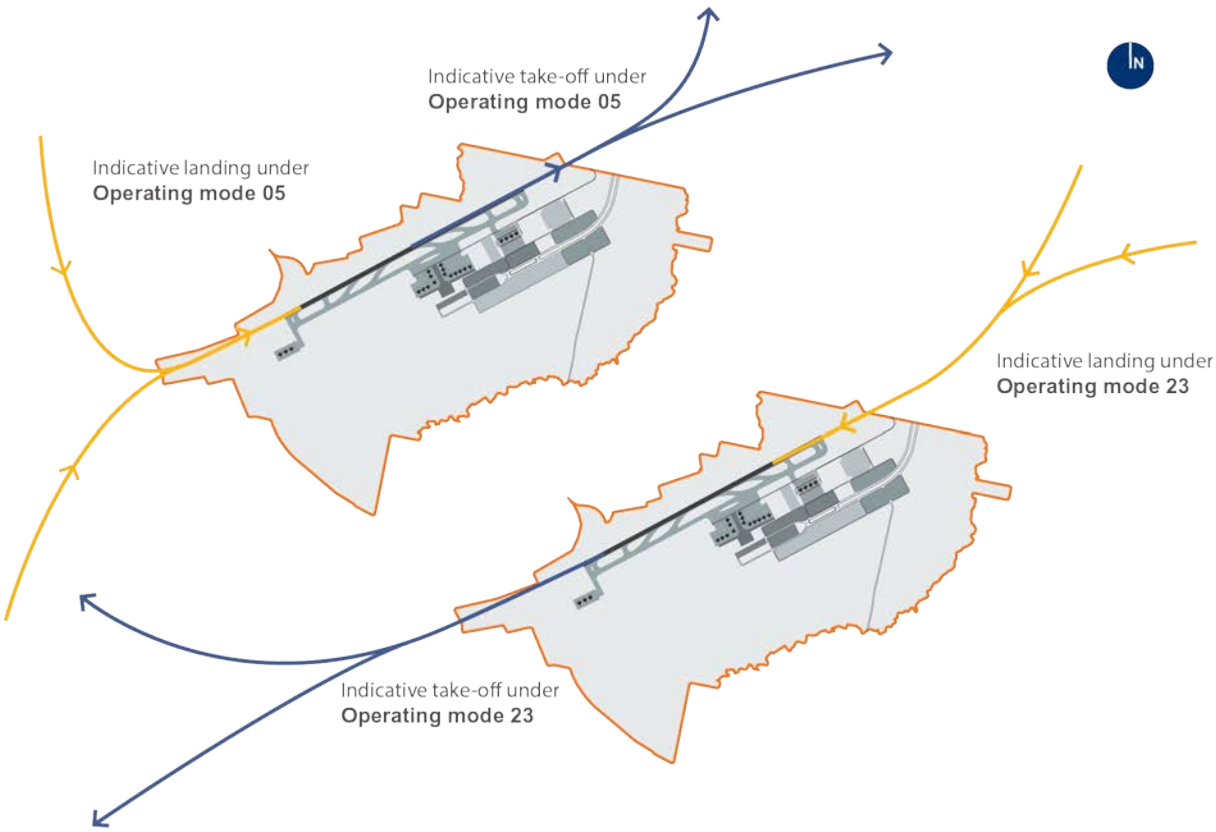


Figure ES 7 – ‘05’ and ‘23’ operating modes

Airspace architecture

Airservices Australia has undertaken a preliminary assessment of the implications for airspace and air traffic management arrangements in the Sydney region associated with the introduction of flights to and from the proposed airport.

Because the operation of the Stage 1 development is potentially more than 10 years away (and construction for the long term development potentially more than 40 years away), the preliminary assessment undertaken by Airservices Australia is limited to a conceptual level airspace management design.

The principal objective of the preliminary assessment was to establish whether safe and efficient operations could be introduced at the proposed airport through the development of indicative proof-of-concept air traffic management designs.

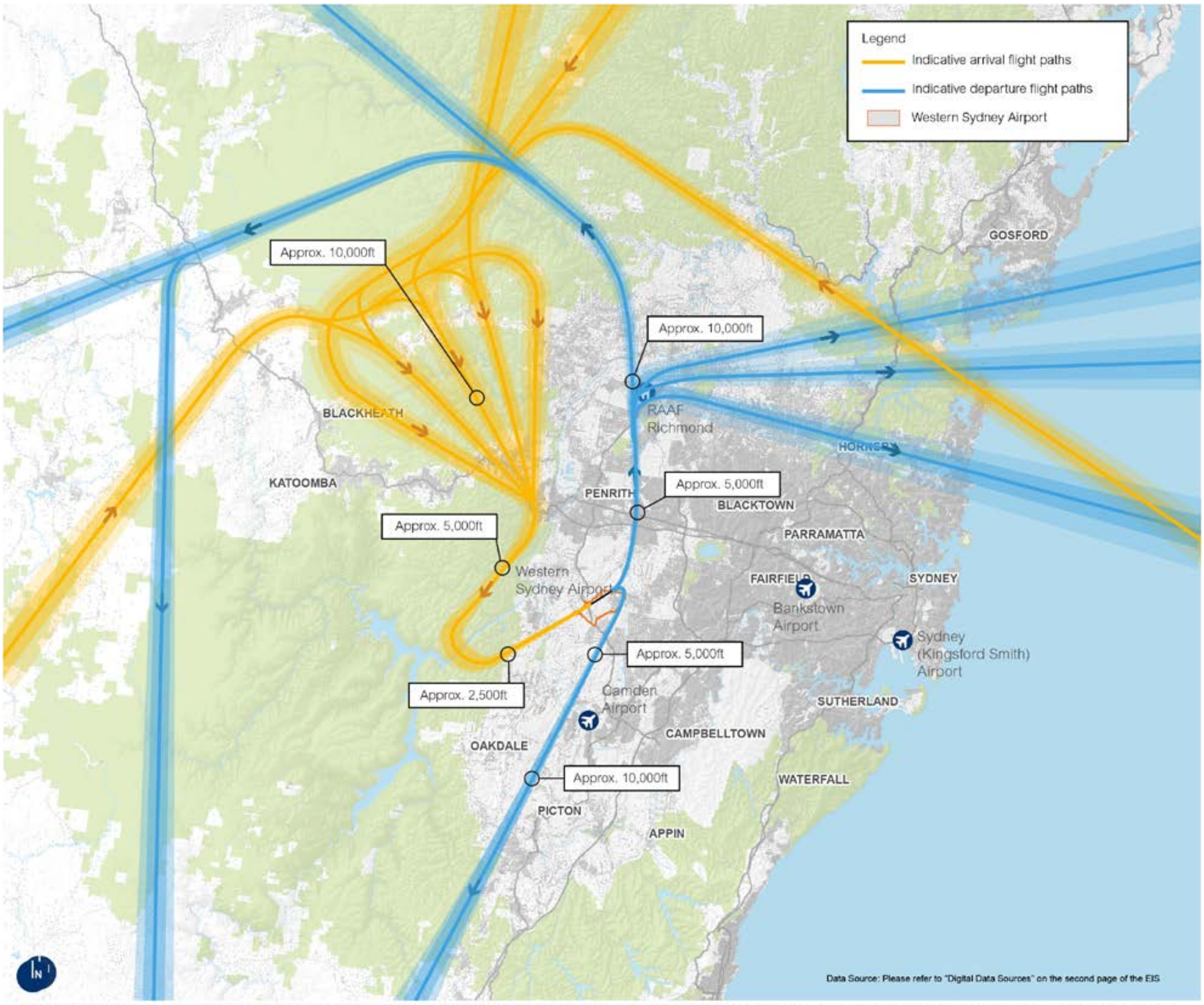
For this draft EIS, it is important to acknowledge that the proof-of-concept air traffic management design by Airservices Australia does not take into account other influences on air traffic movement such as consideration of noise impacts. These factors would be incorporated into the final design of the airspace, which would also be subject to community and industry consultation and may engage further environmental assessment processes. In the meantime, this draft EIS provides an assessment of noise and other impacts based on the preliminary design information currently available and indicative flight paths provided by Airservices Australia.

The indicative flight path concept designs for approach and departure routes demonstrate that Stage 1 of the proposed Western Sydney Airport and Sydney Airport could safely operate independently as high capacity airports. Figure ES 8 and Figure ES 9 present flight paths for both the 05 and 23 directions. This demonstrates that an airspace design could be implemented for a single runway operation at the proposed airport without making significant change to the current design and flight path structure for Sydney Airport or Bankstown Airport. However, as demand for aviation services grows beyond that expected for Stage 1, instrument flight rule operations at Bankstown Airport are expected to be incrementally constrained. This is because aircraft arriving into the proposed airport on runway 23 and aircraft arriving at Bankstown Airport on runway 11 would operate on overlapping flight paths and would need to be sequenced between the two airports.

The operation of parallel runways at the proposed airport would also be viable in the long term. With parallel runways, the proposed airport could potentially achieve aircraft movement rates of around 100 movements per hour (one landing or one arrival constitutes an aircraft movement), with Sydney Airport maintaining a movement rate of 80 per hour. Preliminary analysis suggests that the following issues would need to be assessed in detail as part of the future airspace design process undertaken closer to the commencement of operations at the proposed airport:

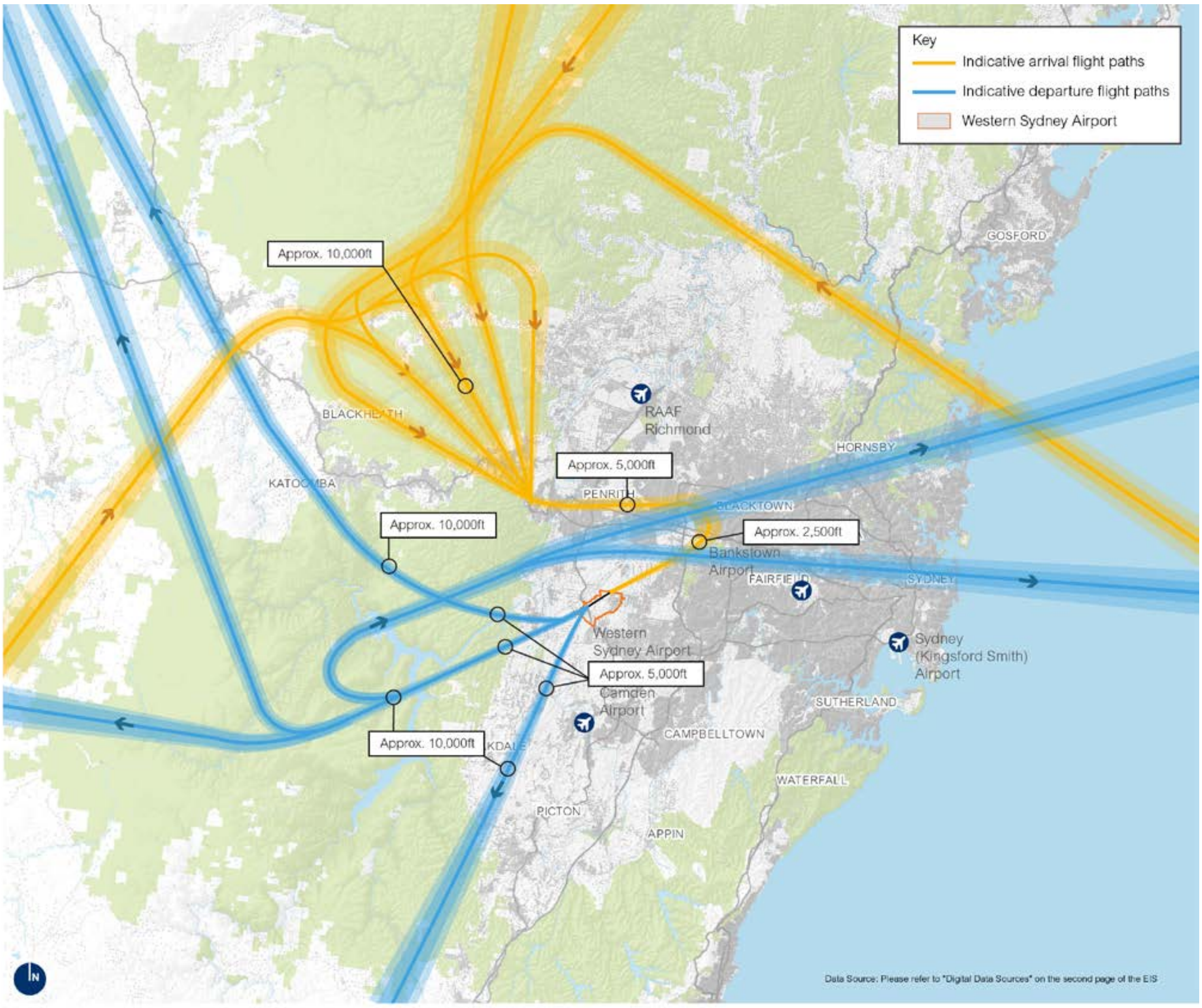
- changes to Sydney Airport flight paths to maintain independent operations at the proposed airport and Sydney Airport, and to achieve the expected demand capacity;
- changes to flight paths serving Bankstown Airport, in particular instrument flight rule operations, in order to maintain independent operations at the proposed airport and Bankstown Airport, and to achieve the expected demand capacity;
- further consideration of existing activity that occurs in the Sydney region, such as minimising the potential impact on local training areas where possible;
- resolution of a potential constraint associated with the restricted airspace area over the Defence Establishment Orchard Hills; and
- further consideration of noise and visual sensitive receivers, such as residential areas and the Greater Blue Mountains World Heritage Area.

Decisions about airspace management above and around the proposed airport, including the determination of flight paths, would be made by Airservices Australia and the Civil Aviation Safety Authority (CASA) closer to the start of airport operations. These decisions could require further environmental assessment processes, community and stakeholder engagement, and may be the subject of a future referral under the EPBC Act following detailed design.



Note: Indicative flight paths are based on Airservices Australia's Western Sydney Airport: Preliminary Airspace Management Analysis. It does not present a comprehensive airspace and air route design and does not consider many essential components that would be necessary to implement an air traffic management plan for the Sydney basin. The formal flight path design for the Airport will be undertaken much closer to the commencement of operations.

Figure ES 8 – Indicative flight paths for the 05 operating mode



Note: Indicative flight paths are based on Airservices Australia's Western Sydney Airport: Preliminary Airspace Management Analysis. It does not present a comprehensive airspace and air route design and does not consider many essential components that would be necessary to implement an air traffic management plan for the Sydney basin. The formal flight path design for the Airport will be undertaken much closer to the commencement of operations.

Figure ES 9 – Indicative flight paths for the 23 operating mode

Community consultation

The Australian Government has committed to providing multiple opportunities for the community to provide feedback on the proposed airport. In addition to consultation undertaken throughout 2015, the Australian Government has conducted research into community and stakeholder views on the project.

The stakeholder and community consultation activities undertaken during the preparation of the draft EIS have assisted in informing the issues addressed in the draft EIS. The principles for the engagement process were guided by the Core Values and Code of Ethics of the International Association for Public Participation.

Feedback received from the community and stakeholders and how this was addressed in the draft EIS and draft Airport Plan is discussed in Chapter 8. A summary of typical questions is provided below.

Typical questions from the community are:

- Will the proposed airport operate 24 hours per day?
- What will be the location of the flight paths over Western Sydney?
- How high will the aircraft be?
- How will the proposed airport impact The Northern Road?
- What will happen to the current rural lifestyle?
- How will public transport connect to the airport?
- Will local roads be upgraded as part of the Western Sydney Airport project?
- Will there be an impact on property prices in the region?
- Will the cumulative impacts of the proposed airport and surrounding projects be evaluated?
- When will construction and operation begin?
- What new jobs will be available in Western Sydney?
- Is there a real benefit of having an airport in Western Sydney?
- Is there the potential for increased tourism in the Blue Mountains region?

Issues raised during the preparation of the EIS include:

- the changing face of Western Sydney;
- proposed flight paths and noise impacts;
- potential for increased pollution levels in Western Sydney;
- impacts of the Western Sydney Infrastructure Plan;
- local traffic and transport changes;
- employment opportunities from the proposed airport; and
- operational issues.

The suite of planned consultation activities to take place during the public exhibition period for the draft EIS and draft Airport Plan has been designed to reach the broader Western Sydney community. Events such as local drop-in information sessions, community market pop up stalls, static displays at local libraries and an online noise modelling tool, as well as printed material including summary documents, fact sheets, newsletters and other relevant documentation, would all be used to ensure the community has access to as much information as possible.

Draft EIS process

The Department submitted a referral under the EPBC Act for the development of the airport on 4 December 2014. On 23 December 2014, a delegate of the Minister for the Environment determined the proposed airport to be a ‘controlled action’. The referral decision instrument identifies the following controlling provisions under the EPBC Act as being relevant to this proposal:

- world heritage properties (sections 12 and 15A);
- national heritage places (sections 15B and 15C);
- listed threatened species and communities (sections 18 and 18A); and
- Commonwealth action (section 28).

At the same time, the delegate decided that the proposed airport development would be assessed by preparation of an EIS. The *Guidelines for the Content of a Draft Environmental Impact Statement – Western Sydney Airport* (EIS guidelines) were issued on 29 January 2015.

This draft EIS addresses the guidelines by assessing the potential environmental, social and economic impacts associated with the Stage 1 development as described in Part 3 of the draft Airport Plan. The intent and objectives of the New South Wales legislative framework and assessment guidelines were also considered, where appropriate, for each environmental value. The draft EIS also considers the potential impacts over the long term, by providing a separate strategic level environmental impact assessment.

The framework for the impact assessment has been designed to provide a structured and objective approach to identifying the proposed airport’s environmental, social and economic impacts, and to developing effective mitigation, management and offset measures. The approach has generally involved:

- project definition including analysis of the need and alternatives to address the growing aviation demand in the Sydney region;
- identification of key issues through reviewing previous investigations, preparation of an EPBC Act referral and a gap analysis and risk assessment process;
- identifying existing environmental, social and economic baseline conditions;
- completion of impact assessments for the project based on the broad parameters presented in the draft Airport Plan, having regard to the baseline conditions;
- refinement of the project having regard to the impact assessments; and

- identification of appropriate mitigation, management, monitoring measures and (where appropriate) offset measures for the identified potential impacts.

The baseline (or existing environment) conditions for the airport site and surrounding locality were derived using a combination of desktop and field investigations relevant to each environmental aspect or value. Where possible, the investigations built on previous studies that have been completed at the airport site.

Mitigation and management measures were applied to reduce the level of identified potential impacts. These measures aim to protect the identified environmental values and would be applied as required during the planning and design, construction and operation phases of the project.

The following sections present a summary of each issue assessed in the draft EIS.

Aircraft noise

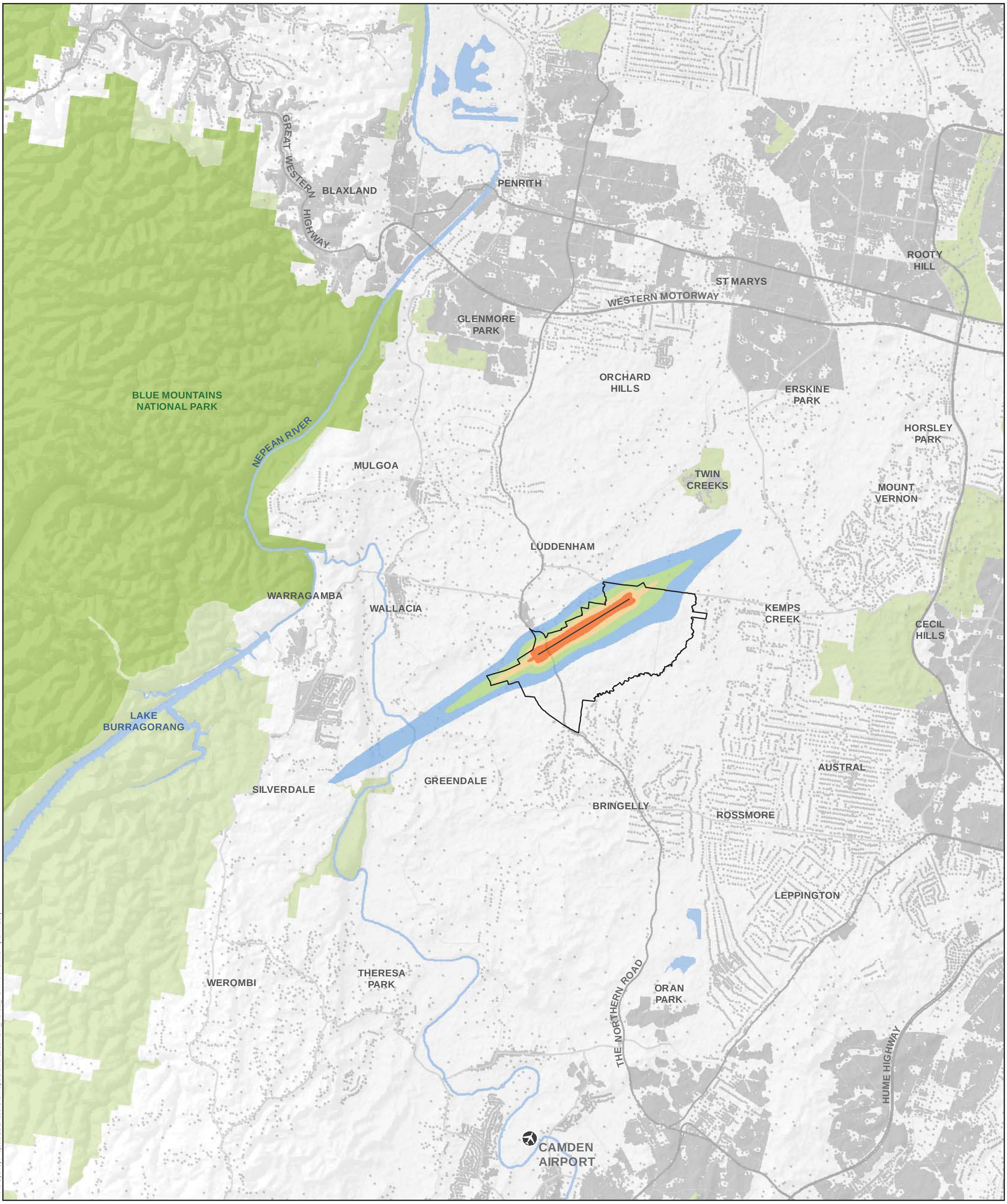
Operation of the Stage 1 development would result in changes to the pattern of aircraft movements in the airspace above Western Sydney. These changes are expected to result in impacts during both the day and night, particularly in communities immediately surrounding the airport site.

The pattern of noise impacts that would result from operation is complex and depends on the time of day or night, season, airport operating mode and other factors. The availability of each operating mode at any given time would depend on meteorological conditions, particularly wind direction and speed, the number of presenting aircraft and the time of day. A number of operational strategies were developed based upon the preferred direction for landing and take-off when weather and operating conditions permit use. Operating strategies include Prefer 05, Prefer 23 and head to head operations at night in combination with the preferred daytime direction.

It is expected that land use and planning around the proposed airport would be influenced by the Australian Noise Exposure Concept (ANEC) contours presented in this EIS, which would be used to define the development of Australian Noise Exposure Forecast (ANEF) contours once flight paths and operating modes are finalised and approved. The ANEF system is intended for use as a land use planning tool for controlling encroachment on airports by noise sensitive buildings. The system underpins AS2021 *Acoustics- Aircraft noise intrusion- Building siting and construction*, which contains advice on the acceptability of building sites based on ANEF zones. The acceptability criteria vary depending on the type of land use, with an aircraft noise exposure level of less than 20 ANEF considered acceptable for the building of new residential dwellings.

Land use planning controls based on the ANEC developed for the 1985 EIS (Kinhill Stearns 1985) have been adopted by councils surrounding the airport site to generally control the type and nature of development in the vicinity of the proposed airport site. ANEC contours have been calculated for the proposed operation of the Stage 1 development as shown on Figure ES 10 and Figure ES 11 are generally less geographically extensive than those developed for the 1985 Draft EIS.

It is important to note that the ANEC figures for the proposed Stage 1 development are for comparative purposes and any change to current land use planning instruments would necessarily be based on long term forecasts of noise exposure.



LEGEND

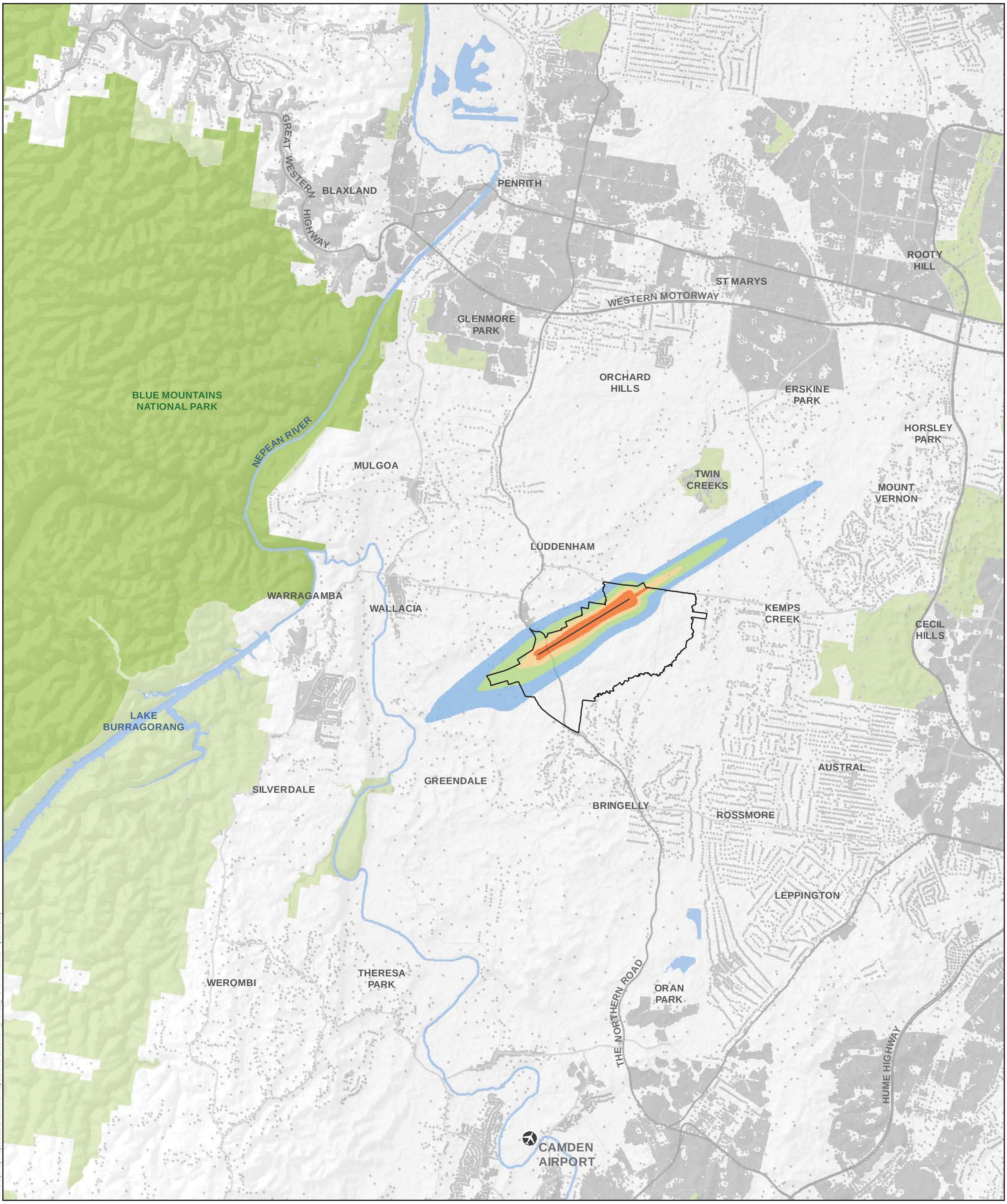
Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

Western Sydney Airport	Greater Blue Mountains World Heritage Area	ANEC = 20-25
Runway	Parks and reserves	ANEC = 25-30
Airfields		ANEC = 30-35
Buildings		ANEC = 35+

0 1 2 4
Kilometres

N

ES10 - ANEC contours for Prefer 05 operating strategy (2030)



LEGEND

Western Sydney Airport	Greater Blue Mountains World Heritage Area	ANEC = 20-25
Runway	Parks and reserves	ANEC = 25-30
Airfields		ANEC = 30-35
Buildings		ANEC = 35+

Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

0 1 2 4
Kilometres

ES11 - ANEC contours for Prefer 23 operating strategy (2030)

Maximum noise levels of 70 to 75 dBA (where a person may need to raise their voice to be properly heard in conversation) can be expected within built-up areas in St Marys and Erskine Park. The maximum noise levels would result from long-range departures by Boeing 747 or equivalent aircraft. Maximum noise levels due to more common aircraft types such as the Airbus A320 or equivalent are predicted to be between 60 to 70 dBA in St Marys and Erskine Park and over 70 dBA in some adjacent areas to the south west of the proposed airport, notably Greendale and Luddenham. Around 1,500 people would experience five or more aircraft noise events per day above 70 dBA. None of these receivers would be in built-up residential areas.

At night the Prefer 05 operating strategy (typically approaching and departing the proposed airport in a south-west to north-east direction) would result in an estimated 48,000 people experiencing more than five events above 60 dBA. This is reduced to approximately 6,000 people with the prefer 23 operating strategy (with arrivals and departures in the opposite direction), or 4,000 people if a head to head operations (both approach and depart to the south west) is implemented.

Figure ES 12 and Figure ES 13 presents the maximum extent noise contours for the arrival and departure of an Airbus A320 which is expected to be one of the more common types of aircraft used at the proposed airport.

Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

LEGEND

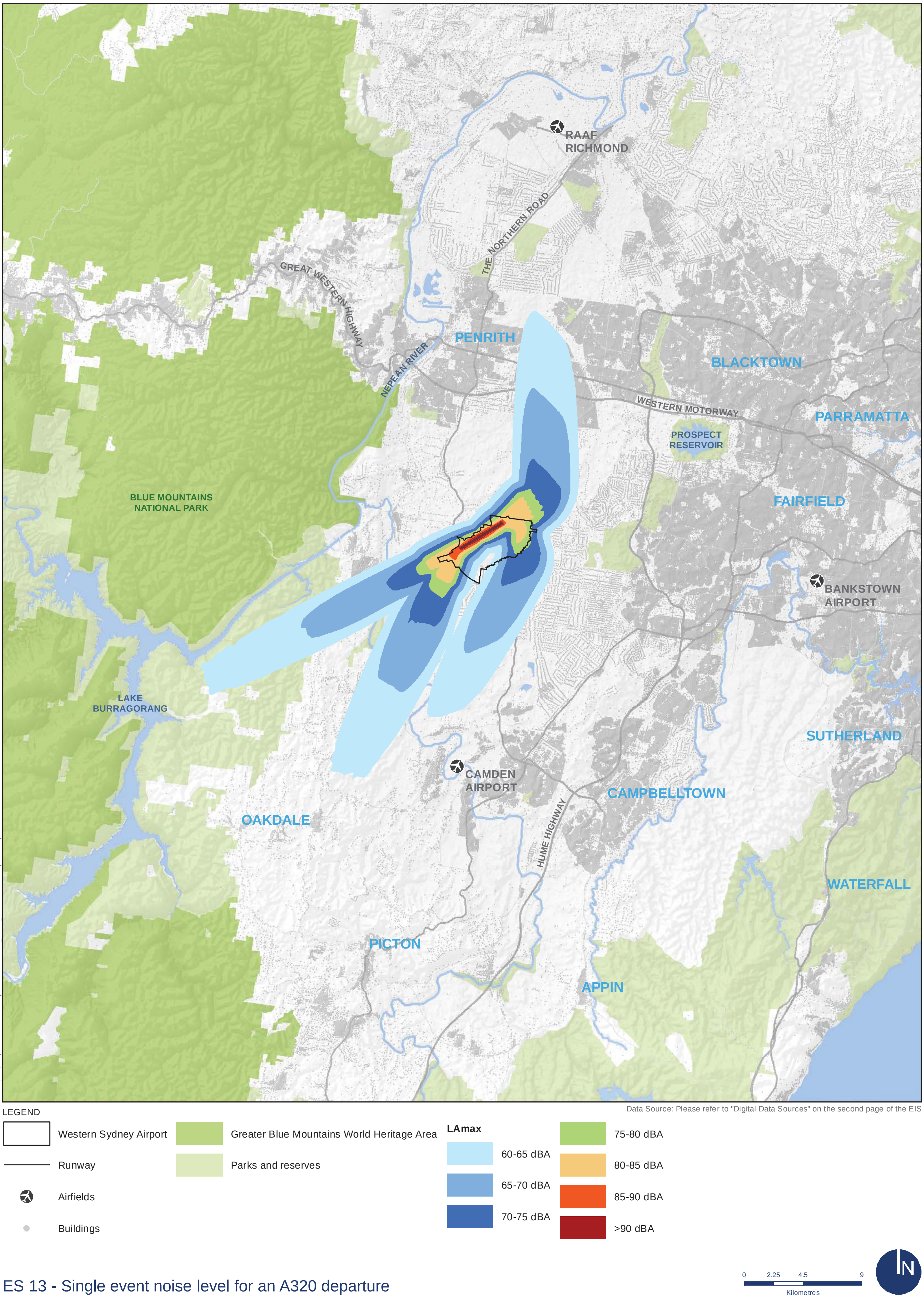
Western Sydney Airport
Runway
Airfields
Buildings
Greater Blue Mountains World Heritage Area
Parks and reserves

LAmax

60-65 dBA
65-70 dBA
70-75 dBA
75-80 dBA
80-85 dBA
>85 dBA

0 2.25 4.5 9
Kilometres

ES 12 - Single event noise level for an A320 arrival



ES 13 - Single event noise level for an A320 departure

A number of recreational areas located close to the airport site, have been identified within the area potentially affected by aircraft overflight noise. These range from sports areas used for active pursuits such as horse riding, bowling or golf to nature reserves which may be used for more passive activities.

The results indicate that most of the identified recreational areas would not be subject to aircraft overflight noise events with maximum levels exceeding 70 dBA, or their exposure would be less than one event per day on average. Aircraft overflight noise levels at Twin Creeks Golf and Country Club would be noticeable and at times a raised voice would be required for effective communication. At this location, predicted noise exposure would be significantly reduced under a Prefer 23 operating strategy.

Bents Basin State Conservation Reserve and Gulguer Nature Reserve would be subject to a number of events with noise levels exceeding 60 dBA, which would be noticeable to passive users of these areas.

The responsibility for managing noise impacts at the proposed airport would be shared by many organisations. These include the ALC, the Australian, NSW and local governments, airlines, aircraft and engine manufacturers, and regulators. Approaches to mitigating aircraft overflight noise generally focus on reducing noise emissions from the aircraft themselves, planning flight paths and airport operating modes in a way that minimises potential noise and environmental impacts, and the implementation of land use planning or other controls to ensure that future noise-sensitive uses are not located in noise-affected areas. Potential noise abatement opportunities such as the selection of operating modes would form a major part of the work required to finalise the airspace design.

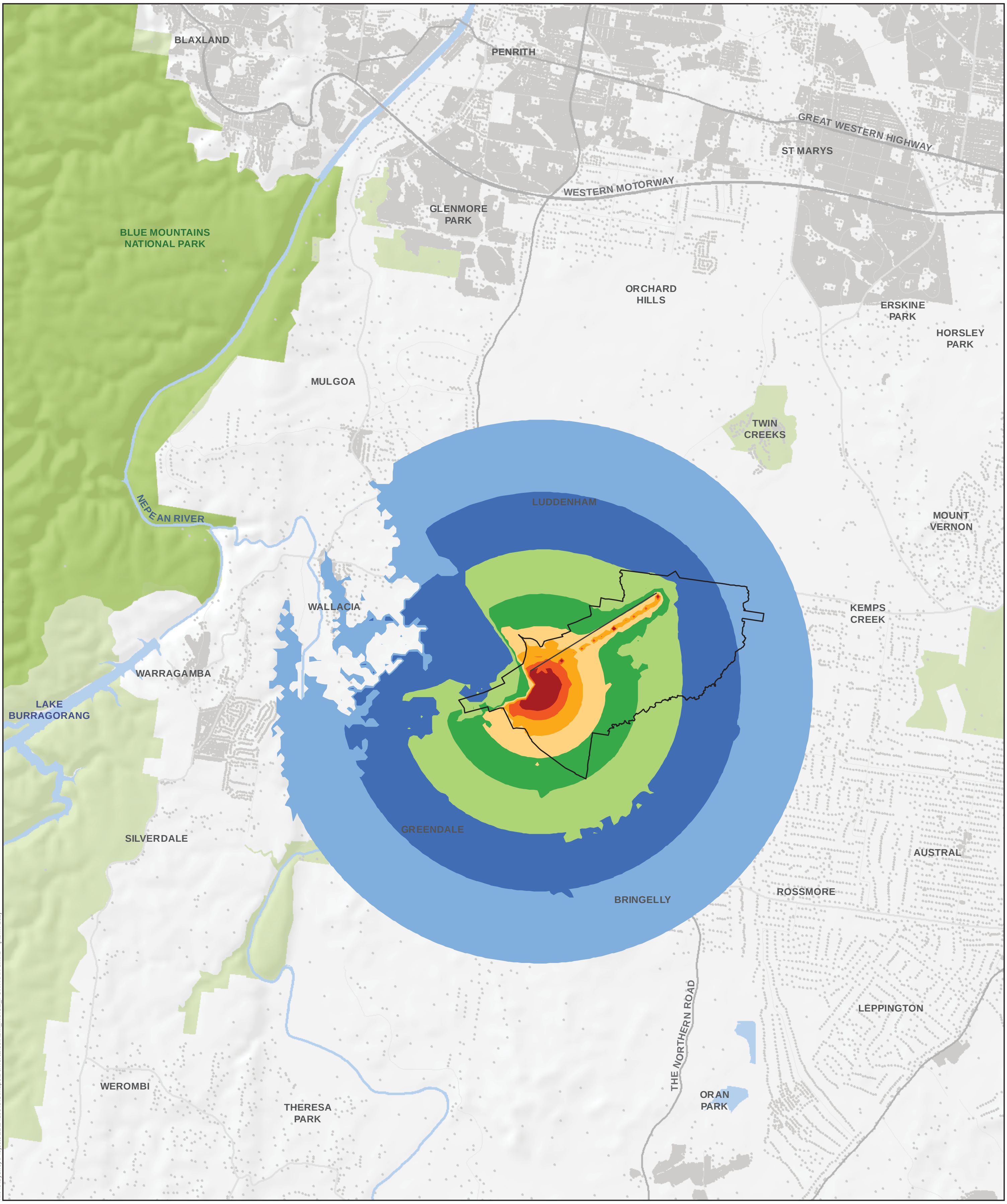
Ground-based noise

Ground-based noise includes noise generated from aircraft taxiing and the ground running of aircraft engines for maintenance testing. Ground-based noise would also include noise associated with the construction of the proposed airport and road traffic associated with the operational airport.

Existing noise sources in the area around the airport site include road traffic noise and industry, reflecting the surrounding land uses. The construction and operation of the proposed airport would introduce new noise sources into the area.

Noise during the construction of the proposed airport would be largely contained within the airport site, although there would be impacts on the Luddenham and Badgerys Creek areas. While heavy and light vehicles would need to access the airport during the construction stage, the increase in traffic noise as a result would not be significant. Vibration generated by construction activities is considered unlikely to cause building damage.

Ground-based operational noise would be generated by aircraft engine run-up and taxiing. The impact of noise from a nominal engine run-up site in the south west of the airport site would extend the furthest from the site boundary, while taxiing would extend over a much smaller area and would primarily affect Luddenham. Noise at these locations may be above the noise criteria adopted for this assessment under worst case meteorological conditions (i.e a ground-based temperature inversion) and depending on existing noise levels in the area at the time. The predicted worst case extent of noise contours (L_{Amax}) associated with engine run up and taxiing are presented in Figure ES 14 and Figure ES 15.



LEGEND

Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

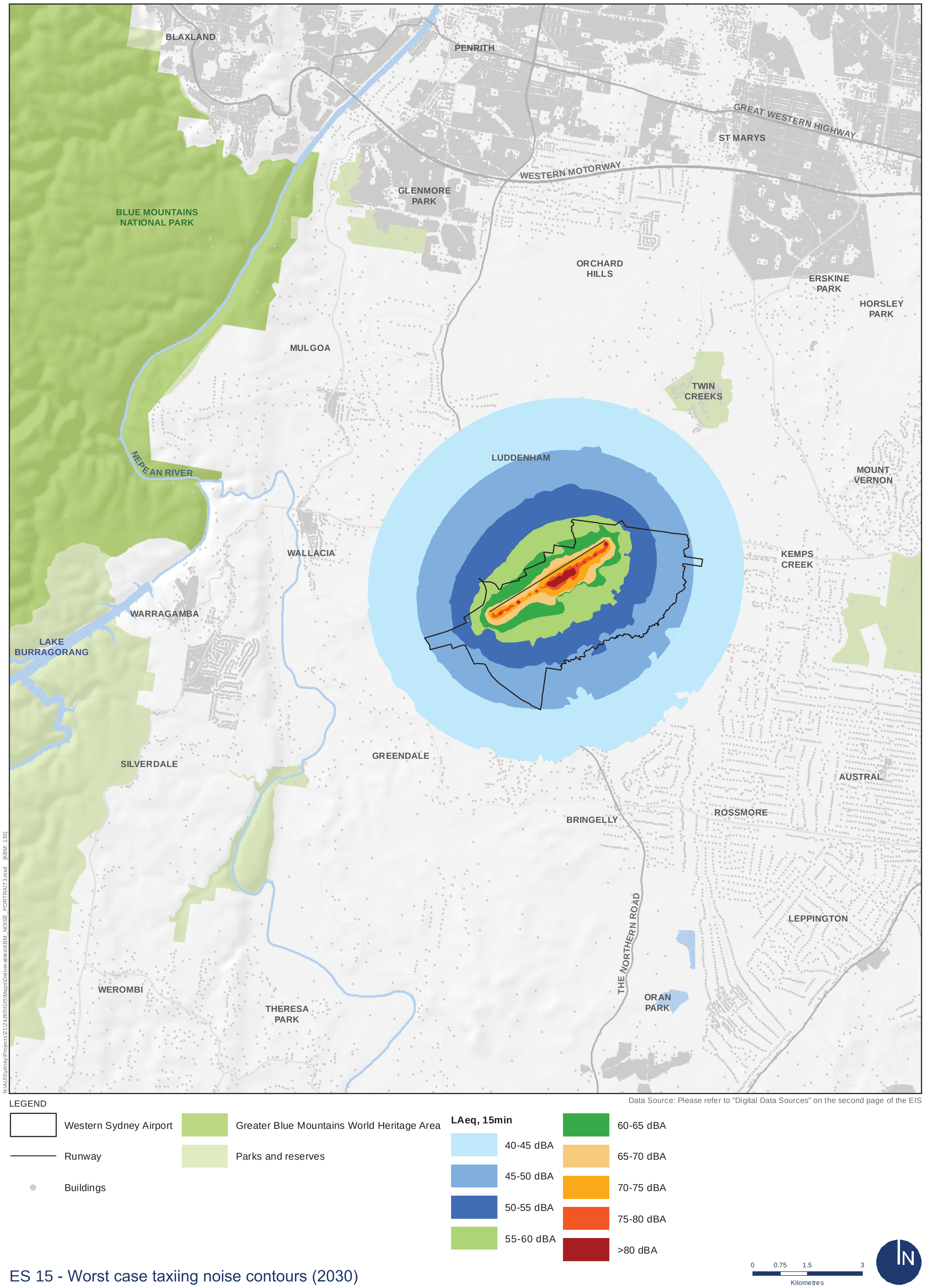
Western Sydney Airport	Greater Blue Mountains World Heritage Area
Runway	Parks and reserves
Buildings	

LAeq, 15min

45-50 dBA	65-70 dBA
50-55 dBA	70-75 dBA
55-60 dBA	75-80 dBA
60-65 dBA	>80 dBA

0 0.75 1.5 3
Kilometres

ES 14 - Worst case engine ground run noise contours (2030)



ES 15 - Worst case taxiing noise contours (2030)

During operation of the proposed airport, noise level increases in the surrounding area due to airport generated road traffic are not expected to be significant.

Mitigation measures have been proposed to address noise during construction and operation of the proposed airport. However, further design work is required to evaluate mitigation measures from the engine run-up facility. Mitigation measures include the implementation of a construction noise and vibration management plan and the development of a strategy to manage ground-based noise during operation.

As noise from the operation of the airport would affect neighbouring communities at levels above the adopted noise assessment criteria further consideration of this impact is required. A ground-based noise amelioration strategy would be developed that identifies reasonable and feasible noise mitigation measures. The strategy would include:

- engagement with occupants of affected residences and other facilities regarding potential noise impacts and amelioration measures;
- a detailed noise amelioration plan that identifies noise criteria for affected residences and other sensitive receivers surrounding the airport site and any reasonable and feasible noise mitigation measures;
- similar to other airports, implementation of aircraft ground running operating procedures including investigations of feasible measures to reduce noise impacts;
- noise modelling to examine the effectiveness of any proposed noise amelioration measures;
- other specific measures to address noise exceedances where physical noise mitigation is ineffective; and
- a noise monitoring plan.

Air quality and greenhouse gases

The air quality and greenhouse gas assessment included a review of climatic data obtained from the airport site and an analysis of ambient air quality from data collected from monitoring stations in the vicinity of the airport site. Air quality impacts associated with the construction of the proposed airport (particularly construction dust) were modelled, as were emissions and air pollution associated with the operation of the proposed airport. Other air quality parameters that were assessed included odour (from aircraft exhaust and the on-site wastewater treatment plant), regional air quality impacts (ozone) and greenhouse gas emissions.

Construction would result in dust emissions generated during both the bulk earthworks and the aviation infrastructure works. The asphalt batching plant would also generate some odour during construction. The results of the air dispersion modelling show that the predicted dust impacts during construction would be below the air quality assessment criteria at all sensitive residential receptors. Levels of odour from the asphalt plant would also be below the relevant criteria at all sensitive residential receptors and would be largely contained within the airport site.

Operation of the proposed Stage 1 development would result in an increase in emissions of nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), sulphur dioxide (SO_2) and air toxics. There would also be odour emissions from exhaust and from the on-site wastewater treatment plant. The highest off-site concentrations of the air quality metrics evaluated were generally predicted to occur at the receptors located to the north and north-east of the proposed airport.

Airport traffic on surrounding road infrastructure was found to be a significant contributor to predicted off-site ground level concentrations, particularly for those receptors located close to proposed roadways. Despite this, there were almost no predicted exceedances of the air quality assessment criteria at any of the sensitive residential receptors investigated as part of the assessment of the Stage 1 development. The exception was the 99.9^{th} percentile one-hour maximum for formaldehyde, which showed one exceedance at an on-site receptor. Predicted off-site odour concentrations were below odour detection limits for both aircraft exhaust emissions and odours from the on-site wastewater treatment plant.

Only marginal ozone impacts would result from the operation of the Stage 1 development. These emissions would be managed using best available techniques and/or emission offsets.

Greenhouse gas emissions from the Stage 1 development have been estimated to comprise 0.13 Mt CO_2-e/annum, with the majority of emissions associated with purchased electricity. The Scope 1 and Scope 2 greenhouse gas emissions estimated from the proposed Stage 1 development would represent approximately 0.10 per cent of Australia's projected 2030 transport-related greenhouse gas emission inventory. For this reason, it can be concluded the greenhouse gas emissions from the proposed airport would not be material in terms of the national inventory.

Mitigation and management measures would be implemented to reduce potential air quality impacts during both construction and operation of the Stage 1 development. In particular, a dust management plan would be developed and implemented to address potential impacts from dust generated during construction. Air quality monitoring would also be undertaken at the airport site during operations. Although greenhouse gas emissions from the proposed airport would not be material in terms of the national inventory, a number of mitigation measures would be implemented during operations to reduce these emissions.

Human health

The health risk assessment considered the risks associated with construction and operation of Stage 1 of the proposed airport on the health of the local community. The assessment focuses on the potential health risks from air, noise, and surface and groundwater pollutant exposure through a comparison with the baseline (existing) situation. These pathways were identified as the likely primary means of potential impact to human health from the development of the proposed airport. The health impact assessment considers impacts from atmospheric particulates, nitrogen dioxide, sulphur dioxide, air toxics (benzene, toluene, xylenes and formaldehydes), diesel, and ozone. Water contaminants considered include petroleum hydrocarbons, heavy metals, polyaromatic hydrocarbons, chlorinated hydrocarbons and perflourinated compounds.

The air quality health risk assessment found that:

- The likely levels of airborne particulates generated by construction would be low overall and within the National Environment Protection Measure (NEPM) Advisory Reporting Standards. The highest concentrations are predicted at Badgerys Creek, Greendale and Rossmore.
- Levels of health risk as a result of exposure to diesel during construction would be within levels considered acceptable by regulatory agencies and the risks from particulate exposure during airport operation would be very low with the highest risk for all-cause mortality and cardiopulmonary mortality between one additional death every 1,000 years and six additional deaths every 100 years.
- Exposure to nitrogen dioxide would be the highest risk category resulting from airport operation, with between six additional deaths every 100 years and six additional deaths every 10 years in people over 30 years of age. If traffic on roads external to the airport is excluded, this risk would reduce to four additional deaths every 10 years.
- Exposure to sulphur dioxide from the airport operations would be very low. The highest risk is for hospital admissions from respiratory causes with approximately three additional admissions per 1,000 years.
- The health risk arising from exposure to carbon monoxide would be negligible. The highest risk is for hospital admissions for cardiovascular disease in people 65 years of age and older with a maximum of five additional hospital admissions in 1,000 years.
- The risk from exposure to benzene during airport operations would result in a very small increase in health risk which is within levels considered acceptable by regulatory agencies.

The noise health risk assessment found that airport operations would lead to an increase in sleep disturbance (assessed as awakenings), increases in risk of cardiovascular disease and delays in childhood learning and cognitive development. These effects are predicted for suburbs close to the airport site, in particular Luddenham. Further work would be undertaken to identify feasible mitigation measures that would reduce these impacts.

While there are potential risks to surface and groundwater resources from construction and operation of the airport site, most of these are not specific to airport developments and a range of standard industry design and precautionary measures would be implemented to reduce these risks. It is considered unlikely that emergency fuel jettisoning would result in impacts to surface water bodies including potable water storages given the rarity of its occurrence and restrictions on where it can be undertaken.

Hazards and risks

A number of hazards and risks may arise from the construction and operation of the proposed airport. These hazards and risks are divided into those associated with airspace operations and those associated with ground-based operations. Hazards and risks associated with airspace operations include bird and bat strike, airspace obstruction, aircraft collisions, adverse meteorology, aircraft crashes and terrorism incidents. Those associated with ground-based operations include fire, flooding, contamination of land and dangerous goods transport. These hazards and risks are not unique to the proposed airport.

Many aspects of the airport design are preliminary and a number of important airspace considerations will only be resolved closer to the commencement of operations. Certification of the aerodrome by the Civil Aviation Safety Authority would be required before operations can commence, as well as implementation of the requirements of the existing regulatory framework. Satisfying these regulatory requirements will necessitate detailed design studies.

Based on the design information currently available, no insurmountable risks associated with the Stage 1 airport development are considered likely. Key issues that need to be finalised prior to the operation of the proposed airport include:

- resolution of aspects of jet fuel storage;
- identification and/or reservation of a pipeline corridor to secure future fuel supply by means other than road transport (in conjunction with NSW Department of Planning and Environment);
- additional bird and bat surveys to confirm the preliminary risk identified;
- completion of a study to identify stack emissions in the proposed airspace; and
- implementation of appropriate development controls on public safety zones outside of Commonwealth owned land.

Before the start of airport operations, a safety review would need to be undertaken in accordance with the requirements of applicable work, health and safety legislation.

Traffic, transport and access

The road network in the vicinity of the airport site is relatively uncongested, with only sections of Narellan Road and Camden Valley Way experiencing congested conditions in peak periods. While there is currently spare capacity on much of the network near the airport site, there is congestion on the broader strategic network including the M4 Motorway, M5 Motorway, M7 Motorway and M31 Hume Highway.

Construction of the Stage 1 development would generate an estimated 1,254 additional vehicle movements per day on the surrounding road network during the construction period. This includes approximately 310 peak hour vehicle movements during both the morning and afternoon peak period. In the context of the broader Western Sydney region, this would not be considered a significant increase. A community engagement program would be implemented during construction, to ensure that the local community and road users are kept informed about construction activities and expected delays, if any. A construction traffic management plan would also be implemented to ensure that construction traffic (including any oversize vehicles) is appropriately managed.

Operation of the Stage 1 development is expected to result in approximately 41,800 vehicles entering and leaving the airport site each day by 2030. With the introduction of the M12 Motorway, this additional traffic is not likely to significantly affect the operation of the surrounding road network but is expected to result in small increases in congestion at The Northern Road/M4 intersection and on Mamre Road.

A significant amount of road improvement works is proposed as part of the Western Sydney Infrastructure Plan in addition to those identified in planning for the Western Sydney Employment Area and South West Priority Growth Area. These are expected to provide sufficient capacity to cater for the expected passenger and employee traffic demand associated with the proposed airport in 2030.

The public transport, walking and cycling systems proposed by the NSW Government and local councils in the region would also have sufficient capacity to cater to the expected airport passenger and employee demand at the proposed airport. Assessment of the long term development considers the need for an extension of the South West Rail Link to the airport site based on increasing demand.

Biodiversity

The airport site comprises gently undulating, low hills on shale and broad flats on alluvium on the Cumberland Plain. It features remnant patches of grassy woodland and narrow corridors of riparian forest within extensive areas of derived grassland, cropland, and cleared and developed land. The condition of native vegetation at the airport site is generally poor and there is moderate to severe weed infestation throughout the site. The main land uses are agriculture and low density rural-residential development. Notwithstanding the generally poor condition of the site, it has high conservation significance as a result of the presence of threatened species and ecological communities and the generally limited extent and quality of similar environments in the Western Sydney region.

Construction of the Stage 1 development would result in the removal of approximately 1,065 hectares of vegetation. The majority of this vegetation consists of exotic grassland and cleared land or cropland, dominated by exotic species and noxious and environmental weeds. About 280 hectares of native vegetation would be removed. The removal of vegetation at the airport site would result in the loss of fauna foraging, breeding, roosting, sheltering and/or dispersal habitat. Construction of the Stage 1 development would also result in indirect impacts on terrestrial and aquatic flora and fauna, including impacts associated with increased fragmentation, altered hydrology, erosion and sedimentation, dust, light, noise and vibration. Indirect impacts may also include fauna displacement, injury and mortality.

Operation of the proposed airport would pose a risk of fauna strike from contact with aircraft and ground transportation vehicles. Indirect impacts may include those associated with light, noise and vibration and the introduction of exotic species.

The Stage 1 development would affect threatened species, populations and ecological communities listed under both the EPBC Act and the *Threatened Species Conservation Act 1995* (TSC Act). Assessments of significance have been prepared for matters of national environmental significance protected under the EPBC Act in accordance with significant impact guidelines prescribed by the EPBC Act. The outcome of these assessments is that the Stage 1 development is likely to have a significant impact on Cumberland Plain Woodland, the Grey-headed Flying-fox and other plants and animals (including a number of species and populations listed as threatened under the TSC Act) in an area of Commonwealth land.

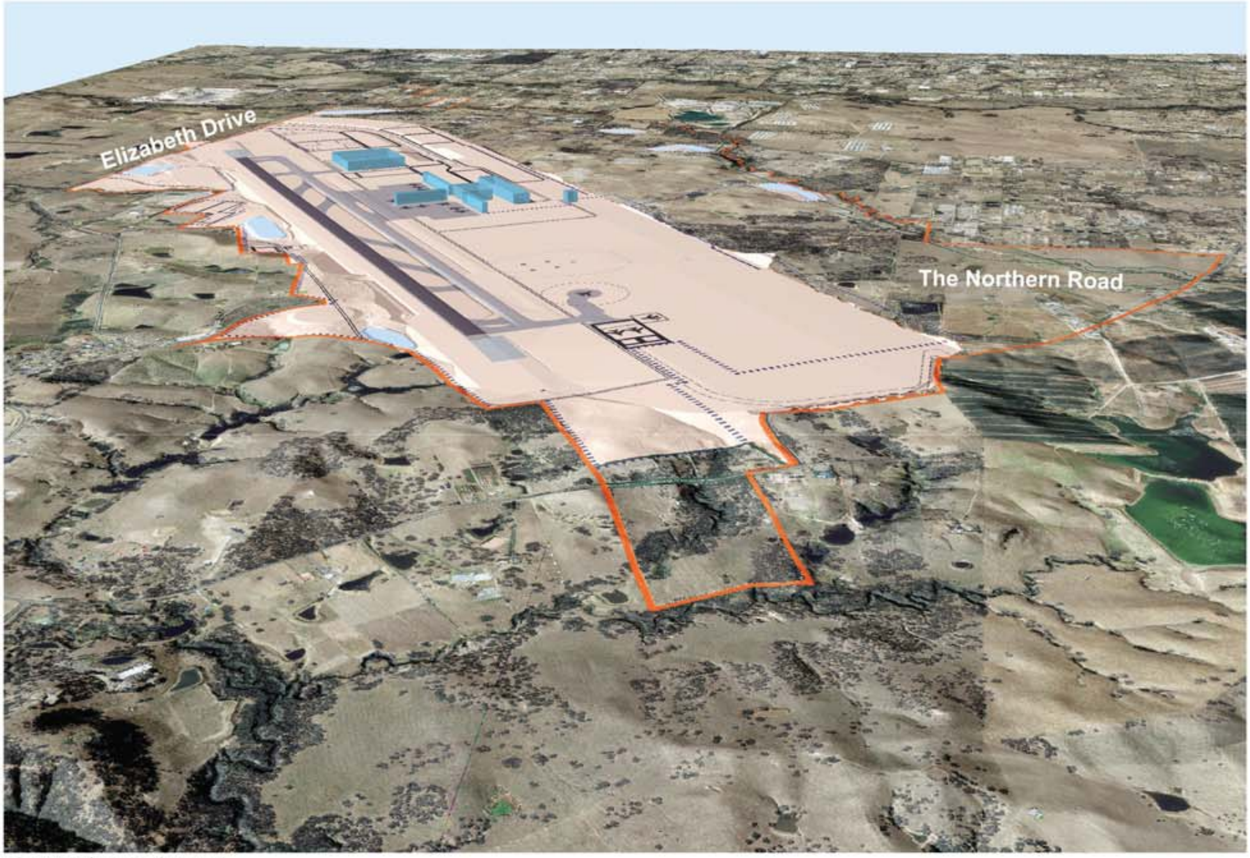
Mitigation and management measures would be implemented to reduce the potential impacts on biodiversity. These measures would include staged vegetation removal during construction, pre-clearing surveys and plans for the salvage of fauna and habitat resources, translocation programmes for threatened flora and fauna species/populations, and designing the airport to minimise its attractiveness to fauna in order to minimise bird, bat and terrestrial fauna strike. In addition, an environmental conservation zone would be established along the southern perimeter of the airport site where approximately 122 hectares of land would be protected.

Biodiversity offsets are required to compensate for significant residual impacts arising from the proposed airport. An offset package has been prepared to compensate for the removal of about 90.8 hectares of Cumberland Plain Woodland, the removal of about 120.6 hectares of foraging habitat for the Grey-headed Flying-fox, and other features of the natural environment including plant populations, fauna populations and several species and communities listed under NSW legislation. The offset package is intended to conserve habitat for the affected threatened biota in suitable offset sites in the surrounding region in perpetuity.

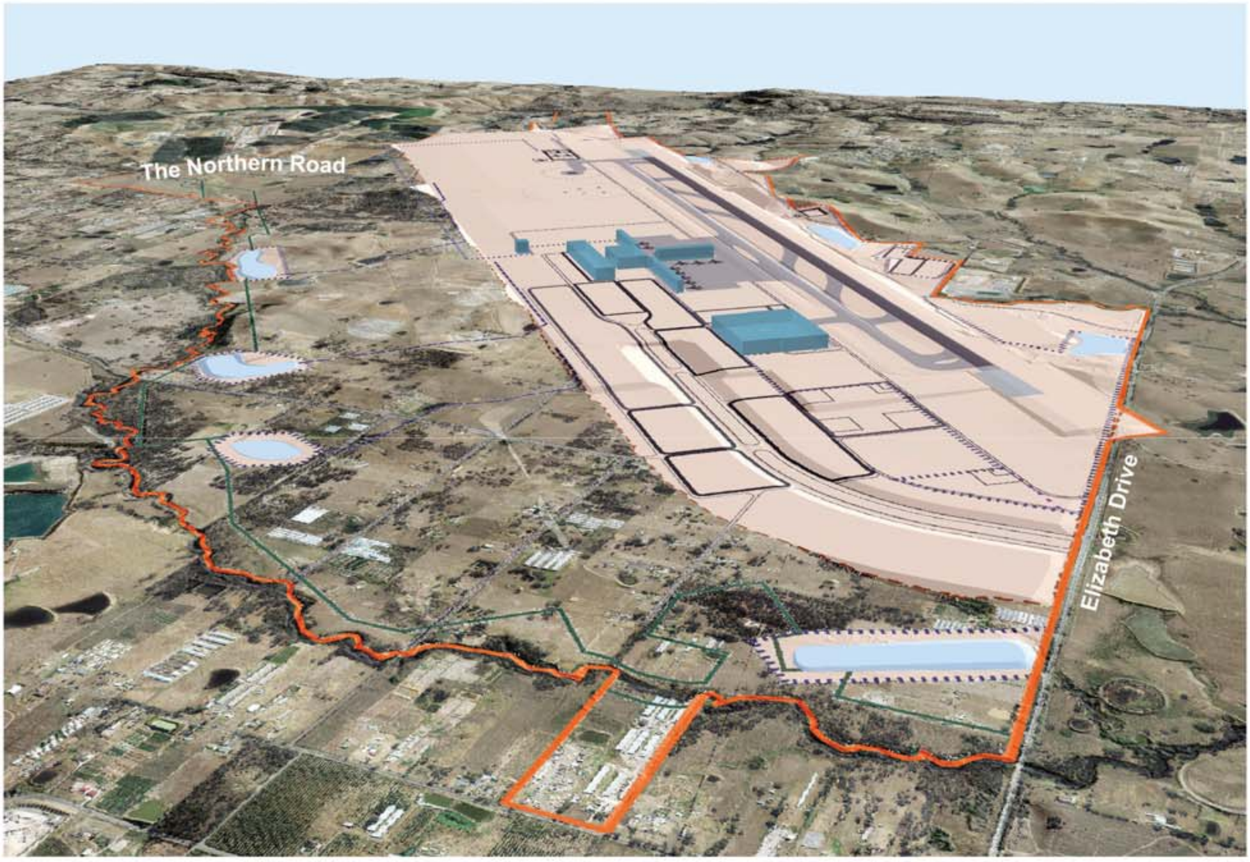
Topography, geology and soils

Soils at the airport site are primarily firm residual clays with areas of alluvial gravels, sands, silts and clays associated with Badgerys Creek.

A major bulk earthworks programme would be carried out for the construction of the Stage 1 development. The programme would essentially involve the redistribution of about 22 million cubic metres of soil across a construction impact zone covering about 60 per cent of the airport site, to achieve a level surface suitable for the construction of airport facilities. The modified landform and Stage 1 layout is presented in Figure ES 16.



view to the north-east



view to the south-west

Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

LEGEND

- Airport site
- Terminal buildings and support facilities
- Runways
- Taxiways and aprons
- Detention Ponds
- Landscape area

Figure ES16 Indicative Stage 1 Landform

Construction and operation would also involve the controlled storage, treatment and handling of fuel, sewage and other chemicals with the potential to contaminate land.

Measures including erosion control structures, sediment basins and stockpile management are required to mitigate and manage potential soil erosion and degradation associated with such a large earthworks operation. Fuel and other chemicals would be stored and handled in accordance with relevant standards and regulations, minimising the potential for contamination to occur.

Previous activities at the airport site including agriculture, light commercial and building demolition mean there is potential for contaminated land to be present. Any contamination discovered during construction would be managed and mitigated to make the land suitable for its intended use and to prevent impacts on human health and the environment.

The potential impacts of the operation of the airport are typical of a large-scale infrastructure project and would be managed with the implementation of stormwater, erosion and dust controls and adherence to industry standards for the storage and handling of chemicals. Sewage would be treated and irrigated in accordance with an irrigation scheme that maintains the receiving soil in a stable and productive state.

Surface water and groundwater

The airport site contains about 64 kilometres of mapped watercourses and drainage lines (notably Badgerys Creek, Cosgroves Creek and Duncans Creek) and overlies the Bringelly Shale aquifer as well as unconfined areas of alluvial groundwater. Water quality sampling indicates that existing water quality is relatively degraded, with high levels of phosphorous and nitrogen in surface water attributable to land uses at the proposed airport site and within the broader catchment.

Site preparation and construction of the Stage 1 development would transform the airport site from a rolling grassy and vegetated landscape to an essentially built environment with some landscaping. These changes would alter the catchment areas within the airport site and the permeability of the ground surface, which would in turn alter the duration, volume and velocity of surface water flow.

Water would be utilised during construction for soil conditioning and dust suppression. Water supply options include water reticulated to the site from existing major utilities and extraction from existing surface water resources.

The design of the Stage 1 development includes a drainage system to control the flow of surface water and improve the quality of water before it is released back into the environment. This drainage system comprises a series of channels and basins to collect and treat flows prior to release to receiving waters. The assessment indicates that this system would be generally effective at mitigating flooding and water quality impacts.

The transformation of the airport site would alter groundwater levels and recharge conditions through an increase in impervious surfaces. Bulk earthworks and excavations at the airport site would also receive some groundwater inflows, which would require management during construction and operation. Impacts on groundwater levels, including impacts on dependent vegetation or watercourses, would be unlikely to be significant given the existing low hydraulic conductivity and water quality of the Bringelly Shale aquifer. Registered bores surrounding the airport site are understood to target the Hawkesbury Sandstone aquifer, which is significantly deeper than the Bringelly Shale aquifer and not considered to be connected. As such, impacts on groundwater users are not expected.

The identified impacts would likely be further reduced during detailed design of the surface water drainage system. Baseline and ongoing monitoring of surface water and groundwater would be undertaken to characterise any residual impacts and prompt corrective action where necessary.

Aboriginal heritage

Since the early 1800s, land use at the airport site has consisted of varying phases of stock grazing, cropping, orcharding, dairying, market gardening, poultry farming and some light industrial functions. Consequently, most of the original native vegetation has been cleared and the airport site is now dominated by agricultural grasslands or cultivated fields with small pockets of open eucalypt woodland or shrubland. These activities are expected to have had a substantial impact on the Aboriginal archaeological resource, especially in the top soil and the plough zone at the airport site.

The airport site has been the subject of a number of previous archaeological assessments as part of the search for an appropriate site for a second Sydney airport. These previous assessments date back to 1978, with the most recent being undertaken in 2014. Fifty-one Aboriginal heritage sites have been recorded during these surveys, consisting of surface artefact occurrences and a modified tree. Twenty-three additional sites were recorded at the airport site during the course of the current assessment, which focused on test excavation and characterising the sub-surface archaeological resource. The new recordings comprised nine sites with surface artefacts (including a grinding groove site) and 14 sites where subsurface artefacts were confirmed through test pit excavations.

The test excavation programme included a representative sample of landform types and zones within the airport site. It was determined that a relatively high average artefact incidence occurred across valley floors, basal slopes, first-order spurlines and within 100 metres of second, third and fourth order streams. These findings are generally consistent with numerous other investigations in the vicinity of the airport site that have confirmed that Aboriginal heritage sites occur widely across the landscape, but particularly on elevated level ground and slopes within relative proximity of a water source. These investigations also indicate that larger sites with higher artefact densities are more likely to be found near permanent water.

Aboriginal stakeholder consultation undertaken for this draft EIS identified the airport site as a place of cultural significance and continuing cultural connection. The reasons for this include the site’s material evidence of occupation, its cultural landscape values, and culturally significant plants, animals and resources. All of these contribute to a sense of place and cultural identity, and are considered to be a valuable educational resource.

In addition, the remaining Aboriginal sites across the Sydney hinterlands may be considered to have an intrinsic value because of their endurance amid concerns about disappearing heritage; the cumulative impacts on Aboriginal heritage sites caused by continuing urban and industrial development of the Cumberland Plain effectively impose a greater significance on those sites that remain.

All of the Aboriginal heritage sites recorded at the airport site are considered to have significance. Many sites contain archaeological material which has both cultural and scientific value, and all sites, irrespective of their scientific or other values, are considered to be culturally significant by the Aboriginal community The predicted archaeological resource of the airport site, as revealed by the test excavation programme, is also assessed to be significant.

Construction of the proposed Stage 1 development would affect at least 39 sites recorded at the airport site, all of which comprise artefact occurrences. Construction activities would also affect approximately 500 hectares of archaeologically sensitive landforms. Impacts during operation of the proposed airport would be limited to indirect impacts on adjacent and nearby sites. The heritage values of these sites are unlikely to be vulnerable to indirect impacts such as loss of context. Consequently, the operational impacts of the proposed Stage 1 development would be low.

Mitigation and management measures would be implemented to minimise the impacts on Aboriginal cultural heritage. These measures would include the conservation of heritage sites in situ, recording of heritage sites and salvage of heritage items, the commemoration of cultural heritage values at the airport site, curation and repatriation of heritage items and protocols for the discovery of artefacts and human remains.

European heritage

A total of 19 European heritage items have been recorded at the airport site and an additional 22 heritage items have been recorded in the surrounding area. The identified European heritage items reflect the historical context of the airport site and European settlement more generally, including early attempts to develop local agricultural and pastoral economies and the emergence of settled village communities.

Site preparation activities would take place before construction of the Stage 1 development. These activities would require the removal of European heritage items from the airport site, which would preclude the in situ preservation of heritage items. Impacts during operation of the proposed airport would be limited to indirect impacts on nearby sites. Indirect impacts of construction and operation on European heritage items surrounding the airport site would include altered landscapes, views and ambience. These impacts are not expected to be significant and would not require implementation of management and mitigation measures.

Mitigation and management measures would be implemented to minimise the impacts on European cultural heritage. These measures would include further archaeological investigations, archival recording, creating an inventory of moveable items, cultural planting investigations, potentially relocating structures and relocating remains located in grave sites and the staged demolition of structures.

Heritage awareness training would be provided to all workers involved in site preparation and construction of the proposed airport. This would include training in the procedure to be followed if European heritage items are discovered during site preparation or construction. The potential presence of unmarked graves at the airport site also necessitates a procedure for the discovery of human remains. These procedures would have regard to the relevant legislation and guidelines.

The preparation of an oral history would be considered as a measure to preserve the heritage value of the airport site. The heritage value of the airport site would also be reflected through the detailed design of the proposed airport.

Planning and land use

To enable the development of the proposed airport, existing rural residential, agricultural, recreational, community and extractive industry land uses on the airport site would be removed. Surrounding land uses could be expected to transition from rural to urban both as a result of airport operations, and as strategic land use planning under the Western Sydney Employment Area and the South West Priority Growth Area takes effect. Infrastructure improvements to main roads and railways would also facilitate land use change in the region.

Measures to manage land use and planning impacts are proposed, including mitigation measures for employment land use conflict, zoning rationalisation, operational airspace controls, aircraft noise and infrastructure corridor protection. The successful implementation of these measures would lead to the airport and its surrounds becoming a focus for employment generating land uses in Western Sydney, creating jobs for the new residents of the South West Priority Growth Area and Greater Western Sydney.

Landscape and visual amenity

The airport site and surrounds are typified by gently undulating landform within a highly modified landscape. The overall landscape character is open and rural with expansive views possible from surrounding hill tops and higher elevations to the west. The area’s character is also defined by cleared pastureland, and large lot residences (both single and double storey) set back from the road network. Patches of remnant vegetation exist within the airport site, particularly along creek lines, road edges and near farm dams.

The construction of the proposed airport is likely to have temporary visual impacts for the nearest sensitive receivers in Luddenham and Bringelly. This would be largely due to the visibility of earthworks and the presence of construction plant, equipment, stockpiling areas and storage areas. Viewpoints that are further away would have more restricted views of the airport site and would, therefore, be less affected.

During operation, the potential for moderate to high visual impacts as a result of overflights have been identified for Luddenham and Mount Vernon, and also along Elizabeth Drive and Lawson Road. Lower level impacts as a result of overflights were identified for areas to the south of the airport site including along Silverdale Road and Dwyer Road, and within Bents Basin State Conservation Area. Operational lighting is likely to have low impacts on sensitive receivers due to topography, existing vegetation, building design, lighting design and runway configuration.

Mitigation measures are proposed to minimise visual impacts during construction and operation. These include design measures as well as investigating opportunities for retention of existing vegetation and revegetation in suitable areas.

Social

The Western Sydney region is diverse, with densely populated and highly urbanised areas, to semi-rural and recreational/natural areas. Many areas of the region are culturally diverse, with strong heritage values (both Aboriginal and European), cohesive communities, natural and recreational values, and connections to the employment hubs of Parramatta and Sydney Central Business Districts.

The major employment, residential and transport infrastructure projects proposed for Western Sydney demonstrate the critical role of the region in Sydney's future. These projects will support the proposed airport, which is recognised as a significant catalyst for increased and faster growth for Western Sydney, and for Greater Sydney more broadly. These projects, along with the proposed airport, have the potential to bring significant change to the people and the economy of Western Sydney.

Economic

The construction and operation of the Stage 1 development is expected to have significant benefits for the economy of Western Sydney and the broader Sydney region as a whole. During the busiest periods of construction, up to 758 full-time equivalent jobs are expected on the airport site. Based on this number, the multiplier effect is expected to generate a further 520 jobs per year across the rest of the Sydney region. In terms of value add, an estimated total direct and indirect economic contribution of $1.9 billion is expected to be generated during the construction period, with a further $400 million generated across the rest of Sydney.

Once the proposed airport is operational, Western Sydney is expected to experience an increase in employment driven by improved access to workers and other businesses. Manufacturing and consumer service sectors would see the largest changes due to improved accessibility. These benefits will increase significantly as the airport develops in the decades ahead.

There is expected to be a significant increase in population near the airport site of up to nine per cent due to an increase in employment opportunities. However there would be some negative economic impacts in the immediate vicinity of the airport site due to a combination of the airport development and the changing land uses. The expected population increases would be likely to reduce with distance from the airport site.

Resources and waste

Construction of the proposed airport would involve clearing and a major bulk earthworks programme to achieve a level surface suitable for the construction of airport facilities, along with the use of a range of construction materials. As with any large infrastructure project, the construction and operation of the proposed airport would involve the consumption of natural resources and has the potential to generate substantial quantities of waste.

The peak for waste generation would be during construction, when an estimated 202,500 tonnes of waste vegetation and construction materials such as concrete and timber would be generated. During the initial airport operations, an estimated 5,251 tonnes of waste would be generated each year, and would include general waste, food, packaging waste from terminals and waste oils, paints and cleaners from maintenance activities.

Resources and waste from the airport would be sustainably managed by maximising waste avoidance, reduction, reuse and recycling (in accordance with a waste management hierarchy), while mitigating and managing impacts on human health and the environment. A waste management plan would be prepared prior to construction and operation of the airport, which would guide the management of waste during construction and operation.

The waste management market in Western Sydney is mature and handles significant volumes of waste from various domestic, commercial and industrial sources across all of Sydney. Waste facilities in Western Sydney have sufficient capacity to handle wastes of the type and volume expected to be generated at the airport site.

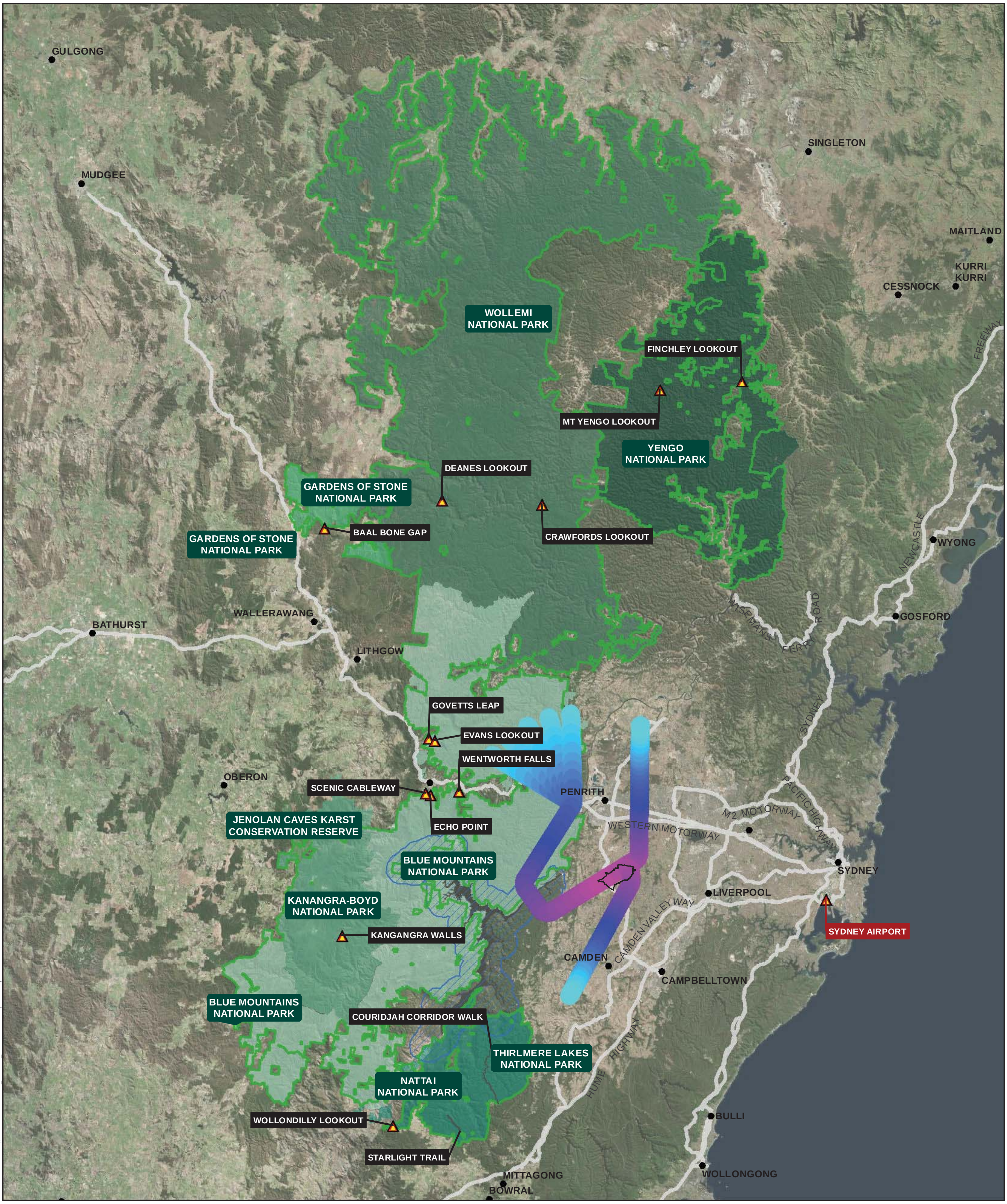
Greater Blue Mountains

The Greater Blue Mountains World Heritage Area (GBMWHA) covers 1.03 million hectares of sandstone plateaus, escarpments and gorges dominated by temperate eucalypt forest. The site constitutes one of the largest and most intact tracts of protected bushland in Australia and is noted for its representation of the evolutionary adaption and diversification of the eucalypts in post-Gondwana isolation on the Australian continent.

The Greater Blue Mountains Area was inscribed on the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage List because it satisfies two of the criteria for natural values of outstanding universal value, including representative examples of the evolution of Eucalyptus species (Criterion ix) and diversity of habitats and plant communities (Criterion x). In addition to the features recognised by the World Heritage Committee as having World Heritage value, the GBMWHA has a number of other important values, which complement and interact with the World Heritage values of the area including recreation, tourism, wilderness, scenic and aesthetic values.

Potential impacts arising from the proposed airport to the World Heritage values and other values of the Greater Blue Mountains Area were assessed against the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (DoE 2013a). The boundary of the GBMWHA is approximately eight kilometres from the proposed airport at its closest point. Site specific direct impacts associated with the construction of the airport are not expected to influence the values of the GBMWHA. A number of indirect operational impacts on the GBMWHA are expected in relation to noise, regional air emissions and visual impact from the overflight of aircraft.

Almost all flights would be at an altitude greater than 5,000 feet and most would be more than 10,000 feet above sea level when passing over the GBMWHA (Figure ES 17 and Figure ES 18). No flights are expected to occur below 6,000 feet above ground level in the vicinity of identified sensitive areas. At these altitudes, aircraft are likely to be difficult to discern from ground level and are not considered to be visually obtrusive. Indicative flight tracks at altitudes of less than 5,000 feet in 2030 are limited to Warragamba and the eastern boundary of the Blue Mountains National Park, which would experience 50 to 100 flights per day.



LEGEND

Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

Airport site

Greater Blue Mountains World Heritage Area

Drinking Water Catchment – No Entry Area

Flight track altitude below 10,000 feet

10,000 ft

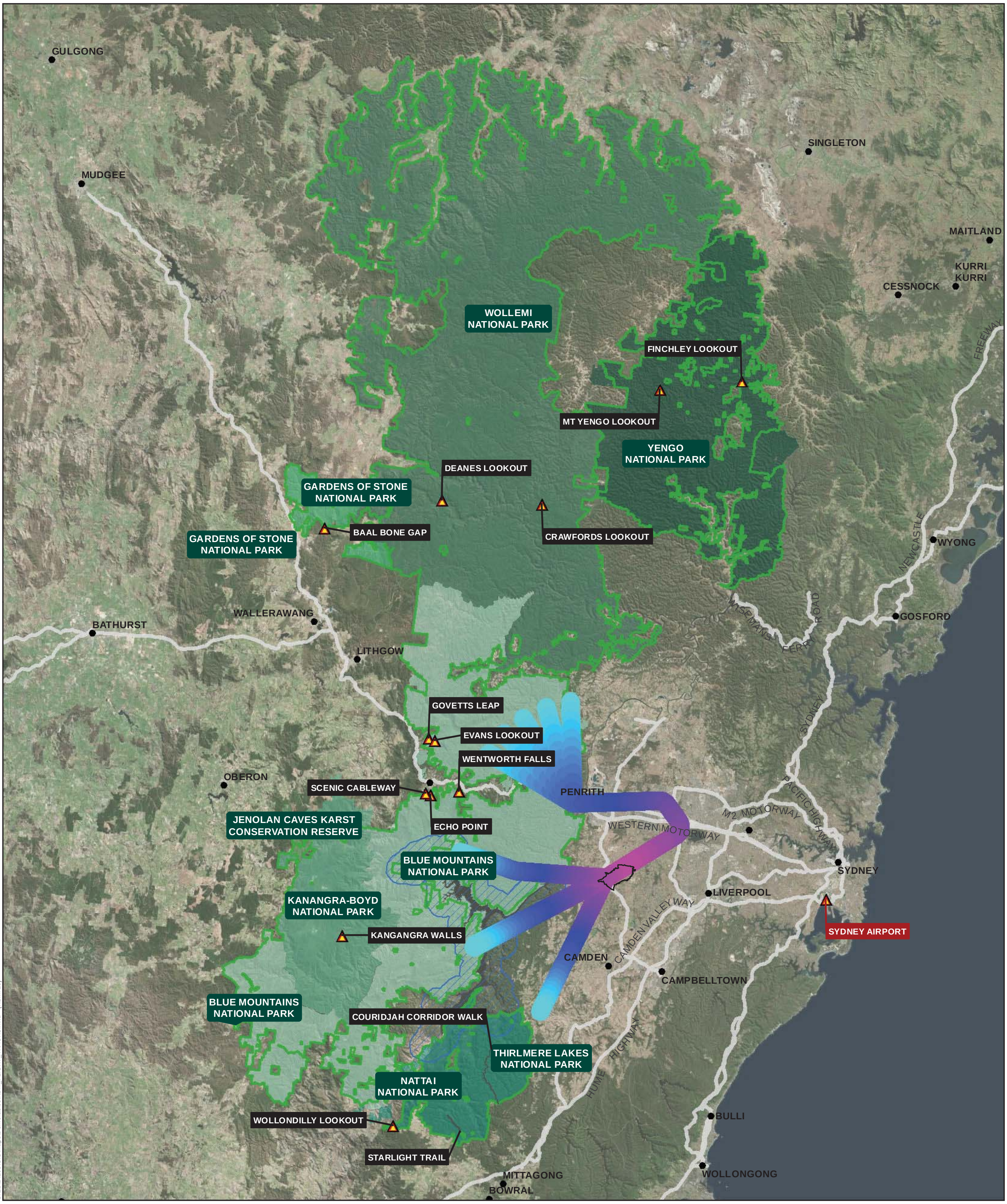
5,000 ft

0 ft

ES 17 - Flight track altitude below 10,000 feet above sea level, prefer 05 single runway

0 5 10 20

Kilometres



LEGEND

Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

- Airport site
- Greater Blue Mountains World Heritage Area
- Drinking Water Catchment – No Entry Area

Flight track altitude below 10,000 feet

10,000 ft

5,000 ft

0 ft

0 5 10 20

Kilometres

ES 18 - Flight track altitude below 10,000 feet above sea level, prefer 23 single runway

Generally across the GBMWHA, minimal incursion of noise levels above 55 dBA would occur. Echo Point at Katoomba would not experience impacts from increased noise levels, and the majority of other sensitive areas are predicted to be affected only during the infrequent operation (predicted to be once every two days) of the Boeing 747 (or equivalent).

Emergency fuel jettisoning is very unlikely to have any impact on the GBMWHA due to the rarity of these events, the inability of many aircraft such as the Boeing 737 and A320 to perform fuel jettisons, the rapid vaporisation and wide dispersion of jettisoned fuel and the strict guidelines on fuel jettisoning altitudes and locations.

Mitigation and management of potential noise impacts would be achieved through the implementation of flight planning and airspace design. The measures would include requirements regarding flight paths, altitude and operational parameters for different aircraft. The potential noise and amenity impacts from aircraft flying over wilderness areas of the GBMWHA, and Aboriginal sites promoted for public visitation, would be considered in the future development of formal flight paths for the proposed airport by Airservices Australia, subject to requirements for safe and efficient aircraft operations. In terms of the indirect impacts from aircraft operations, the proposed airport would not have a significant impact upon the GBMWHA.

The proposed airport would not result in attributes of the World Heritage Area being lost, degraded or damaged, or notably altered, modified, obscured or diminished.

Long term airport strategic environmental assessment

A strategic level assessment of the long term development of the proposed airport is provided in Volume 3 of the draft EIS. The strategic level assessment recognises the uncertainty in predicting impacts that may occur up to 50 years into the future, and the additional approval and consultation requirements for all future development. The assessment approach provides flexibility in the master planning process for the airport site to allow land use changes, technological improvements and changes in operational practices to be reflected in future development scenarios.

The focus of the assessment for the indicative long term development centres on potential impacts of the expanded operations on the amenity of the surrounding community.

The key issues considered as part of the assessment of the long term operation of the proposed airport include noise, air quality, human health, traffic and transport, landscape and visual amenity, and socio-economic impacts. Direct physical impacts are also discussed, including those associated with biodiversity, water resources, heritage and planning and land use.

The key long term environmental impacts are summarised below.

Noise

It is recognised that aircraft noise is one of the most sensitive issues associated with the development of the proposed airport and an increase in air traffic movements beyond the Stage 1 development have the potential to increase the level of noise disturbance to the surrounding community. Taking this into account, aircraft noise impacts were considered for a 2050 scenario in which the single runway is operating close to capacity and for a long term scenario around 2063 in which the airport layout incorporates two runways.

Assessment of the noise impacts associated with the long term development of the proposed airport considered aircraft noise and ground-based noise.

For the loudest aircraft operations (long-range departures by Boeing 747 aircraft or equivalent), maximum noise levels over 85 dBA would be experienced at residential locations close to the airport site, in the area of Badgerys Creek. Maximum noise levels of 75 to 80 dBA would be expected within built-up areas in St Marys and Erskine Park under these worst case operating conditions. Maximum noise levels due to more common aircraft types such as the Airbus A320 or equivalent are predicted to be 60 to 70 dBA in built-up areas around St Marys and Erskine Park, and above 70 dBA in some adjacent areas to the south-west of the airport site, notably the area of Greendale.

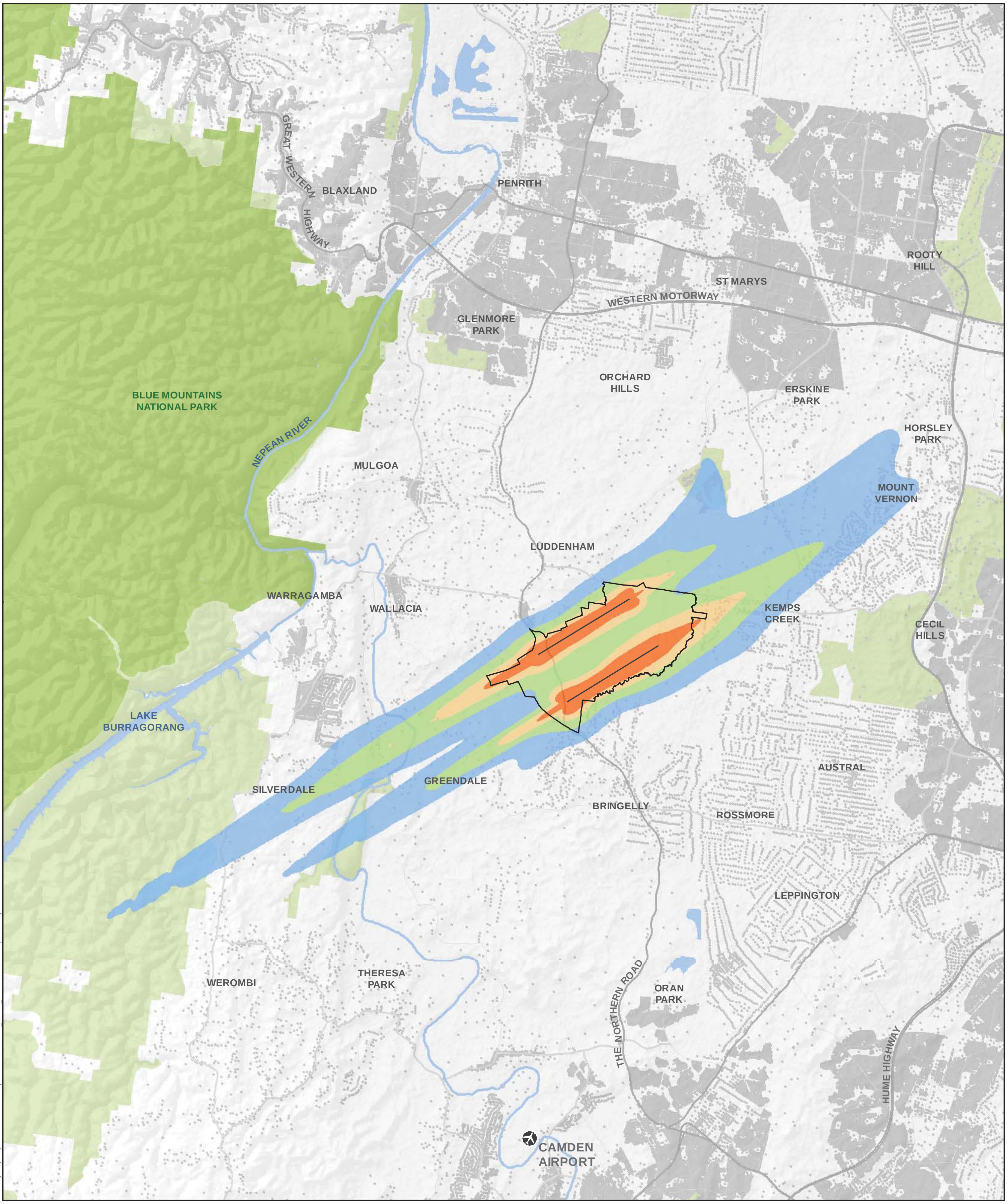
The extent to which particular areas would be potentially exposed to aircraft noise would be strongly influenced by the airport operating strategies especially when operating a single runway at maximum capacity. In terms of total population, the 'Prefer 05' operating strategy (which gives preference to approaches and departures in a south-west to north-east direction) is predicted to have substantially more impact on existing residential areas than the 'Prefer 23' operating strategy, in which the opposite direction is preferred. Most residents that would be affected under the 'Prefer 05' strategy are in suburbs to the north of the airport site, including St Marys and Erskine Park. Predominantly rural-residential areas to the south-west, including Greendale and parts of Silverdale would be affected under the 'Prefer 23' strategy. Adoption of 'Head to Head' operations would also slightly reduce the number of residents affected.

For night-time operations in 2050, the operating strategy with least impact is 'Prefer 23 with Head-to-Head'. Other operating strategies are predicted to result in substantially greater numbers of residents being affected by night-time noise, and in particular, a 'Prefer 05' strategy would result in large parts of St Marys experiencing more than 20 aircraft noise events per night above 60 dBA.

The operating strategies would have less influence following the implementation of operations on the second runway. Despite the forecast number of movements at the airport approximately doubling between 2050 and 2063, there are fewer densely populated areas currently located within the noise affected areas, particularly for the Prefer 05 operating strategy. The reason is that movements can be spread between two runways and the locations of flight paths are less constrained in the two runway scenario. The continuation of existing planning controls will limit the potential for new residential development to be impacted by a progressive increase in usage of the airport. The modelled 2063 ANEC contours for the long term development are shown on Figure ES 19 and Figure ES 20 and are generally comparable to the 1985 ANEC with slight extensions to the north and the south-west. These differences primarily reflect revised modelling assumptions including updated forecasts for the number of aircraft movements, new indicative flight paths and changes in the assignment of aircraft to particular flight paths.

The existing planning controls based on the 1985 ANEC contours have restricted development within the majority of the land area covered by the modelled 2063 ANEC contours.

Approaches to mitigating aircraft overflight and runway noise would generally focus on reducing noise emissions from the aircraft themselves, adjusting flight paths and airport operating modes, and developing land use planning or other controls to ensure that future noise-sensitive uses are not located in noise-affected areas.



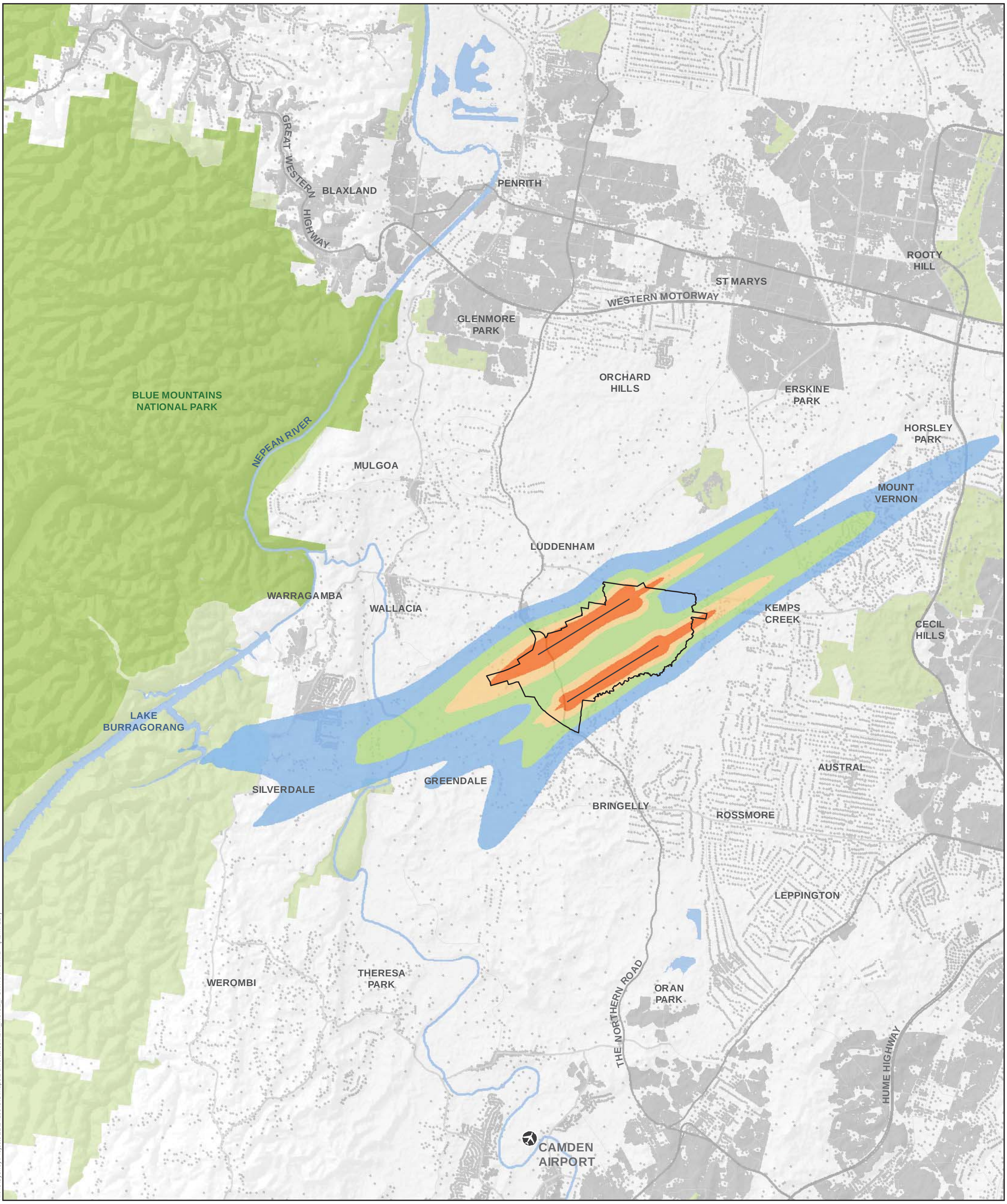
Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

LEGEND

Western Sydney Airport	Greater Blue Mountains World Heritage Area	ANEC = 20-25
Runway	Parks and reserves	ANEC = 25-30
Airfields		ANEC = 30-35
Buildings		ANEC = 35+

0 1 2 4
Kilometres

ES 19 - ANEC contours for Prefer 05 operating strategy (2063)



LEGEND

Western Sydney Airport	Greater Blue Mountains World Heritage Area	ANEC = 20-25
Runway	Parks and reserves	ANEC = 25-30
Airfields		ANEC = 30-35
Buildings		ANEC = 35+

Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

ES 20 - ANEC contours for Prefer 23 operating strategy (2063)

Air quality

Operation of the long term development would result in an increase in emissions of nitrogen dioxide, PM_{10}, $PM_{2.5}$, carbon monoxide, sulfur dioxide and air toxics. Given the uncertainty regarding the future reduction in ground vehicle and aircraft engine emissions, and the anticipated general reduction in background emissions over time, ground level concentration predictions were assessed only for the key criteria pollutants (nitrogen dioxide, PM_{10}, and $PM_{2.5}$) for the long term development. Several exceedances were predicted at sensitive receptors for these indicators.

There would be measurable ozone impacts from the operation of the long term development. These emissions can only be managed through the use of best available techniques and/or emission offsets. Ongoing improvements in aircraft technology would continue to improve emissions from aircraft.

Actual air emissions from the operating long term development may be lower than predicted given the use of electric gates (instead of auxiliary power units), increased use and optimisation of proposed rail connections (instead of motor vehicles) and progressive improvements in aircraft technology.

Traffic

The long term development is expected to result in around 85,000 additional vehicle trips each day. These additional trips would be generated in the context of substantial urban growth forecasts for Western Sydney. Airport-generated travel and the substantial forecast development growth in Western Sydney would significantly increase demand on roads and public transport. Additional transport infrastructure, including an extension to the South West Rail Link or other direct rail link, would be needed to address this demand.

Visual

Future development of the areas surrounding the airport site, under provisions of the Western Sydney Employment Area and the South West Priority Growth Area, would lead to a significant transition from an environment that is predominantly rural in character to one that has a more urban form. In general terms, this is expected to reduce the visual impact of the proposed airport development, including night-time lighting effects, as the proposed airport is integrated into the changing urban visual character of the area.

Conclusions

The proposed airport would be developed on Commonwealth-owned land at Badgerys Creek in Western Sydney and would cater for ongoing growth in demand for air travel, servicing both domestic and international markets.

Development of the proposed airport would be a catalyst for investment and job creation in the region by accelerating the delivery of important infrastructure and the release of employment and housing land, and providing a long term and diverse source of local jobs and economic activity. Additionally, the proposed airport would improve access to aviation services for the growing population of Western Sydney.

A draft Airport Plan has been developed to provide the strategic direction for development of the proposed airport, forming the basis of the authorisation for the project under the Airports Act. The draft Airport Plan includes a specific proposal for Stage 1 to establish the proposed airport with a single 3,700 metre runway on a north-east/south-west orientation and aviation support facilities to provide an operational capacity of 10 million annual passengers as well as freight traffic.

This draft EIS has been prepared in accordance with Part 3 of the EPBC and the Department of the Environment guidelines for the assessment of the airport proposal (EPBC 2014/7391).

Based on the findings of the environmental investigations undertaken to inform this draft EIS, the proposed airport would result in some adverse impacts on the environment and the community. Mitigation measures have been proposed including the need for further design, both for the airport site and airspace operations, to reduce these potential impacts during construction and operation.

The environmental performance of the proposal would be managed through the implementation of environmental management plans and monitoring programmes. This would aid in ensuring compliance with relevant legislation and any conditions set out in the Airport Plan.

PART A:

Project Background

1. Introduction

1.1 Overview

On 15 April 2014 the Australian Government announced that Commonwealth-owned land at Badgerys Creek would be the site for a Western Sydney airport. The proposed airport would cater for ongoing growth in demand for air travel, particularly in the rapidly expanding Western Sydney region. The airport site was selected following extensive studies completed over a number of decades and culminating in the release of the *Joint Study on Aviation Capacity in the Sydney Region* (Department of Infrastructure and Transport 2012), referred to as the 'Joint Study' in March 2012 and *A Study of Wilton and RAAF Base Richmond for Civil Aviation Operations* (DIRD 2013) in April 2013.

The proposed airport is planned to be operational by the mid-2020s. It would service both domestic and international markets and development will be staged in response to ongoing growth in aviation demand. A draft Airport Plan has been developed in accordance with the requirements of the *Airports Act 1996* (the Airports Act), setting out the Australian Government's requirements for the initial airport development.

The draft Airport Plan sets out details of the initial development for which authorisation is being sought (referred to as Stage 1). The Stage 1 development is intended to establish the proposed airport with a single 3,700 metre runway on a north-east/south-west orientation and aviation support facilities to provide an operational capacity of 10 million passengers annually as well as freight traffic. Stage 1 is designed to cater for the predicted demand for five years following opening around 2025 until around 2030.

The draft Airport Plan also refers to the potential long term development of the proposed airport. As demand increases beyond 10 million annual passengers, additional aviation infrastructure and aviation support precincts would add capacity to meet growing aviation demand. Incremental development of the proposed airport would continue as additional taxiways, aprons, terminals and support facilities are developed.

It is anticipated the proposed airport may ultimately expand to have a second parallel runway on a north-east/south-west orientation and supporting facilities, increasing aviation capacity to approximately 82 million passengers annually. The need for a second runway will be triggered when the operational capacity approaches 37 million annual passengers which is forecast to occur by around 2050. The long term passenger capacity of approximately 82 million annual passengers is forecast to occur by around 2063.

This Environmental Impact Statement (EIS) has been prepared in accordance with the *Environment Protection and Biodiversity Conservation Act 1999*. This EIS will inform the determination of the Airport Plan.

Determination of the Airport Plan would authorise the Stage 1 development encompassing the initial design, construction and operation of the proposed airport. The EIS provides a detailed consideration of likely environmental impacts arising from the Stage 1 development based upon clearly defined design and operational parameters described in the draft Airport Plan.

The EIS also provides a strategic level environmental assessment of the long term development of the proposed airport. This approach ensures that the extent of potential impacts for the long term development (including noise exposure), are considered as part of the initial approvals process. Future developments would be subject to separate approval processes through master plans and major development plan requirements in the Airports Act.

1.2 Need for the airport

The need for development of the proposed airport is driven by the continued growth in demand for aviation services in the Sydney basin (particularly in Western Sydney) and physical constraints at the existing Sydney (Kingsford Smith) Airport (Sydney Airport).

Aviation services are critical to a well-functioning developed country like Australia. Efficient access to air services for passenger travel and high-value freight is essential to ensure that Sydney remains an international commercial and financial centre and keeps its place as Australia's foremost tourist destination.

Sydney Airport has limited ability to handle further passenger growth due to the physical constraints at the existing site. The limitations of existing infrastructure are becoming apparent at peak times and are expected to become more pronounced over the coming decades. According to the Joint Study (Department of Infrastructure and Transport 2012), in the absence of additional aviation capacity in the Sydney basin:

- by 2020, all weekday slots for periods at Sydney Airport between 6.00 am and 12 noon and between 4.00 pm and 7.00 pm will be fully allocated;
- by around 2027, all slots at Sydney Airport will be allocated, so new entrants cannot be accommodated, unless another service is cancelled; and
- by around 2035, there will be practically no scope for further growth of regular passenger services at Sydney Airport.

Demand for aviation services is anticipated to continue to grow in parallel to Sydney's ongoing growth in population and business activities. Any shortfall in capacity to meet the demand will affect future economic growth, productivity and employment. It will also affect amenity and social values, as record numbers of Australians choose to travel by air for leisure. Notably, the Joint Study found that the economic cost of not meeting the expected increased demand would be substantial. By 2060, the economy-wide (direct and flow-on) impacts across all sectors of the Australian economy could total $59.5 billion in foregone expenditure and $34.0 billion in foregone gross domestic product (based on 2010 dollars). The NSW economy would be especially heavily affected, with losses across all industries totalling $30.6 billion in foregone expenditure and $17.5 billion in foregone gross state product.

Western Sydney is a dynamic multicultural region and is currently home to around 47 per cent of Sydney's population and nine per cent of Australia's population. Over the next 20 years, the number of people in Western Sydney will grow faster than other parts of Sydney, with almost one million more people expected to live west of Homebush by 2031 (DP&E 2014).

The south west subregion is the fastest growing subregion in Sydney and a new airport will be a major catalyst for growth in investment, infrastructure and jobs throughout the region (DP&E2014). There are a number of key industries that depend on air transport services based in the area and the development of a new airport is likely to trigger further growth in aviation dependent industry sectors given the availability of land, labour and transport linkages.

The Commonwealth-owned land at Badgerys Creek has been selected as the site for the proposed airport due to its proximity to the predicted aviation demand, and to act as a major catalyst for increased investment, infrastructure and jobs in the rapidly growing region.

1.3 Overview of the project

1.3.1 Airport Site

The site for the proposed airport covers an area of around 1,780 hectares located at Badgerys Creek in Western Sydney, as shown in Figure 1–1. The airport site is located within the Liverpool local government area, around 50 kilometres west of Sydney's Central Business District and 15 to 20 kilometres from major population centres such as Liverpool, Fairfield, Campbelltown and Penrith, and 30 kilometres from Parramatta.

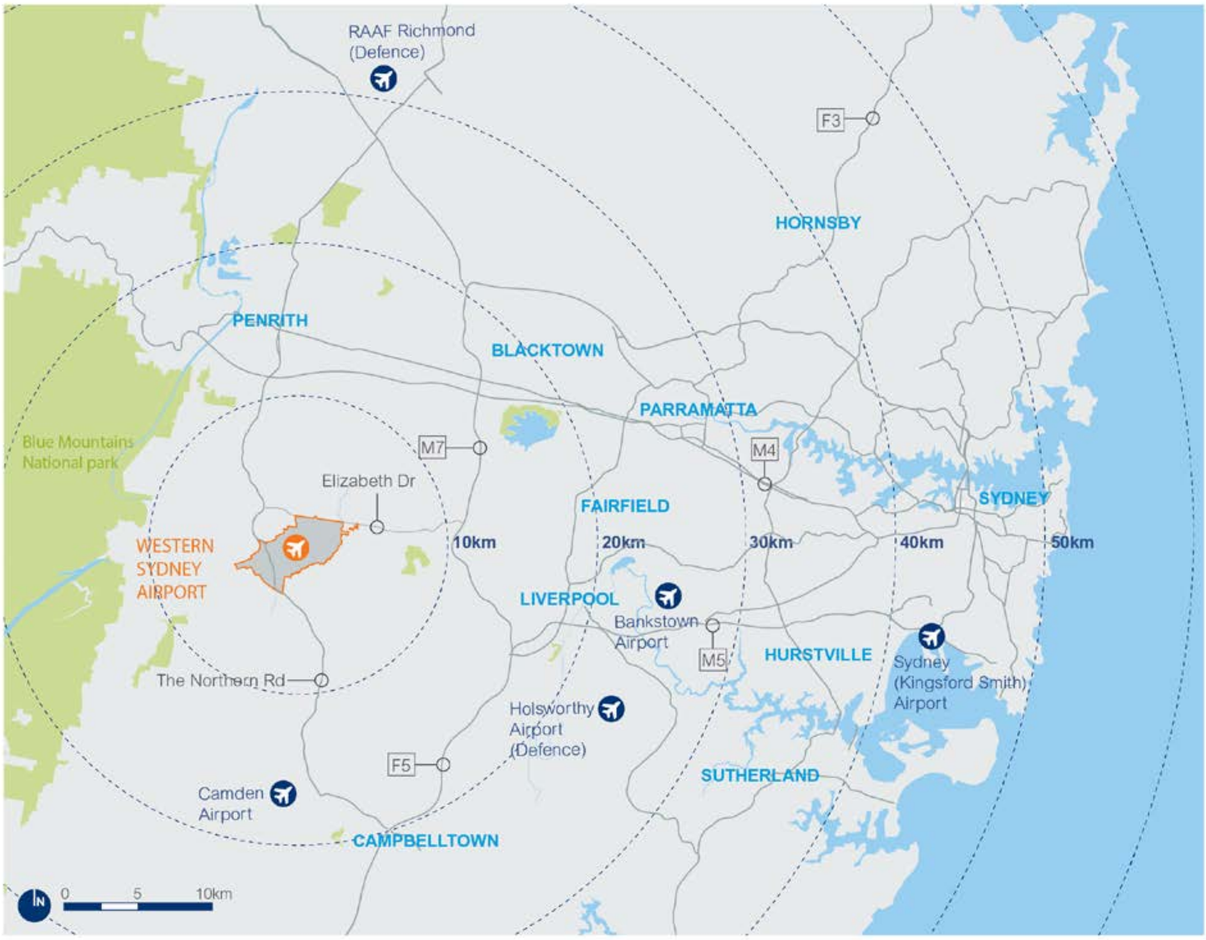


Figure 1–1 – Location of the airport site

The Northern Road transects the western end of the airport site and Elizabeth Drive borders the site to the north. Badgerys Creek flows in a north-easterly direction and forms the south eastern boundary of the airport site. The airport site is located on undulating topography that has been extensively cleared with the exception of stands of remnant vegetation located predominantly along Badgerys Creek and the south western portion of the site.

The airport site originally comprised approximately 200 rural residential properties. These properties were progressively acquired by the Australian Government starting in the 1980s for the purpose of developing an airport and were subsequently consolidated into a single title (Lot 1 of Deposited Plan 838361). During the 1990s, the Australian Government acquired a number of additional properties in close proximity to the consolidated site boundary to facilitate a future airport development. The following properties constitute the airport site for assessment and approval purposes:

- Lot 1 on Deposited Plan 838361;
- Lot 1 on Deposited Plan 851626;
- Lot 2 Section C on Deposited Plan 1451;
- Lot 17 on Deposited Plan 258581;
- Lot 22 on Deposited Plan 258581;
- Lot 23 on Deposited Plan 259698;
- Lot 32 on Deposited Plan 259698;
- Lot 33 on Deposited Plan 259698;
- Lot 7 on Deposited Plan 3050;
- Lot 8 on Deposited Plan 3050;
- Lot 9 on Deposited Plan 226448;
- Lot 3 on Deposited Plan 611519;
- Lot 11 on Deposited Plan 226448;
- Lot 1 on Deposited Plan 129674;
- Lot 1 on Deposited Plan 129675;
- Lot 1 on Deposited Plan 996420;
- Lot 2 on Deposited Plan 996420;
- Lot 28 on Deposited Plan 217001;
- Lot 1 on Deposited Plan 996379; and
- Lot 2 on Deposited Plan 996379

The Commonwealth intends to acquire the following land for operational and safety reasons:

- Lot 102 on Deposited Plan 812563 in the south of the airport site;
- Parts of Lot 101 on Deposited Plan 848215 east of the airport site;
- Part of the easement of The Northern Road where it crosses the west of the airport site; and
- Part of the easement of Elizabeth Drive where it crosses the north of the airport site (adjacent to Lot 101 on Deposited Plan 848215 described above.)

The airport site including coordinates for 14 location points which mark the approximate extent of the airport site, as well as proposed land acquisitions is shown in Figure 1–2. Any additional land would be acquired under the *Lands Acquisition Act 1989* which contains a framework for acquisition of land including compensation arrangements.

There are three parcels of land that form part of the airport site but which are not contiguous with the main site. These parcels, identified as Lot 3 of Deposit Plan 611519, Lot 9 of Deposit Plan 226448 and Lot 11 of Deposit Plan 226448, are located to the north east of the main airport site. Where not material to the subject matter of the relevant chapter or technical paper, these parcels of land may be omitted from some maps and plans used in the draft EIS. The coordinates for location points that mark the approximate extent of the airport site boundary are included in Table 1–1

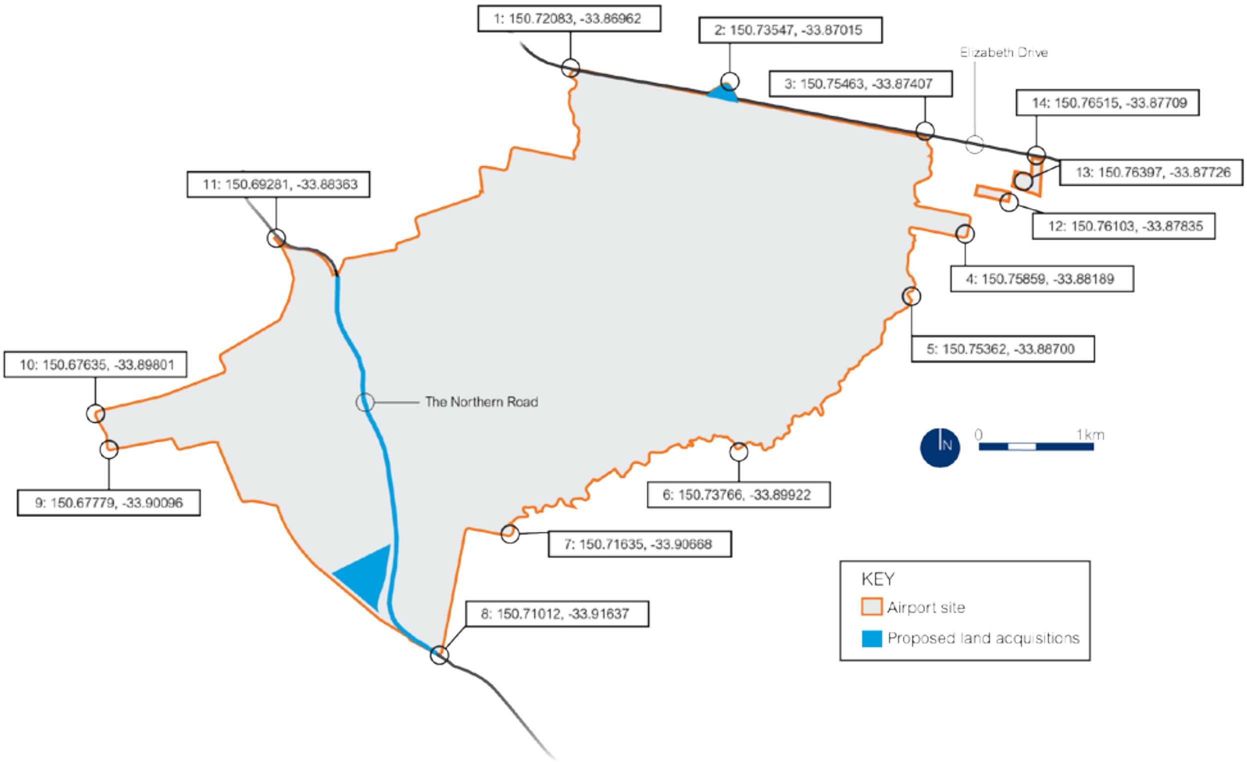


Figure 1–2 – Airport site and proposed land acquisitions

Table 1–1 – Boundary points at the airport site

Location point	Longitude (degrees)	Latitude (degrees)
1	150.720832	-33.8696232
2	150.7354657	-33.87014936
3	150.7546256	-33.87407349
4	150.758585	-33.88188896
5	150.7536154	-33.88699885
6	150.7376634	-33.89921592
7	150.7163548	-33.90667904
8	150.7101159	-33.91636529
9	150.6777915	-33.90095642
10	150.6763526	-33.8980082
11	150.6928106	-33.8836324
12	150.7610289	-33.87835441
13	150.7639748	-33.87726283
14	150.7651519	-33.87709334

1.3.2 Draft Airport Plan

The initial stage of the proposed airport would be constructed and operated in accordance with the Airport Plan, which forms a transitional planning instrument under the Airports Act. A draft Airport plan has been prepared and is exhibited concurrently with this EIS.

The concept design outlined in the draft Airport Plan provides the planning framework for the proposed airport until the first master plan is in place. It includes the objectives for an initial Stage 1 development, indicative flight paths, projected aircraft noise contours and the land use plan for the airport site.

Determination of the Airport Plan under the Airports Act by the Minister for Infrastructure would authorise the Stage 1 development. Authorisation would encompass the initial design, construction and operation of the airport for the first five years of operation till around 2030. The EIS provides a detailed consideration of likely environmental impacts arising from the Stage 1 development based upon the defined design and operational parameters described in the draft Airport Plan.

The draft Airport Plan also refers to the potential long term development of the proposed airport. Progressive development of the airport beyond Stage 1 would require additional aviation infrastructure and aviation support precincts and potentially a second parallel runway. This EIS provides a strategic environmental assessment of the long term development of the proposed airport. This approach ensures that the extent of likely impacts for the long term development (such as noise exposure) is considered as part of the initial approvals process.

1.3.3 Stage 1 development

Stage 1 of the proposed airport will include a 3,700 metre runway, positioned in the northern portion of the site on an approximate north-east/south-west or 50/230 degree orientation. Stage 1 also includes a single full length parallel taxiway and a range of aviation support facilities including passenger terminals, cargo and maintenance areas, car parks and navigational aids, as shown on Figure 1–3.

The Stage 1 development will be capable of facilitating the safe and efficient movement of up to 10 million domestic and international passengers per year, which is equivalent to approximately 63,000 air traffic movements including freight traffic. The proposed airport would operate without a curfew. The Land use plan for the Stage 1 development provides authorisation for development of a range of commercial uses such as retail and business parks within a dedicated business development zone. All commercial operations would be subject to further approvals under the Airports Act and must be consistent with the objectives and permitted uses within the zone.

The Stage 1 development would encompass the entire 1,780 hectare airport site. The majority of construction activity for Stage 1, including bulk earthworks and aviation infrastructure works would be restricted to a 1065 hectare Stage 1 construction impact zone, which is predominantly located in the northern portion of the site. There would also be limited earthworks and development in the southern portion of the site for the establishment of ancillary infrastructure including drainage swales and detention ponds as part of the proposed water management system. The stage 1 construction impact zone is represented on Figure 1–3.

The southern portion of the site would predominantly remain uncleared during the initial stage of airport development. This area is reserved for future development activities which could include construction of a second runway, and expansion of aviation uses and business development in accordance with the draft Airport Plan. Activities associated with these future uses do not form part of the Stage 1 development.

1.3.4 Long term development

It is expected that the proposed airport would be progressively developed as demand increases beyond 10 million passengers annually. Additional aviation infrastructure and support services such as taxiways, aprons, terminals and support facilities would be required to service the growing demand. Future developments beyond the scope of Stage 1 would be subject to the requirements of the Airports Act.

A second runway is forecast to be required by around 2050 and would be located parallel to the first runway with a centre line separation distance of around 1,900 metres. The need for a second runway would be triggered when the operational capacity approaches 37 million passengers per year, which is equivalent to approximately 185,000 air traffic movements including freight traffic.

The long term capacity of the airport is forecast to service approximately 82 million passengers per year, which is equivalent to approximately 370,000 air traffic movements including freight traffic. An indicative configuration for the long term airport development is presented in Figure 1–3. The layout of the long term airport development would form part of a subsequent master plan in accordance with the requirements of the Airports Act.

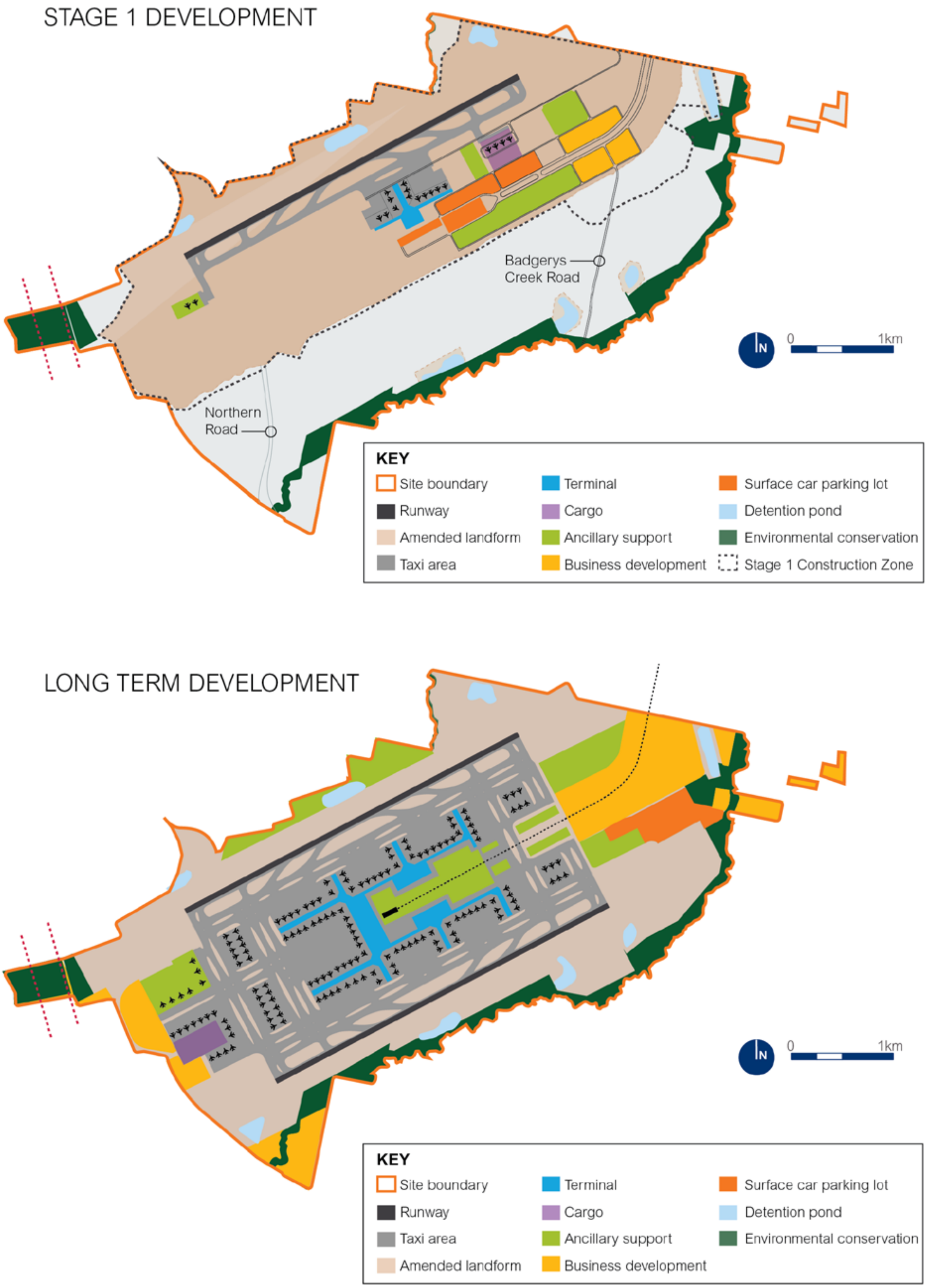


Figure 1–3 – Stage 1 and long term developments (layout of terminal buildings is indicative only)

1.3.5 The proponent

The proponent for the development and operation of the airport is the Australian Government Department of Infrastructure and Regional Development (the Department) which has prepared the draft Airport Plan.

The Department is responsible for national policies and programmes that promote, evaluate, plan and invest in infrastructure and regional development; and foster an efficient, sustainable, competitive, safe and secure transport system for Australia. The Department administers the Airports Act (and its associated regulations) and the Minister for Infrastructure and Regional Development is responsible for the approval of all major developments at major airport facilities across Australia. The proposed airport would be developed and operated under the Airports Act. Construction to prepare the site, including earthworks may be undertaken by the Australian Government. An airport lease would be granted by the Australian Government to an airport lessee company (ALC), which would then become responsible for the airport site and further construction.

The Australian Government is required to meet its obligations under Sydney Airport Group's right of first refusal to develop and operate a second Sydney Airport. This right was granted as part of the Government's sale of Sydney (Kingsford Smith) Airport in 2002 and is applicable to the proposed airport. The right of first refusal consists of a number of phases, including a consultative phase and a contractual phase. The first phase consisted of a nine-month consultation between the Australian Government and Sydney Airport Group concluded on 30 June 2015.

If the Government wishes to proceed with the project, a contractual offer (a 'Notice of Intention') would first be issued to Sydney Airport Group. Sydney Airport Group would then have the opportunity to exercise its option to develop and operate the airport. The Notice of Intention would set out the detailed terms for the development and operation of an airport at Badgerys Creek, including technical specifications, contractual terms and timetable. It is possible a Notice of Intention could be issued to Sydney Airport Group by the end of 2015.

Should Sydney Airport Group decline the opportunity, the Australian Government may approach the market, or develop the airport itself.

1.3.6 The Airport Lessee Company

Once an airport lease is granted, the ALC would be responsible for the implementation of the proposal in accordance with the Airport Plan. The ALC would also be responsible for planning and development assessment for all future stages of the airport in accordance with the Airports Act and other regulatory requirements.

Within five years of an airport lease being granted by the Commonwealth for the airport site, or such longer period as approved by the Minister for Infrastructure and Regional Development, the ALC will be required to submit for approval a full master plan to the Minister for Infrastructure and Regional Development. The Minister is able to refuse to approve a master plan which is not consistent with the Airport Plan. If approved, the master plan would replace Part 2 of the Airport Plan. All future development for the proposed airport must be consistent with the master plan and existing regulatory requirements contained in the Airports Act, including building approvals for all building works and public consultation and approval of major development plans for major developments, as defined in the Airports Act.

1.4 Historical overview

The need and potential location for a second airport in the Sydney region has been considered periodically since 1946. A summary of the major studies and key milestones in the selection of Badgerys Creek as the location of the proposed airport is shown in Figure 1–4.

Badgerys Creek was first identified as a preferred site in the Major Airport Needs of Sydney Study (Major Airport Needs of Sydney Study Committee 1979). The study assessed sites within a number of zones including a northern zone (near Scheyville, Nelson and Galston), north-western zone (near Richmond and Londonderry), south-western zone (near Badgerys Creek and Bringelly) and a southern zone (in Holsworthy Military Area). The 1979 study found Badgerys Creek was the preferred site based on environmental, economic and financial grounds.

Badgerys Creek was again identified as the preferred site for a second airport in the Second Sydney Airport Site Selection Programme Draft Environmental Impact Statement (1985 EIS) (Kinhill Stearns 1985). The programme assessed 10 sites including Badgerys Creek, Bringelly, Darkes Forest, Goulburn, Holsworthy, Londonderry, Scheyville, Somersby, Warnervale and Wilton. A multi-criteria analysis was undertaken considering accessibility, air safety, capital expense, acquisition of land and environmental factors including noise. Badgerys Creek and Wilton were short-listed through this process and the two sites were subsequently assessed through the EIS process, with Badgerys Creek identified as the preferred site.

Badgerys Creek was first formally announced as the site for a major airport by the Australian Government in 1986. Land acquisitions at Badgerys Creek began that year and were completed by 1991. Despite subsequent delays to the airport development, the airport site has remained under Commonwealth ownership since that time.

In January 1996, the Australian Government announced that an EIS would be prepared for the construction and operation of a second Sydney airport at Badgerys Creek. The scope of the environmental assessment process was broadened to include an alternative to the Badgerys Creek site at Holsworthy Military Area, but this was subsequently ruled out as an option on environmental grounds. The Environmental Impact Statement Second Sydney Airport Proposal (1997-1999 EIS) (PPK 1997) assessed the environmental, social and economic impacts of constructing and operating a second major airport at Badgerys Creek. In providing recommendations and advice on the 1997–99 EIS, the then Minister for the Environment found that there were no insurmountable challenges to developing an airport at Badgerys Creek.

More recently, Badgerys Creek was identified as the preferred site in the Joint Study (Department of Infrastructure and Transport 2012). The study assessed 80 sites across 18 locations including Wilberforce, Somersby, Wilton, Luddenham and Badgerys Creek. An airport at Wilberforce was discounted as it would likely require closure of RAAF Base Richmond, while Somersby was discounted due to conflict with Sydney Airport airspace. Wilton was considered too remote from most airport users to justify the development of an airport. Both Luddenham and Badgerys Creek were considered geographically well-placed in relation to growth areas, with Badgerys Creek the preferred choice based on its higher benefit-cost ratio. The Richmond and Wilton Study (DIRD 2013) subsequently supported these findings, noting a ‘clear preference’ within the aviation industry for an airport at Badgerys Creek.

KEY MILESTONES

1946
First investigation into the best site for further airport development in/around Sydney considers three options including a site at Towra Point and expansions of existing airports at Bankstown and Mascot.

1969
Advisory committee to the Australian Government considers 11 potential sites for a second airport, including a site at Badgerys Creek.

1971
Advisory committee narrows potential locations to sites in Richmond, Somersby, Duffys Forest and Wattamolla.

1972
Benefit-cost analysis undertaken of an additional 106 sites. Assessment reduces the number of sites to five potential sites: Towra Point, Rouse Hill/Nelson, Long Point, Marsden Park and Bringelly.

1973
Government announces that Galston has been selected as the site for a potential second airport (decision reversed in 1974 following further consideration).

1976
Major Airport Needs of Sydney Study Committee convened as a joint initiative by the Federal and State governments. Study considers six sites including Londonderry, Scheyville, Austral, Long Point, Bringelly and Badgerys Creek.

1979
Preliminary report released by the Major Airport Needs of Sydney Study Committee. Scheyville and Badgerys Creek shortlisted as potential sites, but development could not be justified before a third runway at Sydney Airport.

1982
Third runway at Sydney Airport announced (decision reversed in 1983).

1983
New programme announced to identify a site for a second airport in Sydney (the Second Sydney Airport Site Selection Programme). Ten sites re-examined: Bringelly, Darkes Forest, Goulburn, Holsworthy, Londonderry, Scheyville, Somersby, Warnervale, Wilton and Badgerys Creek.

1985
Wilton and Badgerys Creek assessed in detail in Second Sydney Airport Site Selection Programme Draft Environmental Impact Statement.

1986
Badgerys Creek announced as the site of the second airport. Acquisition of land begins (completed by 1991).

1991
Decision made to proceed with the construction of a third runway at Sydney Airport and an initial development of a general aviation airport at Badgerys Creek.

1994
Third runway at Sydney Airport opens and the plans to develop the Badgerys Creek site are expanded to provide an international standard airport in time for the Sydney 2000 Olympics.

1996
Government announces that an EIS will be prepared for the development of a second Sydney airport at Badgerys Creek. Scope subsequently broadened to include a potential site at Holsworthy Military Area.

1997
Holsworthy Military Area ruled out on environmental grounds and draft EIS released for public comment prior to finalisation in 1999.

2000
Further development of a potential second airport at Badgerys Creek put on hold.

2004–08
Further consideration of other potential sites by the Australian and NSW governments, including Well's Creek, Camden, RAAF Base Richmond and expansion of the existing Canberra Airport.

2009
Joint Australian and NSW government steering committee appointed to guide a Joint Study on Aviation Capacity for the Sydney Region (the Joint Study).

2012
The Joint Study is released and concludes that an additional airport would be needed from around 2030 and that out of 80 sites considered, Badgerys Creek would be the most logical and cost effective site.

2013
Study into the suitability of Wilton as a second airport and limited civil operations at RAAF Base Richmond supported previous findings that Badgerys Creek would be the most economically viable option for further development.

2014
Australian Government announces that Badgerys Creek will be the site for a second airport for Sydney. Department of Infrastructure and Regional Development start preparing EIS.

Figure 1–4 – Key milestones in the development of the Western Sydney Airport

Most recently on 15 April 2014, the Australian Government announced that Badgerys Creek would be the site for a Western Sydney airport. The announcement follows the numerous studies and environmental assessments over preceding decades, including the recent investigations involved in the Joint Study.

1.5 The need for a new EIS

Development of an airport at Badgerys Creek has been assessed through the preparation of two previous EISs. The 1997-1999 EIS (PPK 1997) is the most recent comprehensive environmental assessment and considered three separate options for the development of the airport site. Option A proposed substantially the same 50/230 degree runway orientation and location as currently proposed, however the capacity of the airport site was limited to 30 million passengers annually.

In September 2014, SMEC Australia (SMEC) was commissioned by the Department to undertake an environmental field survey of the Commonwealth land at Badgerys Creek. The purpose of the field survey was to update the Commonwealth's knowledge of flora and fauna, European and Aboriginal heritage and hydrology aspects of the land at Badgerys Creek. The resulting report, (SMEC 2014) found that the previous EISs, although comprehensive and useful as background information, were outdated due to changes in legislative requirements and obligations, best-practice and industry standard assessment methods, and threatened flora and fauna listings. In addition, there have been substantial changes to the indicative design and operational parameters proposed for the airport, reflecting the changing nature of airports as centres of economic activity. As such, the Australian Government commenced a new environmental assessment for the proposed airport.

This draft EIS has been developed to assess the proposed airport as described in the draft Airport Plan in the context of an updated regulatory framework and the contemporary regional setting for Western Sydney. Where relevant, information from previous assessments such as the 1997-1999 EIS (PPK 1997) has been used to support technical information required for this draft EIS.

1.6 EIS function and structure

1.6.1 Approval framework

The proposed airport would be developed in accordance with the draft Airport Plan determined under the Airports Act. This draft EIS is a companion document to the draft Airport Plan. The draft EIS assesses the potential environmental, social and economic impacts associated with the Stage 1 development as described in Part 2 of the draft Airport Plan. The draft EIS has been prepared in accordance with the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* and the specific assessment guidelines for the development of the airport issued on 29 January 2015.

The draft EIS and draft Airport Plan will be placed on public exhibition concurrently for a period determined by the Minister for the Environment. During the public exhibition period any person, group, corporation or agency can submit comment on the EIS and/or the draft Airport Plan to the Department of Infrastructure and Regional Development. A copy of all comments received on the draft EIS will be forwarded to the Department of the Environment.

The EIS and the draft Airport Plan must be revised taking account of comments received during the exhibition period. The finalised EIS will also provide any additional information that may be relevant to the Minister for the Environment's consideration of the environmental impacts of the proposal.

The Minister for the Environment will consider the finalised EIS and revised draft Airport Plan from an environmental perspective and notify the Minister for Infrastructure and Regional Development whether the Airport Plan should be determined and, if it is determined, whether any specific conditions or provisions should be included for the purpose of protecting the environment.

If the Minister for the Environment is satisfied with the draft Airport Plan, the Minister for Infrastructure and Regional Development may determine the Airport Plan. The Airport Plan must include any conditions or provisions specified in the notice from the Minister for the Environment.

As noted above, the Australian Government may undertake some preliminary works. Once an airport lease is granted, the ALC will be responsible for implementation of the proposal in accordance with the Airport Plan and any conditions contained within it. The ALC will also be responsible for planning and development assessment for all future development on the airport site in accordance with the existing regulatory framework for airports under the Airports Act.

1.6.2 EIS structure

This EIS includes a detailed consideration of the environmental, social and economic consequences of the proposed airport and is presented in four volumes, as described in Table 1–2.

Table 1–2 – EIS structure

Volume	Scope
Executive Summary	The executive summary provides an overview of all aspects of the EIS for the proposed airport. A stand-alone summary document is also provided to assist in public engagement.
Volume 1 – Background	Volume 1 provides the context to the proposed development and includes three parts: • Part A provides a background to the proposal including a detailed rationale and consideration of strategic options for the development of the proposed airport and consideration of the legislative context and approval requirements for the proposed development; • Part B describes the draft Airport Plan including airport performance and design criteria, the land use plan, a detailed description of the Stage 1 development and the construction activities required for the development of the site; and • Part C includes an overview of the community and stakeholder engagement activities completed during the preparation of the EIS and proposed to be undertaken during the exhibition and determination phases of the proposal.

Volume	Scope
Volume 2 – Stage 1 environmental impact assessment	Volume 2 provides a detailed impact assessment of the Stage 1 development and includes three parts. • Part D provides a detailed consideration of all environmental aspects potentially impacted by the proposal; • Part E provides the environmental management framework and mitigation requirements to be implemented as part of the proposal; and • Part F provides a conclusion to the assessment of impacts for the Stage 1 development including the ability to meet the needs and objectives of the proposed development.
Volume 3 – Long term environmental assessment	Volume 3 provides a strategic level environmental assessment for the long term development of the airport site. The assessment includes consideration of environmental aspects impacted by the potential long term development of the site. Future development of the airport will be subject to a detailed master planning and approval process. This assessment is therefore based upon indicative design concepts including indicative flight tracks to provide an idea of the extent of impacts potentially associated with the future development of the airport site. All future development including any cumulative or consequential impacts on other airports such as Sydney Airport will be subject to assessment and approvals in accordance with the applicable legislative framework at the time of the application.
Volume 4 – Specialist Studies	Volume 4 presents detailed specialist studies that have been completed to inform the consideration of impacts as part of the environmental assessment process. These studies assess the potential impacts of the proposed airport with regard to: • noise; • air quality; • community health; • hazard and risks; • bird and bat strike; • surface transport and access; • biodiversity; • surface water, groundwater and water quality; • Aboriginal heritage; • European heritage; • planning and land use; • landscape character and visual; • social impacts; • economic impacts; and • property values.

2. The need for Western Sydney Airport

2.1 Introduction

This chapter provides a review of the need for an airport in Western Sydney and the process that led to the selection of the Commonwealth-owned land at Badgerys Creek as the airport site.

As nationally significant infrastructure assets, airports generate considerable direct and indirect economic activity including jobs for their surrounding regions and the nation. Airports are key international gateways for travel and freight, taking on an increasingly important economic role in a globalised economy. Sydney in particular is reliant on the aviation system to maintain its status as a global city, tourist destination and major financial and services centre in the Asia Pacific region.

The need for an airport in Western Sydney is driven principally by the increasing demand for aviation services in the Sydney region and the limited capacity of existing airports, in particular Sydney (Kingsford Smith) Airport (Sydney Airport), to accommodate that growth.

Strategic alternatives to the development of a new airport in Western Sydney have been assessed over a number of decades. Commonly referenced alternatives include increasing the capacity of Sydney Airport or other existing airport facilities, establishing a greenfield airport outside the Sydney basin or using high speed rail as a substitute for aviation services. While these alternatives demonstrated potential to provide marginal capacity benefits, they would not replace the need for the proposed airport. Detailed studies have been undertaken over a number of decades to assess these options and have consistently found that the most effective way to address increased aviation demand, while mitigating environmental and social impacts, is to develop a new airport at Badgerys Creek.

Western Sydney is identified as the source of many of Sydney's greatest opportunities for economic and employment growth in the NSW Government's *A Plan for Growing Sydney* (DP&E 2014). It is also a region in which several of Sydney's challenges – ageing infrastructure, housing demand growth and access to employment – are most pressing. Development of the proposed airport would be a catalyst for investment and job creation in the region by accelerating the delivery of vitally important infrastructure and the release of employment and housing land, and providing a long term and diverse source of local jobs and economic activity. Additionally, the proposed airport would improve access to aviation services for Western Sydney.

This chapter provides an analysis of the role the proposed airport would have in accommodating increased aviation demand and, in conjunction with other major projects in the area, supporting the continued emergence of Western Sydney as a major economic, social and cultural region.

2.2 Importance of aviation in the Australian context

Aviation is an industry of vital strategic importance to Australia. The Australian continent is relatively isolated and is characterised by geographically dispersed population centres. The aviation sector provides an essential service in physically connecting people and businesses domestically and internationally.

Aviation is also a critical enabling industry for the broader economy, playing a central role in facilitating international and domestic trade and underpinning our tourism industry. According to the Bureau of Infrastructure Transport and Regional Economics (BITRE), major transport hubs such as airports directly contribute to economic growth and are major employment centres in their own right (BITRE, 2014a).

Aviation is also of vital importance to the tourism industry, which has long played an important role in Australia's economy. Tourism Research Australia (2014a) identified that in 2012−13 the tourism industry contributed approximately $91 billion to Australian gross domestic product (GDP) per year (or 6 per cent of GDP). Approximately 25 per cent of the direct economic contribution of tourism was delivered by international tourists, 99 per cent of whom travel to Australia by air (Tourism Research Australia 2014a). At a regional level, aviation is critical to the tourism industry in NSW. According to Destination NSW, the state welcomed 29.7 million visitors in 2014, more than any other state or territory, contributing approximately $28 billion to the NSW economy and supporting over 150,000 jobs in NSW (Destination NSW 2014). Many of these visitors rely on aviation to travel to and from Sydney and other regions in NSW. Looking to the future, tourism is expected to be one of the world's fastest growing industries over the next 20 years, particularly in Asia (Deloitte 2014). Aviation is critical to supporting current tourism activity and positioning Australia to take advantage of future growth in the industry.

Air freight has become increasingly important for the transportation of goods to, from and around Australia, particularly in relation to time-critical and high value goods (Hamal 2011). Sydney has always played a strong part in facilitating this trade, with Sydney Airport being the nation's largest import/export airport in terms of combined trade value (BITRE 2014b). Businesses and agricultural producers in and around the Sydney region rely on air services to transport fresh produce, meat and seafood as well as manufactured goods in export markets in South East Asia and beyond. Sydney Airport also accounted for more than half of total Australian air freight imports by value in 2011−12, largely related to imports of pharmaceuticals, mobile phones and computer equipment (BITRE 2014b). These imported goods support the health and living standards of Australians and facilitate industries such as health, communications and professional services across Australia.

Finally, it is important to note that airports themselves directly contribute to economic and employment growth, supporting flow-on benefits to almost all other sectors of the economy. According to BITRE, airports have become some of the most important job growth hubs in Australian cities, providing direct and indirect employment opportunities across a diverse range of industries, occupations and qualification levels (BITRE 2013).

2.3 Aviation demand

2.3.1 Drivers of aviation demand

Aviation plays a central role in the Australian economy with demand for aviation services seeing considerable increase over recent decades, particularly in the Sydney basin. This growth has largely been driven by population growth, economic growth, increased competition and growth in international tourism. Sydney and Australia have benefited greatly from these trends, both in terms of increased living standards and exposure to global markets and cultures.

Existing major airports such as Sydney Airport will continue to play a significant role in accommodating current and future growth in aviation activity. However, recent studies indicate existing airport capacity in the Sydney basin will not be able to fully absorb the growth in aviation demand in the long term.

Four key factors are expected to continue to drive increased demand for aviation services in the Sydney basin:

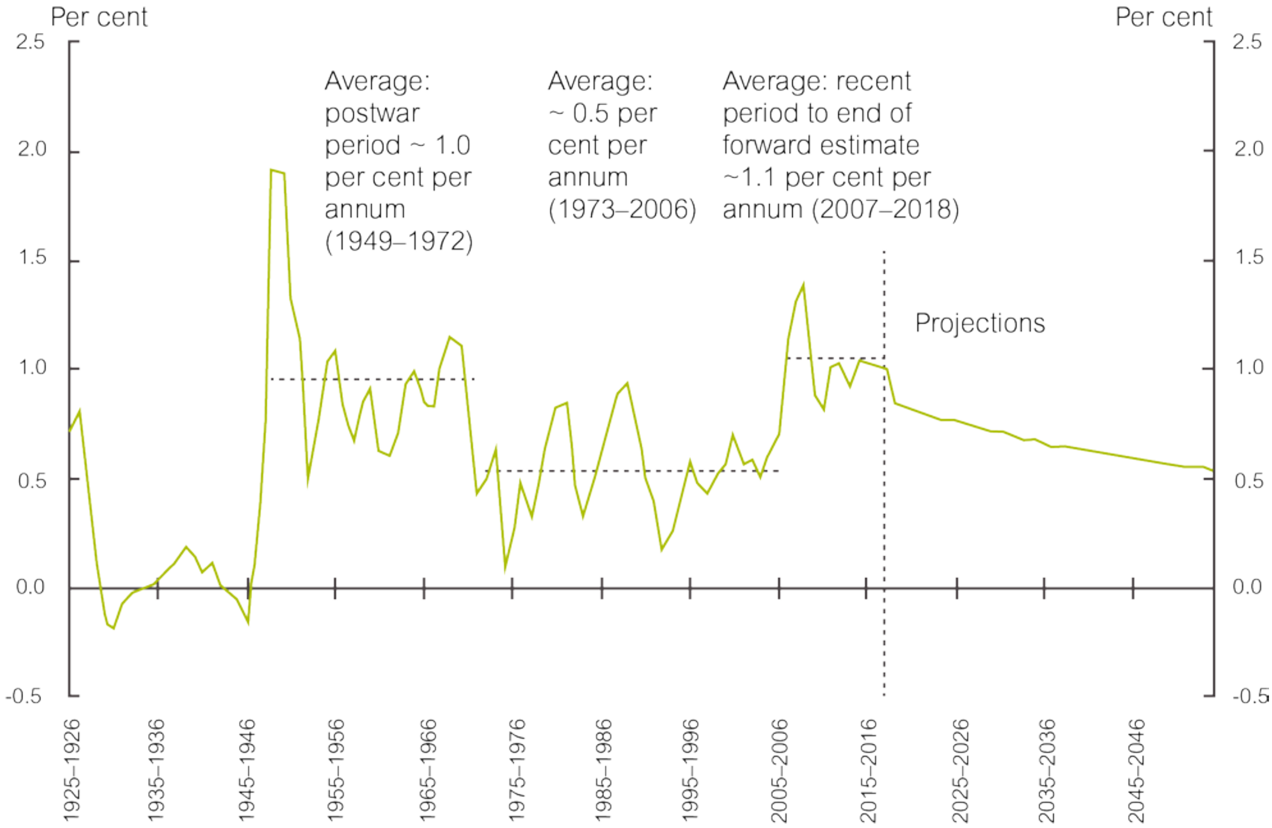
- population growth;
- economic growth;
- increased competition and low cost carrier penetration; and
- increasing international tourism demand – particularly from Asia.

These factors are discussed below.

2.3.2 Expected population growth

A growing population will result in a greater demand for goods and services from businesses, including aviation services. The 2015 Intergenerational Report (IGR) indicates that, based on forecast patterns of migration, fertility and mortality, Australia's population will grow at 1.3 per cent per year to 2054–55, to 39.7 million people. This represents a 66 per cent increase on the current 23.9 million people in Australia (The Treasury 2015).

Net migration to Australia is a key component of expected population growth and a contributor to growing demand for aviation services across Australia. As demonstrated in Figure 2–1, net migration has varied substantially over recent decades, reaching a peak of 300,000 in 2008−09, and is expected to remain above 0.5 per cent of the population (nearly 200,000 net migrants per year) for the next 40 years.



Source: 2015 Intergenerational Report

Figure 2–1 – Historical and forecast net migration to Australia

Continued net migration has important implications for the Australian international aviation sector. Migration represents more than just a single movement to Australia. It also contributes to increases in both inbound and outbound tourism in the long term (for example, through trips to visit friends and family).

Sydney's population and resulting demand for aviation services is also expected to grow significantly. SGS Economics and Policy (SGS) has forecast that Sydney's population will grow from 5.7 million in 2015 to 7.1 million by 2030, and to 8.9 million by 2050. This represents a 96 per cent increase in population over the next 60 years, or a compound annual growth rate of 1.1 per cent (SGS 2015). Western Sydney is expected to be home to a large proportion of this growing population, with a further one million residents expected by 2030 (SGS 2015).

2.3.3 Expected economic growth

Real economic growth, particularly growth per capita, increases living standards and average discretionary spending, with accompanying increased demand for goods and services such as air travel. Historical growth rates for the airline industry indicate that demand for air travel may grow, at a minimum, at the same rate as GDP (Boston Consulting Group 2006).

According to both the IGR and the NSW Government's *State Infrastructure Strategy Update* (NSW Government 2014), the key drivers of economic growth can be attributed to population, productivity and participation.

Australian real GDP is expected to grow at approximately 2.8 per cent per year to 2054−55; average annual growth in real GDP per capita is projected to be 1.5 per cent per year (The Treasury 2015). Productivity has historically been the most important driver of Australia's economic performance, and it is expected that productivity improvements, particularly driven by technological advances, will continue to drive Australia's economy over the coming 40 years as they have done for the last 40 years (The Treasury 2015).

Figure 2–2 demonstrates how population, productivity and participation are forecast to contribute to growth in real GDP per capita across Australia over the next 40 years.

Source: 2015 Intergenerational Report

Figure 2–2 – Australian GDP per capita projections to 2054-55

While this represents a slight slowing in the rate of economic growth relative to the previous 40 years, it remains significant and indicates that Australians will continue to access a growing discretionary income base to support growing aviation demand. Further to this, the *State Infrastructure Strategy Update* indicates that over the coming 20 years, the Sydney basin is anticipated to experience particularly strong economic growth (NSW Government 2014).

Forecasts for economic activity and employment in the Sydney Greater Metropolitan Area show that GDP in the Sydney Greater Metropolitan Area is expected to increase from $283 billion in 2010 to $849 billion in 2050, and employment is expected to increase from approximately 3 million jobs in 2010 to approximately 4.8 million jobs in 2050 (SGS 2015). These forecasts indicate that the Sydney region is likely to continue to experience growth in economic activity, which will drive demand for aviation services.

Table 2–1 – Economic activity forecasts, Sydney Greater Metropolitan Area (real 2015 values)

Type	2010	2030	2050
GDP ($ billions, 2015 dollars)	283	519	849
Employment (millions of jobs)	3.08	3.91	4.73

Source: SGS Economics 2015.

2.3.4 Increased competition and low cost carrier penetration increasing demand

Increased competition in the provision of aviation services, and the increasing market share of low cost carriers, has altered the Australian and global aviation market over the last decade, driving down real air fares and stimulating demand.

In the domestic market, low cost carriers have taken significant market share on key leisure and main haul routes. Accounting for the change in Virgin Australia's status to a full service carrier, domestic low cost carrier market share in Australia has increased from around 8 per cent in 2005 to 31 per cent in 2013. Market penetration rates of international low cost carriers in Australia have been historically low. However, these rates have increased in recent years as a result of new international carriers to the Sydney basin (such as Air Asia X and Scoot) which have been supported by the emergence of a growing price-sensitive middle class in key markets, particularly in Asia. This has increased international low cost carrier market penetration in Australia from 5 per cent in 2008 to 9 per cent in 2013.

In more mature international markets such as Europe, the Americas and Australasia, low cost carrier penetration (including hybrid full service / low cost carriers) currently ranges between 35 and 45 per cent. Over the next 10 years, low cost carriers are forecast to continue to take share in these markets, until a point of market saturation is reached (at around 50 per cent of the market, including hybrid carriers). Asia is forecast to show the strongest growth, with low cost carrier penetration increasing from around 25 per cent to just over 40 per cent over the next 10 years.

In Australia, low cost carrier domestic penetration is expected to increase as competition between carriers intensifies in this segment of the market – rising to 35 per cent of domestic demand by 2050. Over the forecast period, international low cost carrier penetration is forecast to increase to around 16 per cent of international demand, driven by growth in medium haul routes, such as Australia to South East Asia.

Overall, forecast increases in international low cost carrier market penetration and marginal increases in domestic low cost carrier operations are expected to contribute to increased demand for aviation services in the Sydney basin.

2.3.5 Expected international tourism growth

Tourism is expected to play an increasingly important role in Australia's economy and demand for aviation services in Sydney. International tourism demand is expected to continue growing in the medium to long term. In the 2013−23 period it is anticipated that international tourism to Australia will grow by approximately 4.5 per cent per year to 9.6 million, greatly increasing total demand for access to Sydney aviation services (Tourism Research Australia 2014b). Australia's top five inbound markets – New Zealand, China, the United Kingdom, the United States and Singapore – are expected to provide 56 per cent of the additional 3.4 million arrivals over this period (Tourism Research Australia 2014b). Sydney is one of Australia's prime tourist destinations. Therefore, in line with the growth expected nationally, total visitor nights in NSW (the number of nights business and leisure travellers stay in NSW) are expected to almost double over the 10 years to 2023 (Tourism Research Australia 2014c).

Increasing demand for aviation services has been particularly strong in Asian markets. Over the last three years, passenger demand between Sydney and key Asian markets has grown by 7.3 per cent. China alone is expected to contribute around a quarter of the increase in inbound arrivals in 2013–23 period (Tourism Research Australia 2014b). This has been driven by the increasing wealth of the Asian middle classes, liberalisation of air travel markets particularly through the growth in Asian low cost carrier carriers, and the continued attractiveness of Australia as a tourism destination. Long term, demand for international aviation services to Sydney are expected to be driven primarily by improvements in living standards in neighbouring countries. Asian economies are forecast to grow at 4.4 per cent per year to 2033. In particular, China is forecast to show strong growth over the forecast period, with 6 to 7 per cent GDP growth in the short to medium term, and 4 per cent in the long term.

Concurrently, short term international departures by Australian residents are expected to grow by 3.8 per cent per year on average to reach 12.3 million by 2023. Malaysia, China, Indonesia, Fiji and Singapore are forecast to be the top five fastest growing destinations for Australian residents over the forecast period. Of all the Australian states and territories, NSW has the highest propensity for international outbound travel, accounting for 70.6 trips per 100 people in 2013 (Destination NSW 2013).

2.4 Existing airports in the Sydney basin

2.4.1 Sydney (Kingsford Smith) Airport

Sydney Airport is Australia's largest airport in terms of passenger movements and freight. It is located on 907 hectares of land in Mascot, approximately eight kilometres south of Sydney's Central Business District. There are currently 34 international, six domestic and six regional airlines operating from the airport. Together, these service 97 destinations, including 11 international and eight regional destinations not served by any other Australian airport. In 2014, approximately 307,000 aircraft movements, 38.7 million passenger movements, and approximately 408,500 tonnes of international air freight passed through Sydney Airport (BITRE 2015).

Sydney Airport operates three passenger terminals, comprising an international terminal (Terminal 1) located in the north-west sector of the site and a domestic terminal complex (housing Terminals 2 and 3) in the north-east sector of the site. Terminal 2 is used by a number of domestic and regional airlines, while Terminal 3 currently is operated exclusively for Qantas.

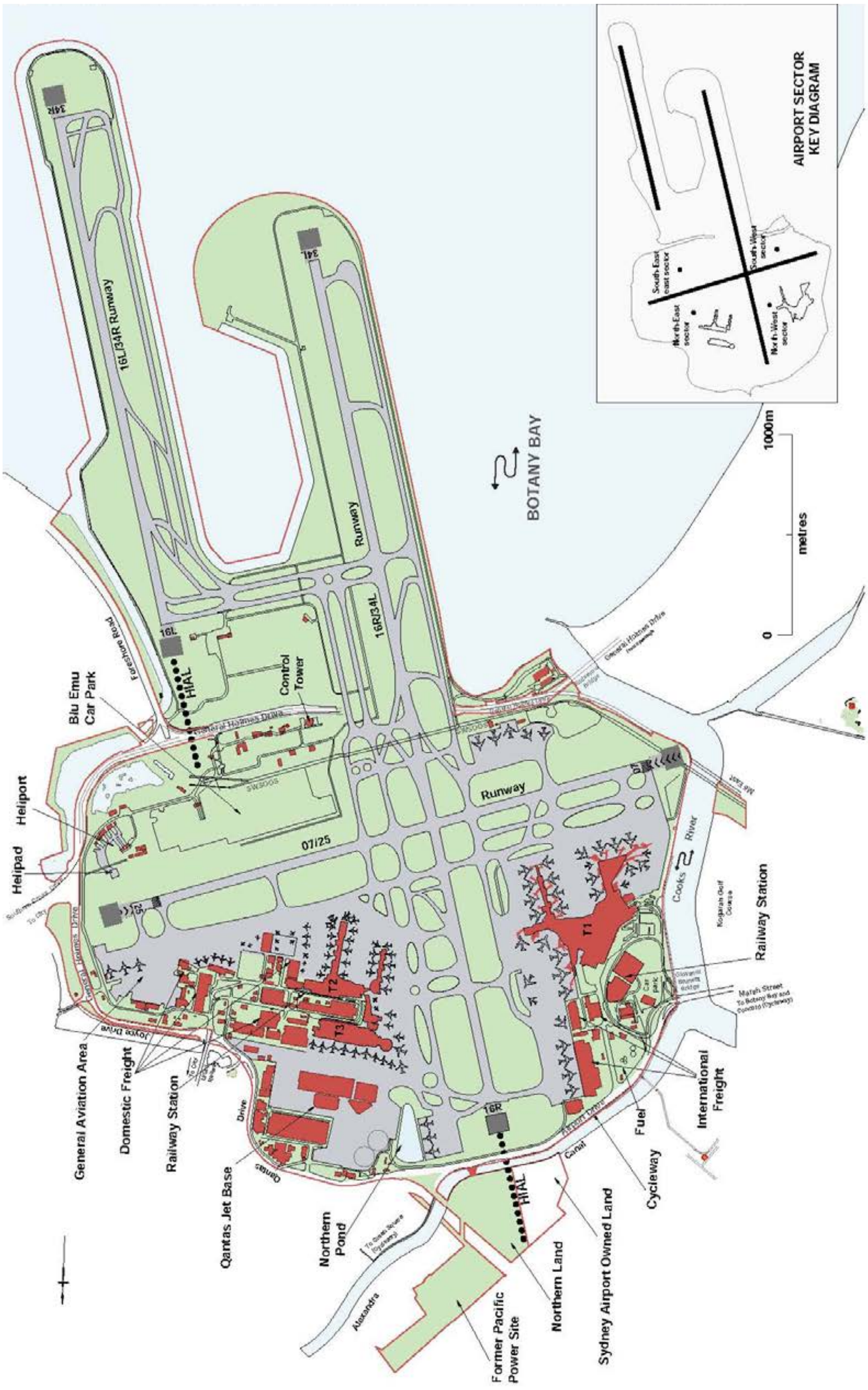
Sydney Airport has three runways, comprising two parallel runways on an approximate north−south alignment and a cross runway on an east−west alignment as shown on Figure 2–3. Runway 16R/34L is the main runway for the airport and is 3,962 metres in length. It parallels the shorter (2,438 metre) Runway 16L/34R, which was completed in 1994. Runway 07/25 is the cross runway and is approximately 2,530 metres long, on an approximate east−west alignment through the centre of the airport.

The runways are supported by a comprehensive taxiway system designed to facilitate the efficient movement of aircraft between the runways and terminal areas. Rapid exit taxiways are provided on the parallel runways to reduce runway occupancy. The runways and their supporting taxiways can accommodate operations of aircraft up to and including the Airbus A380 (currently the world's largest passenger airliner) (SACL 2014).

Apron areas are provided to facilitate aircraft parking (the parking position is known as an aircraft 'stand' or 'gate'). There are 106 aircraft stands dedicated to supporting international, domestic, regional and freight operations at Sydney Airport. The apron areas also support activities associated with the servicing of aircraft such as baggage handling, movement of freight, refuelling and in-flight catering. A network of airside roads provides for ground support equipment and other vehicle movements (SACL 2014).

The general aviation parking area is located in the north-east sector of the airport. The area provides aircraft parking for a number of freight, corporate and private aircraft as well as a variety of aviation support facilities such as maintenance hangars, freight handling and administrative buildings (SACL 2014).

Engineering facilities are located in the north-east sector of the airport. The general aviation parking area is also located in the north-east sector of the airport, east of T2/T3. It provides aircraft parking for a number of freight, corporate and private aircraft. A variety of aviation support facilities such as maintenance hangars, freight handling and administrative buildings are located adjacent to the general aviation parking area (SACL 2014).



Source: *Sydney Airport Master Plan 2033 (SACL 2014).*

Figure 2–3 – Sydney Airport

There are four international cargo terminal operators and two domestic cargo terminal operators operating at Sydney Airport. A helicopter precinct is located in the south-east sector of the airport, which includes a touchdown and lift off area, taxiways, parking pads, storage/maintenance hangars and administrative buildings (SACL 2014).

2.4.2 General aviation airports – Bankstown and Camden

General aviation is the name given to that sector of the aviation industry that is non-military and excludes the larger airlines operating scheduled passenger services. The general aviation sector undertakes a diverse range of passenger and freight activities including charter operations, flight training, aerial agriculture, aerial work, private and business flying and sports related activities.

The two main general aviation airports in the Sydney basin are Bankstown Airport and Camden Airport, which are described below and their locations relative to other airports are shown on Figure 2–4. There are also a number of other smaller general aviation airports within the region. These airports typically provide general aviation facilities and cater for activities such as private flying, flight training and sports aviation.

Figure 2–4 – Existing airports in the Sydney basin

Bankstown Airport

Bankstown Airport is located approximately 25 kilometres south-west of Sydney's Central Business District. The airport caters for a wide range of general aviation (both fixed wing and helicopter) activities including flight training, charter flights, air freight and emergency services.

Bankstown Airport is operated and managed by Bankstown Airport Limited (BAL), a subsidiary of BAC Airports Pty Limited. It is situated on approximately 313 hectares of land. There are three parallel runways – 11L/29R (1,100 metres in length), 11C/29C (1,416 metres in length) and 11R/29L (1,038 metres in length). The runways are supported by a taxiway network totalling approximately 11.5 kilometres. There is also a designated helicopter landing site at the airport (BAL 2014).

Bankstown Airport has approximately 70,600 square metres of paved aircraft parking aprons and approximately 45,000 square metres of designated grass-surfaced small aircraft parking (BAL 2014). The passenger terminal building is a single storey structure with approximately 715 square metres gross floor area. There is no regular scheduled passenger service at the airport, although the terminal building is used on an occasional basis for passenger processing for charter flights, facilitating approximately 4,000 passengers per year (BAL 2014).

There are 90 separate hangar structures at the airport and not all hangars are used for aircraft storage. Other activities within the hangar buildings include aircraft maintenance, flying schools, executive flight operations and air freight handling. Most of the hangars have annexes or space for supporting ancillary activities such as offices, classrooms, storage, workshops, toilets and kitchens (BAL 2014).

Bankstown Airport accommodates an average of around 600 aircraft movements per day. The majority (61.5 per cent) of aircraft operating at the airport are single-engine piston aircraft, typically engaged in flight training, private flying and related activities. Twin-engine piston aircraft are the second largest category (18.8 per cent). Rotary aircraft (helicopters) account for 13.9 per cent of aircraft activity and are typically involved in emergency services and government agency operations, flight training, charter or freight activity. A further 4.5 per cent of aircraft are turbo-prop aircraft, which are typically involved in charter, business, corporate and other aerial work activities. Jet turbine activity contributes only 1.3 per cent of aircraft operating at Bankstown and typically includes business and private activities as well as maintenance of other aircraft (BAL 2014) because of the runway restrictions.

Bankstown Airport serves as a base for the NSW Police Air Wing, the NSW National Parks and Wildlife Service, the Royal Flying Doctor Service, NSW Forests, Greater Sydney Area Helicopter Medical Service and the Aviation Studies program of the University of NSW (BAL 2014).

Camden Airport

Camden Airport is located approximately 53 kilometres south-west of Sydney's Central Business District. The airport caters for general aviation and is used for sport aviation, private flying, flight training and ballooning activities (CAL 2010).

Camden Airport is operated and managed by Camden Airport Limited (CAL), a subsidiary of BAC Airports Pty Limited. It is situated on approximately 196 hectares of land and has four runways – two for powered fixed wing aircraft and two for gliders. Runway 06/24 is approximately 1,464 metres in length. It has an asphalt surface and is the main runway for aircraft movements. It is equipped with single stage, low intensity runway lights. Runway 06/24 is also equipped with runway ends and threshold lighting. Runway 10/28 is a grass surface crosswind runway, approximately 723 metres in length. It is unlit and can only be used during daylight hours under conditions of good visibility. The airport is equipped with a non-directional beacon, which supports a circling non-precision approach (CAL 2010).

There are two grass surface runways reserved for glider operations. One runway parallels Runway 06/24, while the other parallels Runway 10/28. Both are approximately 780 metres in length and neither is equipped with landing aids. There is a designated helicopter landing site with a grass surface to the north of Runway 06/24 (CAL 2010).

Camden Airport has approximately 8,084 square metres of paved aircraft parking aprons and approximately 3,000 square metres of designated grass-surface aircraft parking (CAL 2010). Two large hangars and open parking for an estimated 40 aircraft support the glider operations. There are 17 hangar buildings for aircraft storage. The hangars also provide space for a variety of aviation-related activities including aircraft maintenance, flying schools and corporate/executive aviation facilities (CAL 2010).

Camden Airport has a number of taxiways (both sealed and grass) providing access to the runways, the airport building complex and the aprons.

Camden Airport accommodates between around 100 and 150 aircraft movements per day. The majority of aircraft identified at Camden Airport (93.7 per cent) are single-engine piston aircraft. These aircraft are typically engaged in flight training, private flying and related activities. Twin-engine piston aircraft is the second largest category at 5.2 per cent. These aircraft are typically involved in flight training. The remaining 1.1 per cent is split between turbo-prop and other aircraft (typically military and overseas registered aircraft) (CAL 2010).

Camden Airport serves as a base for helicopters involved in supporting seasonal bush firefighting activities and for air training for the Scout Association of Australia (CAL 2010).

2.4.3 Military airfields – Holsworthy and Richmond

There are two airfields operated by the military within the Sydney basin (see Figure 2–4):

- Royal Australian Air Force (RAAF) Base Richmond, operated by the RAAF. RAAF Base Richmond is located approximately 50 kilometres north-west of Sydney's Central Business District. The airport houses the military aviation activities of the RAAF Heavy Lift Group. The main aircraft type operated at the base is the Lockheed C-130 Hercules. The airport occupies approximately 270 hectares and has a single sealed runway approximately 2,134 metres in length. Some civilian general aviation activity is allowed, including practice instrument landing system approaches and gliding activity on weekends (BAL 2014).

- Holsworthy (Military) Airfield, operated by the Australian Army. Holsworthy Airfield is located within the Holsworthy Military Reserve, which is a training area and artillery range for the Australian Army, approximately 26 kilometres south-west of Sydney's Central Business District. Access to the airport is restricted and only suited to light aircraft. The airfield has a single sealed runway (Runway 11/29) with a length of approximately 580 metres (BAL 2014).

2.5 Capacity constraints

2.5.1 The Joint Study

In response to growing aviation demand, the Australian and NSW governments agreed in 2009 to develop a strategic plan to ensure sufficient future aviation capacity in the Sydney region.

A steering committee comprising government and non-government members with relevant experience and expertise in infrastructure, transport, planning, aviation, economics, the environment and tourism was established to guide the process. In March 2012 the *Joint Study on Aviation Capacity in the Sydney Region* (Joint Study) (Department of Infrastructure and Transport 2012) was released.

The purpose of the Joint Study was to develop an effective strategy for meeting the aviation capacity needs of the Sydney region into the future. It was noted that previous studies had examined options for a second Sydney airport; however, the terms of reference for the Joint Study required a broader examination of:

- the future demand for aviation in the Sydney region;
- how aviation demand relates to the growth of the population and economic activity in the region; and
- how an integrated aviation, surface transport and land development strategy can be developed and implemented over time.

In undertaking an assessment of key drivers of aviation demand, the Joint Study found the Sydney region's demand for aviation services would continue to grow as Sydney's population and business activity grew. It was estimated that annual demand for regular public transport services in the Sydney region would double to approximately 88 million passenger trips by 2035, then double again by 2060.

Overall, the Joint Study concluded that:

- Sydney Airport would continue to be the most important airport for the Sydney region and for Australia, both for passengers and freight;
- even with the implementation of a major terminal redevelopment and revised master plan, Sydney Airport would not be able to cater for the forecast demand in passenger and freight services to and from Sydney;
- the growth in aviation demand and increasing capacity pressures at Sydney Airport would result in increasing impacts on aircraft operations, ground traffic and surrounding communities in terms of reduced scope to mitigate aircraft noise;

- the cost of not accommodating the growth in aviation demand is substantial; by 2060 NSW would have foregone $30.6 billion in expenditure, $17.5 billion in gross state product (GSP) (2010 dollars), and 57,000 jobs; and
- a major greenfield airport in the Sydney basin was the only suitable long term strategy to accommodate the expected growth in aviation demand and ensure significant economic and employment opportunities are not forgone.

The Joint Study forecast that demand for aviation services would continue to grow along with Sydney's ongoing growth in population and business activities. The study conservatively estimated that growth in aviation demand would be less than three per cent per year.

The Joint Study found that on an unconstrained basis (which presumes that all necessary capacity is provided to meet growth), estimated annual aviation demand in the Sydney region would be:

- 57.6 million passenger and 421,200 aircraft movements by 2020;
- 87.4 million passenger and 528,600 aircraft movements by 2035; and
- 165 million passenger and 800,800 aircraft movements by 2060.

As noted earlier, this growth represents a doubling of passenger movements in the Sydney region by 2035 and another near doubling by 2060. In relation to freight, the Joint Study found that on an unconstrained basis, annual demand for freight tonnage would quadruple between 2010 and 2060.

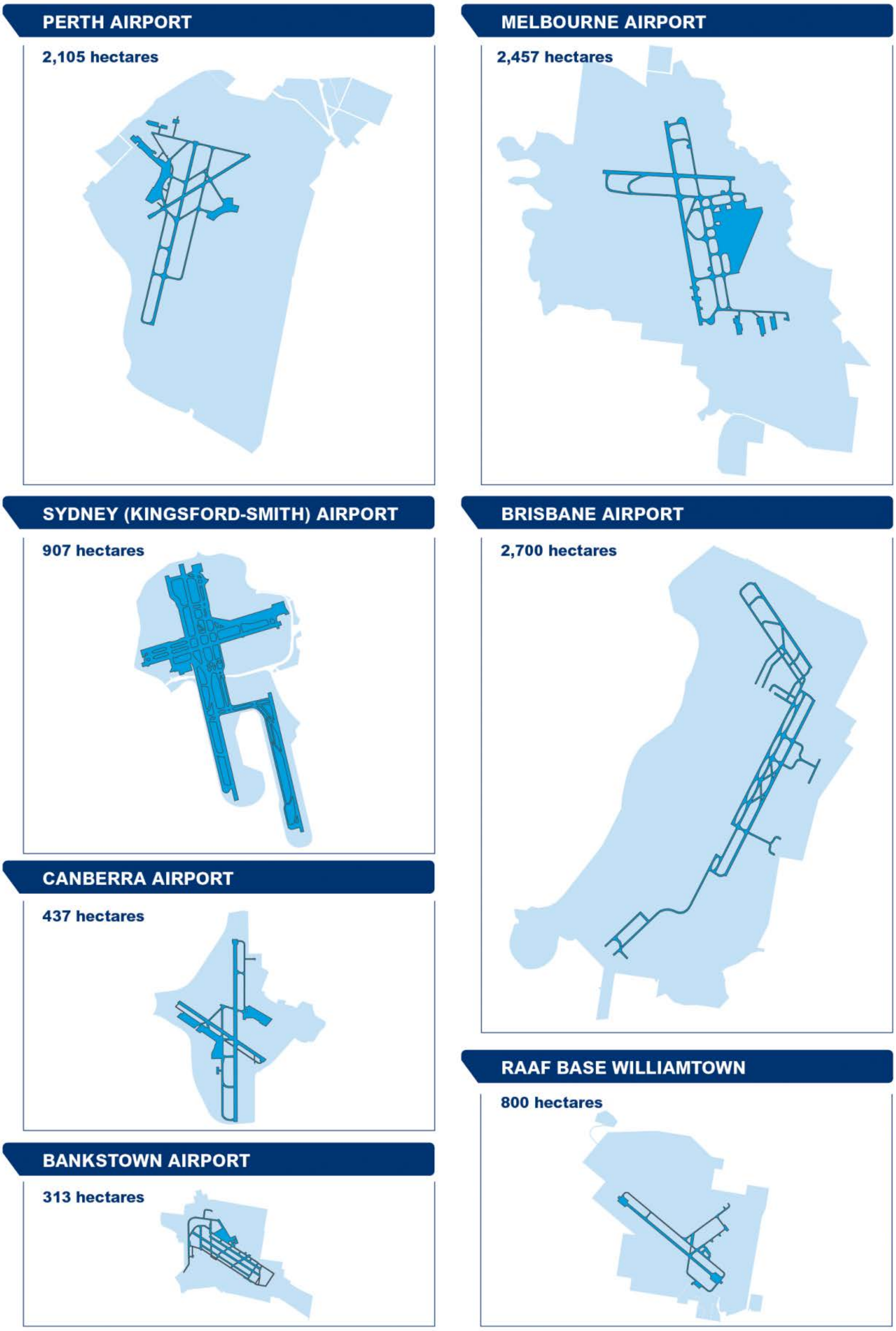
In the absence of other major passenger airports close to Sydney, Sydney Airport would be the only option for servicing this demand. By 2035, Sydney Airport would need to accommodate close to 80 million passengers a year; which is equivalent to around 430,000 annual aircraft movements and represents a 50 per cent increase on movements in 2010. The Joint Study found that due to capacity constraints at and around Sydney Airport, it would not be able to accommodate all of the forecast demand.

2.5.2 Sydney Airport capacity

Sydney Airport's capacity to continue to grow to meet demand is constrained by a number of factors. The existing footprint of 907 hectares is small by comparison with other major airports in Australia, as illustrated in Figure 2–5. It is also small compared to other major airports overseas. The airport has operated since 1920 and has been developed progressively, including the extension of runways into Botany Bay. The particular configuration of the runways, taxiways, terminals and aprons arises from the constraints of the site. It therefore does not reflect the contemporary optimal layout for terminals and runways at a major airport.

The configuration and length of the runways and associated taxiway and apron systems restrict the use of the shorter runways for larger aircraft, creating an imbalance in runway operations and reducing the ability of the dual runway system to be operated efficiently.

Capacity is further restricted when weather prevents the use of the dual runway system, as the length of the cross runway means that it is not suitable for all larger aircraft. The length of the runways also limits the scope for 'up-gauging', a process that provides additional capacity through use of larger aircraft to accommodate growing passenger numbers without increasing the number of aircraft movements.



Source: Joint Study (Department of Infrastructure and Transport 2012).

Figure 2–5 – Comparison of land areas of selected Australian airports

Collectively, the relatively small size of Sydney Airport, along with its location amid surrounding urban development and proximity to Port Botany and Botany Bay, suggest that any significant expansion of the airport site, realignment of runways or rationalisation of the taxiway and apron systems would be extremely challenging to achieve. At current demand levels, the existing stands and apron areas are heavily utilised at each terminal during peak service periods and any growth in aircraft movements would require additional gate capacity in the near to medium term.

The Joint Study considered that the limitations of existing infrastructure at Sydney Airport will start to be felt from 2015. After this time, there is predicted to be a progressive shortfall in the ability to meet demand, particularly for international services during peak periods. The increase in demand will result in the following capacity restrictions:

- by 2020, all weekday slots for periods between 6.00 am and 12 noon and between 4.00 pm and 7.00 pm will be fully allocated;
- by around 2027, all slots will be allocated, so no new entrants can be accommodated unless another service is cancelled; and
- by around 2035, there will be practically no scope for further growth of regular passenger services at the airport.

The effects of pressure on existing operations at Sydney Airport will grow progressively as airport passenger numbers continue to increase. This includes increased risk of delays, lack of access for new services at peak times, impacts upon the surrounding community due to a restricted ability to use ‘noise sharing’ arrangements and increased road congestion and pressure on the ground transport system.

Additional capacity pressures on taxiways and aprons result in increasing delays to airline services during peak hour periods, when handling rates can only be sustained for a limited number of consecutive hours before flow-on delays are likely. This results in a reduction in potential for Sydney Airport to recover from any disruption to services, with any delays during the morning peak periods continuing to have effects throughout the day. The Joint Study also concluded that there would be a substantial shortfall in aircraft stands and increased capacity pressures on aprons, gates and taxiways, resulting in major impacts and costs.

Reduced capacity to cater for new services at commercially viable times for airlines will mean that airlines will have limited ability to shift any new services to a different schedule, if their preferred slots are unavailable. In practice, the capacity pressure will therefore result in a loss of opportunity well before the available slots run out.

2.6 Strategic alternatives

2.6.1 Overview

The development of a new greenfield airport at Badgerys Creek has consistently been found to be the most effective solution to address long term aviation demand in the Sydney region, a position confirmed by the Joint Study. In coming to this conclusion, the Joint Study also provided a re-evaluation and broad consideration of a number of strategic alternatives to the development of a greenfield airport, including:

- expanding Sydney Airport to meet increased demand;
- review of the policy setting and operational restrictions to optimise the use of Sydney Airport;
- optimising the use of other existing airports in the Sydney region;
- use of high speed rail to reduce demand for aviation services; and
- development of other greenfield airports.

While the Joint Study acknowledged that some of the options had potential to provide marginal capacity benefits, such as amending cap and curfew arrangements at Sydney Airport, they were considered extremely short term solutions and incapable of addressing long term aviation capacity requirements. Other proposals, such as expanding Sydney Airport or connecting a high speed train to Canberra or Newcastle airports, were found to require significant capital investment and would not necessarily address the underlying key driver of growth in aviation demand.

The Joint Study identified that a major greenfield airport in the Sydney basin was required before the end of 2030 and that a greenfield airport in Western Sydney would be best placed to meet this growing demand. A review of the key findings of the Joint Study and supplementary assessments to address aviation demand is presented below.

2.6.2 Physical expansion of Sydney Airport

Through a comprehensive assessment of Sydney Airport's existing facilities, investment plans and master planning intentions, the Joint Study concluded that there is no real option to significantly increase the capacity of Sydney Airport. This is primarily due to the physical constraints associated with airport's location, runway lengths, taxiways, and gate and apron capacities, which prevent any significant upgrades or reconfigurations of the airport.

Given the limited scope to expand within its current footprint, a range of options has been considered to expand the airport beyond its boundaries including:

- expansion to the Kurnell/Towra Point area of Botany Bay;
- development of an offshore airport;
- modified or new runways, including extending the shorter north−south runway (Runway 16L/34R) or constructing a second east−west cross runway; and
- terminal redevelopment.

Kurnell/Towra Point

Potential configurations for a new dual runway airport in the Kurnell or Towra Point area on the southern foreshore of Botany Bay have been considered in previous studies, to either complement or replace services at Sydney Airport. These options were not seen as cost effective as they would effectively restrict and displace the existing airport operations without enabling a significant increase in capacity in the region.

New runways in Kurnell were also considered to have high potential for environmental impacts associated with reclamation of land in Botany Bay and the coastal dune system. Since the option was initially investigated, the Kurnell Peninsula has also been restricted by progressive development which includes an oil refinery, a desalination plant and additional residential development.

Offshore airport

The potential for an offshore airport in the vicinity of Sydney has previously been considered but ruled out based on cost and environmental considerations. Passenger access would be expensive to establish and operate, with difficult and costly linkages to the existing transportation networks. Security of infrastructure would also be a key consideration for such a development, and the potential environmental impacts would be even more significant than for the Kurnell or Towra Point options.

Extending existing runways

A range of options were considered to either extend the shorter north−south runway (Runway 16L/34R) or construct a second east−west cross runway at Sydney Airport. Each option would require expansion of the Sydney Airport boundary into Botany Bay, or onto land to the east of the airport. The option of extending the runway into Botany Bay is limited by the location of the container terminal facilities on the north-eastern foreshore of Botany Bay, while extending to the east would require considerable land acquisition and relocation of roads and transport networks.

The lengthening of the shorter runways would allow for better balancing of runway operations for use by larger aircraft, but would provide minimal capacity improvements as the parallel runway configuration would remain the same.

The separation for the two parallel runways is below the ICAO Standards to permit independent arrivals and departures. More importantly, addressing runway balance would not address other critical congestion points due to the lack of suitable land for taxiways, aircraft parking and terminal developments.

Terminal redevelopment

Sydney Airport Master Plan 2033 (SACL 2014) includes details of a proposed terminal redevelopment plan to expand and make better use of the existing airport terminals. While the proposal may help ensure the airport operates efficiently and that the use of the infrastructure is maximised, it does not address underlying capacity limitations. The redevelopment would have minimal influence on the capacity of the runway system, and would not address the immediate shortage of gates available to accommodate the growth of demand into the medium and long term.

2.6.3 Review of operational policy settings

The Joint Study noted that there are three operational policy settings that constrain Sydney Airport's capacity:

- the demand management system, which imposes a maximum aircraft movement limit per regulated hour on the runways and a limit on the slot allocations;
- the curfew, which limits take-offs and landings between 11.00 pm and 6.00 am; and
- the regional ring fence that protects the number of intrastate NSW movements in and out of the airport.

An overview of this analysis is outlined below. The Joint Study concluded that options for changing policy settings at Sydney Airport could provide some additional capacity in the short term but would not meet the medium to long term capacity gap, particularly in the peak periods when demand is already constrained.

Demand management

A demand management system operates at Sydney Airport, setting a cap of 80 movements per hour. The slot management system, which allocates services to the runways, is required to be consistent with the airport movement cap. The effect of allowing up to 85 movements per hour on airport capacity was considered for two scenarios:

- increasing the number of movements during peak hours only; and
- increasing the number of movements for all non-curfew operating hours.

Increasing the cap in the morning peak (6.00 am to 8.00 am) and afternoon peak (5.00 pm to 7.00 pm) would provide 20 additional slots, or a six per cent increase in capacity, during peak periods. Increasing the cap for all non-curfew operating hours (between 6.00 am and 11.00 pm) would make available an additional 85 slots per day, including the additional 20 slots during peak periods. Increasing the cap under either of these scenarios would delay the onset of capacity issues at the airport by around one or three years, respectively, and is not a long term solution to Sydney's aviation capacity needs in either scenario.

It was considered that any increase in peak movement would place additional strain on limited airside infrastructure and surface transport linkages, and would also increase the noise exposure to surrounding communities.

Curfew shoulder settings

A curfew has been in place at Sydney Airport since 1963 to protect the communities close to the airport and flight paths from noise exposure.

The *Sydney Airport Curfew Act 1995* allows a small number of movements in the shoulder periods, including a maximum of 35 weekly arrivals between 5.00 am and 6.00 am and 14 movements between 11.00 pm and midnight, or to such lower levels as set out in regulations. The current regulations set a lower limit of no more than 24 movements per week between 5.00 am and 6.00 am and zero movements between 11.00 pm and midnight. In total, this means that the regulated level for curfew shoulder movements is currently 1,248 movements per year; however, the absolute maximum curfew shoulder level allowed under the *Sydney Airport Curfew Act 1995* is equivalent to 2,548 movements per year.

Possible refinements to the curfew shoulder period have been proposed as a way to increase capacity at Sydney Airport. The effectiveness of this option to provide capacity would be driven by the level of demand for movements in the curfew shoulder hours.

As a result of Sydney's geographic position, international demand is currently characterised by early morning arrival peaks from Europe, Asia and the United States. International flights cannot be spread evenly throughout the day because of:

- scheduling in Asia and Europe;
- connections at hub airports;
- aircraft and crew rotations; and
- the number of sectors per day required to commercially operate trans-Tasman routes.

Considering current demand for international landings in the morning peak, it is likely changes to the curfew would attract some interest from international airlines. Such a measure would reduce pressure on the international terminal and airport infrastructure and relieve some pressure on passenger processing facilities. However, demand for international landings is principally driven by the northern hemisphere summer scheduling period, a time when arrivals of overseas passengers to Australia are at their highest. Therefore, any increased capacity in the curfew shoulder, if utilised, may only be taken up during those six months.

Overall, the Joint Study found that because early morning and late night flights are principally driven by limited seasonal international demand, changes to curfew arrangements at Sydney Airport would only have a limited effect on increasing the operational capacity of Sydney Airport. The Joint Study concluded that, at best, changes to Sydney Airport's curfew could delay the onset of capacity issues for less than one year and would not address the long term aviation capacity constraints.

NSW intrastate ring fence and minimum aircraft size

Sydney Airport currently operates a system of allocating aircraft slots to airlines arriving and departing from regional destinations, known as the 'regional ring fence'. This system includes specific provisions to protect slots for intrastate NSW air services and ensure these slots are not squeezed out by international or major domestic services, to preserve equitable access to the airport for regional communities in NSW.

While the protection of regional access is an important policy objective, these services limit the commercial operations of Sydney Airport as regional services are often operated by small aircraft and do not represent an efficient use of the limited airport capacity in terms of the movement of passengers. This was recognised in amendments to the Slot Management Scheme in 2001, which set a cap for the maximum number of NSW intrastate slots allocated in peak periods.

Any change to the regional ring fence or minimum aircraft size requirements would have the potential to affect the level and pattern of services to regional NSW. Potential implications may include:

- a need for regional airports to be upgraded to cater for larger aircraft;
- reduction in service frequency, but potentially higher capacity in seat numbers;

- increased 'hub and spoke' activity, with consolidation of smaller flights in regional hubs and larger aircraft operating to Sydney Airport;
- operation of smaller aircraft into another airport in the region, such as Bankstown Airport, if available;
- withdrawal of some services to markets with low demand, where only small aircraft are viable and services through a regional hub are not a realistic option; and
- increased travel times and higher costs for many regional passengers.

While a progressive increase in the size of aircraft using Sydney Airport may be a prudent strategy to increase the efficiency of airport operations, the additional capacity created by this change would be limited and would not significantly address the underlying increase in demand for aviation services in the Sydney basin.

Such a strategy would likely require a significant change to the fleet mix used by some airlines and may not be economically viable.

2.6.4 Optimising use of existing airports in the Sydney basin

Bankstown Airport

A potential option to increase capacity at Sydney Airport is to relocate existing turbo-prop movements to Bankstown Airport, leaving these vacated slots available for larger aircraft to operate at Sydney Airport.

The relocation of all turbo-prop aircraft movements to Bankstown Airport would create an increase in slot capacity at Sydney Airport, potentially accommodating increased demand for an additional six years. However, this capacity expansion needs to be balanced against other factors such as the relocation of general aviation traffic to another airport and its associated impacts. The commencement of any substantial level of passenger services at Bankstown may also raise significant issues for the local community, including increased noise and road congestion.

RAAF Base Richmond

As outlined in the Joint Study, Airservices Australia estimated that RAAF Base Richmond may have an unconstrained, theoretical regular public transport aircraft capacity of between 186,000 and 250,000 movements per year. This would provide an additional 35 to 50 per cent of regular public transport capacity above current Sydney Airport slots. Theoretically, if RAAF Base Richmond were capable of accommodating 200,000 aircraft movements by Boeing 737 and Airbus 320s carrying 120 passengers per movement, it could cater for up to approximately 24 million passengers per year.

However, the aerodrome's practical capacity is likely to be lower than this, due to airspace conflicts with Sydney Airport and Bankstown Airport and the likely operational mix of aircraft and peak operating times. The practical capacity would also be affected by RAAF operational requirements and the size of the Richmond site, which is considerably smaller than a number of medium-sized regular public transport airports in Australia.

Construction of a new north−south runway at RAAF Base Richmond would help minimise some of the airspace issues and could also reduce noise impacts on residents. There is also potential to construct a longer north−south runway, creating more opportunity to meet international demand, which is the fastest-growing regular public transport segment. However, *A Study of Wilton and RAAF Base Richmond for Civil Aviation Operations* (DIRD 2013) concluded that, even if a north–south runway was developed, RAAF Base Richmond could only ever provide ancillary capacity for the Sydney region and would not address all of the aviation demand expected in the long term.

2.6.5 High speed rail

While it could become part of Australia's long term transport infrastructure, high speed rail is not considered to be an alternative to the development of a greenfield airport. This is because the two forms of transport cater for different demands and travel markets and are in many ways complementary, rather than alternatives.

In 2010 the Australian Government commissioned a strategic study to investigate the feasibility of a high speed rail network linking Melbourne, Canberra, Sydney and Brisbane as well as other regional centres. Since that time, the Australian Government has released two reports on the subject:

- the *High Speed Rail Study Phase 1 Report* (AECOM 2011). This report identified corridors and station locations, potential patronage and provided an indicative cost to build the high speed rail network; and
- the *High Speed Rail Study Phase 2 Report* (AECOM 2013). This report built on the work of the Phase 1 report and refined many of the estimates, particularly around demand and costs as well as the preferred high speed rail route identified in the Phase 1 report. The report also identified next steps in staging a future high speed rail network in Australia.

The study examined a high speed rail network comprising approximately 1,748 kilometres of dedicated route with four city centre stations at capital cities, four city-peripheral stations (one in Brisbane, two in Sydney and one in Melbourne) and 12 regional stations. The estimated cost of constructing the preferred high speed rail alignment in its entirety would be around $114 billion (in 2012 dollars) (AECOM 2013).

A high speed rail network may reduce domestic aviation demand and provide an alternative for some domestic travel, particularly between Sydney and Canberra. However, the Joint Study found that development of a high speed rail network would not be able to address many of the key drivers of aviation demand, in particular international travel and travel to domestic destinations not on the east coast of Australia.

High speed rail and the need for additional aviation capacity should not be considered mutually exclusive. A number of countries around the world have demonstrated that no one transport mode can address all travel needs and that an effective transportation network requires long term investment in multiple modes of transport systems. For example, China, Germany and the United Kingdom have all been investing in additional aviation capacity while also developing and operating high speed rail networks.

As such, any consideration of a future east coast high speed rail system linking Sydney to other major cities does not remove the need to also provide additional aviation capacity.

While high speed rail may have merit as a strategy for long term travel in Australia, the substantial cost associated with its construction and operation, and its inability to address aviation demand on international and some domestic routes, means that it would not be able to provide all of the benefits made possible by the provision of additional aviation capacity. As such, the decision to construct and operate a high speed rail network should be assessed on its own merit and should not influence the decision to expand aviation capacity in the Sydney region.

2.6.6 Development of greenfield airport sites

The Joint Study evaluated potential sites for a new airport, covering a broad range of geographic areas. This included consideration of 80 sites across 18 localities, extending from Newcastle in the north to the NSW South Coast and Canberra in the south. The Joint Study found that Badgerys Creek was the preferred site for a new airport due to its location relative to the Sydney aviation market, and its ability to generate economic and employment benefits, while mitigating impacts on the environment and surrounding communities.

The Joint Study took a four-phase approach to the analysis.

- Phase 1 – assessment of the entire region using a geographic information system modelling approach for the identification of all reasonable locations for a new airport in the Sydney region. This reduced the overall area under consideration by excluding those lands that did not meet basic criteria for an airport, such as unsuitable terrain or an existing urban area.
- Phase 2 – short listing of localities through comparison of a comprehensive set of criteria to determine the potential for each locality to support an airport.
- Phase 3 – identification of sites within each shortlisted locality that were suitable to accommodate either a full sized international airport or a limited service airport aimed primarily at low cost carriers and regional markets.
- Phase 4 – assessment of the identified sites in greater detail using both qualitative data and a rapid cost benefit assessment. When there was more than one site of either type in a locality, these analyses allowed conclusions to be drawn on which was the 'more suitable' site.

A complex range of factors were identified and applied throughout the phased assessment process to filter and prioritise options. These were developed from sources spanning four decades of Australian and international aviation studies and reports and incorporated a broad range of assessment criteria. Key issues included proximity to demand, aviation development capacity, airspace conflicts with existing airports, environmental impacts and proximity to growth centres.

Phase 1

Phase 1 included a review of areas where a new airport could realistically be established based upon broad aviation infrastructure acceptability criteria such as degree of existing urbanisation, proximity to demand, topography and land parcel size. To guide the identification of greenfield airport sites, consideration was initially given to four possible airport types which could respond to a range of potential aviation demand segments:

- Type 1: full services airport with runway length up to 4000 metres, serving all regular public transport segments and capable of accommodating a future parallel runway layout;

- Type 2: land constrained full service airport serving all regular public transport segments and capable of supporting a single runway;
- Type 3: limited service airport serving all regular public transport segments accommodating a single shorter runway of up to 2600 metres; and
- Type 4: minimum service airport serving general aviation and limited regular public transport segments.

The phase 1 analysis resulted in 18 localities being identified in the Sydney region and surrounding areas that were potentially suitable for the development of an airport as shown in Table 2–2.

Table 2–2 – Greenfield airport localities identified in Phase 1

Region	Locality Number	Locality	Local Government Areas
Northern Localities	1	Ellalong	Cessnock
	2	Watagan Mountains	Cessnock, Lake Macquarie, Wyong
	3	Yengo National Park and Macpherson State Forest	Cessnock, Gosford, Hawkesbury
	4	Central Mangrove-Kulnura	Gosford, Wyong
	5	Central Coast	Lake Macquarie, Wyong
Western and north-west localities	6	Putty Road	Hawkesbury, Lithgow, Singleton
	7	Newnes State Forest and Plateau	Blue Mountains, Lithgow
	8	Great Western Highway	Blue Mountains, Lithgow
	9	Bells Line of Road, Bilpin	Blue Mountains, Hawkesbury
Sydney basin localities	10	Hawkesbury	Baulkham Hills, Blacktown, Hawkesbury, Hornsby, Penrith
	11	Kur-ring-gai National Park and surrounds	Hornsby, Gosford, Pittwater, Warringah
	12	Nepean	Blue Mountains, Liverpool, Penrith, Wollondilly
South-west localities	13	Burragorang	Camden, Wollondilly
	14	Cordeaux-Cataract	Campbelltown, Wingecarribee, Wollondilly, Wollongong
	15	Southern Highlands	Wingecarribee
	16	Goulburn to Marulan	Goulburn-Mulwarree, Upper Lachlan, Wingecarribee
	17	Marulan to Illawarra Highway junction	Goulburn Mulwaree, Upper Lachlan
Southern localities	18	West of Kiama bypass	Shellharbour

Source: Worley Parsons/AMPC Analysis in The Joint Study (Department of Infrastructure and Transport) 2012

Phase 2

Phase 2 involved an assessment of the 18 identified localities to allow short listing against a set of 30 evaluation criteria including proximity to demand, accessibility to land transport networks, economic or commercial opportunities and environmental considerations. The evaluation criteria included consideration of impacts upon protected areas, flora and fauna and noise exposure to surrounding communities. These criteria were used to provide an initial screening tool for environmental impacts, including potential impacts upon matters of national environmental significance and other matters protected by controlling provisions under Part 3 of the EPBC Act.

Proximity to demand and impacts upon protected areas including national parks, state conservation areas and the Greater Blue Mountains World Heritage Area (GBMWHA) were key criteria which distinguished the suitability of each locality.

A number of the identified localities were at the limits of the adopted travel threshold of within two hours' travel to Sydney. These localities were considered too remote to be attractive to airlines or airport users as they would generally involve greater costs in establishing transport links. The more distant localities were not seen to offer any significant advantages over those closer to Sydney and therefore the travel time threshold was reduced to 1.5 hours from Sydney.

Localities positioned within national parks and the GBMWHA were also initially considered technically feasible during the Phase 1 investigations. However, these localities were not considered to provide any additional benefits in comparison to other localities and would result in considerably greater environmental impacts. Localities including Yengo National Park, Newnes Plateau, Great Western Highway and Bells Line of Road were all located partially within the GBMWHA and provide habitat for a range of species of flora and fauna protected under the EPBC Act.

The removal of the more distant localities and those located within protected areas resulted in 11 of the 18 localities being removed from subsequent consideration. The remaining seven localities underwent a preliminary economic appraisal and a qualitative analysis of cultural heritage items, flora and fauna impacts and noise impacts upon residents and other sensitive receivers. A rapid benefit cost analysis was undertaken by Ernst and Young incorporating key monetised as well as non-monetised impacts as shown in Table 2–3.

Table 2–3 – Rapid benefit cost analysis results

Region	Locality Number	Locality	Type 1 airport	Type 2 airport	Type 3 airport	Type 4 airport
Northern localities	4	Central Mangrove-Kulnura	1.37	1.23	0.68	-0.09
	5	Central Coast	2.25	1.64	0.95	0.05
Sydney basin localities	10	Hawkesbury	1.67	1.30	0.74	0.23
	12	Nepean	2.82	1.92	1.22	0.38
South-west localities	13	Burragorang	1.80	1.28	0.72	0.00

Region	Locality Number	Locality	Type 1 airport	Type 2 airport	Type 3 airport	Type 4 airport
	14	Cordeaux-Cataract	2	1.33	0.76	0.18
	15	Southern Highlands	0.81	0.35	0.02	-0.50

Source: Ernst and Young in the Joint Study (Department of Infrastructure and Transport 2012)

The relative benefit cost ratios were developed to provide a comparison between localities. The results indicate that sites in the Nepean locality would have the highest benefit to cost ratio compared to other localities.

The lower economic results for Central Mangrove-Kulnura and the Southern Highlands were principally attributed to higher travel times for aircraft users and the relative site development costs and these localities were subsequently removed from further analysis.

The benefit cost analysis indicates that a Type 1 full service airport is generally more economically viable than other airport types. However, the Joint Study steering committee considered that there was merit in also continuing to assess both Type 1 and Type 3 airports.

Phase 3

Phase 3 involved the identification of the more suitable sites for the establishment of a new airport in the five localities shortlisted as a result of the Phase 2 process. The five shortlisted localities are shown on Table 2–4.

Table 2–4 – Greenfield airport localities assessed in Phase 3

Region	Locality Number	Locality	Local Government Areas
Northern localities	5	Central Coast	Lake Macquarie, Wyong
Sydney basin localities	10	Hawkesbury	Baulkham Hills, Blacktown, Hawkesbury, Hornsby, Penrith
	12	Nepean	Blue Mountains, Liverpool, Penrith, Wollondilly
South-west localities	13	Burragorang	Camden, Wollondilly
	14	Cordeaux-Cataract	Campbelltown, Wingecarribee, Wollondilly, Wollongong

Source: Worley Parsons/AMPC Analysis in the Joint Study (Department of Infrastructure and Transport 2012)

The assessment considered a range of aviation feasibility and environmental criteria to identify the lands within each locality that were broadly suitable and most suitable. Assessment criteria included:

- site terrain and the degree to which an airport can closely align with existing topography and minimise earthworks volumes;
- air navigation requirements and airspace management;
- wind shear associated with particular terrain formations and escarpments;

- protected ecosystems including National Parks, State Conservation Areas, State Forests and RAMSAR wetlands
- urban areas and rural settlements, such as the population density located within a 20 ANEC noise contour based upon indicative airport layouts and runway orientation;
- mine subsidence districts;
- distance to land transport networks; and
- future land-use and growth centre plans.

This process identified a number of sites as potentially suitable to support development of a greenfield airport as shown in Table 2–5 and in Figure 2–6.

Table 2–5 – Suitable airport sites by locality

Region	Locality number	Locality	Short listed sites
Northern localities	5	Central Coast	Wallarah
			Peats Ridge (Type 3 only)
			Somersby
Hawkesbury	10	Hawkesbury	Wilberforce
			Castlereagh (Type 3 only)
			Windsor Downs (Type 3 only)
			Glenorie
Sydney basin localities	12	Nepean	Luddenham
			Kemps Creek (Type 3 only)
			Badgerys Creek
			Bringelly
			Greendale
			Catherine Field
South-west localities	13	Burragorang	Silverdale (Type 3 only)
			The Oaks (Type 3 only)
			Mowbray Park
	14	Cordeaux-Cataract	North Appin
			Southend (Type 3 only)
			Wilton
			Wallandoola
			Dendrobium (Type 3 only)

Source: Worley Parsons/AMPC Analysis in the Joint Study (Department of Infrastructure and Transport 2012)

Source: Joint Study on aviation capacity in Sydney region (Department of Infrastructure and Transport 2012)

Figure 2–6 – Potential short listed sites for second Sydney Airport

Phase 4

Phase 4 involved applying a set of technical criteria to the sites identified as suitable to determine the most suitable site within each locality. The analysis is presented in full within the Joint Study.

The sites in the Nepean locality (including Luddenham, Kemps Creek, Badgerys Creek, Bringelly and Greendale) were found to be preferable when assessed against most criteria. The key advantage of these sites is their relative proximity to the sources of potential demand and the associated benefits that would accrue to airport users. Site development costs were also estimated to be relatively lower, compared with most sites in other localities.

The Badgerys Creek site was highlighted as the preferred site for a greenfield airport due to its location relative to the growing aviation demand in Western Sydney and proximity to road and rail transport links. It was found to provide the additional benefits of increased employment and economic opportunities for the Western Sydney community and to be a catalyst for much-needed supply of housing.

Further investigation of Wilton as an alternative greenfield location

In addition to finding Badgerys Creek as the preferred site for a greenfield airport, the Joint Study also noted that the Wilton site in the Cordeaux-Cataract locality had some merit as an alternative airport site. Due to its location, Wilton was considered as best placed to mitigate noise impacts on surrounding communities and was also one of the least constrained sites in terms of airspace interactions. Wilton was therefore subject to further investigations to consider its viability as a potential alternative location for a greenfield airport.In 2013 the Australian Government released the *Study of Wilton and RAAF Base Richmond for Civil Aviation Operations* (DIRD 2013). The report included a technical scoping study of the suitability of Wilton as an alternative airport site and included consideration of environmental, economic and social impacts associated with construction and operation of an airport at Wilton.

The report found that, while an airport would be feasible at Wilton, the ecological impact would be greater and the earthworks needed to prepare the site would be significantly more costly than at Badgerys Creek. In particular, the report found that development of an airport at Wilton would require:

- an estimated 100 million cubic metres of cut and fill for bulk earthworks which is significantly larger than the estimated requirements for the proposed Western Sydney Airport;
- the majority of the potential airport site would sit within drinking water catchment areas, requiring extremely rigorous and expensive works to prevent contamination;
- extensive vegetation clearance and removal of habitat for a range of threatened species which are known to occur in the area, including the Koala; and
- significant upgrades to surrounding transport and utility infrastructure.

The report also noted that the aviation industry was doubtful that an airport at Wilton would be close enough to the primary market for aviation services to make the case for the kind of investment needed to bring it into service. Further, the aviation industry had a clear preference for a greenfield airport to be located on the Commonwealth-owned land at Badgerys Creek.

2.6.7 Assessment of strategic alternatives against Matters of National Environmental Significance

Controlling provisions

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places which are defined as matters of national environmental significance. Development of a new airport has potential for a range of direct and indirect impacts upon matters of national environmental significance and other protected matters under the EPBC Act. The referral decision instrument identifies the following controlling provisions under the EPBC Act as being relevant to this proposal:

- world heritage properties (sections 12 and 15A);
- national heritage places (sections 15B and 15C);
- listed threatened species and communities (sections 18 and 18A); and
- Commonwealth action (section 28).

As outlined earlier, a range of strategic alternatives were considered as part of the Joint Study, including alternative solutions and alternative locations. The Joint Study found that development of a greenfield airport was the only alternative capable of meeting the anticipated long term aviation demand. As a result, only the alternative airport site locations, as assessed in the Joint Study and described in Section 2.6.6, have been assessed against Matters of National Environmental Significance in this section.

World heritage properties

The GBMWHA covers an area of 1.03 million hectares to the west and north of Sydney. It is inscribed on the UNESCO World Heritage List and is considered a matter of national environmental significance. Airport localities with potential for direct physical impacts upon the GBMWHA were excluded from further consideration during Phase 2 of the assessment process. Localities including Yengo National Park and Macpherson State Park, Newnes State Forest and Plateau, Great Western Highway and Bells Line of Road, Bilpin were all located partially within the GBMWHA and were removed from the site selection process together with localities within other protected areas.

A new airport in the Sydney region will result in an increase in the number of aircraft flying above the GBMWHA. Given the size of the world heritage area and the structure of existing airspace arrangements, potential indirect impacts associated with aircraft overflights upon the world heritage property would be similar for the alternative sites assessed in the Joint Study. In particular, as the second-best option for a greenfield airport, Wilton is located close to the GBMWHA, being approximately 15 kilometres from Nattai National Park. It is therefore likely that it would have similar impacts as expected for Western Sydney Airport.

National heritage places

The Greater Blue Mountains is also listed on the National Heritage Register together with a range of other protected areas around Sydney including Ku-ring-gai Chase National Park, Kurnell peninsula headland, the Royal National Park and Garawarra State Conservation Area. Similar to the situation with world heritage, localities were excluded during the site selection process that would have direct impacts upon national heritage places. Indirect impacts on national heritage places would be limited to additional aircraft overflights and would be similar for all shortlisted sites, including Wilton.

Listed threatened species and ecological communities

Potential impacts upon flora and fauna was a primary selection criteria as part of Phase 2 of the site selection process in the Joint Study. The potential to impact upon listed threatened species and ecological communities was a relevant consideration in the determination of the potential suitability of the localities. In addition, localities situated in protected areas were excluded. This provides for the conservation of the diversity of habitats and ecological communities within these areas.

In addition, the scoping study of the Wilton site in the Study of the Study of Wilton and RAAF Base Richmond for Civil Aviation Operations (DIRD 2013) found that it would require larger amounts of bulk earthworks and vegetation clearance compared to an airport at Badgerys Creek. This would suggest that the impact on listed threatened species and ecological communities would be higher at Wilton than for the proposed airport.

The Nepean locality has been largely cleared for agriculture and rural development which limits the extent of potential disturbance to threatened species and communities. The majority of the Badgerys Creek site consists of exotic grassland and cleared land or cropland dominated by exotic species and noxious and environmental weeds. An offset package has been developed to compensate for the removal of the remaining woodland that provides habitat for threatened species and ecological communities at the site.

Commonwealth action

The proposed airport is located on Commonwealth land and is an action proposed to be undertaken by the Australian Government. Impacts upon the environment in general are therefore required to be considered as part of the action. Environmental factors were considered within each phase of the site selection process.

The Nepean locality contains continuous areas of terrain which minimise the extent of earthworks and disturbance necessary to create a level platform for an airport development. The locality was also favourable due to its proximity to growing aviation demand in Western Sydney. The locality also has close proximity to road and rail links, which further reduces the potential disturbance area.

One of the key factors that makes Badgerys Creek the preferred site for a greenfield airport is that the site and its surrounding area has been protected from urban and noise-sensitive development. This has been achieved through the implementation of Strategic Direction 5.8 – Second Sydney Airport: Badgerys Creek (Strategic Direction), which was issued by the NSW Minister for Planning to local councils under section 117(2) of the Environmental Planning and Assessment Act 1979. The objective of the Strategic Direction is to avoid incompatible development in the vicinity of any future airport at Badgerys Creek, and specifically applies to land within the 20 ANEC contour prepared for the 1985 EIS. These planning controls have been implemented by local councils through local environment plans and have largely ensured that noise-sensitive and residential developments have not occurred in the vicinity of the airport site.

2.7 Emergence of Western Sydney

The Sydney metropolitan region is currently home to more than four million residents and is the economic capital of Australia (DP&E 2014). A significant proportion of the population resides in Western Sydney – including the local government areas of Auburn, Bankstown, Blacktown, Blue Mountains, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith, The Hills and Wollondilly. At present, Western Sydney represents around 47 per cent of Sydney's residents, 36 per cent of Sydney's jobs and one third of Sydney's gross regional product (DP&E 2014).

Western Sydney is regarded as one of Australia's most significant economic growth corridors. It is expected that over the next 20 years Western Sydney's population will grow faster than that in the rest of Sydney. Almost one million more people are expected to live west of Homebush by 2031 (DP&E 2014) and, over the next 25 years, Western Sydney is expected to account for 60 per cent of Sydney's population growth and 25 per cent of the nation's population growth (Deloitte 2015).

The anticipated growth in Western Sydney over the coming decades will represent a profound regional transformation. The Australian and NSW governments are shaping this transformation through a number of key strategies, including the South West Priority Growth Centre, the positioning of Parramatta as a second Central Business District for Sydney, the Western Sydney Infrastructure Plan, the Western Sydney Employment Area, the South West Rail Link extension, and the Outer Sydney Orbital corridor preservation study.

These strategies have emerged partly in response to several issues confronting Western Sydney. Some of the most pertinent concerns are a lack of infrastructure and employment opportunities in the region. Many Western Sydney residents must travel outside the region for work, particularly for well-paid knowledge-based jobs. Around 28 per cent of the resident workforce, or close to 226,000 people, travel to other parts of the metropolitan area for work every day (DP&E 2014). These issues are adding to congestion and greatly increasing the time Western Sydney residents spend commuting to and from work.

The Australian and NSW governments have established a Western Sydney Infrastructure Plan involving major road and transport linkage upgrades intended to capitalise on the expected economic gains of developing an airport at Badgerys Creek and address the lack of ground transport infrastructure. The NSW Government has also established the Western Sydney Employment Area, which largely borders the airport site, to provide businesses in the region with land for industry and employment, catering for transport and logistics, warehousing and office space.

Development of the proposed airport would coincide with an expected period of significant economic expansion and growing demand for employment opportunities and access to infrastructure in Western Sydney. The proposed airport is expected to be a catalyst for investment and job growth in the region, providing long term employment opportunities, accelerating infrastructure and housing development and strengthening Western Sydney's emergence as a discrete socio-economic region over the coming decades.

2.8 Role of the proposed Western Sydney Airport

As well as being an important transport gateway and economic centre for Western Sydney, the proposed airport would operate as part of the existing airport system in the Sydney basin. In this context, the proposed airport is expected to have a dual role in:

- providing additional capacity to accommodate future aviation demand in the Sydney basin; and
- providing Western Sydney with better access to aviation services, bringing with it long term economic and employment opportunities and accelerating the development of critical infrastructure and urban development in the region.

2.8.1 Providing additional aviation capacity

At the expected commencement of operations in the mid-2020s and during its initial development phase, the proposed airport's customer base is expected to consist predominantly of domestic and international low cost carrier traffic. This demand is expected to be attracted to the proposed airport due to lower aeronautical charges compared to Sydney Airport, as well as by the availability of peak slots, lower airside congestion and the ability to serve a diverse customer base in Western Sydney. While there is expected to be some demand for full service operations at the proposed airport in its initial development phase, full service operations are expected to remain focused at Sydney Airport. In the long term, and as Sydney Airport reaches capacity, the proposed airport is expected to transition to a full service airport, catering to a diverse range of domestic and international travel routes.

Table 2–6 provides a summary of forecast demand and traffic at the proposed airport. During Stage 1 with a single northern runway, total passenger demand at the proposed airport is forecast to reach approximately 10 million passengers annually by 2030. Beyond Stage 1, the single runway is expected reach capacity, at a level of approximately 37 million passengers annually by 2050. This equates to approximately 63,000 air traffic movements in 2030 and 185,000 air traffic movements in 2050.

In the long term, the proposed airport is expected to include a second runway, reaching operational capacity at approximately 82 million passengers annually and 370,000 air traffic movements by 2063, assuming development occurs in line with the indicative long-term concept design.

Table 2–6 – Forecast demand and traffic at Western Sydney Airport

Demand type	Stage 1 (c.2030)	First runway at capacity (c.2050)	Long term (c.2063)
Annual passengers (arrivals and departures)	10 million	37 million	82 million
Peak hour passengers (international and domestic)	3,400	9,500	18,700
Total annual air traffic movements (passenger and freight)	63,000	185,000	370,000
Total peak hour air traffic movements	21	49	85

As noted, Sydney Airport is expected to continue to be the most important airport in the Sydney region for the foreseeable future. Concurrent with the operation of the proposed airport, overall demand at Sydney Airport is expected to continue growing to 51 million passengers annually by 2030, 72.7 million passengers annually by 2050 and 85.3 million passengers annually by 2075.

Despite this continued growth in overall demand, it is expected that Sydney Airport will reach its international passenger capacity by 2042 and domestic passenger capacity by 2048. Once Sydney Airport reaches capacity, the majority of air traffic growth in the Sydney basin is expected to occur at the proposed airport. A small amount of growth may occur at Sydney Airport, but this would generally be limited to use of larger passenger aircraft, increases in aircraft seat density and greater operational efficiencies.

In light of the demand expected at the proposed airport during Stage 1, it is forecast that about five years after opening, around 2030, the proposed airport would accommodate approximately 800 domestic flights per week, with multiple daily services to Australian capital cities, and approximately 130 international flights per week. By 2050, the proposed airport would accommodate approximately 1,700 domestic flights per week, with multiple daily services to Australian capital cities and regional areas, and approximately 1,200 international flights per week.

The domestic and international passenger mix at the proposed airport is expected to evolve over time, driven by carrier decisions about services and the timing of international and domestic capacity constraints being realised at Sydney Airport. Passenger demand at the proposed airport is expected to be initially biased towards domestic markets, representing 79 per cent of total demand in 2030. International services are expected to progressively increase as capacity constraints at Sydney Airport take effect and would make up to 43 per cent of air traffic movements at the proposed airport by 2050. At this time the proposed airport is forecast to serve 55 per cent of the Sydney basin's international traffic demand.

In providing additional aviation capacity, the proposed airport is expected to play a critical role in accommodating long term aviation demand and enable the economic and employment opportunities outlined by the Joint Study to be realised.

2.8.2 Providing Western Sydney with better access to aviation services

With a population of about two million, Western Sydney as a region is larger than the population of South Australia (ABS 2015). Locating the proposed airport at Badgerys Creek will provide an airport for this heavily populated and growing region. Development of the proposed airport is expected to provide the current and future community with improved access to aviation services by reducing travel times, increasing destination choice and increasing competition.

As a major transport gateway, the proposed airport is expected to become a vital piece of infrastructure at the centre of Western Sydney's economic transformation. According to the NSW Department of Planning and Environment (2014), the proposed airport would emerge as a new economic and transport hub, enabling nearby centres such as Liverpool, Penrith, Campbelltown and Macarthur to continue to grow as regional city centres. In addition, the airport site is approximately 30 kilometres from Parramatta, which is emerging as Sydney's second CBD.

By accommodating future aviation demand, the proposed airport is expected to attract investment to the area and transform the economic structure of the region, driving growth in a range of industries such as transport and logistics, hospitality, education, research and professional services. This would make the proposed airport a significant catalyst for other economic activity in the area, accelerating investment in critical infrastructure, facilitating development of nearby employment and industrial precincts, and broadening the employment opportunities available to residents.

As infrastructure assets, airports are unique in that they generate more jobs during operation than construction. These jobs will involve a range of industries, skills and qualifications, and will help to support local education, apprenticeships and workplace skills into the future. Finally, these jobs will be close to where people live – cutting travel time to work, reducing the need to travel outside the region for work, and improving lifestyles.

2.9 Conclusion

Aviation has been a critical component in the economic success of Australia and of Sydney in particular. Over the coming decades, Sydney is expected to become more reliant on its connections to other parts of Australia and the world for its continued economic growth. In addition to its role in facilitating GDP growth, aviation plays an increasingly important social role in connecting Australians with each other and with the rest of the world.

The Joint Study provided a comprehensive review of anticipated demand for aviation services in the Sydney region and potential alternatives to address the increasing aviation capacity constraints in the Sydney region.

The Joint Study predicted that demand for aviation services will continue to grow along with Sydney's ongoing growth in population and business activities, and that the majority of population growth would occur in Western Sydney. Sydney Airport is Australia's busiest regular public transport airport and will continue to be the major focus for international and domestic airlines operating in and out of Sydney. Further development of Sydney Airport is limited by both physical and operational constraints and the airport will not be able to cater for the forecast long term demand in both passenger and freight services to Sydney.

The Joint Study found that the economic cost of not meeting the expected increased demand would be substantial. By 2060, the economy-wide (direct and flow-on) impacts across all sectors of the Australian economy could total $59.5 billion in foregone expenditure and $34.0 billion in foregone gross domestic product (based on 2010 dollars). The NSW economy would be especially heavily affected, with losses across all industries totalling $30.6 billion in foregone expenditure and $17.5 billion in foregone gross state product.

The Joint Study also predicted a substantial impact on potential employment in relation to the loss of opportunity to create new jobs to service the increasing demand for aviation services. The number of total jobs that would be foregone is estimated to grow over time, in parallel with unmet demand. By 2060 the estimate of foregone jobs is approximately 57,000 in NSW and 77,990 nationally.

A range of alternatives has been considered both for the expansion of existing airport facilities and the development a new greenfield airport. The Joint Study considered there was limited ability to meet the anticipated aviation demand through expansion of existing airports, and that a greenfield site would be required.

Badgerys Creek has been selected by the Commonwealth Government as the site for the development of a greenfield airport following the completion of an extensive site selection process. In addition to its inherent suitability to be developed as a major airport, the site was selected due to its proximity to an area of increasing aviation demand and having regard to the economic benefits and opportunities that an airport could provide for the growing Western Sydney region.

Development of the proposed airport at Badgerys Creek would simultaneously accommodate long term aviation demand and avoid foregoing economic and employment opportunities. During Stage 1, the proposed airport would be focused on low cost carrier domestic operations, although it would be capable of supporting the full range of airline services. In the long term, Sydney Airport will reach capacity and the proposed airport is expected to take a more prominent role in servicing a variety of domestic and international markets. By 2050 the proposed airport is expected to be accommodating the majority of international arrivals and departures in the Sydney basin. In this context, the proposed airport will play a critical role in fostering long term growth and development opportunities in Western Sydney.

3. Approvals framework

3.1 Introduction

The proposed airport is one of the largest infrastructure projects considered in Australia in recent years and would be the first major greenfield airport development in decades.

Development of the proposed airport will be subject to a Commonwealth environment and development approvals framework. Development at existing federally leased airports requires approvals under the Airports Act, through the approval of major development plans submitted by an ALC. An ALC has not been appointed for the proposed airport and the typical process under the Airports Act did not appropriately cater for development of an airport at a greenfield site.

The Australian Government therefore introduced into Parliament the Airports Amendment Bill 2015 (Airports Act amendment) which was passed by Parliament and then received Royal Assent on 30 June 2015. This amendment provides a single and transparent mechanism to seek planning, environment and development approval for the Stage 1 development of the proposed airport. The Airports Act amendment provides for the preparation of an airport plan to guide the development of the airport, which is to be determined by the Minister for Infrastructure and Regional Development.

The Airports Act amendment strengthens the Minister for the Environment’s role under the Airports Act. This draft EIS has been prepared and will be finalised under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The draft EIS will meet all requirements of the EPBC Act and the EIS guidelines issued for the proposed airport, including the requirement for public consultation. In determining the Airport Plan, the Minister for Infrastructure and Regional Development must accept any environmental conditions proposed by the Minister for the Environment, taking into account this EIS.

To this end, the draft Airport Plan sits alongside this EIS as a companion document. The draft Airport Plan specifies how Stage 1 of the proposed airport is to be developed on the Badgerys Creek site, while this EIS assesses the environmental, social and economic impacts associated with the Stage 1 development, as shown in Figure 3–1.

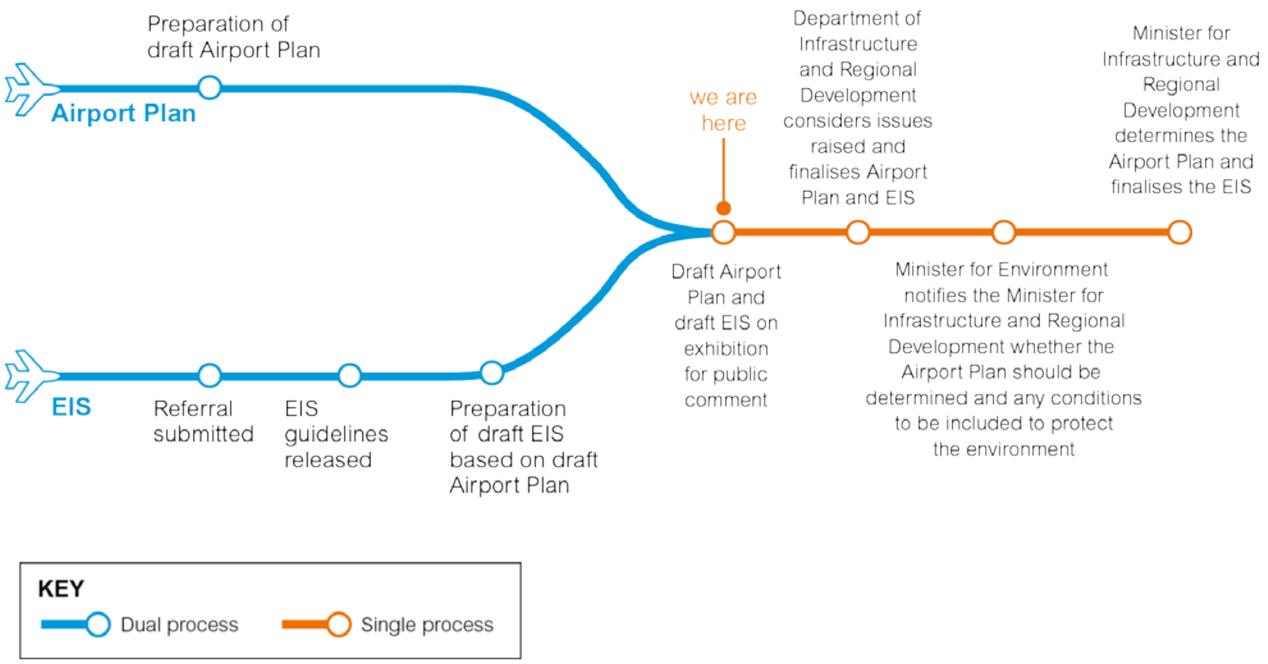


Figure 3–1 – Western Sydney Airport approval process

3.2 Approval process for Stage 1

3.2.1 The Environment Protection and Biodiversity Conservation Act

Introduction

The environmental assessment of the airport commenced with a referral of the proposal under the EPBC Act. The EPBC Act is the national environment law that provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined in the EPBC Act as matters of national environmental significance. These matters are:

- world heritage properties;
- national heritage places;
- wetlands of international importance (listed under the Ramsar Convention);
- listed threatened species and ecological communities;
- migratory species protected under international agreements;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions; and
- a water resource, in relation to a coal seam gas or large coal mining developments.

The EPBC Act also applies to actions that have a significant impact on the environment where the actions affect, or are taken on, Commonwealth land, or are carried out by a Commonwealth agency (Commonwealth action).

Referral of the proposal

The Department of Infrastructure and Regional Development submitted a referral under the EPBC Act for the development of the airport on 4 December 2014. The Department of the Environment invited public comment on the referral for 12 business days.

On 23 December 2014, a delegate of the Minister for the Environment determined the proposed Western Sydney Airport to be a ‘controlled action’. The referral decision instrument identifies the following controlling provisions under the EPBC Act as being relevant to this proposal:

- world heritage properties (sections 12 and 15A);
- national heritage places (sections 15B and 15C);
- listed threatened species and communities (sections 18 and 18A); and
- Commonwealth action (section 28).

At the same time, the delegate decided that the proposed airport development would be assessed by preparation of an EIS.

Tailored guidelines for the preparation of a draft EIS were issued on 29 January 2015. A copy of the guidelines is provided at Appendix B in Volume 4.

The EIS process

This draft EIS has been prepared to address the requirements of the EPBC Act and the EIS guidelines issued by the Department of the Environment. The draft EIS will be finalised following public exhibition and submitted to the Minister for the Environment for consideration in the manner described in Section 3.2.3 below.

Scope of the environmental assessment

The proposed airport would be developed as outlined in the draft Airport Plan prepared in accordance with the Airports Act (as amended in June 2015). Consistent with the proposal for a staged airport development, the draft Airport Plan includes a specific proposal for Stage 1 of airport development. The proposed Stage 1 development is the subject of this EIS. The environmental impacts of the proposed Stage 1 development are described and assessed in Volume 2.

The draft Airport Plan also provides indicative design concepts for the long term development of the airport. Subsequent stages of development beyond Stage 1, including construction of the proposed second runway, do not form part of the action subject to the current assessment process. It is expected that there would be several incremental stages of development before the airport approaches its potential long term capacity. Future stages of development beyond Stage 1 as described in the draft Airport Plan will be subject to the general assessment and approval requirements in accordance with the Airports Act.

Although the long term airport development is not part of the current action, Volume 3 of this EIS provides a preliminary assessment of the environmental impacts associated with a potential long term airport development concept, including indicative aircraft noise exposure levels.

3.2.2 Airports Act and the Airport Plan

The Airports Act provides a system for regulating certain federally-leased airports, including requirements for land use planning, building approvals and environmental management. Part 1 of the Airports Act provides for a ‘Sydney West Airport’ to be taken as an airport at a particular time, even if at that time it is only intended to be developed for use as an airport. The proposed airport at Badgerys Creek is therefore considered to be an airport for the purpose of the Airports Act. An airport lease would in due course be granted by the Commonwealth to an airport lessee company which would then become responsible for the airport site.

The Stage 1 development would be constructed and operated in accordance with the draft Airport Plan, which forms a transitional planning instrument under the Airports Act.

As set out in section 96C of the Airports Act, the Airport Plan consists of three main parts:

- Part 1 is the title section and provides an overview of the development and regulatory context;
- Part 2 outlines the indicative concept design for the Stage 1 development and an overview of the long term development; and
- Part 3 details the specifics and functionality of the developments.

While the Airport Plan defines the parameters for the Stage 1 development, future work including the long term development would be undertaken under the planning framework in Part 5 of the Airports Act as applies to existing major airports.

The Airports Act amendment provides for development of an Airport Plan, which is a transitional planning instrument for the initial development of the airport as a greenfield site. The purpose of the Airport Plan is to set out the Australian Government’s requirements for the Stage 1 airport development. Once determined by the Minister for Infrastructure and Regional Development, the Airport Plan becomes the instrument that guides the development as detailed in Part 3 of the Airport Plan.

The Airport Plan is primarily concerned with Stage 1 of the proposed airport, which involves the development of a single runway located in the north of the airport site, a terminal and other relevant facilities to accommodate approximately 10 million domestic and international passengers per year as well as freight traffic. Over time, as demand grows, the airport is expected to expand to include a second runway and more substantial terminal, support and commercial facilities.

Developments that are not included in Part 3 of the Airport Plan remain subject to the general planning framework in Part 5 of the Airports Act. Further information about the provisions of the Airports Act is provided in Section 3.3.

The Airport Plan may be varied under the Airports Act. A variation of the Airport Plan has the same effect as if it were an authorisation of an action described in subsection 160(2) of the EPBC Act. That is, it is treated like a major development plan, and the advice of the Minister for the Environment must therefore be sought on the variation before it is made. In addition, any condition or provision that the Minister for the Environment requires to be included in the Airport Plan to protect the environment may only be varied with the approval of the Minister for the Environment.

3.2.3 Public consultation and determination of the Airport Plan

The EIS and draft Airport Plan will be placed on public exhibition concurrently for a period as determined by the Minister for the Environment. Notices inviting public comment on both documents have been placed in national, metropolitan and local newspapers, and online at www.westernsydneyairport.gov.au.

During the public exhibition period any person, group, corporation or agency may submit comment on the draft EIS or the draft Airport Plan to the Department of Infrastructure and Regional Development. All comments on either document will be considered to be comments on the EIS and a copy will be forwarded to the Department of the Environment.

Finalisation of the EIS and determination of the Airport Plan

The draft EIS and the draft Airport Plan will be revised, taking account of comments received during the exhibition period. The finalised EIS will also provide any additional information that may be relevant to the Minister for the Environment's consideration of the environmental impacts of the proposal.

The Minister for the Environment will consider the finalised EIS and revised draft Airport Plan from an environmental perspective and notify the Minister for Infrastructure and Regional Development whether the Airport Plan should be determined and, if it is determined, whether any specific conditions or provisions should be included for the purpose of protecting the environment.

If the Minister for the Environment is satisfied with the draft Airport Plan, the Minister for Infrastructure and Regional Development may determine the Airport Plan. The Airport Plan must include any conditions or provisions specified in the notice from the Minister for the Environment.

3.3 The broader planning framework

3.3.1 Airports Act – Land use planning and building controls

Airport Master Plan

Part 5 of the Airports Act requires an ALC to prepare an airport master plan to provide the strategic direction for the airport site for a period of 20 years. For the Western Sydney Airport, the ALC will be required to submit for approval a full master plan within five years of an airport lease being granted, or in such a longer period as approved by the Minister for Infrastructure and Regional Development. Part 2 of the Airport Plan will provide the planning framework for the airport until the first master plan is in place.

The master plan will include:

- development objectives and consideration of future needs for civil aviation and other users, services and facility requirements;
- proposed land use and development for the airport site;
- flight paths at the airport;
- an Australian Noise Exposure Forecast (ANEF) and measures for managing aircraft noise;
- an environmental strategy including assessment of key environmental issues and details of proposed management and monitoring;
- a plan for a ground transport system on the landside of the airport including linkages with the surrounding road and public transport network;
- information on proposed commercial, retail, community, office or other non-airport related developments over the first five years of the master plan; and
- the likely effects of proposed developments on employment levels at the airport and on the local and regional economy and the community.

Section 79 of the Airports Act requires an ALC to notify and make available a preliminary version of a draft airport master plan for public comment. The ALC must provide copies of any public comments to the Minister for Infrastructure and Regional Development and demonstrate that the company has had due regard to those comments in preparing the draft master plan.

Major development plans

The ALC will also be required to prepare major development plans (MDPs) for future major airport developments that are not covered by the Airport Plan. Major developments are defined in section 89 of the Airports Act to include items such as constructing or modifying runways, certain buildings, taxiways, transport links or any development that is likely to have significant environmental or community impacts. Consultation with state and local government authorities is required during preparation of a draft MDP. The draft MDP must also be publicly exhibited to allow comment prior to finalisation and approval by the Minister for Infrastructure and Regional Development.

Under section 160 of the EPBC Act, the Minister for Infrastructure and Regional Development is required to seek the advice of the Minister for the Environment before deciding to approve a draft MDP. The Minister for the Environment determines whether advice is required and the approach to assessing the environmental impacts of the proposal under the EPBC Act, and also provides advice on the suitability of the development for approval, including any recommended conditions. If the Minister is satisfied that the draft major development plan meets the objectives defined in the Airports Act, the decision may be made to approve the plan.

Building controls

Once the airport lease has been granted by the Commonwealth, most building activities on the airport site, including those authorised by Part 3 of the Airport Plan, require building approval and certification under the Airports (Building Control) Regulations 1996. Approval and certification is given by the Airport Building Controller and must be consistent with the relevant planning instrument (for example, the Airport Plan, master plan or major development plan).

3.3.2 Environmental management

Once an airport lease has been granted, the Airports Act and the Airports (Environment Protection) Regulations 1997 set out the framework for the regulation and management of activities at airports that have potential to cause environmental harm once the airport lease has been granted. Part 6 of the Airports Act specifies offences relating to environmental harm, environmental management standards, monitoring and incident response requirements. The ALC for the proposed airport will be responsible for environmental management, including the responsibilities listed under Part 6 of the Airports Act.

The Airports (Environment Protection) Regulations 1997 impose duties on airport operators to take all reasonable and practicable measures to prevent or minimise air, water and soil pollution, as well as offensive noise. There are also duties regarding the preservation of biota, ecosystems and habitats, threatened species and ecological communities, sites of indigenous significance, and aesthetic, cultural, historical, social and scientific values. An operator must also take reasonable and practicable measures to ensure compliance with international environmental obligations.

The Regulations also impose extensive monitoring and reporting requirements in relation to air, water and soil pollution, as well as noise levels. This regime will be supplemented by the statutory appointment of an independent airport environment officer, dedicated to the airport, who will have powers to issue environment protection orders in relation to matters such as pollution, noise and habitat preservation and powers to issue infringement notices for environmental contraventions.

Another source of regulation of environmental matters at the proposed airport will be the environment strategy in the airport's master plan. This strategy will cover a number of environment matters and, in particular, will detail the specific measures to be carried out by the ALC for the purposes of preventing, controlling or reducing the environmental impact associated with airport operations. The environment strategy is a legally binding instrument that will apply to the airport operator and other people who conduct activities at the airport. The environment strategy will be prepared as part of the master plan development process.

3.3.3 Protection of airspace

The framework for the protection of airspace surrounding an airport is provided in Part 12 of the Airports Act. The regulations may declare airspace to be ‘prescribed airspace’ if it is in the interests of safety, efficiency or regularity of existing or future air transport operations for the airspace to be protected. If prescribed airspace has been declared, activities that result in intrusions into this airspace – such as new buildings or other structures – are termed ‘controlled activities’ and require approval. It is expected that prescribed airspace will be declared for the airport before operations commence. The prescribed airspace would include the Obstacle Limitation Surface (OLS) and Procedures for Air Navigation Services – Aircraft Operations (PANS–OPS) surfaces for safety and navigation purposes at the proposed airport.

3.3.4 Aerodrome certification

Before the airport commences operations, the ALC will be required to obtain an aerodrome certificate from the Civil Aviation Safety Authority (CASA). Aerodrome certificates are granted under Division 139.B.1 of the Civil Aviation Safety Regulations 1998. To be granted an aerodrome certificate, the ALC will need to demonstrate that:

- the airport’s facilities and equipment are in accordance with the applicable standards;
- the airport’s operating procedures make satisfactory provision for the safety of aircraft;
- an aerodrome manual, in accordance with the regulations, has been prepared; and
- the ALC would, if the certificate is granted, be able properly to operate and maintain the aerodrome.

3.3.5 Airspace management

Airspace management, including the ultimate determination of flight paths into and out of the proposed airport, is the responsibility of Airservices Australia and the Civil Aviation Safety Authority (CASA). Preliminary airspace architecture has been developed for the purpose of this draft EIS (see Chapter 7). The following matters would be taken into account in determining final flight paths.

- In designing airspace management arrangements for the airport, flight paths and procedures would be optimised for noise management purposes as part of the work that Airservices Australia would undertake before the airport became operational.
- Under the *Air Services Act 1995*, Airservices Australia is required to exercise its functions, as far as practicable, so as to protect the environment. *Airservices Commitment to Aircraft Noise management* (Airservices Australia 2013) outlines the considerations which are taken into account in designing flight paths and procedures.
- CASA would need to validate proposed flight paths and procedures. Under the Civil Aviation Act 1988, CASA is also required to exercise its functions so as to, as far as practicable, protect the environment.
- It is expected that a referral to the Minister for the Environment under the *Environment Protection and Biodiversity Conservation Act 1999* would be required before flight paths for the airport are put into place.

Consultation with airlines and other stakeholders would be undertaken through the design process, which would be subject to separate regulatory assessment processes. Important considerations in airspace design include:

- efficient use of the Sydney region airspace and integration with the national air traffic network as a whole;
- airspace protections for other aerodromes in the Sydney region including Defence establishments;
- the use of navigational technologies available both on ground and in aircraft at the time;
- opportunities to minimise potential noise and amenity impacts and other potential environmental issues; and
- consideration of operator and airline preferences and requirements.

3.3.6 Aviation transport security

It is expected that the proposed airport will be a security controlled airport for the purposes of the *Aviation Transport Security Act 2004*. This Act, along with the Aviation Transport Security Regulations 2005, imposes extensive requirements relating to the security of airport premises.

3.3.7 Biosecurity

It is expected that the proposed airport will be a first point of entry for the purposes of the *Biosecurity Act 2015*. An airport that is a first point of entry is required to comply with conditions imposed by the Minister for Agriculture regulating matters such as the conduct of biosecurity risk management.

3.3.8 Other regulatory considerations

A number of other regulatory requirements apply to the operation of airports including requirements relating to matters such as:

- designation of international airports under the *Air Navigation Act 1920* and related regulations;
- customs and immigration;
- work health and safety;
- limitations on foreign and airline ownership of airport-operator companies; and
- controls related to activities such as commercial trading, liquor licensing, vehicle movements, gambling and smoking.

3.4 New South Wales planning framework

The Western Sydney Airport would be located on land owned by the Commonwealth within the state of New South Wales (NSW). Section 96C(3) of the Airports Act authorises development of the airport in accordance with the Airport Plan and section 112 of the Airport Act excludes the operation of any state law which applies to land use planning. Accordingly, NSW planning laws do not apply to the proposed airport.

While the EIS guidelines form the primary guidance material for this EIS, consideration has also been given to relevant NSW legislation including environmental planning instruments, policies, and guidelines where considered appropriate.

The table following provides a brief summary of various NSW Acts and planning instruments that have been considered. Further information on how NSW Acts, planning instruments, policies and guidelines have been taken into consideration can be found in the relevant EIS chapters and technical studies.

Table 3–1 – Brief summary of NSW acts and planning instruments considered

NSW legislation and planning instruments	Overview
Environmental Planning and Assessment Act 1979	The objects of the *Environmental Planning and Assessment Act 1979* include the encouragement of proper management and conservation of natural and artificial resources and the promotion of the orderly and economic use and development of land in NSW. The Act also provides for the making of environmental planning instruments including State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs), which include land use controls, such as development standards applicable to the land within the area covered by each instrument.
State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP)	The Infrastructure SEPP aims to facilitate the effective delivery of infrastructure across NSW.
State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP)	The SRD SEPP identifies development that is State significant development (SSD) or State significant infrastructure (SSI).
State Environmental Planning Policy (Western Sydney Employment Area) 2009 (WSEA SEPP)	The Western Sydney Employment Area (WSEA) was established to provide businesses in the region with land for industry and employment. The WSEA has been extended to include land to the north and west of the airport site. The WSEA SEPP provides a range of development controls and standards for development within the WSEA.
State Environmental Planning Policy 19 – Urban Bushland (SEPP 19)	The purpose of SEPP 19 is to protect and preserve bushland within urban areas due to its inherent aesthetic, community and natural heritage values.
State Environmental Planning Policy 44 – Koala Habitat Protection (SEPP 44)	SEPP 44 aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline.
State Environmental Planning Policy 33 – Hazardous and Offensive Development (SEPP 33)	SEPP 33 presents a systematic approach to planning and assessing proposals for potentially hazardous and offensive development for the purpose of industry or storage.
State Environmental Planning Policy 55 – Remediation of Land (SEPP 55)	SEPP 55 provides for a statewide planning approach to the remediation of contaminated land and aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment.
State Environmental Planning Policy 64 – Advertising and Signage (SEPP 64)	SEPP 64 aims to ensure outdoor advertising is compatible with the desired amenity and visual character of an area, provides effective communication in suitable locations and is of high quality design and finish.

NSW legislation and planning instruments	Overview
Liverpool Local Environmental Plan 2008 (Liverpool LEP)	The Liverpool LEP provides local environmental planning provisions for land in the Liverpool Local Government Area (LGA) in accordance with the relevant standard environmental planning instrument under section 33A of the EP&A Act.
Protection of the Environment Operations Act	The objectives of the *Protection of the Environment Operations Act 1997* Act are to protect, restore and enhance the quality of the environment, in recognition of the need to maintain ecological sustainable development.
Threatened Species Conservation Act 1995	The *Threatened Species Conservation Act 1995* provides for the conservation of NSW-listed threatened species, populations and ecological communities of animals and plants. The Act does not generally apply to fish.
Fisheries Management Act 1994	The *Fisheries Management Act 1994* aims to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations, including conserving fish stocks and fish habitat and promoting ecologically sustainable development.
National Parks and Wildlife Act 1997	The *National Parks and Wildlife Act 1997* provides for the protection of Aboriginal objects (sites, objects and cultural material) and Aboriginal places.
Heritage Act 1977	The *Heritage Act 1997* makes provisions for the conservation of NSW's non-Aboriginal environmental heritage.
Water Management Act 2000	The *Water Management Act 2000* is intended to ensure that NSW water resources are conserved and properly managed for sustainable use benefitting both present and future generations.
Contaminated Land Management Act 1997	The main objective of the *Contaminated Land Management Act 1997* is to establish a process for notifying, investigating and remediating land which is or may be contaminated to a prescribed extent.
Roads Act 1993	The *Roads Act 1993* governs the opening, operation and management, and closure, of public roads in NSW.
Waste Avoidance and Recovery Act 2001	The *Waste Avoidance and Recovery Act 2001* promotes waste avoidance and resource recovery.
Noxious Weeds Act 1993	The *Noxious Weeds Act 1993* provides for the identification, classification and control of noxious weeds.

3.5 Related actions and proposals

This section provides an overview of actions and proposals related to transport planning, site preparation and other activities that are outside the scope of the Airport Plan and this EIS.

3.5.1 Demolition of buildings

As part of the day-to-day management of the airport site, the Australian Government is demolishing and removing vacant buildings and other structures that present a health or safety hazard. Any works associated with this day-to-day management of the site are not expected to have a significant environmental impact and are outside the scope of this draft EIS.

Realignment of utilities

A range of utility infrastructure assets, such as electricity transmission lines, telecommunications lines and water mains, are located on the site and are considered incompatible with the airport proposal. Removal of utility infrastructure off the airport site is considered as part of this draft EIS. However, as these utility assets are the responsibility of private or state-owned owners and operators, any works to relocate them off site would be subject to a separate process and are not within scope for this draft EIS.

Regional airspace design and management

The impacts identified in this EIS are based on indicative flight paths developed by Airservices Australia for aircraft approaches and departures at the proposed airport. It is expected these flight paths would be progressively refined during a detailed design process which would provide the opportunity to optimise safety, efficiency, noise and environmental impacts and may require changes to existing regional airspace management arrangements before operations begin at the proposed airport.

Proposals about airspace management above and around the proposed airport, including the determination of flight paths, will be made by Airservices Australia and the CASA closer to the start of airport operations. These proposals may require further environmental assessment processes to assist decision making and may be the subject of a future referral under the EPBC Act following detailed design.

Western Sydney Infrastructure Plan

The proposed airport is supported by the Australian and NSW governments’ Western Sydney Infrastructure Plan (WSIP), which is investing $3.6 billion over 10 years in major road infrastructure upgrades in Western Sydney. The WSIP will ensure transport connections are capable of handling future traffic growth in Western Sydney and will deliver the major road upgrades and transport linkages required to service the proposed airport. These include:

- upgrade of The Northern Road to a minimum of four lanes from Narellan to Jamison Road, South Penrith, including realignment around the western boundary of the airport site;
- construction of a new four lane motorway, including access to the site, between the M7 Motorway and The Northern Road, generally along the alignment of Elizabeth Drive;
- upgrade of Bringelly Road to a minimum of four lanes between The Northern Road and Camden Valley Way;
- Werrington Arterial Road linking the M4 and Great Western Highway;
- upgrade of Ross Street and Great Western Highway intersection at Glenbrook; and
- a $200 million package for local road upgrades.

With the exception of activities associated with the demolition of parts of the section of The Northern Road currently bisecting the site, these projects are outside the scope of the Airport Plan and this EIS. The NSW Government will be responsible for delivering these projects as operator of the road network. This will include undertaking any environmental impact assessments that may be required.

Western Sydney Employment Area Extension

The NSW Government established the Western Sydney Employment Area (WSEA) to provide businesses in the region with land for industry and employment, catering for transport and logistics, warehousing and office space. Following the Australian Government announcement that Badgerys Creek would be the site for a Western Sydney airport the NSW Government has extended the WSEA south to Elizabeth Drive and includes some land west of the site.

A draft Structure Plan was released in June 2013. It outlines a broad framework for the area including the location of future employment land and centres, a road network, potential freight and transport corridors and staging scenarios. The NSW Government is revising the draft Structure Plan to take into account the proposed airport. This revision is anticipated to be completed by the end of 2015. The Western Sydney Employment Area is described further and mapped in Chapter 21.

South West Growth Centre

The South West Growth Centre (SWGC) is a major greenfield land release area bordering the airport site to the south-east. The SWGC will eventually contain about 110,000 new dwellings for some 300,000 residents. The land immediately adjoining Badgerys Creek south of Elizabeth Drive has been earmarked for industrial and employment lands.

The NSW Government program for development of the SWGC (along with the North West Growth Centre) was assessed under the strategic assessment provisions of the EPBC Act. The SWGC, which provides for conservation outcomes through a comprehensive biodiversity offsets package, was endorsed by the then Australian Government Minister for the Environment in December 2011. The South West Growth Centre is described further and mapped in Chapter 21.

South West Rail Link Extension Corridor Preservation

The NSW Government has started the planning and consultation process for the preservation of a corridor for the future extension of the South West Rail Link. The extension corridor is proposed to connect Leppington station to Bringelly and then head in two directions: north to the T1 Western Line near St Marys; and south to Narellan. The NSW Government is also considering an extension of the corridor further south to the existing T2 South Line.

It is anticipated that the northern section of the South West Rail Link Extension between Bringelly and the T1 Western Line will be undertaken as part of the Outer Sydney Orbital study and consultation process. In the context of the South West Rail Link Extension, rail services will be required at the proposed airport initially through a connection to the Sydney metropolitan network and in the long term, a dedicated airport express rail service from a key transport node. The rail line will be predominantly underground through the airport site to avoid critical infrastructure, and also preserves flexibility for a station(s) in the terminal precinct.

The Stage 1 development does not currently include a rail service as the forecast demand would not require rail access. However, planning for the airport preserves flexibility for two potential rail alignment options. These alignments would follow a corridor under the terminal at 90 degrees to the runways, a corridor parallel to the runways in line with the ground transport access, or a combination of both. Figure 3–2 indicates the potential locations where these alignments enter the airport site.

A final rail alignment will be determined in consultation with the NSW Government. Depending on the final alignment and preferred timing to develop rail services, some enabling work may be required during the Stage 1 airport development to future-proof the corridor. Any such work is expected to be subject to a separate approval process.

Figure 3–2 – Potential rail corridors leading to airport site

Outer Sydney Orbital Corridor Study

The NSW Government is undertaking a corridor preservation study that is investigating a suitable Outer Sydney Orbital corridor to provide a north–south connection for a future motorway, freight rail and, where practicable, a passenger rail line. The corridor is expected to run from the Hume Highway south of Campbelltown, past the South West Growth Centre, the Broader Western Sydney Employment Area and the airport site, and through to the North West Growth Centre. Ultimately the corridor will provide increased capacity for the road network to improve accessibility to housing and employment opportunities in Western Sydney.

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PART B:

Airport Plan

4. Land use plan

4.1 Context

The Stage 1 development would be constructed and operated in accordance with the draft Airport Plan, which forms a transitional planning instrument under the Airports Act (see Section 3.2.2). The concept design outlined in the draft Airport Plan provides the planning framework for the proposed airport until the first master plan is in place. This part includes the development objectives for the proposed airport, indicative flight paths, projected aircraft noise contours and the Land Use Plan for the airport site. The concept design, including the Land Use Plan, cannot be altered without approval of the Minister for Infrastructure and Regional Development.

The indicative concept design outlined in Part 2 of the draft Airport Plan considers the development objectives, design rational and performance criteria for the Stage 1 development. It also sets out the Land Use Plan for the airport site. While the indicative concept design may be subject to some change depending on the business needs of the ALC and consistency with this EIS, the Land Use Plan cannot be altered without the approval of the Minister for Infrastructure and Regional Development.

The Land Use Plan will be applicable in the period between an airport lease being granted to an ALC and a master plan being developed by the ALC and approved by the Minister for Infrastructure and Regional Development. The Land Use Plan regulates the types of development, in terms of permissible land uses, that can occur within the airport site. It also outlines land uses and indicative developments that will facilitate long term growth.

Developments are only permissible where they meet the planning objectives and permitted uses outlined for each zone. Once an airport lease is granted, any development requires a building approval from the airport building controller under the Airports (Building Control) Regulations 1996. In deciding whether to approve the building activity, the airport building controller will consider, among other things, whether the building activity is consistent with the Land Use Plan contained in the Airport Plan (or the Land Use Plan included in any master plan that replaces it).

Any major development plan must be consistent with the Land Use Plan in the Airport Plan or, if the Airport Plan is replaced by a master plan, with the Land Use Plan contained within that master plan. Any sensitive development (as defined in section 71A of the Airports Act) which is not specifically authorised by Part 3 must comply with section 89A of the Airports Act; this section requires the Minister for Infrastructure and Regional Development to approve the preparation of a major development plan for the sensitive development.

4.2 Land use zones

This section provides an overview of land use zones and permissible uses as described in the draft Airport Plan. For land use planning purposes, the airport site has been divided into a number of zones. These land use zones (including the approximate area of each zone for the Stage 1 development) are listed in Table 4–1.

Table 4–1 – Proposed land use zones within the airport site (Stage 1 development)

Land use zone	Approximate area (hectares)
AD1 Aviation Activity	322
AD2 Terminal and Support Services	229
AD3 Aviation Logistics and Support Facilities	230
AD4 Aviation Activity (Reservation)	494
BD1 Business Development	167
BD2 Business Development (Reservation)	148
EC1 Environmental Conservation	129
TOTAL	1,780
Overlays[1]	
Detention Ponds	32
Indicative Airport Access Road	14
Potential Road Corridor	15[2]
Existing Roads On Site	15

[1] Not included in total

[2] 11ha may otherwise be zoned as EC1 and 4ha otherwise zoned as AD3 if not used for re-routing The Northern Road.

The land use zones applicable to the Stage 1 development are presented in Figure 4–1. These land use zones would apply from the grant of an airport lease until a master plan is prepared and in force.

Figure 4–2 presents an indicative long-term Land Use Plan for reference purposes only. It provides context for the aviation reservation zones and indicates the expected location of major aviation infrastructure, such as the second runway and associated taxiways.

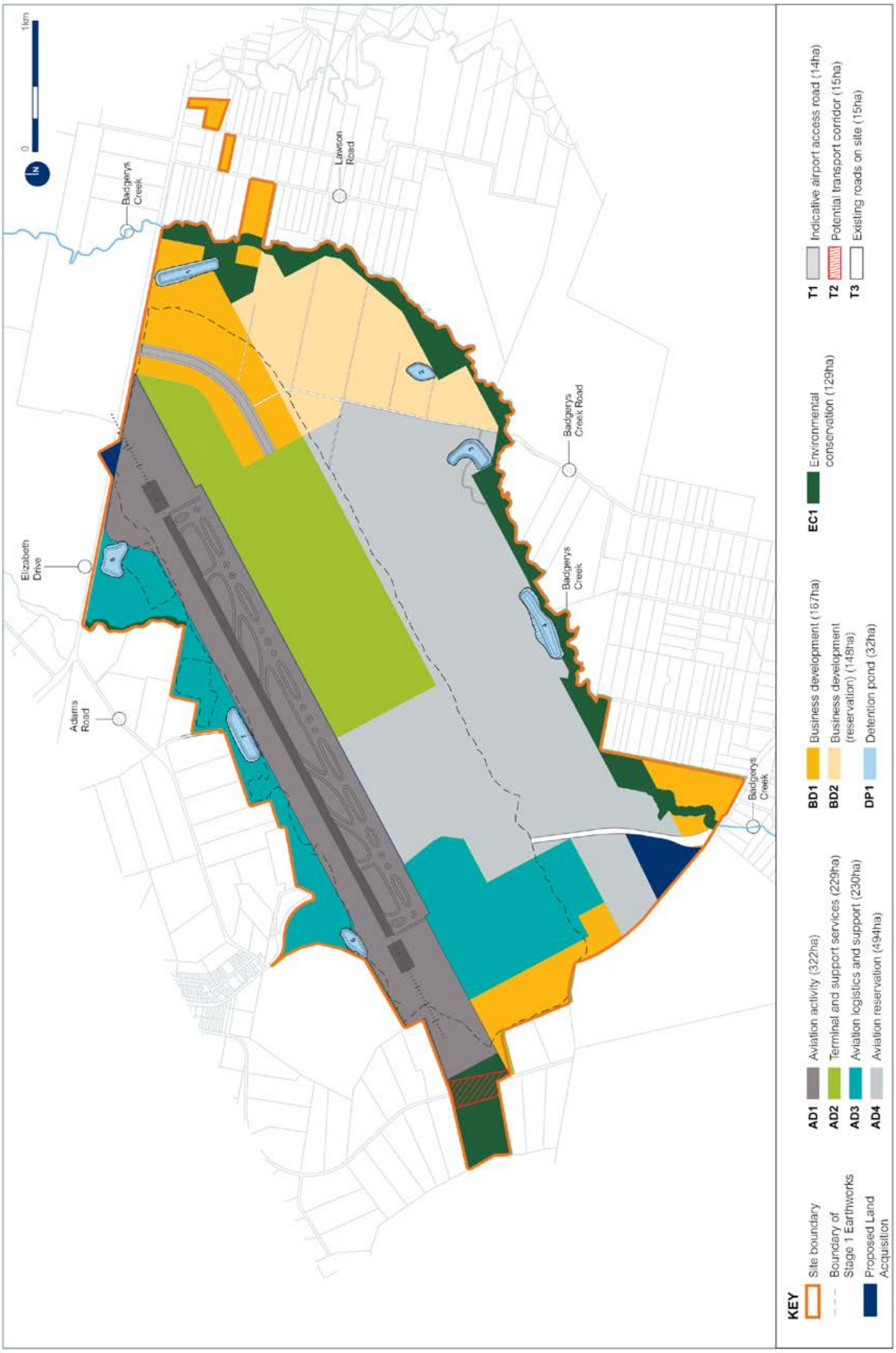


Figure 4–1 – Land use zones (Stage 1)

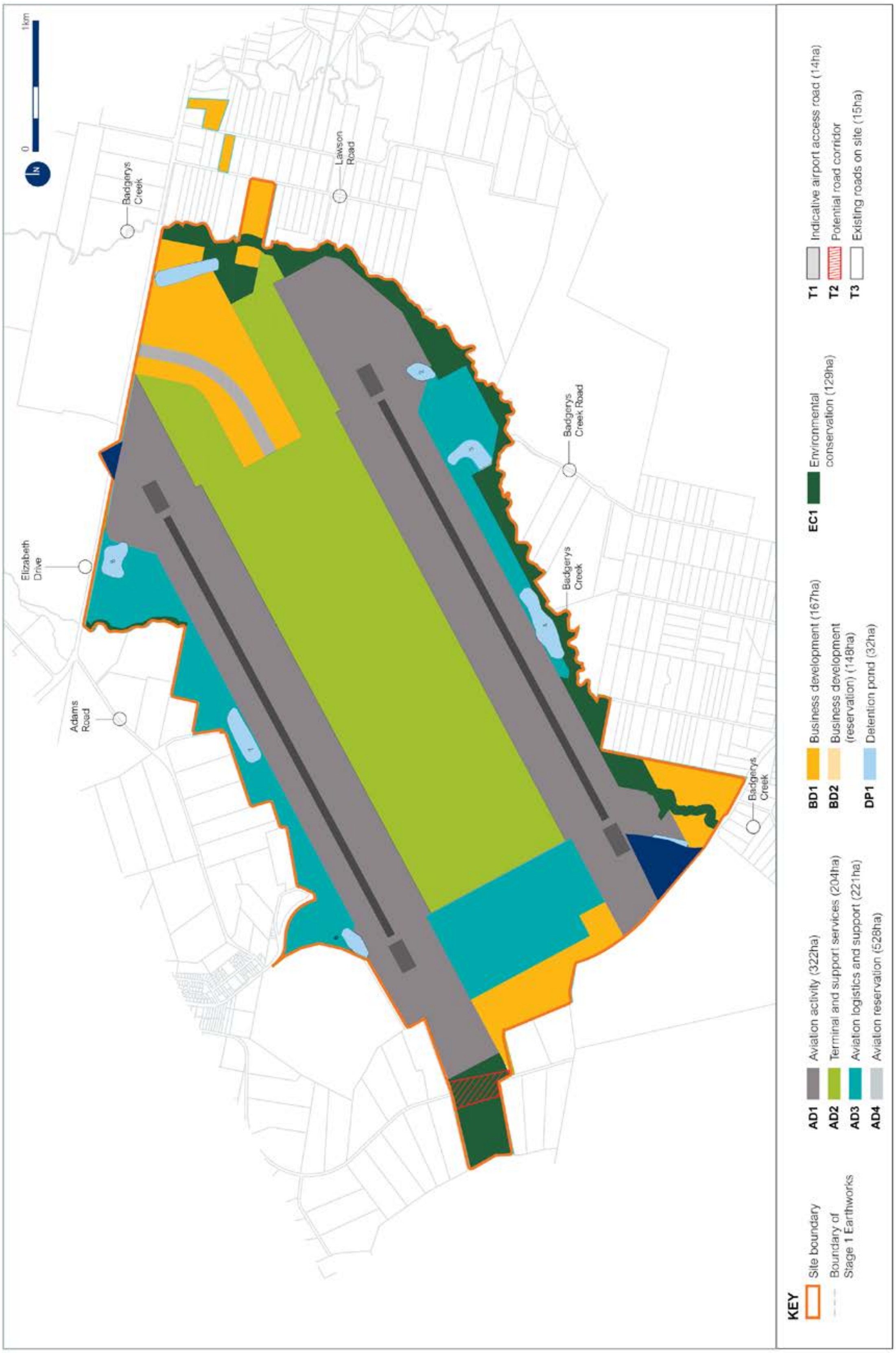


Figure 4–2 – Indicative land use zones (long term)

4.3 Land use zones – objectives and permissible uses

Each land use zone encompasses a series of objectives and permissible uses.

Objectives

Any development within a zone must be consistent with the objectives for that zone. In addition, a development must also meet the following objectives:

- to protect the long term viability and operational efficiency of the proposed airport; and
- to ensure the environment and heritage items are appropriately considered and managed.

Permissible uses

The permissible uses largely adopt the definitions used in the Dictionary contained in the *Standard Instrument (Local Environment Plans) Order 2006* (NSW), except where airport specific terms are required. Definitions of permissible uses are at Appendix 1 of the draft Airport Plan. A permissible use that is marked with an asterisk '*' is only permissible to the extent that the use relates to the construction, development or operation of the airport site. Existing uses on the airport site on the day the Airport Plan is determined are permissible until future development occurs in accordance with the land use objectives and permissible uses contained in the draft Airport Plan, provided that the existing use continues uninterrupted.

A description of the land use objectives and permissible uses for each land use zone is provided below. A permissible use marked with an asterisk is only permissible to the extent that the use relates to the construction, development or operation of the airport site.

4.3.1 AD1 Aviation activity

This land use zone primarily caters for runways and associated taxiways and navigational aids. The objectives and permissible uses of this land use zone are described in Table 4–2.

Table 4–2 – Objectives and permissible uses – AD1 Aviation Activity

Objectives	Permissible uses
The objectives of the AD1 zone are to: • provide for safe, secure and efficient airfield operations including aircraft take-off, landing and taxiing; • provide for aviation activities and aviation support facilities; and • facilitate compatible and ancillary functions within the zone provided that development does not render the land unfit for aviation activities	• Aviation activity • Detention pond • Earthworks* • Environmental protection works • Extractive industry* • Liquid fuel depot and distribution facility • Navigational aids • Public administration facility • Public utility undertaking • Road • Signage (other than an advertisement) • Telecommunications facility • Temporary structure • Works depot*

*Only permissible to the extent that the use relates to the construction, development or operation of the airport site.

4.3.2 AD2 Terminal and support services

This land use zone applies to the terminal precincts and terminal support facilities for the Stage 1 development. Forecast growth of international, domestic and regional air traffic requires the establishment, development and expansion of a passenger terminal and support activities (such as landside access, car parking and utilities). To accommodate the projected growth in traffic forecasts, the terminal is proposed to be developed as an integrated terminal precinct servicing a mix of international, domestic and regional passengers during the planning period. Developments to facilitate the provision of goods and services to meet the quality and standards that international, domestic and regional travellers have come to reasonably expect from a world-class transport hub are also permissible in this zone.

The objectives and permissible uses of this land use zone are described in Table 4–3.

Table 4–3 – Objectives and permissible uses – AD2 Terminal and Support Services

Objectives	Permissible uses
The objectives of the AD2 zone are to: • facilitate development of a contemporary passenger terminal and related facilities for the handling, transfer and processing of passengers that are capable of meeting the standards expected by international, domestic and regional travellers as well as supporting the needs of the proposed airport's workforce; • enable future expansion of the airport's operations, including associated aviation facilities; • encourage employment opportunities; • facilitate compatible and ancillary functions within the zone provided that development does not render the land unfit for aviation activities; and • Provide for aviation activities and support facilities	• Amusement centre • Animal boarding • Aviation activity • Aviation support facility • Business premises • Car park and parking spaces • Child care centre • Convenience store • Detention pond • Earthworks* • Environmental protection works • Extractive industry* • Food and drink premises • Freight handling and transport facility • Hotel or motel accommodation • Kiosks • Liquid fuel depot and distribution facility • Markets • Navigational aids • Office premises • Passenger transport facility • Public utility undertaking • Public administration facility • Road • Shop • Signage • Telecommunications facility • Temporary structure • Terminal • Transfer corridor • Vehicle hire premises • Works depot*

*Only permissible to the extent that the use relates to the construction, development or operation of the airport site.

4.3.3 AD3 Aviation logistics and support

This land use zone applies to land used for airport logistics and to support airport operations.

Development to facilitate freight logistics operations as well as other compatible and ancillary uses identified in the table below are permissible in this zone, including office space related to any of the identified permissible uses.

The objectives and permissible uses of this land use zone are described in Table 4–4.

Table 4–4 – Objectives and permissible uses – AD3 Aviation Logistics and Support Services

Objectives	Permissible uses
The objectives of the the AD3 zone are to: • facilitate the development of freight services and airport logistics (and ancillary office space); • ensure development is compatible, where practicable, with surrounding land uses in this area; and • facilitate compatible and ancillary functions within the zone provided that development does not render the land unfit for aviation activities.	• Animal boarding • Aviation activity • Aviation support facility • Business premises • Car park and parking spaces • Detention pond • Earthworks* • Environmental protection works • Extractive industry* • Food and drink premises • Freight handling and transport facility • Light Industry • Liquid fuel depot and distribution facility • Navigational aids • Office premises • Public administration facility • Public utility undertaking • Retail – low intensity • Road • Signage • Telecommunications facility • Temporary structure • Transport depot • Works depot*

*Only permissible to the extent that the use relates to the construction, development or operation of the airport site.

4.3.4 AD4 Aviation reservation

This land use zone is reserved for future aviation activities and aviation support facilities and has been informed by the operational requirements of the proposed airport for the planning period. It would be incrementally released for aviation purposes as it becomes operationally required, over the next 40 years or so.

The non-aviation land uses identified in this zone are permitted on a short to medium term basis until the land is required for aviation purposes provided that:

- the proposed development will not render the land unfit, or affect the capacity of the land to be used, for aviation purposes;
- the proposed development will be capable of being removed or relocated easily and economically; and
- appropriate provisions or arrangements are in place which ensure that the land can be vacated when needed for aviation purposes.

The ALC will be required to pursue development strategies that allow for the necessary controls to ensure delivery of the aviation needs. This includes ongoing tenure reviews and the consideration and implementation of temporary and alternative uses.

Development in this zone must not adversely impact on neighbouring environmentally sensitive areas. The design, construction and operation of such developments will need to consider the sensitivity of and proximity to the biophysical environment, including Badgerys Creek, and investigate the incorporation of appropriate mitigation strategies such as the provision of setbacks and reserves.

The objectives and permissible uses of this land use zone are described in Table 4–5.

Table 4–5 – Objectives and permissible uses – AD4 Aviation Activity (Reservation)

Objectives	Permissible uses
The objectives of the AD4 zone are to: • coordinate the orderly and economic use and development of land until it is required for aviation activities or aviation support facilities; • integrate compatible aviation, business and industrial activities in accessible locations; • encourage appropriate employment opportunities in accessible locations; and • ensure that development will not render the land unfit for aviation activities or aviation support facilities when it is required for these purposes.	• Agriculture • Animal boarding • Aviation activity • Aviation support facility • Detention pond • Earth works* • Environmental protection works • Extractive industry* • Navigational aids • Passenger transport facility • Public utility undertaking • Public administration facility • Retail – low intensity • Road • Shop • Signage • Telecommunication facility • Temporary structure • Terminal • Waste or resource management facility • Works depot*

*Only permissible to the extent that the use relates to the construction, development or operation of the airport site.

4.3.5 BD1 Business development

This land use zone is reserved for on-site business development and has been informed by the operational requirements of the proposed airport for the planning period.

Development in this zone must not:

- compromise the future aviation needs of the proposed airport;
- adversely impact on neighbouring environmentally sensitive areas;
- adversely impact on built form considerations for the airport; and
- adversely impact on surface transport access for aviation facilities.

The design, construction and operation of such developments will need to consider the sensitivity of and proximity to the biophysical environment, and investigate the incorporation of appropriate mitigation strategies such as the provision of setbacks and reserves. The developments in this zone may include office space related to any of the identified permissible uses.

The objectives and permissible uses of this land use zone are described in Table 4–6.

Table 4–6 – Objectives and permissible uses – BD1 Business Development

Objectives	Permissible uses
The objectives of the BD1 zone are to: • enable a mix of business, retail and industrial uses in locations that are close to and that support the functioning of the airport; • integrate suitable and compatible land uses in accessible locations so as to maximise public transport patronage and encourage cycling; • encourage employment opportunities and promote businesses along main roads; • enable a limited range of other land uses that will provide facilities and services to meet the day-to-day needs of local workforce; and • maximise, where possible the use of existing access and egress points.	• Agriculture • Animal boarding • Aviation activity • Aviation educational facility • Aviation support facility • Business premises • Car park and parking spaces • Child care centre • Detention pond • Earth works* • Environmental protection works • Extractive industry* • Freight handling and protection works • Hotel or motel accommodation • Light industry • Medical centre • Navigational aids • Office premises • Passenger transport facility • Public Utility undertaking • Public administration facility • Recreation facility (indoor) • Retail premises • Road • Service station • Shop • Signage • Telecommunication facility • Temporary structure • Vehicle hire premises • Warehouse and distribution centre • Works depot*

*Only permissible to the extent that the use relates to the construction, development or operation of the airport site.

4.3.6 BD2 Business development (Reservation)

This zone is reserved for future aviation activities and also terminal and support facilities. It has been informed by the operational requirements of the Airport for the planning period. It may be used for on-site business development but will be incrementally released for the reserved purposes as it becomes operationally required over the next 40 years or so.

A number of activities could be located in this zone in the interim. The ALC will be required to pursue development strategies that allow for the necessary controls to ensure delivery of the aviation needs. This includes ongoing tenure reviews and the consideration and implementation of temporary and alternative uses.

The non-aviation land uses identified in this zone are permitted on a short to medium term basis until the land is required for aviation purposes provided that:

- the proposed development will not render the land unfit, or affect the capacity of the land to be used, for aviation purposes;
- the proposed development will be capable of being removed or relocated easily and economically;
- appropriate provisions or arrangements are in place which ensure that the land can be vacated when needed for aviation purposes;
- there is no adverse impact on built form considerations for the airport; and
- there is no adverse impact on surface transport access for aviation facilities.

The design, construction and operation of such developments will need to consider the sensitivity of and proximity to the biophysical environment, including Badgerys Creek, and investigate the incorporation of appropriate mitigation strategies such as the provision of setbacks and reserves.

The objectives and permissible uses of this land use zone are described in Table 4–7.

Table 4–7 – Objectives and permissible uses – BD2 Business Development (Reservations)

Objectives	Permissible uses
The objectives of the BD2 zone are to: • enable a mix of business, retail and industrial uses in locations that are close to and that support the functioning of the airport; • integrate suitable and compatible land uses in accessible locations so as to maximise public transport patronage and encourage cycling; • encourage employment opportunities and promote businesses along main roads; • enable a limited range of other land uses that will provide facilities and services to meet the day-to-day needs of local workforce; and • maximise, where possible, the use of existing access and egress points;	• Agriculture • Animal boarding • Aviation activity • Aviation education facility • Aviation support facility • Business premises • Car park and parking spaces • Child care centre • Detention pond • Earth works* • Environmental protection works • Extractive industry* • Freight handling and transport facility • Hotel or motel accommodation • Light industry • Medical centre • Navigational aids • Office premises • Passenger transport facility • Public utility undertaking • Public administration facility • Recreation facility (indoor) • Retail premises • Road • Service station • Shop • Signage • Telecommunication facility • Temporary structure • Vehicle hire premises • Warehouse and distribution centre • Works depot*

*Only permissible to the extent that the use relates to the construction, development or operation of the airport site.

4.3.7 EC1 Environmental conservation

This zone applies to the environmental value of the airport site, notably with respect to natural habitats and water flows, including Badgerys Creek, and also provides for an environmental preservation corridor to the south of the airport site. The objectives and permissible uses of this land use zone are provided in Table 4–8.

Table 4–8 – Objectives and permissible uses – EC1 Environmental Conservation

Objectives	Permissible uses
The objectives of the EC1 zone are to: • protect the ecological and scenic values of the waterways in this zone; • maintain the health and natural flows of the waterway; • enhance, restore and protect local biota and the ecosystem and habitats of native species, and the cultural heritage values of the land; • provide for the effective management of remnant native vegetation, including native vegetation and regeneration and revegetation, noxious and environmental weed eradication, and bush fire hazard reduction; • enable the land to be used as passive open space in a manner that is not inconsistent with the protection of its natural and cultural heritage values; and • manage development to minimise impacts that could destroy, degrade, damage or otherwise have an adverse effect on natural and cultural heritage values.	• Environmental protection works • Public utility undertaking Note: permissible land uses outlined in the draft Airport Plan would be confirmed following finalisation of the EIS.

5. Stage 1 Western Sydney Airport

5.1 Introduction

5.1.1 Overview

The proposed Western Sydney Airport would be developed in stages in response to demand. Stage 1 would comprise a single runway, a terminal and other relevant facilities to accommodate up to 10 million annual passengers as well as freight traffic.

Over time, as demand grows, the proposed airport is expected to include an expanded terminal, further support and commercial facilities and ultimately a second runway (to be developed around 2050). The expansion of the proposed airport similarly would occur in a number of stages in response to demand for aviation services. The long term development would be capable of handling approximately 82 million annual passengers.

The draft Airport Plan provides an indicative concept design and land use plan for the proposed airport. The location and orientation of main elements such as runways and the area reserved for terminal development (for both Stage 1 and the long term) optimise the use of the site in light of the size, shape and orientation of the available land. In general the preferred runway orientation and the amount of separation required between two runways defines the parameters for other aspects of the concept design. Consideration has also been given to previous airport design concepts, in particular with regards to runway orientation, to minimise the changes in potential impacts identified by previous environmental impact statements which were subject to public consultation.

This chapter provides an overview of the major functional elements of Stage 1 as described in the Airport Plan.

5.1.2 Stage 1 development

The majority of the construction of Stage 1 is expected to occur between 2016 and 2025. During this period, major site preparation would be undertaken, including bulk earthworks commencing in mid-2016 the earthworks are required to create a level surface for the Stage 1 development which covers approximately 60 per cent of the airport site. Airport operations are proposed to begin around 2025 and provide capacity to service the predicted 2030 demand of up to 10 million annual passengers, equating to approximately 63,000 annual traffic movements.

Stage 1 would include the construction of a 3,700 metre runway positioned in the northern portion of the airport site on an approximate north-east/south-west or 50/230 degree orientation (referred to as runway 05L/23R). Stage 1 includes a single full length parallel taxiway and a range of aviation support facilities such as passenger terminals, cargo and maintenance areas, car parks and navigational instrumentation.

These facilities would be developed before operations begin in 2025 and would be capable of handling both domestic and international regular public transport services.

An indicative layout for Stage 1 is provided in Figure 5–1.

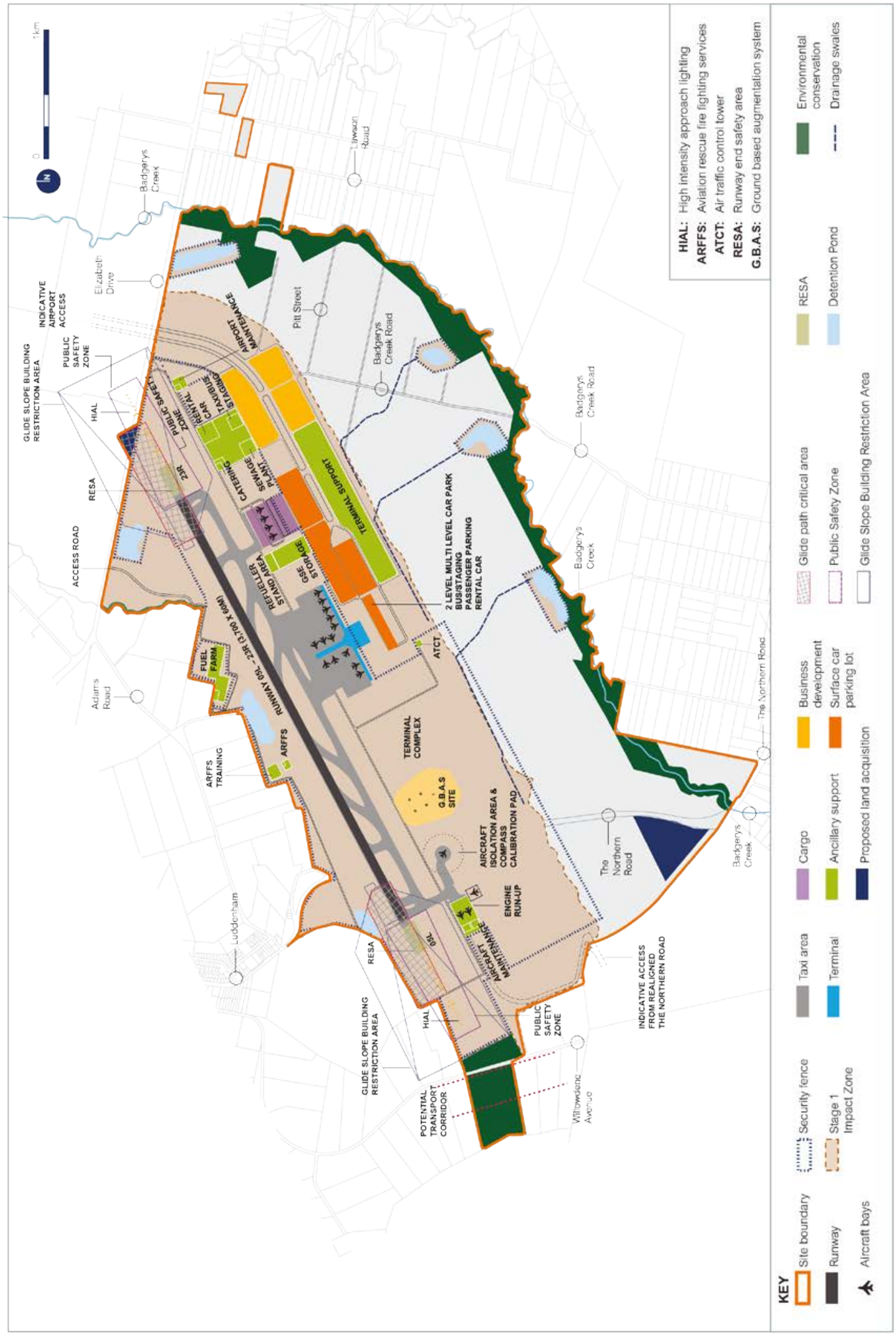


Figure 5–1 – Indicative airport site layout – Stage 1 development

The scale of the Stage 1 development has been designed to match demand. However, the precise layout of Stage 1 would be the responsibility of the ALC and may differ from the indicative layout shown in Figure 5–1. Some other examples of terminal layouts that could meet the Stage 1 capacity requirements as set out in the draft Airport Plan are presented in Figure 5–2.

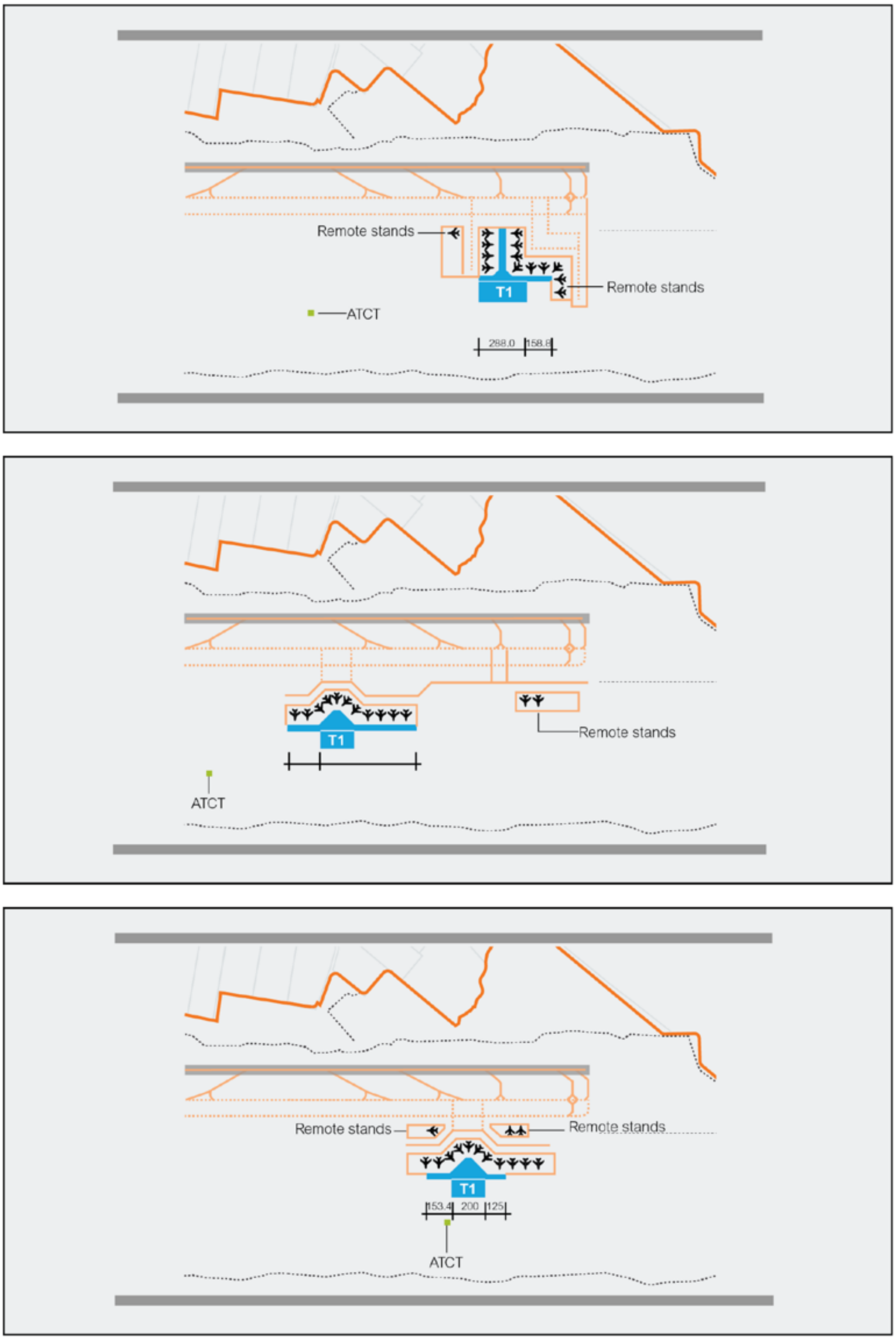


Figure 5–2 – Alternative Stage 1 terminal layouts

5.1.3 Long term airport development

Incremental development of the proposed airport would be required at various stages as passenger demand approaches and exceeds 10 million annual passengers including:

- expansion of the terminal precinct;
- continued growth of the airport support facilities and business development activities;
- improvements in transportation infrastructure on and into the site such as the development of a railway station; and
- development of a second runway.

The functional elements of Stage 1 would be designed so as not to preclude future expansion and to provide the required capacity for aircraft, passengers, cargo, and vehicle movements expected for the future. Flexibility and expandability have been considered in the geometry of the proposed airport and indicative facility layout to allow for the proposed staged development over the long term in line with increasing demand.

The Stage 1 runway is expected to reach capacity when passenger demand approaches 37 million annual passengers, around 2050. This is equivalent to approximately 185,000 annual traffic movements. By around 2063, the total annual traffic movements for the proposed airport is expected to be 370,000, serving approximately 82 million annual passengers.

To meet expected growth and additional demand beyond 37 million annual passengers, a second parallel runway 3,700 metres in length would be required. This is expected to be around 2050. The Land Use Plan, as outlined in the draft Airport Plan, has identified an area as aviation reservation to provide for future development of a second runway positioned in the southern portion of the airport site. The second runway would be on a similar 05/23 orientation and is anticipated to require a minimum of 1,900 metres separation from the first runway.

These future stages beyond Stage 1 would be subject to further regulatory approval in accordance with the Airports Act (see Section 3.2.2), including any required environmental assessment, and are not assessed as part of this draft EIS. However, as Stage 1 clearly facilitiates the development of these future stages, it is appropriate for this draft EIS to refer to the potential impacts associated with the long term development. In this context, a strategic environmental assessment is provided in Volume 3.

An indicative layout of the long term development is provided in Figure 5–3.

Figure 5–3 – Indicative airport site layout – Long term development

Figure 5–3 represents only one indicative layout for the long term development. Alternative long term terminal layouts may be developed by the ALC. Some other examples of long term terminal layouts are presented in Figure 5–4.

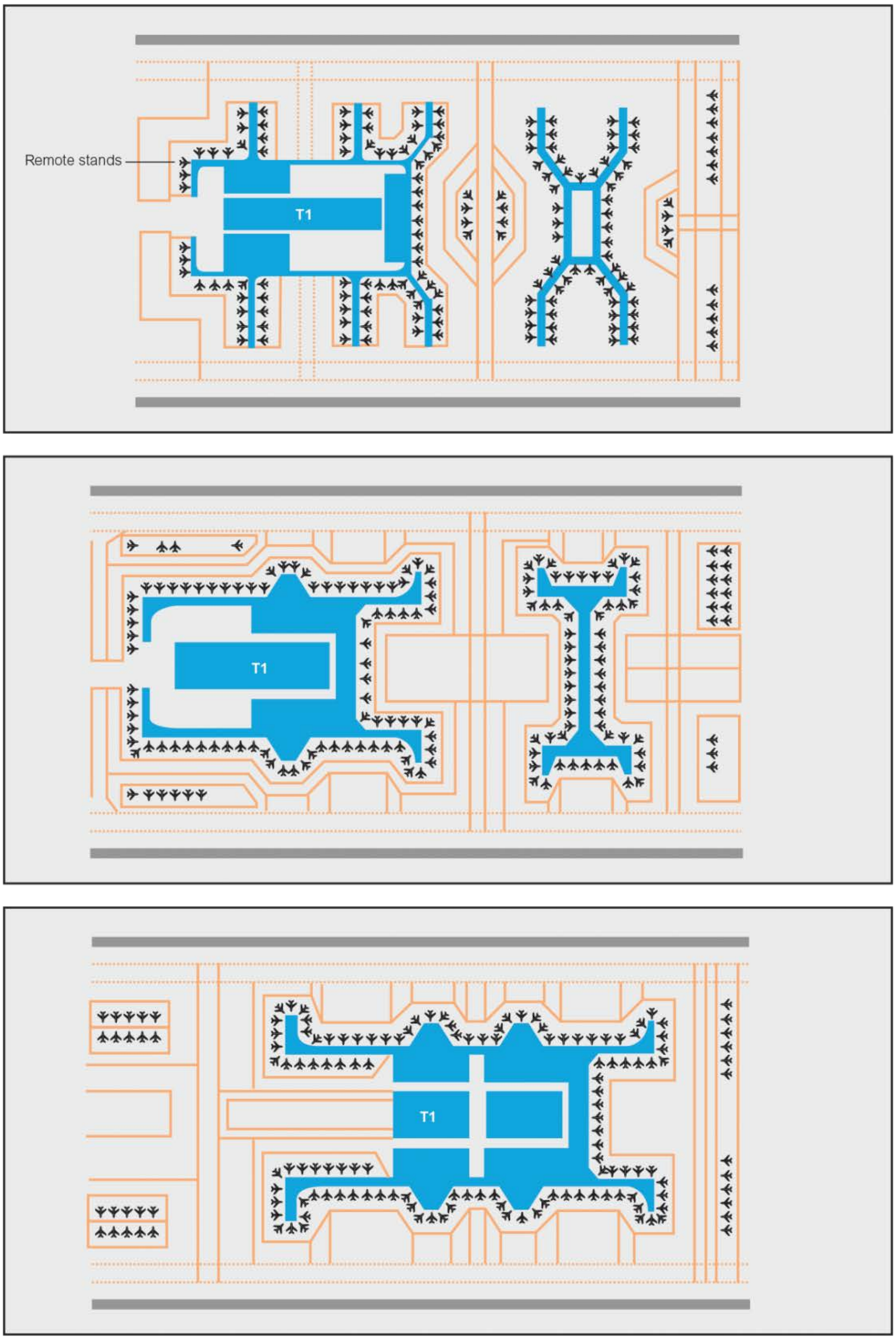


Figure 5–4 – Alternative long term terminal layouts

5.2 Airport precincts

Airports are generally divided into two main areas, or ‘precincts’, that reflect the level of public access to the main functional elements within each area. These are known as the airside and landside precincts.

The airside precinct includes all areas that are accessible to aircraft, as well as the restricted access areas within the airport site that support passenger and freight aircraft operations, including runways, taxiways, aprons, baggage handling, air traffic control, fuel facilities, and firefighting and rescue services. Parts of the terminal buildings and cargo handling facilities also form part of the airside precinct. These include boarding gates, lounges and other areas that are only accessible following security screening.

The landside precinct includes areas that are open to general public access such as parking lots, access roads and kerbside drop-off areas, bus stations and train stations. Those parts of the terminal buildings and cargo handling facilities not subject to security and screening, such as check-in and baggage drop-off and freight delivery docks, also form part of the landside precinct.

5.3 Summary of key features

The key features and performance criteria for Stage 1 at 2030 are provided in Table 5-1.

Table 5-1 – Summary of key Stage 1 features

Feature	Performance criteria
General	
Airport site	Total area 1,780 hectares
Ownership	Commonwealth
Land use	Commercial aviation
Predicted 2030 demand	
Annual aircraft movements – passenger	Approximately 56,000 international and domestic
Annual Aircraft movements – freight	Approximately 7,000 international and domestic
Domestic aircraft movements – passenger	~48,300 annual traffic movements
Domestic aircraft movements – freight	~3,100 annual traffic movements
International aircraft movements – passenger	~7,700 annual traffic movements
International aircraft movements – freight	~3,900 annual traffic movements
Nominal passenger movements	Approximately 10 million per year international and domestic
Domestic nominal passenger movements	7.8 million per year
International nominal passenger movements	2.1 million per year

Feature	Performance criteria
Runway and lighting	
Length	3,700 metres
Width	60 metres
Aerodrome reference aircraft	Code F
Orientation	Approximately north-east/south-west (50/230)
On-site/ off-site lighting	900 metre high intensity approach lighting (HIAL) off end of each threshold requires offsite easements.
Aviation fuel supply	
Fuel delivery method	Road tanker
Storage	Onsite fuel farm providing at least 3 days' storage of 8.1 mega litres
Terminal	
Configuration/ type	Integrated domestic and international
Size/ floor space	74,000 to 90,000 square metres of floor space
Ground transport links and access	
Access	Road access only
Public entrance	M12 link at Elizabeth Drive (100 metre wide corridor comprising up to six traffic lanes, two bus lanes and a 40 metre rail reserve corridor)
Freight and maintenance	The Northern Road (50 metre wide corridor comprising a minimum of two traffic lanes)
Car parking and drop-off	
Car parking spaces	11,500 (minimum) to 12,500 (maximum authorised)
Kerbside drop-off – Arrivals	180 to 250 metres
Kerbside drop-off – Departures	180 to 250 metres
Major utility requirements	
Water	1.6 mega litres of potable water per day and 1.8 mega litres of non-potable water per day
Sewage and wastewater	2.5 mega litres of wastewater treated onsite and 0.11 mega litres of surplus sludge
Electricity	16.7 megavolt amperes at peak demand
Gas	57,000 gigajoules per year

A holistic approach to the planning of the proposed airport has been applied to provide the initial required capacity for aircraft, passengers, cargo, and vehicle movements. Flexibility and expandability have been considered in the airport geometry and facility layout to allow for the proposed staged development in line with increasing demand. The capacity of each facility has been planned with regard to the overall airport operating efficiency and ability to accommodate future growth and cost.

The development of the Airport Plan has taken into account various forecasts and assumptions around expected air traffic movements and required capacity for the proposed airport to operate during Stage 1 and in the long term.

In order to provide the most efficient and safe operation of the proposed airport, the following codes and regulations were taken into account in developing the Stage 1 indicative concept design, as outlined in the draft Airport Plan:

- International Civil Aviation Organization (ICAO) standards and manuals;
- *Civil Aviation Act 1988*, the Civil Aviation Regulations and the Civil Aviation Safety Authority's (CASA) Manual of Standards;
- *Aviation Transport Security Act 2004* and Regulations;
- *Air Navigation Act 1920* and Regulations;
- *Customs Act 1901* and Regulations;
- *Crimes (Aviation) Act 1991* and Regulations;
- *Quarantine Act 1908* and Regulations, which will be replaced by the *Biosecurity Act 2015* when it commences in June 2015*;*
- *Airspace Act 2007*; and
- *Air Services Act 1995*.

5.3.1 Aircraft fleet mix and aerodrome reference codes

The draft Airport Plan has been developed to provide flexibility to accommodate any aircraft fleet mix anticipated to use the proposed airport. ICAO aerodrome reference codes (A, B, C, D, E, and F) were used in the planning of the functional elements of the airport site. Using the ICAO system provides flexibility to accommodate a variety of aircraft fleet types at the proposed airport during Stage 1 and long-term development. Table 5-2 outlines the fleet mix categories and provides examples of applicable aircraft.

Table 5-2 – Aerodrome and aircraft reference codes and examples

Aerodrome and aircraft reference code	Most common routes	Aircraft examples
Code A	General aviation	General aviation aircraft
Code B	Regional	SAAB 340 Dash 8-300
Code C	Domestic	Airbus A320 Boeing 737

Aerodrome and aircraft reference code	Most common routes	Aircraft examples
Code D	Domestic	Boeing 767
Code E	International	Airbus A330/ A350 Boeing 747-400 Boeing 777 Boeing 787
Code F	International	Airbus A380 Boeing 747-800

During Stage 1 Code C aircraft are expected to account for the majority of domestic operations at the proposed airport, representing approximately 90 per cent of the domestic fleet mix at the time. The international fleet mix during Stage 1 is expected to comprise about 59 per cent Code E aircraft and about 40 per cent Code C aircraft.

The fleet mix of freight aircraft assumes the majority of domestic dedicated freight activity is served by Code C aircraft and international freight activity served by larger Code E aircraft.

The remaining fleet mix would consist of Code A, B and F aircraft. No Code D aircraft are expected to operate at the proposed airport, since most Code D aircraft (e.g. B767, A310, B757) are being phased out of operations.

5.3.2 Critical design aircraft

The largest aircraft expected to use an airport determines the airfield planning dimensions and is considered the 'critical design aircraft'. The critical design aircraft also determines the critical separation and design geometry dimensions for safe operations on runways, taxiways and aprons.

Code F is the largest type of aircraft expected to use the proposed airport, and has therefore been adopted as the critical design aircraft. This means that from the start of operations, the airport would be able to service the largest aircraft in operation today (e.g. the Airbus A380). Designing to meet Code F standards means that the functional elements would be able to meet Code F activity as operations develop without disrupting existing airport operations. This would be particularly important in advance of the potential second runway and terminal expansion.

Although Code F has been adopted as the critical design aircraft, it is expected that only a small number of Code F aircraft are likely to use the proposed airport, equating to about 0.5 per cent of movements in 2030 and up to one per cent of the expected fleet mix in the long term.

5.3.3 Airfield capacity and activity forecasts

Airfield capacity

Airservices Australia has assessed airspace implications and air traffic management approaches for the Sydney region airspace associated with the development of the proposed airport. It is important for long-term planning that the configuration of the airport site in Stage 1 does not preclude future development in the long term and therefore airfield capacity analysis is based on the long term, parallel runway scenario.

This analysis indicates that an airport development at Badgerys Creek could potentially achieve the following capacity (per hour) with parallel runway operations in the long term:

- 45 landing operations;
- 58 departure operations; and
- 103 total aircraft movements (landing and departing).

Activity forecasts

Indicative activity forecasts based on the expected fleet mix have been developed for the purpose of planning the capacity, layout and functionality of the proposed airport. The key indicative forecast parameters considered during the design and planning of the airport site include:

- The annual passenger demand in terms of million annual passengers;
- Forecast air traffic movements (annual traffic movements), either landing or departing; and
- Peak hour passenger and annual traffic movements demand at the airport.

The major functional areas of the airport such as terminal facilities, runways, taxiways and roadways are would be designed to accommodate the peak hour passenger or peak hour aircraft demand. The peak hour activity represents the greatest level of demand being placed on facilities required to accommodate passenger and aircraft movements. Consideration of the peak hour activities during planning allows facilities to be sized appropriately so that they are neither underutilised nor overcrowded too often, and ensures that users consistently receive a satisfactory level of service and are not subject to significant congestion.

In 2030, the proposed airport is expected to accommodate approximately 63,000 passenger and freight annual traffic movements, including approximately 21 annual traffic movements per hour during peak times. This could increase to 370,000 annual traffic movements in 2063, including 85 annual traffic movements per hour during peak times.

The Stage 1 and long term capacity requirements for the proposed airport based on the indicative activity forecasts and the expected peak hour activity are summarised in Table 5-3. The Stage 1 airport layout would be designed so as not to preclude future development to accommodate expected long term capacity requirements.

Table 5-3 – Summary of activity forecasts

	Stage 1 (c. 2030)	First runway at capacity (c. 2050)	Long term (c 2063)
Annual passengers (arrivals and departures)	10 MAP	37 MAP	82 MAP
Peak hour passengers (international and domestic)	3,400	9,500	18,700
Total annual annual traffic movements (passenger and freight)	63,000	185,000	370,000
Total peak hour annual traffic movements	21	49	85

The volume and profile of passengers using the proposed airport is expected to evolve over time in response to growing demand and relative market position. It is expected that in the early years around 80 per cent of passenger demand at the proposed airport would involve regional and domestic travel. Domestic demand is likely to be focussed on travel between capital cities, including Melbourne, Brisbane and Perth, as well as Gold Coast Airport.

Over time, it is expected that demand could grow, particularly in international regular public transport, as residual capacity at Sydney Airport is used. It is expected that the proposed airport could serve approximately 2 million international passengers annually by 2030, growing to approximately 19.5 million international passengers annually by 2050. By this time, the domestic/international split could be approximately 43 per cent domestic and 57 per cent international. In the long term, the proposed airport is expected to serve all types of aviation traffic including low cost carriers, full service carriers, international, domestic, connecting and regional traffic.

Freight aircraft are also expected to operate at the proposed airport, with the site able to accommodate approximately 7,000 dedicated freight annual traffic movements in 2030, increasing to 30,000 annual traffic movements in 2063.

5.4 Airside precinct

The airside precinct includes all areas that are accessible to aircraft, as well as the restricted access areas within the airport site that support passenger and freight aircraft operations, including runways, taxiways, aprons, baggage handling, air traffic control, fuel facilities, and firefighting and rescue services. Parts of the terminal buildings and cargo handling facilities also form part of the airside precinct. These include boarding gates, lounges and other areas that are only accessible following security screening.

5.4.1 Runways

Orientation

Design principles

Runway orientation is determined largely by the shape and size of the available land and the prevailing wind conditions at the site. The amount and shape of land available at the airport site is relatively constrained, and design development is limited in terms of options for runway orientation.

The site is oriented generally north-east/south-west. To provide for future development to two parallel runways, the design has been developed around an optimal orientation of 50/230 degree (magnetic) heading (referred to as 05/23). This is illustrated in Figure 5–5.

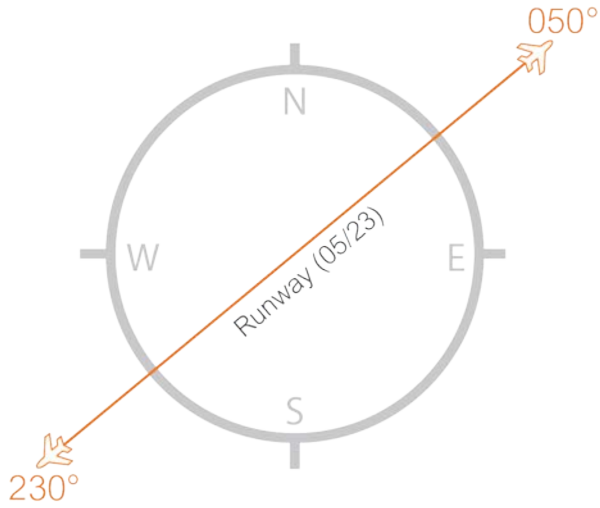


Figure 5–5 – Runway orientation

ICAO aerodrome design standards dictate that the number and orientation of runways at an aerodrome should ensure that the aerodrome is useable for not less than 95 per cent of the time for the aircraft it is intended to serve (ICAO 2006).

In developing and assessing the usability factor for various runway orientation options it is assumed that landing or take-off operations are precluded when the crosswind component exceeds the following:

- 20 knots (37 kilometres per hour) in the case of aircraft that require a minimum field length of 1,500 metres for take-off;
- 13 knots (24 kilometres per hour) in the case of aircraft that require a minimum field length of 1,200 metres for take-off; and
- 10 knots (19 kilometres per hour) in the case of aircraft that require a minimum field length required of less than 1,200 metres for take-off.

The Bureau of Meteorology assessed the usability of the airport site based on a 05/23 runway orientation by analysing, historical wind speed and direction data over the last 18 years. The *Western Sydney Airport Usability Report* is provided in Appendix D. This data was obtained from weather stations at and around Badgerys Creek. Analysis indicates that the proposed airport would be able to be used approximately 99.5 per cent of the time based solely on a prevailing crosswind of less than 20 knots.

The assessment undertaken by the Bureau of Meteorology found that a runway orientation of 05/23 would provide a high level of usability at the airport site and would likely exceed the 95 per cent usability target recommended by ICAO aerodrome design standards.

Given the constraints presented by the size and shape of the airport site, this orientation is considered the optimal parameter for the development of the airport layout.

Number of runways

To meet the anticipated passenger and freight demand at the proposed airport, two parallel runways are proposed in the long term. This provision limits the options available for locating the first runway for Stage 1.

By 2030, the Stage 1 runway is expected to accommodate approximately 63,000 passenger and freight annual traffic movements, including approximately 21 annual traffic movements per hour during peak times. This is equivalent to about 10 million annual passengers. At full capacity (in about 2050) the first runway could accommodate 185,000 annual traffic movements per year, including 49 annual traffic movements per hour during peak times – equivalent to about 37 million annual passengers.

Once the first runway reaches capacity around 2050 a second runway could be required.

In the long term, two runways would be expected to service about 85 annual traffic movements per hour during the peak hour, or up to 370,000 annual traffic movements per year, equivalent to around 82 million annual passengers.

The Stage 1 layout consists of a single runway in the northern portion of the site, close to the boundary, referred to as the 'northern runway'. Using standard naming conventions for runways to indicate their relationship to the left and right of each other in relation to the direction of travel, the northern runway would be 05L-23R and the future 'southern runway' would be 05R–23L. The layout of the Stage 1 05L–23R runway is provided in Figure 5–6.

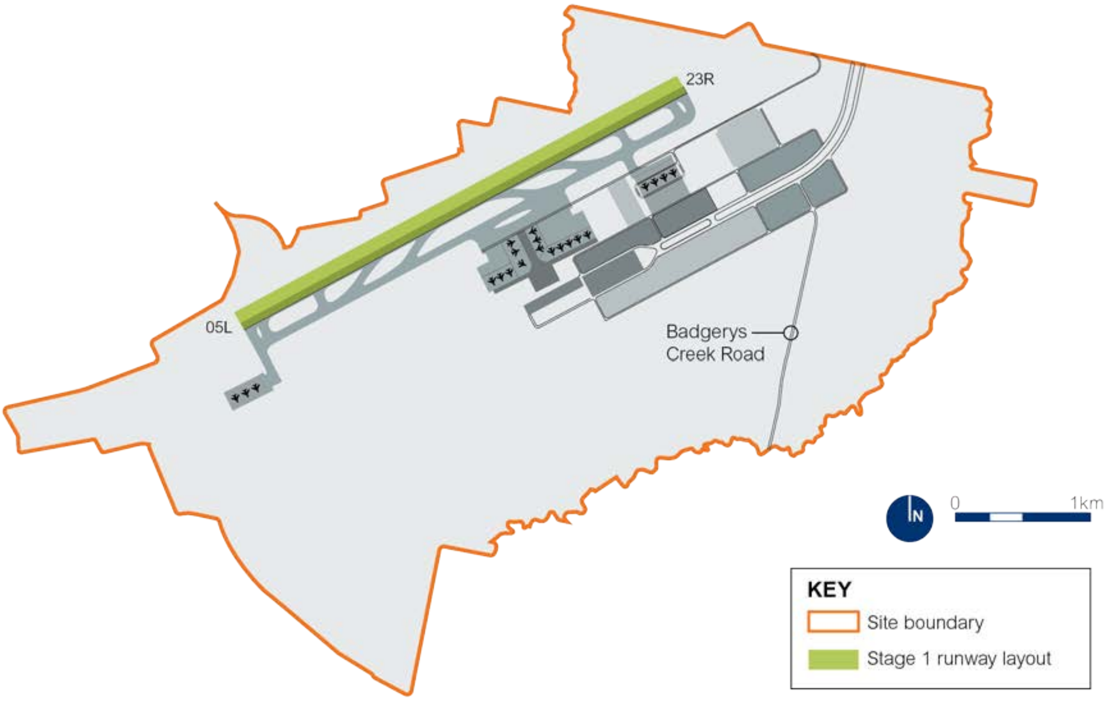


Figure 5–6 – Stage 1 'northern runway' (05L–23R) layout

Runway length requirements

Safe aircraft operating conditions require a runway length that is sufficient to ensure that, after beginning a take-off, an aircraft can either be brought safely to a stop or safely complete the take-off.

ICAO Annex 14 – Aerodromes Volume 1[2] identifies the minimum specification requirements for currently operating aircraft and for similar aircraft planned for introduction that are likely to have similar characteristics to those currently operating. Runway length analysis was conducted using the ICAO Aerodrome Design Manual[3] with consideration given to the following information:

- mean maximum temperature;
- aerodrome elevation;
- equivalent temperature in standard atmosphere;
- runway slope; and
- maximum take-off weight for the critical aircraft likely to use the proposed airport.

The maximum take-off weights for a range of aircraft expected to use the proposed airport, including the design critical Code F aircraft are shown in Table 5-4. These weights were used to analyse the runway length required to allow the aircraft to reach its furthest possible destination, based on payload and fuel weight. Analysis included the domestic and international operations expected at the proposed airport.

Table 5-4 – Maximum take-off weights for critical aircraft expected to use the proposed airport

Aircraft	Code	Maximum take-off weight (kg)	Runway length requirements (m)
B737-500	C	60,550	2,960
B747-400	E	396,894	3,790
B747-800	F	447,696	3,670
B767-300ER	D	186880	3,790
B777-200	E	286,900	3,320
B777-300ER	E	351,535	3,640
A321-200	C	93,500	3,000
A330-300	E	242,000	3,650
A340-600	E	380,000	3,400
A380-800	F	575,000	2,900

Source: Aircraft Manufacturer's Manuals

[2] *ICAO Annex 14 – Aerodromes Volume 1, Aerodrome Design and Operations, 6th Edition* (ICAO2013)

[3] *Doc. 9157 Aerodrome Design Manual, Part 1, Runways, 3rd Edition* (ICAO 2006)

Based on the analysis undertaken, the maximum runway length requirement is 3,790 metres for the B747-400 and B767-300ER aircraft. However, these two aircraft are currently being phased out of the Boeing fleet.

The heaviest Code F aircraft, the A380-800, only requires a runway length of 2,900 metres and is therefore not a significant design constraint in considering the most appropriate runway length. A runway length of 3,700 metres will cater for the requirements of the A330-300, the B777-300ER (both Code E) and the B747-800 (Code F) aircraft and is considered the most appropriate length for the Stage 1 development and long-term planning of the airport.

A runway length of 3,700 metres would be constructed for Stage 1 and would enable the airport to serve all domestic and international destinations within a radius of 8,000 nautical miles. Figure 5–7 shows that, for the B777-300ER aircraft at maximum take-off weight, the proposed airport could serve international destinations including Dubai and mid-west USA.

Figure 5–7 – B777-300ER range with 100 per cent passenger load

Runway separation

Airport developments with two or more parallel runways require adequate separation to accommodate independent (but parallel) approach and departure operations during peak hour operations. Runway separation requirements are based on ICAO Standards as prescribed in the *Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways*[4]. These standards require a minimum separation of 1,525 metres to enable runways to operate independently of each other in poor weather.

[4] ICAO Doc. 9643

The separation criteria for the Stage 1 and the long term runways have been developed in accordance with the requirements set out in the ICAO Standards and in such a way as to maximise the land between the two runways for terminal buildings, aprons and taxiways.

The Stage 1 northern runway would be positioned in the northern portion of the site, allowing for a separation of 1,900 metres between the Stage 1 runway and the second runway in the southern portion of the airport site.

A separation of 1,900 metres would be required to allow the second runway to operate completely independent, parallel arrival and departure operations. This separation would also ensure adequate midfield separation to accommodate the airfield taxiway system, terminal buildings, aircraft stands and maintenance facilities; as well as ground transport access infrastructure required for operations to meet the long-term demand capacity of up to 82 million annual passengers expected to be achieved around 2063.

5.4.2 Taxiway and apron system

Taxiways and taxi lanes

Taxiways and taxi lanes allow the safe and efficient movement of aircraft between runways and the terminal. Landing aircraft cannot touch down until any preceding aircraft has moved completely clear of the runway. Rapid exit taxiways are required to facilitate this movement and need to be optimally positioned and configured to support the aircraft fleet mix expected to use an airport, so that the time an aircraft spends on a runway is minimised.

It is expected that the taxiway system for the proposed airport constructed as part of Stage 1 would include a full length parallel field taxiway, with linking taxiways and taxi lanes providing safe and efficient access and circulation between the runway/parallel taxiway and the apron areas, including rapid exit taxiways. Stage 1 would be designed to preserve the ability to expand the proposed airport in the long term.

An indicative layout of the Stage 1 taxiways is provided in Figure 5–8.

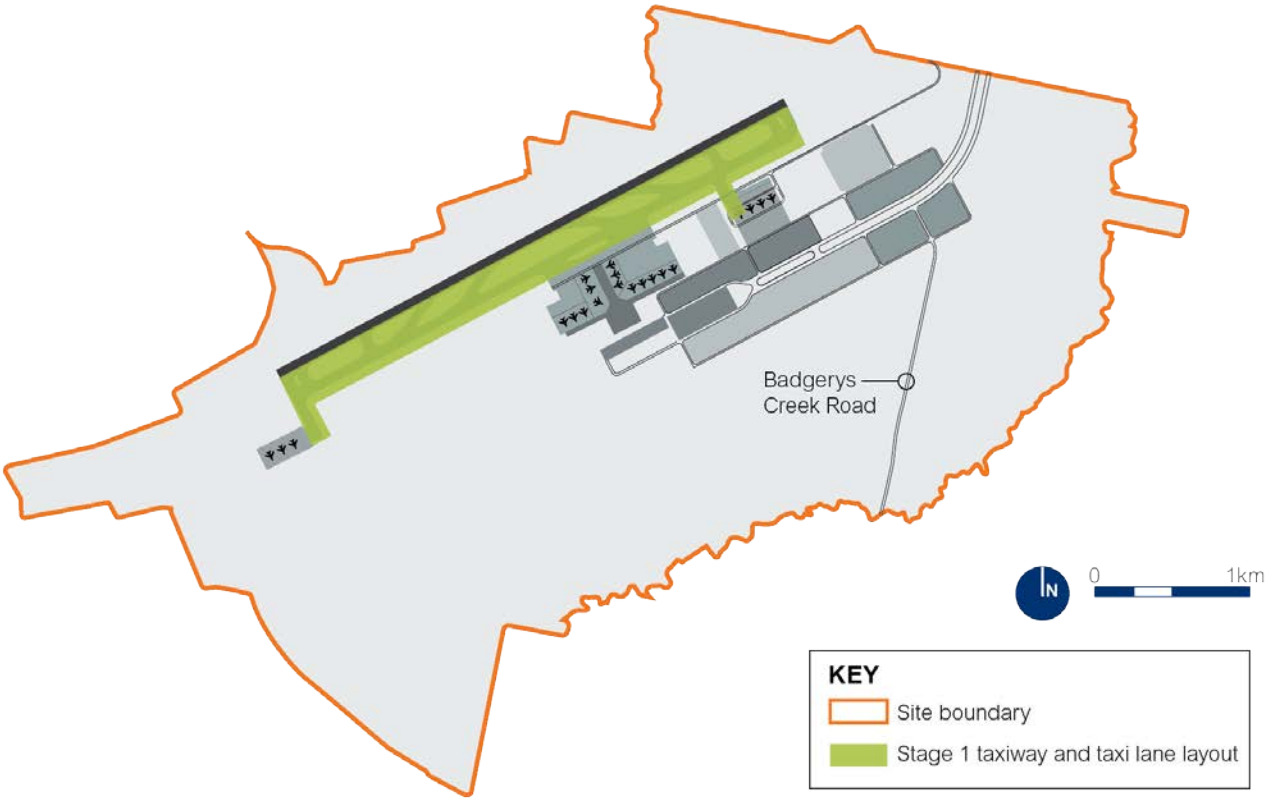


Figure 5–8 – Taxiway and taxi lane layout

Lighting, marking and signage

The proposed airport would require a range of airfield ground lighting including low visibility lighting, as well as movement control and guidance system interface, pavement marking and signage for the taxiway and taxi lane systems. These would be developed in accordance with CASA Manual of Standards (MOS) – Part 139 Aerodromes and ICAO Standards.

5.4.3 Apron and aircraft stands

The main public transport apron and aircraft stands would be developed to operate as an integrated terminal. This is discussed in more detail in Section 5.4.9 and Section 5.5.1. An integrated terminal design would provide efficiencies in operation due to the ability to 'swing' certain airport facilities, allowing the airport operator to switch the use of airport facilities such as check-in, security and baggage claim between domestic and international passengers.

Swinging certain facilities would provide benefits including increased flexibility to accommodate the up-gauging of domestic aircraft, sharing of passenger processing facilities by international and domestic passengers and increased efficiency in transfers and the usage of stands and gates.

All aircraft stands on the regular public transport apron and the permanent freight apron area (if constructed in Stage 1) would be provided with an aircraft (reticulated) hydrant refuelling system.

A freight apron may be located at the western end of the airport site or, as a temporary provision, near to the passenger terminal area. If the temporary location is utilised, fuelling of aircraft may be undertaken by fuel truck instead of hydrant fuelling.

It is likely that some Code F stands would be developed as Multiple Aircraft Ramp Systems, which provide maximum flexibility in stand capability and airline allocation within the terminal by allowing one stand to handle either two Code C aircraft or one Code F aircraft.

A mix of contact (aerobridge served) stands and non-contact (walk-on/walk-off) stands would be required according to the nature of traffic, (e.g. full service carriers versus low cost carriers).
The layout of the Stage 1 aprons and aircraft stands would be designed such that they are able accommodate the capacity requirements of both the Stage 1 and the long term developments and the requirements of the critical Code F aircraft. This would include consideration of the following functional elements:

- aircraft servicing;
- taxi lane support;
- push back zones;
- jet blast considerations;
- hydrant fuelling;
- safety zones;
- aerobridge manoeuvring zones;
- Ground Service Equipment staging and storage areas;
- safe walk out or bussing stand provisions;
- airside road layout with preservation for long-term design capacity and circulation of ground service equipment and airside vehicles; and
- other provisions typically associated with compliant stand design.

An indicative example of an apron and stand layout sufficient to accommodate a Code F aircraft is provided in Figure 5–9.

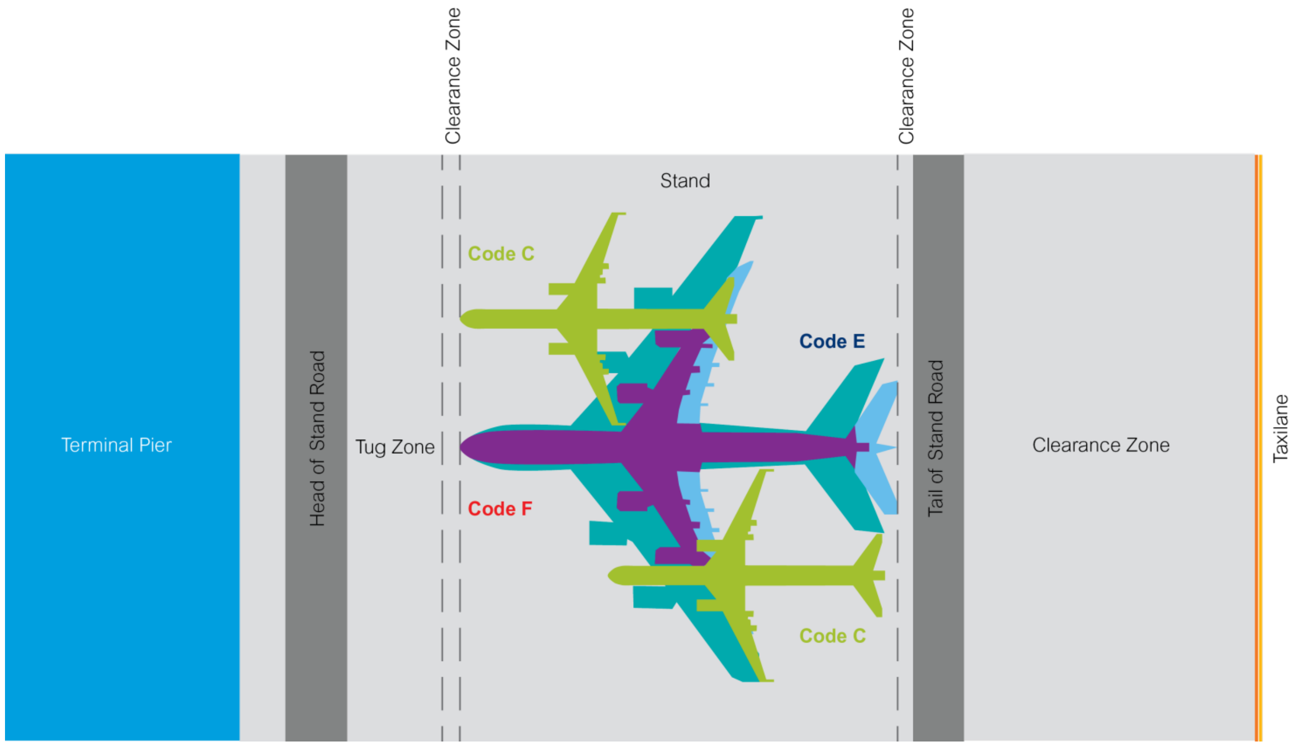


Figure 5–9 – Indicative apron and stand layout for a Code F aircraft

5.4.4 Air traffic control

An air traffic control tower (ATCT) needs to be located so that the time taken by the air traffic controller to detect the start of an aircraft's movement at take-off is minimised. This is referred to as the Response Time.

The CASA *Draft Advisory Circular 172-003 (Control Tower Advisory Principles)* (CASA 2005) require that the response time be kept below four seconds, with an upper limit of five seconds for exceptional circumstances.

Based on the design grading of the airport site, estimated runway locations and elevation plans, the controller eye level elevation would need to be a minimum of 115 metres Australian Height Datum (AHD) to provide the required four second response time. For the airport site, this means that the ATCT would need to be approximately 35 metres high.

In order to provide air traffic control coverage of both runways within the required response time the ATCT would be located within the area shown in Figure 5–10.

The facility would be a stand-alone installation approximately 35 metres high and would be segregated in a secure ATCT precinct.

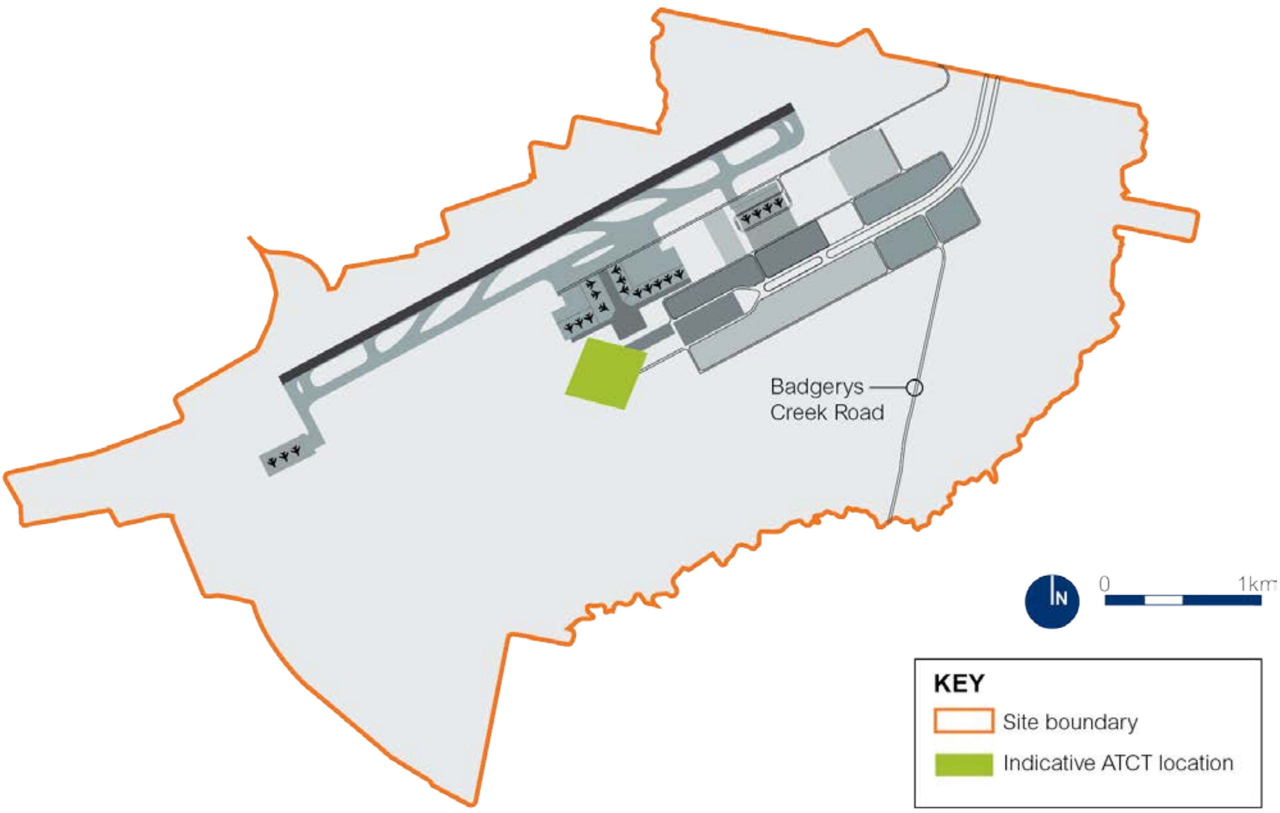


Figure 5–10 – Location of the air traffic control tower

5.4.5 Navigational aids

The Stage 1 runway is expected to be equipped to accommodate instrument approach procedures at both ends, which provide navigational guidance to approaching aircraft enabling them to land safely during periods of poor visibility.

Protection zones would need to be included to assure the continuous operation of the navigational aids. Easements or land acquisition may be required to facilitate these protection zones, within which restrictions would be placed on building types, building heights and certain activities in order to avoid interference with navigational aid equipment.

Navigational equipment

Stage 1 would include a number of navigational aids, located in accordance with the relevant equipment siting guidelines. The following equipment would typically be required:

- Precision Approach Path Indicator (PAPI);
- Instrument Landing System (ILS) – Category III;
- Glide Path (GP);
- Localiser (LOC);

- High Intensity Approach Lighting (HIAL) – where HIAL protrudes beyond the airport site boundary, these facilities would be protected either with an easement or through land acquisition. Indicative locations for the required HIAL are shown in Figure 5–11;
- Marker Beacons (Inner, Middle, and Outer Markers);
- Far Field Monitor (FFM);
- Distance Measuring Equipment (DME);
- Advanced-Surface Movement Guidance and Control System (A-SMGCS); and
- Ground Based Augmentation System.

A Ground Based Augmentation System (GBAS) is a critical component of the navigational aids required for safe airport operations. The system improves the accuracy and reliability of an aircraft's navigational system by transmitting location data between one or more accurately surveyed ground stations and an approaching aircraft's navigation system.

The GBAS facility comprises two components including a VHF Data Broadcast antenna and four Remote Satellite Measurement Unit antennas. The GBAS is required to be located at least 200 metres from operating aircraft, 150 metres from major roads and railway lines and requires clear unobstructed coverage to the entire runway length. The location of the GBAS would be confirmed during detailed airport design.

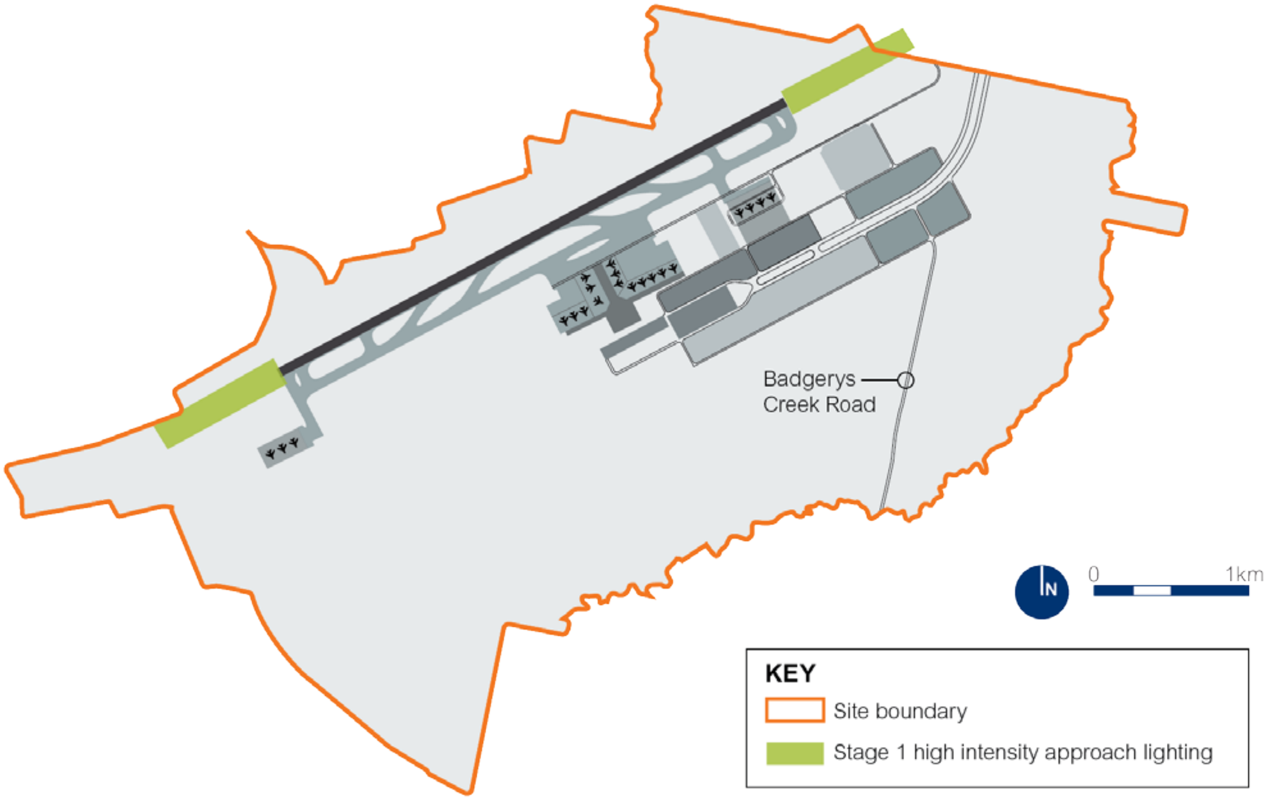


Figure 5–11 – Indicative location of the required high intensity approach lighting

Runway lighting

Runway lighting would comprise the following typical elements:

- High Intensity Runway Lights (HIRL);
- Airfield Lighting Equipment Room (ALER) Facility, which will house all control systems and Constant Current Regulators (CCR) of the Airfield Ground Lighting (AGL) system;
- Runway Centreline Lights;
- High Intensity Approach Lighting;
- Touchdown Zone Lights (TDZ);
- Runway Threshold Lights;
- Runway Wing Bar Lights;
- Runway End Lights; and
- Runway Guard Lights.

Taxiway lighting

Taxiway lighting would comprise the following typical elements:

- Rapid exit taxiway indicator lights;
- Stop bars;
- Taxiway edge lights;
- Taxiway centreline lights; and
- Movement area guidance signs.

Meteorological equipment

Meteorological equipment would comprise the following typical elements:

- Runway visual range – touchdown;
- Runway visual range – roll-out;
- Runway Visual Range – mid-point; and
- Illuminated wind direction indicator.

5.4.6 Security and safety

The proposed airport is expected to be designated as a ‘Category 1’ airport for the purposes of the Aviation Transport Security Act 2004 and related regulations. This designation dictates minimum security requirements for the proposed airport.

A perimeter security fence and pass controlled secure airside access points would be required to restrict public access to all airport operations areas and supporting facilities.

Inside the security fencing, a perimeter road would provide access to all perimeter support infrastructure, including all navigational aids, as well as detention basins and water quality structures. This roadway may also be used to monitor airport perimeter security and provide access for maintenance of the security fencing, perimeter lighting, and closed circuit television (CCTV).

Safety measures at the airport site would be put in place in accordance with all relevant laws including requirements in relation to:

- emergency safety response facilities and reserves;
- fuel and other toxic spill containment infrastructure;
- fire training area;
- public safety areas; and
- airside emergency safety assembly areas.

5.4.7 Aviation Rescue and Firefighting Services (ARFFS)

An ARFFS station would be required to service the Stage 1 runway. In the long term, a second ARFFS station would be required to service the southern runway.

During Stage 1 the ARFFS station is expected to be located on the outboard side (to the west) of the northern runway and as close to the centre of the runway alignment as possible in order to optimise response time to each end of the runway. An indicative location for the ARFFS is shown in Figure 5–12.

The ARFFS station would accommodate vehicle fuel storage and delivery systems and firefighting foam storage facilities and standard fire and rescue station operating requirements such as a control centre, accommodation and services and vehicle maintenance facilities.

An ARFFS training area would be provided adjacent to the ARFFS station and is likely to be positioned to the west, between the ARFFS station and the airport site boundary.

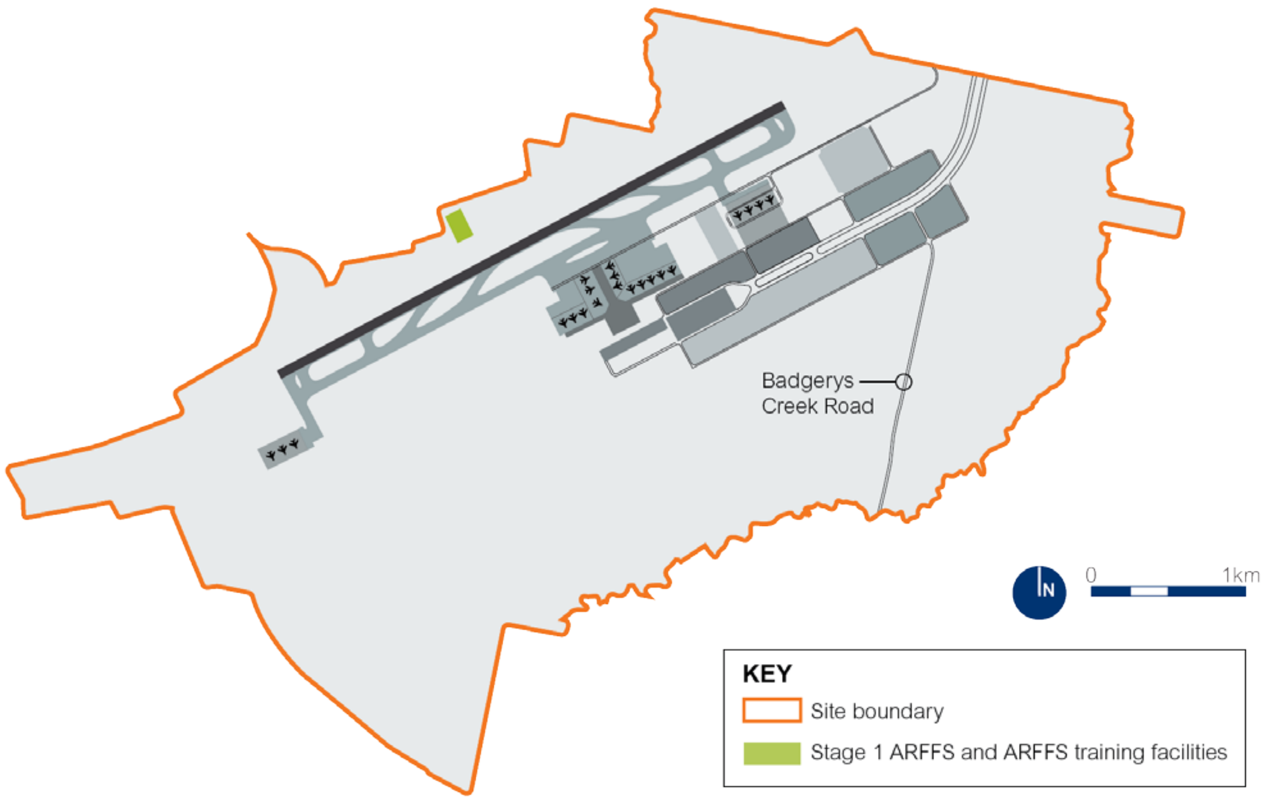


Figure 5–12 – Indicative location of the ARFFS station and training facility

5.4.8 Aviation support

The proposed airport would require the provision of fully serviced support facilities, internal road infrastructure, drainage and all necessary utilities to provide optimal support to aviation activities. The type and scale of the support services required would change and develop over time in line with increased demand.

Stage 1 may include maintenance facilities for aircraft and ground vehicles and equipment, fuel services for aircraft and ground vehicles, freight and cargo handling and processing facilities, general and corporate aviation facilities, flight catering facilities and other support facilities such as storage areas, policing operations and waste disposal.

Aircraft maintenance facilities

Stage 1 would include an aircraft maintenance precinct and associated aprons, taxiways and landside access. Facilities may include:

- general maintenance facilities including an engine run up area;
- hangars;
- aircraft wash;
- staff car park; and
- fuel provision facilities for ground vehicles.

A major element of the aircraft maintenance facility is the aircraft engine run up area, where aircraft engines are run at full throttle to check that they capable of producing take-off thrust. A dedicated bunded location is provided to ensure that air blast from the engines does not damage other aircraft or structures, and to assist in the reduction of ground based noise associated with airport operations.

Fuel

Appropriate facilities for the handling of aircraft fuel and lubricants would be provided. These facilities would include fuel storage for JET A-1 aviation fuel and fuels for ground vehicles (diesel and petrol), provision for electric vehicles and/or gas driven vehicles, and fuel transfer and aircraft defueling facilities.

The requirements for the storage and transfer of fuel are discussed in more detail in Sections 5.6.11 and 5.6.12.

Freight and cargo

Stage 1 is expected to include a freight precinct, to which aprons, taxiways and landside access would be provided in order to meet the expected capacity requirements for freight. As for all functional elements in Stage 1, they would be developed so as not to preclude future growth in the long term.

Stage 1 may include a multi-tenant cargo terminal complex and provision for support activities such as truck docking, staging, cargo agents, storage equipment repair and associated quarantine, customs and immigration activities.

The indicative locations of the main functional elements providing aviation support are shown in Figure 5–13.

General and corporate aviation

The proposed airport would be developed to address aviation passenger demand and does not make specific provisions for general aviation facilities, which may include helicopter flight support and tourist flight facilities. Should such provisions be required in the future, they would be subject to separate environment and planning processes under the Airports Act.

Flight catering

Stage 1 may include a flight catering facility, depending on demand. This would include appropriate airside and landside access for flight catering providers. Provision would also be made for supporting activities, such as a truck manoeuvring area for loading docks within the complex, truck parking and a fuel facility for ground vehicles.

Other support facilities

Other support facilities that may be developed as part of Stage 1 include:

- facilities to support policing operations;
- facilities as required by various Government agencies;

- crash gates;
- vehicle maintenance for ground service equipment;
- long term storage areas for various airlines;
- an airfield lighting equipment room;
- an aircraft waste disposal facility;
- a recycled water treatment plant; and
- a building and ground maintenance facility.

The main airport support facilities are shown in indicative locations in Figure 5–13.

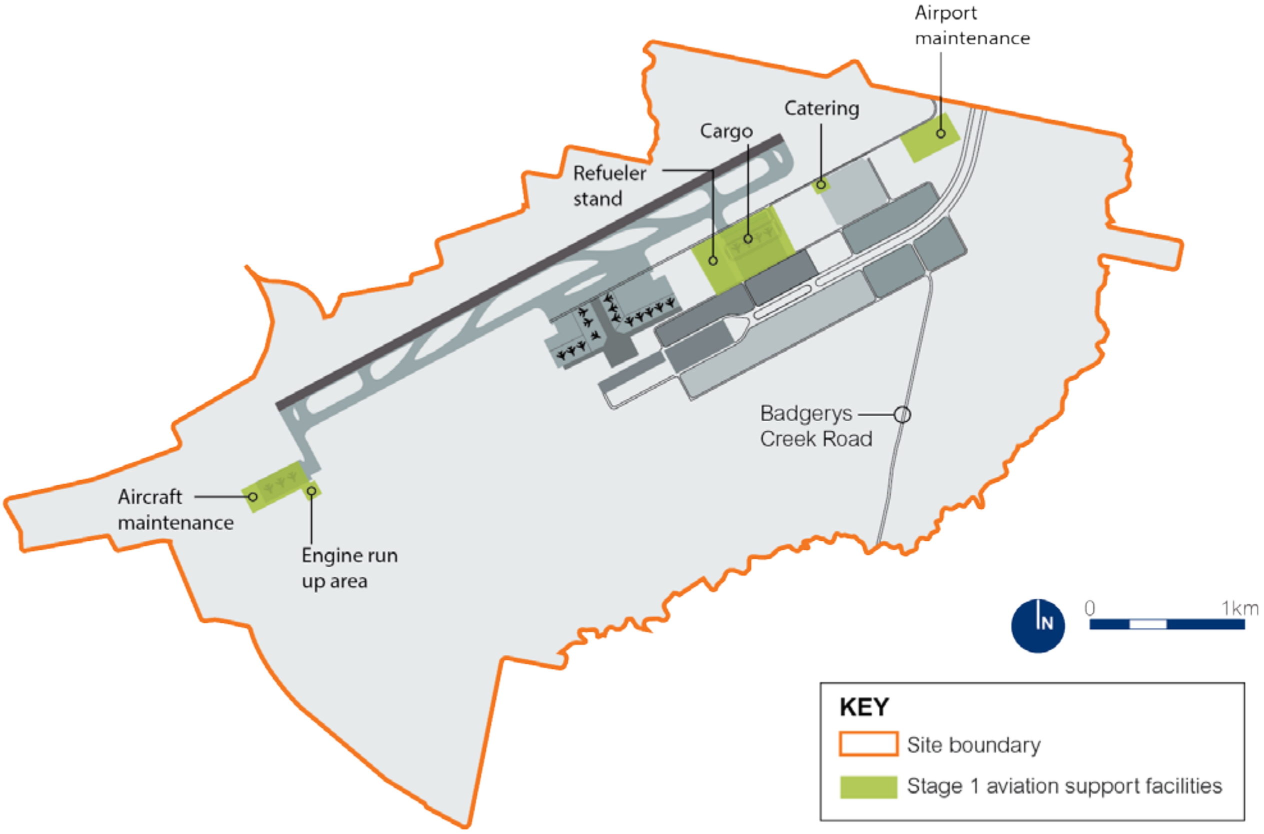


Figure 5–13 – Indicative locations of the main aviation support facilities

5.4.9 Airside roads

Airside roads would be provided for efficient movement of vehicles around the airport site between the terminal area and support facilities without disruption to aircraft operations. These roads would be internal access roads and subject to security clearance and restricted access. A Ground Transport Plan would be prepared as part of the detailed design of the proposed airport.

Perimeter road

A perimeter road would provide access to perimeter support infrastructure and navigational aids. This road would also be used to monitor the perimeter security and perform any maintenance of the security fencing, perimeter lighting, and CCTV system.

The perimeter road pavement (surface) would be designed to accommodate all expected vehicles, including specialised and emergency response vehicles. Where the perimeter road would be used for emergency response vehicles, it would be a sealed two-lane road. Where the perimeter road would be remote from airside activities, and used for maintenance and inspection of support facilities only, it may be an all-weather (unsealed) road.

Internal road layout

Airside roadways would be provided to ensure efficient movement of required vehicles without disruption to aircraft operations between the terminal area and support facilities.

Where not part of the apron areas, the airside roadways would generally be sealed, have two trafficable lanes and have a design speed of 60 kilometres per hour.

Airside access to airport support facilities

Airside secure access is likely to be provided via Anton Road and Adams Road, the connecting road to the realigned The Northern Road, and may also be provided from internal public roads as required.

Emergency access points

Emergency access would be available to both the airside and landside precincts via entry points at Badgerys Creek Road, Anton Road and Adams Roads and The Northern Road connection, as well as via the primary public entrance off Elizabeth Drive and the future M12 Motorway.

An Emergency Access Plan addressing infrastructure required for all Emergency Services would be prepared in consultation with ARFFS.

5.5 Landside precinct

The landside precinct includes areas that are open to general public access such as parking lots, access roads and kerbside drop-off areas, bus stations and train stations. Those parts of the terminal buildings and cargo handling facilities not subject to security and screening, such as check-in and baggage drop-off and freight delivery docks, also form part of the landside precinct.

5.5.1 Terminal

An integrated terminal precinct, serving both international and domestic passengers and located in the midfield area between the Stage 1 northern runway and the long-term southern runway, is considered the most effective design solution for the layout of the airport site. In the long term, a midfield terminal would most appropriately utilise the available space and facilitate the best integration of landside, terminal and airfield operational requirements.

An integrated terminal would provide the greatest flexibility and allow the terminal precinct to evolve to meet changing passenger demand over time. In an integrated terminal precinct, performance criteria for the common use elements such as check-in, security and baggage claim facilities would be developed to meet the overall peak hour demand, rather than individual domestic and international peak hour demands.

The Stage 1 terminal would be designed for incremental expansion to meet the expected long-term demand cost effectively and on commercial terms, without significant disruption to operations and applying the same level of service and performance standards as Stage 1.

The terminal precinct would be the primary public focus of the proposed airport, serving arriving and departing international, domestic and regional (intrastate) passengers. It would incorporate features to optimise the functional and aesthetic appeal of a significant airport, while being efficient and cost effective for passengers, airlines, government agencies and related aviation service providers.

All elements of the terminal design would be developed in accordance with the requirements of relevant laws, including the Airports (Building Control) Regulations and the *Aviation Transport Security Act 2004* and Regulations; ICAO Standards, IATA and MOS guidelines; instruments governing the provision of disabled access; provisions for heritage and other memorial areas; and industry benchmarks for support and retail areas.

5.5.2 Terminal building

Service requirements

The Stage 1 terminal would include:

- facilities for departing passengers (check-in and departure concourse) and for arriving passengers (baggage claim and arrivals concourse areas);
- outbound and inbound inspection services (passport control, security screening, and immigration/emigration, quarantine and custom checks);
- passenger facilitation areas such as departure and gate lounges/areas; and
- areas for the provision of food and beverage and retail for passengers, visitors and staff.

General Design Considerations – Built Form

Western Sydney Airport would be a key gateway for people arriving from other national and international destinations and a gateway to Western Sydney and therefore must present a positive image for the city, state and nation.

The airport site would achieve a cohesive identity through built form integration, both within the site and also within the surrounding environment. The design would consider:

- specific factors relating to climate and geography;
- the urban or local planning context, in particular limitations and constraints;
- the size of individual developments so that structures do not dominate the landscape unless important to the overall design (e.g. airport terminals and control towers);

- morphology and elevation;
- design for cultural expression;
- access to natural light;
- transport corridors, including active transport considerations, supporting efficient movement within and between the airport site and its surrounding environment;
- universal access for the public including disability access standards;
- external spaces, circulation and services;
- any particular requirements to address evidence based design;
- specific design requirements for efficient movement of passengers and operations of the facility;
- human scale environments and inviting building frontages;
- clear way-finding with recognisable entrances, directions of movement and definition between arrivals and departures;
- safety and security considerations;
- visual and acoustic separation of the public and operational zones of the facility;
- expansion and future proofing requirements;
- lifespan and life cycles of materials;
- operational, maintenance and environmental services efficiency;
- integrated design approach through landscaping and public art; and
- applicable elements of environmentally sustainable design including consideration of climate and water sensitive principles in design and in selection of materials and colour.

Location

The terminal as part of Stage 1 would be constructed in the northern portion of the airport site, within the airport midfield (the Terminal and Support Services Zone in the Land Use Plan). The terminal would provide direct access to the Stage 1 northern runway and its associated taxiway system.

Ground transport access to the terminal would be provided via the north-eastern side of the site at Elizabeth Drive and as a high capacity connection to the future M12 Motorway, which is expected to be located north of Elizabeth Drive. An indicative location for the terminal precinct is shown in Figure 5–14.

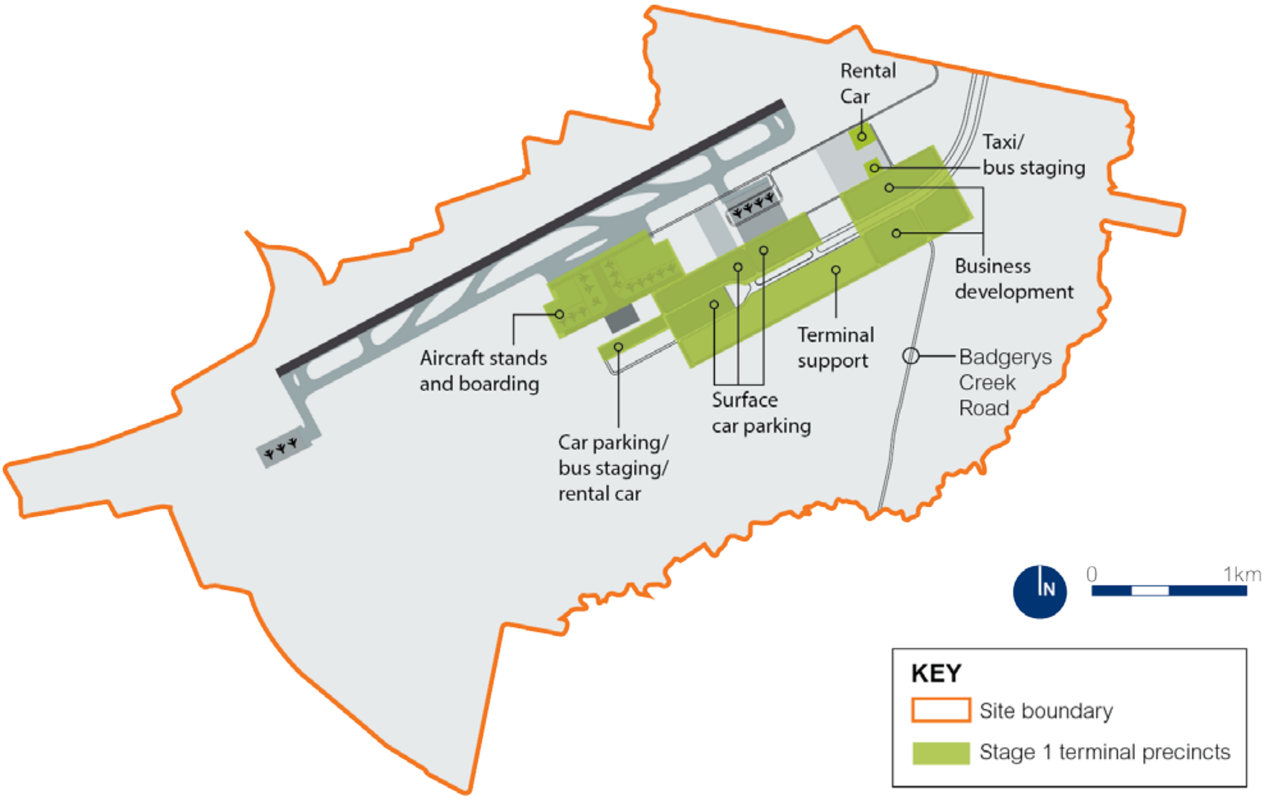


Figure 5–14 – Location of the terminal precinct

Size

The size of the Stage 1 terminal would be determined in the detailed design process based on capacity requirements, but is expected to be in the order of 74,000 to 90,000 square metres of floor area.

Terminal – public areas

The terminal will include a range of public areas that would be developed as demand dictates. The main passenger and baggage sub-components would include the following key elements:

Check-in and bag drop off

Passengers and their checked luggage would be processed using a combination of self-service and staffed counters for check-in and baggage drop-off.

Check-in facilities may include common use and airline-specific branding. The specific layout would be developed as part of the design process informed by demand, technology advancements and general market trends.

A baggage system with screening and sorting capabilities would be provided to facilitate efficient and secure processing of all baggage in accordance with Commonwealth security requirements and taking into account IATA guidelines regarding functionality, throughput and hardware requirements.

Immigration and emigration, customs and quarantine

Inbound and outbound border control processing facilities would be provided to satisfy the relevant demand and level of service standard. Adequate flexibility would be provided in Stage 1 to accommodate changes in policy, threat levels and legislation, and to integrate current and future screening technologies.

Passengers would be processed using a combination of automated processes and staffed positions.

The terminal design would take into account IATA recommendations for queuing and circulation within these passenger processing facilities.

Office facilities and amenity areas for government and border agencies, including detention areas would be provided.

Security processing

Passengers and their carry-on baggage would be screened before entering the boarding gate area of the terminal and. The facilities provided in the Stage 1 terminal would provide sufficient flexibility to accommodate changes in screening requirements and protocols, and would provide for future growth in line with increasing demand.

Additional screening points may be located in aircraft boarding lounges. Separate screening facilities may also be provided for processing of goods and other items.

Baggage claim

Baggage claim facilities, presentation areas for inbound baggage reconciliation and delivery gates, and associated circulation belts would be provided. In addition, inbound baggage offload belts would be provided with convenient access for tugs and carts.

Departure gates and aircraft boarding areas

The layout of contact and remote aircraft parking positions would be provided to meet the forecast aircraft fleet mix, taking account of aircraft types, schedules, and gate occupancy and turn-around times.

Flexible aircraft parking positions would accommodate a variety of aircraft types and sizes, including domestic and international traffic, thus optimising the overall gate utilisation.

When gates are used for international arrivals, segregation would be provided to direct arriving passengers to immigration and customs facilities.

Retail and food and beverage offering

The retail and terminal operations would be integrated to provide a high quality airport customer experience, and would be designed into the overall operation of the passenger terminal.

A range of food and beverage outlets and retail shops and services would be provided to meet the needs of customers, which are expected to be similar to those available at other comparable Australian airports. The necessary storage, back-up facilities, goods delivery access, logistics, and security screening for these activities would be built into the overall airport and terminal design.

Other terminal provisions

The proposed airport would be designed to meet the growing demand from passengers and other stakeholders for a high level of automation, more convenience, more self-service and the use of technology for a more efficient airport experience. Consistent with other comparable Australian airports, the terminal may include other operational and commercial facilities.

5.6 Utilities

Stage 1 would include the provision of utility (service) connections to external suppliers of power, water, gas and telecommunications. The connections would have sufficient capacity for Stage 1 and would be capable of expansion without significant disruption to operations as demand grows.

A Services Master Plan would be developed and all design and construction would be consistent with this plan. The Services Master Plan would include provisions, routes, easements and reservations for all services, including provision for expansion as appropriate.

Coordination with utilities (service providers) would be required during detailed design to determine supply points. All agencies and stakeholders associated with the proposed airport would be consulted in relation to their service requirements.

5.6.1 Services supply

Services would be connected to the site boundary by the relevant utility provider. Offsite works associated with connecting the services to the boundary would be the subject of separate approval processes initiated by the relevant utility provider. Stage 1 would include reticulation of services on the airport site.

5.6.2 Corridor identification and preservation (onsite and offsite)

Services entering the site would, where possible, be appropriately integrated and co-located within the access transport reserves and using common trenching. Supply corridors would be located within the airport site, and could be accessed with minimal disruption to the airport operations. Consultation with NSW authorities and utility providers would be conducted to determine and provide infrastructure to connect transport infrastructure and services to networks.

The utilities would where practicable, be designed to allow for future expansion to provide adequate supply to meet the demands of the long term development.

5.6.3 Relocation and removal of existing utilities

Where offsite services rely on existing on-site infrastructure that would need to be removed for the development of the proposed airport, connections would be relocated as needed by or in consultation with the relevant utility provider in accordance with established processes. Where relocations are required to off-site locations, they would be the subject of separate approval processes in accordance with the relevant utilities provider’s established processes.

There is currently no gas, wastewater or recycled water infrastructure on the airport site that would require relocation or removal. Services expected to be relocated or removed are discussed below.

5.6.4 Water

There is existing Sydney Water infrastructure along The Northern Road, which connects to a private easement that runs through the site to properties on Mersey Road. Properties on Badgerys Creek Road are serviced by a water main from Elizabeth Drive. Existing customers on the southern side of the airport site are also serviced through connections that cross the airport site.

Water main extensions and augmentations would be required in order to maintain service delivery to these customers, and the process for removal and relocation of existing assets would be discussed with Sydney Water.

5.6.5 Electricity

Elizabeth Drive contains a 33kV sub transmission feeder as well as an 11kV feeder that forms part of the Endeavour Energy network in the area. These feeders are currently overhead and due to their proximity to the end of the northern runway would need to be relocated or buried.

Endeavour Energy has advised that some of 11kV lines traversing the site provide important cross feeder/zone connections in the network and as such would need to be relocated.

The 11 kilovolt feeder along the existing The Northern Road is expected to be relocated into a realigned The Northern Road.

The 11 kilovolt feeder in Badgerys Creek Road would need to be re-routed to the east of Badgerys Creek. This may require an easement to be established through private property if suitable road routes cannot be found.

An existing TransGrid 330 kilovolt above ground transmission line currently runs across the south west area of the airport site. TransGrid is investigating potential options to relocate the line, which would require a separate environmental assessment. Consultation would need to occur with Air Services Australia to ensure the relocation of the 330 kilovolt line does not have impact on operations at the proposed airport.

5.6.6 Telecommunications

Telstra has an aerial cable along the existing alignment of The Northern Road, which would need to be relocated off the airport site. A new copper cable is expected to be installed as part of the works for the new fibre cable route in the The Northern Road once realigned.

Consultation would need to occur with Telstra regarding the possible removal of the conduit/cable route along Badgerys Creek Road, which connects the Elizabeth Drive conduit/cable network to the Bringelly Exchange.

If Elizabeth Drive requires realignment (separate to the development of the M12) to cater for the Stage 1 northern runway, it is expected that part of the main fibre cable route in Elizabeth Drive would also need to be relocated. The timing for removal would be co-ordinated with any Elizabeth Drive diversion.

Depending on road realignments and closures, works may need to be undertaken to move existing customers to the north of Elizabeth Drive from the Bringelly exchange to the Luddenham exchange, when Badgerys Creek Road is no longer available. A new fibre would need to be run from the Luddenham exchange along Elizabeth Drive and a new conduit route along Lawson Road.

5.6.7 Water

Potable water requirements

Initial consultation with Sydney Water has indicated that the nearby water reticulation system has capacity to meet the Stage 1 potable water requirements of an estimated 1.6 mega litres per day. It is expected that there is currently sufficient capacity at the anticipated connection point on Elizabeth Drive. Additional connection locations would be determined in consultation with the relevant utility provider.

All water mains on the airport site would be designed and constructed with regard to all relevant standards and codes.

Non-potable and recycled water

Maximum use will be made of non-potable water sources (on site stormwater storage and recycled water), for permissible uses within the airport site, subject to meeting appropriate health and safety requirements.

An estimated 1.8 mega litres of recycled water per day is expected to be generated at an onsite recycled water plant.

Redundancy

It is expected that the detailed design would accommodate redundancy requirements, currently estimated at a minimum of two days' redundancy of the maximum day demand for both potable and non-potable water stored on site.

5.6.8 Sewage and wastewater

System requirements

An estimated 2.5 mega litres of wastewater per day would be generated at peak operating capacity of Stage 1. This would be reticulated, treated and recycled (as grey water) or irrigated on site. An approximate surplus of 0.11 mega litres of generation sludge each day would be stored and removed by tanker.

The treatment process would be determined in detailed design but is expected to require an onsite wastewater treatment facility using a Membrane Biological Reactor. Effluent quality would be in accordance with *National Guidelines on Water Recycling*. Redundancy requirements and reliability in the event of failure would also be addressed in the detailed design.

The processes, technologies, footprint and location of the sewage treatment plant, (if required), would be determined as part of the detailed design process. This would include odour management requirements, chemical handling processes and sludge disposal procedures.

It is expected that a trade waste contract may need to be established for offsite waste disposal including trade waste metering requirements.

Aircraft waste disposal

An appropriate facility would be provided for the management of aircraft waste. Quarantine waste collection and disposal (incineration) would be provided for all international operations.

5.6.9 Electricity

System capacity requirements

The proposed airport would be a high voltage customer that would be responsible for electrical reticulation within the airport site from a boundary connection. The supply voltage would be 132 kilovolts. Stage 1 would have an estimated maximum electricity demand of 16 megavolt amperes during operation. Consultation with electricity suppliers has indicated that there is sufficient capacity in the current system to meet this demand.

Connection points to the local network and the location of high voltage substations will be consistent with the Land Use Plan and would be determined in consultation with electricity suppliers.

Redundancy and backup supply capacity requirements

N-1 reliability would be required for the power supply. ‘N-1’ means that the electricity system would continue to supply the loads connected to the system even if any one element were to fail. N-1 reliability would apply to the external connection, which would require the electricity network supply provider to use diverse routes and connect to zone substations that also have N-1 reliability to support the operations of the proposed airport.

Onsite delivery and distribution

The electrical connections would be at the boundary of the site, one at Elizabeth Drive and one from The Northern Road. These are expected to be supplied from the north and south by new infrastructure from West Hoxton and Bringelly.

The high voltage power system within the airport site would be run between the Stage 1 northern runway and the future southern runway, forming a ring supply for reliability.

5.6.10 Gas

System requirements

The Stage 1 airport is expected to require approximately 57,000 gigajoules of gas each year. This estimated demand is based on supplying commercial catering facilities with gas as the preferred fuel.

The gas requirements are expected to be provided via connection to the Jemena network. There is currently sufficient capacity at the anticipated connection point on Elizabeth Drive to supply the airport site. A single gas pipeline connection is considered to be adequate to provide a high reliability supply.

Onsite delivery and distribution

At the connection point to the airport site, a pressure reducing station is required to change the secondary mains pressure to 210 kilopascals for reticulation. The location for the pressure reduction station would be determined in consultation with the supplier, Jemena.

All gas works would be designed and constructed in accordance with all relevant standards and codes and the gas supplier's network operation rules.

Redundancy

It is assumed that there will be no redundancy of the gas pipeline or supply points; this is considered normal industry practice.

5.6.11 Aviation fuel

Fuel storage requirements and location

Stage 1 would include a fuel farm with fuel storage capacity equivalent to at least three days' requirements. It would be capable of incremental expansion to meet the anticipated long-term development capacity of 82 million annual passengers.

The fuel farm for Stage 1 would be located near the northern boundary of the proposed airport. An underground fuel piping system would connect it to a network of hydrants to be located at aircraft stands and designated hydrants to refuel ground based trucks.

The fuel farm is expected to require four fuel tanks, each with a capacity of three mega litres. Each tank would be contained in a bunded area 65 metres square and 1.5 metres high. The location, configuration, design and construction of this area would be compliant with AS1940 and other standards referenced therein and will include provisions for up to five B-Double tankers to be unloaded at any one time. An indicative location of the fuel farm is provided in Figure 5–15.

An access road approximately 20 metres wide would be required for maintenance and inspection (and any ongoing delivery of fuel by road tanker). This road would be located off Anton Road and a small office structure for security and administration would be located adjacent to the entry gate off Anton Road.

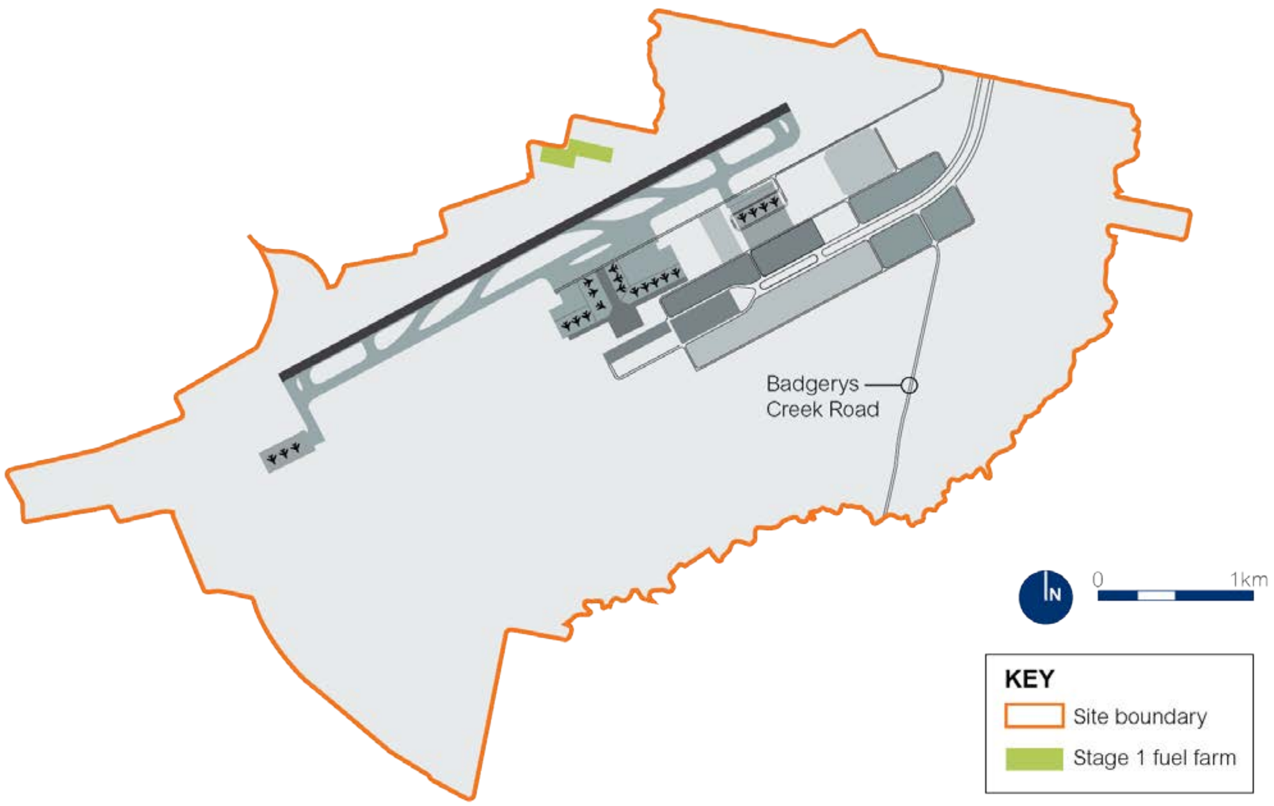


Figure 5–15 – Indicative location of the fuel farm

An airside refueller stand area of 900 square metres (60 x 150 metres) in the vicinity of the terminal would provide adequate space for tankers, support activities and a filling stand to be serviced via the fuel piping system.

Fuel distribution (onsite)

Fuel would be distributed onsite via a purpose built underground pipeline grid served from the on-site fuel tank farm. Runway, taxiway and apron designs would provide for expansion of the grid as staged expansion of the airport occurs, and allow for the expected range of climatic conditions at the site.

There would also be a requirement for some above ground fuel delivery (refuelling trucks) for general aviation aircraft and in specific circumstances. In these instances, the refuelling trucks would be filled via the filling stand.

Fuel delivery (offsite)

Fuel delivery for Stage 1 would be initially supplied by road tanker and anticipated to be sourced from either the Clyde of Banksmeadow fuel terminals. Site access will be via either the M4 or M5 motorways to access the M7 motorway, Elizabeth Drive, Anton Road and Adams Road. Local roads including Anton Road and Adams Road would need to be upgraded to cater for B-double traffic for final access to the site. An estimated fuel delivery of 2.7 mega litre per day would be required for Stage 1. This would result in two road tankers per hour entering and exiting the airport site.

As the proposed airport grows in response to demand beyond Stage 1, future delivery may be via a dedicated pipeline. A secure, landside delivery point immediately adjacent to the fuel tank farm would be provided. Any off-site pipeline would be subject to separate approval.

Redundancy and bypass capability

The fuel tank farm would allow for the decanting of fuel by tankers. Sufficient decanting points would be provided to enable delivery of at least one day's demand within one day.

The filler point would be located within the fuel tank farm compound, but is expected to be connected to Anton Road via entry and exit gates.

The offtake pipeline grid within the fuel tank farm and servicing the airport would provide bypass capability and redundancy. Redundancy would be considered as part of detailed design, but is expected to be achieved by providing tank storage for at least three days' demand (approximately 8.1 mega litres).

5.6.12 Petrol and diesel

Small holdings of petrol and diesel would be maintained in the vicinity of the airport maintenance depot to service ground vehicles and aviation support activities.

5.6.13 Telecommunications

Stage 1 would include the provision of communications facilities within the airport site and necessary connections with off-site communications infrastructure. To ensure continuity of communications, two separate fibre optic cable connection points would be required to the airport site. These would be determined in consultation with the telecommunications providers but are expected to connect from Elizabeth Drive, with the second connection point likely to be in the re-aligned route of The Northern Road.

Within each major terminal building a communications room would be required. This would become the interface point for the airport's communication network.

Airport operations

Communications requirements for airport operations would be determined during detailed design.

Passenger services

Communication services for passengers would be provided in consultation with telecommunications providers.

Reliability

A high level of reliable telecommunications coverage would be required across the airport site. The telecommunications system would be designed to continue to provide communication to the connected systems, even if any one element were to fail. The same reliability would apply to the external system connection, which would require the telecommunication network provider to use diverse routes and connect to exchanges that have similarly high levels of reliability.

5.6.14 Meteorology instrumentation

The proposed airport would require meteorological instrumentation which would be determined and designed in consultation with the Bureau of Meteorology and CASA to meet the requirements of the airport operator and other potential users including airlines.

An automatic weather station and an anemometer are expected to be required to provide relevant data to support aviation operations in accordance with international standards and recommended practices.

5.6.15 General waste disposal

Based on assumptions from other currently operating airports around the world, during Stage 1 operation the proposed airport is expected to generate up to about 11,210 tonnes of general waste per year.

There would be locations for onsite waste collection, with disposal to occur off-site. Landside waste collection would allow for sorting and separate disposal of recyclable, non-recyclable and hazardous materials.

Infrastructure required within the airport site to manage waste is expected to include:

- distributed vacuum systems within the airport terminals with a process plant to separate the waste streams; this would need to be scalable to allow expansion as new terminal floor space is brought on line;
- a waste management transfer depot for collection and dispatch off site to landfill or other disposal facilities;
- facilities for recycling; and
- facilities on or close to the proposed airport site that could convert the waste stream to energy.

5.7 Stormwater

5.7.1 Stormwater management

The development of the proposed airport would create a large impervious area and appropriate management, treatment and storage of stormwater runoff would be required. In identifying the required infrastructure for managing stormwater runoff across the airport site, consideration has been given to the mitigation of ponding and standing water areas that could not only impact on the movement of aircraft and airport vehicles, but also attract birds to the area, increasing the risk of bird strikes.

The location and alignment of the stormwater infrastructure would be determined based on the requirements of the *Manual of Standards Part 139—Aerodromes*[5].

[5] Version 1.12: November 2014, Australian Government Civil Aviation Safety Authority

5.7.2 Water quality

The design considerations for the management of surface water quality across the airport site need to mitigate any change to the quality of water being discharged from the site. In analysing the water quality treatment requirements, consideration was given to the required reduction of all pollutants specified in the Upper Parramatta River Catchment Trust (2004) *Water Sensitive Urban Design (WSUD) Technical Guidelines for Western Sydney* (total suspended solids of 80 per cent, total phosphorous of 45 per cent and total nitrogen of 45 per cent). Water quality is discussed further in Chapter 18 Water Quality.

5.7.3 Apron drainage

A pit and pipe stormwater system would provide drainage of the apron and aircraft parking areas and feed into a branch pipeline. The pit and pipe system would be sized to cater for the 10 year average recurrence interval (ARI) storm event. Overland flows in excess of the 10 year ARI storm event would be captured by the taxiway drainage.

The branch pipelines would discharge into trunk pipelines that run parallel to the taxiways and runways. These trunk lines would then convey flows beneath the runway and taxiway area and discharge at specific locations into a series of detention basins at the airport site boundary. The arrangement of the pipelines and discharge points would be developed to reflect the existing catchment areas and discharge locations where possible.

5.7.4 Runway and taxiway drainage

The predominant surface water management for the runway and taxiway areas would be provided through parallel grassed swales, which would also provide the initial treatment of runoff from the paved areas.

The swales would be sized according to the management of flows from the runway and taxiway areas under the 50 year ARI storm event and would discharge into pipelines then ultimately discharge into the detention basins.

Overland flows from the apron area and taxiway closest to the terminal buildings would be designed to cater for the management of flows to prevent ponding on the taxiway or within 30 metres of the buildings, for up to the 50 year ARI storm event. The management of these flows would be achieved by providing slot drains at the low point between these features.

5.7.5 Detention basins

A series of eight detention basins would be provided around the edges of the airport site to provide detention and final treatment of stormwater runoff prior to discharge into the major watercourses of Badgerys Creek, Cosgroves Creek and Oaky Creek. The basins have been sited to allow discharge points that are consistent with natural drainage lines and watercourses wherever possible to minimise potential impacts on existing hydrology and watercourse downstream of the airport site.

In addition to these basins, consideration during detailed design would be given to providing a basin or other form of detention on a tributary of Duncans Creek before discharge from the airport site.

The detention basins would be planted with vegetation that has effective nutrient removal properties. These basins are expected to perform a similar function to bio-retention basins. A forebay would be provided in each of the basins to capture any gross pollutants before they reach the main basin area.

The detention basins would operate as dry basins in order to minimise bird attraction to the site and reduce the risk of bird strike. Indicative locations of the detention basins are shown in Figure 5–16.

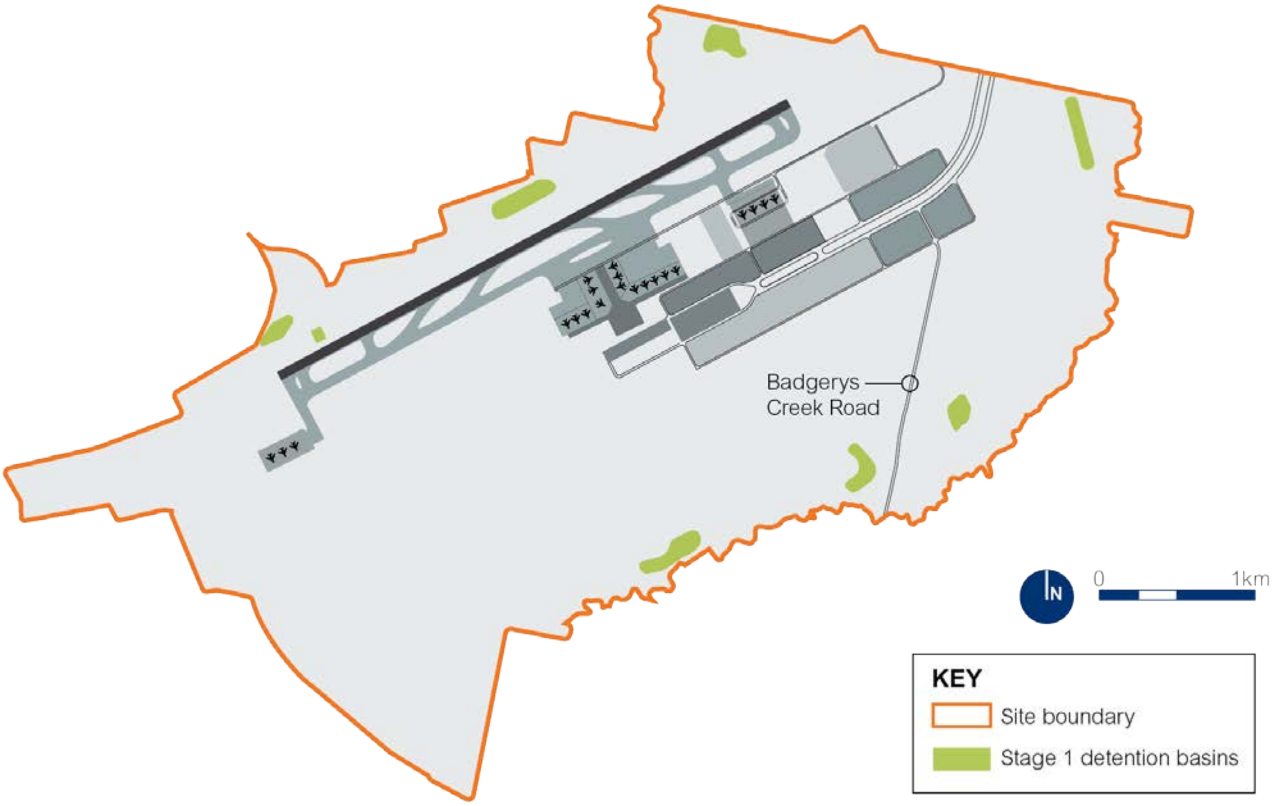


Figure 5–16 – Indicative location of the detention basins

5.7.6 Airside stormwater quality management

Stormwater quality of the airside surface water runoff would be managed through the following key elements:

- flame traps proposed on the aprons and aircraft parking areas to collect small and accidental spills; and
- swales to manage and provide initial treatment and conveyance for stormwater runoff from the runway and taxiway areas. Bio-retention systems would be included in the downstream end of each of these swales and would provide secondary treatment prior to discharge into a detention basin via a gross pollutant trap.

5.7.7 Flame traps

In accordance with clause 6.5.3.5 of the *Manual of Standards Part 139—Aerodromes*, flame traps would be provided where stormwater drains could also serve to collect spilt fuel from the apron area. These pits would be installed in the aprons at the junction where each catchpit connects to a branch pipeline. The flame traps provide a means to collect small spills such as oil or aviation fuel, and isolate and prevent the spread of fuel into other areas.

5.8 Ground transport

The proposed airport is located in the growing areas of Western Sydney. It is immediately adjacent to the Broader Western Sydney Employment Area to the north-east and South West Growth Centre to the south-east. This area is anticipated to grow significantly over the next 30 years and will place its own demands on the transport system.

The NSW Long Term Transport Masterplan, Western Sydney Roads Infrastructure Package and South West Rail Link Extension Corridor Preservation set the road and public transport network requirements for the region. In the long term, the proposed airport is expected to generate 82 million passenger movements per year. This is the equivalent of 224,000 passengers per day entering and leaving the airport site.

5.8.1 Ground Transport Plan

A Ground Transport Plan would be prepared as part of the detailed design of Stage 1 and before the proposed airport begins operating. The plan would address:

- road design speeds;
- security issues;
- traffic loads from the proposed airport and other developments on site;
- connections with off-site/external roads, including matching capacity, speeds and road geometry;
- forecast traffic flows, including public transport requirements;
- car parking;
- commercial and operational vehicles and storage;
- terminal interface;
- passenger pick-up and drop-off by private and commercial vehicles;
- pedestrian linkages between terminals and all transport drop-off and pick-up areas;
- pedestrian, cycle or road networks for workers moving around the airport site;
- use of dedicated busways;
- ability to continue to provide access to and from the airport site when key intersections are unavailable; and
- the ability to expand, with minimal disruption, to meet future airport and business development requirements.

5.8.2 External roads crossing the site

The Northern Road

The Northern Road is a state road under the care and control of Roads and Maritime Services (Roads and Maritime). It currently traverses the airport site. It would be realigned outside the airport site by Roads and Maritime before the start of construction. Concurrently, services in easements along The Northern Road alignment would also be relocated.

A connection to The Northern Road would be constructed to the airport site boundary by Roads and Maritime as part of the construction of The Northern Road on its new alignment.

The offsite realignment would be subject to separate approval processes to be conducted by Roads and Maritime.

Other existing internal roads

Existing internal roads on the airport site outside the Stage 1 construction impact zone, such as Badgerys Creek Road, may remain in place for interim uses. This would be determined in consultation with the ALC and in accordance with the Land Use Plan.

Other external roads

Other roads that would be upgraded to meet the requirements of Stage 1 include:

- Elizabeth Drive, which may be deviated to the northeast and upgraded (separate to the M12), approximately between its current intersection with Badgerys Creek and Adams Road to accommodate the northern runway;
- Adams Road, which is expected to be upgraded from Elizabeth Road at least to Anton Road to meet the needs of support traffic for the proposed airport, including B-double tanker traffic; and
- Anton Road, which would be upgraded from Adams Road to meet the need for secondary access to non-public airport facilities located along the northern site boundary, including B-double tanker traffic.

All road upgrades outside the airport site boundary would be subject to a separate approvals process.

5.8.3 Landside roads

Public access

Road access would provide for private car, public transport, commercial traffic, pedestrians and cyclists. The primary public access road to the proposed airport would be from the future M12. Roads and Maritime would construct the M12 connection to the airport site boundary, subject to separate approval.

The design of the main public access road (from Elizabeth Drive connection with the future M12) would take account of the connecting road developed by Roads and Maritime from the M12. The current expectation is that this main public access road would include:

- a minimum design speed of 90 kilometres per hour and minimum posted speed of 80 kilometres per hour for the main carriageways including the connections to the M12 Motorway, decreasing to safe speeds in the vicinity of the terminal forecourt and Ground Transportation Centre (minimum design speed of 40 kilometres per hour);
- a minimum of two (and up to three) trafficable lanes for each carriageway on the main carriageways;
- two bus lanes; and
- a 40 metre rail reserve.

The main public access road would allow efficient and safe vehicle movement around the ground transport hub within the terminal forecourt, including access to the commercial precinct, support areas and airport parking.

Secondary public access points from Elizabeth Drive may also be provided to improve traffic circulation to commercial areas on either side of the main entrance road.

Pedestrian and cycle access would be included in the Terminal and Ground Transport precincts and parking areas, and pedestrian and cycle routes would likely be provided within the airport site including:

- pedestrian graded ramps between terminal levels for passengers arriving and departing with baggage; and
- grade separated, safe undercover pedestrian access between parking, pick-up and drop-off areas and the terminal.

All ground transport connections would comply with the *Disability Discrimination Act 1992*.

Road layout

The road layout within the airport site would provide for the safe and efficient movement of traffic under all expected traffic conditions. The location of the road network would be generally as shown on the Land Use Plan and may include additional secondary roads. Existing local roads on the airport site that are outside the proposed Stage 1 earthworks footprint are expected to remain open.

Commercial access road (from The Northern Road realigned)

The design of the access road to and from The Northern Road as realigned to freight and maintenance precincts would take into account the connecting road to be constructed by Roads and Maritime. Current expectations are that this road would include a minimum of two trafficable lanes for each of the main carriageways, and have a minimum design speed of 90 kilometres per hour and minimum posted speed of 80 kilometres per hour for the main carriageways connected to The Northern Road, decreasing to safe speeds in the vicinity of these facilities.

Emergency access points

Emergency access would be available to both the airside and the landside precincts via the entry points which would include Badgerys Creek Road, Anton Road and Adams Road, and The Northern Road connection, as well as via the primary public entrance off Elizabeth Drive and the future M12.

An Emergency Access Plan addressing infrastructure required for all emergency services would be prepared in consultation with ARFFS.

5.8.4 Rail access

For the proposed airport to reach its long term capacity, rail services would be required at the airport site at an appropriate point in its development. Stage 1 does not currently include a rail service because the recently approved road network upgrades have been assessed as adequate to support anticipated airport demand for at least a decade after operations commence. The timing of investment in a rail connection to the proposed airport will take into account the cumulative demand from a growing airport and surrounding urban growth and development.

Initial rail services are expected to be provided to the airport site through the extension of the existing Sydney metropolitan rail network. In the longer term, the proposed airport is expected to also be serviced by a dedicated airport express rail service from a key transport hub in the Sydney basin.

Planning for rail connections to the airport site have been undertaken in close consultation with Transport for NSW. The indicative airport layout is aligned with Transport for NSW's current planning for the extension of the South West Rail Link. It preserves flexibility for two possible rail routes across the airport site: one along a corridor under the terminal at right angles to the runways, and one along the airport ground transport access corridor parallel to and between the runways. The rail line would be predominantly underground through the airport site to avoid critical infrastructure, and to preserve flexibility for one or more stations in the terminal precinct.

Figure 5–17 broadly indicates how the proposed corridors for the South West Rail Link Extension would approach the airport site. A final rail alignment would be determined in consultation with the NSW Government. Depending on the alignment and preferred timing to develop rail services, some enabling work may be required during the Stage 1 development to future-proof the corridor. Any such work is expected to be subject to a separate approval process.

Figure 5–17 – Indicative rail alignments connecting to the airport site

5.8.5 Parking

Stage 1 would include dedicated car parking facilities to meet the expected demand. These car parking facilities are expected to include:

- parking for a minimum of 11,500 up to 12,500 vehicles;
- short and long stay parking;
- employee and operational parking;
- commercial vehicle parking and storage;
- parking for rental cars; and
- emergency services vehicle parking.

The majority of passenger car parking for Stage 1 is expected to be surface level parking although some multi-level parking may be provided.

5.8.6 Terminal kerbside

The design for the terminal kerbside would be developed as part of detailed design. It is estimated that a kerbside of 180 to 200 metres would be likely for both departures and arrivals for Stage 1.

5.8.7 Ground transport hub

A ground transport hub would include facilities to provide for connections to the terminal, including:

- set down and drop off zones;
- pick-up, including waiting zones;
- loading zones;
- commercial and operational vehicle parking and storage;
- buses;
- taxis;
- hire cars; and
- rental cars.

The road and pedestrian systems servicing the ground transportation hub and terminal kerbside would also provide for safe and equitable vehicular and pedestrian access to and from these facilities.

6. Construction

6.1 Introduction

This chapter provides an overview of the construction framework for the proposed airport. The framework includes an indicative construction schedule, methods and activities that may be adopted for construction of the Stage 1 development.

The construction framework described here forms the basis of the assessment of environmental impacts throughout the draft EIS. The actual construction schedule, methods and activities for construction of the Stage 1 development would be finalised prior to the start of construction.

Construction of the Stage 1 development represents a major greenfield development with complex delivery using multiple contractors working across a range of specialist services. The area that would be directly impacted by construction (the construction impact zone) covers approximately 1,065 hectares (about 60 per cent of the airport site).

Construction activities for the Stage 1 development are anticipated to occur in three major work phases as outlined below.

- Site preparation works including activities such as the securing of the construction impact zone, establishment of site services and construction facilities, clearing of vegetation, and a major earthworks programme. The earthworks would include relocation of around 1.8 million cubic metres of topsoil and 20 million cubic metres of subsoil and rock to create a level site.
- Aviation infrastructure works including activities such as construction of the runway, taxiways, apron areas, internal road network, the terminal complex, air traffic control tower, freight, cargo and maintenance facilities and a fuel farm.
- Site commissioning activities at the completion of the aviation infrastructure works, involving testing and commissioning of all facilities in readiness for the operation of the proposed airport.

A range of existing infrastructure located at the airport site is incompatible with the proposed airport and would need to be removed. These assets include The Northern Road, a TransGrid 330 kilovolt (kV) transmission line, telecommunication lines and water mains. Although considered in this draft EIS, these assets are the responsibility of the relevant private or State owners and their removal of would be subject to separate assessment processes.

It is expected that construction would proceed from the north-east to the south-west of the airport site to allow relocation of existing infrastructure such as The Northern Road and the TransGrid 330 kilovolt (kV) transmission line. The relocation of existing infrastructure would be subject to separate approvals, but may occur concurrently with other site preparation works.

Construction of the Stage 1 development would occur within the impact zone shown in Figure 6–1. The construction impact zone includes the area of bulk earthworks in the northern half of the airport site, which would facilitate the development of the runway, terminal and aviation support facilities, as well as areas of disturbance outside the bulk earthworks boundary that would be used for ancillary infrastructure such as drainage swales and detention ponds as part of the sites proposed water management system. The total ground disturbance area is expected to cover around 1,065 hectares and relocate around 22 million cubic metres of soil and rock on site. The southern sector of the airport site would remain largely undisturbed and zoned for future aviation use, business development or environment protection in accordance with the Airport Plan. Long term development such as the second runway or ancillary development outside the construction impact zone are not covered by Part 3 of the Airport Plan and would therefore be subject to separate approvals under the *Airports Act 1996*.

The final construction methodology would be subject to refinement during detailed design. This construction framework has been developed, based on contemporary construction methodologies for similar scale projects, to provide a reasonable indication of the likely construction activities and the potential sequencing, methodology and equipment that may be used in the proposed development of the airport site.

6.2 Construction logistics

6.2.1 Indicative construction schedule

It is expected that construction of the Stage 1 development would progress generally from the north-east to the south-west of the airport site, allowing for the early relocation of The Northern Road and a TransGrid transmission line. Site preparation and construction of aviation infrastructure is expected to be completed on a sector or zone basis across the airport site. The indicative construction schedule presented in Table 6–1 reflects a progressive handover and completion of site preparation works in each of the zones shown in Figure 6–1.

Site preparatory works may commence from mid-2016 and continue for around six and a half years. Sectors of the airport site may be subject to progressive handover to the aviation infrastructure works which would then be completed over approximately five years to December 2024. Indicative construction dates are as follows:

- site preparation works start mid-2016 and end early 2023 with progressive handover of the site to the aviation infrastructure works;
- aviation infrastructure works start mid-2019 and end mid- 2024; and
- commissioning and operational readiness occurs late 2023 until late 2024, allowing for a start of operations in early January 2025.

Table 6–1 – Indicative construction schedule

Construction zone	Activity	Indicative construction period	
		Start	Finish
Site preparation works – General	Site facilities and fencing	August 2016	August 2017
	Detention ponds and preliminary controls	September 2016	May 2017
	Perimeter road	February 2017	August 2018
Site preparation works – East	Clear and grub	December 2016	November 2017
	Bulk earthworks	June 2017	September 2018
	Rehabilitation	July 2018	April 2019
Site preparation works – North-west and south-west	Clear and grub	May 2019	December 2019
	Bulk earthworks	November 2019	July 2020
	Rehabilitation	May 2020	November 2020
	Runway completion and bulk earthworks balance	December 2020	February 2023
Aviation infrastructure works – East	Preliminaries and establishment	April 2019	July 2022
	Services	April 2019	December 2021
	Buildings	July 2019	February 2024
	Runways	December 2019	January 2022
	Taxiways	December 2020	January 2022
	Aprons and stands	June 2021	July 2022
	Main access road	August 2021	December 2021
	Internal roads and carparks	September 2021	January 2022
Aviation infrastructure – North-west	Preliminaries and establishment	November 2021	December 2021
	Runways	December 2021	December 2022
	Taxiways	July 2022	November 2023
Aviation infrastructure – South-west	Preliminaries and establishment	February 2023	June 2023
	Aircraft maintenance and cargo facilities aprons and stands	June 2023	January 2024
	Access roads from The Northern Road	August 2023	June 2024
Commissioning	Testing and commissioning and operational readiness	December 2023	December 2024

The dates provided in this construction schedule are indicative only and have been developed specifically for the purpose of assessing environmental impacts. The actual construction schedule would be finalised prior to commencement of construction activity.
The removal of existing utility infrastructure has not been included in the indicative construction schedule as the dates for these activities are subject to further consultation with utility asset owners and operators.

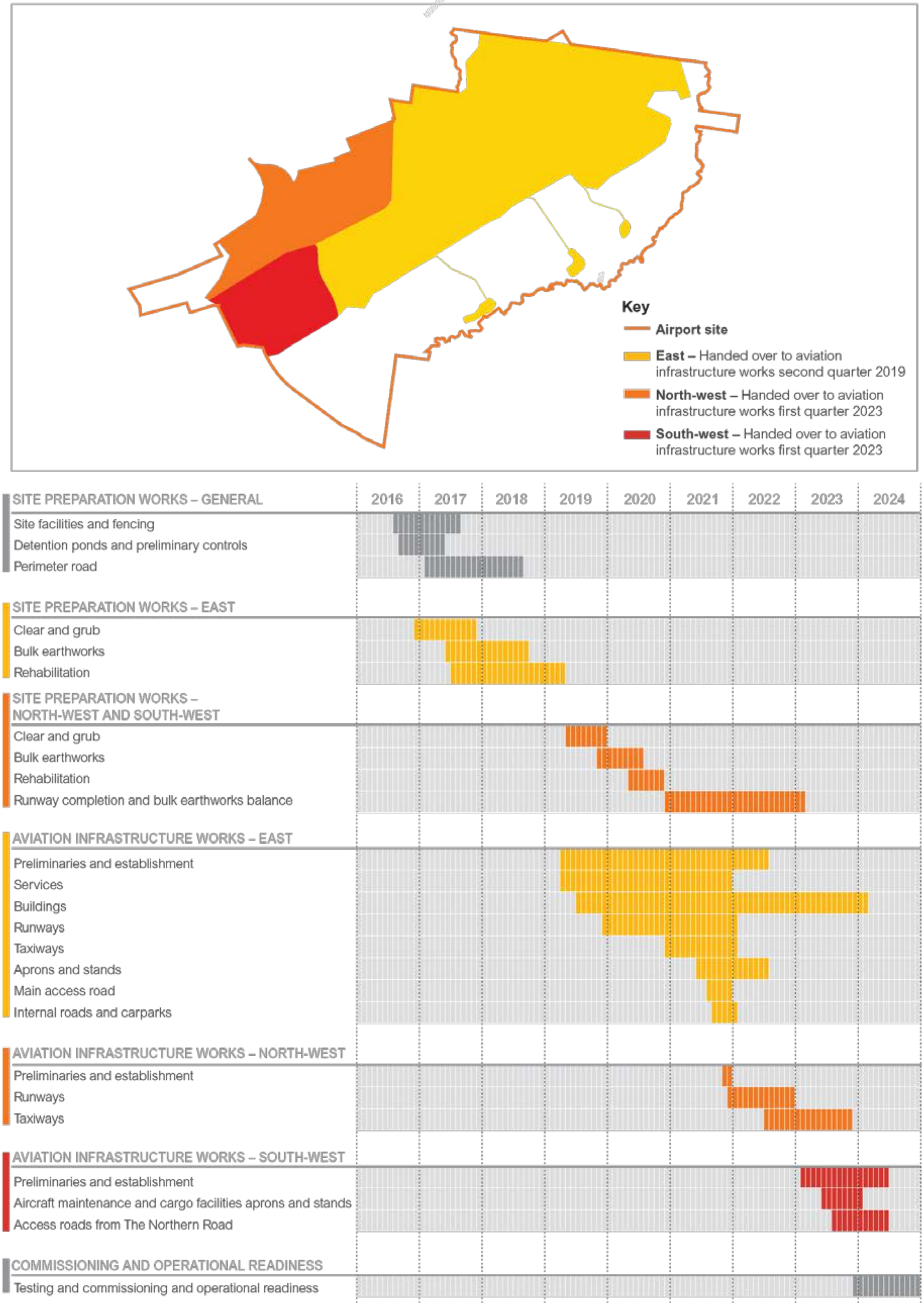


Figure 6–1 – Stage 1 construction impact zone and indicative construction schedule

6.2.2 Workforce

Construction of the proposed airport would create employment opportunities for construction workers and support staff particularly in and around Western Sydney. Based on the indicative construction schedule a relatively modest workforce would be required at the commencement of the site preparation works, starting at around 45 personnel and increasing to a peak of around 230 personnel during the peak period of bulk earthworks activity. The aviation infrastructure workforce would start with approximately 130 personnel and increase to more than 700.

The estimated workforce numbers for direct on-site jobs to implement the indicative construction schedule are provided in Table 6–2 and shown on Figure 6–2.

The peak on-site workforce is anticipated to exceed 800 personnel, starting from early 2022 when site preparation and aviation infrastructure construction activities are expected to be running concurrently. The peak workforce is important for quantifying employment opportunities generated by the construction programme and for consideration of indirect impacts on the surrounding community generated by the workforce, such as increased traffic.

Table 6–2 – Peak workforce (site preparation and aviation infrastructure works)

	2016		2017				2018				2019				2020				2021				2022				2023				2024	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Site preparation workforce																																
Labour (Civil)	31	47	62	67	161	140	129	132	145	142	111	16	15	15	15	15	15	15	19	55	64	64	58	59	55	51	8	–	–	–	–	–
Supervisory and management	10	10	10	31	37	40	59	59	71	81	79	80	81	81	80	80	81	81	73	59	59	45	37	35	11	11	5	–	–	–	–	–
Contract administration	3	3	3	9	10	11	17	17	20	23	22	23	23	23	23	23	23	23	21	17	17	13	10	10	3	3	1	–	–	–	–	–
Aviation infrastructure workforce																																
Labour (Building)	–	–	–	–	–	–	–	–	–	–	–	–	–	80	120	96	61	160	177	98	128	226	337	334	365	324	95	85	120	129	79	–
Labour (Civil)	–	–	–	–	–	–	–	–	–	–	–	107	176	147	164	147	169	122	125	97	101	164	102	88	87	68	85	57	101	86	130	100
Supervisory and management	–	–	–	–	–	–	–	–	–	–	–	15	21	45	73	81	116	116	152	156	159	159	154	156	159	156	156	121	115	90	73	57
Contract administration	–	–	–	–	–	–	–	–	–	–	–	11	15	33	53	58	84	84	109	113	114	114	111	113	114	113	113	87	83	65	53	41
Total	44	60	75	107	208	191	205	208	236	246	212	252	331	424	528	500	549	601	676	595	642	785	809	795	794	726	463	350	419	370	335	198

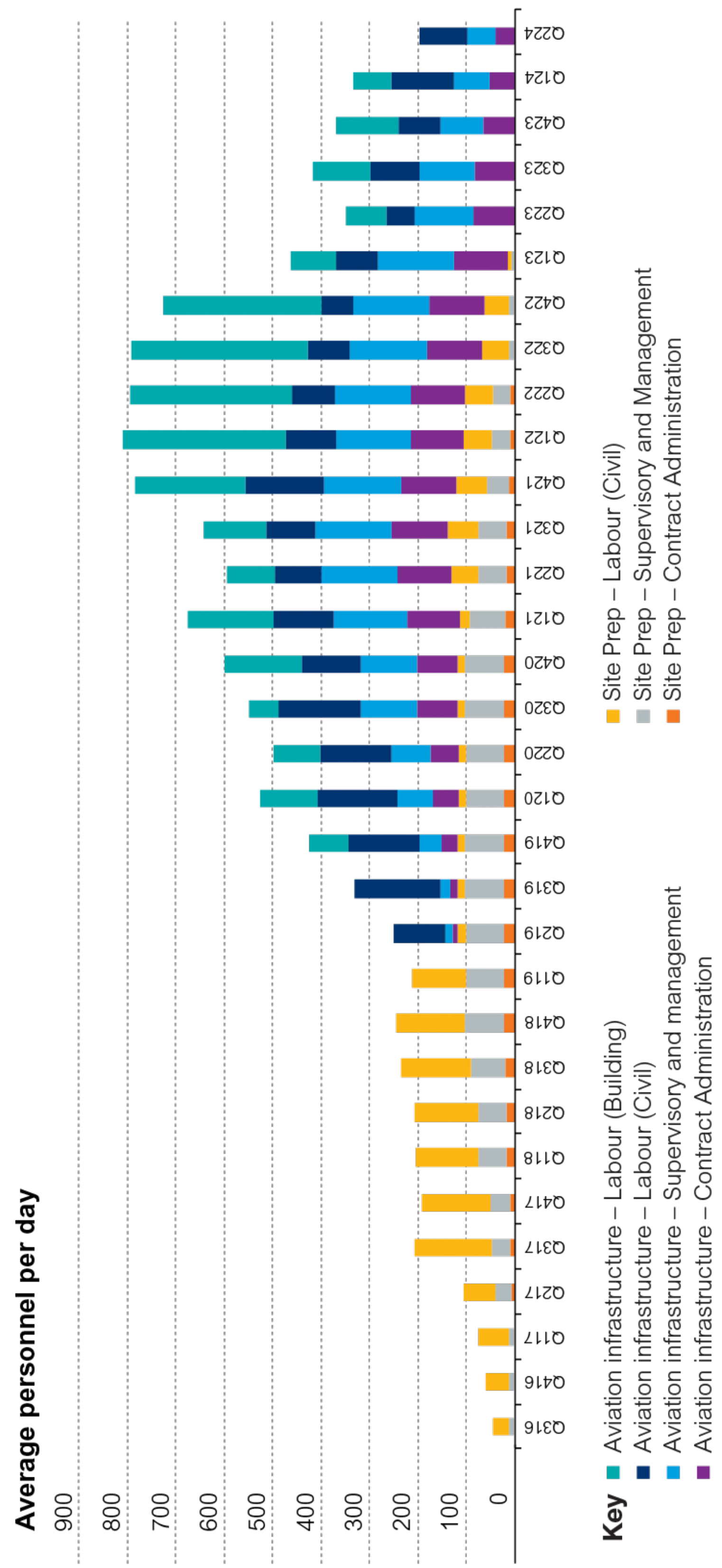


Figure 6–2 – Construction workforce

6.2.3 Construction hours

The hours of construction would generally be between 6.00 am and 6.00 pm, Monday to Saturday. However, during the site preparation works, heavy and light vehicle movements to and from site are likely to occur outside these work hours. During the aviation infrastructure works some construction materials, such as paving materials, are expected to be delivered to the site 24 hours per day.

Other activities that may be undertaken at night during both construction stages include:

- works to existing services (if shutdowns are required);
- works on or adjacent to existing roads due to lane closure requirements, specifically on Elizabeth Drive and The Northern Road;
- deliveries of oversized loads;
- catch-up works if works are delayed by unforeseen circumstances;
- responsive activities to protect people, property and the environment in the event of an emergency such as a fire or structural failure; and
- other activities undertaken in accordance with relevant noise guidelines, or which have no material noise or other impacts on residences.

It is noted that the proposed construction hours fall outside the standard hours for construction recommended in the NSW Environmental Protection Authority (EPA) *Interim Construction Noise Guideline* (DECC 2009a) of 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm on Saturday. The guidelines state that the recommended hours are not mandatory, and identify a number of categories of works that might be undertaken outside the recommended hours, including:

- deliveries of oversized plant or structures;
- public infrastructure works that shorten the length of the project and are supported by the affected community; and
- works where a proponent demonstrates and justifies a need to operate outside the recommended standard construction hours.

The airport site covers a broad area, and a range of management measures such as the placement of temporary noise barriers or exclusion buffers within the airport site would be adopted to mitigate disturbance to nearby receivers for construction activity outside of standard construction hours.

6.2.4 Site access

Construction of the proposed airport would generate considerable additional traffic on the regional and local road network. However, this is not expected to significantly impact on the surrounding transport system with the exception of potential oversize vehicle movements for earthworks (see Chapter 15).The airport site is located in Badgerys Creek, approximately 10 kilometres from the M7, and the majority of deliveries are expected to arrive via the M7 and Elizabeth Drive with some access also to occur from The Northern Road and Badgerys Creek Road. The M7 has good connectivity to southern NSW via the M31, Sydney City via the M5 and M4 and northern NSW via the M2. Figure 6–3 shows the major access routes that are expected to be used by construction vehicles to access the airport site.

Figure 6–3 – Major access routes to the airport site

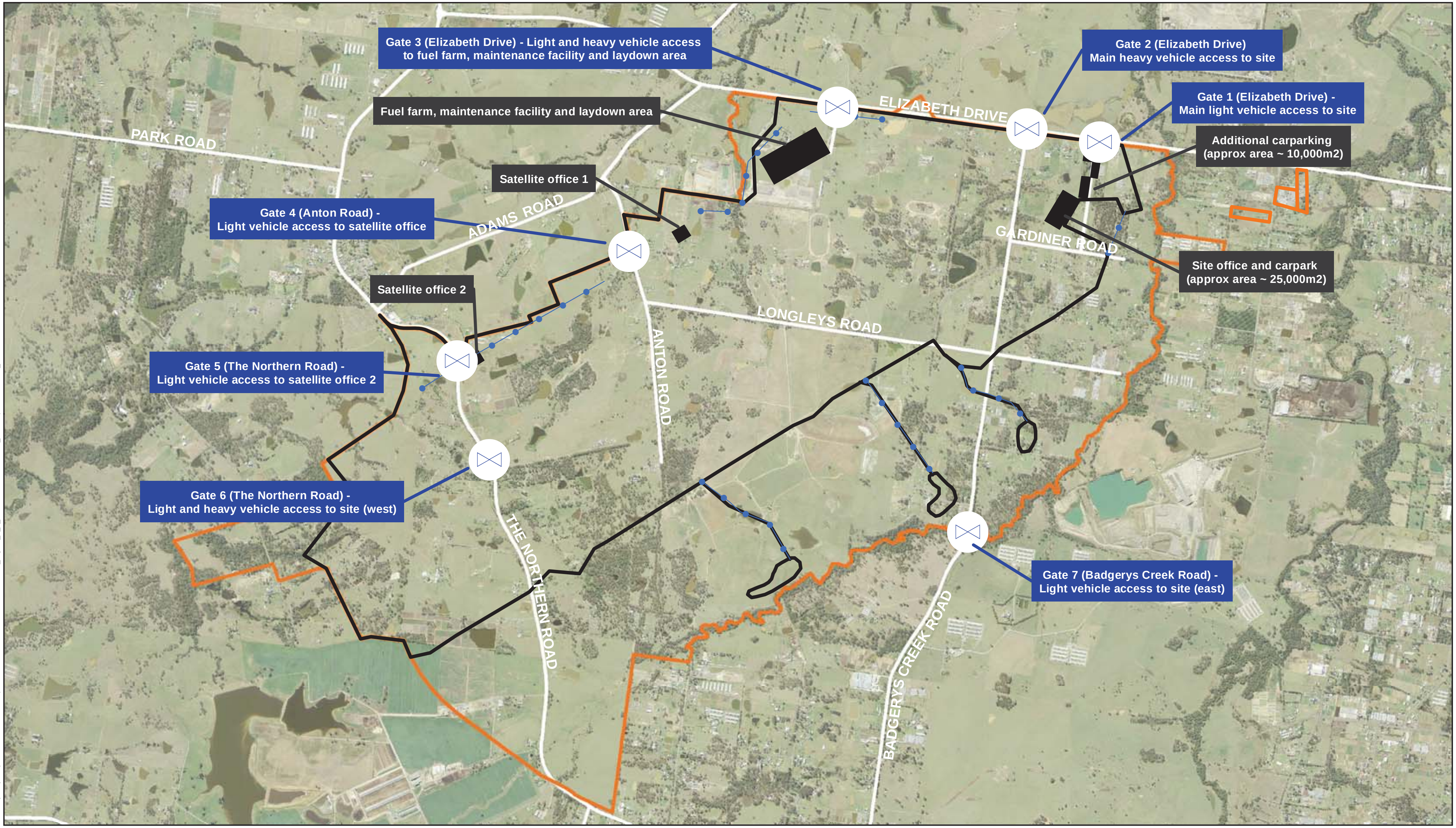
Seven site access gates would be established at the start of site preparatory works, as detailed in Table 6–3 and shown on Figure 6–4. Provision would be made for access by heavy and light vehicles (see Section 6.2.5).

Table 6–3 – Access gates to the airport site

Gate Number	Road	Access to	Vehicles
1	Elizabeth Drive	Site office	Light only
2	Elizabeth Drive	Airport site (east)	Heavy only
3	Elizabeth Drive	Fuel farm, maintenance facility and laydown area	Light and heavy
4	Anton Road	Satellite Office 1	Light only
5	The Northern Road	Satellite Office 2	Light only
6	The Northern Road	Airport site (west)	Light and heavy
7	Badgerys Creek Road	Airport site (east)	Light only

Upgrades to Elizabeth Drive and The Northern Road at the access points would include deceleration and acceleration lanes and right turn lanes as required to accommodate heavy vehicle movements associated with the construction programme. Other roads in the vicinity may also require upgrades and traffic control measures to accommodate additional vehicle movements. The access points would have lockable temporary gates in the permanent boundary fence. Internal egress through the site would initially be provided by the existing roads. As the site develops and the earthworks progress, new site access roads would be constructed within the construction impact zone using imported gravels and maintained by graders and water carts, as required. Access to the proposed detention ponds in the southern half of the site is available via the existing public road network and formed farm access roads.

A traffic management plan would be developed as part of the overall Construction Environmental Management Plan as described in Section 6.5. The traffic management plan would provide specific requirements for all light and heavy vehicle movements accessing the site during construction, and any road network improvements required to accommodate the vehicles.



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Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

LEGEND
- Badgerys Creek Site Boundary
- Construction impact zone
- Site facilites
- Drainage channels
- Site access - gates

0 0.5 1 2
Kilometres

N

Figure 6-4 - Site preparation works - facilities and access

6.2.5 Construction vehicles

Light vehicles

Light vehicles are generally defined as cars, utility vehicles and some commercial vehicles with a gross vehicle mass of less than 4.5 tonnes.

Daily light vehicle trips would be carried out primarily by the construction workforce. The number of light vehicles entering and leaving the airport site is estimated to increase steadily from around 30 during the early stages of site preparation to a peak of around 440 in 2021. Expected daily light vehicle numbers over the indicative construction schedule are shown in Figure 6–5.

Heavy vehicles

Heavy vehicles are defined under the *Heavy Vehicle National Law 2013* (NSW) as large vehicles with a gross vehicle mass or aggregate trailer mass of more than 4.5 tonnes.

Heavy vehicles including trucks and semi-trailers would be required for the delivery of equipment and construction materials. Pavement materials for the runway, taxiways, aprons, roads and carparks are expected to be imported predominantly from outside the airport site.

Substantial volumes of gravel would be required for the base and sub-base material, while large volumes of asphalt and concrete materials would be used for surfacing. Concrete would also be a major construction material for structures (buildings).

The total quantity of gravel (or other suitable materials such as sandstone) used during construction would be approximately three million tonnes (or about 3,500 tonnes per day over around 33 months of the indicative construction schedule).

Gravel would be imported onto the airport site from excavations at other major Sydney infrastructure projects and from established quarries in the Southern Tablelands of NSW (for example, Gunlake Marulan Quarry, Holcim Lynwood Quarry and/or Boral Peppertree Quarry).

An asphalt batch plant would be established on site and would operate for around 550 days over 48 months (approximately three days per week) throughout the indicative construction schedule. The asphalt plant would require raw materials including aggregate, sand, crusher dust, lime filler and bitumen.

Aggregate would be imported to the airport site from the same quarries supplying the gravel. Sand is likely to be imported from Kurnell or Wollongong.

A concrete batch plant would also be established on site to supply concrete for an estimated 54 months, with a daily average production of 424 cubic metres. Raw materials delivered to the concrete batch plant would consist of cement, fly ash, aggregate, sand and admixture.

General building materials such as structural steel, roofing materials, flooring materials and furniture would be supplied from various sources within Greater Sydney.

The number of heavy vehicles entering and leaving the airport site during the peak construction period would range from about 100 to 200 each day, as shown on Figure 6–6. Expected daily heavy vehicle numbers over the indicative construction schedule are shown in Figure 6–6.

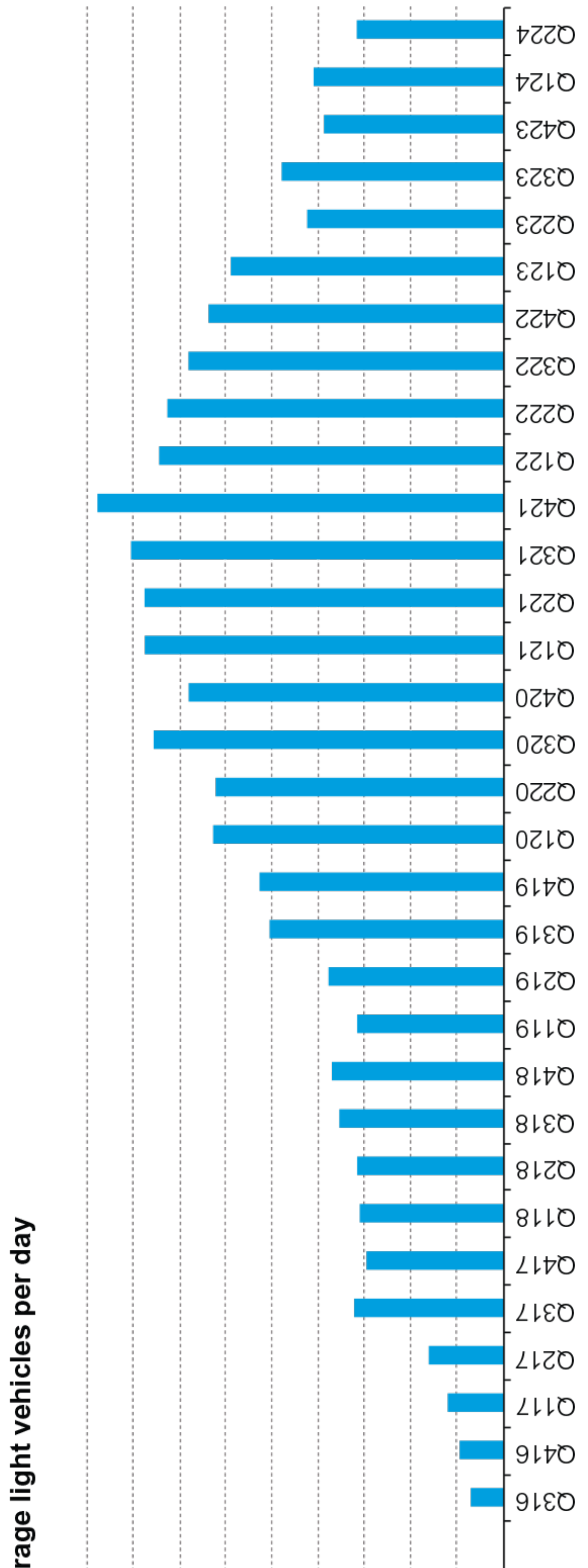


Figure 6–5 – Light vehicle movements for indicative construction schedule

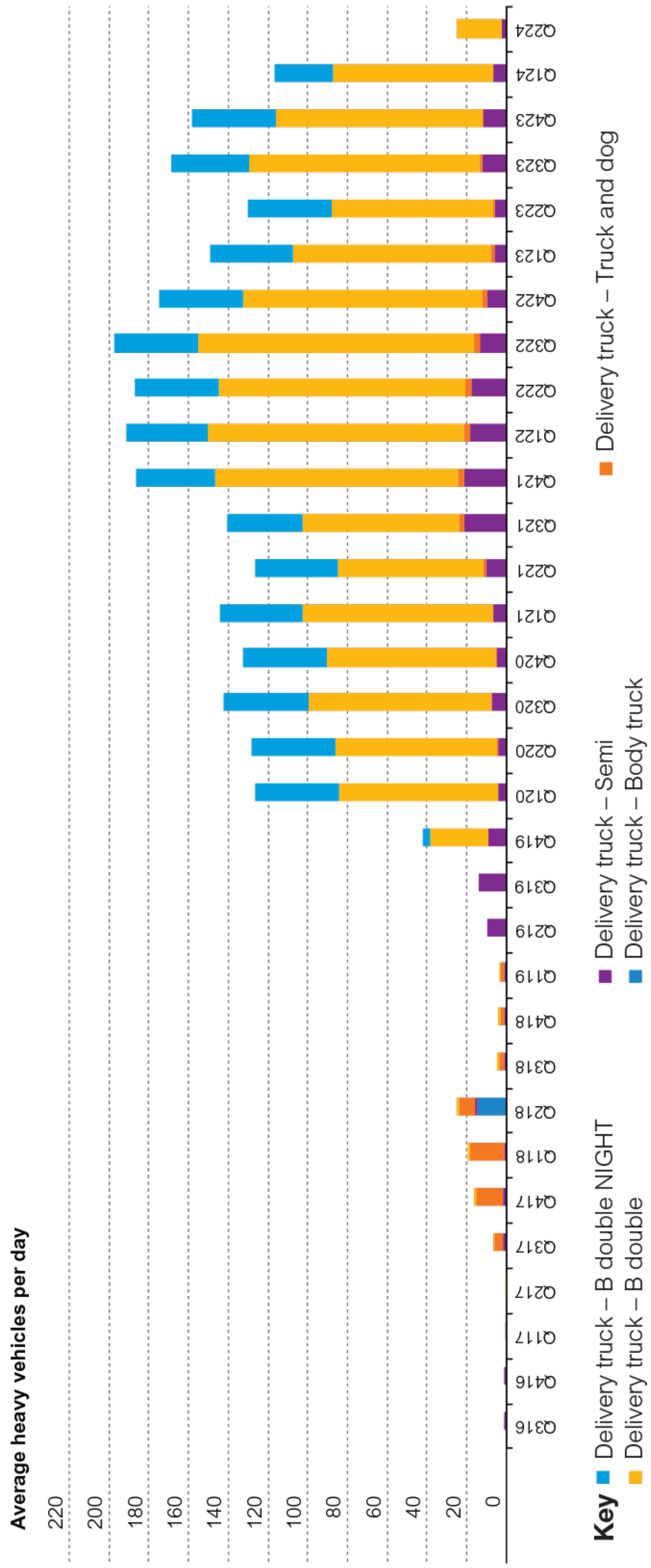


Figure 6–6 – Heavy vehicle movements for indicative construction schedule

6.2.6 Construction machinery

In addition to heavy and light vehicles, which would generate substantial volumes of traffic on the external road network, a range of construction machinery would be used at the airport site, as listed in Table 6–4. Expected machinery use over the indicative construction schedule is presented in Figure 6–7.

Table 6–4 – Expected construction machinery

Construction equipment likely to be used during the Stage 1 development (indicative only)	
Dozers (e.g. D6, D8 and D11)	Pad foot rollers
Scrapers	Loaders
Excavators (e.g. 30 tonne and 200 tonne)	Gravel pavers
Water carts (20,000 litres)	Asphalt pavers
Graders (e.g. 14 inch and 16 inch)	Elevated work platforms
Compactors	Concrete placer spreaders
Multi-tyre rollers	Concrete slip form pavers
Smooth and tandem drum rollers	Concrete texture cure machines
Dump trucks (e.g. 50 tonne)	Mobile crane
Backhoe	Piling rig

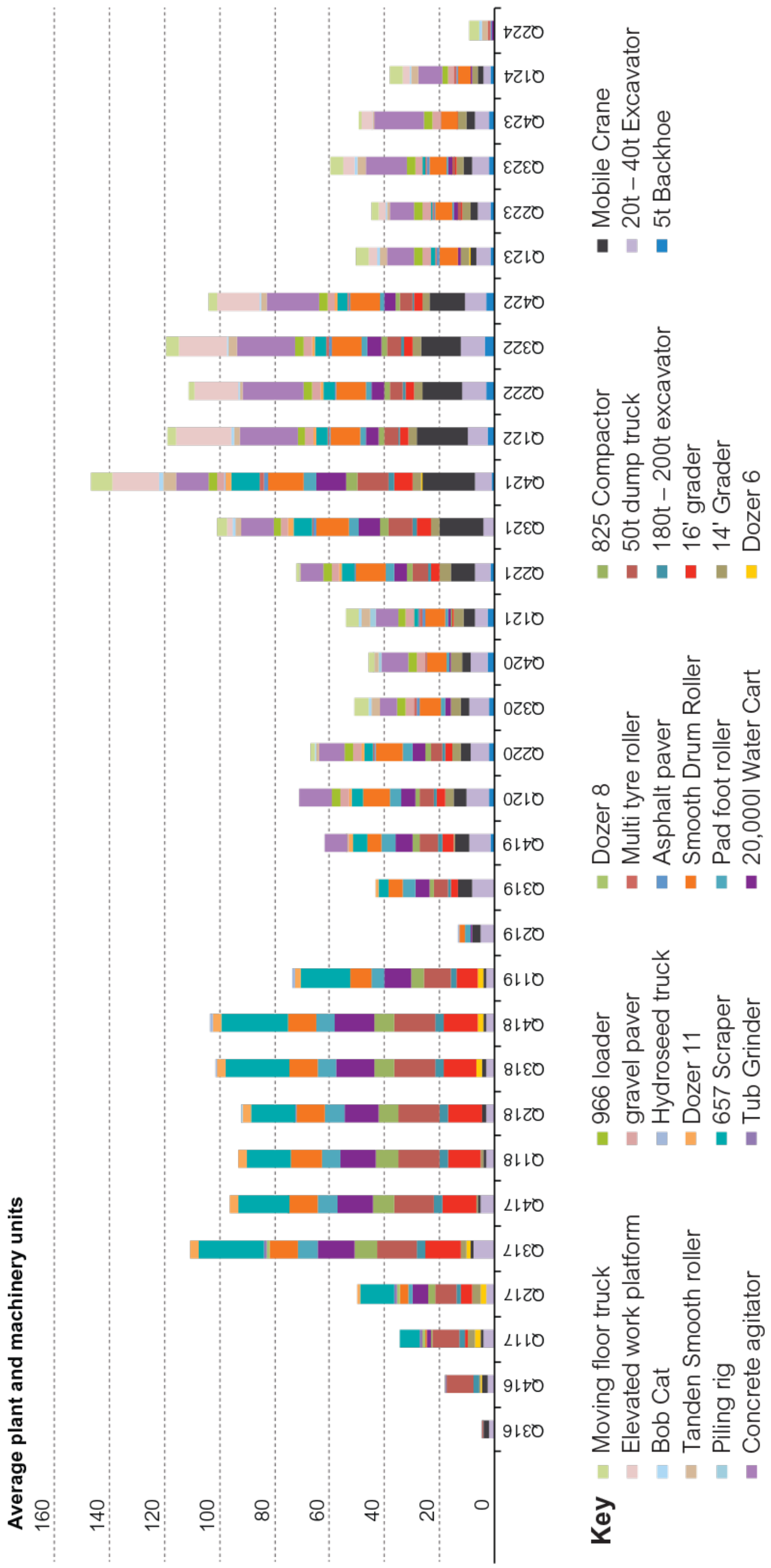


Figure 6–7 – Plant and machinery for indicative construction schedule

6.3 Site preparation works

6.3.1 Establishment of temporary construction facilities

Temporary facilities for the site preparation works would generally be constructed within the construction impact zone as shown in Figure 6–4. The proposed site facilities are outlined below.

- **Security**. Access to the site would be restricted by the early installation of a site perimeter fence around the construction impact zone. This would include both sides of The Northern Road until the road is relocated.
- **Site office and car park**. A site office would be constructed in the north-east section of the airport site, adjacent to the Stage 1 development area. The site office would be accessed via a sealed, temporary road from Elizabeth Drive. The site office would accommodate a staff of about 90 people. The site office would include an office, first aid and training rooms, lunch room and male and female toilets. A temporary carpark would be provided adjacent to the office, outside of the Stage 1 development area. The carpark would have about 280 car spaces (for light vehicles only), providing parking for both office and site based construction personnel.
- **Satellite offices**. Two satellite offices would be provided within the airport site, likely outside of the earthworks area. Each satellite office would include an office, first aid and training rooms, lunch room and male and female toilets. Each office would have separate parking for light and heavy vehicles.
- **Fuel farm**. A fully bunded and fenced temporary fuel farm would be established in the north of the airport site, adjacent to Elizabeth Drive. Infield machinery would be refuelled by fuel truck, which would fill at the fuel farm. The fuel farm would have capacity for three days' supply or 165,000 litres. This fuel farm would be temporary and replaced with a permanent fuel farm to support the operation of the proposed airport.
- **Laydown area**. A laydown area would be provided adjacent to the fuel farm and accessed via Elizabeth Drive. The laydown area would be fully fenced and surfaced with suitable material to provide all-weather access. The laydown area would be used for the storage of precast concrete products and other items that could be safely stored outside.
- **Maintenance facility**. A maintenance facility would likely be established adjacent to the laydown area and the fuel farm. The facility would be capable of servicing and repairing plant and would consist of a covered work area. There would be bunded storage for lubricants, oils and other materials, container storage for spare parts and spare tyre storage. The maintenance facility would also include an office, crib facilities, toilets and a washdown area for trucks.

- **Services**. Services would be provided from existing utilities at the airport site supplemented by temporary utilities, subject to agreements with the relevant operators.
  - The approximate 300 kilovolt-ampere (kVA) demand during construction is expected to be provided through electricity assets operated by Endeavour Energy. Current forecasts indicate there would be sufficient feeder capacity to provide the energy requirements (Endeavour Energy 2014). Any temporary reticulation would be constructed in accordance with Endeavour Energy standards.
  - Up to 1.36 megalitres of water would be required per day for site preparation works. Of this, about 8,600 litres (0.0086 megalitres) is expected to be required as potable drinking water for site workers Water would be sourced through existing utilities accessible from the airport site and supplemented by stormwater runoff captured in sediment dams or farm dams. Any temporary water supply works would be carried out in accordance with Australian Standards and other standards set by the Water Services Association of Australia.
  - The 8,200 litres of domestic wastewater and sewage estimated to be generated each day during site preparation would be stored in tanks at the airport site for collection by disposal trucks to appropriate licenced facilities.
  - Telecommunications would be facilitated through underground optical fibre cable and customer multiplex cabinets. Any temporary telecommunications poles and wires or underground cables would be constructed in accordance with relevant standards.
  - Provision of services to the site boundary would be undertaken by the relevant service provider. Locations for the respective service entries to site and details for future connections would be determined during detailed design to allow efficient connection when required.
- **Perimeter road**. A perimeter road would be constructed around the Stage 1 development.

6.3.2 Vegetation clearing

The airport site has been largely cleared through previous rural and urban development, but retains pockets of vegetation that would need to be cleared at the start of construction. Clearance of vegetation for the Stage 1 development would be restricted to the construction impact zone, and remnant vegetation in the southern portion of the site would remain largely intact.

Before clearing, a fauna spotter would undertake an assessment to identify potential habitat trees. These trees would be clearly identified with spray paint. A dozer would then clear the undergrowth and trees not identified as potential habitat trees. An excavator would follow several days behind the dozer. The excavator would drop trees in a manner designed to maximise the likelihood of survival of any fauna present, and a qualified fauna spotter would be on hand to relocate any fauna found during the clearing activities.

It is expected that the clearing and grubbing (removal of tree stumps and roots) would generally commence in the north-east of the airport site and proceed to the south-west. This would encourage fauna to move towards the south of the airport site and towards Badgerys Creek. The clearing would be undertaken before the construction of the majority of the southern perimeter fence, to allow fauna to relocate off site.

The cleared vegetation would be sheared and mulched before being stockpiled for use in erosion and sedimentation control measures. The ground would then be grubbed to remove any roots to a depth of approximately 300 millimetres.

All existing services and fencing would be removed from the construction impact zone before earthworks. Materials would be salvaged for recycling where possible, or disposed off site. Existing septic systems would either be left in place and grout filled (if under areas of fill) or excavated and removed from the airport site.

Existing farm dams located on site would be progressively emptied over a number of days. Smaller dams would be emptied by direct pumping into water carts larger dams would have a standpipe installed. The recovered water would be used primarily for dust suppression during construction.

6.3.3 Removal of existing roads and utilities

A range of existing infrastructure located at the airport site may be incompatible with the proposed airport and would need to be removed. These assets include The Northern Road, a TransGrid 330 kilovolt (kV) transmission line, telecommunication lines and water mains. Their removal may be concurrent with other site preparation works before construction. Although considered in this draft EIS, these assets are the responsibility of the relevant private or State owners and their removal of would be subject to separate assessment and/or approval processes.

Existing utilities including roads, electricity, water and telecommunications on the airport site would be used where practical to do so; otherwise they would be removed progressively where they are not required for construction or by other customers. Utilities that service customers outside the airport site would be relocated to provide continuity of these services. The various service providers have documented processes for removal and replacement of assets, and this activity would be undertaken in consultation with the Department of Infrastructure and Regional Development.

The Northern Road would be diverted around the airport site by NSW Roads and Maritime Services as part of The Northern Road Upgrade Stage 4 under the Western Sydney Infrastructure Plan. It is also expected that Elizabeth Drive would be slightly diverted from its current alignment to accommodate safety requirements for the Stage 1 runway. At the time of development of this draft EIS, the exact routes for these road diversions have not been determined.

Roads within the airport site but located outside the construction impact zone for the Stage 1 development, including sections of Badgerys Creek Road and Pitt Street, would remain in place to maintain access to the airport site and surrounding areas. Roads within the construction impact zone would be closed and pavement materials removed. Any road closures would be managed in accordance with the requirements of NSW Roads and Maritime Services and Liverpool City Council, and would be subject to the provisions of a traffic management plan that would be prepared as part of the overall environmental management plan for the construction of the proposed airport (see Section 6.5).

Removal of electricity assets at the airport site would be subject to applications to relevant network operators. TransGrid is the network operator of the 330 kV overhead transmission line, while Endeavour Energy is the network operator of the smaller 11 kV and 33 kV overhead lines. The 330 kV overhead transmission line would be relocated, subject to feasibility assessments in accordance with TransGrid's processes. Options being considered by TransGrid include a buried transmission line or an alternative overhead route.

The 11 kV overhead line along The Northern Road would be relocated underground in line with the road diversion. The 11 kV overhead line at Badgerys Creek Road would be relocated along existing roads to the east of the airport site. The 11 kV and 33 kV overhead lines along Elizabeth Drive would be relocated underground in line with the road diversion.

Removal of potable water infrastructure at the airport site would be subject to applications to the relevant water utility provider (Sydney Water). Reconfiguration of the water supply network would be carried out prior to removal of underground piping from the airport site, in order to maintain continuity of service to customers outside the airport site.

The overhead telecommunications cable along The Northern Road would be replaced by an underground line within the road diversion. The underground telecommunications cable that runs along Badgerys Creek Road from Elizabeth Drive to Bringelly Exchange would be replaced by an underground line along The Northern Road, including the diversion. Customers north of Elizabeth Drive serviced by Bringelly Exchange would instead by serviced by Luddenham Exchange via underground optical fibre cable along Elizabeth Drive and Lawson Road.

6.3.4 Earthworks

Topsoil stripping and stockpiling

Topsoil over the bulk earthworks footprint would be stripped by scrapers to a depth of approximately 150 millimetres. The total volume to be stripped is approximately 1,757,000 cubic metres.

About 200,000 cubic metres of topsoil would be used to rehabilitate disturbed areas within the longer term development area (outside the construction impact zone for Stage 1). Rehabilitation of the disturbed areas would be associated with the demolition and removal of vacant buildings and other structures, which the Australian Government is undertaking as part of the day-to-day management of the airport site. The remaining topsoil would be stockpiled within the construction impact zone. Stockpiles would be no higher than two metres to prevent degradation of the topsoil, and erosion control devices would be installed around the stockpiles.

Based on the indicative construction schedule, topsoil stripping would commence in the north-east of the airport site and progress to the south-west. Erosion and sedimentation controls would be installed before the start of topsoil stripping in each area of work.

Bulk earthworks

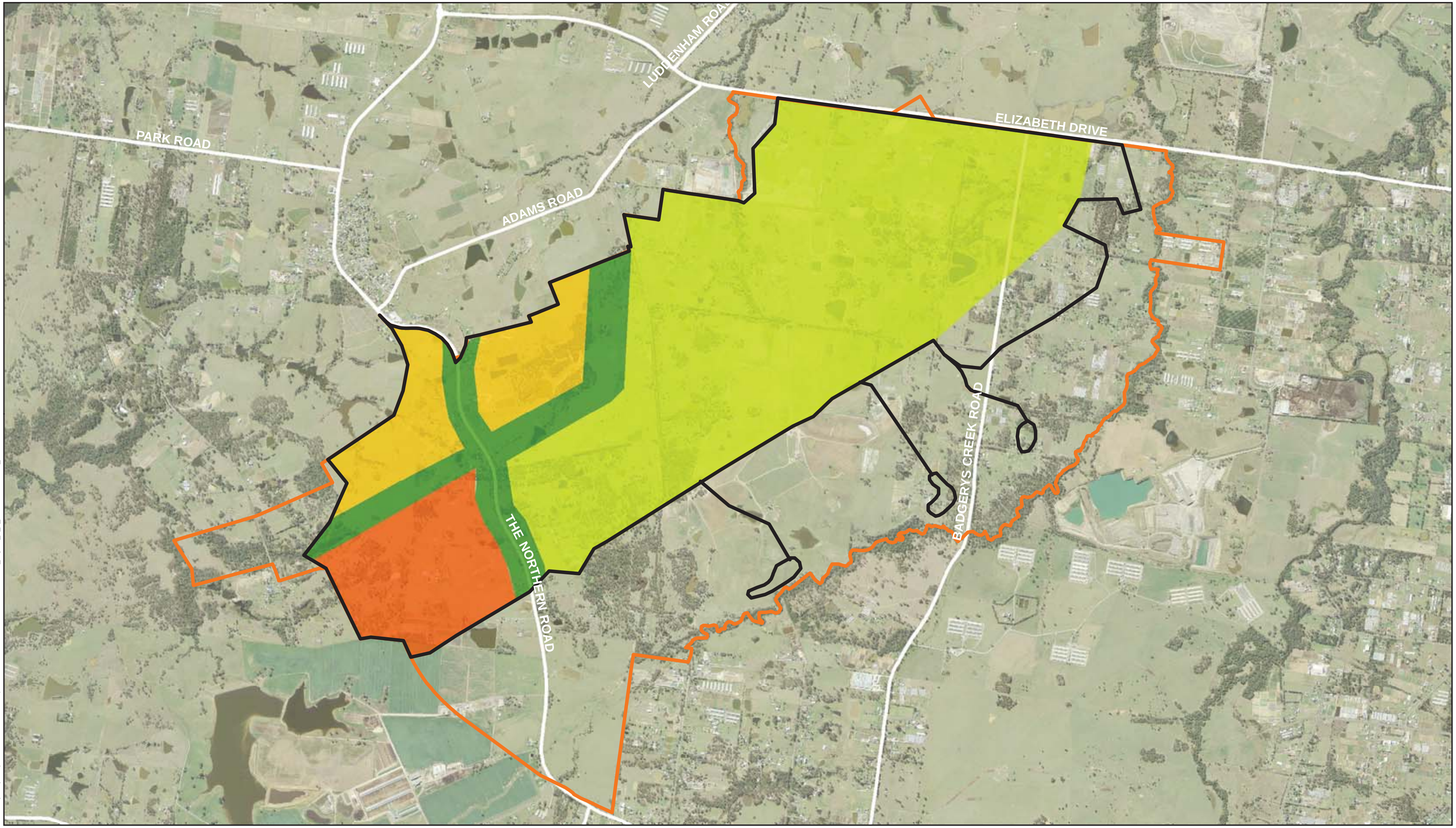
The airport site is characterised by rolling landscapes typical of the Bringelly Shale with a prominent ridge in the west of the site, reaching an elevation of about 120 metres Australian Height Datum (AHD), and smaller ridge lines in the vicinity with elevations of about 100 metres AHD. The topography of the airport site generally slopes away from the ridges in the west, with elevations between 40 metres and 90 metres AHD, with the lower elevations toward Badgerys Creek.

Major earthworks are required in order to achieve a level surface suitable for construction of the airport runway. The target elevation for the airport runway is 93 m AHD on the northern end and 73 metres AHD on the southern end. The target elevation was selected in order to balance the cut and fill across the site and thereby avoid the need for any off-site disposal of surplus material. However, initially the final earthworks landform would be left higher than this at the completion of the early site preparation works in order to prevent degradation of the subgrade, which could be exposed to the elements for up to two years.

Bulk earthworks would involve excavation (or cut) of approximately 20 million cubic metres of earth, and a similar amount of embankment construction (or fill). The majority of the bulk earthworks would be undertaken during the site preparation works by load and haul crews (either scrapers or excavator and trucks) and placement crews (compactors, rollers, graders and water carts). The earthworks during site preparation would occur in two phases as follows.

- Phase 1 earthworks (east, north-east and south-west) would be undertaken prior to decommissioning the TransGrid power line and relocating The Northern Road.
- Phase 2 earthworks (earthworks balance) would entail the remainder of earthworks following decommissioning of the TransGrid power line and relocation of The Northern Road.

Indicative earthworks volumes for each area (east, north-west, south-west and balance areas) are shown on Figure 6–8 and summarised in Table 6–5. The excess material from the south-west area and the earthworks balance area would be transported and placed in the north-west area. It is not expected that earthworks material would be transported off the airport site.



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Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

LEGEND

Airport site

Construction impact zone

Earthworks areas

Earthworks balance

East

North-west

South-west

0 0.5 1 2

Kilometres

Figure 6-8 - Bulk earthworks areas

Table 6–5 – Indicative earthworks quantities by area

Phase	Area	Approximate cut (million cubic metres)	Approximate fill (million cubic metres)	Cut/fill balance (million cubic metres)[1]
Phase 1	East	11.7	11.7	0
	North-west	1.8	2.5	-0.7
	South-west	2.2	2.1	0.1
Phase 2	Earthworks balance	4.3	3.7	0.6
Total		20	20	0

[1] Positive number is excess cut

Up to 1.36 megalitres of water would be required per day for site preparation works. Of this, about 8,600 litres (0.0086 megalitres) is expected to be required as potable water for the construction workforce accessible from the airport site. Water would be sourced through access to existing water supply pipelines and from stormwater runoff captured in sediment dams or farm dams at the airport site or procured from alternate locations. Water demand for moisture conditioning of bulk earthworks (to allow compaction) would be in the order of 650,000 cubic metres or 650 megalitres over the construction programme. The earthworks crews would move approximately 37,000 cubic metres of material per day, requiring a daily demand of around 1.1 megalitres of water daily for soil conditioning and approximately 0.25 megalitres for dust suppression.

Existing surface water (farm dams and sediment basins) would be used to capture run off for water before resorting to the use of potable water. There are two potable water supply pipes located adjacent to the airport site along Elizabeth Drive and The Northern Road. Offtakes would be installed on the pipes to allow for 24 hour access to water. Temporary storage dams would be constructed adjacent to the offtakes to provide two days' storage, and standpipes would be fitted to allow filling of water carts.

It is expected that bulk earthworks would include excavation of terminal building basement levels and a station cavity for a future rail connection. This would likely require additional excavation in the central part of the airport site, following selection of a preferred alignment for a future rail connection.

The construction of a rail connection and associated enabling works on the airport site does not form part of the Stage 1 development and would be subject to a separate assessment process. While the Stage 1 development would not include a rail service, planning for the proposed airport preserves flexibility for several possible rail alignments including a potential express service. A final alignment would be determined in consultation with the NSW Government.

6.3.5 Installation of drainage

Stormwater management at the airport site would consist of detention ponds, pipe and/or box culverts and open drains (swales). A series of eight detention basins would be established on the periphery of the airport site to hold stormwater runoff before it is discharged into nearby creeks. The locations of the basins have been selected to allow discharge points consistent with existing drainage lines, thus minimising impacts upon downstream hydrology, and would be sized to manage post-development flows to maintain predevelopment levels. The basins are proposed to operate effectively as dry basins, to minimise the attraction of birds to the airport site.

The basins and their associated drains would be constructed, as needed, early in the indicative construction schedule to direct runoff for treatment before discharge from the airport site. Each basin would include a forebay with provision for Alum (aluminium sulphate) dosing to assist with settling of dispersive sediments before discharge to receiving waters. Depending on final earthworks levels, some amendment to the inlet structures may be required to divert runoff into the ponds at the completion of the site preparation works. Installation of pipe and/or box culverts would occur progressively as the earthworks are completed.

Due to the requirement for the drainage to fit in with earthworks progression, it may be necessary for the drainage crew to demobilise and remobilise to the airport site at various times during the bulk earthworks.

Materials such as precast concrete products (for example, pipes, box culverts and headwalls) as well as bedding sand and any select backfill would be delivered to the airport site progressively, as required. Where possible, the materials would be delivered directly to their final position. If this is not possible, they would be delivered to the laydown area and then moved at an appropriate time to their final position using onsite cranes and heavy vehicles.

Open drains would be constructed progressively as earthworks are completed. The drain construction would commence at the downstream end of the drain and work upstream to prevent excessive standing water in the drains after rain. Lining or grassing of open drains would be completed as soon as practicable after excavation. Material from the excavation of drains would be used as general fill in the works. Depending on the size of the open drains, they may be constructed by excavator and truck. If drains are of sufficient size, the earthworks scrapers would excavate as part of the bulk earthworks.

6.3.6 Rehabilitation

Topsoil that was previously stripped from the site would be spread to areas nominated for landscaping and/or grassing. The topsoil would be transported by scrapers and spread by dozers to the nominated depth. Seeding and/or planting would occur after the spreading of topsoil.

Topsoiling and seeding would be undertaken as soon as practicable after completion of the bulk earthworks, to assist with erosion and sedimentation control.

6.4 Aviation infrastructure works

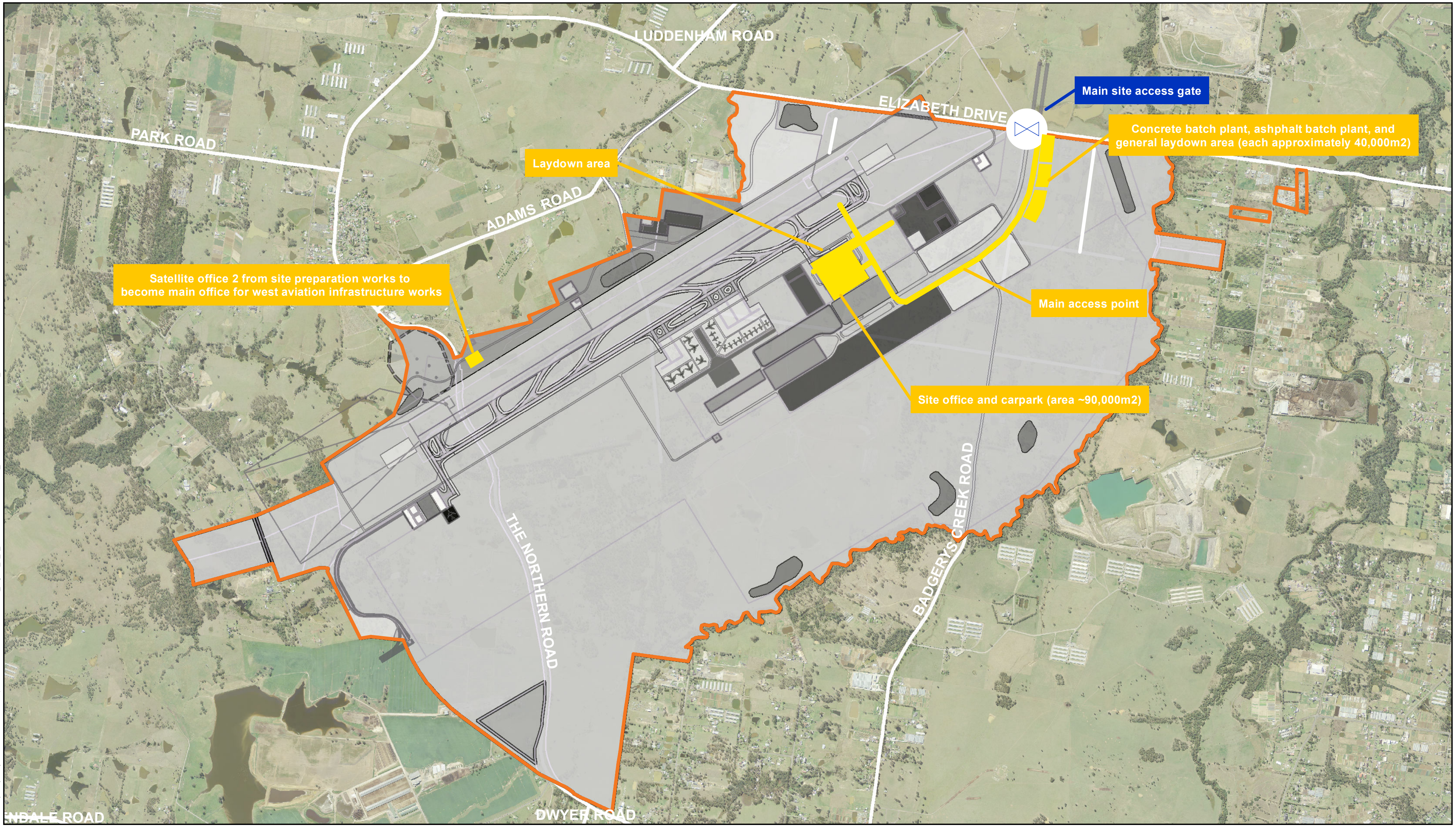
6.4.1 Establishment of site facilities

The indicative construction schedule shows that aviation infrastructure works would be staged for progressive commencement, in line with the completion of components of the site preparation works. Due to the scale of the infrastructure requirements, a range of construction site facilities would be required within the construction impact zone including:

- **Site office and carpark.** A site office would be constructed in the north-east of the site adjacent to the proposed terminal complex as shown on Figure 6–9. The site office would accommodate around 240 people and the carpark to be provided adjacent to the office would have around 600 car spaces (for light vehicles only), providing parking for both office and site based construction personnel. The site office would include an office, first aid and training rooms, lunch room and male and female toilets. Services (except sewerage) to the site office would be provided from the existing services on Elizabeth Drive. Sewage holding tanks would be provided and emptied regularly and carted offsite.
- **Asphalt batch plant.** Due to the large quantity of asphalt required for the pavement construction, an asphalt batch plant would be established on site. The asphalt batch plant would be located in the north-east of the airport site. The total asphalt required would be approximately 712,000 tonnes over a total period of 48 months. The plant would operate for approximately 550 days over this period, producing a daily average of about 1,300 tonnes.
- **Concrete batch plant.** In order to ensure reliable and continuous supply of concrete, a concrete batch plant would be established on site. It would be located in the same vicinity as the asphalt batch plant. The concrete required would be approximately 224,000 cubic metres for pavements and 234,100 cubic metres for buildings, a total of about 458,100 cubic metres. The concrete would be required over a period of 54 months with a daily average of about 424 cubic metres.
- **Laydown areas.** Two laydown areas would be provided. The first would be adjacent to the asphalt and concrete batch plants. The second laydown area would be provided to the north of the site office and car park. The laydown areas would be used for the storage of materials on site before integration into the aviation infrastructure works.

6.4.2 Establishment of main access point

The main access point to the airport site would be from Elizabeth Drive, as shown on Figure 6–9. The main access point would be surfaced with gravel pavement and a two-coat seal. Other internal site access roads would be gravel pavement maintained by grader and water cart.



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Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

LEGEND

Airport site boundary
Site facilites
Site access - gates

Notes:
1. Major site access roads to be sealed. Other access roads to be unsealed and maintained by grader and watercart.
2. Batch plants are located close to site boundary to minimise travel distance onsite for delivery vehicles

0 0.5 1 2
Kilometres

Figure 6-9 - Aviation infrastructure works - facilities and access

6.4.3 Construction of paved areas

Construction of paved areas (including the northern runway, taxiways, aprons, internal roads and carparks) would involve the following.

- **Pavement box out.** Areas of pavement would be left high at the completion of the early site preparation works (to prevent degradation of the subgrade, which could be exposed to the elements for up to two years). When the pavement preparation works are under way, the earthworks would be completed to subgrade level (that is, the underside of pavement). The earthworks would be undertaken by load and haul crews (either scrapers or excavator and trucks) and placement crews (compactors, rollers, graders and water carts). Water infrastructure used in the site preparation works would be retained to supply water for these works. The general earthworks profile for the pavement box out is shown on Figure 6–10.

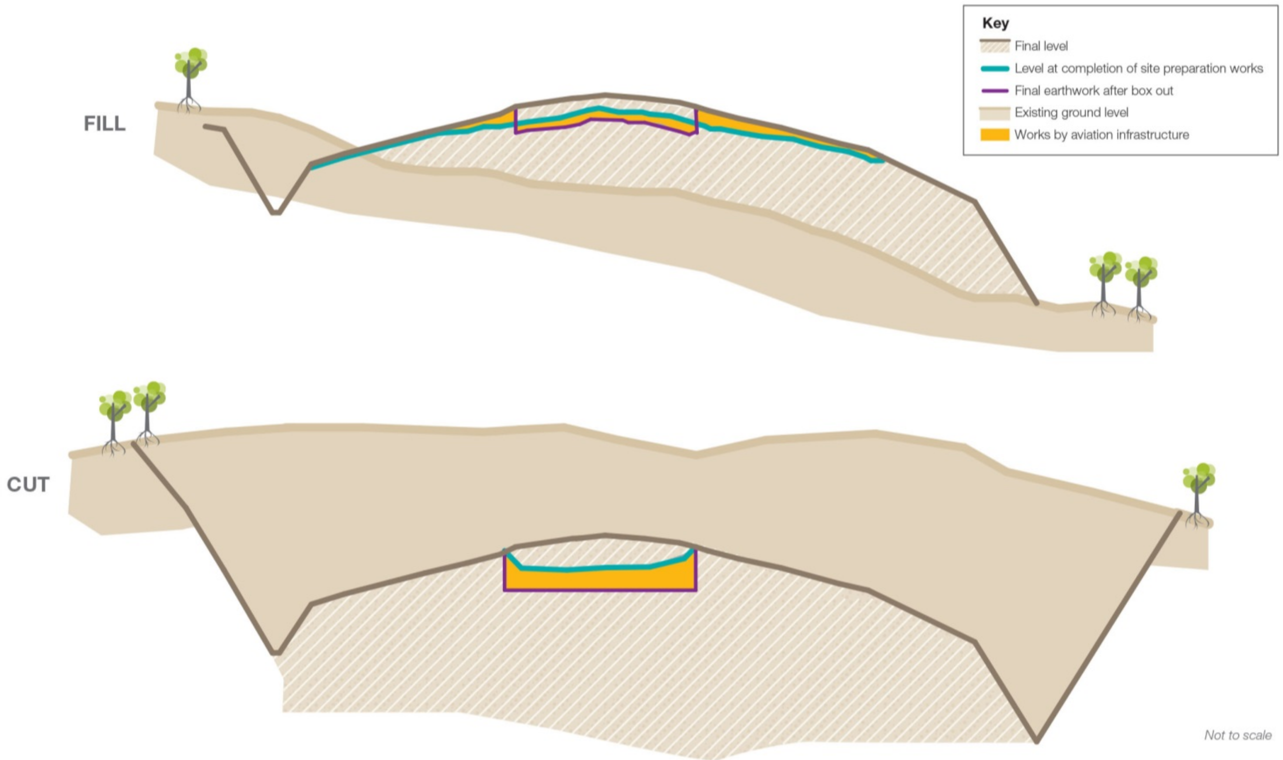


Figure 6–10 – Earthworks Profile

- **Subgrade preparation.** At the completion of the box out, the subgrade would be tested for conformance. If the subgrade is non-conforming, the material would be removed and replaced with suitable material. If it is conforming, it would be ripped and re-compacted. Machinery used in this operation would comprise a grader, water cart and smooth drum roller. If removal is required, the earthworks scrapers would be utilised. The unsuitable material would be disposed of on site in non-critical earthworks areas.
- **Gravel placement.** Gravel would be placed at all paved areas constructed within the airport site. The gravel would be placed by a paver and loader and compacted by a smooth drum roller.

- **Asphalt placement.** The runway, taxiways, internal roads and carparks would be surfaced with asphalt. Asphalt would be placed by an asphalt paver fed by a material transfer vehicle from the on-site batching plant. A multi-tyre roller and smooth drum rollers would follow the paver to compact the asphalt.
- **Concrete placement.** The aprons would be surfaced with reinforced concrete.
- **Installation of lighting.** Ground lighting would be installed within the pavement surface for aircraft ground navigation.

6.4.4 Provision of services

Major services that would need to be reticulated around the airport site include electricity, telecommunications, gas, water and sewerage. Where possible, the services would be designed and installed in shared, underground trenches following the conclusion of the site preparatory works and would be designed to service both construction and operation of the aviation infrastructure. Services would be provided subject to agreements with the relevant operators, generally as described below.

- The 700 kVA of electricity estimated to be required during construction is expected to be provided via connection to electricity assets operated by Endeavour Energy. Current forecasts indicate there would be sufficient feeder capacity to meet the energy requirements during construction (Endeavour Energy 2014), whereas the electricity demand during operation would require TransGrid to establish a new bulk supply point at the Kemps Creek substation to meet Endeavour Energy's requirements. Poles, wires and buried conduits to reticulate power to and within the airport site would be constructed in accordance with Endeavour Energy standards by a designated service provider.
- The 25,500 litres of potable water estimated to be required each day during aviation infrastructure works is expected to be provided via connection to existing assets. Temporary storage dams and associated offtakes from Sydney Water pipes would be established to support construction, whereas connection to the supply main at Elizabeth Drive would be required during operation. There is currently sufficient capacity at the anticipated connection point to supply the required potable water. Water supply works to reticulate water to and within the airport site would be carried out in accordance with Australian Standards and other standards set by the Water Services Association of Australia.
- The 24,000 litres of wastewater and sewage estimated to be generated each day during aviation infrastructure works would be stored in tanks at the airport site for collection by disposal trucks to a licenced facility.
- Telecommunications would be facilitated via connection to underground optical fibre cable and customer multiplex cabinets. It is anticipated that a connection would be made to the existing underground optical fibre cable at Elizabeth Drive. Poles and wires, or underground cables, would be constructed in accordance with relevant standards.

6.4.5 Building construction

Construction of the airport buildings (for example, the terminal complex, air traffic control tower, freight and maintenance facilities) would generally involve the following stages:

- foundations and floor slabs, structural framing and intermediate floors (if required);
- roofing;
- exterior wall systems;
- vertical circulation;
- automated systems and security systems (if required);
- internal fit out; and
- commissioning

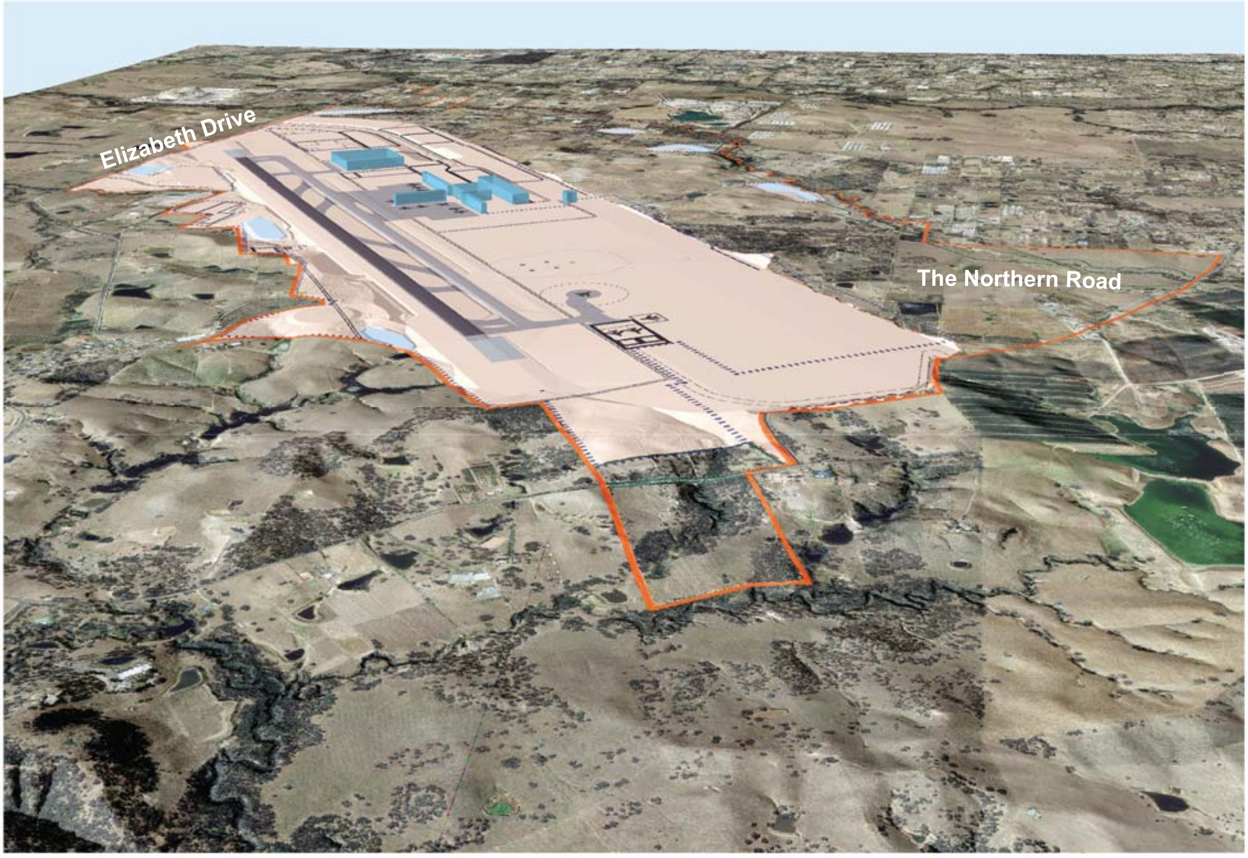
Detailed design of the proposed airport would be carried out in accordance with the requirements set out in the Airport Plan.

6.4.6 Construction of fuel farm

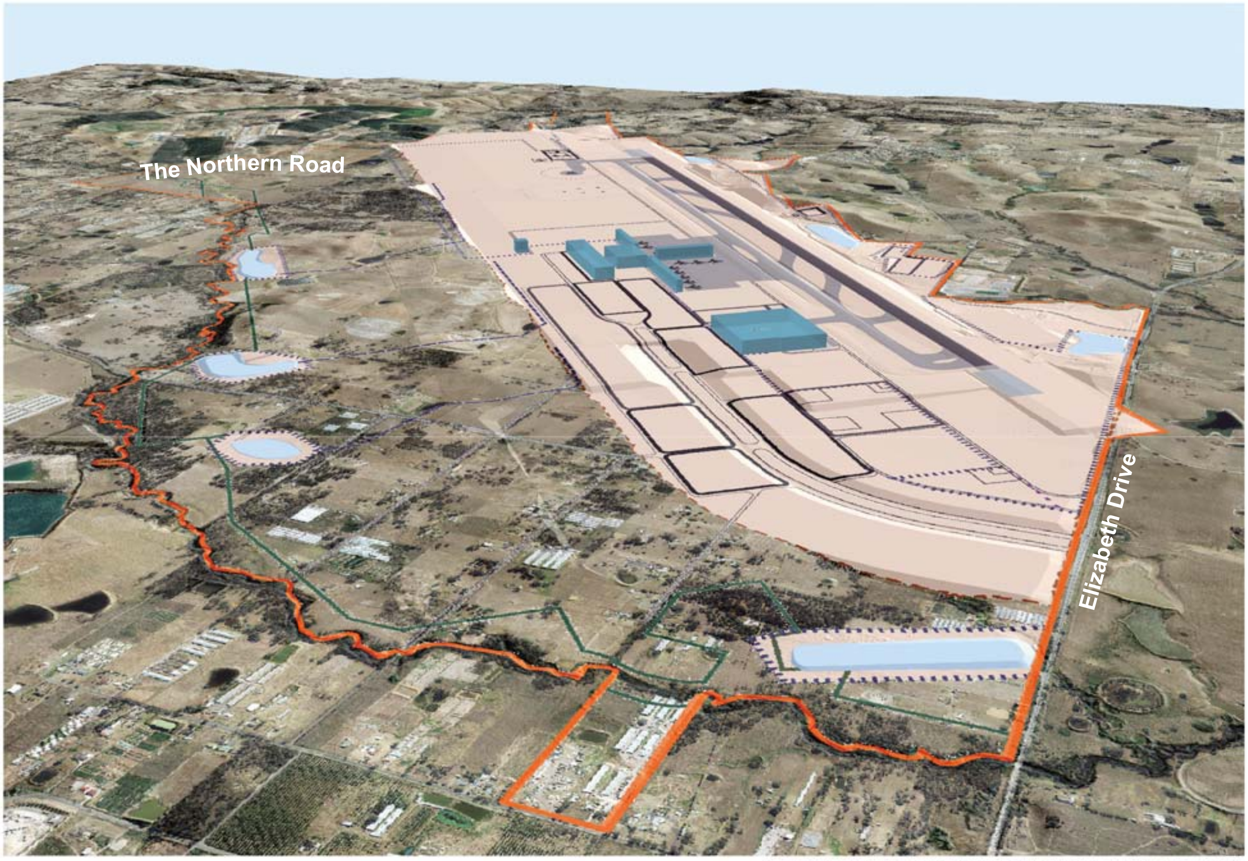
This temporary construction fuel farm would eventually be replaced with a permanent fuel farm to support the operation of the proposed airport. The fuel farm would be located toward the northern edge of the airport site. The fuel farm would be designed and constructed in accordance with *AS 1940-2004 The storage and handling of flammable and combustible liquids* and would include an underground piping system for connection to the aircraft stands. The fuel farm would require construction and installation of four tanks and an on-site refueller stand within a bunded area of around 30,000 square metres.

6.4.7 Final landform

The final landform incorporating proposed bulk earthworks and aviation infrastructure is indicatively depicted in Figure 6–11.



view to the north-east



view to the south-west

Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

LEGEND
- Airport site
- Terminal buildings and support facilities
- Runways
- Taxiways and aprons
- Detention Ponds
- Landscape area

Figure 6-11 - Indicative Stage 1 Landform

6.5 Construction management

Construction of the Stage 1 development would be undertaken in accordance with a Construction Environmental Management Plan (CEMP). The CEMP would include:

- consideration of all required statutory and other obligations, including consents, licences, approvals and voluntary agreements;
- management policies, procedures and review processes to assess the implementation of environmental management practices and the environmental performance of the proposed airport against defined objectives and targets;
- requirements and guidelines for management in accordance with mitigation measures specified by this draft EIS, the draft Airport Plan and construction guidelines;
- requirements in relation to incorporating environmental protection measures and instructions in all relevant standard operating procedures and emergency response procedures;
- specific procedures, including monitoring, as defined by this draft EIS and the draft Airport Plan;
- roles and responsibilities of all personnel and contractors to be employed on site;
- procedures for complaints handling and ongoing communication with the community;
- a monitoring and auditing programme;
- environmental sub-plans specified in this draft EIS and the draft Airport Plan;
- an incident response procedure; and
- a contingency plan for utility disruptions.

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7. Airspace architecture and operation

7.1 Overview

Airservices Australia assessed airspace implications and air traffic management approaches for Sydney region airspace associated with the proposed Western Sydney airport. Airservices Australia’s analysis indicates that there are no apparent physical impediments that would prevent safe and efficient operations for aircraft arriving at or departing from the proposed airport. On the basis of this analysis, Airservices Australia developed indicative flight paths to inform this draft EIS.

It is important to note that the formal flight path design for the proposed airport will be undertaken much closer to the commencement of operations. The formal design process will provide an opportunity to optimise flight paths on the basis of safety, efficiency, noise and environmental considerations, as well as minimising changes to existing regional airspace arrangements.

Decisions about airspace management arrangements, including the determination of flight paths, would be made by Airservices Australia and the CASA. These decisions may engage further environmental assessment processes, community and stakeholder engagement, and may be the subject of a future referral under the EPBC Act following detailed design.

7.1.1 Regulatory context

Airspace is the term used for the three dimensional space in which aircraft are able to fly. Elements of airspace include terminal airspace, controlled airspace and restricted airspace.

Terminal airspace generally encompasses the area within 55 to 90 kilometres (30 to 50 nautical miles) from a major airport. The height of terminal airspace extent varies depending on the operational parameters at an airport. In the case of Sydney Airport, terminal airspace extends from ground level up to about 6,000 metres (20,000 feet) close to the airport. As the distance from the airport increases, the lower boundary of this zone rises in steps, beginning at 300 metres (1,000 feet) and increasing to typically about 2,300 metres (7,500 feet) at the outer edges of the Sydney region.

Controlled airspace includes the terminal airspace area and also the airspace along the flight paths between airports.

Restricted airspace includes all airspace that has restrictions placed on its use. This is generally associated with military installations or other situations where safety is an issue, for example explosives storage facilities such as the Defence Establishment Orchard Hills.

Flight paths define the anticipated routes of aircraft arriving and departing from an airport when operating on standard instrument departures or conducting approaches under instrument guidance, or under visual meteorological conditions.

Ideally, aircraft would fly by the most direct route and at the optimum altitude for reasons of economy and efficiency of flight operations. However, it is not always possible for aircraft to fly optimum routes because of noise and safety considerations, and the competing demands of other airspace users.

When departing from an airport, an aircraft follows a predetermined flight path from the end of the runway until it is established on a route that leads ultimately to its destination. Because of the greater manoeuvring options available for aircraft after take-off, there is greater flexibility in determining flight paths for departing aircraft than for aircraft landing at an airport.

Australian airspace is largely available for civil aviation use, with overall responsibility for management of the airspace shared by Airservices Australia and the Department of Defence. CASA sets policies and standards governing the use of the non-military portion of the airspace. Airservices Australia manages the airspace and provides the necessary air traffic control services and equipment to maintain a safe and efficient flow of air traffic.

Day to day management of the airspace is achieved through air traffic controllers who direct the various phases of flight. Management procedures are published for each airport including standard instrument departures, standard arrival routes and noise management procedures.

The efficient use of airspace in the Sydney region is influenced by the geographic location of airport sites. The relatively close proximity in airspace terms, between the proposed airport, Sydney Airport and other existing facilities, such as Bankstown Airport means that operations would interact.

Runway orientation at the proposed airport is the major factor influencing the design of aircraft traffic flow patterns and flight path arrangements. Wherever operationally feasible, it is also desirable that aircraft traffic flow patterns are sufficiently flexible to minimise the effects of aircraft noise on surrounding residential and other noise sensitive areas.

7.2 Potential airspace parameters in the Sydney basin

7.2.1 Existing Sydney basin airspace

A review of the existing airspace arrangements in the Sydney basin was undertaken in March 2015 by CASA[6]. The review considered the airspace within 45 nautical miles of Sydney Airport. High levels of private operations, flight training activity, military operations and a wide range of other general and sports aviation activity combine to make the Sydney region one of the busiest and most complex volumes of Australian airspace, supporting Australia's busiest international airport and a number of satellite airports and aerodromes. The locations of prominent existing airports and aerodromes in the Sydney Region are shown in Figure 7–1. It is important to note that while operationalising the proposed airport is outside of CASA's current 2013-2018 study period this is likely to be considered in subsequent airspace reviews closer to the commencement of operations.

[6] *The Sydney Basin Aeronautical Study (CASA 2015)*

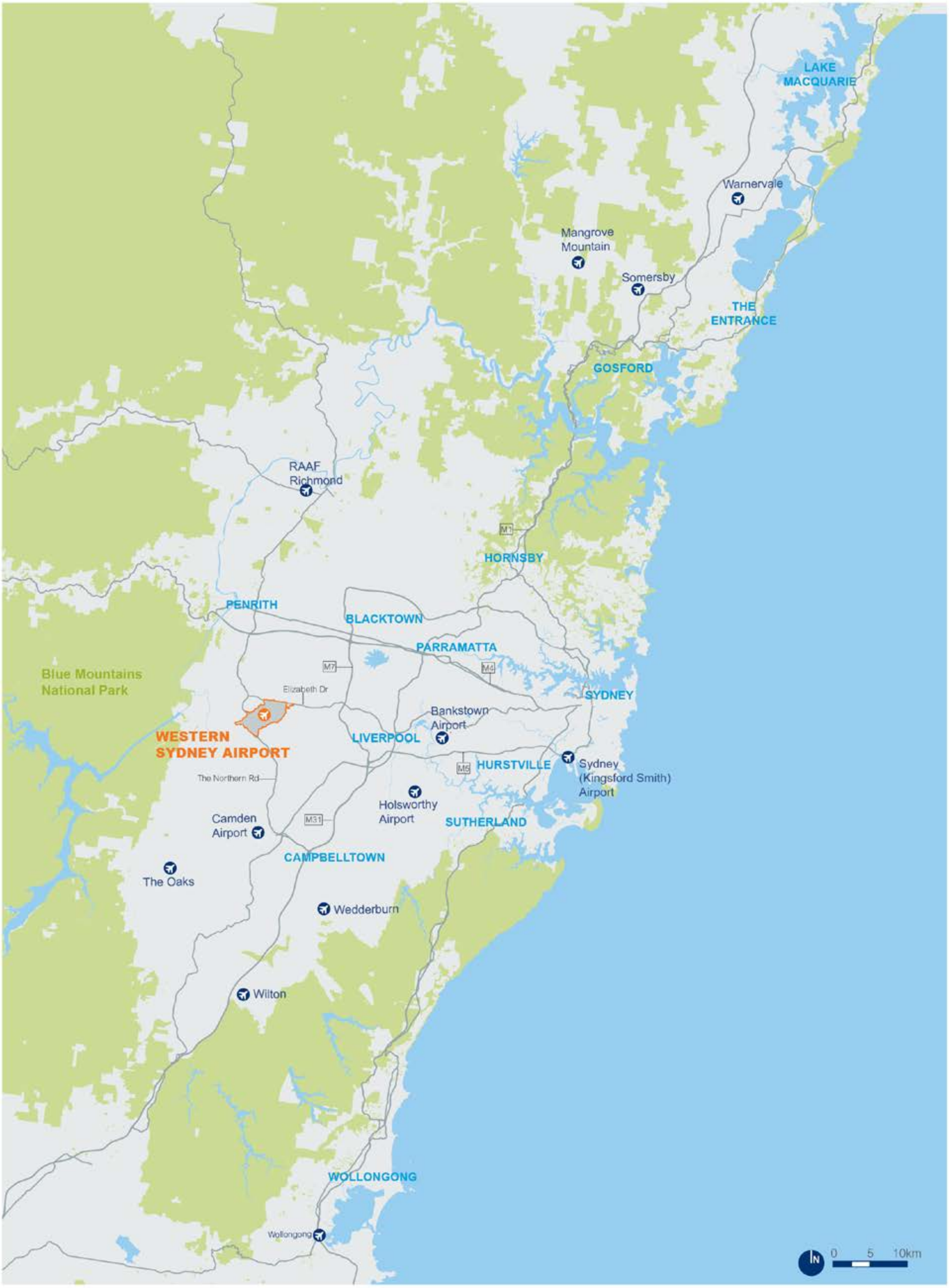


Figure 7–1 – Airports and aerodromes in the Sydney basin

7.2.2 Existing Sydney region airspace controls

The Sydney region airspace comprises a number of zones that are set to control the safe and efficient function of the airspace. These include:

- Class C control zone;
- Class C control areas;
- Class G uncontrolled airspace;
- Restricted areas; and
- Danger areas.

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

Control zones

Control zones extend from surface level to a specified altitude in airspace surrounding major airports. There are three control zones within the Sydney region located at Sydney Airport, Bankstown Airport and Camden Airport. These control zones, labelled as 'CTR' are illustrated in Figure 7–2.

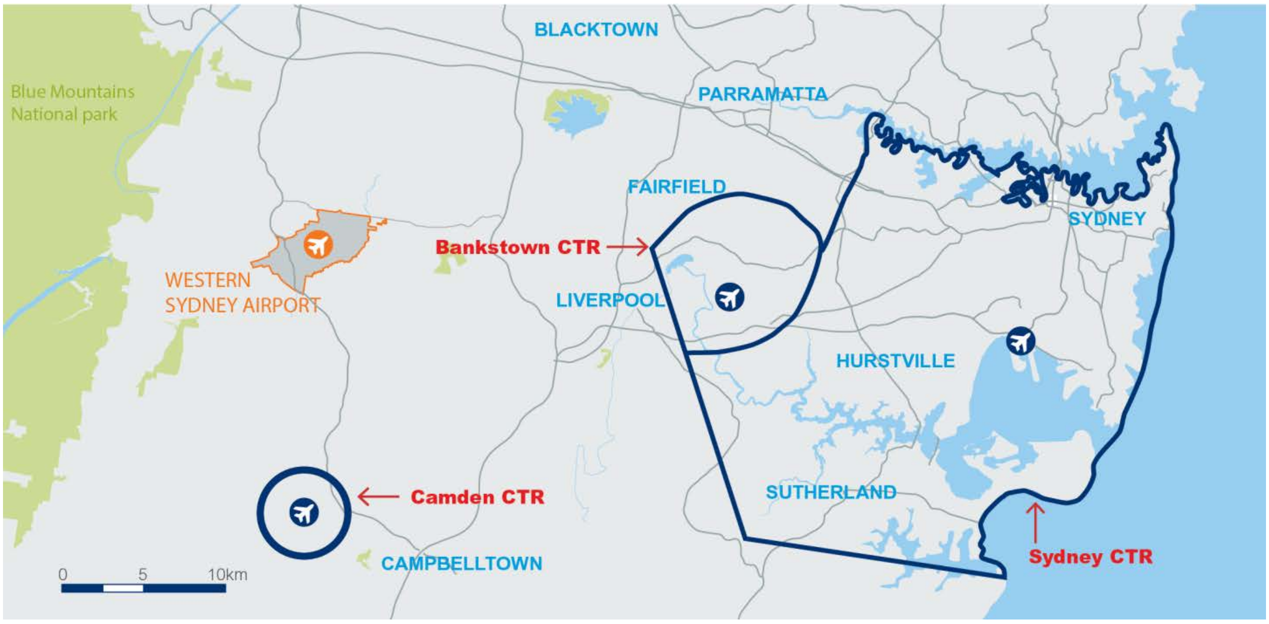


Figure 7–2 – Control zones in the Sydney region

The Sydney control zone is Class C airspace from the surface to 2,500 feet Above Mean Sea Level (AMSL). It has an irregular boundary design extending four nautical miles to the north and up to 11 nautical miles to the south west of the airport. Sydney has a large number of published terminal instrument flight procedures that allow aircraft to safely navigate to and from the airport at times of low visibility. The Bankstown control zone is Class D airspace (controlled airspace that surrounds general aviation and regional airports equipped with a control tower) the surface to 1,500 feet AMSL and abuts the Sydney control zone.

The Bankstown control zone extends three nautical miles north and two nautical miles south of the aerodrome. The control zone at Bankstown also has terminal instrument flight procedures published to allow safe navigation during low visibility conditions.

The Camden control zone is also Class D airspace from the surface to 2,000 feet AMSL. Centred on Camden airport, the control zone has a radius of two nautical miles and includes published terminal instrument flight procedures to allow safe navigation during low visibility conditions.

Control areas

Control areas extend upwards from a specified altitude. The control areas within the Sydney region are Class C airspace. The control areas within 45 nautical miles of Sydney make up the Sydney terminal control area, which has a number of different control area steps at different altitudes. The Sydney terminal control area is controlled by Airservices Australia.

Class G airspace

Class G (uncontrolled) airspace exists below the control areas and extends from the surface to the control area lower limits. The total volume of Class G airspace within 45 nautical miles of Sydney varies depending on the activation of various restricted areas and control zones.

The Sydney basin Class G airspace supports a range of typically smaller aircraft operations including flight training (fixed wing and helicopters), parachute operations, emergency services and sports and private general aviation.

A clearance from air traffic control to enter Class G airspace is not required. Aircraft equipped with instrument flight rule equipment receive a flight information service from air traffic control including movement information on other instrument flight rule aircraft.

To aid visual flying in the Sydney region, CASA, in consultation with Airservices Australia, publishes a Sydney Basin Visual Pilot Guide 20, Sydney General Flying Guide 21, visual flight rule Flight Guide 22 and the On Track 23 website.

In order to support light aircraft and helicopter flights between the control zones and operating over the Sydney Central Business District and along the coast, visual flight rules routes rules of entry have been established in Class G airspace.

Restricted areas

The declaration of a restricted area in most cases creates airspace of defined dimensions within which the flight of aircraft is restricted, in accordance with specified conditions. Restricted areas are also allocated a conditional status (restricted area 1, restricted area 2 or restricted area 3) which provides an indication as to the likelihood of obtaining a clearance to fly through the airspace (restricted area 1 being the most likely to obtain a clearance from air traffic control).

In accordance with the Airspace Regulations 2007, CASA must not declare an area to be a restricted area unless in the opinion of CASA, it is necessary in the interests of public safety or the protection of the environment to restrict the flight of aircraft over the area to aircraft flown in accordance with specified conditions.

Twenty restricted areas are located within 45 nautical miles of Sydney. The main restricted areas can be grouped as follows:

- RAAF Base Richmond;
- Army Range Holsworthy/Lucas Heights; and
- Tasman Sea Military Flying Training.

Other restricted areas within 45 nautical miles of Sydney are located in the vicinity of Sydney Harbour, Defence Establishment Orchard Hills and the Tasman Sea, to the north east of Sydney. Indicative locations of these restricted areas are identified as red in Figure 7–3. Outside of the 45 nautical mile radius, there are also restricted areas associated with RAAF Base Williamtown at Newcastle.

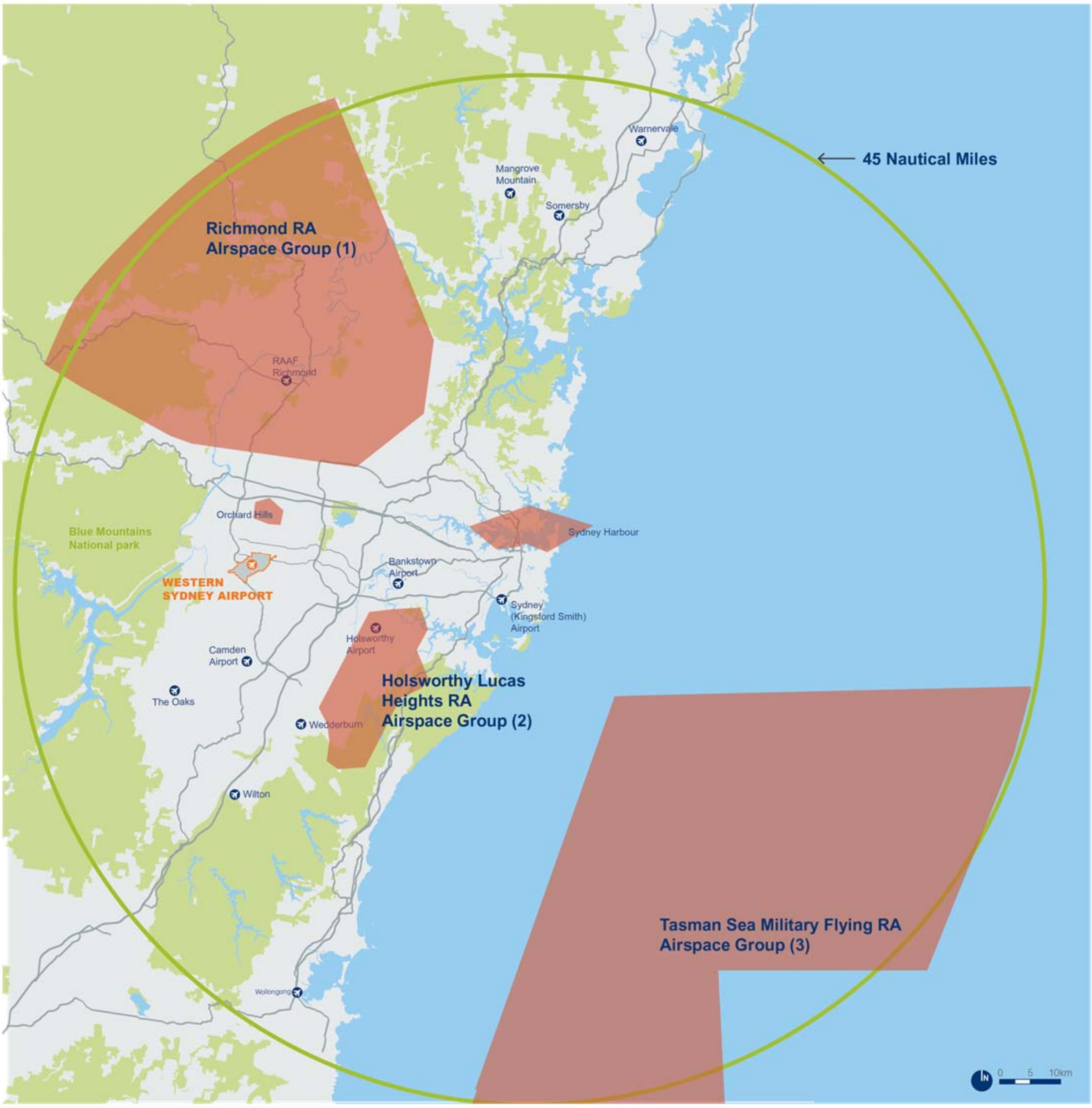


Figure 7–3 – Sydney region restricted areas

The hours of operation of restricted areas can vary to accommodate a range of activities. Most restricted areas are activated by the issue of a Notice to Airmen and some can be activated at standard times or based on defined conditions. Two restricted areas in the Sydney region are active 24-hours per day, these are R521 (Lucas Heights) and R555A (Military flying area, Holsworthy).

Danger areas

CASA may declare a danger area where, in its opinion, there exists an activity that is a potential danger to overflights. Danger areas generally relate to airspace over hazardous areas such as mining or quarrying sites, or in areas of special use such as hang-gliding, parachuting and unmanned aerial vehicle testing. Approval for flight through a danger area outside controlled airspace is not required. However, pilots are expected to maintain a high level of vigilance when transiting a danger area.

There are 10 danger areas located within 45 nautical miles of Sydney. Five of these encompass visual flight rule flying training areas and lanes of entry supporting operations to and from Bankstown and Camden. Other danger areas support parachuting and unmanned aerial vehicle testing activities. Indicative locations of the danger areas within 45 nautical miles of Sydney are identified as red in Figure 7–4.

7.2.3 Defence airspace operations

RAAF Base Richmond is the home of Air Mobility Group and supports locally based C130J and C27J aircraft as well as visiting aircraft. The airspace architecture consists of three main restricted areas.

R470 is the terminal area airspace and also supports two parachute zones which are active several times a week. Other flying operations include circuit and low flying training. R469 lies outside R470 and supports low flying and additional training areas. It is activated in conjunction with R470. Both of these are RA1 which allows civilian traffic to use these areas for instrument training and transit, if a clearance is available.

R494 is the upper air airspace overlying RAAF Base Richmond and is primarily used as air-test airspace. Activation is by Notice to Airmen only. RAAF Base Richmond also serves as an alternate aerodrome for military fast jet operations at RAAF Base Williamtown. R469 and R470 are generally activated 15-hours per day, seven days a week.

A visual flight rule lane exists to the west of Richmond to provide support to civilian operations. It is designed to provide separation from drop zones and circuit traffic in the RAAF Base Richmond terminal area however, a clearance through the terminal areas may be available subject to traffic. Defence is conducting a scoping study to identify whether the restricted areas can be reduced in volume to better support civilian operations while not compromising Defence activities.

The Orchard Hills restricted areas exist to prevent aircraft overflying an explosive risk area. The status is RA3 due to the explosive risk and activation times may vary. The Orchard Hills restricted areas are two nautical miles in diameter and are not expected to change from the present design.

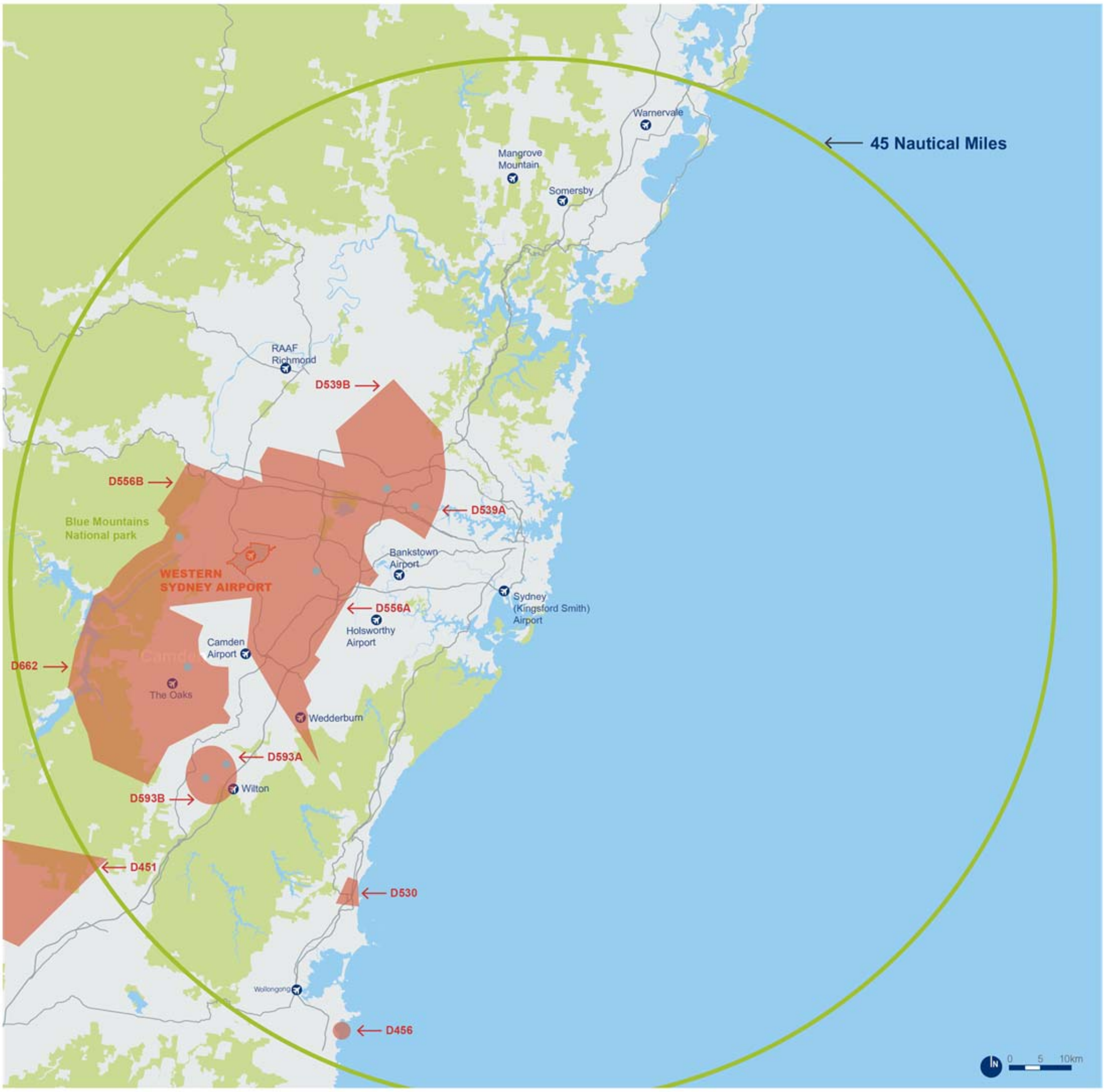


Figure 7–4 – Sydney region danger areas

Holsworthy restricted areas are provided to protect activities in support of both flying and non-flying operations. Holsworthy is home to special operations personnel and includes helicopter support located at the barracks. Additionally there are firing and demolition activities occurring.

A minor portion of the restricted area is active 24-hours per day and has a RA3 conditional status to prevent civilian entry to potentially hazardous military airspace. The other portions are a combination of RA2 and RA3. These statuses exist to protect non-participants from the dangerous operations in the areas. A local arrangement is in place which allows rescue and police operations into specific areas with prior notice.

7.3 Preliminary assessment of airspace

Airservices Australia provided a preliminary assessment of airspace implications and air traffic management arrangements for airspace in the Sydney region associated with the potential introduction of flights to and from the proposed airport.

Because the operation of the Stage 1 development is potentially more than ten years away (and construction for the long term development potentially more than 30-40 years away), the preliminary assessment undertaken by Airservices Australia is limited to a conceptual level airspace management design.

The principal objective of the preliminary assessment was to establish whether safe and efficient operations could be introduced at the proposed airport through the development of indicative proof-of-concept air traffic management designs. The analysis was conducted in two stages and included the development of three assessment models as shown in Figure 7–5.

An important aspect to note relevant to this draft EIS is that a proof-of-concept design does not take into account other influences on air traffic movement such as consideration of noise impacts. These factors would be incorporated into the final design of the airspace, which would also be subject to community and industry consultation and may require further environmental assessment processes. In the meantime, this draft EIS provides an assessment of noise and other impacts based on the preliminary design information currently available.

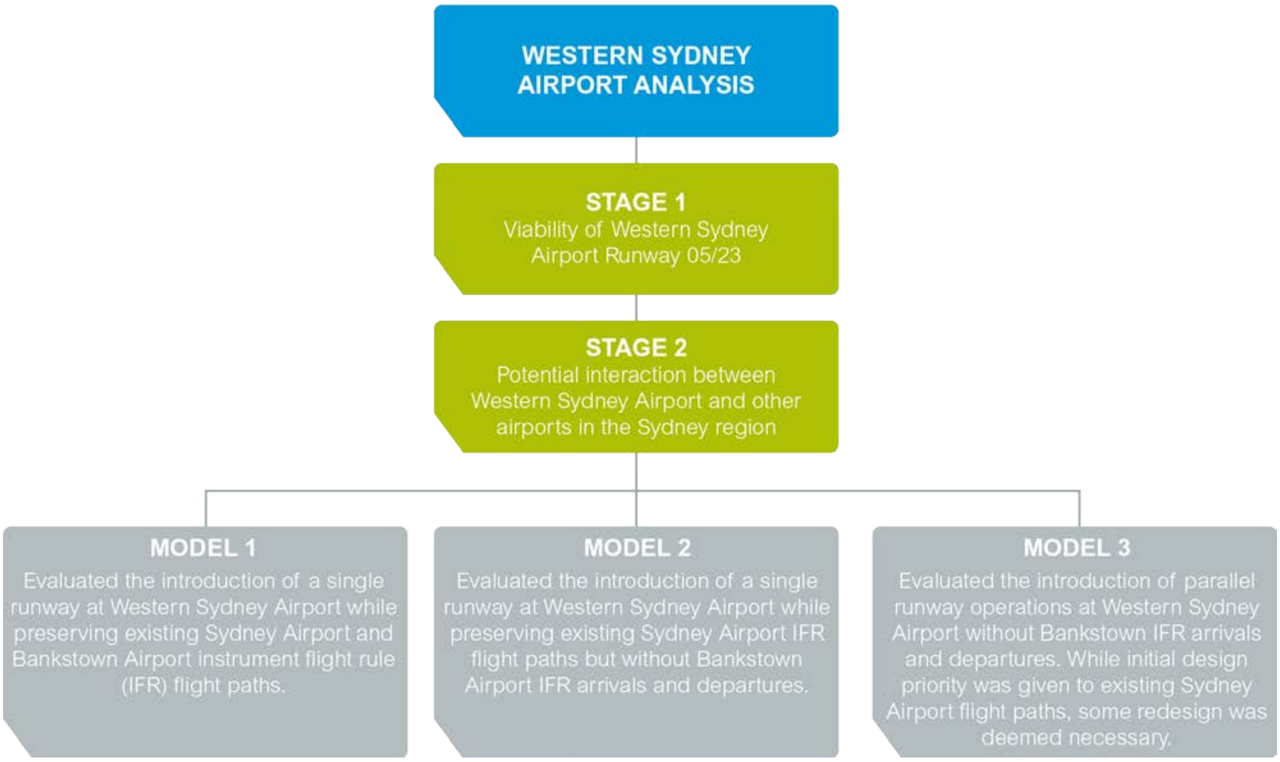


Figure 7–5 – Scope of the analysis to develop the indicative airspace architecture

The Stage 1 assessment evaluated the viability of the proposed airport operations with a single runway orientation of 05/23. It included consideration of terrain and man-made objects and their implications on airport operations and potential solutions to these where required.

The Stage 2 assessment analysed the potential interactions between the proposed airport indicative flight paths and the operation of other airports in the Sydney region including Sydney Airport and Bankstown. Three models were developed for this Stage 2 assessment.

- Model 1 evaluated the introduction of a single runway at the proposed airport, whilst preserving the existing Bankstown Airport and Sydney Airport flight paths. The objective of this model was to inform a potential scenario for the opening day operation of Western Sydney Airport to identify potential significant operating restrictions caused by the proximity of the flight paths to and from Sydney Airport and Bankstown Airport.
- Model 2 evaluated the introduction of a single runway at the proposed airport, whilst preserving the existing Sydney Airport flight paths. This model removed instrument flight rules arrivals and departures at Bankstown Airport.
- Model 3 evaluated the increased airspace activity associated with the introduction of a second runway at the proposed airport but removing instrument flight rules arrivals and departures at Bankstown Airport. While initial design priority was given to existing Sydney Airport flight paths, some redesign was deemed necessary.

Airservices Australia's preliminary assessment demonstrates a proof of concept and confirms the basic viability for the operation of the proposed airport for both single and parallel runway operations. The assessment indicates that there are no apparent physical impediments that would interfere with safe and efficient operations at the airport site.

Indicative concept designs for approach and departure routes demonstrate that Stage 1 and Sydney Airport could safely operate independently as high capacity airports. An airspace design could be implemented for a single runway operation at the proposed airport without making significant change to the current design and flight path structure for Sydney Airport or Bankstown Airport. However, as demand for aviation services grows at the proposed airport, instrument flight rule operations at Bankstown Airport are expected to be incrementally constrained. This is because aircraft arriving into the proposed airport on runway 23 and aircraft arriving at Bankstown Airport on runway 11 would operate on overlapping flight paths and would need to be sequenced between the two airports.

In the longer term, the operation of parallel runways at the proposed airport would also be viable. With parallel runways, the proposed airport could potentially achieve aircraft movement rates of around 100 movements per hour (one landing or one arrival constitutes an aircraft movement), with Sydney Airport maintaining a movement rate of 80 per hour. Preliminary analysis suggests that the following issues would need to be assessed in detail as part of the future airspace design process undertaken closer to the commencement of operations at the proposed airport:

- Whether there should be any changes to Sydney Airport flight paths to maintain independent operations at the proposed airport and Sydney Airport, and to achieve the expected demand capacity;
- Whether there should be any changes to flight paths serving Bankstown Airport, in particular instrument flight rule operations, in order to maintain independent operations at the proposed airport and Bankstown Airport, and to achieve the expected demand capacity.
- whether the restricted airspace area over the Defence Establishment Orchard Hills would impose any constraint on airspace and, if so, how that should be resolved; and

- further consideration of noise and visual sensitive receivers, such as residential areas and the Greater Blue Mountains World Heritage Area.

7.4 Interactions with Sydney Airport and the broader Sydney region airspace

7.4.1 Airspace architecture and potential impacts on air traffic movement

As discussed in Section 7.3, Airservices Australia undertook a preliminary assessment of airspace implications and air traffic management approaches associated with the proposed airport. The assessment considered the potential interactions between the proposed airport and other airports in the Sydney basin including Sydney Airport and Bankstown Airport.

The assessment demonstrated that the proposed airport and Sydney Airport could operate independently as high capacity aerodromes. Furthermore, the Stage 1 development for the proposed airport could be implemented without significant impact or change to current operations at Sydney Airport or Bankstown Airport. Indicative flight paths associated with this concept are presented in Figure 7–8 and Figure 7–9.

In addition to the matters identified by Airservices Australia, CASA recently identified a number of important Sydney basin airspace matters that should be considered in in future airspace design process. These include:

- the need for a Sydney region revised airspace design in order to minimise constraints on operations for existing airports, as well as improved relationships between airports to increase efficiency and delays;
- new operator and airline preferences and requirements over time;
- integration with the national air traffic network;
- the role of new technologies both in aircraft and on the ground in the longer term, including new technologies and air traffic management approaches;
- potential unmet demand;
- continued and improved equitable access to airspace within the Sydney region;
- provision of optimum aircraft profiles for climbs and descents, continuous climb for aircraft from take-off to cruising level within the Sydney region and access to restricted airspace;
- priority for the proposed airport or Sydney Airport versus other operations within Sydney basin; and
- traffic conflicts/ disconnected airspace.

The long term development of the proposed airport would include a second parallel runway at the airport site (commissioned by around 2050) to accommodate expected demand. Airservices Australia also found that the operation of parallel runways at the proposed airport would be viable in the future. Under a parallel runway scenario at the proposed airport a number of issues would need to be addressed as part of the future airspace design process:

- changes to Sydney Airport flight paths to maintain independent operations at the proposed airport and Sydney Airport and to achieve expected demand capacity;
- changes to flight paths serving Bankstown Airport, in particular for instrument flight rule operations, in order to maintain independent operations at the proposed airport and Bankstown Airport and achieve the expected demand capacity; and
- resolution of a potential constraint associated with the restricted airspace over Defence Establishment Orchard Hills.

Overall there is a need for a whole of Sydney region focus on airspace architecture, which would provide an integrated model for airspace management.

7.4.2 Potential implications for aviation safety

The *Sydney Basin Aeronautical Study* undertaken by CASA (CASA 2015) reported an improving safety trend in total airspace related incidents in the Sydney region. The rate of airspace incidents in relation to total recorded basin movements has been declining consistently over the period between 2008 and 2013. The number of airspace related incidents has more than halved (a reduction of -56.4 per cent) in the five year period from 2008-2013.

Compared to other Australian capital city airports including Melbourne, Brisbane, Adelaide and Perth; Sydney has had the largest reduction in the rate of airspace incidents per 1,000 aircraft movements. The data indicates that despite increasing traffic at Sydney, airspace related safety has improved in the past six years.

The proof-of-concept airspace design developed by Airservices Australia demonstrates that the proposed airport and Sydney Airport could both safely operate independently as high capacity airports.

The provision of a safe and efficient airspace design will be a principal consideration during the detailed development of future airspace design.

7.5 Operating modes

Aircraft operations are allocated to a runway, which determines both the physical runway to be used for take-off and landing and the direction in which that runway is to be used. Allocation of the runway to be used is normally determined by air traffic control personnel and is based on a combination of meteorological conditions and airport operating policy.

Standard airport operating procedures (Airservices Australia 1997) indicate that a runway may not be selected for either approach or departure if the wind has a downwind component greater than five knots, or a cross wind component greater than 25 knots. If the runway is wet, it would not normally be selected if there is any downwind component at all. This applies to all aircraft types, although larger aircraft would be capable of tolerating relatively higher wind speeds.

Wind conditions at the airport site therefore limit the times when particular runways may be selected and the orientations on which landings and take-offs occur on runways (refer to Chapter 5 Stage 1 Western Sydney Airport). However, there would be a substantial proportion of the time, under low wind conditions, when the choice of runways would be determined by airport operating policy.

Based on the 05/23 runway orientation for Stage 1, there are two main operating modes that will occur depending on meteorological conditions at different times including:

- ‘Prefer 05’ operations whereby aircraft will take off and land on the 05 orientation. Under this operating mode, all aircraft will be directed to approach the proposed airport to land from the south west and directed to take-off to the north east, before redirecting towards their ultimate destination. If this is not possible due to meteorological or operating policy reasons, operations would occur in the opposite direction i.e. the 23 orientation. The concept of Prefer 05 operations is shown in Figure 7–6; and
- ‘Prefer 23’ operations whereby aircraft will take off and land on the 23 orientation. Under this operating mode, all aircraft will be directed to approach the proposed airport to land from the north east and directed to take-off to the south west, before redirecting towards their ultimate destination. If this is not possible due to meteorological or operating policy reasons, operations would occur in the opposite direction i.e. the 05 orientation. The concept of Prefer 23 operations is shown in Figure 7–6;

Under each of these operating modes, when the non-preferred operating direction is used for a period of time, operations would be switched back to the preferred direction when it becomes available after a time lag.

A third operating mode, ‘head to head’ may be feasible following further detailed assessment prior to the commencement of operations. This would involve all landings and take off movements occurring in opposing directions, either to or from the south west; or to or from the north east.

Under this mode all aircraft operations would effectively occur only on one side of the airport site for a period of time and therefore offer a period of no aircraft operations for other areas during that time. The concept of ‘head to head’ operations is shown in Figure 7–7.

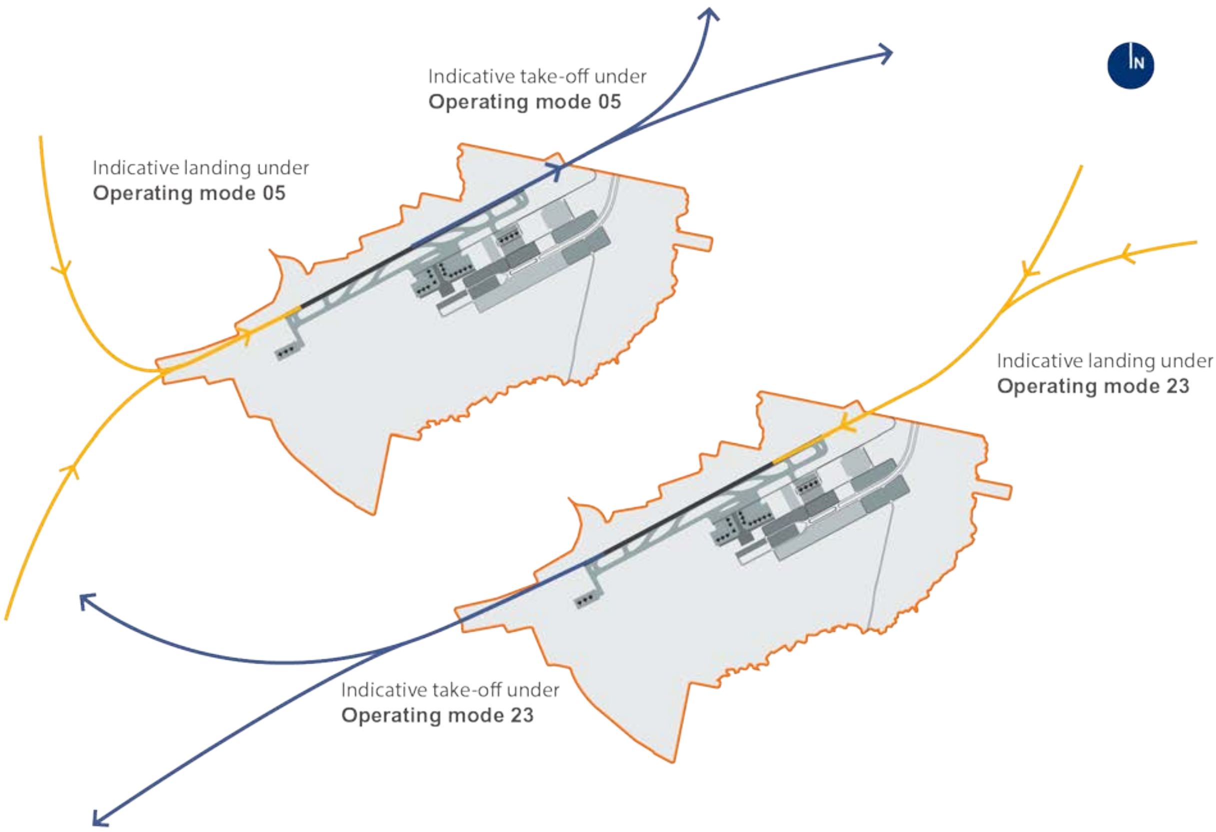


Figure 7–6 – ‘Mode 05’ and ‘Mode 23’ operating modes

Operation of the proposed airport would result in significant changes to the pattern of aircraft movements in the airspace above Western Sydney due to the introduction of new aircraft flight paths and airport operating modes.

The changes are expected to result in noise impacts which may be significant in some areas. In addition, projected future growth in air traffic would result in increased numbers of aircraft operations at the proposed airport, so noise impacts would also generally increase in the future. However, this would likely be mitigated to some extent by the introduction of new, quieter aircraft into the fleet over time.

The pattern of noise impacts which would result from operation is complex, and depends on operating mode, time of day, season and other factors. In some cases, alternative airport operating modes would be available, each with differing impacts on different areas. For example the operation of head to head arrivals and departures may offer respite for noise sensitive receivers in some areas for a period of time. Potential noise abatement opportunities such as the selection of operating modes will form a major part of the work required to finalise the airspace design prior to implementation.

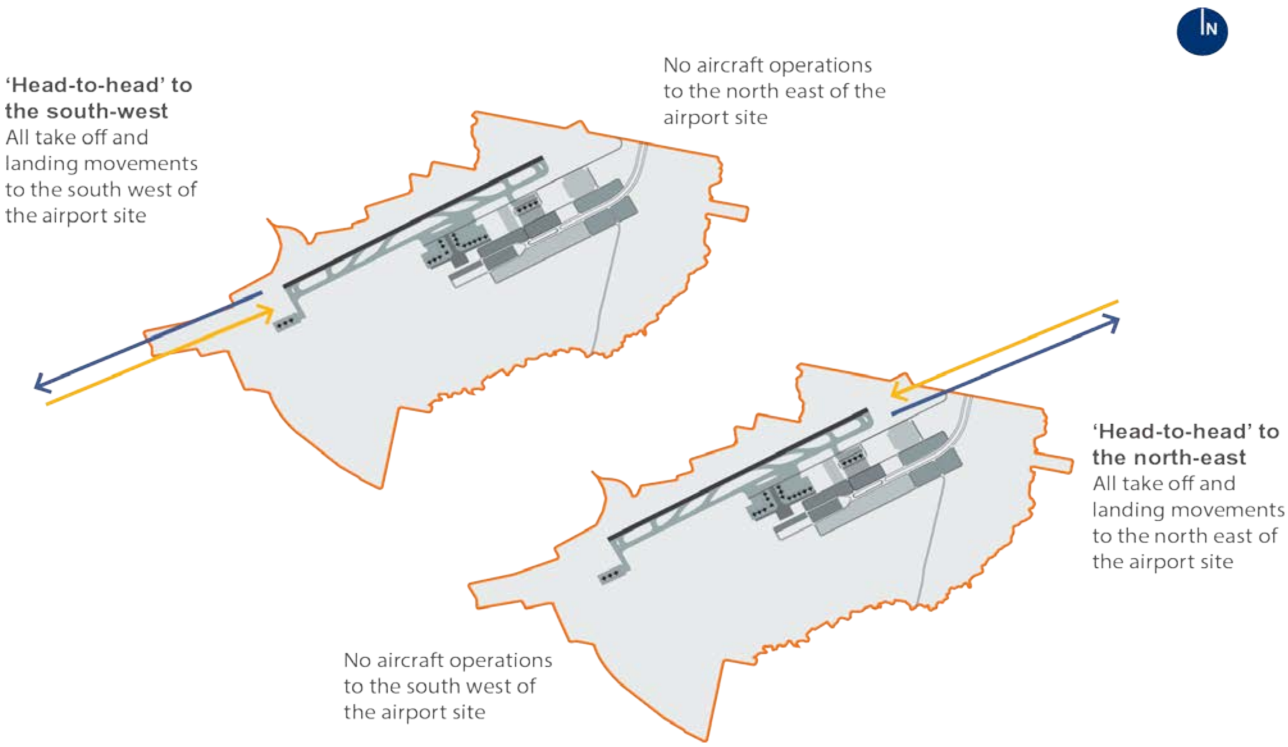


Figure 7–7 – ‘Head to head’ operating modes

7.6 Indicative flight paths

The main consideration when designing the indicative flight paths was air traffic management, particularly how the flights would interact with aircraft operating to and from Sydney Airport. Indicative flight paths developed by Airservices Australia have been designed on the premise that the proposed airport would operate independently of Sydney Airport in all cases. This ensures the selection of runways or operating modes at one airport can be made to suit local conditions without considering the operating mode at the other.

The design work and analysis was conducted using the current standards and procedures that apply to air traffic management, including:

- relevant provisions of the Australian Civil Aviation Safety Regulations 1998;
- International Civil Aviation Organization Procedures for Air Traffic Management (Doc 4444);
- International Civil Aviation Organization Procedures for Aircraft Operations (Doc 8168); and
- *Airspace Act 2007* and relevant regulations.

The conceptual airspace design presented in this draft EIS has not been developed to a level of detail necessary for implementation. A separate regulated airspace design process would be required to develop actual flight paths suitable for implementation prior to the commencement of operation.

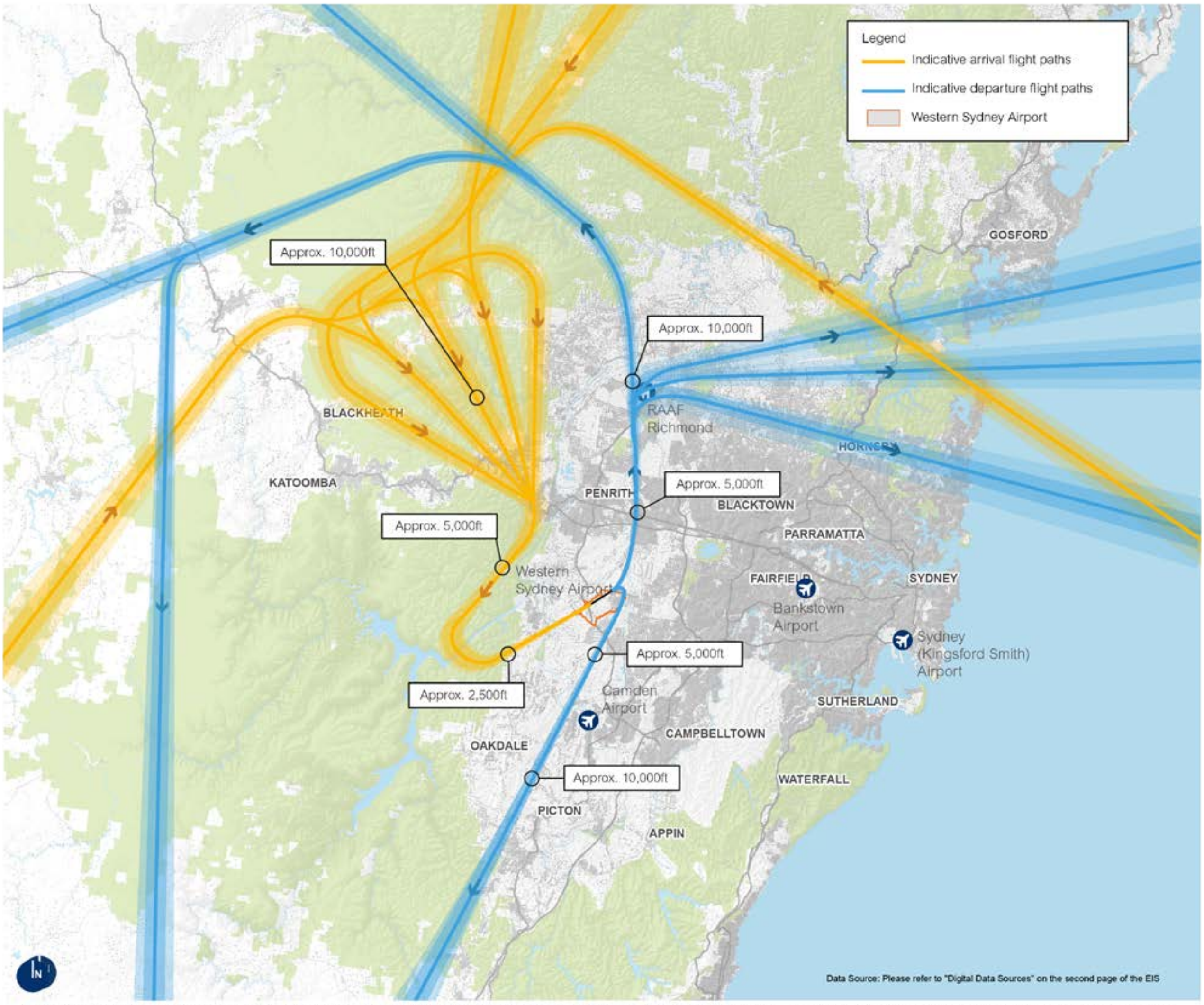
Importantly, the conceptual airspace design has not been developed with consideration to potential noise abatement opportunities, which would form a major part of the subsequent design work required prior to implementation. Consultation with airlines and other stakeholders would be undertaken through the design process, which would be subject to separate regulatory assessment processes required under the Airports Act. This process would be undertaken closer to the commencement of operations.

Important considerations in airspace design include:

- efficient use of the Sydney region airspace and integration with the national air traffic network as a whole;
- airspace protections for other aerodromes in the Sydney region including Defence establishments;
- the use of navigational technologies available both on ground and in aircraft at the time;
- opportunities to minimise potential noise and amenity impacts and other potential environmental issues; and
- consideration of operator and airline preferences and requirements.

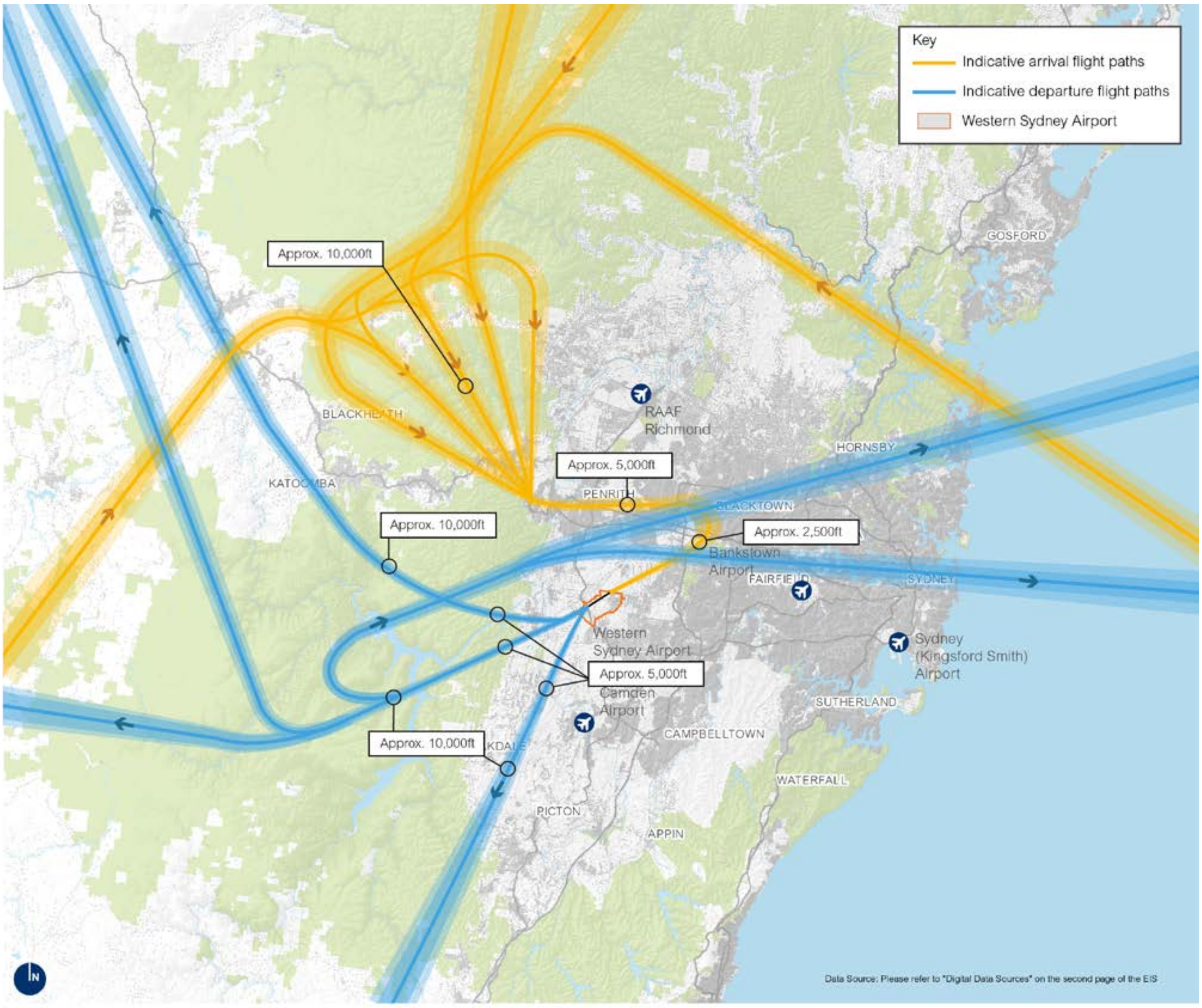
While particular flight paths are depicted as single lines of travel, it is not always possible for each aircraft to fly precisely along the same line. In practice, flight paths tend to be corridors up to several kilometres wide, although the increasing use of new navigation technologies such as satellite will continue to assist in minimising this issue.

Indicative flight paths for Stage 1 operations are presented in Figure 7–8 and Figure 7–9.



Note: Indicative flight paths are based on Airservices Australia's Western Sydney Airport: Preliminary Airspace Management Analysis. It does not present a comprehensive airspace and air route design and does not consider many essential components that would be necessary to implement an air traffic management plan for the Sydney basin. The formal flight path design for the Airport will be undertaken much closer to the commencement of operations.

Figure 7–8 – Stage 1 indicative flight paths for the Prefer 05 operating mode



Note: Indicative flight paths are based on Airservices Australia's Western Sydney Airport: Preliminary Airspace Management Analysis. It does not present a comprehensive airspace and air route design and does not consider many essential components that would be necessary to implement an air traffic management plan for the Sydney basin. The formal flight path design for the Airport will be undertaken much closer to the commencement of operations.

Figure 7–9 – Stage 1 indicative flight paths for the Prefer 23 operating mode

7.6.1 Arrivals

In developing the preliminary flight paths, consideration has been given to potential options for the management of multiple aircraft approaching the airport. Different arrivals management systems offer different benefits depending on the needs of the airport and can provide flexibility in air traffic control, efficiency and fuel management. Three options were considered to provide a safe and efficient landing sequence:

- open standard terminal arrival route with radar vectoring to final;
- runway connected standard terminal arrival routes; and
- point merge system.

The mode of operation for arrivals depends primarily on meteorological conditions with aircraft landings preferably occurring into the prevailing wind. For a given mode, different approach flight paths may be assigned depending on whether meteorological conditions dictate either an instrument guided approach or, if visibility is good enough, a visual approach. Visual meteorological conditions are defined by:

- visibility greater than 10 kilometres; and
- cloud height greater than 4,000 feet.

Open standard terminal arrival route with radar vectoring to final

The open standard terminal arrival route with radar vectoring to final system is a method of processing approaching aircraft that focuses primarily on achieving consistent arrival spacing by allowing air traffic control personnel to adjust the approach path, descent and aircraft speed.

Standard terminal arrival routes are used to direct aircraft from approximately 65 nautical miles from landing to a position specified downwind position. From the downwind position, a radar vector is used to adjust the aircraft's final approach spacing.

This arrival management system is currently used at Sydney Airport, where runway demand is consistently high. The system has a focus on efficiency and can accurately control arrival spacing and deliver maximum runway capacity.

Runway connected standard terminal arrival routes

Runway connected standard terminal arrival routes is a system that enables a continuous descent profile that is defined in an aircraft's on board fuel management system. Runway connected standard terminal arrival routes are currently used at Brisbane, Melbourne and Perth airports and enable accurate fuel time and energy management; but they may not provide the flexibility required to maximise traffic throughput to the runway.

Point Merge System

The Point Merge System is a way of synchronising arriving aircraft and directing them to the runway in a structured manner through a single final approach track. By directing aircraft though a series of predictable routes, the vertical and lateral path taken on approach is more accurate and can result in a reduction in the number of level flight segments required at a low altitude. The system may help to reduce fuel consumption, emissions and noise impacts as it relies on a continuous decent path and therefore requires limited use of aircraft engines. The concept of the Point Merge System is presented in Figure 7–10 and can be seen on the indicative flight paths presented in Figure 7–8 and Figure 7–9.

Point merge is now operational in Oslo, Dublin, Seoul, Kuala Lumpur, Hannover and partially in Paris airports and has been demonstrated to result in fuel efficient flight paths at these busy international airports.

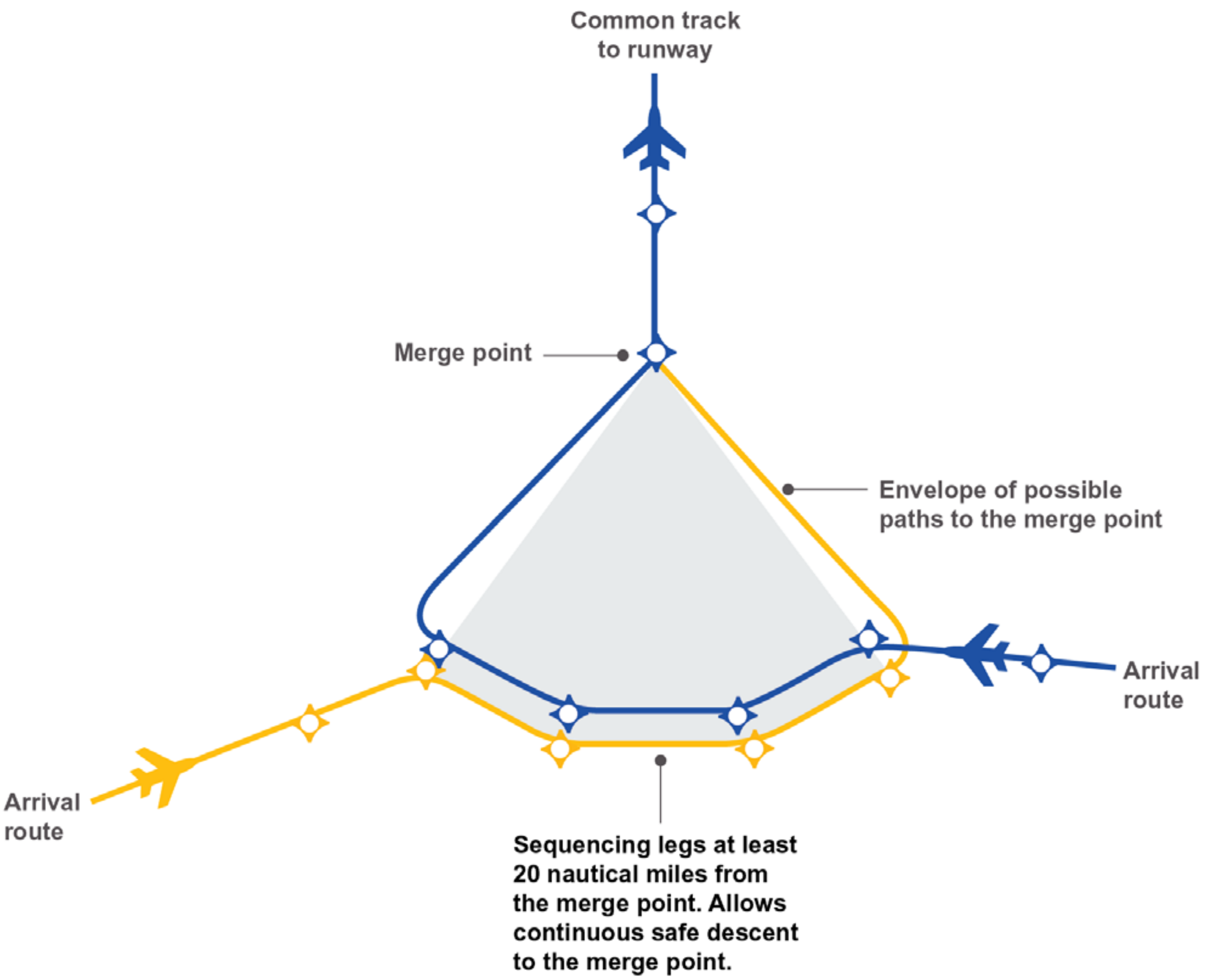


Figure 7–10 – Point Merge arrivals management system

Airservices Australia adopted the Point Merge System for the development of the indicative flight paths for the proposed airport. This is because it is simple, predictable and repeatable, potentially offering economies in fuel, efficiency, standardisation of procedure and reduction of noise impacts. It may also provide flexibility and the easiest method for adopting runway changes which are independent to Sydney Airport operations.

The conceptual airspace design presented in this draft EIS nominates one location for the merge point for each mode of operation. The location of this point makes little difference to analysis of environmental impacts, particularly noise impacts, relatively close to the airport. However, when considering impacts closer to the merge point and along the single arrival path from the merge point, the location is important because the potential impacts effectively become concentrated.

Potential noise impacts and consideration of noise abatement opportunities would form a major part of the subsequent design work required prior to implementation of the final airspace design. If the point merge system is adopted for the proposed airport, the location of the merge point would be a key component of this further development.

7.6.2 Departures

The indicative flight paths presented in this draft EIS show two major departure flight paths in each direction from the proposed airport. Both of these would branch off to other flight paths at distances that are relatively far from the proposed airport.

For departures to the south-west (the 23 direction) there is a third flight path passing roughly over the township of Warragamba that is nominated to be used by non-jet aircraft only.

The indicative use of this flight path is for non-jet aircraft only and would limit predicted noise exposure in areas beneath this route.

7.6.3 Flight path dispersion

Dispersion refers to the assumed variability of actual flight paths around a nominated flight path. In undertaking modelling required for the assessment in this draft EIS, dispersion for departure tracks was applied using one main track and four sub-paths, two on either side of the main flight path. The concept of dispersion is illustrated in Figure 7–8 and Figure 7–9.

No dispersion is added for instrument controlled arrival flight paths, on the basis that these will be strictly controlled through the Point Merge System. However the use of a number of flight paths for visual approaches provides a form of dispersion over the relevant areas.

7.7 Airspace protection

Obstructions in the vicinity of an airport, such as tall buildings and exhaust plumes from vent stacks, have the potential to create air safety hazards and to seriously limit the scope of aviation operations into and out of an airport. The most critical areas of concern are the immediate approach and take-off areas.

The airspace around the proposed airport would be protected in the interests of the safety, efficiency or regularity of future air transport operations. The airspace protection measures are described in terms of airspace surfaces at varying altitudes around the airport site, including:

- Obstacle Limitation Surfaces (OLS); and
- Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) Surfaces.

7.7.1 Obstacle Limitation Surfaces (OLS)

Under the CASA Manual of Standards (MOS), the airspace to be protected for aircraft operating during the initial and final stages of flight, or manoeuvring in the vicinity of an airport is defined by the OLS. This includes assessment of surrounding terrain and obstacles so as to provide protection to a height of 300 metres for take-off and landing.

The OLS serves as a first filter for assessing the operational impact of an obstacle. Subject to an operational assessment (refer Section 7.7.4), an obstacle penetrating the OLS may need to be lowered or removed; or it may be adequate for the obstacle to be marked and/ or lit and noted in aeronautical publications.

7.7.2 Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS)

At major airports radio-navigation aids and satellite navigation enable aircraft to operate in poor weather conditions. The PANS-OPS are established to protect those stages of take-off, landing or manoeuvring, when aircraft are operating in non-visual (instrument) conditions. Pilots must be assured of obstacle clearance in these circumstances. Obstacles cannot be permitted into the PANS-OPS. If an obstacle were within the PANS-OPS the published approach or departure procedure would need to be withdrawn and redesigned to ensure safe operation of aircraft.

The design of a full set of PANS-OPS for Stage 1 and long term operations would be required in response to the formal flight path design prior to commencement of operations.

7.7.3 One-Engine-out Procedures

Operators of aircraft having a weight in excess of 5,700 kilograms are required to consider obstacle clearance requirements in the event of an engine failure. The airport operator does not specifically consider obstacle clearance requirements in the event of an engine failure. The specific procedure design to meet these requirements will be a matter for the individual aircraft operator concerned.

7.7.4 Obstruction analysis

It is important to note that the OLS does not prohibit all intrusions. The aim is to ensure that all objects that intrude into the OLS can be identified and assessed for their potential impact on aircraft operations. This determination will be based on an assessment of the PANS-OPS surfaces and the object’s impact to air navigational operations.

A preliminary analysis of terrain around the airport site was undertaken as part of the development of indicative flight paths. The Blue Mountains escarpment encroaches into the OLS airspace to the north-west of the airport site by between 0.6 metres and up to 95 metres in some places. Other potential encroachments in the area include various mobile telephone towers and power transmission lines. Notably, the existing TransGrid 330kV transmission line that currently crosses the airport site, but this line will be relocated prior to commencement of operations.

Vegetation close to the runway, such as tall trees, would require assessment and may need to be removed or lowered. Height limitations will also apply to airport buildings, street lighting, and signage within the protected surfaces.

Vertical exhaust plumes may pose a hazard to aviation and would be controlled under the *Airports (Protection of Airspace) Regulations 1996*, subject to a plume rise assessment. The airport operator will need to determine if there are any potential impacts from plume rise from chimney stacks in the vicinity of the airport site prior to the commencement of operations.

7.8 National Airport Safeguarding

Protection of operational airspace around airports is a part of the National Airports Safeguarding Framework (NASF). The NASF is a national land use planning framework applied by each state that aims to improve safety outcomes by ensuring aviation safety requirements are recognised in land use planning decisions.

NASF includes guidelines on building generated windshear and turbulence, wildlife airport buffers to prevent bird strike, lighting restrictions to prevent pilot distraction and wind turbine risks.

Importantly, NASF also covers noise from aviation activity and seeks to improve community amenity by minimising aircraft noise-sensitive developments near airports. Public safety zones (PSZ) protection against development or activity in the areas immediately off runway ends is an additional consideration that may be included in the NASF in due course.

7.8.1 Windshear and turbulence

The shape, height and arrangement of buildings in relatively close proximity to the runway may adversely affect safe aviation movement on runway operations. All elements of the airport development will need to be assessed for its potential windshear and turbulence effects.

7.8.2 Wildlife airport buffer

A Wildlife Hazard Management Programme to control the risk of wildlife hazards on and near the airport site would be developed by the airport operator, in consultation with local authorities prior to commencement of operations.

Considerations for the wildlife hazard management program may include recommendations for the location of waste facilities in the vicinity of the airport site or the netting of standing water features such as detention basins. A bird and bat strike assessment has been undertaken as part of this draft EIS (refer Chapter 14 Hazards and Risks and Chapter 16 Biodiversity).

7.8.3 Restrictions to lighting

CASA has the authority to determine the potential impact of surrounding ground lighting on pilots during take-off and landing operations and to control ground lights where they have the potential to cause confusion or distraction to pilots within a six kilometre radius of an airport.

7.8.4 Public Safety Zones (PSZ)

The Australian Government is working with the states and territories on the development of a national standard for PSZs to be incorporated into the NASF. A nominal 1,000 metre trapezoid-shaped clearance off the end of each runway threshold is provided as part of the protected runway strip. The PSZ would manage risk associated with an aircraft undershoot or overrun by placing restrictions on land use within the zone. The zone would be sized to cover the area of highest risk to safety in such an event. These public safety zones are discussed in Chapter 5.

7.9 Operational parameters

Based on the layout of the airport site, operating parameters including the expected hours of operation, number of expected arrivals and departures; and the expected operating heights for aircraft need to be considered in designing the airspace architecture. These parameters affect not only operational and commercial viability, but also the safety of operations and the potential for environmental and social impacts.

7.9.1 Hours of operation

The development of the proposed airport is a rare opportunity to establish major transport gateway in the Western Sydney region. As outlined in Chapter 2, the development of the proposed airport is necessary for the continued success of Sydney as a global city and would provide substantial economic and employment opportunities to the region and the national economy. To maximise these opportunities and ensure long-term competitiveness with other major airports such as Brisbane, Melbourne and Canberra, the proposed airport has been planned to operate on a 24-hour basis and measures have been put in place at all levels of government to reflect this. NSW Government planning restrictions, in particular Local Planning Direction 5.8 made by the NSW Planning Minister under section 117 of the NSW *Environmental Planning and Assessment Act 1979*, have been in place for more than 20 years and require local governments to limit noise-sensitive developments around the airport site.

7.9.2 Number of flights

Predicted future numbers of aircraft movements have been based on synthetic schedules which estimate the expected number of aircraft operations for a typical day including aircraft family, operation type (arrival or departure), and time of operation and port of origin or destination for each operation. These schedules form the basis of modelling undertaken as part of this draft EIS such as noise and air quality modelling.

Predicted total aircraft movements per day for the proposed Stage 1 development and indicative long term operation of a parallel runway are presented in Table 7–1. Note that these figures represent a typical busy day and the number of movements is slightly greater than the annual average. For example, in 2030 the estimated 63,000 movements per year represents an annual average of approximately 173 aircraft movements per day, compared with 198 outlined in the schedule in Table 7–1.

Table 7–1 – Total predicted daily aircraft movements by type by year

Year	Aircraft movements Per Day		
	Freight	Passenger	Total
Stage 1 (2030)	28	170	198
First runway at capacity (2050)	74	480	554
Long term (2063)	104	1006	1110

Table 7–2 shows the predicated daily aircraft movements for Stage 1 and the long term, as summarised in Table 7–1, categorised by aircraft family. Note that the breakdown by aircraft family is based on current generation aircraft. Not all types of aircraft listed in Table 7–2 are expected to be operating in 2030 or 2063. It is expected that aircraft technology will continue to improve and airlines will continue replace older aircraft with newer models which are generally quieter and more fuel efficient.

Table 7–2 – Predicted daily aircraft movements by aircraft family by year

Aircraft Family	Aircraft movements Per Day	
	Stage 1 (2030)	Long term (2063)
Passenger aircraft movements		
Airbus A320	100	378
Airbus A330	18	286
Airbus A380	-	8
Boeing 737	28	196
Boeing wide-body general	-	40
Boeing 777	4	78
DeHaviland DHC8	8	10
Freight aircraft		
Airbus A330	2	2
Boeing 737	2	6
Boeing 747	10	38
Boeing 767	4	16
Boeing 777-300	-	10
Small Freight	10	32

Although the airport is proposed to operate on a 24-hour curfew free basis, there is predicted to be relatively few aircraft movements occurring during the night-time period, particularly for the Stage 1 development. Indicative aircraft movements per hour are presented on Figure 7–11.

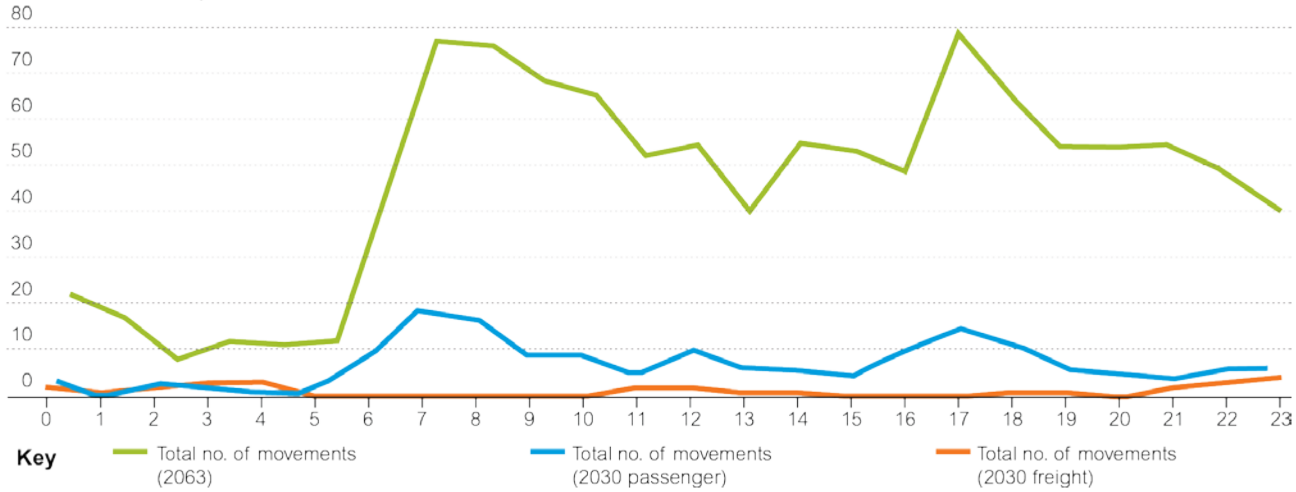
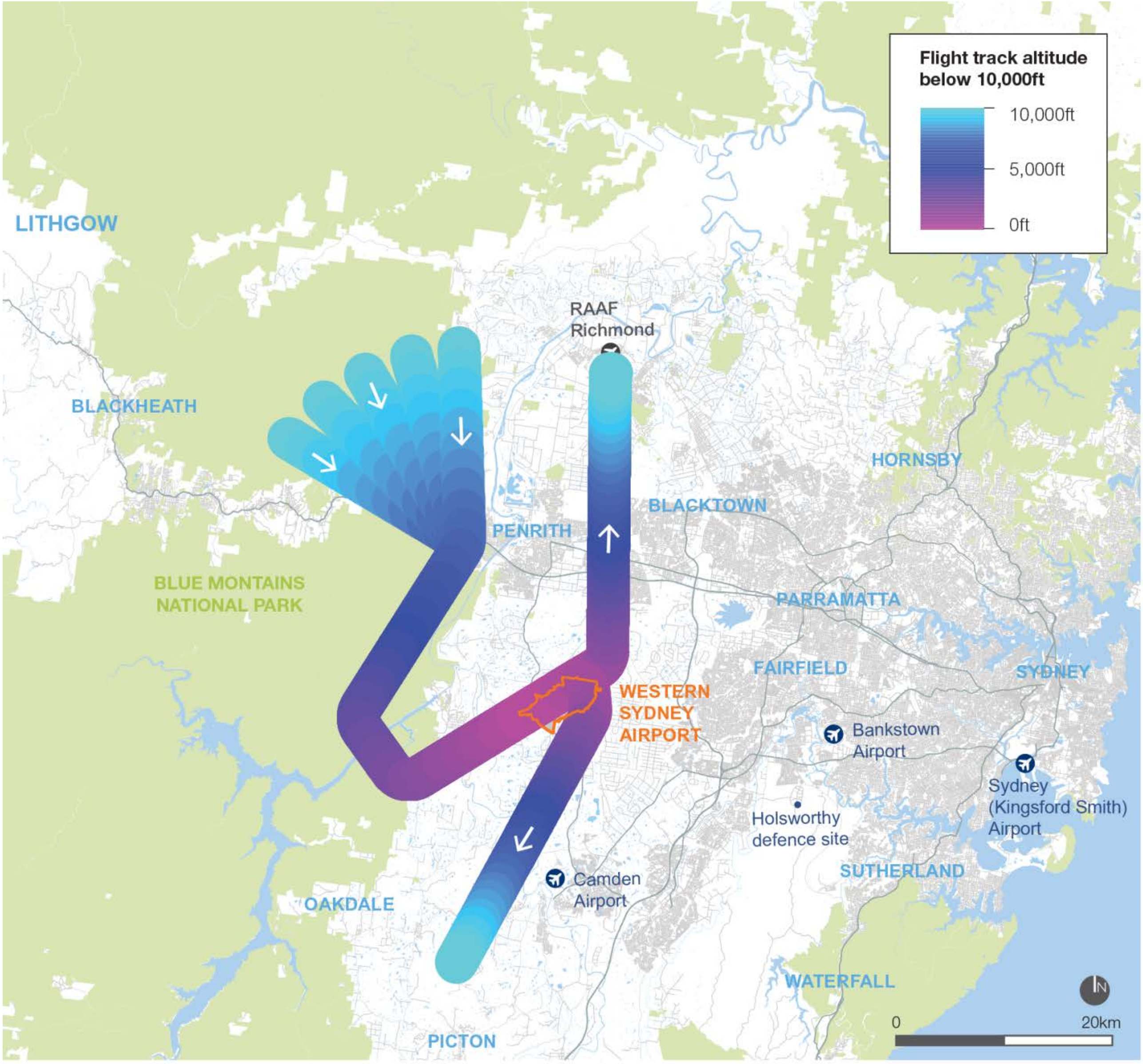


Figure 7–11 – Aircraft movements per hour

7.9.3 Flight altitude

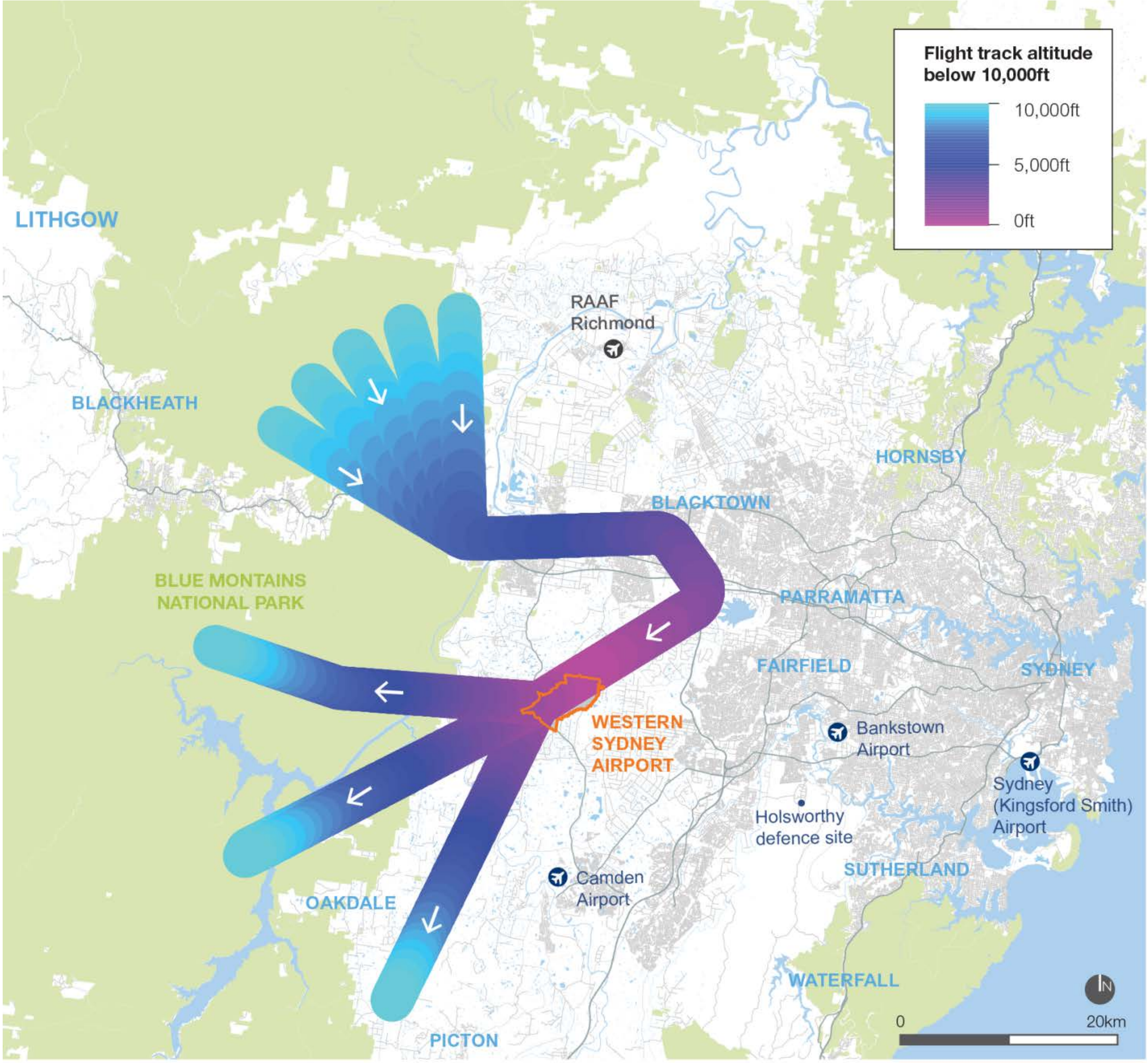
The altitude of an aircraft at a particular point along a flight path can have a significant effect on potential noise and other environmental impacts to receivers beneath the flight path. At altitudes above 10,000 feet (approximately three kilometres), the expected impacts are likely to be minor. Expected altitude of aircraft has been considered as part of the assessment required for this draft EIS and further information regarding specific environmental and amenity impacts is provided in Volume 2.

Indicative altitudes of flights arriving and departing the proposed airport at Stage 1 are illustrated in Figure 7–12 and Figure 7–13.



Note: Indicative flight paths are based on Airservices Australia's Western Sydney Airport: Preliminary Airspace Management Analysis. It does not present a comprehensive airspace and air route design and does not consider many essential components that would be necessary to implement an air traffic management plan for the Sydney basin. The formal flight path design for the Airport will be undertaken much closer to the commencement of operations.

Figure 7–12 – Stage 1 Indicative altitude of flights arriving and departing for the Prefer 05 operating mode



Note: Indicative flight paths are based on Airservices Australia's Western Sydney Airport: Preliminary Airspace Management Analysis. It does not present a comprehensive airspace and air route design and does not consider many essential components that would be necessary to implement an air traffic management plan for the Sydney basin. The formal flight path design for the Airport will be undertaken much closer to the commencement of operations.

Figure 7–13 – Stage 1 Indicative altitude of flights arriving and departing for the Prefer 23 operating mode

7.9.4 Emergency fuel jettison (fuel dumping)

Emergency fuel jettison for civilian aircraft, commonly referred to as fuel dumping, is a rare procedure used by aircraft in certain emergency situations to reduce an aircraft's weight to allow it to land safely. This may occur if an aircraft is required to undertake an emergency landing before reaching its destination airport, or if it needs to return to its origin airport shortly after take-off (for example due to a mechanical problem, or a passenger medical issue). In these instances, there would not be enough time to consume the amount of fuel expected to get the aircraft to its destination and it would be heavier than its maximum landing weight limit.

Landing over weight may cause a safety issue and an aircraft would need to reduce its weight in order to minimise the risk of structural damage.

Not all aircraft have the capacity to jettison fuel. For example, the most common types of civilian aircraft that perform the majority of domestic flights in Australia, such as the Boeing 737 and others of similar (or smaller) size, do not have the capability to jettison fuel as they do not need reduce their weight in this way in order to make an emergency landing. All international long haul aircraft, and some medium-to-long haul aircraft including the Boeing 777, Boeing 747 and Boeing 787 and the Airbus A330 Airbus A340 and A380 are able to jettison fuel.

If fuel is jettisoned, the exact evaporative characteristics of jettisoned fuel depends on a number of factors like the altitude at which it was released, the atmospheric temperature, and the dumping pressure. Most of the fuel evaporates as it falls within the first few hundred metres.

Instances of fuel jettisoning are extremely rare worldwide. In Australian airspace, where there is mandatory reporting of fuel jettisoning events, there were 10 reported instances of civilian fuel jettisoning in 2014 from 698,856 domestic air traffic movements and 31,345 international movements. This equates to emergency fuel jettisoning occurring in approximately 0.001 per cent of all aircraft movements.

The procedure for jettisoning fuel is specified in the En Route supplement of the Aeronautical Information Package published by Airservices Australia. When fuel jettisoning is required, the pilot in command requests authority from air traffic control before commencing a fuel jettison and must:

- take reasonable precautions to ensure the safety of persons or property in the air and on the ground;
- where possible, conduct a controlled jettison in clear air at an altitude of above 6,000 feet (approximately 1.8 kilometres) and in an area nominated by air traffic control; and
- notify air traffic control immediately after an emergency jettison.

The authority for fuel jettisoning is the Air Navigation (Fuel Spillage) Regulations 1999, which prescribe penalties for the unauthorised release of fuel from an aircraft other than in an emergency.

Instances of fuel jettisoning are extremely rare worldwide. In Australian airspace, where there is mandatory reporting of fuel jettisoning events, there were 10 reported instances of civilian fuel jettisoning in 2014 from 698,856 domestic air traffic movements and 31,345 international movements. This equates to emergency fuel jettisoning occurring in approximately 0.001 per cent of all aircraft movements.

Given the rarity of fuel jettisoning globally, the known low occurrence in Australian airspace, the standards set out in the Aeronautical Information Package, and the high evaporation rates known to occur at high altitude, authorised fuel jettisoning associated with the operation of the proposed airport, is unlikely to cause significant environmental or social impacts.

7.10 Potential meteorological impacts on operation

Weather conditions at different locations across the Sydney region are largely influenced by topography in and around the Sydney Basin. Generally, the weather conditions experienced at a given location depends upon proximity to the ocean or some other body of water, elevation, and the surrounding topography. These factors influence daily and seasonal temperature ranges and variability, humidity, rainfall, fog occurrence, and wind gustiness, direction and speed.

In 2014 the Bureau of Meteorology was engaged to provide a preliminary report on the meteorological parameters affecting the usability of the proposed airport and provide a comparison of expected conditions with Sydney Airport and other airports in the region. The *Western Sydney Airport Usability Report* (Bureau of Meteorology 2015) is provided in Appendix D.

The Bureau of Meteorology works closely with Airservices Australia and CASA in providing services for civil aviation, a role which is established through the *Meteorology Act 1995*. Under the Convention for International Civil Aviation (the Chicago Convention) the Bureau of Meteorology is the designated Meteorological Authority for Australia and also provides meteorological services for civil aviation in Australia in accordance with the standards and practices set out in Annex 3 to the Convention.

7.10.1 Badgerys Creek automatic weather station

In 1995 the Bureau of Meteorology installed an automatic weather station at Badgerys Creek, which has recorded a continuous supply of meteorological information including wind, temperature, dewpoint temperature, pressure and rainfall. Owing to the location of the airport site in the Western Sydney Basin, the climate and weather phenomena that may affect the proposed airport can be significantly different to those experienced at Sydney Airport.

Topography in the Sydney Basin is likely to cause local disparities in temperature, moisture, pressure, rainfall and wind. Any combination of these factors will indirectly affect the frequency and severity of weather phenomena such as fog, thunderstorms, turbulence, wind shear and low cloud. A topographical map of the Sydney Basin is provided in Figure 7–14.

Figure 7–14 – Topographic map of the Sydney Basin

It is expected that the proposed runway configuration for Stage 1 will be usable approximately 99.5 per cent of the time based on crosswinds alone. Other weather phenomena such as fog, low cloud and low visibility conditions may lower the usability of the proposed airport; however mitigation is obtainable through navigational systems and aids. In addition, many of these other weather phenomena occur at other major airports (e.g. fog at Canberra Airport) demonstrating that these weather phenomena could be effectively managed at the proposed airport and do not preclude the safe operation of an airport.

7.10.2 Wind

The wind at the airport site in all seasons is effectively blocked by topography from the west to north-westerly directions. Under the proposed runway orientation, the proposed airport would likely be less susceptible to both crosswind and headwind effects than Sydney Airport.

The analysis undertaken by the Bureau of Meteorology indicates that there appears to be a threshold (approximately 20-25 knots) in which the north-westerly synoptic winds are sufficiently strong to overcome the terrain and produce a crosswind at the airport site.

The months of August to October are the most probable times to experience a crosswind exceeding 20 knots at the airport site, with the majority of crosswind events occurring from the southwest. This has been taken into consideration during the planning of the functional elements of the airport as discussed in Chapter 5.

Headwinds in excess of 25 knots would be rare at the proposed airport but could occur in almost any month of the year.

It is important to note that the clearance of vegetation and the erection of buildings can cause changes in wind speed and direction. Removal of vegetation is likely to cause a reduction in surface drag resulting in slightly stronger wind speeds than would have occurred otherwise. The effect may be more pronounced at the base of the lee side of the Great Dividing Range.

7.10.3 Temperature

Whilst average daily temperatures are important, it is the extremes in heat or cold that can have the most impact on airport operations generally.

A summary of the temperature information recorded at the Badgerys Creek weather station is presented in Table 7–3 and Table 7–4.

The month of January has the most days on average above 30 degree Celsius and 35 degrees Celsius with 13.4 and 5.2 days respectively. July has the most number of days on average below zero degrees Celsius with 3.3 days.

Table 7–3 – Temperature climatology at the airport site

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean daily maximum temperature (°C)	29.9	28.5	26.7	23.9	20.6	17.8	17.3	19.3	22.7	24.7	26.1	28.1
Highest temperature (°C)	45.5	42.6	40.0	34.6	27.9	25.2	25.4	28.8	34.8	37.2	41.9	42.5
Mean daily minimum temperature (°C)	16.9	17.1	15.1	11.3	7.6	5.4	4.2	4.6	7.7	10.2	13.4	15.2
Lowest temperature (°C)	8.2	8.5	6.4	-0.1	-1.1	-3.0	-4.5	-1.9	-0.5	2.2	5.3	6.6

Table 7–4 – Temperature extremes at the airport site

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean number of days over 30°C	13.4	9.6	4.8	0.8	Nil	Nil	Nil	Nil	1.7	5.1	6.8	10.2
Mean number of days over 35°C	5.2	2.6	0.5	Nil	Nil	Nil	Nil	Nil	Nil	0.8	1.8	2.8
Mean number of days below 0°C	Nil	Nil	Nil	0.1	0.3	2.0	3.3	2.1	0.2	Nil	Nil	Nil

High temperatures

High temperatures have the ability to affect airport operations and temperature has an indirect relationship with air density. As temperature climbs the air becomes less dense and affects aero-dynamical lift.

High temperatures can also affect fuel, causing it to expand and restrict the capacity to adequately refuel aircraft in some cases. A temperature exceeding the flash point for jet fuel (approximately 38 degrees Celsius for Jet A/A1) is extremely important as liquid becomes a gas at this temperature and becomes extremely hazardous.

Data recorded at the Badgerys Creek weather station indicates that the temperature is equal to or greater than 30 degrees Celsius regularly throughout the end of spring, summer and the start of autumn at Badgerys Creek. Temperatures exceeding 30 degrees Celsius are most commonly during the middle to late afternoon. It is also not unusual to see temperatures exceed 35 degrees Celsius in late spring and summer at these times of the day.

Whilst it is possible to see temperatures exceed 40 degrees Celsius in late spring and summer it is not common at the airport site. Temperatures are most likely to exceed 40 degrees Celsius in January.

Low temperatures

Temperatures below zero degrees Celsius at surface level have the ability to produce adverse weather conditions that affect aircraft operations including hail, snow, sleet, frost, icing and freezing fog.

Data recorded at the Badgerys Creek weather station indicates that it is common for temperatures to drop below zero degrees Celsius in the months from June to August. This occurs most commonly in July, on average for more than 75 hours a month. The early morning period prior to sunrise is the most common time for temperatures to be recorded below zero degrees Celsius at the airport site.

Frost

Frost and ice accumulation on ground surfaces can occur at temperatures below zero degrees Celsius. Data with a temperature of below zero degrees Celsius was analysed by the Bureau of Meteorology to indicate the potential for frost at the airport site and compared to data for Canberra Airport.

Analysis found that frost could potentially form between the months of May to September at the proposed airport, with occurrence most likely in July with an expected average of over four hours. Frost is most likely to occur near sunrise.

In comparison, Canberra Airport experiences approximately 20 times more hours of frost occurrence than Badgerys Creek between the months of April to October.

7.10.4 Freezing fog

Conditions are conducive to the formation of freezing fog when the temperature is below zero degrees Celsius and the relative humidity is greater than or equal to 95 percent. In these conditions the density of super-cooled liquid water suspended in the air would be high enough to potentially cause rime icing on an aircraft's surface whose temperature is below zero degrees Celsius. Rime icing is rough opaque ice, formed by supercooled drops rapidly freezing on impact producing 'horns' or protrusions. Rime icing can reduce the performance of aircraft operations by increasing the weight of an aircraft, decreasing thrust and increasing drag.

These atmospheric conditions are also conducive to the formation of black ice on paved areas such as runways and taxiways, especially after rain. Black ice or 'clear ice' refers to a thin coating of glazed ice that is often practically impossible to see and therefore presents a risk of aircraft skidding due to loss of traction.

Conditions conducive to freezing fog could potentially occur in the months of May to September at the airport site; however it is more common from June to August. On average there are 3.5 hours in July in which icing may impact surfaces at the airport site. In comparison, Canberra Airport experiences on average 10 times more hours a month of freezing fog conditions during the winter months.

Freezing fog would most commonly occur in the hours surrounding sunrise during the winter months. It would be possible, though rare, for events to initiate in the early morning hours. The availability of de-icing equipment will mitigate the impact of icing on aircraft and hard surfaces at the proposed airport.

7.10.5 Temperature inversions

Under normal conditions the air temperature reduces with height above a location. A temperature inversion occurs when there is an increase in temperature with height. The atmosphere beneath the inversion forms a stable layer of cold air trapped by the warm air above. Temperature inversions tend to be more significant during the cooler months where the air at the surface is cooler than the air above and the ability of the surface to heat during the early morning is diminished.

The main impact of a temperature inversion is on local air quality and noise propagation. The presence of a temperature inversion has a significant influence on the ability of the atmosphere to disperse pollutants. An inversion layer effectively forms a barrier in the lower atmosphere which restricts the mixing of air, and causes a build-up in pollutants. Pollutants from the previous day and those advected overnight into the area can be trapped by the inversion causing morning pollution problems. Generally, the concentration of pollutants in the air is strongest during the early morning hours when a low-level temperature inversion exists and wind speeds are light. The effects of temperature inversions on air quality are discussed in more detail in Chapter 12 Air Quality and Greenhouse Gases.

7.10.6 Rainfall

An airport's operations can be affected by rainfall in many ways including aircraft landing distance, runway nomination and the type of approach due to poor visibility or low cloud. Additionally, heavy rainfall leading to flash flooding can affect aircraft operations by flooding taxiways and runways, damaging the runway, severely reducing tyre traction and in the worst case lead to aircraft hydroplaning. These risks can be managed effectively through runway design.

Rainfall climatology

Rainfall data for Badgerys Creek has been extracted and analysed by the Bureau of Meteorology and findings show that the average annual rainfall at Badgerys Creek is 680.9 millimetres with rain recorded on average on 117.8 days per year. The recorded monthly rainfall statistics are presented in Table 7–5.

Table 7–5 – Rainfall statistics at the airport site

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean monthly rainfall (mm)	77.4	108.0	77.3	43.2	40.1	52.1	23.0	35.9	33.9	52.7	74.5	63.6
Highest monthly rainfall (mm)	192.2	342.4	198.0	129.4	155.6	220.0	71.6	231.0	82.2	182.2	173.2	131.2
Lowest monthly rainfall (mm)	13.6	13.4	21.4	1.8	1.8	2.0	2.8	1.0	6.4	0.4	8.4	14.2
Highest daily rainfall (mm)	138.0	106.8	67.8	82.4	54.0	63.8	28.4	70.0	50.8	63.0	63.0	65.0

Monthly rainfall in excess of 50 millimetres on average occurs in the months from October to March at Badgerys Creek.

Rainfall and the amount of rain days appear to be less variable at Badgerys Creek than at Camden and Sydney airports. Badgerys Creek experiences lower monthly highs and higher monthly lows in rainfall than the other two airports. This may be due to topographical effects or the shorter length of rainfall records.

7.10.7 Fog and low cloud

Fog is caused by a suspension of water droplets in the air near the surface of the earth. Internationally fog is reported when the horizontal visibility has dropped below 1,000 metres (ICAO 2007). However in order to exclude smoke and other circumstances which may cause a reduction in visibility an additional condition of relative humidity above 95 per cent has been applied to data analysis by the Bureau of Meteorology.

For aviation purposes, a visibility of less than 1000 metres must be observed at a height of two metres above the ground or the fog is termed shallow fog. Observations instrumentation is currently unable to determine the difference between shallow fog and fog at an airport.

Most major Australian airports are equipped with Instrument Landing Systems (ILS) which allows a pilot to attempt to approach an airport in reduced visual conditions. However, in the event of a fog it is the Runway Visual Range (RVR) system which becomes critically important. The RVR system may allow aircraft to land in dense fog provided the RVR is above specified thresholds for the aircraft that is landing, the aircraft has the required instrumentation, and the pilot has valid certification.

The presence of a low cloud ceiling has the ability to affect airport operations and air traffic flow. To ensure that aircrew can adequately prepare for low cloud situations an ‘alternate minima’ is assigned dependant on aircraft type. The alternate minimum represents the broken cloud height below which additional fuel must be carried to enable the aircraft to safely land at an alternative aerodrome.

The formation of low cloud is dependent on factors such as temperature, low-level moisture content, low-level wind direction, atmospheric stability, and topography. From data recorded at the Badgerys Creek weather station it is possible to calculate the dewpoint depression, which is the difference between temperature and dewpoint. The dewpoint is the temperature to which the air must be cooled to reach saturation, or the temperature at which dew would form should the air temperature fall sufficiently.

7.10.8 Turbulence and wind shear

Turbulence is caused by a disruption to air flow. Turbulence in the lower atmosphere is generally created by the flow of air around an obstacle such as topography or buildings. However, meteorological conditions such as boundaries between different air masses can also provide turbulent effects.

Moderate and severe turbulence at the proposed airport would be most common in the months of June to August. Analysis indicates that the proposed airport would experience slightly fewer turbulence events than Sydney Airport.

7.10.9 Thunderstorms

Regardless of size or intensity, any thunderstorm can be hazardous to aviation. Potential impacts include disruption to the management of air traffic both in the air and landside, in the terminal area; and disruptions to airport ground operations. Aviation hazards encountered in and near thunderstorms include severe wind shear and turbulence, severe icing, downbursts, hail, lightning, heavy rain, tornadoes, low cloud, poor visibility, and rapid air pressure fluctuations.

While most 'ordinary' thunderstorms individually have lifetimes of thirty minutes to an hour, under certain atmospheric conditions organised systems of thunderstorms or even individual storms may last for several hours.

The Bureau of Meteorology analysis suggests that the thunderstorm season in the vicinity of the proposed airport appears to start and finish earlier in the year by approximately one month when compared to Sydney Airport. Outside of the thunderstorm season, there is expected to be more thunderstorm activity at Sydney Airport when compared to the proposed airport.

Most thunderstorms in the region develop over the Great Dividing Range moving eastwards into the Sydney Basin. The close proximity of the airport site to the mountain ridge would mean that this would only allow for a relatively short lead time for thunderstorm warnings at the proposed airport. For example, a thunderstorm which initiates over the Great Dividing Range and moving at 20 knots, would reach the proposed airport in approximately 30 minutes.

7.10.10 Summary of meteorological impacts on operation

The Bureau of Meteorology found that siting of the proposed airport at Badgerys Creek has many meteorological advantages compared to Sydney Airport namely the minor exposure to significant crosswind and headwind, the lack of low-level vertical wind shear and lower frequency of thunderstorms.

Mitigation processes and equipment exist for most weather phenomena which are expected to occur at the proposed airport. The runway availability and usability of the proposed airport is primarily determined by crosswind at the airport site. Based on the proposed runway alignment, it is expected that the proposed airport would be usable approximately 99.5 per cent of the time, based on cross-wind analysis.

There are factors which need consideration during the operational planning of the proposed airport that are more likely to occur at the airport site than at Sydney Airport. These include weather phenomena such as high temperatures, freezing fog and frost. In some cases these weather phenomena would occur less frequently at the proposed airport when compared to other airports such as Canberra Airport. Through adequate planning and infrastructure it is possible to mitigate the influences of most weather phenomena.

The study undertaken by the Bureau of Meteorology indicates that perhaps the most significant aspect of the airport site is likely to be the occurrence of fog. The development of fog overnight in the western Sydney Basin is possible during all months of the year; and often for extended periods of time during winter. It is important to acknowledge that an increase in pollutants in the adjacent atmosphere to the airport site could likely affect fog formation in the future. Additional equipment for monitoring visibility and cloud is required in order to develop a true fog climatology at the airport site and for meteorologists to improve forecast skill into the future. However, while the occurrence of fog is relatively common, modern ILS and RVR systems allow aircraft to land safely in dense fog and when visibility is low.

Further meteorological studies are likely to be required in the following areas as part of the operational planning for the proposed airport:

- correlating low visibility statistics with instrument landing system categories will likely aid airport planners in determining the navigational aids required for optimal usability at the proposed airport;
- estimated correlation between the occurrence of fog events at Sydney Airport and the proposed airport may inform decisions regarding network management;
- anecdotal evidence of wind rotors at the airport site indicates that rotors may impact airport operations in certain wind regimes. It is unclear as to whether further effort in this area would yield any significant gain in airport usability. A scoping study into different methods of measuring rotors and associated costs could provide key elements for a cost-benefit analysis in this area;
- a comparison study into the numerical modelling of turbulence at major airports such as Brisbane and Melbourne will be considered and conducted as required;
- research into the potential impact of freezing fog at the proposed airport and associated mitigation measures available for implementation; and
- further calculations for crosswind and headwind will be conducted as required.

PART C:

Consultation

8. Community and stakeholder engagement

8.1 Introduction

This chapter provides an overview of the stakeholder and community consultation activities undertaken for the proposed Western Sydney Airport EIS and Airport Plan, up to the development of this draft EIS and the draft Airport Plan. This includes an outline of the principles for engagement, stakeholders identified and engaged, activities undertaken to date, feedback from the community and stakeholders and how this feedback is addressed in the draft EIS and draft Airport Plan.

An outline of planned consultation activities during the public exhibition period for the draft EIS and draft Airport Plan has also been provided. These activities aim to increase awareness of, and accessibility to, these documents and provide community members and stakeholders with the opportunity to comment.

This chapter addresses the consultation and engagement requirements from the Australian Government Department of the Environment EIS guidelines (refer Appendix C in Volume 4), and Schedule 4 of the EPBC Regulations 2000.

8.2 Approach and objectives

8.2.1 Engagement objectives

The objectives of the communication and engagement activities are to:

- proactively and regularly engage with stakeholders to ensure they are appropriately consulted throughout the approval and development process;
- inform and advise the community, with a particular focus on the Western Sydney community, of the current activity and the next steps in the process;
- engage with the community to communicate the significant benefits of the proposed airport and address any points of concern;
- encourage participation in the conversation and submission of comments through community consultation opportunities; and
- provide accessible and reliable information about the project.

8.2.2 Communication and Engagement Strategy

An overarching *Communication and Engagement Strategy* (Strategy) was prepared to support the proposed airport, including the development of the draft EIS and communication with the community and stakeholders about the project's progress. The Strategy identified three key target audiences for communication and engagement:

- the community in the direct environs of Badgerys Creek;
- stakeholders and significant others; and

- the broader Sydney community.

The Strategy addresses the communication and engagement needs of each target audience, based on initial community research and stakeholder consultation conducted in September 2014. The research involved 11 focus groups and an online survey of 2,041 Sydney residents (from within a 20 kilometre radius of Badgerys Creek). The key findings of the research indicated that:

- there was support for the idea of a Western Sydney airport;
- there was limited awareness of the announcement of the proposed airport and associated infrastructure;
- there was a general acknowledgement that are challenges that need to be addressed in developing the proposed airport; and
- there was considerable scepticism about this project proceeding.

In consideration of these findings and supported by the results of ongoing independent research, an engagement approach was developed for the draft EIS. This approach supports the overarching Strategy.

8.2.3 Engagement approach

The engagement approach for the preparation and exhibition of the draft EIS and draft Airport Plan is guided by the Core Values and Code of Ethics of the International Association for Public Participation (IAP2). The following approach was taken for community and stakeholder engagement throughout the preparation of the EIS:

- identify all relevant stakeholders;
- develop a Stakeholder and Community Engagement Framework (Framework) including communication and engagement activities during the preparation of the draft EIS and the draft Airport Plan and throughout the public exhibition period;
- implement the Framework to reach identified communities and stakeholders; and
- evaluate engagement outcomes for use in ongoing consultation regarding the airport.

Figure 8–1 below provides a broad overview of the opportunities for engagement across each phase of the EIS and Airport Plan.

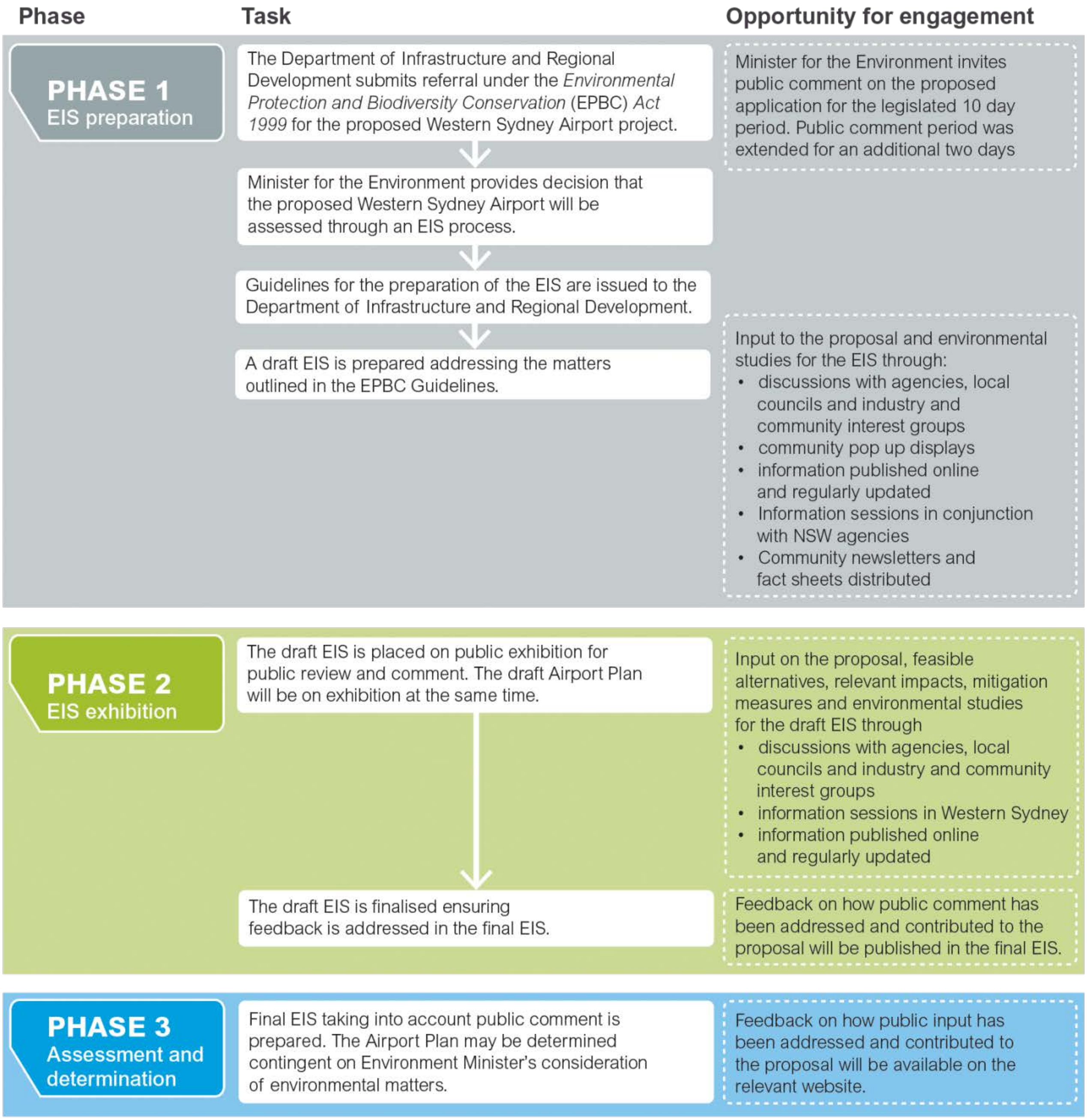


Figure 8–1 – EIS and Airport Plan process and consultation flowchart

8.2.4 Overview of stakeholder groups

Stakeholder groups who would be potentially affected by, or have an interest in, the proposed airport include members of the community, special interest groups and organisations, businesses, government agencies, local governments and other authorities. Stakeholders have been categorised into three key groups; aspects of each group relevant to the engagement approach planned for the Draft EIS are outlined in Figure 8–2 below.

KEY ISSUES

DESIGN
- Flight path direction and hours of operation
- Changes to flight paths and impacts from Sydney Airport

ENVIRONMENT
- Air quality and noise impacts
- Water catchment quality
- Noise
- Increased congestion on existing roads
- European and Indigenous heritage
- Ecological impacts

SOCIO-ECONOMIC
- Lack of social infrastructure
- Property access for site investigations
- Integration with other major infrastructure projects
- Ensuring local economic benefits are realised
- Changes in amenity of local area
- Changes in property values

EIS PROCESS
- Scope EIS
- Project timing

1 STAKEHOLDERS AND SIGNIFICANT OTHERS

Engagement objectives
- To proactively and regularly engage with stakeholders to maximise the opportunities and mitigate any issues.
- To engage with key stakeholders throughout the drafting of the EIS to ensure issues are managed and the draft and final EIS is robust.

Engagement approach
- Meet with stakeholder organisations to gather relevant data for the preparation of the EIS.
- Encourage a 'whole of government' approach for public events and community newsletters whereby information on other Western Sydney infrastructure projects is provided.
- Provide timely information about EIS activities and communicate feedback from the community and stakeholders.

Audience
- Local Members of Parliament (State and Federal)
- Cabinet Ministers (State and Federal)
- NSW Government Departments and Agencies
- Federal Government Departments and Agencies
- Local Councils
- Community and environmental action groups
- Special Interest Groups

2 PEOPLE WHO LIVE IN THE DIRECT ENVIRONS OF BADGERY CREEK

Engagement objectives
- To inform and advise the local community of the specific actions, implications and next steps of the progression of the proposed airport.
- Outline the benefits of the proposed airport and encourage participation in the conversation.
- Deliver a comprehensive engagement programme ensuring the community and local stakeholders have opportunities to input, view, discuss and comment on the draft EIS.

Engagement approach
- Engage with stakeholders to understand key issues of interest/concern to guide specialist studies being undertaken.
- Manage community expectations for information.

Audience
- Communities directly surrounding Badgerys Creek (Luddenham, Kemps Creek, Mulgoa, Bringelly, Wallacia, Rossmore, Mount Vernon).

3 THE BROADER COMMUNITY

Engagement objectives
- To provide information and progress to date as well as the benefits pending the outcomes of the EIS process.
- Provide stakeholders and the community with the opportunity to understand the EIS process and outcomes and actively engage with the project team during the exhibition phase.

Engagement approach
- Ensure the local, Western Sydney and broader Sydney communities and stakeholders understand the EIS process. Raise awareness of upcoming engagement opportunities.
- Work with local councils to raise awareness about the EIS.

Audience
- Broader Western Sydney community
- Broader Sydney community

Figure 8–2 – Community and stakeholder engagement plan

8.3 Phase 1 – draft EIS and draft Airport Plan preparation

The proposed airport represents one of the most significant infrastructure projects in Australia for decades. Ensuring the community is informed about the project and has access to the latest project information is a key component throughout all phases of its approval, development and implementation.

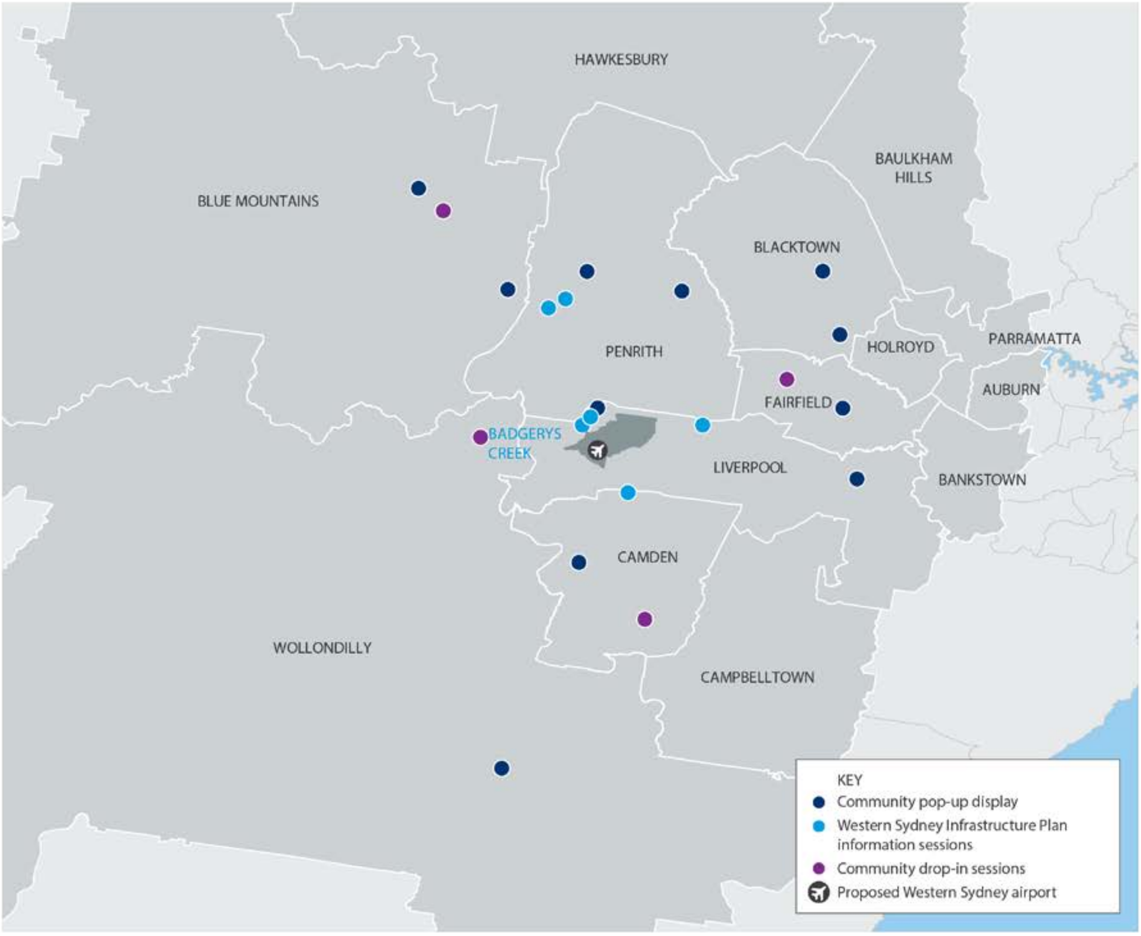
Given the high level of public interest and the likelihood of project impacts, both positive and negative, the engagement programme during preparation of the draft EIS and the draft Airport Plan focused on informing and consulting with the community and key stakeholders.

Figure 8–3 summarises the consultation with stakeholders and the community, which has been undertaken progressively throughout the development of the proposal. The consultation approach has been designed to inform stakeholders about the proposed airport and encourage participation in the conversation, to allow the development of the proposal to benefit from stakeholder knowledge and understanding of specific needs. Consultation activities will continue as the planning progresses.

A variety of activities to engage the community and stakeholders have been undertaken. Focus groups, stakeholder meetings, community pop-up displays and information sessions were conducted, and a dedicated information line and email have been available. A dialogue has been established with Federal and State Members of Parliament (MPs) representing the electorates surrounding the site, in consultation with relevant Ministers' offices.

In addition, a range of materials have been developed to inform community and stakeholders about the project, including a dedicated project website, fact sheets and regular newsletters. Table 8–1 lists the stakeholder engagement and community consultation activities undertaken during Phase 1, from September 2014 through to the beginning of the exhibition of the draft EIS and draft Airport Plan.

Attitudes and concerns of the community are summarised in Section 8.3.3 below.



	LGA	Event type	Location
FEBRUARY	Penrith/Liverpool	Community pop-up stall	Luddenham Show
MARCH	Blacktown	Community pop-up stall	Blacktown Show
APRIL	Blue Mountains	Community pop-up stall	Glenbrook Rotary Market
	Fairfield	Community pop-up stall	Fairfield City Markets
MAY	Blue Mountains	Community pop-up stall	Blue Gum Rotary Market
	Wollondilly	Community pop-up stall	Picton Markets
JUNE	Blacktown	Community pop-up stall	Blacktown Markets
	Blacktown	Community pop-up stall	St Marys and Mt Druitt Rotary Clubs Markets
	Liverpool	Community pop-up stall	Liverpool Night Markets
JULY	Liverpool	Western Sydney Infrastructure Plan information sessions	Bringelly
	Liverpool	Western Sydney Infrastructure Plan information sessions	Luddenham
	Penrith	Western Sydney Infrastructure Plan information sessions	Orchard Hills
AUGUST	Liverpool	Western Sydney Infrastructure Plan information sessions	Luddenham
	Penrith	Western Sydney Infrastructure Plan information sessions	Glenmore Park
	Penrith	Western Sydney Infrastructure Plan information sessions	Kemps Creek
	Penrith	Community pop-up stall	Penrith Show
	Camden	Community pop-up stall	Cobbitty Markets
SEPTEMBER	Blue Mountains	Community drop-in sessions	Blue Mountains Theatre & Community Hub
	Fairfield	Community drop-in sessions	Horsley Park Hall
	Wollondilly	Community drop-in sessions	Warragamba Town Hall
	Camden	Community drop-in sessions	Narellan Child, Family & Community Centre
	Penrith	Community pop-up stall	St Marys Spring Festival

Figure 8–3 – Summary of community consultation activities between February and September 2015

Table 8–1 – Summary of stakeholder engagement and community consultation activities

Activity	Outcome
Briefings	
Discussions held with a variety of stakeholders including government agencies, businesses, industry peak bodies, and tourism and community groups as well as elected officials.	Over 70 meetings have been held with individuals or groups.
Community based events	
A total of 15 community pop-up displays at local events have been carried out between February and September 2015.	3,734 community members approach the stalls for information
Information sessions	
A total of 10 information sessions were held between July and September 2015, before the exhibition of the draft EIS and the draft Airport Plan, to provide information on the proposed airport.	1,281 community members attended the information sessions.
Focus groups	
Members of the Western Sydney community participated in 11 focus groups in September 2014 and a stakeholder focus group in June 2015. The focus groups were to understand and explore the existing attitudes and perceptions towards a Western Sydney airport, including information needs and requirements.	97 Western Sydney community members participated in the focus groups in September 2014. Representatives of nine stakeholder groups participated in a stakeholder workshop in June 2015.
Survey	
Online surveying was used to gauge interest and existing understanding of the proposed Western Sydney Airport. Online surveys were completed in September 2014, November 2014 and June 2015.	A total of 3,041 community members from Western Sydney and greater Sydney have completed online surveys.
Community newsletters	
Three community newsletters were released during Phase 1. *Newsletter 1* (Summer 2014) was released in November 2014; *Newsletter 2* (Autumn 2015) was released in May 2015; and *Newsletter 3* (Winter 2015) was released in July 2015.	Each edition of the newsletter was distributed to more than 7,500 households in the Western Sydney area.
Fact sheets	
A number of fact sheets were available at all community events as well as online.	Fact sheets available during Phase 1 were: • An airport for Western Sydney; • Western Sydney Infrastructure Plan; • Environmental assessment for Western Sydney airport; and • The right of first refusal.

Activity	Outcome
Website (www. westernsydneyairport.gov.au)	
An online presence has been a vital source of information for the community and stakeholders. In the early stages of the project, a dedicated page was available via the Department of Infrastructure and Regional Development website. A dedicated website was subsequently launched in May. The website is updated regularly with the latest project information.	Over 19,000 visits to the website between May and September 2015.
1800 information line (1800 038 160)	
A project specific free-call phone number was available during Phase 1 for individuals wishing to speak to the project team.	Approximately 225 phone calls were received.
Email (wsu@infrastructure.gov.au)	
A project specific email was established at the start of Phase 1 to receive and respond to project specific queries.	Over 200 emails have been received.
Media releases	
Media releases were issued throughout Phase 1.	11 media releases about the project were issued.
Advertising	
Advertisements were placed in Sydney metropolitan and local newspapers to formally announce the beginning of the exhibition period.	Adverts were placed in the following publications: • Daily Telegraph; • Black town Advocate; • Blue Mountains Gazette; • Camden Advertiser; • Macarthur Chronicle; • Fairfield City Champion; and • Wollondilly.

8.3.1 Stakeholder engagement

Engagement with key stakeholders has been a key component of communication and engagement activities and has been ongoing throughout the development of the Draft EIS and the draft Airport Plan. Consultation with key stakeholders has been a key component of communications and engagement activities, ensuring stakeholders are informed and are able to assist their broader communities in accessing information about the project.

Table 8–2 lists the stakeholders that have been engaged. The table also identifies the consultation undertaken with each stakeholder group.

Table 8–2 – Key stakeholder engagement undertaken during the preparation of the Draft EIS and Airport Plan

Stakeholder group	Stakeholder	Level of consultation
Australian Government	Civil Aviation Safety Authority, including the Office of Airspace Regulation Australian Federal Police Air Services Australia Bureau of Meteorology Department of Infrastructure & Regional Development Department of the Environment Department of Immigration and Border Protection Department of Agriculture Department of Defence	• One-on-one meetings and briefings • Letters • Organisational briefings • Telephone and email communication
NSW Government	Transport for NSW NSW Environment Protection Authority NSW Office of Environment & Heritage NSW Department of Planning & Environment NSW Roads and Maritime Services Sydney Water Corporation NSW Office of Water NSW Rural Fire Services NSW Department of Primary Industries (Fisheries) NSW Department of Trade & Investment NSW Land and Housing Corporation – South Western Sydney, Nepean-Blue Mountains NSW Community Services – Sport and Recreation NSW Fire and Rescue NSW Police NSW Ambulance NSW Health – Local Health Districts (South Western Sydney, Western Sydney, Nepean Blue Mountains) NSW Catholic Schools Office NSW Department of Education and Communities NSW Department of Premier and Cabinet	• One-on-one meetings • Telephone and email communication • Letters • Briefings

Stakeholder group	Stakeholder	Level of consultation
Local government	Auburn City Council Bankstown City Council Blacktown City Council Blue Mountains City Council Camden Council Campbelltown City Council Fairfield City Council Hawkesbury City Council Holroyd City Council Liverpool City Council Parramatta City Council Penrith City Council The Hills Shire Council Wollondilly Shire Council	• One-on-one meetings • Telephone and email communication • Briefings
Other stakeholders	Australian Tourism Export Council Bankstown Airport and Camden Airport Blue Mountains Accommodation and Tourism Association Blue Mountains Lithgow and Oberon Tourism Board of Airline Representatives Australia Bus and Coach Association NSW Infrastructure Partnerships Australia Macarthur Regional Organisation of Councils NSW Business Chamber NSW Land Council Office of Penrith Lakes Penrith City Council Property Council of Australia SITA Australia Sydney International Regatta Centre TAFE NSW Transport and Tourism Forum University of Western Sydney Urban Development Institute of Australia Urban Taskforce Western Sydney Airport Alliance Western Sydney Business Chamber Western Sydney Business Connection Western Sydney Community Forum Western Sydney Parklands Trust Western Sydney Regional Organisation of Councils	• One-on-one meetings • Telephone and email communication • Briefings

In addition to these stakeholders, the Department of Infrastructure and Regional Development has also consulted with other industry participants relevant to an airport development, including airlines, aviation industry groups, airport operators and financiers.

Aboriginal stakeholder consultation

As part of the Aboriginal heritage component of the EIS, Aboriginal stakeholder consultation was undertaken by Navin Officer Heritage Consultants with reference to the NSW Office for Environment and Heritage protocols. The four stages of consultation undertaken between February and August 2015 were:

- Stage 1 – Notification of the project proposal and identification and registration of stakeholders;
- Stage 2 – Presentation of information about the proposed project and the proposed assessment methodology;
- Stage 3 – Gathering information about cultural significance; and
- Stage 4 – Review of draft cultural heritage assessment report.

Overall there were 33 registered stakeholders for the field participation program. For further information refer to Chapter 19 Aboriginal heritage in Volume 2 and Appendix L1 in Volume 4.

8.3.2 Community consultation

Community consultation for the proposed airport began in 2014 and has been an ongoing focus of the project. The key community consultation activities undertaken to date are described below.

Community pop-up stalls

A total of 12 community pop-ups stalls at local events were carried out between February and September 2015. The stalls were designed to provide information about the project to the Western Sydney community and provide an opportunity to engage with the project team. These stalls provided newsletters, factsheets and maps to assist with responses to enquiries. Approximately 2,025 community members approached the stalls for information. Table 8–3 provides a breakdown of the number of community members who approached the stands and discussed the project with the team. Information on issues raised is outlined in Table 8–6.

Table 8–3 – Summary of visits to community pop-up stalls

Location	Date	Number of people who visited the stall
Luddenham Show	21-22 February 2015	225
Blacktown Show	7-8 March 2015	158
Fairfield City Markets	11 April 2015	180
Glenbrook Markets	18 April 2015	230
Picton Markets	3 May 2015	90
Blue Gum Rotary Markets, Faulconbridge	23 May 2015	120

Location	Date	Number of people who visited the stall
Liverpool Night Markets	6 June 2015	113
Blacktown Markets	14 June 2015	407
St Marys and Mt Druitt Rotary Club Market	28 June 2015	72
Cobbitty Village Markets	1 August 2015	430
Penrith Show	29 August 2015	382
St Marys Spring Festival	5 September 2015	670

Western Sydney Infrastructure Plan information sessions

The Western Sydney Infrastructure Plan (WSIP) comprises a number of proposed road projects around the airport site, including:

- upgrade of The Northern Road between Narellan and Jamison Road at South Penrith;
- a new M12 Motorway to the Western Sydney airport site between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham;
- upgrade of Bringelly Road between The Northern Road and Camden Valley Way;
- building the Werrington Arterial Road;
- upgrade of the intersection of Ross Street and the Great Western Highway at Glenbrook; and
- a local road upgrade package.

Table 8–4 summarises the information sessions that were conducted.

Table 8–4 – Summary of WSIP information sessions

Location	Date	Approximate number of enquiries
Penrith Anglican College	22 July 2015	200
Bringelly Community Centre	25 July 2015	200
Holy Family Primary School, Luddenham	29 July 2015	200
Glenmore Park Youth & Community Centre	1 August 2015	60
Kemps Creek Public School	6 August 2015	150
Holy Family Primary School, Luddenham	8 August 2015	115

Survey results

A total of 78 responses to the survey were obtained during the six information sessions. The majority of respondents (49 per cent) were from the Penrith LGA, with 29 per cent from the Wollondilly LGA, six per cent from Liverpool and 16 per cent from other LGAs.

Attitudes to the proposed airport were overall positive, with 46 per cent of respondents definitely supportive and a further 15 per cent conditionally supportive. Twenty per cent of respondents had concerns while 11 per cent were definitely opposed to the proposed airport.

Impacts from noise, local transport connections and local benefits were areas of interest to respondents.

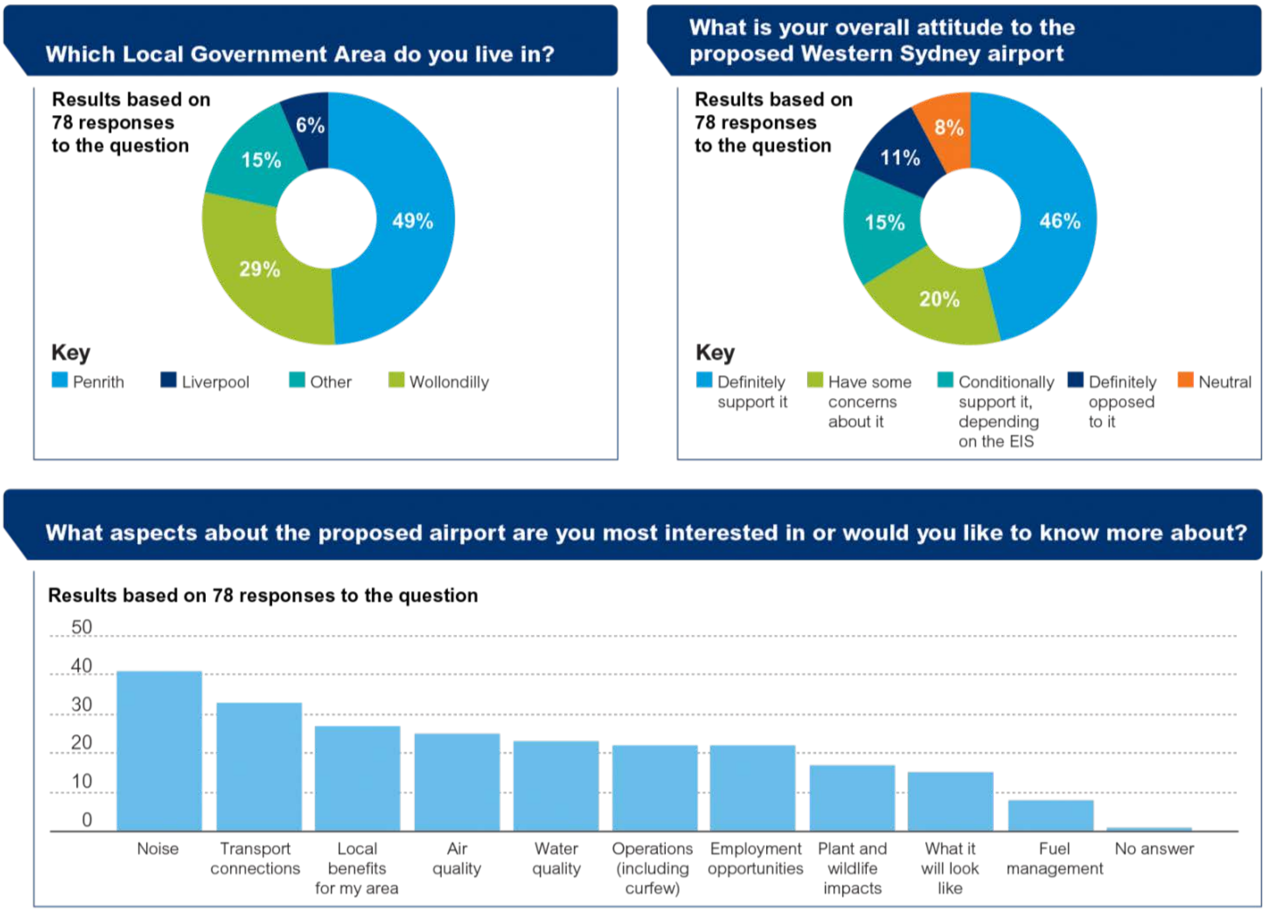


Figure 8–4 – Summary of results from the information session questionnaire

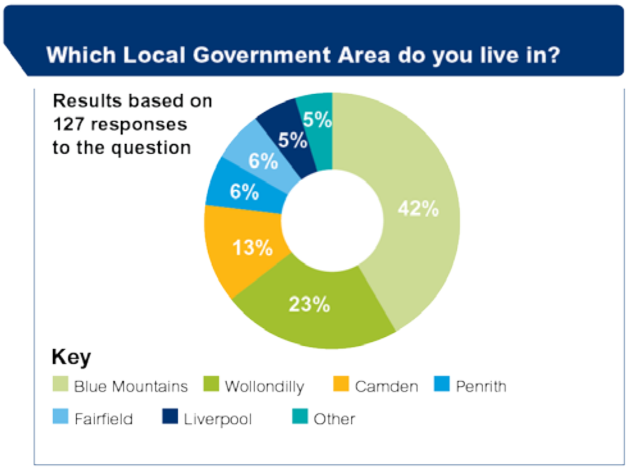
Additional information sessions

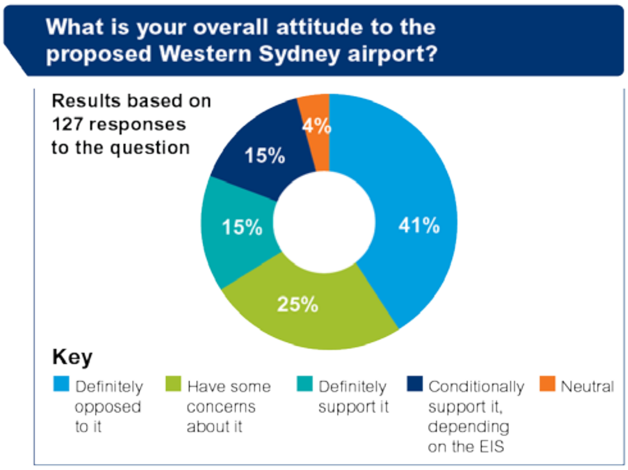
Additional information sessions relating only to the proposed airport were also held during Phase 1. The purpose of these sessions was to increase accessibility to project information in advance of the release of the Draft EIS and Airport Plan, in addition to reaching a broader community than those affected by the WSIP. These information sessions provided the same information as the WSIP information sessions; however, for greater geographic coverage of Western Sydney, they also included areas of the Blue Mountains, Wollondilly, Camden and Fairfield Local Government Areas (LGAs). Details are provided in Table 8–5.

Table 8–5 – Summary of Phase 1 information sessions

Location	Date	Number of enquiries
Blue Mountains Theatre and Community Hub	10 September 2015	74
Narellan Child, Family & Community Centre	12 September 2015	36
Warragamba Town Hall	17 September 2015	69
Horsley Park Hall	19 September 2015	32

Survey results





Community research

Research has been conducted at intervals to understand attitudes towards the proposed Western Sydney Airport and to ensure communication activities were tailored to meet the needs of the community and stakeholders.

Initial online surveys of 2,041 randomly selected and representative participants and 11 focus groups were undertaken in September 2014. Outcomes of the surveys and focus groups were used by the EIS project team to better understand the communication needs of the community and inform the engagement strategies going forward.

A benchmark survey was undertaken in November 2014, with a subsequent survey undertaken in June 2015. These rounds of online surveys were completed by 501 randomly selected Western Sydney residents representative of age, gender and location. The findings on attitudes, concerns and demand for information are summarised in Figure 8–4.

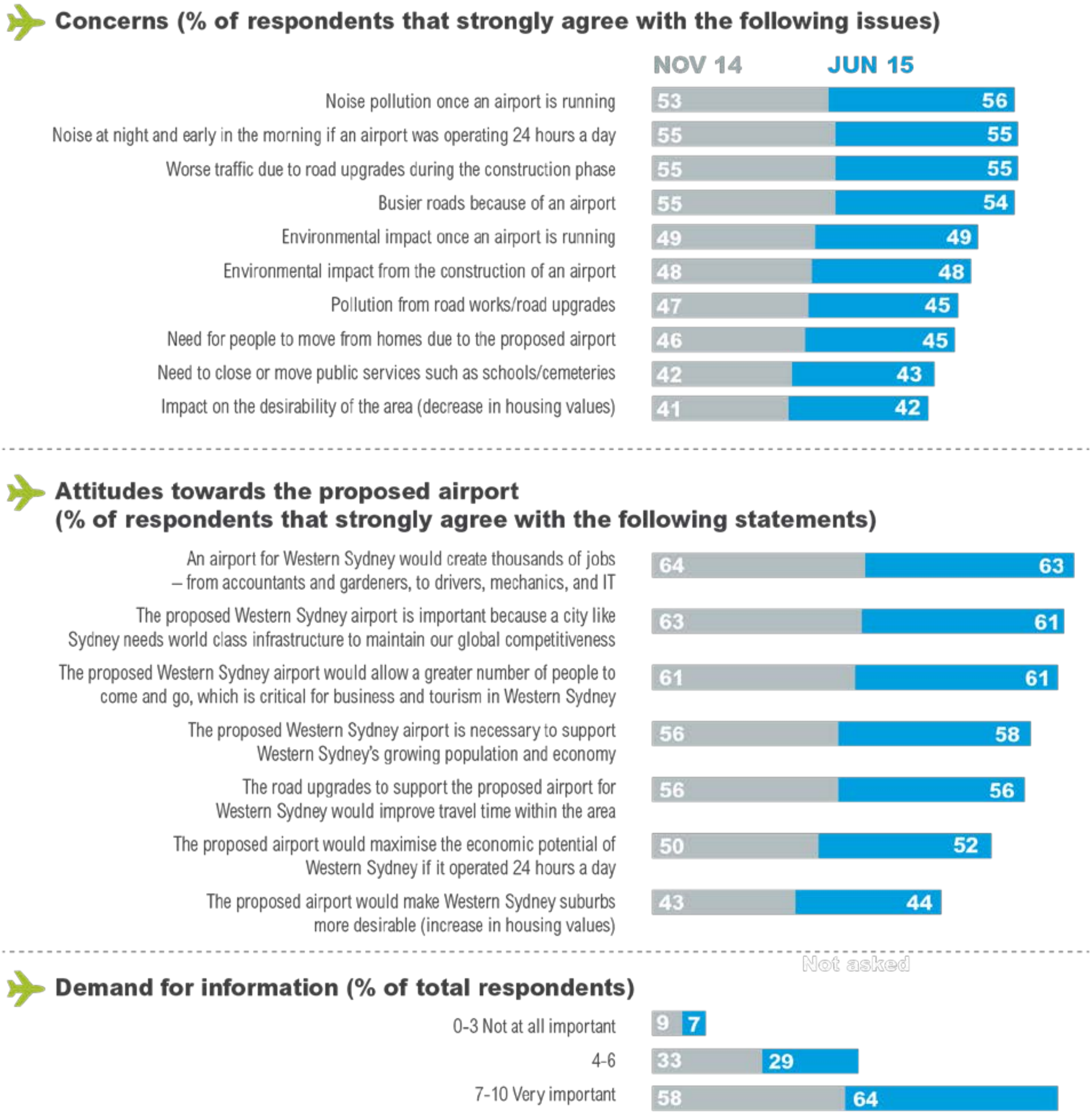


Figure 8–5 – Summary of key community research results from November 2014 and June 2015

8.3.3 Summary of engagement, issues and responses

Community and stakeholder consultation has identified a broad range of key issues. The issues raised by government agencies, authorities, stakeholders and the community are listed in Table 8–6, along with a cross-reference to where they are addressed in the EIS. These issues are listed in order of most enquiries to the fewest.

Table 8–6 – Summary of issues raised and where addressed in the EIS

Category	Issue raised	Response and where addressed in EIS
Noise	Impacts of 24 hour operation	• An airport at Western Sydney has always been planned to operate on a curfew free basis. Planning restrictions have been in place for over 30 years to restrict incompatible development and allow flights to occur with minimal impact on the community. • Aircraft today are about 75 per cent quieter than they were 40 years ago, with the industry continually reducing aircraft noise in line with technology and equipment improvements. • Noise impacts due to airport ground-based operational noise would occur during the daytime and night time and affect dwellings and community infrastructure, particularly in Luddenham, Badgerys Creek, Bringelly, Greendale and Wallacia. • Depending on the operating strategy adopted for WSA, communities that may experience overflight noise at varying levels during the daytime and night time include areas of St Marys and Erskine Park, Greendale, Silverdale, Horsley Park and parts of Blacktown. • More detail of indicative noise modelling and impacts are explained in Chapters 10 and 11.
	Comparison with Sydney (Kingsford Smith) Airport operations	• The size of the Sydney (Kingsford Smith) Airport site means the airport cannot grow sufficiently to support Sydney's long-term aviation needs. It is expected that the number of people flying into the Sydney region will be approximately 87 million by 2035, and double again by 2060. • The proposed Western Sydney airport will meet the growing demand for air services and provide Sydney's growing West with its own airport.
Flight paths	Location and height of flight paths over Western Sydney	• Indicative flight paths have been developed in consultation with Air Services Australia. Final flight paths will be prepared closer to the commencement of airport operations. Further detail on the indicative flight paths is provided in Chapter 7.
Employment opportunities from the proposed airport	Positive economic impact of the proposed airport on Western Sydney	It is expected that there will be a number of benefits from the construction and operation of the proposed Western Sydney airport. During construction in is expected that the benefits will include: • approximately 700-800 additional jobs during peak construction in 2022; • over 3,000 direct jobs between 2017 and 2024 specifically for Western Sydney; • approximately 8,000 indirect and induced jobs between 2017 and 2024 for Western Sydney; and • an additional 2,200 indirect and induced jobs in the greater Sydney metropolitan region. During stage 1 operations it is expected that the proposed Western Sydney Airport will create approximately 7,600 direct jobs. Further detail is provided in Chapter 23 and Appendix P1.

Category	Issue raised	Response and where addressed in EIS
Western Sydney Infrastructure Plan	Impacts on The Northern Road from the Western Sydney Infrastructure Plan	• The Northern Road will be relocated concurrently with site preparation activities. The relocation is subject to detailed planning by Roads and Maritime. Further detail is provided in Chapter 15
	What is the investment in the region for upgrading the roads?	• The Australian and NSW governments are investing more than $3.6 billion in a ten year road investment plan for Western Sydney Further detail is provided in Chapters 15 and 21
	Connectivity with public transport and the CBD	• In the short term it is expected that private transport will be the dominant mode of travel to and from the proposed Western Sydney airport. • In the longer term, an extension of the SWRL to the proposed Western Sydney airport is expected after 2031. A final alignment will be determined in consultation with the New South Wales Government. Further detail is provided in Chapter 15
Transport	Local connections maintained with the closure of Badgerys Creek Road.	• Sections of Badgerys Creek road located within the airport site but outside the construction impact zone for the Stage 1 development would remain in place to maintain access to the airport site and surrounding areas • Roads located within the construction impact zone would be closed and pavement materials removed. Any road closures would be managed in accordance with the requirements of NSW Roads and Maritime Services and Liverpool City Council, and would be subject to the provisions of a traffic management plan that would be prepared as part of the overall environmental management plan for the construction of the proposed airport. Further detail is provided in Chapter 6.
	Impacts of additional traffic in the local area during construction	• During construction it is expected that the distribution and volume of construction traffic would be approximately 160 additional vehicle movements (to and from the airport site) on Elizabeth Drive during the AM peak and 150 additional vehicle movements (to and from the airport site) on Elizabeth Drive during the PM peak. • The types of vehicle movements associated with the construction of the proposed airport would not significantly impact on the surrounding transport system, with the exception of potential oversized vehicle movements required for the delivery of equipment during earthworks. These movements may require temporary road closures or suitable escorts. Further detail is provided in Chapter 15.
Changing face of Western Sydney	Impact on property prices – positive or negative	• Overall no discernible effect on property values as a result of other positive factors which offset the adverse impacts of noise. Further detail is provided in Chapter 23 and Appendix P2.
	Assessment of loss in visual amenity in the area	• It is anticipated that there will be a minor reduction in visual amenity and enjoyment of recreational areas located in Western Sydney e.g. Bents Basin Conservation Area, Burragorang State Conservation Area as well as the Blue Mountains. Further detail is provided in Chapter 23 and Appendix P1.

Category	Issue raised	Response and where addressed in EIS
	Impacts on the current rural lifestyle	• Semi-rural areas of Greendale, Silverdale and Horsley Park will have some impact due to overflight noise at varying levels during the daytime and night time. Further detail is provided in Chapter 23 and Appendix P1.
Operational issues	Location of fuel pipe and storage	• The fuel farm for Stage 1 will be located near the northern boundary of the proposed airport. An underground fuel piping system will connect it to a network of hydrants to be located at aircraft stands and designated hydrants to refuel ground based trucks. • Investigations of an easement for a future fuel pipeline will be undertaken in conjunction with the NSW Government. Further detail is provided in Chapter 5.
	Will the proposed airport accommodate both domestic and international flights?	• In 2031 there is expected to be a total of 170 passenger flights per day, of which 149 flights are assumed to be domestic and 21 are assumed to be international.
	Freight transport to and from the proposed Airport	• It is anticipated that freight transport to and from the proposed airport will be approximately seven heavy movements per hour in 2031. Further detail is provided in Chapter 15.
	Freight aircraft traffic and potential for noise impacts	• Freight noise is assessed with passenger noise. It is anticipated that in 2030 there will be approximately 28 freight movements per day and 104 in the longer term (2063). Further detail is provided in Chapters 7, 10 and 11.
Pollution levels in Western Sydney	Potential for impact on water quality in Warragamba Dam	• Warragamba Dam is located approximately four kilometres west of the site. • The construction of the proposed airport is located within the vicinity of the catchment area for the Warragamba Dam and Prospect Reservoir. There is potential that airborne particles from the airport construction may be deposited in the catchment areas of these two waterbodies. This is unlikely to represent a significant risk to water quality. • It is considered a low risk for potential aircraft emissions to impact the quality of surface water due to the proposed airport. Further detail is provided in Chapter 13

Category	Issue raised	Response and where addressed in EIS
	Assessment of the cumulative impacts of the proposed airport and surrounding projects	• The cumulative impacts of noise, air quality, traffic and transport, biodiversity, water resources, Aboriginal and European heritage, planning and land use, landscape and visual amenity, social, economic, resources and waste and the Greater Blue Mountains World Heritage Area are assessed in the EIS. • The assessment considers the potential cumulative impacts that may arise as a result of the construction and operation of the Western Sydney Airport and other major projects that are scheduled to coincide in the vicinity of the proposed airport site. The chapter identifies key major projects to consider in project planning and key cumulative risks. • The highest risk for cumulative impact is the concurrent upgrade of The Northern Road and Elizabeth Drive which could contribute to construction fatigue for surrounding communities. To manage this risk a high level of coordination would be required between the Department of Infrastructure and Regional Development, Roads and Maritime and relevant construction contractors. • During operations the airport operator and the Department of Infrastructure and Regional Development, will liaise with Airservices Australia, CASA, other nearby airport operators, NSW Government agencies and other key stakeholders to identify measures to reduce operational cumulative impacts. Further detail is provided in Chapter 27.
	Impact of fuel dumping on the local area, including on human health and water quality	• The majority of fuel jettisoning instances for commercial aircraft occurs in rare emergency conditions where an unscheduled landing is required. Where fuel dumping is considered necessary, the pilot is required take all reasonable precautions to ensure the safety of people and property on the groundwater and in the air. • It is considered unlikely that fuel dumping will result in impacts to surface water bodies surrounding the proposed airport site including Warragamba Dam, Prospect Reservoir and private water storages. Further detail is provided in Chapter 13.
Airport process and timing	Timing of the construction and operation of the proposed airport	• It is expected that work on site will commence in 2016. • Operations are expected to commence mid-2020s. Further detail is provided in Chapter 13

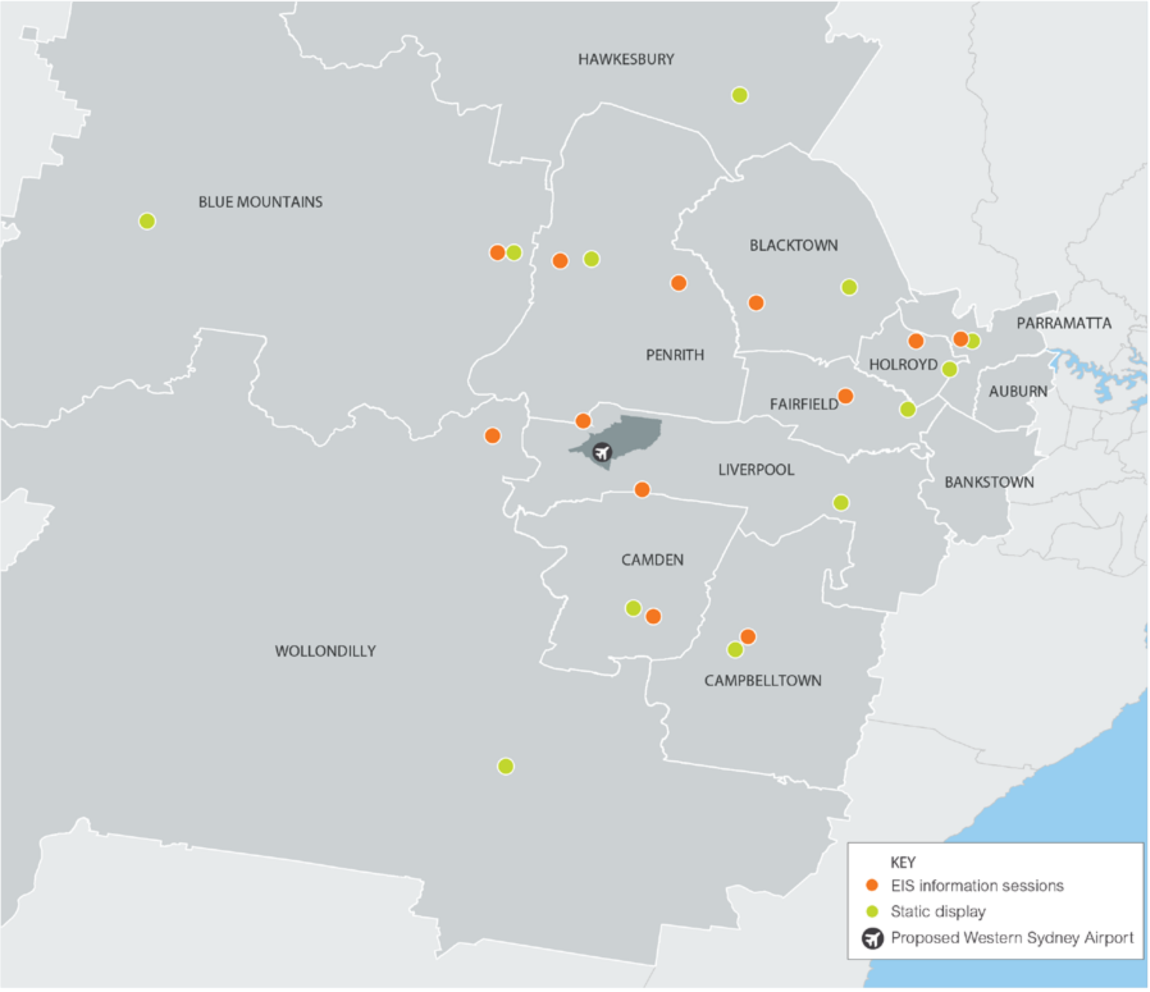
8.4 Phase 2 – draft EIS and draft Airport Plan exhibition

Public exhibition of the draft EIS is required under Commonwealth legislation. Section 103 of the EPBC Act requires the Department of Infrastructure and Regional Development (the proponent) to invite comment on the draft EIS. The draft Airport Plan will also be exhibited alongside the draft EIS

The public exhibition of the draft EIS and the draft Airport Plan will run for a period determined by the Minister for the Environment. During this phase, engagement tasks will focus on providing stakeholders and the community with an understanding of the draft Airport Plan and details about outcomes of the draft EIS through a variety of activities across Western Sydney. The engagement activities will provide the community and stakeholders with the opportunity to talk with the project team and gain an understanding of the proposal.

During the exhibition period, government agencies, interest groups and organisations, stakeholders and the community will be invited to make written submissions to the Department of Infrastructure and Regional Development. A copy of all comments received on the draft EIS will be forwarded to the Department of the Environment.

Information sessions and static displays will be used to increase awareness of the proposal and facilitate the opportunity to comment during the public exhibition phase. The locations of these activities are shown in Figure 8–6.



	LGA	Event type	Location
OCTOBER	Liverpool	EIS information sessions	Holy Family Primary School
	Blue Mountains	EIS information sessions	Blaxland Community Hall
	Penrith	EIS information sessions	St Mary's Memorial Hall
NOVEMBER	Liverpool	EIS information sessions	Bringelly Community Centre
	Campbelltown	EIS information sessions	Campbelltown Civic Hall
	Holroyd	EIS information sessions	Wentworthville Community Centre
	Camden	EIS information sessions	Narellan Child Family Community Centre
	Penrith	EIS information sessions	Melrose Hall
	Parramatta	EIS information sessions	Parramatta Town Hall
	Blacktown	EIS information sessions	Minchinbury Neighbourhood Centre
	Wollondilly	EIS information sessions	Warragamba Town Hall
	Fairfield	EIS information sessions	Prairiewood Community Centre
OCTOBER – DECEMBER	Blacktown	Static display	Max Webber Library
	Blue Mountains	Static display	Katoomba Library
	Blue Mountains	Static display	Springwood Library
	Camden	Static display	Narellan Library
	Campbelltown	Static display	HJ Daley Library
	Fairfield	Static display	Fairfield Library
	Hawkesbury	Static display	Hawkesbury Library Service, Deerubbin Centre
	Holroyd	Static display	Merrylands Central Library
	Liverpool	Static display	Liverpool City Library
	Liverpool	Static display	Green Valley Library
	Parramatta	Static display	Parramatta City Library
	Penrith	Static display	Penrith City Library
	Wollondilly	Static display	Wollondilly Library
	Sydney	Static display	City of Sydney Library

Figure 8–6 – Summary of community consultation activities between October and December 2015

8.4.1 Stakeholder and community engagement programme

Activities to facilitate access to the draft EIS and the draft Airport Plan during the exhibition period are summarised in Table 8–7.

Table 8–7 – Proposed community activities during draft EIS and draft Airport Plan exhibition

Activity	Detail
Events	
Community events (12)	The project team will visit 12 venues across Western Sydney to provide an opportunity for the community to review the draft EIS and draft Airport Plan and speak to a member of the project team. These venues are outlined in Figure 8–6.
Static displays at 14 local libraries throughout Western Sydney	The draft EIS and draft Airport Plan will be available for review at 14 libraries throughout western Sydney as well as one in the City of Sydney main library. Refer to Figure 8–6 for details. Details of these displays will be available on the westernsydneyairport.gov.au website.
Noise modelling tool	A web-based mapping tool that will provide aircraft noise information by allowing the community to access information about indicative noise exposure at a specific address.
Collateral	
EIS summary document	A plain English EIS summary has been developed for stakeholders and the community. It will be available at community events hosted by the Department of Infrastructure and Regional Development, online and at static display locations.
Fact sheets	Fact sheets have been developed on the following key topics to assist in the explanation of the outcomes of the draft EIS and the draft Airport Plan: • An Airport for Western Sydney; • Draft Airport Plan and draft Environmental Impact Statement; • Air quality; • Greater Blue Mountains World Heritage Area; • Biodiversity, water and heritage; • Health risk assessment; • Managing aircraft noise; • Social and economic benefits; and • Traffic, transport and access.

Activity	Detail
Postcard	A postcard will be used to inform the broader community of the exhibition of the draft EIS and draft Airport Plan, and the many opportunities to engage with the project. The postcard will be delivered to approximately 480,000 residential properties in the following local government areas: • Camden; • Penrith; • Blacktown; • Liverpool; • Wollondilly; • Campbelltown; • Blue Mountains; • Fairfield; • Parramatta; and • Holroyd.
Community newsletter	A detailed community newsletter (*Newsletter 4 Spring 2015*) was released to coincide with the release of the draft Airport Plan and draft EIS. The newsletter will be delivered to approximately 7,500 residential properties in the surrounding suburbs to the proposed Western Sydney airport. The suburbs for delivery include: • Badgerys Creek; • Luddenham; • Wallacia; • Greendale; • Bringelly; • Rossmore; • Kemps Creek; • Horsley Park; and • Erskine Park.
Newspaper advertisement	Advertisements will be placed in major Sydney, local and multicultural newspapers during the exhibition period. The advertisements will provide details of the draft EIS and draft Airport Plan exhibition activities.
Frequently asked questions leaflet	A document of frequently asked questions is available on the website. It provides a list of questions with answers from the draft EIS and draft Airport Plan.
Monitoring	
Website content and update	The westernsydneyairport.gov.au site will be updated with current information including the draft EIS, draft Airport Plan, summary booklet, fact sheets, newsletter and question and answer document, along with details of opportunities to be involved in the draft EIS and draft Airport Plan exhibition.
Monitoring the project email and 1800 number	The project team will continue to monitor emails and calls during the exhibition period and will provide responses to questions.

8.5 Phase 3 – assessment and determination

During Phase 3, the project team will collate and sort all submissions received via mail, email, online and the online mapping tool. The issues raised will be addressed in the final EIS and published. The Department of Infrastructure and Regional Development will keep the community and stakeholders informed about the project.

A *Community and Stakeholder Engagement Plan* to support Phase 3 will be developed. This plan will provide detail on the release of the finalised EIS, including how information on any outstanding environmental concerns from stakeholders, which were addressed in the finalised EIS, will be communicated. It will also detail further consultation to be undertaken during the pre-construction and construction stages to ensure that stakeholders are kept informed of upcoming activities.

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